

Building a contemporary model for integrating digital technologies to improve mental health services and wellbeing in public healthcare system in Nigeria

Olubunmi Yemisi Fashoto (22279284)

Thesis submitted in fulfilment of the requirements for the Philosophiae Doctor
in Health Sciences in the Faculty of Health Sciences at the Durban University
of Technology

Supervisor : Prof M. N. Sibiya

Co-supervisor : Dr O. Oladimeji

Date : October 2023

Declaration

This is to certify that the work is entirely my own and not of any other person, unless explicitly acknowledged (including citation of published and unpublished sources). The work has not previously been submitted in any form to the Durban University of Technology or to any other institution for assessment or for any other purpose.

Signature of student _____

26 October 2023

Date

Approved for final submission

Prof M. N. Sibiya
RN, RM, D Tech: Nursing

26 October 2023

Date

Dr O. Oladimeji
PhD

26 October 2023

Date

Abstract

Background

The world is constantly experiencing the outbreak of infectious diseases, social unrest and insurgencies in some areas. The World Health Organization (WHO), together with other regulatory authorities, imposed movement restrictions (locally, regionally and internationally) and other preventative measures to alleviate the catastrophic impact of the coronavirus disease (COVID-19). The practice of using digital health technologies to provide mental health services has been generally abysmal; however, with the lockdown and restrictions of movement and physical meetings, it became necessary to adapt and utilize available digital technologies to provide mental health services. Meanwhile, prior to the COVID-19 lockdown in most African countries, mental healthcare services were basically provided through physical meetings of patients with their therapists and psychiatrists for various therapeutic and medical care services. The introduction of digital technology to mental health services presents unprecedented opportunities to provide mental health care services remotely to the affected populace. Advancement in information and communication technology is positively changing the way people interact and accomplish tasks across almost every sector of human endeavour and particularly, the health sector. This can circumvent existing delays in accessing mental health services, and the shortage of healthcare professionals, while supporting remote counselling and consultation and improving timely mental health care response between doctors and patients in case of social distancing measures. This is crucial for Nigeria, and other low- and middle-income countries, in order to manage and mitigate the emerging public mental health crisis caused by the outbreak of infectious diseases, social unrests and insurgencies.

Aim

The aim of this study was to develop a contemporary model for integrating digital health technologies to improve mental health services and wellbeing in the public healthcare system.

Methodology

The study was guided by two theoretical frameworks; the Health Belief Model (HBM) and Unified Theory of Acceptance and Use of Technology (UTAUT) model. The study adopted mixed-method convergent design to gain participants' viewpoints on the study. A purposive sampling technique employing the snowball method was utilized in selecting participants for qualitative study, while the proportional stratified sampling method utilizing probability proportion to size (PPS) technique was adopted in selecting participants for the quantitative study to increase the chances of equal representation. Questionnaires were distributed to three hundred and seventeen (317) Healthcare professionals, selected from four psychiatric Hospitals in South-West Nigeria. A total of 16 participants from the four selected psychiatric hospitals participated in the interview. Descriptive analysis and Structural Equation Modelling (SEM) were computed on quantitative data while thematic analysis was employed to analyse qualitative data in the formulation of themes and sub-themes. The result from both analyses was triangulated to provide an overall picture of the study.

Findings

The study found several challenges with the provision of adequate and efficient services in public mental healthcare facilities in Nigeria, such as human resource challenges, brain drain, lack of infrastructure and strains on Healthcare professionals (HCPs). Findings from the study indicated that digital technologies are sparingly utilized in public mental healthcare service delivery due to lack of policy and framework. HCPs perceive digital technologies to be beneficial to themselves and their clients. The highlighted benefit to patients reduces levels of stigmatization, decreases the financial burden, enhances

easy accessibility to therapists, strengthens adherence, mitigates relapse incidences and improves timely intervention. However, HCPs are concerned that the integration of digital technologies with mental health service delivery may prompt unwanted access, compromise patient data security and also, erratic power supply and network challenges could hamper smooth online therapy sessions. However, the integration of digital technologies in public healthcare can improve the delivery of mental health services remotely, on a wide scale, and most importantly can mitigate the impact of pandemic outbreaks and other health emergencies.

Conclusion

Findings from the study showed HCPs' knowledge, perception of digital tools, challenges and barriers to the adoption and utilization of digital tools. The findings aid the development of a model that integrates digital technologies into public mental healthcare to improve service delivery in Nigeria. Transition from traditional/conventional space of mental healthcare service delivery to digital space requires a collaborative approach with Computer scientists (i.e. software developers and database administrators), Data scientists, investors, stakeholders and mental healthcare professionals. The proposed model serves as a contemporary framework that Government, policy makers in the Ministry of Health and Management of mental health facilities in Nigeria can adopt which will provide the needed awareness of the benefit of technological intervention. Furthermore, the model can be utilized to revise the existing policies and Standard Operating Procedures in public mental health sector.

Key words

Mental Health, Wellbeing, Digital Technologies, HCPs

Dedication

This research is dedicated to my late mother, Omorinola Beatrice Olabodu. You taught me resilience, patience and perseverance and I am grateful for your impact in my life, LOVE YOU MUM. To my darling husband Dr Stephen Gbenga Fashoto and my lovely children Ayomide and Ayomikun, thank you so much for your encouragement, support and believing in me.

Acknowledgements

Praise is the gratitude I bring to you my Maker and Redeemer, the Giver of Life. Thank you, Jesus for grace, mercy, wisdom, understanding, strength and direction. All I can say is THANK YOU JESUS.

- My heartfelt appreciation goes to my supervisor, Prof Nokuthula Sibiya, for your immense contribution, guidance and support during the course of this study. Prof. your kind words and encouragements gave me courage. I do not think these words convey how grateful I am, thank you Prof.
- My appreciation to my co-supervisor, Prof Olanrewaju Oladimeji for your support and contributions. Thank you so much sir.
- To my siblings, nephews and nieces, in-laws and my spiritual parent, Pastor and Mrs Aderopo Adedoyin, I want to thank you for your encouragement and constant prayers.
- My gratitude goes to Dr Yinusa Faremi, Saheed Faremi, Dr Ugwunnadi family, Dr Olamijuwon Emmanuel, Dr Mbunge family, Nompumelelo Shongwe, Racheal Oguntade, Dr Murye family especially Rejoice, David and Poni for immerse encouragement and support.
- To my research assistants especially Mr Iniongun Joseph Ayangeaor, thank you very much for the huge support and assistance.
- I also want to appreciate the Chief Medical Directors and staff of the four Neuropsychiatric Hospitals utilized in this study, thank you so much for your cooperation and assistance.
- My appreciation goes to Durban University of Technology (DUT) for this great opportunity to advance my career. I am forever grateful for this opportunity.

Table of Contents

Declaration	ii
Abstract	iii
Acknowledgements	vii
Table of Contents	viii
List of Tables	xviii
List of Figures	xix
List of Appendices	xxi
Glossary of Terms	xxii
List of Acronyms	xxvi
CHAPTER 1: OVERVIEW OF THE STUDY	1
1.1 INTRODUCTION	1
1.2 BACKGROUND TO THE STUDY	2
1.3 PROBLEM STATEMENT	5
1.4 AIM OF THE STUDY	7
1.5 OBJECTIVES OF THE STUDY	7
1.6 RESEARCH QUESTION	7
1.7 SIGNIFICANCE OF THE STUDY	8
1.8 STRUCTURE OF THE THESIS	9
1.9 SUMMARY OF CHAPTER	10
CHAPTER 2: LITERATURE REVIEW	12
2.1 INTRODUCTION	12
2.2 SOURCES OF LITERATURE REVIEWED	12
2.3 GLOBAL VIEW ON DIGITAL TECHNOLOGY AND MENTAL HEALTH	12
2.4 CONTEXT IN AFRICA ON DIGITAL TECHNOLOGY AND MENTAL HEALTH	15
2.5 CONTEXT IN SOUTH AFRICA ON DIGITAL TECHNOLOGY AND MENTAL HEALTH	17

2.6	CONTEXT IN NIGERIA ON DIGITAL TECHNOLOGY AND MENTAL HEALTH	19
2.7	WORLD HEALTH ORGANIZATION'S POLICIES ON DIGITAL TECHNOLOGIES IN HEALTHCARE IN NIGERIA	21
2.8	MENTAL HEALTH FRAMEWORK	22
2.9	SUMMARY OF THE CHAPTER	24
CHAPTER 3: THEORETICAL FRAMEWORK		25
3.1	INTRODUCTION	25
3.2	THEORETICAL FRAMEWORKS THAT GUIDE THIS STUDY	25
3.2.1	Health Belief Model (HBM)	25
3.2.2	Unified Theory of Acceptance and Use of Technology (UTAUT) Model	26
3.3	CONSTRUCT OF THE HEALTH BELIEF MODEL (HBM).....	27
3.3.1	Perceived Seriousness.....	27
3.3.2	Perceived Susceptibility.....	27
3.3.3	Perceived Benefits.....	28
3.3.4	Perceived Barriers	28
3.3.5	Modifying Variables	28
3.3.6	Cues of Action	29
3.3.7	Self-Efficacy.....	29
3.4	CONSTRUCT OF UNIFIED THEORY OF ACCEPTANCE AND USE OF TECHNOLOGY (UTAUT) MODEL.....	30
3.4.1	Performance Expectancy.....	30
3.4.2	Effort Expectancy	31
3.4.3	Social Influence	31
3.4.4	Facilitating Conditions.....	31
3.5	THEORETICAL FRAMEWORK AND MODEL DEVELOPMENT	32
3.6	INTEGRATION OF UTAUT AND HBM MODEL	35

3.7	SUMMARY OF THE CHAPTER	36
CHAPTER 4: RESEARCH DESIGN AND METHODOLOGY		37
4.1	INTRODUCTION	37
4.2	RESEARCH DESIGN	37
4.3	RESEARCH PARADIGM.....	39
4.4	SETTING	41
4.4.1	Lagos State	42
4.4.2	Ogun State	42
4.4.3	Ondo State	43
4.4.4	Oyo State.....	43
4.5	STUDY POPULATION	44
4.5.1	Inclusion criteria.....	44
4.5.2	Exclusion criteria	45
4.6	SAMPLING PROCESS.....	45
4.6.1	Sampling technique(s) and sample size	45
4.7	DATA COLLECTION PROCESS.....	49
4.7.1	Qualitative study	49
4.7.2	Quantitative study.....	50
4.8	PRE-TESTING OF THE DATA COLLECTION TOOLS	51
4.9	DATA ANALYSIS.....	53
4.9.1	Qualitative Study	53
4.9.2	Quantitative Study	54
4.9.3	Triangulation.....	54
4.10	TRUSTWORTHINESS	55
4.10.1	Credibility.....	55

4.10.2	Dependability.....	56
4.10.3	Confirmability.....	56
4.10.4	Transferability.....	57
4.10.5	Authenticity.....	58
4.11	Research Rigour.....	58
4.11.1	Reliability.....	59
4.12	ETHICAL CONSIDERATIONS	60
4.13	SUMMARY OF THE CHAPTER	61
CHAPTER 5: PRESENTATION OF FINDINGS FROM THE QUALITATIVE DATA		62
5.1	INTRODUCTION	62
5.2	PRESENTATION OF RESULTS	63
5.3	FACTORS AFFECTING THE PROVISION OF MENTAL HEALTH SERVICES AND WELLBEING IN PUBLIC HEALTHCARE.....	66
5.3.1	Theme 1: Human resource challenges.....	66
5.3.2	Theme 2: Poor infrastructure.....	70
5.4	DIGITAL TECHNOLOGIES THAT COULD BE EFFECTIVELY UTILIZED TO PROVIDE MENTAL HEALTHCARE SERVICES AND WELLBEING IN PUBLIC HEALTHCARE DURING NATURAL DISASTERS AND HEALTH EMERGENCIES	73
5.4.1	Theme 1: Knowledge on Digital technologies.....	73
5.4.2	Theme 2: Digital technologies used.....	74
5.4.3	Theme 3: Benefits of digital tools for mental health service provision ..	77
5.5	EXPLORE PERCEPTIONS OF HEALTH WORKERS TOWARDS THE UTILIZATION OF DIGITAL TECHNOLOGIES TO IMPROVE MENTAL HEALTHCARE SERVICE	83
5.5.1	Theme 1: Perception of digital tools	83

5.5.2	Theme 2: Emerging operational issues	86
5.6	BARRIERS AND CHALLENGES IMPEDING THE PROVISION OF MENTAL HEALTHCARE SERVICES AND WELLBEING THROUGH DIGITAL TECHNOLOGIES	88
5.6.1	Theme 1: Financial challenges	89
5.6.2	Theme 2: Technological concerns	90
5.7	SUMMARY OF THE CHAPTER	93
CHAPTER 6: PRESENTATION OF RESULTS FROM QUANTITATIVE DATA		94
6.1	INTRODUCTION	94
6.2	RESPONSE RATE	94
6.3	SECTION A: DEMOGRAPHIC DATA	96
6.3.1	Gender	96
6.3.2	Age	97
6.3.3	Area of Specialization	98
6.3.4	Years of Experience	98
6.3.5	Number of hours of meeting clients per week	99
6.3.6	Use of digital technology with Clients	100
6.3.7	Digital technology tools used with clients	100
6.3.8	Pearson Chi-Square Analysis	101
6.4	SECTION B: DIGITAL TECHNOLOGIES THAT COULD BE EFFECTIVELY UTILIZED TO PROVIDE MENTAL HEALTHCARE SERVICES AND WELLBEING IN PUBLIC HEALTHCARE DURING NATURAL DISASTERS AND HEALTH EMERGENCIES	102
6.5	SECTION C: PERCEPTIONS OF HEALTH WORKERS TOWARDS THE UTILIZATION OF DIGITAL TECHNOLOGIES TO IMPROVE MENTAL HEALTHCARE SERVICES	104

6.6	SECTION D: BARRIERS AND CHALLENGES IMPEDING THE PROVISION OF MENTAL HEALTHCARE SERVICES AND WELLBEING THROUGH DIGITAL TECHNOLOGIES	108
6.7	SECTION E: FACTORS AFFECTING THE PROVISION OF MENTAL HEALTH SERVICES AND WELLBEING IN PUBLIC HEALTHCARE.....	110
6.8	STRUCTURAL EQUATION MODELLING (SEM).....	112
6.8.1	UTAUT Model Analysis.....	113
6.8.2	Modified UTAUT Model	131
6.8.3	HBM Model Analysis	143
6.8.4	Modified HBM Model	161
6.9	SUMMARY OF THE CHAPTER	175
CHAPTER 7: INTEGRATION OF THE RESULTS FROM QUALITATIVE AND QUANTITATIVE DATA.....		176
7.1	INTRODUCTION	176
7.2	INTERPRETATION OF THE INTEGRATED FINDINGS	177
7.3	FACTORS AFFECTING THE PROVISION OF MENTAL HEALTH SERVICES AND WELLBEING IN PUBLIC HEALTHCARE.....	178
7.3.1	Human resource challenges	178
7.3.2	Poor infrastructure	181
7.4	DIGITAL TECHNOLOGIES THAT COULD BE EFFECTIVELY UTILIZED TO PROVIDE MENTAL HEALTHCARE SERVICES DURING HEALTH EMERGENCIES	182
7.4.1	Knowledge on digital technologies	183
7.4.2	Digital technologies used	184
7.4.3	Benefits of digital technologies for mental health service provision	185

7.5 PERCEPTIONS OF HEALTH WORKERS TOWARDS THE UTILIZATION OF DIGITAL TECHNOLOGIES TO IMPROVE MENTAL HEALTHCARE SERVICES	188
7.5.1 Perception of digital tools.....	188
7.5.2 Emerging operational issues	191
7.6 BARRIERS AND CHALLENGES IMPEDING THE PROVISION OF MENTAL HEALTHCARE SERVICES AND WELLBEING THROUGH DIGITAL TECHNOLOGIES	193
7.6.1 Financial challenges	193
7.6.2 Technological concerns	195
7.7 SUMMARY OF THE CHAPTER	197
CHAPTER 8: DISCUSSION OF FINDINGS.....	198
8.1 INTRODUCTION	198
8.2 FACTORS AFFECTING THE PROVISION OF MENTAL HEALTH SERVICES AND WELLBEING IN PUBLIC HEALTHCARE.....	199
8.2.1 Human resource challenges	199
8.3 DIGITAL TECHNOLOGIES THAT COULD BE EFFECTIVELY UTILIZED TO PROVIDE MENTAL HEALTHCARE SERVICES DURING HEALTH EMERGENCIES	204
8.3.1 Knowledge of digital technologies	204
8.3.2 Digital technologies used.....	205
8.3.3 Benefits of digital technologies for mental health service provision	206
8.4 PERCEPTIONS OF HEALTH WORKERS TOWARDS THE UTILIZATION OF DIGITAL TECHNOLOGIES TO IMPROVE MENTAL HEALTHCARE SERVICES	210
8.4.1 Perception of digital tools.....	210

8.4.2	Emerging operational issues	213
8.5	BARRIERS AND CHALLENGES IMPEDING THE PROVISION OF MENTAL HEALTHCARE SERVICES AND WELLBEING THROUGH DIGITAL TECHNOLOGIES	215
8.5.1	Financial challenges	215
8.5.2	Technological concerns	217
8.6	SUMMARY OF THE CHAPTER	220
CHAPTER 9: A CONTEMPORARY MODEL FOR INTEGRATING DIGITAL TECHNOLOGIES TO IMPROVE MENTAL HEALTH SERVICES AND WELLBEING IN PUBLIC HEALTHCARE.....		221
9.1	INTRODUCTION	221
9.2	INTEGRATION OF UTAUT AND HBM MODEL	221
9.3	RESULTS OF THE INTEGRATED UTAUT AND HBM MODEL (UTAUT-HBM)	222
9.3.1	Reflective Measurement Model	222
9.3.2	Variation inflation factor for collinearity statistics	224
9.3.3	Discriminant validity	227
9.3.4	UTAUT-HBM Model Fit.....	228
9.3.5	Path Analysis.....	228
9.4	OPERATIONAL MODEL IN PUBLIC MENTAL HEALTHCARE IN NIGERIA 232	
9.5	PROPOSED MODEL INTEGRATING DIGITAL TECHNOLOGIES INTO PUBLIC MENTAL HEALTHCARE IN NIGERIA	238
9.5.1	Purpose of the Model	238
9.5.2	Development of the Proposed Model	238
9.5.3	Description of the Model Integrating Digital Technologies into Mental Healthcare Service Delivery in public healthcare facilities in Nigeria	244

9.6 SUMMARY OF THE CHAPTER	249
CHAPTER 10: SUMMARY, LIMITATIONS, RECOMMENDATIONS AND CONCLUDING REMARKS OF THE STUDY	250
10.1 INTRODUCTION	250
10.2 SUMMARY OF THE STUDY	250
10.3 LIMITATIONS	253
10.4 RECOMMENDATIONS	253
10.4.1 Federal Government.....	254
10.4.2 Management.....	255
10.4.3 Future research	256
10.5 CONCLUDING REMARKS	256
REFERENCES.....	258
APPENDICES	291
Appendix 1: University Ethics clearance.....	291
Appendix 2a: Letter of request for permission from Neuropsychiatric Hospital Akure	292
Appendix 2b: Approval letter from Neuropsychiatric Hospital Akure	293
Appendix 3a: Letter of request for permission from ARO Neuropsychiatric Hospital.....	294
Appendix 3b: Approval letter from ARO Neuropsychiatric Hospital	295
Appendix 4a: Letter of request for permission from University of Ibadan Teaching Hospital.....	296
Appendix 4b: Approval letter from University of Ibadan Teaching Hospital	297
Appendix 5a: Letter of request for permission from Yaba Neuropsychiatric Hospital.....	298
Appendix 5b: Approval letter from Yaba Neuropsychiatric Hospital	299
Appendix 6a: Letter of information for survey participants	300
Appendix 6b: A letter of information for interview participants	304
Appendix 7: Consent	308

Appendix 8a: Demographic data for the interview participants	310
Appendix 8b: Interview guide	311
Appendix 9: Questionnaire	314
Appendix 10: Ethics Training Certificate	322
Appendix 11: Sample of the interview transcript	323
Appendix 12: Letter from the statistician	330
Appendix 13: Letter from the professional editor	331
Appendix 14: Turnitin Report	332

List of Tables

Table 4.1: The total population of HCPs at the four selected psychiatric hospitals ..	47
Table 5.1: Coding of qualitative participants.....	63
Table 5.2: Summary of Themes and Subthemes Identified.....	65
Table 6.1: Presentation of HCPs response for each facility (n=317)	95
Table 6.2: Use of Digital Technology with clients	100
Table 6.3: The frequencies and percentages of digital technology respondents adopted.....	100
Table 6.4: The descriptive statistics for effective digital technologies that could be utilized to provide mental healthcare services and wellbeing.....	103
Table 6.5: Percentages on Perception of mental workers towards the utilization of digital technologies to improve mental health care services	105
Table 6.6: The analysis of the barriers to the provision of mental healthcare services and wellbeing through digital technologies	108
Table 6.7: The analysis of factors affecting the provision of mental health services and wellbeing in public healthcare	111
Table 6.8: Construct Reliability and Validity (First Stage Factor Analysis)	116
Table 6.9: Result from Variation Inflation Factor (first stage)	117
Table 6.10: Heterotrait-Monotrait ratio (HTMT) – Matrix (first stage).....	119
Table 6.11: Hypothesis testing first stage.....	122
Table 6.12: Construct Reliability and Validity (Second Stage Factor Analysis)	125
Table 6.13: Result from Variation Inflation Factor (Second Stage)	125
Table 6.14: Heterotrait-Monotrait ratio (HTMT) – Matrix (second stage).....	127
Table 6.15: Hypothesis testing for second stage.....	130
Table 6.16: Construct Reliability and Validity (Factor Analysis)	135
Table 6.17: Result from Variation Inflation Factor	136
Table 6.18: Heterotrait-Monotrait ratio (HTMT) – Matrix.....	137
Table 6.19: MH-UTAUT Hypothesis testing	138
Table 6.20: Construct reliability and validity (First stage factor analysis)	146
Table 6.21: Result from Variation Inflation Factor (First Stage).....	147
Table 6.22: Heterotrait-Monotrait ratio (HTMT) – Matrix (first stage).....	149

Table 6.23: Hypothesis testing first stage.....	152
Table 6.24: Construct Reliability and Validity (Second Stage Factor Analysis)	155
Table 6.25: Result from Variation Inflation Factor (Second Stage)	155
Table 6.26: Heterotrait-Monotrait ratio (HTMT) – Matrix (second stage).....	157
Table 6.27: Hypothesis testing second stage	160
Table 6.28: MMH-HBM Construct Reliability and Validity (Factor Analysis).....	165
Table 6.29: Result from Variation Inflation Factor	166
Table 6.30: Heterotrait-Monotrait ratio (HTMT) – Matrix.....	167
Table 6.31: MMH-HBM model Hypothesis testing.....	169
Table 9.1: construct reliability and validity for all UTAUT-HBM variables (n=317)..	224
Table 9.2: Result of UTAUT-HBM model from Variation Inflation Factor.....	225
Table 9.3: Heterotrait-Monotrait ratio (HTMT) – Matrix.....	227
Table 9.4: UTAUT-HBM model hypothesis testing	231

List of Figures

Figure 3.1. Health Belief Model (HBM) (Janz and Becker 1984)	30
Figure 3.2. The Unified Theory of Acceptance and Use of Technology (UTAUT) Model (Vankatesh <i>et al.</i> 2003)	32
Figure 4.1. Mixed method convergent design (Creswell and Plano Clark 2017).....	38
Figure 4.2. Map of Nigeria showing Study Setting (Oladehinde <i>et al.</i> 2018: 46).....	44
Figure 6.1: Chart showing gender distribution of respondents.....	96
Figure 6.2: Chart showing the age distribution of respondents	97
Figure 6.3: Chart showing the area of specialization of respondents.....	98
Figure 6.4: Graph showing the years of experience of respondents	98
Figure 6.5: Graph showing the number of hours respondents meets clients per week.....	99
Figure 6.6: First stage UTAUT Model using factor analysis	115
Figure 6.7: UTAUT Model path analysis for first stage	121
Figure 6.8: Second stage UTAUT Model using factor analysis	124
Figure 6.9: UTAUT Model path analysis for second stage.....	129
Figure 6.10: Factor analysis of the MH-UTAUT model	134
Figure 6.11: MMH-UTAUT MODEL PATH ANALYSIS	138
Figure 6.12: First stage HBM Model using factor analysis	145
Figure 6.13: HBM Model path analysis for first stage	151
Figure 6.14: Second stage HBM Model using factor analysis	154
Figure 6.15: HBM Model path analysis for second stage.....	159
Figure 6.16: MMH-HBM MODEL USING FACTOR ANALYSIS.....	164
Figure 6.17: MMH-HBM MODEL PATH ANALYSIS	169
Figure 7.1: Triangulation of qualitative and quantitative data (Adapted from Creswell and Plano Clark 2017).....	176
Figure 9.1: UTAUT-HBM Model using factor analysis	223
Figure 9.2: UTAUT-HBM Model path analysis	230
Figure 9.3: Operating Procedure (Adapted from Yaba and Akure Neuropsychiatric hospitals)	237
Figure 9.4 Proposed contemporary model adapted from Dickoff <i>et al.</i> (1968: 575).....	243

Figure 9.5: Proposed operational pathways Integrating Digital Technologies into Public
Mental Healthcare in Nigeria 249

List of Appendices

Appendix	Page
Appendix 1: University Ethics clearance	270
Appendix 2a: Letter of request for permission to Neuropsychiatric Hospital Akure, Ondo State	271
Appendix 2b: Approval letter from Neuropsychiatric Hospital Akure, Ondo State	272
Appendix 3a: Letter of request for permission to Neuropsychiatric Hospital ARO, Ogun State	273
Appendix 3b: Approval letter from Neuropsychiatric Hospital ARO, Ogun State	274
Appendix 4a: Letter of request for permission to University of Ibadan Teaching Hospital, Ibadan, Oyo State	275
Appendix 4b: Approval letter from the University of Ibadan Teaching Hospital, Ibadan, Oyo State	276
Appendix 5a: Letter of request for permission to Yaba Neuropsychiatric Hospital, Lagos State	277
Appendix 5b: Approval letter from the Yaba Neuropsychiatric Hospital, Lagos State	278
Appendix 6a: Letter of information for survey participants	279
Appendix 6b: A letter of information for interview participants	283
Appendix 7: Consent	287
Appendix 8a: Demographic data for the interview participants	289
Appendix 8b: Interview guide	290
Appendix 9: Questionnaire	293
Appendix 10: Ethics Training Certificate	301
Appendix 11: Sample of the interview transcript	302
Appendix 12: Letter from the statistician	309
Appendix 13: Letter from the professional editor	310

Glossary of Terms

Mental health: it is “a state of well-being in which the individual realizes his or her own abilities, can cope with the normal stresses of life, can work productively and fruitfully, and can contribute to his or her community” (WHO 2014).

Wellbeing: Well-being is the ability to refine one’s perspective in the face of new circumstances (Langer 2005: 214).

COVID-19: An acute respiratory infection caused by the exposure to SAR-CoV-2 virus (Olufadewa *et al.* 2020: 51).

Digital Technologies: technology is defined as “the use of computing devices to create, save, process, disseminate and display information which includes but not limited to mobile phones, television, radio, computers” etc. (Rice 2003: 72).

Teleconferencing: is the utilization of virtual platforms such as video and telephone platforms for case discussion hospital visitation (Perrone *et al.* 2020).

Telemedicine: is a digital application based that remotely monitor patients, provide consultation, check-up and diagnosis (Bellemo *et al.* 2019: 35).

List of Acronyms

Acronyms	Full words
AIDS	Acquired Immune Deficiency Syndrome
CAAT	Computerised Aid to Treat
CBT	Cognitive Behaviour Therapy
CD	Compact Disk
CF	Conceptual Framework
COVID-19	Coronavirus Disease 2019
DB	Diabetes Mellitus
DR	Diabetic Retinopathy
DUT	Durban University of Technology
FMC	Federal Medical Centre
GAD	Generalised Anxiety Disorder
HBM	Health Belief Model
HCPs	Health Care Workers
HIV	Human Immunodeficiency Virus
HTMT	Heterotrait-Monotrait ratio
ICT	Information and Communication Technology
IREC	Institutional Research Ethics Committee
KZN	KwaZulu-Natal
MAI	Medical Artificial Intelligence
MANI	Mentally Aware Nigeria Initiative
MHSS	Mental Health Surveillance Service
NGO	Non-Governmental Organisation
PLS-SEM	Partial Least Squares-Structural Equation Modeling
PPS	Probability Proportion to Size
RAFT	Réseau en Afrique Francophone pour la Télémédecine
RDT	Rapid Diagnostic Tool
SEM	Structural Equation Modelling

SDGs	Sustainable Development Goals
SPSS	Statistical Package for the Social Sciences
SSA	Sub-Saharan Africa
UCH	University College Hospital
USA	United State of America
UTAUT	Unified Theory of Acceptance and Use of Technology
VIF	Variation Inflation Factor
WHO	World Health Organization

CHAPTER 1: OVERVIEW OF THE STUDY

1.1 INTRODUCTION

The mental health and wellbeing of the population should be a top priority in every society because mental health problems are contributory factors to global health problems (January *et al.* 2018: 1) and affect every facet of life physically, socially, emotionally, economically, educationally, psychologically and also impact how individuals interact within their environment (Rotenstein *et al.* 2016: 316). According to the World Health Organization's (WHO) (2014) definition of mental health, it is *"a state of well-being in which the individual realizes his or her own abilities, can cope with the normal stresses of life, can work productively and fruitfully, and can contribute to his or her community"*.

Wellbeing is the ability to refine one's perspective in the face of new circumstances (Langer 2005: 214). Cognitive strength is key to wellbeing and protects against cognitive dysfunction and fosters optimism, mindfulness and high expectation of good (Carver and Scheier 2005: 231). Mindfulness refers to "paying attention to the world around us in a way that allows openness and flexibility" (Langer 2005: 214). Optimists are inclined to navigate paths to anticipated goals and are encouraged to explore those paths (Langer 2005: 214). Estimating the prevalence of mental illness in the populace is fundamental to understanding its impact on the population (Andrew *et al.* 2001:145). Perception of stressors can trigger anxiety and depression or other types of mental disorders but mental strength is like a shield against the development of mental illnesses and individuals with mental strength take decisive steps to ensure a better quality of life (Carver and Scheier 2005: 231). Interaction among biological, social and psychological factors determines our mental health and consequently, the mental health of each individual cascades to the entire populace (WHO 2004).

Stress, anxiety, depression, sleeplessness, rage and panic are some of the reported mental problems experienced during COVID-19 (Torales *et al.* 2020: 317). Global findings reveal that the pandemic increased incidences of mental health problems across the population (Mohindra *et al.* 2020: 51; Xiao *et al.* 2020: 405; Rajkumar 2020: 52). Current research also submits that the present pandemic cause suicide cases in the population to surge (Xiang *et al.* 2020: 228). In a study by Wang *et al.* (2020: 1729) on immediate psychological responses and associated factors during the initial stage of the 2019 coronavirus disease (COVID-19) epidemic among the general population in China, participants reported 8.1% of moderate to severe stress, 16.5% reported moderate to severe depressive symptoms while 28.8% of the participants reported moderate to severe symptoms of anxiety. The misery of losing family members, social isolation, uncertainty, and economic woes may precipitate mental problems and could lead to extremities (Roy *et al.* 2021: 587). The health challenges posed by lingering mental illnesses burdens healthcare services and the population (Andrews *et al.* 2001: 145). Furthermore, it is important to explore mental health challenges experienced in the course of any pandemic or outbreaks in order to justify any treatment plan that is needed. In a survey conducted in 1997 and 2007, it was found that about 45.5% of people living in Australia have had mental health disorders at a point in their life. This means a population that is already burdened is now at its wits' end as a result of the present pandemic (Slade *et al.* 2007: 594). Studies have also shown that there has been an increase in mental health problems such as depressive episodes, stress and anxiety since the COVID-19 pandemic (Wang *et al.* 2020: 1729).

1.2 BACKGROUND TO THE STUDY

A pandemic is a threat to human existence. Uncertainty looms at every corner, and survival becomes probabilistic. During pandemics, the focus is on the preservation of lives while mental health is pushed aside, yet mental health and wellbeing are fundamental to surviving (daSilva *et al.* 2020: 229; WHO, 2004).

The survey on mental health in Australia led to the reformation of mental health services including improved and enhanced access to mental health service providers (Andrews 2001: 145; Slade *et al.* 2007: 594). Mental healthcare professionals also experience emotional stress and the fear of contracting the virus (Pfefferbaum and North 2020: 510). The recent pandemic was exhaustive on the medical team, spawned anxiety in people, burdened healthcare facilities with a great influx of patients, although some avoided healthcare facilities due to fear of contracting the virus despite the need for medical attention (daSilva *et al.* 2020: 229). Nigeria is among the developing countries that are generally experiencing social unrest, ethnic wars (Afzal 2020), coupled with disease outbreaks and other health emergencies such as Malaria, Lassa fever, HIV/AIDS, Ebola, and COVID-19. These uncertainties cause tremendous mental health challenges caused by insufficient financial and human resources, and incessant strike actions by the healthcare professionals (Ola and Olibamoyo 2020: 32). Apart from the general population in Nigeria, the growing mental health concerns here involve persons with pre-existing mental disorders, people with alcohol and other substance use disorders (Olumade *et al.* 2020: 736), frontline health workers (Torales *et al.* 2020: 317), vulnerable populations such as the elderly, children, pregnant women, and those who live with chronic diseases. However, the introduction of digital technology to mental health services presents unprecedented opportunities to provide mental health care services remotely to the affected populace, so bridging and reducing the gap in response time between patients and doctors in case there is another total lockdown or restriction of movement. Digital technology is defined as “*the use of computing devices to create, save, process, disseminate and display information which includes but is not limited to mobile phones, television, radio, computers*” etc. (Rice 2003: 72).

In developed countries, digital technologies have been adopted in various healthcare systems before the COVID-19 pandemic so as to meet up with growing need (Babalola *et al.* 2021: 46). For instance, different digital technologies such as chatbot, smartphone application, short messages (SMS),

instant messages, wearable sensors, telemedicine, symptoms reporting app, drones, internet, social media have been used to improve mental health service delivery (Budd *et al.* 2020: 1183; Sesagiri Raamkumar *et al.* 2020: 12; Limaye 2020: 277; Van Daele 2020: 160; Fernandez-Álvarez *et al.* 2020: 197). The usage of digital tools among individuals with mental health issues is increasing as well as enhancing overall wellbeing across diverse communities (Aschbrenner *et al.* 2018: 539; Brunnette *et al.* 2019: 973; Firth *et al.* 2015: 448; Naslund *et al.* 2016: 364). Such digital tools led to the emergence of different online support systems such as “informational support” (which helps with information about medications or assessing mental healthcare service providers), “esteem support” (reinforce positivity) and “network support” (which provide emotional encouragement) (Chang 2009: 1504). Berry *et al.* (2017: 107) discovered that online platforms such as Twitter allow shared experiences among individuals with mental illness. Naslund *et al.* (2016: 364) found that digital tools provide an avenue to share everyday struggles, reduce loneliness, increase optimism, and communicate ways of coping with mental health issues. In a report about individuals living with bipolar disorder, the main focus of the online self-help forum was to “share emotion” with members of the online group (Bauer *et al.* 2013: 185). Despite the importance of providing mental health services during emergencies, many African countries including Nigeria, face challenges to developing robust mental health systems due to poor funding, fragile healthcare systems (Olumade *et al.* 2020: 736), lack of effective mental health digital interventions (Aluh and Onu 2020: 557), reduced access to care, a huge treatment gap, and out-of-pocket payment for services (Abdulmalik *et al.* 2019: 38).

However, integration of digital mental interventions in both public and private healthcare can improve delivery of mental health services remotely and on a wider scale, which is particularly important during pandemic outbreaks and other health emergencies. This can circumvent existing delays in accessing mental health services and a shortage of healthcare professionals, support remote counselling and consultation, improve access to mental healthcare and

bridge the gap of response time between doctors and patients in case of social distancing measures. This is crucial for Nigeria, and other low- and middle-income countries, in managing and mitigating the emerging public mental health crisis due to the outbreak of infectious diseases, social unrests and insurgencies.

1.3 PROBLEM STATEMENT

The world is constantly experiencing the outbreak of deadly pandemics. Despite this, regulatory health systems and other stakeholders remain largely underprepared for the next major pandemic (Kain and Fowler 2019: 337) and heavily rely on prevention and containment measures (daSilva *et al.* 2020: 229). This results in hypervigilance, anxiety, depression, fear of the unknown and in some instances, causes severe cases of post-traumatic stress disorder (Jalloh *et al.* 2018: 1; January *et al.* 2018: 1; Morens *et al.* 2020: 812; Corringa and Bink 2016: 230). Individuals, families, and communities experience feelings of hopelessness, despair, grief, bereavement, profound loss of purpose and other pre-existing mental health conditions because of pandemics and stringent measures that discourage in-person care and face-to-face consultations (daSilva *et al.* 2020: 229). Shortage of mental health service providers, stigmatization, high cost of treatment, poor infrastructure, lack of policy and guiding framework exacerbate mental health challenges in Nigeria (Olumade *et al.* 2020:736). There is also poor healthcare funding, which jeopardizes the effectiveness of the healthcare system. In Nigeria, about 4.5% of the budget is allocated to the health department in 2020 which jeopardize the efficiency towards readiness for outbreaks or public health emergencies (Olumade *et al.* 2020: 736; Wada *et al.* 2021: 1; Adebayo and Ofoegbu 2014: 36). There is a need to prioritize and strengthen the health care sector. Fundamentals of capacity building for outbreak readiness lies greatly in a resilient health system, infrastructure and communication system for easy accessibility and dissemination of information (Olumade *et al.* 2020:736). Recent advancement in emerging digital technologies continues to revolutionize the healthcare

system globally (Sigulem *et al.* 2017: 152), expanding its utilization in different health sectors and subsequently transforming mental healthcare service delivery. Mobile phones, smartphones, internet use, telemedicine, software application, online help and information resources have proven the effectiveness of digital movement. Digital mental health interventions bring global transformative shifts in mental health services delivery during the pandemics. These interventions aid easy access to mental health services with limited constraints and exposure to the pandemic (Andrews *et al.* 2001: 145; Slade *et al.* 2007: 594).

Mental Aware Nigeria Initiative (MANI); PsyndUp (Adepoju 2020: 571); Mental Health Foundation; Neem Foundation; Love, Peace and Mental Health Foundation (LPM); and She Writes Woman (Wada *et al.* 2021: 1) are initiatives that use digital technologies but unfortunately they are not government funded initiative so their scope is limited. There is a need to facilitate the widespread adoption and implementation of digital mental health interventions in routine care during pandemics and other public health emergencies. Effective adoption and utilization of digital mental health interventions require consolidated and consistent guidelines as well as consensus, expert and position statements on the screening and tracking of mental health in general, as well as affected populations, and also as considerations and initiatives for underserved and vulnerable subpopulations (Olumade *et al.* 2020: 736; Gething *et al.* 2006: 825). There is a need to develop a localized framework that takes into consideration factors peculiar to the Nigerian populace, such as lack of electricity, poor infrastructure, underfunded healthcare system, unresponsive government, poor and inconsistent data reporting, and low mental health awareness (Alobo *et al.* 2020: 948; Adebayo and Ofoegbu 2014: 36; Olumade *et al.* 2020: 736; Wada *et al.* 2021: 1). Therefore, this study aims to develop a contemporary model for integrating digital health technologies to improve mental health services and wellbeing in the public healthcare system.

1.4 AIM OF THE STUDY

This study aimed to develop a contemporary model for integrating digital health technologies to improve mental health services and wellbeing in the public healthcare system.

1.5 OBJECTIVES OF THE STUDY

The study seeks to address the following research objectives:

- Determine factors affecting the provision of mental health services and wellbeing in public healthcare.
- Analyze digital technologies that could be effectively utilized to provide mental healthcare services and wellbeing in public healthcare during natural disasters and health emergencies.
- Explore perceptions of health workers towards the utilization of digital technologies to improve mental healthcare services.
- Determine barriers and challenges impeding the provision of mental healthcare services and wellbeing through digital technologies.
- Develop a contemporary model for integrating digital mental health interventions to improve mental health services and wellbeing in the public healthcare system.

1.6 RESEARCH QUESTION

The research questions that guided this research are:

- What are the factors affecting the provisions of mental health services in public healthcare?
- What are the digital technology tools that would be effective in public healthcare during health emergencies?
- How do the healthcare providers perceive the utilization of digital technologies?

- What are the barriers and challenges that could hinder the provision of mental health services through digital technologies?
- What model best suits the integration of digital technology and how will it improve health services and wellbeing in the public healthcare system.

1.7 SIGNIFICANCE OF THE STUDY

Efficient Response during an outbreak has been very difficult in many developing countries including Nigeria because of the fragile healthcare system which is a result of several obstacles, challenges and complexities (Olumade *et al.* 2020: 736). Nigeria is among countries generally experiencing social unrest, ethnic wars coupled with outbreaks and other health emergencies such as Malaria, Ebola, and COVID-19. It is important to note that between 2016 and 2018, there were several infectious disease outbreaks and health emergencies in Africa, but very few World Health Organization (WHO) African countries organized events on mental health in a year (Olumade *et al.* 2020: 736). The emergence of natural disasters coupled with the outbreak of infectious disease triggered a transformative shift towards the integration of digital technologies in the provision of much needed mental health services. Shortage of mental health service providers coupled with stringent restrictions and measures also exacerbates mental health challenges. There is also poor healthcare funding, which jeopardizes the effectiveness of the healthcare system. In Nigeria, about 4.5% of the budget was allocated to the Health Department in 2020 which risked the country's readiness for outbreaks or public health emergencies (Olumade *et al.* 2020: 736; Wada *et al.* 2021: 1; Adebayo and Ofoegbu 2014: 36). The integration of digital technologies will improve mental health services, bridge response gap especially in areas with limited access to services (Wada *et al.* 2021: 1). Research interest in digital health has assumed an upsurge in recent times and this has been further encouraged by the recent COVID 19 pandemic. Empirical findings have shown that the benefits of digital health significantly outweigh its shortcomings, likewise, advancement in information and communication technology is positively changing the way people interact

and accomplish tasks across almost every sector of human endeavor and particularly, the health sector (Olumade *et al.* 2020: 736). There is a need to prioritize and strengthen the health care sector. Notably, there is limited literature on the integration of digital technologies in mental health services especially during public health disasters. There is also a lack of policy or a framework to guide the provision of mental health services in the public health system through digital technologies.

1.8 STRUCTURE OF THE THESIS

CHAPTER 1: ORIENTATION TO THE STUDY: This chapter provides a background to mental health and wellbeing and how digital health technologies can be integrated into mental health services to improve and enhance service delivery. This chapter incorporates the motivation of the study, the significance of the study, the aim of the study, research objectives and research questions that drive the study.

CHAPTER 2: LITERATURE REVIEW: This chapter details different pieces of literature on the research topic. These are studies that were conducted in other countries. These pieces of literature provide a backdrop of what is obtainable in developed countries and an assessment of the effectiveness of these digital tools.

CHAPTER 3: THEORETICAL FRAMEWORK: This chapter focuses on the frameworks that critically explain the research topic. Two theoretical frameworks were adopted by this study which are the Health Belief Model (HBM) and Unified Theory of Acceptance and Use of Technology (UTAUT) model. These two models explore and investigate the acceptability and utilization that will occur if these digital health tools are to be adopted.

CHAPTER 4: RESEARCH DESIGN AND METHODOLOGY: The methodology depicts data collection techniques. The study employed a mixed method

research design, as there is a need to collect qualitative and quantitative data from participants. This section covers the research population, area of study and ethical considerations.

CHAPTER 5: PRESENTATION OF FINDINGS FROM THE QUALITATIVE DATA: This chapter details results from the qualitative survey.

CHAPTER 6: PRESENTATION OF FINDINGS FROM THE QUANTITATIVE DATA: This chapter provides results from quantitative findings.

CHAPTER 7: INTEGRATION OF THE RESULTS FROM QUALITATIVE AND QUANTITATIVE DATA: This chapter focuses on the results from both qualitative and quantitative findings.

CHAPTER 8: DISCUSSION OF THE FINDINGS: This chapter evaluates and discuss the results and also assesses the implication and justifications of theories.

CHAPTER 9: DEVELOPING A CONTEMPORARY MODEL FOR INTEGRATING DIGITAL TECHNOLOGIES TO IMPROVE MENTAL HEALTH SERVICES AND WELLBEING IN PUBLIC HEALTHCARE: This chapter presents the development of a model that integrates digital technologies with the traditional method of service delivery in mental healthcare sector.

CHAPTER 10: SUMMARY, LIMITATIONS, RECOMMENDATIONS AND CONCLUSION OF THE STUDY: This chapter concludes the research and makes recommendations aimed at enabling other researchers to work in this area of study and build upon the findings of this study.

1.9 SUMMARY OF CHAPTER

This chapter evaluates the perspectives on the introduction and background of mental health and wellbeing globally and locally. The chapter also presents the

statement of problems which entails identified problems in Nigeria's healthcare system and the country's mental health challenges, the objectives and research questions as well as the significance of the study and the structure of the study.

CHAPTER 2: LITERATURE REVIEW

2.1 INTRODUCTION

This chapter reviewed relevant literatures to justify the study. This section shows an overview of existing literatures from developed as well as developing countries, which provides contextual evidence and identifies gaps in the use of digital technologies in mental healthcare service delivery.

2.2 SOURCES OF LITERATURE REVIEWED

The literature that was reviewed was sourced from relevant databases. The following search engines were used; PubMed, World Wide Web, Google Scholar, Durban University of Technology (DUT) Repository, Science Direct, Springer Link. Key words used for the search were mental health, digital technologies, COVID-19, e-Health, telemedicine and digital health.

2.3 GLOBAL VIEW ON DIGITAL TECHNOLOGY AND MENTAL HEALTH

The first infectious outbreak was recorded in 430 BCE. It was named the plague of Athens and killed about 100 000 people. Since the first outbreak, several outbreaks have tremendously affected human life. Those outbreaks include the Plague of Justinian (killed about 50 million people), Black Death (killed around 50 million people), Tuberculosis (killed millions), Hueyztahuatl (killed around 3.5 million people), Spanish Flu (50 million people in 1918), Ebola virus (killed around 15 000 people between 1976 to 2020), HIV/AIDS (killed about 32 million people since 1984 to date) (Morens *et al.* 2020: 812; Morens *et al.* 2008: 710)

and currently COVID-19 is ravaging the world with over 15 million deaths worldwide (Taylor, 2022: 1).

History suggests that any infectious disease outbreak or pandemic brings major setbacks in mental health services delivery. In the case of the Ebola outbreak in 2014, symptoms of Post-Traumatic Stress Disorder (PTSD) and anxiety-depression were more prevalent even after a year of Ebola response (Jalloh *et al.* 2018: 3). The global HIV pandemic also provides a similar picture and it has been found that the prevalence of mental illnesses in HIV-infected individuals is substantially higher than in the general population (WHO 2008). The risk of PTSD in the aftermath of the pandemic can, therefore, be a huge challenge to the mental health system of the country.

Unfortunately, the world is not out of the woods yet in terms of pandemics or infection outbreaks. Mental health services need a shift from only face-to-face to the integration of digital tools to reach more people at different locations at a faster rate and in a timelier manner. Around 90% of the global population have access to phones (International Telecommunication Union 2011). The effective integration of digital tools enhances the efficiency of mental healthcare and also aids in preparing for any futuristic infectious outbreaks or pandemics (Institute of Medicine 2006). Digital technology such as mobile phones, laptop and desktop computers, tablets, television, and radio can provide support and help in the dissemination of health information, giving people the opportunity to learn, unlearn and relearn (Smith *et al.* 2020: 309).

An advanced Information and Communication Technology (ICT) integrated healthcare system in the United States and United Kingdom (National Health Services) enables virtual post-discharge check-up to remotely monitor patients recovering from COVID-19, enhanced communication with healthcare professionals and vulnerable medical students on clinical internship continued with virtual clinical presence during the peak of the pandemic. Teleconferencing was also used for case discussion while video and telephone consultation

replaced face-to-face hospital visitation (Babalola *et al.* 2021: 46; Olufadewa *et al.* 2020: 51; Perrone *et al.* 2020: 76; Monaghesh and Hajizadeh 2020: 1193). This increased virtual consultation from 1% to about 70% in developed countries (Babalola *et al.* 2021: 46).

The developed world has integrated digital technologies into the mental healthcare system, such as '113 Suicide prevention' Netherland, which is 24 hours 7 days a week helpline to assist over 900 000 individuals with suicide ideation. The programme is fully funded by Dutch government and it provides both online and offline comprehensive suicide prevention services (Setkowski *et al.* 2018: 1). SPARX and HABITs was developed to enhance mental health and wellbeing in adolescents in Australia and New Zealand (Perry *et al.* 2017: 369). SPARX is embedded into HABITs application and it offers Behaviour intervention technology and aids coping skills (Barnett *et al.* 2019). SPARX is interactive and involves 'online role-playing' using Cognitive behaviour therapy (CBT) which allows adolescents to deal with mental breakdown (Perry *et al.* 2017: 369; Barnett *et al.* 2019). EMPOWER, and Digital Clinic were developed in United State of America (USA) and India and utilize digital technologies to enhance accessibility to psychosocial interventions by millions of users (Singla *et al.* 2017:149; Rahman *et al.* 2013: 593; Singla *et al.* 2014:53). In Australia, the digital device has been continuously employed by healthcare providers in helping patients in nursing homes to sustain treatment and follow-up on medications (Pachana Beattie and Byrne 2020: 1135).

Leng *et al.* (2020)'s systematic review found that digitalized programmes and supportive interventions were used concurrently in assisting caregivers in the management of dementia. Gual-Montolio *et al.* (2020: 3170)'s systematic review revealed that digital technologies were employed for routine outcome monitoring (ROM) and management-based care (MBC) for mental health problems so as to monitor adherence to treatment plans. Several therapeutic interventions were combined with digitalized programmes in preventing suicide among the youth (Szlyk and Tan 2020; Timakum *et al.* 2022: 57). A smartphone

app with safety navigations (mood monitor, emotional control exercises) was utilized in assisting individuals with borderline personality disorder having symptoms such as suicidal thoughts, self-injury or mania (Ilagan *et al.* 2020: 1). Eilert *et al.* (2021: 196)'s systematic review on the utilization of digital technology in the management of generalized anxiety disorder (GAD) found that digital interventions based on Cognitive behaviour therapy (CBT) are effective in providing needed assistance, promote wellbeing and preventing relapse in people with GAD.

Social media was found to assist in disseminating mental health information, while supporting and providing interventions for youth. Similarly, digital wearables were used to monitor, measure and manage symptoms of depression in adolescents (Ridout and Campbell 2019; Sequeira *et al.* 2020: 314). Naslund and Aschbrenner (2021: 1)'s study focuses on the use of digital technologies (smartphones, mobile phones, online platforms) in searching for mental health information and the willingness to use these mobile applications for health purposes among young adults in the USA. The result from the research indicates that the willingness to use digital platforms in accessing mental health information and intervention is high among adolescents.

2.4 CONTEXT IN AFRICA ON DIGITAL TECHNOLOGY AND MENTAL HEALTH

In Africa, several pilot studies have been conducted on the integration of Digital Technologies in healthcare service delivery. A pilot on the Medical Artificial Intelligence (MAI) (which uses Artificial Intelligence tools) was conducted in Kenya in 1989 to enhance patient-worker relationships (Hunter 1989) and in Egypt in 1986 to detect eye disorders (Kastner 1984: 389). Countries that first embraced and deployed e-Health as a way of improving healthcare service delivery in Africa include (in no particular order) Ghana, Malawi, Kenya, Cape Verde followed by other African nations (WHO 2005; WHO 2016). Probabilistic decision-making system helped Gambian rural Healthcare professionals

(HCPs) in the detection of serious medical conditions in patients (Byass 1987; Owoyemi *et al.* 2020: 6). In Zambia, Artificial Intelligence is used in diagnosing diabetic retinopathy (Bellemo *et al.* 2019: 35) and Tanzania's healthcare system employed the use of telemedicine in healthcare service delivery (Olu *et al.* 2019). The Delft Institute's CAD4TB software (digital tool) is utilized in detection of pulmonary tuberculosis in The Gambia, Zambia and Tanzania (Olu *et al.* 2019: 341). Countries like Ghana, Tanzania and Kenya incorporated rapid diagnostic tests (RDT) into m-Health systems while smartphone enabled cloud computing electrocardiographs are in use in Malawi and Uganda (Olu *et al.* 2019: 341).

The 1990s saw an increase in bioinformatics studies, expanding the acceptability of Medical Artificial Intelligence (MAI) with the global projection that by 2026, implementation of MAI in healthcare could help save around 150 billion dollars from health cost (Owoyemi *et al.* 2020: 6). The use of m-Health helped HCPs during the Ebola and Zika outbreaks to promptly test those exposed to the virus, and to screen and identify those at risk of catching the virus in Sub-Saharan Africa (Bempong *et al.* 2019; Ahmadi *et al.* 2018). Sutcliffe *et al.* (2017: 1) found that the adoption of m-Health in Zambia could aid in early detection of HIV in new-born babies.

The Réseau en Afrique Francophone pour la Télémédecine (RAFT) project on telemedicine was launched from year 2000 in over 10 African nations (Chitungo *et al.* 2021). It was first implemented in 2003 in Mali then later in Ethiopia, Egypt, Zambia, and Ghana (Chitungo *et al.* 2021). Recently, Angola launched the Anglosat project (telemedicine) which allows people in rural areas access to physicians (specialists) for medical services which they may not have access to in their location, thereby reducing travelling time and cost (Oluwakemi 2020). Teleconsulting centres are being established in Ghana with the support of Novartis foundation, and mTrac is developed for the Ugandan populace so that mobile phones users can access remote healthcare services without the need for internet or data (Oluwakemi 2020).

Digital technologies are crucial in the attainment of sustainable healthcare service delivery. One of the Sustainable Development Goals of the United Nations Member States (SDGs) hinges on equality, promotion of healthy living and provision of affordable, accessible healthcare services and wellbeing across all ages (Owoyemi *et al.* 2020:6). The attainment of this goal is through the use of digital technologies which can enhance detection and prompt response in healthcare service delivery (Owoyemi *et al.* 2020:6). In high income countries, digital technologies have been integrated successfully in their mental healthcare service delivery. Advancement in ICT is increasing the scope and coverage of digital technologies in mental health. Unfortunately, the integration of digital technology in mental health is very limited in Africa.

2.5 CONTEXT IN SOUTH AFRICA ON DIGITAL TECHNOLOGY AND MENTAL HEALTH

Viruses have shaped the course of human history. For instance, COVID-19 emerged as a public health emergency. COVID-19 came with an alarming daily death rate, changed how we live daily, relate to people and how we work. However, due to the lack of pandemic information centres and policies, many people experienced an infodemic exacerbated by social media platforms, which increased anxiety, stress and depression (Morens *et al.* 2020: 812). In enhancing healthcare service delivery, South Africa utilized robust information and communication technologies during COVID-19, for instance telemedicine, and the smart health app in healthcare services during COVID-19 (Mbunge 2020: 1631).

Artificial intelligence (AI) was employed to predict HCPs' duration of stay in South Africa's public service (Moyo *et al.* 2018: 68). The utilization of teleophthalmology (digital tool) in assessing people with Diabetes mellitus (DM) aided the early detection of Diabetic retinopathy (DR) which could reduce vision problems and enhance patient wellbeing and also improve quality of life and minimize medical cost (Khan *et al.* 2013: 170). South Africa launched the mega

project so as to provide easy accessibility to virtual mental health services (Adepoju 2020: 571).

South African nurses employed a Computerized Aid to Treat (CATT) in the prescription of medication (Owoyemi *et al.* 2020: 6). The Delft Institute's CAD4TB software (digital tool) is also employed in detecting pulmonary tuberculosis in South Africa (Olu *et al.* 2019: 341). Telemedicine remotely monitors patients and provides mental health services. A WhatsApp platform was utilized in communicating precautionary measures and to provide information on COVID-19 as well as for prompt detection and contact tracing during the peak of COVID-19 pandemic (Seidner *et al.* 2020: 109; Mbunge *et al.* 2022; Sehume and Markus 2020: 1451).

Mobile phones are capable of providing therapeutic benefits among South Africans due to the high level of use in seeking and contacting medical professionals and searching for health-related information (Watkins *et al.* 2018: 139; Fischer *et al.* 2021). MomConnect is among the most successful m-Health integrated projects, had about 500 000 users in the first year of its launch in 2015 which grew to about 1.7 million users in 2017 (Pillay and Motsoaledi 2018). It is a platform in which females get pre-natal and post-natal health information twice a week through mobile phone short messages (SMS) and can also contact helpdesk (which focus is increasing and enhancing quality of treatments) with enquiries (Peter *et al.* 2015: 3).

Studies found that the integration of mobile phone SMS will reduce forgetting, which is a key factor in missed mental health appointments (Sibiya and Ramlucken 2020; Kaplan-Lewis and Percac-Lima 2013: 251; Balogun *et al.* 2012: 76; Trujillo 2015: 104; Guy *et al.* 2012: 614; Vernig and Repique 2015: 31; Watkins *et al.* 2018: 139). It can also assist refugees with depression (Tomita *et al.* 2016: 369). Policy on m-Health was established in 2015 in South Africa but there was no standard of practice, and no stated approach on how to

utilize these service deliveries in the provision of mental health services (Adepoju 2020: 571; Mbunge *et al.* 2022: 102; Pillay and Motsoaledi 2018).

2.6 CONTEXT IN NIGERIA ON DIGITAL TECHNOLOGY AND MENTAL HEALTH

Effective disease outbreak response has historically been a challenging accomplishment for the Nigerian health system due to an array of hurdles not unique to Nigeria but also found in other African nations which share its large size and complexity (Olumade *et al.* 2020: 736). Olumade *et al.* (2020: 736) did a comprehensive review on prior infectious disease response, its effectiveness and challenges to recommend policy to enhance response readiness for imminent outbreaks. Findings from the review revealed that infectious outbreak readiness in Nigeria is ongoing and geared towards the targeted goal but not at the required standard. Presently, there are quite several mobile laboratories all over the country to test for COVID-19, which was made possible by Aliko Dangote, 54 gene and other private organizations partnering with the federal government of Nigeria (Olumade *et al.* 2020: 736).

Fundamentals of capacity building for outbreak readiness lie in a resilient health system, and an infrastructure and communication system for easy accessibility and dissemination of information (Kruk 2008: 529; Olumade *et al.* 2020: 736). A trial app was developed in Nigeria (Abiye) and Uganda (RESCURER) by public-private investors to remotely monitor pregnant women and also to provide antenatal services but could not be sustained due to lack of government involvement (Obasola *et al.* 2015: 1813). Likewise, Shell a multinational oil and gas company delivers e-Health services to its employees in isolated locations in Nigeria but unfortunately, these services are not open to the public (Ekanoye *et al.* 2017: 341).

Digital technology such as mobile phones, smartphones and internet services enhances psychosocial support and treatment on medical health issues (Heron and Smyth 2010: 1). The use of mobile phone SMSes as a reminder will likely reduce missed appointments among patients newly diagnosed with mental illness in Nigeria (Thomas *et al.* 2017: 275). Mental Aware Nigeria Initiative (MANI) is an online based initiative founded in 2015, by a non-governmental organization (NGO) in Nigeria focusing on the mental health of Nigerian youth by disseminating mental health information on different social media platforms and allowing users communicate their challenges without fear of being judged (Adepoju 2020: 571). PsyndUp is another online based NGO initiative which allows users to find the therapist closest to them. Therapy sessions are provided free. It also uses social media platforms in communicating mental health information with end users (Adepoju 2020: 571). Other NGO mental health initiatives in Nigeria include Mental Health Foundation, Neem Foundation, Love, Peace and Mental Health Foundation (LPM), and She Writes Woman (Wada *et al.* 2021: 1).

Having almost 700 000 members, Ask the Paediatrician is a group on Facebook created by Paediatricians in public healthcare in Nigeria. The group provides professional medical help to child-related questions and concerns and also provides parenting support to parents. The main goal of the group is to *“improve child survival by promoting child health intelligence”*. Ask the Physician is a sister group to Ask the Paediatrician which caters for adult health issues. The group comprises physicians working in public healthcare in Nigeria and has about 91 000 members. Ask the Gynaecologist with about 1.7 million members, was created by Nigerian gynaecologists to provide professional assistance to pregnant women to decrease maternal mortality and morbidity not only in Nigeria but in Africa and to enhance positive dialogue on maternal health matters. Female in Nigeria (FIN) has about 1.8 million members and it provides support for women to end domestic violence. It’s a platform in which females can open up without fear and gain online support from other women who have walked out of an abusive relationship or lost a loved one. It is an inclusive group

for women and a strictly no discrimination group where most women find solace.

These groups can reach millions of people almost at the same time strictly with the aid of digital health technology. Individuals can post either with their names or anonymously and their questions are answered promptly. The exquisite part is that most people benefit from such posts. The groups gained popularity because the populace trusted the competence and judgement of healthcare professionals in public healthcare to give referrals to the best public healthcare service providers. With Nigeria's population sitting at almost 200 million people, the incorporation of digital health technology in mental health care can create an avenue for treatment beyond physical presence at healthcare facilities and allow easy access to resources (WHO 2011). Based on this empirical evidence, the outbreak of pandemics in the future is inevitable, therefore, there is a need for preparing and adopting the use of digital mental health interventions.

2.7 WORLD HEALTH ORGANIZATION'S POLICIES ON DIGITAL TECHNOLOGIES IN HEALTHCARE IN NIGERIA

The policies of the World Health Organization (WHO) on digital technologies highlights an enduring strategic plan to deploy e-Health services, putting in place necessary structure that enable information and communication technology (ICT) in healthcare in order to promote equal, inexpensive and accessible benefits (WHO 2005). WHO (2013) refers to the Nigerian government's e-Health app which had the stated aim of gathering electronic based information on birth and death rates. Unfortunately, the system is not robust and could not manage this information and it failed (Idoga 2016: 145). Due to lack of e-Health adoption, over 50 000 women die annually from health complications and sub-standard care (Idoga 2016: 145). However, despite the tremendous benefits of incorporating digital mental health interventions in the public healthcare systems, its adoption is still nascent due to several obstacles (Olumade *et al.* 2020: 736). The lunacy law was decreed in 1916 but it

underwent amendment in 1958 and was called the 1958 Lunacy Act. This Act empowers physicians to confine individuals with mental illness but unfortunately, this Act has not been fully passed into law (Wada *et al.* 2021: 1). The Senate has debated a Mental and Substance Abuse Bill with the purpose of increasing the budget allocated for mental health treatments and substance abuse rehabilitation but unfortunately, this Bill is yet to be passed (Wada *et al.* 2021: 1; Lancet Global Health 2021).

Nigeria introduced a national Mental Health Policy in 1991, which was reiterated in a 2003 policy stating that mental health services should be incorporated from primary to tertiary health care services. Unfortunately, these policies were not fully implemented (Abdulmalik *et al.* 2013, Ryan *et al.* 2020: 10). The challenges include the lack of a framework/model and policy guiding the use of digital mental health interventions, technological barriers, organizational barriers and funding among others.

According to the WHO's recommendation, mental health laws should have been revised by the year 2020 but mental health policies in Nigeria are outdated. There is a need to formulate new policies because the existing policies cannot cater for the present demand (Wada *et al.* 2021: 1). The adoption of sophisticated digital health intervention faces some challenges in Nigeria due to lack of digital infrastructure, policy implementation, political support, slow/no internet services in rural area, inability to afford health insurance and insufficient application of ICT (Babalola *et al.* 2021: 46; Kapoor 2020: 61; Wamala 2013: 6; Adenuga *et al.* 2017: 84; Ahmed *et al.* 2017: 22; Olayiwola *et al.* 2020: 97; Adewale 2004: 221).

2.8 MENTAL HEALTH FRAMEWORK

Ransing *et al.* (2020: 1) developed a Mental Health Preparedness and Action Framework (MHPAF) to aid effective preparedness and response during health emergencies. The need for this framework is because the WHO-GIPP did not

make provision for mental health (WHO 2019), furthermore, there is no organized intervention plan for the COVID-19 pandemic and contributors are from WHO region (Ransing *et al.* 2020: 1). The conceptual framework (CF) has five interlinked phases, therefore adequate preparation must be done at each phase to avoid a total failure of the framework (Ransing *et al.* 2020: 1). The phases include:

- Preparation and co-ordination:
- Monitoring and assessment:
- Reducing mental health distress and misinformation.
- Sustainability of mental health care services.
- Communication.

The Mental Health Surveillance Service (MHSS) aids the early detection of the pandemic and facilitates a fast response plan. This framework is geared towards putting infrastructures such as the mental health surveillance system (MHSS) in place and also the training of HCPs and volunteers to assist in disseminating accurate mental health information and demystifying false news about mental illness. At the MHSS phase, data is collated, analysed and interpreted and disseminated at a timely manner to aid preclusion and containment of pandemic (Ransing *et al.* 2020: 1). The MHSS aid prompt intervention during mental health emergencies, that is, the utilization of virtual system, mobile phone applications will be beneficial to the populace. HCPs such as Psychologist, Psychiatrists should be adequately trained and involved in the MHSS, Regrettably, HCPs are not properly trained. The inability to properly implement MHSS at the first stage could lead to inability to curtail mental illness among the population (Nsubuga *et al.* 2020: 997). A well-outlined plan should have been in place. MHSS should be furnished with digital health technologies (mobile phone applications, social media, dedicated call centres) tools, which are crucial in providing mental health services and support. Projected myths, distorted and false information surrounding mental illness are addressed at this phase (Ransing *et al.* 2020: 1).

One of the limitations of this framework is that it is not country specific because each country has its own peculiarities. Another limitation is that a key component in the early detection and prompt response plan in Phase 1-3 of the CF is lacking in Nigeria. It is safe to categorize these challenges of implementation into human-related, governance-related, and technology-related challenges. An example of human-related challenge is lack of technical skills and competence; while poor healthcare policies and budgeting are examples of governance-related challenges; and poor user interface and complex menu navigation are some technology-related challenges (Owoyemi, *et al.* 2022; Iyamu, 2022). There is sufficient evidence in literature that suggests that these challenges are been encountered at some point in the implementation of digital health technologies across healthcare systems (Owoyemi *et al.* 2022; Iyamu 2022). Other challenges of implementing digital health that have been researched especially in developing countries includes resistance to change, low level of digital health literacy, unskilled work force, declining quality of healthcare systems, infrastructural deficit (e.g., electricity), poor broadband/internet connectivity/coverage, and weak healthcare policies and implementation frameworks among others (Owoyemi, *et al.* 2022; Iyamu, 2022). Failure of the first phase has created a snowball effect (Ransing *et al.* 2020: 1). Furthermore, information from an individual is not sufficient enough in evaluating the need of a country since, ethics of practice and funding varies from one country to another (WHO 2006).

2.9 SUMMARY OF THE CHAPTER

This chapter examined the mode of data inquiry, types of search engines used, discussion on digital technologies adoption globally, the trend in digital technologies and mental health in Africa, and the utilization of digital tools in South Africa as well as in Nigeria.

CHAPTER 3: THEORETICAL FRAMEWORK

3.1 INTRODUCTION

This chapter presents the theoretical framework that guided this study. These frameworks assisted in the understanding and investigation of factors that motivate intentions in the acceptance and utilization of digital technologies so as to improve mental health services and wellbeing in public healthcare. The theoretical frameworks are the Health Belief Model (HBM) and the Unified Theory of Acceptance and Use of Technology (UTAUT) Model.

3.2 THEORETICAL FRAMEWORKS THAT GUIDE THIS STUDY

This study was guided by two theoretical frameworks, namely a) Health Belief Model (HBM) and Unified Theory OF Acceptance and Use of Technology (UTAUT) Model.

3.2.1 Health Belief Model (HBM)

Health Belief Model (HBM) was developed in the 1950s to examine factors that influence people who lacks acceptance of disease preventive measures (Janz and Becker 1984: 1). The HBM Model explains that health behaviour is determined by personal beliefs or views regarding a disease and available ways to minimize incidences (Janz and Becker 1984: 1; Sibiya and Ramlucken 2021: 1). The Model elucidates behaviour in the context of the individual belief and standpoint regarding illness. This standpoint propels an individual to develop self-efficacy so as to take decisive steps in adopting a behaviour (Baranowski *et al.* 2003: 23). When an individual believes that there is an imminent health risk, taking a decisive step can aid in mediating the impact of the risk or sickness and when a preventive measure is pursued, it mitigates the cost of treatment

(Champion and Skinner 2008:45). Presence of cue to action, for instance, environmental input such as media, can encourage the individual to make choices that will help in reducing severity of illness (Champion and Skinner, 2008: 45). HBM is extensively used in mental health (Valenstein *et al.* 2011: 727; Corrigan and Rüsch, 2002: 312) to ease psychiatric incidence (Kilbourne *et al.* 2014: 74). The focus of HBM is the relationship between its components (perceived seriousness, perceived susceptibility, perceived benefits, perceived barriers, modifying variables, cues to action and self-efficacy) and the use of mental healthcare services. Optimizing digital technology can effectively reduce the incidences of mental breakdown if the individual perceives the severity of the sickness especially the ongoing COVID-19 pandemic (perceived seriousness), believes they are at risk of this serious condition (perceived susceptibility), and weighs the benefit as higher (perceived benefit) (Haryati *et al.* 2020: 201). Then the individual makes a conscious effort to embrace ways of reducing his risk of succumbing to the illness (digital technology tools).

3.2.2 Unified Theory of Acceptance and Use of Technology (UTAUT) Model

The emphasis of the UTAUT Model is on exploring the adoption and utilization of digital technologies (such as radio, television, smartphones among others) in delivering mental healthcare services. Furthermore, recommendations from HCP can influence patients or individuals in need of mental services to embrace digital tools and when the individual is satisfied with the services received through the use of digital tool, then he strengthens its use (Marchewka and Kostiwa 2007: 93; Dwivedi *et al.* 2019: 719). Expectations of mental health service providers and family members can aid in the utilization of digital health technologies by mental health patients. The realization that mental health issues could become severe if untreated, will propel an individual to embrace and utilize tools that are beneficial to his state of health and wellness.

3.3 CONSTRUCT OF THE HEALTH BELIEF MODEL (HBM)

The main focus of HBM is the association that exists between health behaviours, practices and utilization of health care services (Figure 3.1). The key component of health behaviour according to HBM includes perceived seriousness, perceived susceptibility, perceived benefits, perceived barriers, modifying variables, cues to action and self-efficacy (Haryati *et al.* 2020: 201; Sibiya and Ramlucken 2021: 1). The HBM focuses on the relationship between its components (perceived seriousness, perceived susceptibility, perceived benefits, perceived barriers, modifying variables, cues to action and self-efficacy) and the use of mental healthcare services (Haryati *et al.* 2020: 201). Optimizing digital technology can effectively reduce the incidences of mental breakdown if the individual perceives the severity of the sickness especially the ongoing COVID-19 pandemic (perceived seriousness), believes they are at risk of this serious condition (perceived susceptibility), and weighs the benefit as higher (perceived benefit) (Haryati *et al.* 2020: 201). Then, the individual makes a conscious effort to embrace ways of reducing their risk to the illness (digital technology tools).

3.3.1 Perceived Seriousness

Perceived seriousness is an individual belief concerning the magnitude of a disease (Sibiya and Ramlucken 2021: 1). This belief is determined by medical reports and the certitude of risk of the disease (Janz and Becker 1984: 1). People perceive the seriousness of pandemics and outbreaks and the risk these conditions pose to them.

3.3.2 Perceived Susceptibility

Perceived susceptibility is an individual's perception that he is vulnerable to a serious condition. Perceived susceptibility maintains that people are inclined to embrace a salubrious way of living (Janz and Becker 1984: 1). When the

vulnerability is perceived to be higher, the higher the likelihood is of embracing behaviours that diminish risk (Sibiya and Ramlucken 2021: 1). Perceived susceptibility influences people to seek positive and healthy behaviour during outbreaks and pandemics so that they are less at risk.

3.3.3 Perceived Benefits

Perceived benefits occur when an individual takes a decisive step to develop a new behaviour to counter the chances of developing a condition (Haryati *et al.* 2020: 201). It is when an individual places importance on the new behaviour, that the outcome of this new behaviour reduces the possibility of contracting a disease (Janz and Becker 1984: 1; Sibiya and Ramlucken 2021: 1).

3.3.4 Perceived Barriers

Perceived barriers occur when an individual perceives hindrances in carrying out the recommended health behaviour. The individual perceives impediments that could be detrimental to the achievement of the health behaviour (Janz and Becker 1984: 1). Challenges of limited access to mental health providers, restrictive movements during pandemics and outbreaks and the negativity attached to mental illnesses and lack of funds can hinder the attainment of health behaviour (Corrigan and Bink 2016: 230). For health behaviour to be attained, the consequence of the barriers or obstacles will be lesser than the perceived new behaviour (Janz and Becker 1984: 1; Sibaya and Ramlucken 2021: 1).

3.3.5 Modifying Variables

Modifying variables are characteristics peculiar to an individual which decide whether there would be the adoption of health behaviour (Janz and Becker 1984: 1). Modifying variables can include but are not limited to educational background, access to mobile phones, age of the individual, location of mental

healthcare providers, stigmatization, shortage of resources and mental health care providers, booking of appointments (Corrigan and Bink 2016: 230). Digital tools (mobile phone, Internet, wearable etc), can also serve as modifying variables in mitigating against barriers and enhance the adoption of health behaviour (Riley *et al.* 2011: 53; Corringa and Bink 2016: 230)

3.3.6 Cues of Action

Cues of action are indicators that encourage an individual to adapt to the new behaviour. These include mental health events (Olumade *et al.* 202: 736), radio and television mental health campaigns, churches preaching about coping strategies and support systems such as family members, acquaintances and friends. Furthermore, cues of action such as the media, support system and loved ones (Olumade *et al.* 2021) will also strengthen the health behaviour which invariably enhances positive attitude and improved mental health (Kasayira and Chireshe 2010: 203).

3.3.7 Self-Efficacy

Self-efficacy means an individual's ability to perform a task (Janz and Becker 1984: 1). Individuals can develop a positive outlook on life and function effectively mentally. Kasayira and Chireshe (2010: 203) found that people impacted with HIV/AIDS and poverty but with a positive outlook on life report lower levels of mental illness.

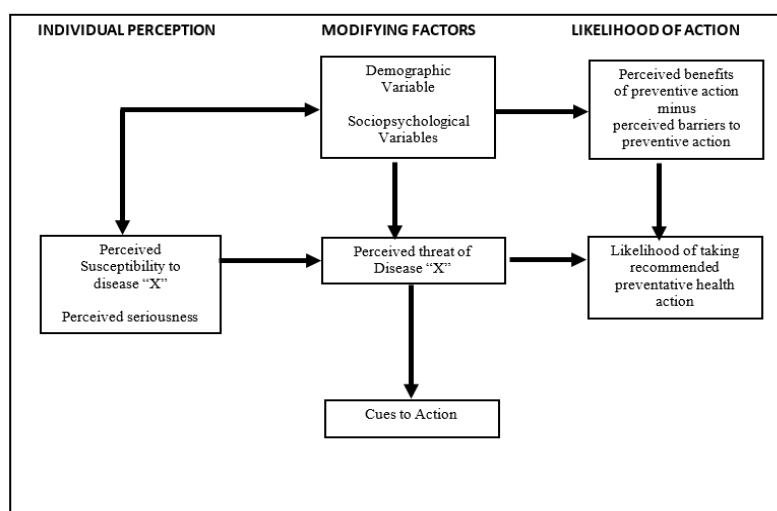


Figure 3.1. Health Belief Model (HBM) (Janz and Becker 1984)

3.4 CONSTRUCT OF UNIFIED THEORY OF ACCEPTANCE AND USE OF TECHNOLOGY (UTAUT) MODEL

The UTAUT (Figure 3.2) examines individual factors that affect the acceptance and usage of digital tools (Vankatesh *et al.* 2003: 425; Marchewka and Kostiwa 2007: 93; Dwivedi *et al.* 2019: 719). UTAUT model identifies four constructs (Performance Expectancy, Effort Expectancy, Social Influence and Facilitating Condition) that influence the acceptability and use of technologies (Vankatesh *et al.* 2003: 425; Marchewka and Kostiwa. 2007: 93; Dwivedi *et al.* 2019: 719).

3.4.1 Performance Expectancy

Performance expectancy construct is determined by the individual level of conviction that technologies can aid in the improvement of performance. Technologies substantially influenced performance expectancy with moderating factors such as age and gender (Vankatesh *et al.* 2003: 425; Marchewka and Kostiwa. 2007: 93; Dwivedi *et al.* 2019: 719).

3.4.2 Effort Expectancy

Effort expectancy is the level of comfortability with the use of technologies (Vankatesh *et al.* 2003: 425). The correlation among Perceived ease of use, Ease of use and the Intention of use are moderated by age, gender and experience (Vankatesh *et al.* 2003: 425; Marchewka and Kostiwa 2007: 93; Dwivedi *et al.* 2019: 719). This posits that acceptance and utilization of digital health technologies will be influenced by the age of the individual, and it could be more accepted and utilized among males with experience compared to females.

3.4.3 Social Influence

Social Influence has to do with the expectation of others concerning the use of technologies (Vankatesh *et al.* 2003: 425). Factors embedded in Social Influence include image, subjective norm and moderating factors for social influence that incorporate age, gender, experience and voluntariness (Vankatesh *et al.* 2003: 425; Marchewka and Kostiwa. 2007: 93; Dwivedi *et al.* 2019: 719).

3.4.4 Facilitating Conditions

The Facilitating condition is the degree to which the individual believes in the availability of infrastructure that can aid in the use of technologies (Vankatesh *et al.* 2003: 425). Factors that moderate Facilitating conditions are experience and age (Vankatesh *et al.* 2003: 425; Marchewka and Kostiwa 2007: 93; Dwivedi *et al.* 2019: 719). Expectations of mental health service providers and family members can aid in the utilization of digital health technologies by mental health patients.

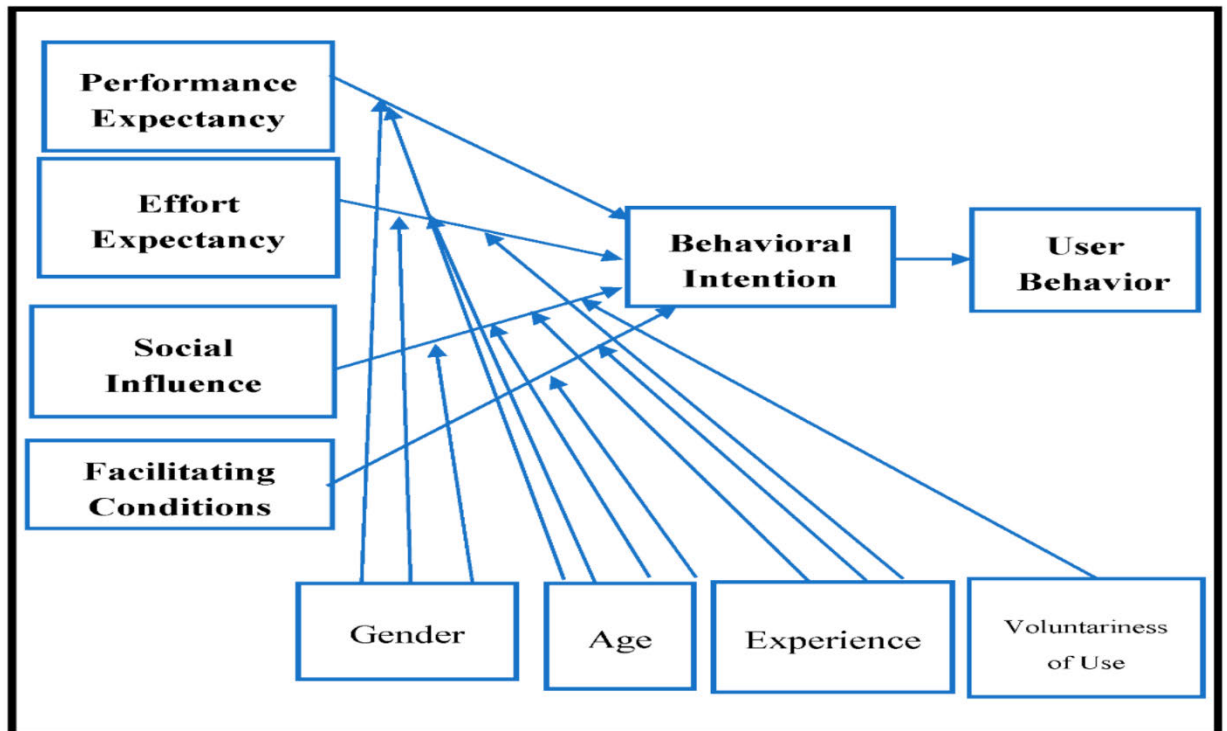


Figure 3.2. The Unified Theory of Acceptance and Use of Technology (UTAUT) Model (Vankatesh et al. 2003)

The HBM corroborated the UTAUT model in the utilization of digital technology. The realization that mental health issues could become severe if untreated, will propel an individual to embrace and utilize tools that are beneficial to his state of health and wellness.

3.5 THEORETICAL FRAMEWORK AND MODEL DEVELOPMENT

The Health Belief Model (HBM) is a psychological framework that seeks to understand and predict health-related behaviours by examining individuals' beliefs and perceptions about health threats and the perceived benefits of taking action to reduce those threats. Thus, principles of the HBM are relevant to the utilization of digital technologies for mental health services, and it is applicable within the context of this research study. The HBM suggests that individuals are more likely to take action to address a health issue if they

perceive themselves as susceptible to the condition and if they perceive the condition as severe. In the context of mental health, digital technologies can play a crucial role in increasing individuals' awareness of mental health issues and their potential severity. Through educational content, online screenings, and interactive platforms, individuals can better understand the prevalence and impact of mental health disorders, thereby increasing their perceived susceptibility and severity, which may motivate them to seek out digital mental health services. More so, as individuals weigh the perceived benefits of taking action against the perceived barriers or costs, digital mental health services can address some of the barriers commonly associated with traditional in-person services, such as cost, accessibility, and stigma. For example, online therapy platforms offer convenience, affordability, and anonymity, which can increase the perceived benefits of seeking mental health support. Additionally, digital interventions can provide tailored and accessible support, which may outweigh perceived barriers such as time constraints or discomfort with face-to-face interactions. Furthermore, the HBM proposes that individuals are prompted to take action when they encounter cues that trigger thoughts about their health status and the recommended actions to take. Digital technologies can serve as powerful cues to action through various channels, including social media campaigns, targeted advertisements, personalized recommendations, and reminders within mental health applications. These cues can remind individuals to engage with mental health services, encourage them to track their symptoms or progress, and prompt them to seek help during times of distress.

Conversely, The Unified Theory of Acceptance and Use of Technology (UTAUT) posits that the intention to use a technology is influenced by four key factors: performance expectancy, effort expectancy, social influence, and facilitating conditions, moderated by gender, age, experience, and voluntariness of use. The relevance of UTAUT in this study cannot be overemphasized as the model offers valuable insights into understanding and predicting the adoption and utilization digital technologies by both mental health practitioners as well as the service users.

Performance expectancy refers to the degree to which an individual believes that using a particular technology will help them perform better or achieve positive outcomes. In the context of mental health services, digital technologies such as tele-therapy platforms, mental health apps, and online support communities can offer convenience, accessibility, and anonymity, leading to improved mental well-being. Mental health practitioners may perceive these technologies as effective tools for reaching and engaging with clients, enhancing the quality and efficiency of service delivery. Effort expectancy which relates to the perceived ease of use and usability of a technology, may practically imply that mental health professionals and service users will be more inclined to adopt digital mental health solutions if they find them user-friendly, intuitive, and compatible with their existing workflows or treatment routines. Interventions that are seamlessly integrated into daily practices and require minimal technical expertise are more likely to be embraced by practitioners and accepted by clients.

Furthermore, social influence encompasses the impact of social factors, such as norms, opinions of others, and peer recommendations, on technology adoption decisions. Within the context of mental health services, the endorsement of digital technologies by professional organizations, colleagues, or trusted individuals can influence practitioners' attitudes and intentions to incorporate these tools into their practice. Similarly, positive feedback and support from peers or social networks can encourage individuals seeking mental health support to utilize digital platforms. Facilitating conditions, which refer to the availability of resources, support, and infrastructure necessary for using a technology effectively, this means that, factors such as access to reliable internet connectivity, adequate training and technical support for practitioners, data privacy and security measures, and reimbursement policies can influence the feasibility and sustainability of implementing digital technologies. Addressing these facilitating conditions is crucial for ensuring the successful adoption and utilization of digital mental health solutions.

The HBM does not only offer valuable insights into factors that influence individuals' decisions to utilize digital technologies for mental health services, but also plays a crucial role in developing a model for the utilization of digital technologies. By understanding and addressing individuals' beliefs, perceptions, and motivations, digital mental health interventions can be designed to effectively promote engagement, improve access to care, and enhance mental health outcomes. Similarly, UTAUT provides a comprehensive framework and also plays a vital role in understanding the factors influencing the adoption and utilization of digital technologies in the provision of mental health services. Additionally, UTAUT recognizes the moderating effects of demographic variables (e.g., age, gender) and contextual factors (e.g., voluntariness of use) on technology acceptance. Therefore, understanding these nuances can inform the development and implementation of a model for digital technological interventions to cater for diverse user needs and preferences.

3.6 INTEGRATION OF UTAUT AND HBM MODEL

This study Integrates UTAUT and HBM model is to provide a complementary perspective in explaining HCPs' behaviour toward the use of digital technologies in providing services. The UTAUT model outperformed other technology acceptance model such as Theory of acceptance (TAM), theory of planned behaviour (TPB), theory of reasoned action (TRA) etc (Vankatesh *et al.* 2003: 425; Dwivedi *et al.* 2019: 719) in the prediction of HCPs' utilization of digital technologies. The HBM model explain factors that may predispose those that are in need of mental health services to embrace health behaviour. Individuals perceived mental illness as a serious disease and they also identify the likely risk it poses. Digital technologies are embraced when people perceived the potential benefit it can provide in supporting their mental health. These benefit may include assessing mental health information over the media or online. Individuals may perceive themselves as susceptible to mental illness

due to the burden of COVID-19 and the challenges that came along with it. The integration of the two models may provide a good model-fit in the development of the proposed model that will integrate digital technologies into mental healthcare service delivery.

3.7 SUMMARY OF THE CHAPTER

This chapter presents the theories that guided the study. It outlines the significant contributions of the HBM and UTAUT models to mental health and ways to enhance service delivery in healthcare.

CHAPTER 4: RESEARCH DESIGN AND METHODOLOGY

4.1 INTRODUCTION

The chapter highlights the research methodology and details the research design, targeted population, paradigm, data collection technique as well as the technique that was employed in data analysis. This chapter details a step by step approach on how data was gathered and analysed.

4.2 RESEARCH DESIGN

This study adopted mixed methods convergent design. Mixed methods approach is an exhaustive research design that provides a broad understanding of the research questions which only qualitative or quantitative design may not adequately explain (Creswell 2014: 43). Mixed methods approach is a way of addressing research problems and it provides ease to inquiries when qualitative and quantitative methods alone cannot provide justification (Creswell and Plano Clark 2017: 114). It is a way of compensating for the weakness of quantitative and qualitative research methods and utilizes all data collection tools in collection, analysing both quantitative and qualitative data and integrating the result from both analyses to gain an in-depth understanding and wider perspective of the research (Creswell 2014: 43; Creswell and Plano Clark 2017: 114). This study utilized mixed methods because they afford a deeper, concrete and more complete perspective of HCPs on the shortfalls of healthcare service delivery in public mental healthcare services, challenges in utilizing digital tools and a framework which will guide the development of a model that is workable in public mental healthcare system. The design involved the utilization of both quantitative and qualitative instruments for data collection to gain a comprehensive difference in perspective of the respondents on the research. Data was collected and analysed and all variables were measured and findings

collated contemporaneously, and most importantly, the data was collected at only one point in time (Creswell 2014: 43; Morse 1991: 120). For participants, the advantage is that both quantitative and qualitative data were collected concurrently (Morse 1991: 120). The convergent mixed method was utilized for the collection of quantitative and qualitative data. Both qualitative and quantitative data were analysed separately and triangulation was conducted. Triangulation allows the results of both data analyses to be combined and compared to gain an overall perspective of the study. Mixed methods convergent design is represented with the diagram in Figure 3.

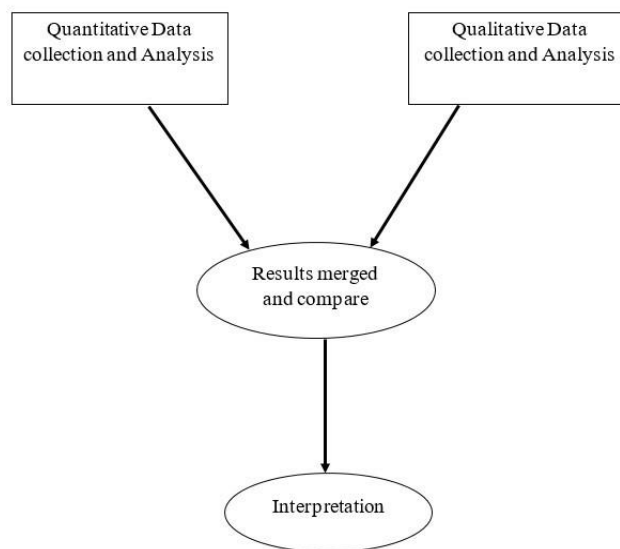


Figure 4.1. Mixed method convergent design (Creswell and Plano Clark 2017)

The UTAUT and HBM models guide the development of the instrument used for qualitative and quantitative data collection. The constructs of HBM (perceived susceptibility, perceived seriousness, perceived barriers, perceived seriousness), its modifying variables (educational background, age, access to phones, stigma, facility location) and UTAUT (performance expectancy, effort expectancy, social influence and facilitating conditions) models guide the survey questionnaires and also the in-depth interview guide. This provides

insight, explore intentions and identify benefits and barriers in using digital technologies in mental health service delivery.

4.3 RESEARCH PARADIGM

Paradigm denotes “philosophical assumptions or the basic set of beliefs that guide the actions and define the worldview of the researcher” (Lincoln *et al.* 2011: 91). It details overview, standpoint and assumptions of researchers concerning knowledge. Paradigm is a theoretical and empirical approach that emphasizes ontology, epistemology, theoretical perspective, methodology and methods in research (Abbott 2004: 42). Types of paradigms includes positivism, constructivism, pragmatic, subjectivism and critical approaches. Positivism focuses on quantitative enquiry, constructivism guides qualitative study while pragmatism is the combination of both qualitative and quantitative enquiry (Creswell and Plano Clark 2011).

- Positivism: this assumes an objective reality that can be measured and observed. In the study, mental health services, wellbeing and integration of digital technologies are viewed as measurable entities within the public healthcare system in Nigeria.
- Epistemology: seek to discover general laws or cause-and –effect relationship through empirical observations and quantitative data analysis.
- Constructivism: acknowledges that reality is socially and constructively constructed. In this context, it would recognises mental health services, wellbeing, and integration of digital technologies as complex phenomenon influenced by various actions and context within the Nigeria public healthcare system.
- Methodology: mixed methods combines quantitative and qualitative approaches to gain a comprehensive understanding of possible factors to be considered in integrating digital technologies to improve mental health services and wellbeing in public healthcare system in Nigeria. The

study utilizes mixed method convergent design which identify areas of disagreement and comparison.

Mixed methods came as a bridging gap between qualitative and quantitative study and attempt to integrate both qualitative and quantitative approaches (Creswell and Plano Clark 2011). Pragmatism is a philosophical paradigm that emphasizes practical consequences and real-world experiences as the basis for determining the truth or value of beliefs, theories, and actions. Pragmatism rejects the idea of absolute or fixed truths and instead focuses on the practical outcomes of ideas and actions in shaping human experience and solving problems (Morgan 2014: 26). A key assumption of pragmatism as a theoretical paradigm is re-evaluation of a situation. In pragmatism, the re-evaluation of a situation is a fundamental assumption that aligns with the paradigm's emphasis on practical consequences and flexibility in understanding truth and knowledge. Pragmatism posits that beliefs, theories, and knowledge are not fixed or absolute but are instead subject to revision based on new experiences, evidence, and outcomes.

This assumption is rooted in the pragmatist view that the value of beliefs and theories lies in their practical implications and usefulness in navigating and adapting to the complexities of the world. In essence, the assumption of re-evaluation in the pragmatism paradigm underscores the dynamic and iterative nature of knowledge acquisition and problem-solving. By remaining open to new perspectives, evidence, and outcomes, individuals can engage in more adaptive, effective, and responsive approaches to navigating the complexities of the world. Pragmatism provides a framework for fostering adaptive, inclusive, and effective responses to the challenges of contemporary society. It is important to know that it is still an ongoing debate if pragmatism is the correct paradigm for mixed methods, as constructivism, realism and interpretivism are also used, and well debated.

The view of Morgan (2014) that every individual has a unique experience even in same circumstances, which shape our belief and “shared social belief” could also be related to realism. However, pragmatism differs from realism, which asserts the existence of an objective reality independent of human perception. While realists aim to uncover the truth about this external reality, pragmatism prioritize the usefulness and practical implications of beliefs and theories, often acknowledging that truth may be context-dependent and subject to revision.

This study utilizes the Pragmatic approach as it aligns with its objectives and methodology. More so, there is need to re-evaluate reality and present “new unpredictable situations” (Abbott 2004: 42). Actions cannot be separated from the situations and contexts in which they occur, likewise every individual has a unique experience even in same circumstances, which shape our belief and “shared social belief” (Morgan 2014: 26). The study utilised mixed methods in the development of a model that will enhance mental health care service delivery and wellbeing in public mental health facilities in Nigeria.

4.4 SETTING

The research setting is the location in which data for the study was collected (Polit and Beck 2012: 743). The setting geo-political zone for this study was South-West in Nigeria. The South-West geo-political zone comprises six states namely Ondo, Ogun, Osun, Lagos, Oyo and Ekiti. Four psychiatric hospitals in the South-West geo-political zone were utilized for this study because of the present insecurity in Nigeria (Afzal 2020). Travelling to other parts of Nigeria seems unsafe at the moment. The selected states for this study were Lagos State, Ogun State, Oyo State and Ondo State. The study sites for this study included Neuropsychiatric Hospital Yaba, Lagos State; ARO Neuropsychiatric hospital Abeokuta, Ogun State; Department of Psychiatry, University of Ibadan Teaching Hospital, Oyo State; and Neuropsychiatric Hospital, Akure, Ondo State. These mental healthcare facilities are Government-owned psychiatric hospitals that provide both in-patient and out-patient services. The

aforementioned four hospitals are the only public psychiatric hospitals in these four states except for Yaba Neuropsychiatric hospital with an annex in Oshodi, and ARO Neuropsychiatric hospital whose annex is in Lantoro, Abeokuta. The University of Ibadan Teaching Hospital, Oyo State operates a dedicated neuropsychiatric department among various other medical departments, the neuropsychiatric hospitals in Lagos, Ogun and Ondo States provide mental health services only. Nevertheless, all the hospitals have administrative, clinical services, training and research, and directorate departments, with affiliated units under each department. However, the selected hospitals differ in terms of landmass, capacity and staff strength.

4.4.1 Lagos State

Yaba Neuropsychiatric hospital situated in Lagos State and one of the first psychiatric hospitals in Nigeria. It was formerly used as an asylum to remove the mentally ill from the society (Bilaminu and Aina 2020:12). The institution provides training for resident psychiatrists, has both in and out-patient treatment and has over 1 000 staff members which include doctors and nurses (Bilaminu and Aina 2020: 12).

4.4.2 Ogun State

ARO Neuropsychiatric hospital is in Ogun State. It started out as an institution for soldiers with mental illness but was later converted to a neuropsychiatric hospital (Bilaminu and Aina 2020: 12). ARO is the first psychiatric hospital to debut a School of Psychiatric nursing. It provides both in and out-patient services and is invested in mental health research (Bilaminu and Aina 2020: 12).

4.4.3 Ondo State

Neuropsychiatric hospital Akure is situated in Ondo State. It is a state managed psychiatric hospital which provides mental health services to patients within the state and environs (Edward *et al.* 2020: 1; Agara and Onibi 2007: 272). The facility also provides both in-patient and out-patient mental health services (Agara and Onibi 2007: 272).

4.4.4 Oyo State

University of Ibadan Teaching Hospital, Oyo State is a federal government owned and managed psychiatric hospital. The Psychiatric unit of the hospital provides both theoretical and practical training for psychiatrists and creates a platform for research (Gureje *et al.* 1995: 125). It provides psychiatric care to both adults and children within the state and its environs (Gureje *et al.* 1995: 125).

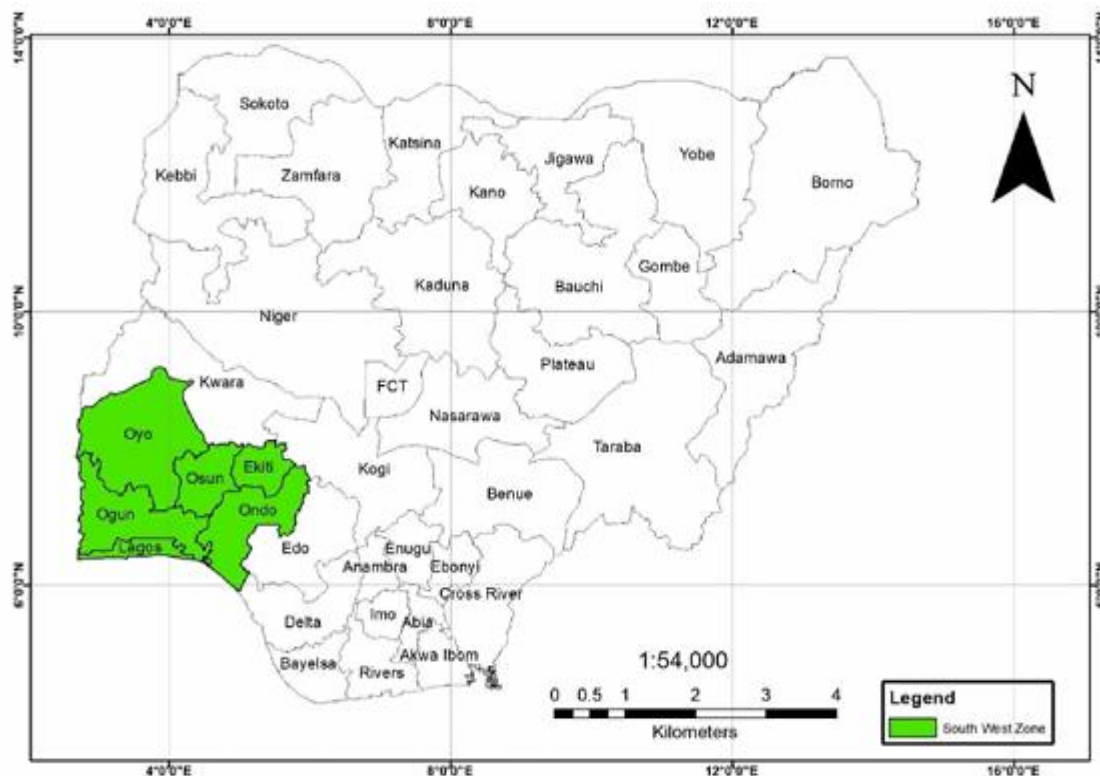


Figure 4.2. Map of Nigeria showing Study Setting (Oladehinde *et al.* 2018: 46).

4.5 STUDY POPULATION

The participants for this study entailed HCPs who provide mental health care services at the four psychiatric hospitals located in the South-West geo-political zone in Nigeria. These includes Clinical Psychologists, Psychiatrist Doctors, Psychiatric Nurses and Occupational therapists. The total number of these HCPs in the four selected facilities is 345 as tabulated below in Table 4.3.

4.5.1 Inclusion criteria

- HCPs with two years or more working experience in mental health facilities. These health care workers would have had a reasonable insight into the challenges of their patients.
- HCPs currently working in the four selected facilities.

4.5.2 Exclusion criteria

- Administrative staff members are excluded because they do not work directly with patients with mental illness
- Clinicians on internships were excluded from this study because they may not be available for data follow up.
- Social Workers were also excluded since they do not make mental illness diagnosis but only follow up selected cases.

4.6 SAMPLING PROCESS

4.6.1 Sampling technique(s) and sample size

4.6.1.1 Qualitative study

A non-probability, purposive sampling technique was used to select participants for qualitative study. Purposive sampling method is a non-probability sampling method whereby participants are selected based on the research and can provide crucial information in understanding the study phenomenon (Schuman and Kalton 1985: 635; Creswell and Plano Clark 2017: 114). Purposive sampling is a sampling method employing the snowball method in which pre-informed HCPs identified and recruited other HCPs (population of interest) for the study (Creswell 2014: 43). The sample size for qualitative study was 16. Four HCPs were selected from the sample size from each of the mental health facilities. Purposive sampling method was done such that, pre-informed HCPs who met the inclusion criteria were identified and contacted to participate in the study (Creswell 2014: 43). In addition to meeting the inclusion criteria, HCPs were purposely selected to participate in the qualitative study based on their professional experience and knowledge on the topic under research. Thus, the researcher utilized the snowball method to select sixteen HCPs (Clinical Psychologist; Occupational Therapists; Psychiatric Doctors; and Psychiatric Nurses), across the study area to participate in the qualitative study. The sampling technique was suitable to examine the diverse range of cases that

are all relevant to the utilization of digital technology in mental health service provision.

4.6.1.2 Quantitative study

Proportional stratified sampling was utilized for selecting participants for the quantitative study. Proportional stratified sampling is a probability sampling method in which everyone in the population has equal chances of inclusion (Grinnell and Unrau 2008; Iliyasu and Etikan 2021: 24). Embedded in the population are small units or strata of the population with specific characteristics. These strata have unequal numbers of stratum but to increase the chances of participation in each stratum with smaller numbers, a Probability Proportion to Size (PPS) technique was utilized (Iliyasu and Etikan 2021: 24; Kothari and Garg 2019: 63). PPS assured participants with smaller cluster have equal probability as participants with larger clusters, which increases the chances that every individual in a cluster has equal chances (Kothari and Garg 2019: 63). The population of HCPs in each of the four selected facilities was divided into strata based on their specialization (Clinical Psychologist, Psychiatrist, Psychiatric Nurse, Occupational Therapist) but some specialization has larger numbers of participants while some very few, therefore to ensure professionals with few numbers had equal chances to the larger group, PPS utilised Taro Yamane 1973 formula (Uakarn, Chaokromthong and Sintao 2021: 76). Taro Yamane formula (equation 4.1) was employed in calculating the samples from each cluster as shown in Table 4.2.

$$n = \frac{N}{1 + Ne^2} \quad (4.1)$$

Where:

n = sample size

N = total population

e = margin error value is 0.05

Margin error indicates random sampling error which is as a result of variation in sampling from the sample population. The total population is shown in Table 4.1.

Table 4.1: The total population of HCPs at the four selected psychiatric hospitals

Population	Psychiatric Doctors	Clinical Psychologist	Psychiatric Nurses	Occupational Therapist	Total population
Aro Neuropsychiatric Hospital	38	6	80	13	137
Yaba Neuropsychiatric Hospital	29	25	37	8	99
University of Ibadan Teaching Hospital	18	12	32	10	72
Neuropsychiatric hospital, Akure	11	4	18	4	37
TOTAL	96	47	167	35	345

Table 4.2: Selected samples from the four psychiatric hospitals using Taro Yamane formula

HCP	Psychiatric Doctors	Clinical Psychologist	Psychiatric Nurses	Occupational Therapist	Total Sample
Aro Neuropsychiatric Hospital	35	6	67	13	121
Yaba Neuropsychiatric Hospital	27	24	34	8	93
University of Ibadan Teaching Hospital	17	12	30	10	69
Neuropsychiatric Hospital, Akure	11	4	17	4	36
TOTAL	90	46	148	35	319

Participants that filled the survey include 319 HCPs from the four selected mental health facilities. A feature that could affect the survey is non-response. It is a situation in which responses are not provided on all variables on the survey (Sadiq 2011: 207; Särndal and Lundström 2005). Non-response could be item or unit. Non-response unit is when there is an omission on all the sections on the survey while non-response item is skipped question in a particular section on the survey (Särndal and Lundström 2005).

The formula $\frac{n}{(1-0.05)}$ (equation 4.2) was used to calculate non-response rate in anticipation of a 5% non-response rate. Table 4.3 below showed the calculation of the non-response rate in each cluster, which is the number of participants that were given the questionnaires in each cluster and the exact sample in each cluster that handed in a completed questionnaire.

Table 4.3: Non-response rate calculation

HCP	Psychiatric Doctors	Clinical Psychologist	Psychiatric Nurses	Occupational Therapist	Total Sample

Aro Neuropsychiatric Hospital	37	6	71	14	128
Yaba Neuropsychiatric Hospital	28	25	36	8	97
University of Ibadan Teaching Hospital	18	13	32	11	74
Neuropsychiatric Hospital, Akure	12	4	18	4	38
TOTAL	95	46	157	37	337

4.7 DATA COLLECTION PROCESS

4.7.1 Qualitative study

A semi-structured interview guide (Appendix 8b) was utilized in the collection of qualitative data. One-on-one face-to-face in-depth interviews were conducted to collect data due to the sensitive nature of the questions and to generally ensure the accuracy of the data. Participants were first given letter of information (Appendix 6b) about the study, then a consent form was given to participants to sign before commencing the interview. Participants were given a copy of the interview guide to enable them go through and get familiar with the interview questions before commencing each interview session and in some instances, participants requested to keep the interview guide for official reference purpose. A voice recording device was made available to record each interview session in order to capture details of participants' responses. The researcher booked appointments with the HCPs prior to data collection, although some participants prefer to have their interview over the phone after close of work due to their hectic workload. To mitigate clash of interview appointments and maximize participants availability, the researcher trained two (2) research assistants on the administration, recording, and notes taking of key

points/themes from participants' response during interview sessions. After the training, both the researcher and the assistants repeatedly practiced and perfected the data collection process before engaging with the selected HCPs. The researcher interviewed majority of the participants and conducted two interviews telephonically. The semi structured interview guide aids in establishing participant's subjective experience regarding the study, evaluating, affirming, disapproving and expounding prevailing viewpoint (McIntosh and Morse 2015: 1). Semi-structured interviews were conducted with the assistance of trained research assistants in a well-ventilated room and where participant felt comfortable, and COVID-19 regulations were upheld. Social distance was maintained during interview sessions, participant/researcher/research assistants sanitized at the entrance of the interview room and the use of a facemask was adhered to.

4.7.2 Quantitative study

A survey questionnaire (Appendix 9) was used to collect data from the participants. Self-developed questionnaires and adapted questionnaires were utilized in this study. Electronic-Therapy Attitude and Process questionnaire-Therapy version developed by Clough Rowland and Casey (2019:1) were adapted to assess the perception of mental health workers towards the utilization of digital technologies to improve mental healthcare services. The instrument has a reliability coefficient of 0.91 Cronbach alpha. A questionnaire that measured knowledge of digital tools, barriers to the provision of mental healthcare services and wellbeing through digital technology and factors affecting provision of mental healthcare services in public healthcare was self-developed. Subsequently, the adapted Electronic-Therapy Attitude and Process questionnaire showed a reliability coefficient of 0.86 Cronbach alpha.

It is imperative to note that questionnaires were in English as English is the only recognized language for communication in official settings in Nigeria. Also this study's participants are professionals who were comfortable speaking English.

Prior to the distribution of the questionnaires, participants were given a letter of information (Appendix 6a) about the study and then a consent form was given to participants to sign. The structured questionnaire was disseminated to the HCPs (337) in their respective offices with the assistance of trained research assistants. Completed questionnaires were collected afterwards. The researcher and trained research assistants were available to assist when necessary and confidentiality was maintained. Additionally, three (3) research assistants were trained on the distribution collection and interactions with/or providing assistance to participants while maintaining confidentiality. After the training and practice, both the researcher and the trained research assistants administered the questionnaires across the four selected facilities over a period of three weeks. Questionnaires were administered during office hours and retrieved after few days. However in some cases, due to time, convenience and confidentiality, some respondents asked research assistants to come back a week after distribution to retrieve the completed questionnaires. A total of 337 questionnaires were distributed however, 17 questionnaires were not returned, while 3 questionnaires had incomplete information. A total of 317 completed questionnaires were collected and analysed. It is important to note that COVID-19 regulations were strictly maintained. The researcher and all research assistants wore face masks, maintained social distance and sanitized during distribution and collection of questionnaires. Washing of hands was also encouraged before the distribution of questionnaires and after collection.

4.8 PRE-TESTING OF THE DATA COLLECTION TOOLS

Data pre-testing was done using self-developed questionnaires prior to the main data collection (Polit and Becks 2012: 296). Pre-testing of the questionnaires, which was in English was conducted using a total of ten participants. The self-developed questionnaire was piloted on HCPs in Yaba Neuropsychiatric hospital annex in Lagos state and ARO Neuropsychiatric hospital annex in Ogun state. These two facilities were used because of the higher number of HCPs there when compared to others. A pre-test was

conducted on the subsection of the population of interest to ascertain validity and reliability of the instrument (Chawla and Sondhi 2016: 228). A total number of 10 participants participated in the pre-testing of data and these participants did not partake in the main study. Purposive and snowball sampling techniques were used to recruit participants. The reason for these sampling methods was to ensure a homogenous sample such that participants recruited are strictly mental health professionals with hands-on experience in clinical practice. Ten copies of the questionnaire were administered and retrieved within one week. Thus, a total of ten questionnaires were retrieved, out of these, one questionnaire was completed by a respondent who did not meet the inclusion criteria, and it was excluded. A total of nine were coded for demographic and psychometric analyses.

Results of inter-item correlations among 12 items designed to assess perceptions about digital technologies that could be effectively utilized to provide mental healthcare services showed that the majority of the items reported high positive inter-item correlation values greater than or equal to ≥ 0.70 . Result further shows a reliability coefficient of $\alpha = 0.92$ Cronbach's alpha as reliability of the 12-item scale. Thus, all 12-items on this scale were considered reliable to measure the variable of interest.

The inter-item correlations were among 30 items that were designed to assess perceptions of mental health workers towards the utilization of digital technologies in providing mental healthcare services. Majority of items showed perfect inter-item correlations ($r = 1$) and high positive correlation values greater than or equal to ≥ 0.70 . Result further shows a reliability value of $\alpha = 0.97$ Cronbach's alpha as reliability of the 30-item scale. Thus, all 30-items on this scale were considered reliable to measure the variable of interest.

Results of inter-item correlations among 18 items designed to assess perceived barriers to the provision of mental healthcare services and wellbeing through digital technologies show that the majority of the items reported perfect inter-

item correlations ($r = 1$) and high positive inter-item correlation values greater than or equal to ≥ 0.70 . Result further shows a reliability value of $\alpha = 0.81$ Cronbach's alpha as reliability of the 18-item scale. Thus, all 18-items on this scale were considered reliable to measure the variable of interest.

Results of inter-item correlations among 18 items designed to assess factors perceived to be affecting the provision of mental health services and wellbeing in public healthcare in Nigeria show that majority of the items reported perfect inter-item correlations ($r = 1$) and high positive inter-item correlation values greater than or equal to ≥ 0.70 . Thus the 18 items on this scale were considered reliable to measure the variable of interest. Participants that participated in the pre-testing phase also reported that the questionnaire is unambiguous, clear, informative and easy to complete.

4.9 DATA ANALYSIS

Data analysis entails a methodical organization and integration of data. The approach is that the researcher analyses both quantitative and qualitative data in a systematic process so as to generate a compelling conclusion (Polit and Beck 2012: 725; Onwuegbuzie and Combs 2011: 1).

4.9.1 Qualitative Study

Thematic analysis was used in analyzing qualitative data. Thematic analysis is a data analysis technique that provides an organised, qualitative process to make justifiable deductions from oral or printed data so as to depict and measure a particular phenomenon (Downe-Wambolt 1992: 313). Thematic analysis provides a resonant, comprehensive yet convoluted description of data (King 2004). It is a way of exploring individual viewpoints, experiences emphasizing relationships, disparities and generating unexpected insights in research (Braun and Clarke 2006: 77). The following steps guide the qualitative data analysis:

- The researcher records the entire interview on an audio device.
- Familiarisation and transcription of the audio recording verbatim.
- Generation of codes.
- Transcripts are carefully read through to identify occurring themes.
- Presentation and description of identified themes.

4.9.2 Quantitative Study

Latest version of SPSS was employed to compute descriptive analysis (e.g., mean, standard deviation) to provide an overall picture. Structural Equation Modeling (SEM) was also computed for quantitative data. SEM is a unique and versatile data analysis model because it tested variables that have both direct and indirect influence among identified variables (Fan *et al.* 2016: 1). SEM is a multivariate analysis technique, more comprehensive and flexible because it evaluates identified variables in the research model in explaining the integration of digital technologies to mental health care service delivery. SEM also performs confirmatory factor analysis and test validity of theories used (Fan *et al.* 2016: 1). This study used SMART-PLS version 4 with a Structural Equation Model (SEM) to evaluate the statistical significance of UTAUT and HBM model respectively. This approach is frequently used in social science studies because of its accuracy in psychometric model analysis (Kim and Lee 2020: 1). SMART-PLS is a common technique for estimating path models with hidden variables and their relationships. The major aim of PLS-SEM analysis is to identify important factors of success, their sources of competitive advantage for key target constructs of the UTAUT and HBM models, and how these constructs influence user behaviour.

4.9.3 Triangulation

Triangulation is way of increasing the credibility and validity of research (Creswell and Plano Clark 2017: 114; Bans-Akutey and Tiimub 2021: 3392;

Helen and Roberta 2019: 67). It increases the understanding and rigour of the phenomenon under investigation (Creswell and Plano Clark 2017: 114; Bans-Akutey and Tiimub 2021: 3392). Limitation and biases of using findings from only qualitative and quantitative source is also minimized (Helen and Roberta 2019: 67). Triangulation allows convergence, complimentary and expansion of research findings. There are four types of triangulation (Bans-Akutey and Tiimub 2021: 3392; Helen and Roberta 2019: 67) namely: Data triangulation, which utilizes diverse sources of data; investigator triangulation, which uses different method of investigations; theory triangulation, which allows the use of multiple theories in understanding and explaining the research under investigation and methodological triangulation, which utilizes both qualitative and quantitative data. This study utilized the qualitative and quantitative findings to achieve triangulation. This enables complimentary of research findings and enhanced in-depth understanding of the research. Findings from the triangulation was utilized in the development of the contemporary model that integrates digital technologies into mental health service delivery in Nigeria.

4.10 TRUSTWORTHINESS

Trustworthiness was achieved using Lincoln and Guba's (1985) five-dimension criteria for qualitative data. These constructs include credibility, dependability, confirmability, transferability and authenticity. For researchers, ensuring trustworthiness is a way of showing the research is credible (Lincoln and Guba 1985). The researcher utilized appropriate data collection technique for qualitative data.

4.10.1 Credibility

To achieve credibility, the researcher presents accurate facts about the research under investigation (Lincoln and Guba 1985). Credibility was ensured by gathering information from those participants who meet the inclusion criteria. Participants who meet the selection criteria are believed to have first-hand

knowledge of the phenomenon under discussion. HCPs who do not two years working experience in mental health facilities were excluded from the research because their knowledge of mental illness and services is at infancy state, likewise non-medical staff were excluded because they do not have direct interaction with individuals with mental illness. Participants were interviewed individually to avoid bias using in-depth open-ended questions and their responses were audio recorded and later transcribed verbatim. To ensure credibility, all interviews were recorded on an audio device, notes were taken, and participant's quotes were reported. The researcher repeatedly played participant's responses to ensure all information are captured and transcribed to ascertain confidence in the data. The researcher and assistant researchers did not interfere with the interview and saturation was attained during the session. The verbatim reports were kept under lock and key and would be used as resource documents, but confidentiality was taken into consideration. Finally, the researcher personally conducted all interviews in the four locations to ensure consistent follow-up on questions.

4.10.2 Dependability

Dependability is the stability of data over time and conditions, and it asks whether the findings could be replicated, should the study be repeated with the same participants under similar conditions (Polit and Beck 2014: 584). Dependability is met when the study has satisfied the requirements for audit trail, dense description of research methods, and audit strategies. In this study, the researcher facilitated an in-depth interview session until saturation was achieved. Tape recordings of each session were transcribed by the researcher.

4.10.3 Confirmability

Confirmability refers to objectivity and accuracy of the findings after being confirmed by other researchers (Moule and Goodman 2014: 190). According to Polit and Beck (2014: 420), the researcher reported information provided by the

participants and the researcher excluded her opinion or views on the interview questions. The researcher did not interrupt interview sessions and the researcher took a decisive step to establish that findings from the study are not based on the researcher's personal beliefs. The researcher bracketed her personal experiences and feelings related to the topic by ensuring not to express her own thoughts, opinion and prejudices about the topic. Proper documentation of data collection tools was ensured to allow for auditing (Lincoln and Guba 1985; Koch 1994: 976). Audio recordings in addition to direct quotes of HCPs were captured and the researcher and research assistants' subjective feelings, bias and opinion were eliminated.

4.10.4 Transferability

Transferability means that the findings have applicability in other contexts (Tracy 2013: 239). Polit and Beck (2014: 524) suggest that researchers should provide detailed descriptions of their studies so that readers can evaluate their applicability to other settings. Thick description refers to a rich and thorough description of the research setting and of observed transactions and processes (Polit and Beck 2014: 526). The researcher provided a detailed description of the four psychiatric hospitals in which samples were drawn. For transferability to be attained, the researcher allowed readers to evaluate and make the decision that findings from the present study can easily be employed in another setting similar to the setting of the present study (Lincoln and Guba 1985). To achieve transferability, the researcher ensured the application of the following criteria:

- Selected information-rich data from the participants;
- Conducted data collection until data saturation has occurred; and
- Provided dense descriptions of the research data, so that in similar contexts and conditions the results could be transferable.

Further, the researcher also provides thick descriptions to enable any interested person to reach a conclusion on whether transfer to other settings is possible.

4.10.5 Authenticity

Authenticity refers to the extent to which qualitative researchers truthfully and honestly demonstrate that their data collection, analysis, and interpretation are believable, with no fabrication of findings (Polit and Beck 2014: 720). In this study, the researcher sought permission from the Chief Medical Directors of the four selected psychiatric hospitals, and consent of participants was sought for data collection. In addition, the researcher ensured respect for the participants, which was demonstrated through verbatim references to their original information so that the meaning is truly expressed in its original form, unaltered, as described by them without any coercion to suit the researcher.

4.11 Research Rigour

According to Holloway and Wheeler (2002) research rigour is defined as “the means by which we show integrity and competence”. The researcher strictly adhered to the standard of quantitative research and ensured the sample selected is a true representation of the entire population. Questionnaires were developed on the population. This captured the true characteristics of the population under investigation. Before the administration of the questionnaires, pre-tests were conducted so as to ensure the instrument captured and generated accurate results and necessary adjustments were done before data collection. The researcher followed the necessary protocols and procedures in quantitative data collection and analysis. Four psychiatric hospitals were selected from the South-West geo-political zone in Nigeria and a Probability Proportion to Size (PPS) technique was used for selecting participants for quantitative study. These data collection techniques were adopted through

expert opinion and the objectives of the study, the HBM and UTAUT models were adequately covered in the questionnaires.

4.11.1 Reliability

Reliability is the degree to which an instrument measures what it is expected to measure (Polit and Beck 2012: 741). The questionnaire was in English and there were seven sub-scales in the questionnaires. Section A of the questionnaire comprises the demographic information. Sub-scale B measured the performance expectancy that a mental health professional has generally on the utilization of digital technologies for the provision of mental health services. Analysis presented a Cronbach's alpha reliability value of $\alpha = .92$ which is an excellent reliability coefficient. C sub-scale indicated a Cronbach's alpha reliability value of $\alpha = .7$ which is acceptable. The sub-scale measured efforts expectancy of mental health professionals on the use of digital technologies for the provision of mental health services. Section D sub-scale examined whether the use of digital technology for the provision of mental health services can be motivated by social influence and it showed a Cronbach's alpha reliability value of $\alpha = .85$ for this sub-scale. This is interpreted as good reliability. The 12-items E sub-scale assesses the facilitating conditions for the use of digital technology for the provision of mental health services and wellbeing and showed a Cronbach's alpha reliability value of $\alpha = .65$. This falls within the acceptable range of reliability coefficient. Sub-scale F showed an excellent Cronbach's alpha reliability value of $\alpha = .98$. Thus, this sub-scale is interpreted as having excellent reliability for assessing benefits of using digital technology for the provision of mental health services and wellbeing, as viewed by a respondent. 17-items G sub-scale show a good Cronbach's alpha reliability value of $\alpha = .87$. Thus, this sub-scale is interpreted as having good reliability for assessing the perceived barriers to the use of digital technology for the provision of mental health services and wellbeing.

4.12 ETHICAL CONSIDERATIONS

Prior to commencing the study, full ethics clearance was granted by DUT (Appendix 1). Gatekeeper permission was sought and granted by Neuropsychiatric Hospital Akure (Appendix 2a and 2b); Yaba Neuropsychiatric Hospital (Appendix 3a and 3b); ARO Neuropsychiatric Hospital (Appendix 4a and 4b); and University of Ibadan Teaching Hospital (Appendix 5a and 5b). Once permission for access was granted by the Ethics Committees, the researcher gave participants letter of information (Appendix 6a and 6b) regarding the study and afterwards, proceeded to administer questionnaires (Appendix 9) and the semi-structured interview (Appendix 8b) to the participants. The consent forms (Appendix 7) were signed by participants and they were familiarized with the aim and objectives of the research. The researcher was trained and awarded an ethics training certificate (Appendix 10). The researcher followed ethical guidelines, as specified by the DUT Research and Ethics Committee. This entailed requesting ethical approval and undergoing an ethics review process before engaging participants, ensuring that procedures are fair and unbiased and not harmful to all involved. Participants were informed about the purpose of the research, while confidentiality and anonymity were assured. All the participants completed an informed consent form (Appendix 7) before taking part in the study as per ethical recommendations.

Participants were informed that participation in this study is voluntary, no one was forced to participate in this study and they were free to withdraw at any point from the study without any implications. To ensure confidentiality, there were no video recordings of interview sessions, audio recordings were saved in a password protected device and questionnaires were filled in at the participants' convenience. The researcher made sure not to refer to or discuss her research with any of the participants in public spaces. Participants were not asked to write their names, identification numbers or any private information on the questionnaires and during the interview, they were addressed with codes.

After extracting soft copies from the hard copies, the hard copies of the questionnaires were destroyed while soft copies of the data were kept in a password protected document. Access to the document shall be very limited and it will not be published without proper consent from participants.

4.13 SUMMARY OF THE CHAPTER

This chapter showed the study design, methodology, sampling technique, the rigorous process of data collection and technique employed in data analysis, criteria that included and excluded some participants from participating in this study and ethical considerations. Mixed method was utilized in exploring the research objectives. Thematic analysis was utilized for qualitative data while SEM was used to analyse quantitative data. The next chapter presents the findings from qualitative analysis.

CHAPTER 5: PRESENTATION OF FINDINGS FROM THE QUALITATIVE DATA

5.1 INTRODUCTION

The previous chapter presented the research methodology. This chapter presents the findings from qualitative data analysis. The data analysed are data from interviewed participants. The study aimed to develop a contemporary model which will integrate digital technologies to improve mental health services and wellbeing in the public/ government owned healthcare facilities in Nigeria. Mixed methods convergent design was utilized and data was collected in two phases. Findings from the in-depth interview and direct responses from participants are presented in this chapter.

The participants that participated in the qualitative study were HCPs at the four selected Government owned psychiatric Hospitals in the South West of Nigeria. The facilities were Neuropsychiatric Hospital Yaba, Lagos State; ARO Neuropsychiatric hospital Abeokuta, Ogun State; Department of Psychiatry, University of Ibadan Teaching Hospital, Oyo State; and Neuropsychiatric Hospital, Akure, Ondo State. A non-probability, purposive sampling technique which employed snowball method was used in selecting the 16 participants. Open ended questions derived from the research objectives guided the interview process and HCPs granted permission for audio recording during the interview. Themes and subthemes were identified from the transcribed data. The result from the qualitative data is discussed which incorporates participants' views and narrations.

The objectives that guided the study were:

- Determine factors affecting the provision of mental health services and wellbeing in public healthcare.
- Analyze digital technologies that could be effectively utilized to provide mental healthcare services and wellbeing in public healthcare during natural disasters and health emergencies.
- Explore perceptions of health workers towards the utilization of digital technologies to improve mental healthcare services.
- Determine barriers and challenges impeding the provision of mental healthcare services and wellbeing through digital technologies.
- Develop a contemporary model for integrating digital mental health interventions to improve mental health services and wellbeing in the public healthcare system.

5.2 PRESENTATION OF RESULTS

The interview audio recordings were studied, understood and participants' responses were meaningfully interpreted. The table below showed the code used for the presentation of each interviewed participant's responses during the interview. This was to distinguish participants from different facilities and to highlight the source of the quotes.

Table 5.1: Coding of qualitative participants

Facility	Facility Code	Total Participant Interviewed
Neuropsychiatric Hospital Yaba, Lagos State	#P1; YAP1, #P2; YAP2, #P3; YAP3, #P4; YAP4	4
ARO Neuropsychiatric Hospital Abeokuta, Ogun State	#P1; ARP1, #P2; ARP2, #P3; ARP3, #P4; ARP4	4
Department of Psychiatry, University of Ibadan Teaching Hospital, Oyo State	#P1; IBP1, #P2; IBP2, #P3; IBP3, #P4; IBP4	4
Neuropsychiatric Hospital, Akure, Ondo State	#P1; AKP1, #P2; AKP2, #P3; AKP3, #P4; AKP4	4

KEY: #P1; YAP1 to #P4; YAP4 represents the four HCPs from Yaba neuropsychiatric hospital, Lagos. #P1; ARP1 to #P4; ARP4 represents the four HCPs interviewed at ARO Neuropsychiatric hospital Abeokuta, Ogun State. #P1; IBP1 to #P4; IBP4 represents the four participants from Department of Psychiatry, University of Ibadan Teaching Hospital, Oyo State while #P1; AKP1 to #P4; AKP4 represents the four respondents at Neuropsychiatric Hospital, Akure, Ondo State.

From the data gathered, nine themes and 24 subthemes were identified. Each main theme had subthemes. The main themes linked with the areas pointed out in the objectives of the study.

The nine main themes identified were:

- Human resource challenges.
- Poor infrastructure.
- Knowledge of digital technologies.
- Digital technologies used.
- Benefits of digital technologies for mental health service provision.
- Perception of digital tools.
- Emerging operational issues.
- Financial challenges.
- Technological concerns.

The themes and sub-themes identified are highlighted in Table 5.2 below. As part of the analysis, excerpts of the interviews have been included to further explain the points identified. To better situate the findings made from this study, it is important to note that generally mental health service provision is not prioritized in Nigeria, in comparison to other health matters. The number of mental health cases was high prior to the onset of COVID-19 but saw an upsurge of cases after COVID hit. Again, the inadequacy of health facilities' supporting infrastructure including offices, wards, and therapy rooms coupled

with inadequate personnel further supports the narrative of mental health not being prioritized.

Table 5.2: Summary of Themes and Subthemes Identified

Research Objective	Main Theme	Subthemes
Factors affecting the provision of mental health services and wellbeing in public healthcare.	Theme 1: Human resource challenges.	- Brain drain. - High patient-HCP ratio. - Strain on HCPs. - Shortfall in services.
	Theme 2: Poor infrastructure.	- Inadequate facilities. - Lack of spacious offices.
Digital technologies that could be effectively utilized to provide mental healthcare services and wellbeing in public healthcare during natural disasters and health emergencies.	Theme 1: Knowledge on digital technologies.	Known digital technologies.
	Theme 2: Digital technologies used.	- Technology before COVID-19. - Technology during COVID-19.
	Theme 3: Benefits of digital technologies for mental health service provision.	- Accessibility. - Continuity of service provision. - Ease inconveniences of HCPs. - Reduced patient travel cost. - Eliminate stigmatization.
Utilization of digital technologies to improve mental healthcare services.	Theme 1: Perception of digital tools.	- Attitude towards digital tools. - Acceptability. - Patient care.
	Theme 2: Emerging operational issues.	Policy.

		• Perceived extra burden on HCPs.
Barriers and challenges impeding the provision of mental healthcare services and wellbeing through digital technologies.	Theme 1: Financial challenges.	• High cost of setting up. • Extra cost to patients.
	Theme 2: Technological concerns.	• Poor network connectivity. • Inconsistent power supply. • Possibility of being hacked.

5.3 FACTORS AFFECTING THE PROVISION OF MENTAL HEALTH SERVICES AND WELLBEING IN PUBLIC HEALTHCARE

The public healthcare system in Nigeria is fraught with a myriad of challenges particularly with mental health service provision, which is often at the bottom of the pyramid. Two main themes were identified under this objective which include human resource challenges and poor infrastructure. The subthemes are discussed under each theme.

5.3.1 Theme 1: Human resource challenges

The shortage of HCPs impedes the provision of mental health services. If the government will not mitigate this challenge, it will impact negatively on the quality services and those in need of mental health services.

5.3.1.1 Brain drain

The inadequacy of personnel was a recurring theme in all the interviews conducted. This was especially in relation to HCPs leaving the country in search of greener pastures. This was partly due to the poor working conditions

prevalent in the mental health sector as well as poor remuneration of HCPs. In the interviews, participants had this to say:

“There is an alarming brain drain in the country and nurses are migrating seeking greener pastures. In a day, we can receive one or two resignation letters in this facility. This is impacting service delivery in this facility” [#P1; AKP1]

“.... HCPs have to adapt to their environment and what is available. The level of HCPs leaving the country is impacting on service delivery and they are leaving because of working conditions and the environment in which they had to provide services.” [#P4; ARP3]

Even more alarming is the fact that people are still leaving and there's no permanent solution in sight. This brain drain is not limited to just nurses but cuts across a wide range of HCPs within the mental health space. This is noted on the excerpt below:

“Before now, this facility had a lot of consultants, such as doctors, psychologists, psychiatrists and nurses but unfortunately because of migration, most health workers have relocated, and people are still leaving.” [#P2; AKP2]

The continuous brain drain of mental health workers from Nigeria to different parts of the world exacerbates the current challenges of providing quality services. Unfortunately, the problem is likely to get worse since there are currently no proactive interventions by the Government to retain HCPs. This is indicated in the quote below:

“Nigeria is not conducive and there is a lot of migration. It's unfortunate that a ward was closed down because of lack of manpower. This is of a great concern.” [#P4; ARP4]

5.3.1.2 High patient-HCP ratio

The brain drain situation is worrying and compounds the issue of inadequate personnel in the provision of mental health services in Nigeria. This inadequacy places a burden on the HCPs on a day-to-day basis. Participants shared their view with the following responses:

“We have a smaller number of professionals as compared to patients. You have large number of patients to a small number of professionals which has implications for service delivery but most of the time, one must give the best to satisfy his or her conscience.” [#P4; YAP4]

“.... presently, in this entire hospital at UCH, a premier hospital in Nigeria and even in Africa, we are just five clinical psychologists servicing all the departments, wards, and out-patient cases. This does affect service delivery. Shortage of hands do affect, how do I mean, imagine when out of the five clinical psychologists, one goes on annual leave, another goes of study leave, and yet another on sick leave, this would mean the two will be in charge of thousands of patients. So, it is affecting service delivery....” [#P1; IBP1]

Apart from stretching themselves thin, HCPs must further battle with being at different places at different times to be able to cater to the demand for mental health services. In an ideal case, a therapist is encouraged to attend to five to six patients per day. This is, however, not the case in many public health care facilities across the country. This places a huge burden on them physically and their ability to attend to all of them and more importantly, provide quality services to the patients. This is confirmed by the quotes below:

“Therapists are not enough at all. I work at the drug and substance abuse unit and I attend to 40 to 45 patients daily. The two wards that I attend to are in Dater 1 and Dater 2. I attend to them daily for therapy session, anger

management, drug education, relapse prevention and the likes.” [#P2; ARP2]

“..... I was at the male ward and I saw just one psychiatric nurse attending to about 40 patients, the services you will give when you attend to six patients is not the same with 40 patients. She is not supposed to be attending to patients, she is a senior level officer. I am the only one here today to attend to patients in the ward and those coming for appointments. I am so overwhelmed.” [#P4; YAP4]

5.3.1.3 Strain on Health Care Workers

Closely linked to the high HCP-patient ratio is the burdensome daily routine by HCPs. They are often overworked. This presents as a daily challenge. From the account of the HCPs, they always run through patients quickly to be able to attend to everyone present. This is corroborated by the statements below:

“.... sometimes there are situations in which you see like 10 patients with one professional at once, how will such person cope and give a thorough service. HCPs are so overworked that they could not give a proper treatment. It affects the efficiency of the service. This does affect service delivery.” [#P1; ARP1]

“The lack of adequate HCPs in the facility is impacting on the few HCPs. UCH Ibadan is a big institution with different departments that need the services of professionals. These departments are now being catered for by the few clinicians available, so the job becomes cumbersome and outweighs the number of available staff”. [#P2; IBP2]

5.3.1.4 Shortfall in services

Mental health patients are not receiving the best care and treatment they ought to. This is primarily due to the inadequacy of mental health facilities and limited trained HCPs. Some patients are turned away due to this. This is supported by the following quote:

“.... the need is vast. I work more in the oncology unit and I cannot meet the need in the unit even if we work eight hours of the day. We really do not meet the need of the patients because we lack manpower. Some patients unfortunately come but could not be assisted. Unfortunately, some patients suffer because they cannot access these services. This is unfortunate.” [#P3; IBP3]

As unfortunate as this is, there seems to be no solution in sight. This places patients at the receiving end of the inefficiencies of mental health service provision in the country. For those who are lucky enough to be attended to, they have to wait days before getting the chance to be assessed by a psychologist or psychiatrist. This problem seemed manageable before COVID-19 but escalated during and after the pandemic as the demand for mental health services increased. Participant response is indicated as follows:

“The rate of patients is very high and over the years since COVID, we had a surge, and it has affected the system. We usually do not have bookings for more than one month but now it has changed. We spoke about it this morning in the meeting, the month of January and February 2023 have been fully booked. These bookings are for assessment and interventions.” [#P3; YAP3]

5.3.2 Theme 2: Poor infrastructure

The participants reported that the Infrastructure in some facilities is in a deplorable state while some are in a process of renovation. They recommended

a need for an overhaul of infrastructure. HCPs need a conducive environment which aid in their provision of quality services.

5.3.2.1 Inadequate facilities

Compounding all these challenges above is the issue of inadequate public mental health facilities. The existing facilities serve a large catchment area and are unable to meet demand. This inadvertently means that not all patients can be catered to. This is substantiated by the excerpt below:

“We do not have adequate facilities. We are now servicing Ondo state, Kogi state, Osun state, and Ekiti state. Mental health patients access this facility from these states. This facility provides service sometimes to people from Benin and Delta states and riverine communities that share boundaries with Ondo State. Apart from this facility, we only have a unit in Federal Medical Centre Owo and Federal Medical Centre Ido Ekiti, which can only accommodate around eight males and eight female patients.” [#P1; AKP1]

The inadequacy of facilities also translates into inadequate office spaces. Not only are the offices small but HCPs often share these office spaces which also doubles as therapy rooms. Privacy, therefore, becomes an issue. This influences patients to be able to freely and openly talk about their problems during therapy sessions. A participant had this to say:

“With our patients, privacy is assumed and not assured. This is so because could be in a session, or my colleagues could be in a session and I could clearly hear what they are talking about in the session. Sometimes, I am tempted to just open the door to see the face of the patient. This means that the office is not conducive for good therapeutic intervention. Patients can also hear the other person in the other room and are self-conscious about what to say and what not to say. This impacts service delivery.” [#P3; IBP3]

According to a participant, mental health care should be integrated into primary health care to reduce inadequacy in mental health service delivery. Having mental health care units in Federal Medical Centres (FMC) is the way to go. This is noted in the excerpt below:

“Ideally, a psychiatric unit should be incorporated into federal medical centres (FMC) such as Okitipupa and Owo so that patients do not need to travel a far distance to see their therapist. Akure Neuropsychiatrist hospital is the only psychiatric hospital in Ondo State, and we cater for not only patients within the state but outside the state and the surrounding communities. It does not make sense that people travel a far distance to see a therapist.” [#P3; AKP3]

5.3.2.2 Lack of spacious offices

Aside the lack of adequate mental health facilities in the state, the available ones are not properly maintained. There is poor ventilation in nurse offices which could hamper their health. In some situation, two HCPs do share a small office space which unfortunately encumbers service delivery. Participants shared their view as follows:

“.... the environment is not conducive and we do share office space. As we are doing interviews here, we have few minutes to leave so that patients can use this space for their morning meeting. The situation is totally beyond us and even management also indicate that the situation is beyond them too. The nurse unit has no proper ventilation.” [#P4; ARP4]

“Before now, there has been serious office space challenges, most HCPs don't have office space to perform their duties. Working environment in most health facilities including my facility is suboptimal which obviously affects services provided.” [#P4; AKP4]

The challenges identified from the study contribute to making the provision of mental health services in Nigeria a problem. The statement below confirmed this:

“I did not want to go through the details but the problem is funding. When funding is very poor, working environment will be affected. Sometime the struggle for materials, furniture and electricity we need to use is a challenge. Before now, there has been serious office space challenge, most HCPs don’t have office space to perform their duties. Working environment in most health facility including my facility is suboptimal which obviously affect service provided” [#P4; AKP4]

However, notwithstanding, the use of digital tools and technologies has the potential of easing some of these challenges.

5.4 DIGITAL TECHNOLOGIES THAT COULD BE EFFECTIVELY UTILIZED TO PROVIDE MENTAL HEALTHCARE SERVICES AND WELLBEING IN PUBLIC HEALTHCARE DURING NATURAL DISASTERS AND HEALTH EMERGENCIES

The second objective was geared towards analyzing digital technologies which could be used to provide mental health services, especially during emergency situations such as natural disasters or health emergencies. Three main themes emerged from this objective; namely knowledge on digital technologies, digital technologies used and benefits of digital technologies for mental health service provision. The different subthemes under each theme are discussed below.

5.4.1 Theme 1: Knowledge on Digital technologies

To be able to address the issue of incorporating digital technology tools in the provision of mental health services, it is important to understand if HCPs know

what these tools are in the first place. In addition, their knowledge on the use of these digital tools has a bearing on their acceptability. Due to the ban placed on movement during the pandemic which came with its associated increase in the demand for mental health services, other HCPs had to incorporate some digital tools in service provision.

5.4.1.1 Known digital technologies

The digital technologies available for use in providing mental health services, plays a huge role in how and when they are used. HCPs were aware of these technologies before the pandemic, which gained much popularity during and after COVID-19. According to the responses, some of the digital tools HCPs are aware of included telephone, WhatsApp chats, WhatsApp Calls, Zoom, computer, electronic gadget, Google Meet, Media platforms, Teleconferencing among others. This is indicated by the quotes below:

“.... I am aware of Zoom, different app, WhatsApp platform either video or call, virtual reality, artificial intelligence.” [#P4; YAP4]

“Electronic Medical Record System, Telemedicine, phone, WhatsApp, Zoom.” [#P3; ARP3]

As it has been established already, the pandemic made the use of these digital technologies popular. Some of the technologies which were already in used prior to the pandemic were maintained but other technologies were also introduced.

5.4.2 Theme 2: Digital technologies used

Some of the HCPs started using digital tools before COVID-19 hit. Digital technology offered a convenient way to enhance communication between

patients and HCPs no matter the location. This way, patients did not have to truncate their treatment.

5.4.2.1 Technology before COVID-19

The study revealed that some HCPs started using digital technology tools prior to COVID-19, although not officially. Due to the therapeutic alliance HCPs have formed over the years with their patients, they voluntarily make phone calls, send SMSes or use WhatsApp platforms to check on their patients' progress and wellbeing. This was to enable them to communicate better with their clients or patients. Participant responses were as follows:

"We started using the telephone before COVID-19 but I have been using it more since the pandemic." [#P3; AKP3]

".... personally, I give my numbers to my patients..... I feel giving out my contact is a way to easily access me. Although I may not necessarily conduct a session but I feel it makes me at reach to my patients and we can agree on a time to meet at the clinic" [#P3; IBP3]

Apart from using it to book appointments and for follow-up sessions, some HCPs were using other technologies such as Skype and WhatsApp for therapy sessions and assessments prior to COVID-19 in their private practice and in privately owned mental health facilities. Although they could not give the exact timeframe of use, they indicated the use of these digital tools for a considerable period before COVID-19. Participants had this to say:

".... we used these technologies for a considerable period of time and we have been using it more since COVID." [#P2; IBP2]

"I have been privileged to work with several organizations who use digital technology (before joining government establishment) I think aside

from Google Meet, Zoom, WhatsApp or voice call over the phone, some organization have started building individualized platforms in which you pick your therapist virtually, book virtually and also have your therapy session virtually. Everything is virtual.” [#P3; IBP3]

5.4.2.2 Technology during COVID-19

The restrictions on movement coupled with the increase in demand for mental health services made it necessary to incorporate the use of digital tools to minimize barriers to services. This made it possible for HCPs to have therapy sessions, follow up sessions and handle distress calls or emergencies from a distance. This was apparent in a respondent’s quote below:

“... it was COVID that forced us all to embrace this technology, now it is not much in use as when it was during the pandemic...” [#P2; IBP2]

Generally, the use of these tools during COVID-19 made it possible for HCPs not to lose touch with their patients. This ensured that patients received care irrespective of the different barriers brought on by the pandemic. In cases where patients run out of medications, they were able to communicate with the HCPs on the next steps to take. This is shown in the excerpt below:

“During the pandemic, it (digital tools) provided an avenue for interaction and when the patients are out of medications and can’t find the particular drug, they snap the picture of the medication over WhatsApp and we give advice on what to do.” [#P1; AKP1]

The pandemic made digital technologies popular and their use intensified. A respondent indicated that management was able to provide the needed digital tools to meet the need of the patients during the pandemic, however, the use of digital tools post pandemic is not the same as during the pandemic. Services have moved from online to face-to-face therapy sessions, while bookings, follow-ups and appointments have to be done physically at the facility.

Although, the continuous use is not discouraged in some facilities, unfortunately it is not encouraged in other facilities. The quotes below confirmed this:

“... laptops were provided to different departments where patients can be seen online. I do not see us going away from the use of such digital tools although everything has normalized now, patients are now seen physically.”
[#P2; IBP2]

“ there were times in which we were clamouring for our patients to be put on a WhatsApp group so that they can continue group discussion and connect with each other so as to prevent relapse but unfortunately it was not done [#P4; ARP4]

5.4.3 Theme 3: Benefits of digital tools for mental health service provision

Digital tools have come to stay. In the provision of mental health services, they offer a wide range of benefits to both HCPs and patients at large. The benefits of using digital tools for mental health services identified in this study are as follows:

5.4.3.1 Accessibility

The utilization of digital tools in mental health services bridged the gap of distance in accessing mental health services. Irrespective of the location, these digital tools connect patients and HCPs with the tap of a button. Issues of travelling long distances, waiting times at the hospitals, staying in long queues, being sent back home without seeing the Doctor and many others do not come to play here. The statement below affirms that:

“For patients, it makes access to health care workers easy. They will not have to travel long distance for their appointment. Also, it reduces queueing

time at the facility. Patients will not need to queue for a long time for bookings and appointments. Generally, it makes life easier.” [#P1; AKP1]

Aside this, having access to HCPs helps patients to be able to ask pertinent questions they may have been shy to ask in person or forgot to ask. This promotes the continuity of care. One unique thing about using these digital tools is that care does not necessarily end at the health facility. It transcends physical locations and times which makes it easier and more comfortable for patients. This is highlighted with the response below:

“It is far better than not having any contact with the patients. You can imagine travelling a long distance for an appointment. Sometimes patients forget to ask some questions from the HCPs and they will have to travel a long distance (sometimes one to two hours) to see the HCP and ask the question but with this kind of communication, you are able to reach the patient and the patient can reach the HCP in a timely manner.” [#P4; IBP4]

Patients also do not need to be within proximity of the health facility to be able to access mental health care. The statements below indicated that the use of digital tools makes it possible for patients to connect with HCPs across borders.

“Those in diaspora are also able to benefit through digital platforms. Due to cultural differences, some mental illnesses cannot be understood and treated outside the country, so those in diaspora are able to reach out to HCPs in Nigeria for mental health services.” [#P3; YAP3]

“This (digital technologies) is a very good innovation and an avenue to reach as much people as possible. What is operational in Yaba is the traditional method. COVID opens us to information and education about online platforms. We do webinars on a monthly basis and it is called Yaba voice. People do join online, connect on Facebook and some actually can call in on a dedicated line for more information and clarity. This program has been on-going for the past two years now. The programme allows patient to receive

first aid before coming to the hospital for proper management. The hospital management is also working seriously on the establishment of teletherapy in which patients can call in and also get assistance too. We are considering doing a podcast in 2023 so as to get more information out there.” [#P2; YAP2]

It is important to note that digital technologies pave an effective and efficient way of providing mental health care for people who need it irrespective of their location.

5.4.3.2 Continuity of service provision

Closely linked with having access to mental health services is the continuity of service provision. As patients and HCPs alike can have access to their patients irrespective of their locations, it makes it easier to continue treatment without having the burden of travelling long distances for care. This has the propensity to significantly reduce relapses or truncate treatment midway as revealed by the quote below:

“Some patients are discharged, and they relapse when they get home because they can’t afford the cost of travelling back to the facility to see a professional. When the (digital) tools are there, they can easily use it to communicate with their therapist.” [#P1; ARP1]

The use of digital tools also makes it ideal for emergency situations due to how easy it is to connect both patients and HCPs. Although there may be concerns raised about the ease with which patients are able to reach HCPs and the need to put in place measures to control access to HCPs, it helps in placing situations under control. The absence of these tools would mean having to physically move to a health facility to access care even in emergency situations. A participant highlighted this in the response below:

“Sometimes, I tell my patient when to call at a specific time and in case I did not pick up, it does not mean they are not important, it means I am busy with other things and I will get back to them. With mental health patients, you need to be careful how you deal with them and explain very well to them, otherwise we will be having issues. Sometimes, I have patients who called in very late at night or they send in messages late at night but I try to manage the situation.” [#P2; YAP2]

5.4.3.3 Ease inconveniences for HCPs

With the introduction of digital tools and technologies, HCPs do not necessarily have to be physically present at the health facilities to attend to patients thereby cutting down on their travel cost and time. Secondly, therapists can offer therapy sessions at their own convenience. This, however, does not apply to patients who have been hospitalized, emergencies or for patients who have chronic conditions, as revealed in the statement below:

“If I can stay at home and do my therapy sessions, of course I will choose such. It saves me commuting time and fuel.” [#P3; IBP3]

In addition, the use of digital tools would help in the better management of treatment in some cases. This applies to mild cases where patients live far away from the health facilities. The ease with which they can access HCPs would aid in the treatment process thus requiring fewer visits and therapy sessions compared to the situation where the said patients had to physically travel to the health facilities and had a high probability of skipping visits leading to even worse outcomes. This is supported by the following quotes:

“It will help alleviate some crisis cases...When the tools are there, they (HCPs) can easily use it to communicate with their patients. It is a way to assist their patients better.” [#P1; ARP1]

“..... a friend called me to speak to someone over the phone who has suicide ideation. I had that therapy over the phone, even though it was not structured but it was extremely helpful and timely. I was able to convince her to visit the psychiatric hospital and she actually did.” [#P4; IBP4]

“The use of digital tools will depend on the situation and condition of the patient. It is distance and situation that determines when to use. For example, I was in the Eastern part of Nigeria and actually in the market when a call came through that there is an emergency and a session is needed immediately, I had to provide the service immediately.” [#P1; IBP1]

Digital tools were used for therapy sessions, assessment and to follow-up on the wellbeing of patients. In some rare cases, HCPs had to use these tools during distress calls.

5.4.3.4 Reduced patient travel cost

The introduction of digital technologies would ease travel cost for patients. Patients are expected to visit the facility to be able to access health care. The use of digital tools such as Zoom and WhatsApp places less financial burden on the patients. Monies which would have been used to travel to the health facility are saved. The excerpt below showed this:

“WhatsApp would be very helpful especially to our patients that travel for six to seven hours to reach the facility. The financial burden on transportation will be reduced.” [#P1; AKP1]

Another financial burden reduced is the cost of therapy sessions. In this case, when digital tools are integrated and used for therapy, patients would be less burdened financially. Highlighting this is the quote below:

“It will reduce cost of transportation and travel time. It will make access to therapist easy. Patients can easily call in without the need to book or any special protocol and they get assisted almost immediately. Accessing of care will be easy especially for those that are living far from the facility. It will decentralise services.....” [#P2; YAP2]

5.4.3.5 Eliminate stigmatization

At the heart of mental care service provision is patients' wellbeing. Stigmatization, which is often associated with mental health, to a large extent is reduced. This is because patients (and their families or caretakers) do not need to be physically present to have access to mental health services. This means less visibility with little to no association with mental health facilities. Respondents' shared their view below:

“Obviously, there is stigmatization and many are reluctant to come to the facility. Digital tools can make things easier for the patient. Some are VIPs insist on having online sessions even if the best option is face-to-face contact.” [#P1; AKP1]

“We have some relatives of the patients on admission who comes for visitation but will park their cars far from the facility so as not to be identified with the facility. They attach a lot of stigma to the facility.” [#P3; AKP3]

Patient with anxiety can benefit greatly from the use of digital tools. Such patients do not need to visit the mental health facility but can have all their therapy sessions online seamlessly. Not only would it improve their mental health but also their wellbeing generally, as captured in the following statement:

“... someone who suffers from anxiety and dreads going to the hospital will also benefit from this platform (digital tools). It would give patients the opportunity to explore (treatment options) to improve their wellbeing” [#P1; IBP1]

Digital technologies will reduce missed appointments and the number of defaulting patients. Excuses such as travel cost, long waiting hours at the hospital among others will lessen and patients will not have any reason not to continue with their sessions online. Having relatively easier access to mental health services helps in their treatment process as emphasized by the statement below:

“.... it (Digital tools) would enable easier follow up and it would minimize missed appointments as well as reduce excuses such as ‘I cannot take permission from work’, ‘there is too much traffic’, ‘there is no one to pick my child at the time of my appointment’, ‘I don’t have transport to come’. It will remove all of these and give patients the opportunity to access services.”

[#P1; YAP1]

5.5 EXPLORE PERCEPTIONS OF HEALTH WORKERS TOWARDS THE UTILIZATION OF DIGITAL TECHNOLOGIES TO IMPROVE MENTAL HEALTHCARE SERVICE

The acceptability and the use of digital technologies in mental health service provision depends mostly on two stakeholders, the patients and HCPs. These two groups of people are the ones who would be using these tools the most. Below are highlights of their perceptions about incorporating these tools into mental health service provision. These have been grouped into two main themes with their subthemes and discussed below.

5.5.1 Theme 1: Perception of digital tools

Most HCPs perceived digital tools to be reliable to an extent while few perceived it as unreliable. The dangers of missing important facial and bodily cues during sessions are the major highlight with the use of digital tools. Some HCPs

believe patients can easily hide their hands, feet or emotions when using digital tools which impact their perception of digital technologies.

5.5.1.1 Attitude towards digital tools

HCPs attitude towards the use of digital tools may likely hamper their adoption and use. HCPs with a negative attitude towards the use of digital tools may likely not encourage their patients to use available digital tools. The following quotes support this:

“I initiated the use of telephone to be used among staffs so as to save time, energy and human resources so that staff would not need to run from one office to another but unfortunately people are unwilling to use it, maybe not consciously because they are used to the crude method of doing things. Sometimes when you try to investigate, you find that the phone has not been charged in a week and the battery is dead or there is a fault with the phone and nobody will report it. The attitude is just the challenge. It would have been effective and make things easier if the attitude of staff is positive.” [#P4; AKP4]

“Like any other new inventions, at the beginning it will look strange but with time people will start getting used to it just like social media. Some at the beginning social media was somehow wary but as time goes on, everyone started using it, even market women. Another concern is in our environment, anything new is usually not accepted, our government and management is another issue. Human factor is also another concern, if HCPs will accept and use the digital tools, then the use of technologies will be easy.” [#P4; ARP4]

5.5.1.2 Acceptability

According to some of the HCPs, using digital tools will make their work easier. Not only does it reduce time spent in the hospitals, but it also makes treatment relatively easier and seamless. As in-person meetings are reduced, they can

have sessions with their patients in their comfort zones. The excerpt below showed that, although some HCPs are hesitant in accepting digital technologies for service delivery but they are still open to it.

“.... I cannot speak for everyone, some believe that for intervention, it is not adequate while some believe otherwise. But no one is against it but it all boils down to individual acceptance.” [P1; IBP1]

“Generally, there is more reception for e-technology or e-services. It was COVID that forced us all to embrace this technology, now it is not much in use as when it was during the pandemic. COVID opened the door of possibilities and the acceptance was much higher then. Although there are some of our colleagues that are still resistant to its use because they feel it will not allow them do a concrete assessment of their patient compare to when they come to the facility. For me, if you are doing online assessment or follow up, you may not see hand and feet movement of the patient, but you could only see facial reaction.” [#P2; IBP2]

Although some HCPs accept digital tools, others have a different view. They believe that these tools, on their own, are inadequate and should be used with caution. There is therefore the need to be circumspect with their use and put in place the necessary measures to ensure that HCPs are conversant enough to use such tools to improve diagnosis and treatment. Participants' statements below confirmed this:

“.... there is need for HCPs to be trained. If they are not trained, they may make a lot of mistakes and blunders. This is new to everyone; they need to be trained on not just doing it but doing it well to produce results.” [#P4; YAP4]

“.... there is no platform or technique that does not require training so as to get the best out of it. What I have discovered is that we do not know

everything, there are features that when you put in place it helps you better and makes conversation easier. So, if there is need for improvement and training, why not.” [#P2; YAP2]

5.5.1.3 Patient care

One of the main concerns of some HCPs was the inability to read their patients' emotions and observe them on digital platforms which are important cues in treatment. Although, incorporating these tools in daily care would make it easier to reach patients to ensure that their treatments are not derailed but there is still need for caution. These concerns were highlighted by the following quotes:

“... “The first thing is not being able to view your patient’s facial or bodily communications on digital platforms. You may be able to see your patient’s hand movement, leg movement, sweaty hands or the face during face-to-face consultation or sessions but with online or virtual, you may not really see if there is anything going on which can make clinician miss out on key observations and diagnosis.” [#P3; YAP3]

“... It (digital technology) is needful, although to an extent face to face contact is also needful. For example, when you do follow-up and assessment of patient, you could use online platform but for treatment, I believe physical contact is of essence because there are some known verbal cues that digital platform will not help clinicians to pick.” [#P1; IBP1]

5.5.2 Theme 2: Emerging operational issues

There are some operational issues that came up from participants. There is no framework or guiding policy in the provision on services on online platforms. The use of digital tools is at the discretion of HCPs and the facilities are not liable for any of the conduct on online platforms.

5.5.2.1 Policy

One major concern which came up is the issue of putting in place regulations to protect the HCPs. According to some of the HCPs, the use of digital tools is not a bad idea. However, there should be in place appropriate policy and regulations to protect both the HCPs and patient. The need to have policy in place was confirmed by the following response:

“.... we are using it but until there is a policy guiding the use, I use it cautiously. There is need for proper documentation of communication over digital platforms and bookings need to be made before consultations are scheduled. Both patient and HCPs must be protected and communication documented because if it is not documented and no policy in place, I could easily be implicated and patients can make unfounded claims against me, so documentation, policy regarding the use of digital platforms need to be in place.” [#P3; ARP3]

There is need for proper documentation so as to ensure that both patients and clients are protected legally, as noted by a participant below:

“Digital innovation is not new and in the hospital setting, we are yet to commence the use of digital services because policy is yet to be in place which hinders implementation. So, this hinders us to fully make use of it.” [#P1; IBP1]

5.5.2.2 Perceived extra burden on HCPs

The introduction of new technologies has the propensity of placing an extra burden on its users especially if the users are not conversant with them. When asked if the integration of these tools could demand extra effort from HCPs, some of those interviewed were of the view that it would not while some believe it would. Participants' views were captured as follows:

“I won’t see it as creating more burdens. As long as the HCPs are used to the digital tools, it will make things easy.” [#P4; ARP4]

“You cannot communicate easily with someone with low educational level. There are some things you can easily explain to an educated individual during online interaction whereas, it is a challenge with an uneducated or low educated individual. This means that when using digital tools, explaining some things to uneducated or low educated individual will surely be a challenged.” [#P2; ARP2]

A participant, however, believed the introduction of these tools would serve as an extra burden to the HCPs. According to him, adding incentives would curtail this problem. The statement below emphasized this:

“From my experience, quite a number of them will see it as extra burden, although with awareness and some incentives, it will see the light of day.”
[#P4; AKP4]

5.6 BARRIERS AND CHALLENGES IMPEDING THE PROVISION OF MENTAL HEALTHCARE SERVICES AND WELLBEING THROUGH DIGITAL TECHNOLOGIES

The fourth objective of this study was to identify factors affecting the provision of mental health services and wellbeing in public healthcare through digital technologies. Three main barriers were identified including financial challenges, behavioural concerns, and technological concerns. These are addressed below.

5.6.1 Theme 1: Financial challenges

Finance was identified as a major bottleneck in the provision of mental health services through digital technologies in Nigeria. From the administrative point of view, setting up a system in the mental health facilities to enable patients and HCPs to communicate seamlessly online as part of treatment options is expensive.

5.6.1.1 High cost of setting up

Quotations received from service providers just for the setup is high. The inadequate funds received from the Federal Government and the inability to generate funds internally preclude the integration of digital tools. The excerpt below confirmed this:

“The billing by service providers stands in the way. Some of the service providers are open to a post-paid service while some want a 1.5 million naira deposit before deployment and another want around 3 million naira before they would deploy these services. The government left the decision of deployment in the hands of each facility, provided they have funds which unfortunately forestalled the commencement of this good initiative.” [#P1; AKP1]

5.6.1.2 Extra cost to patients

Patients are burdened with the inability to purchase the tools needed for therapy such as tablets and phones, inability to afford data needed for the use of Zoom calls, WhatsApp video and audio calls, Google Meet sessions among others. The quote below indicate that this could deter patients from embracing the use of digital tools.

“.... some are ready while some are not. Some that are ready is due to some factors like having the application and needing someone to talk to online

while some that are not ready are not used to these applications (digital tools), lack of data, electricity issues, lack of gadgets such as smartphones and computers. Since they do not have these things, they are not ready to use digital platforms.” [#P4; IBP4]

5.6.2 Theme 2: Technological concerns

At the heart of using digital tools are technological concerns. Technology should foster hitch free online therapy sessions but unfortunately this is not the case with the Nigeria system. This poses a challenge for the integration of digital technologies.

5.6.2.1 Poor network connectivity

The country at large has a problem with network connectivity which makes it a challenge to have consistent therapy sessions without interruption. In some cases, such therapy sessions may end abruptly due to bad connectivity, which is noted in the statement as follows:

“Network is the number one challenge. Some of our patients are from rural areas. We have some patients who need to call in during an emergency or relapse and you can hardly hear them over the phone due to network issue but when they get to the facility, they tell you they had to climb a tree so as to get network.” [#P1; AKP1]

Such poor connectivity also influences the wait times of other patients. It places a burden on the HCPs who may have other patients waiting for their online therapy sessions. This challenge as captured in the statement below, impedes the use of digital tools for service delivery.

“Personally, I cannot bear to stay on the phone for too long when the network is poor or fluctuating because I have other patients waiting and other things to do.” [#P3; ARP3]

5.6.2.2 Inconsistent power supply

Inconsistent power supply is also a challenge. The use of Wi-Fi requires electricity to run. This is the case where electricity supply in the country is largely inconsistent. This influences the effectiveness of online therapy sessions. Mental health facilities, just like other health facilities, need consistent power supply to be able to run effectively. One of the challenges of providing services, according to the respondents, is the inconsistent power supply. This makes service provision inconsistent, uncomfortable, and inefficient especially when it truncates therapy sessions. The following quote highlight this:

“The state of our electricity is terrible. There is no constant power supply which surely impacts service delivery and performance during therapy sessions.” [#P1; ARP1]

The inconsistent power supply has forced many facilities to use generators. However, their use is often regulated by the hospital administration as revealed in the following statement:

“It [the generator] is switched on from 7pm to 10pm. We are left in the dark with the patients throughout the night unless there is electricity. The wards are not properly ventilated, so it’s very challenging.” [#P4; ARP4]

On occasions where both generator and power supply are off, providing the patients with mental health services becomes a challenge.

5.6.2.3 Possibility of being hacked

In using these digital tools, one ought to be wary of a possible hack. Intruders (hackers) could hack the datasets of the health facilities and extract information on a person of interest. Considering the political terrain in the country, this is of major concern to some of the HCPs. This is supported by the quotes below:

“There is nothing with advantage that does not have its disadvantages. For example, in this hospital, they are planning to change all paper records to digital records, to ensure everything is done digitally. I will be here seeing my patients and am typing on the system and I sent the report to a central file. But the implication of such is that hackers can hack into the system. I was seeing a man with mental health issues and he came with his wife to be. She asked me in confidence if she could snap a certain part of the man report because she did not intend to marry him, I told her it’s against my work ethics. Hackers can go to any length to get information, so such systems must be properly secured. In politics, they do hunt for such information to bring the political candidate down. Viruses can also corrupt such files, while manpower development, and cybersecurity are challenges that need to be considered so that the innovation is not overridden.” [#P4; YAP4]

“There could also be security breaches even though there is end-to-end encryption. Sessions are not being recorded by therapist but are being stored by the system. If some questionnaires are filled-in by patients online and stored in emails, there is no guarantee that such emails cannot be hacked and such information leaked.” [#P2; IBP2]

Although these barriers exist, incorporating digital tools in mental health service provision is still a welcome concept. Despite the stated barriers and challenges, most HCPs believe digital technologies should be partially integrated into mental health so as to improve mental health service delivery. HCPs that want partial integration are of the opinion that face to face sessions are very crucial in therapy and should not be discarded. However, the level at which HCPs want

digital technologies integration differs. Some want 50% integration, some 25% integration while others want a 100% integration.

5.7 SUMMARY OF THE CHAPTER

This chapter captured findings from the analysis of qualitative data. Themes and sub-themes derived from the objectives were presented and discussed, likewise quotes from interviewed HCPs are also stated. Constructs of the theoretical framework explored HCPs' perspective on the integration of digital technologies into mental health service delivery. Findings from the qualitative data was utilized in the development of the proposed model. The next chapter reports findings from the quantitative data.

CHAPTER 6: PRESENTATION OF RESULTS FROM QUANTITATIVE DATA

6.1 INTRODUCTION

The previous chapter presented findings from qualitative data analysis. This chapter presents results from the quantitative survey with HCPs. The objectives of the study and theoretical framework guides the development of the survey. The survey was administered to larger groups of HCPs in four psychiatric hospitals in the South-West of Nigeria to allow for the generalization of findings from the study. Findings from the quantitative data are presented below.

6.2 RESPONSE RATE

The survey questionnaire was developed specifically on HCPs who are currently working in the four selected psychiatric facilities and have not less than two years hands-on experience with providing mental health services. Taro Yamane formula was employed in computing the number of participants for the study. A 5% non-response rate was also calculated to guide the number of participants to whom we distributed the questionnaires. The need for calculating a non-response rate was to guide against uncompleted questionnaires which may affect the original number we have for the survey. The total number of required participants was 319 but with the non-response rate calculated, 337 survey questionnaires were distributed. 317 completed questionnaires were retrieved, while 16 HCPs collected the questionnaires but did not return them and the researcher could not get hold of them. Meanwhile four HCPs collected the questionnaire but completed few sections and left it a week later at their work station. Table 6.1 below showed the responses of HCPs of completed questionnaires retrieved per facility.

Table 6.1: Presentation of HCPs response for each facility (n=317)

Variables	Frequency (n)	Percentage (%)
Facility Location (n=317)		
Aro Neuropsychiatric Hospital	121	38.2
Yaba Neuropsychiatric Hospital	93	29.3
University of Ibadan Teaching Hospital	69	21.8
Neuropsychiatric Hospital, Akure	34	10.7
*Gender (n= 294)		
Female	192	60.6
Male	102	32.2
*Age group (n =313)		
20-29	53	16.7
30-39	143	45.1
40-49	86	27.1
Above 50	31	9.8
*Area of Specialization (n= 314)		
Clinical Psychologist	53	16.7
Occupational Therapist	20	6.3
Psychiatric Doctor	51	16.1
Psychiatric Nurse	190	59.9
*Years of Experience(n=313)		
2-5 years	130	41
6-10 years	59	18.6
11-15 years	44	13.9
16-20 years	36	11.4
21-25 years	27	8.5
26-30 years	12	3.8
31-35 years	3	0.9
Above 35 years	2	0.6
*Hours of meeting with clients(n=314)		
0	2	0.6
1-5	7	2.2
6-10	9	2.8
11-15	8	2.5
16-20	13	4.1
21-25	8	2.5
26-30	25	7.9
Above 30	242	76.3

*Variables with missing data

6.3 SECTION A: DEMOGRAPHIC DATA

This section presents the characteristics of 317 participants at the four selected psychiatric hospitals. The gender, age, area of specialization, years of experience as a mental healthcare provider, hours of meeting with their clients per week, therapeutic approach and the use of digital technologies with their clients are also presented in the demographic data section.

6.3.1 Gender

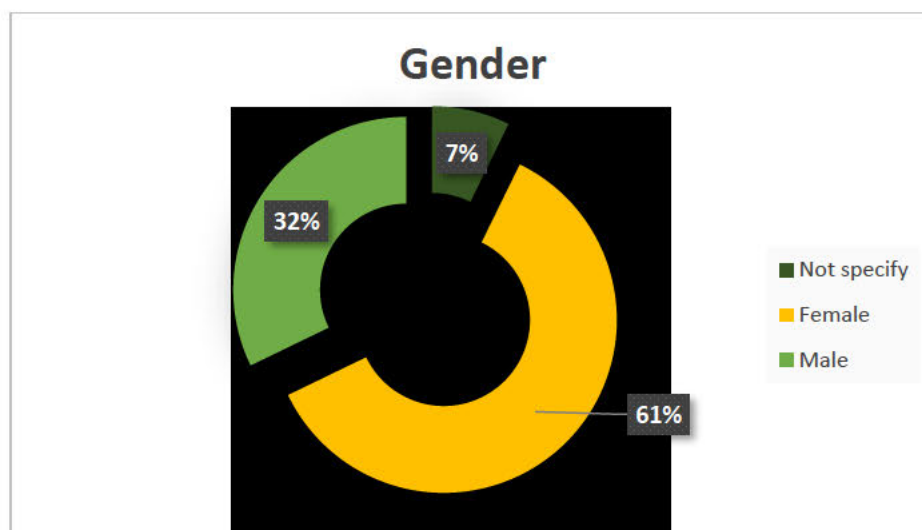


Figure 6.1: Chart showing gender distribution of respondents

Figure 6.1 provides the percentages of individuals within different gender categories. The data reveals that the majority of individuals who were surveyed identified as female, comprising 60.6% of the total. Male individuals accounted for 32.2% of the total, and the remaining 7.3% of individuals did not specify their gender.

6.3.2 Age

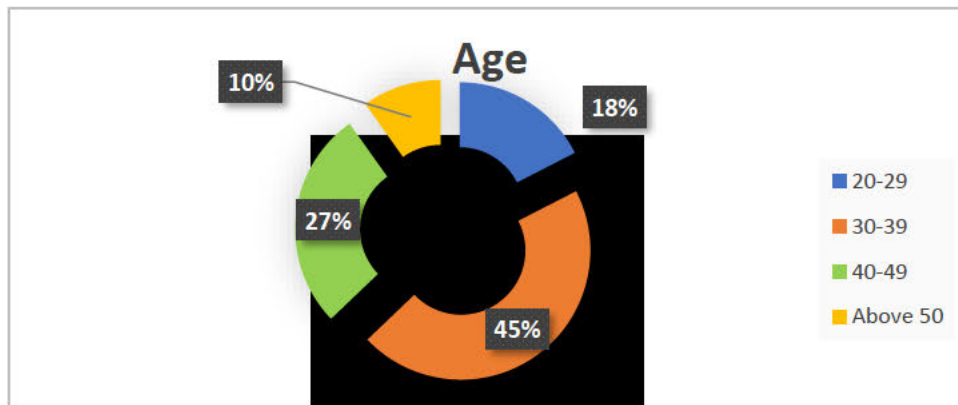


Figure 6.2: Chart showing the age distribution of respondents

Figure 6.2 showed the percentages of individuals within different age groups and the age ranges from 20-29, 30-39, 40-49 to 50 and above. The data reveals that the largest proportion of individuals falls within the age range of 30-39, comprising 45.1% of the total. This is followed by the age range of 40-49, which makes up 27.1% of the total. The age range of 20-29 represents 16.7% of the total population, and the remaining 9.8% consists of individuals above the age of 50. These findings indicate that the majority of individuals belong to the age ranges of 30-49, comprising over 70% of the total population. In contrast, individuals under the age of 30 account for less than 20% of the population, while individuals over the age of 50 make up less than 10% of the population.

6.3.3 Area of Specialization

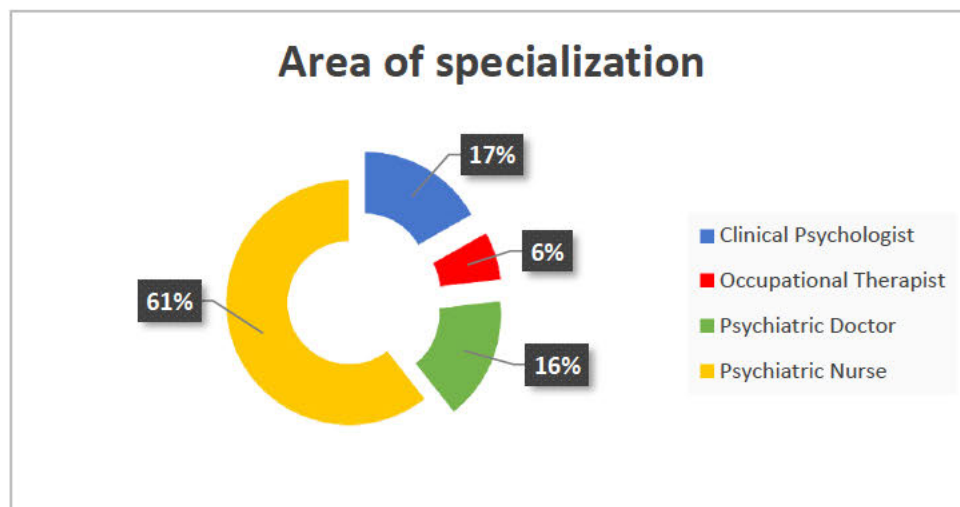


Figure 6.3: Chart showing the area of specialization of respondents

Figure 6.3 provides the percentages of respondents' areas of specialization. The data reveals that about 60% of the study participants were Psychiatric Nurses, while Clinical Psychologists and Psychiatric Doctors accounted for 16.7% and 16.1% of sample respectively. The remaining 6.3% of individuals identified as Occupational Therapists.

6.3.4 Years of Experience

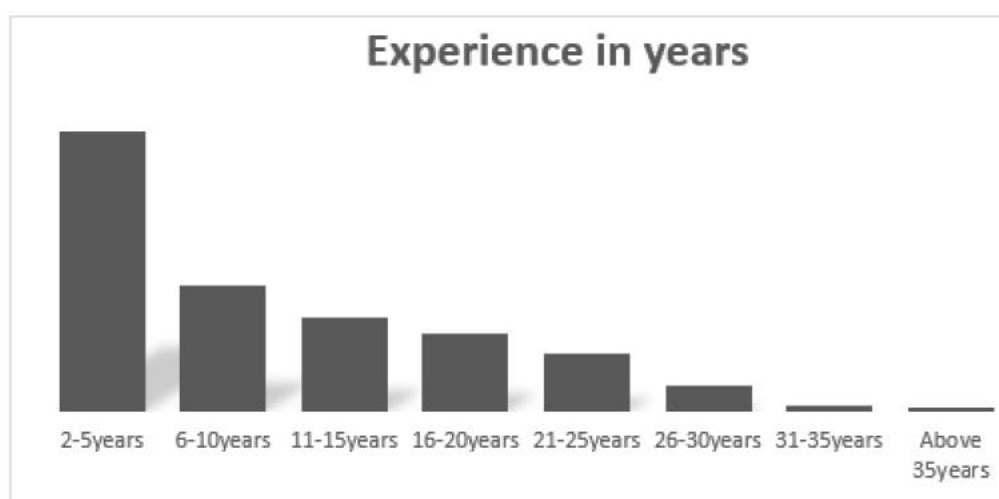


Figure 6.4: Graph showing the years of experience of respondents

Figure 6.4 provides the percentages of individuals within different categories of years of experience in their profession. The data reveals that the majority (41%) of individuals who were surveyed had 2-5 years of experience in their profession, while those with 6-10 years of experience accounted for 18.6% of the sample. The categories of 11-15 years and 16-20 years of experience accounted for 13.9% and 11.4% of the sample respectively. The remaining categories of years of experience (21-25, 26-30, 31-35, and above 35 years) accounted for less than 10% each.

6.3.5 Number of hours of meeting clients per week

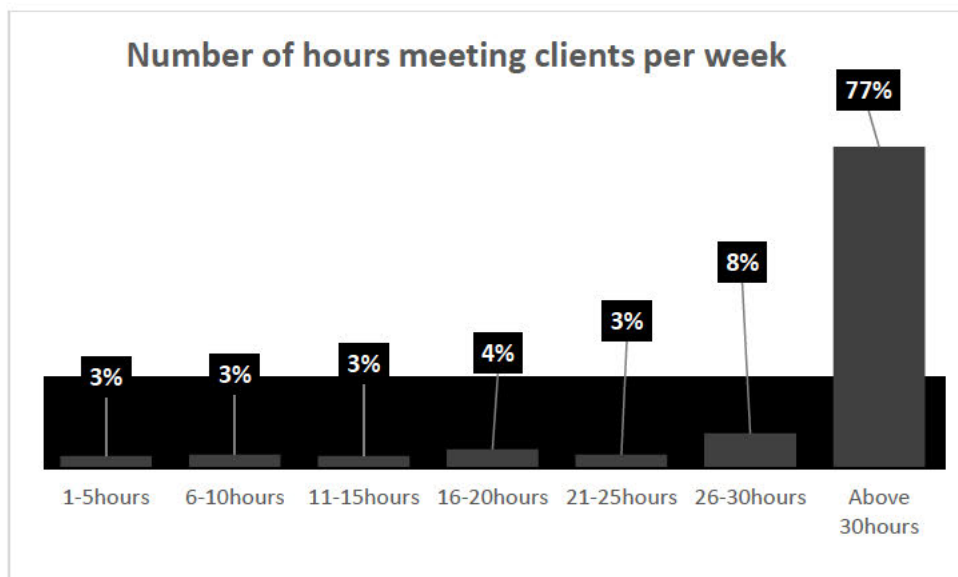


Figure 6.5: Graph showing the number of hours respondents meets clients per week

Figure 6.5 provides the percentages of individuals within different categories of the number of hours spent meeting with clients. The data reveals that the majority of individuals who were surveyed spent above 30 hours meeting with clients, comprising 76.3% of the sample. The next highest category was 26-30 hours, which accounted for 7.9% of the total. The categories of 1-5 hours, 6-10 hours, 11-15 hours, 16-20 hours, and 21-25 hours of meeting time accounted for less than 3% of the sample.

6.3.6 Use of digital technology with Clients

Table 6.2: Use of Digital Technology with clients

	Yes	No
Use digital technology with clients	137 (43.2%)	178 (56.2%)

Table 6.2 shows valuable insights into the utilization of digital technology among respondents with clients. 43.2% of mental health professionals use digital technology while 56.2% do not use digital technology. Likewise, two respondents (0.6%) did not indicate the use of digital technologies in their response.

6.3.7 Digital technology tools used with clients

Table 6.3: The frequencies and percentages of digital technology respondents adopted

Items	Yes Frequencies (Percentages)	No Frequencies (Percentages)
Calls	28 (8.8%)	289 (91.2%)
BP machine	2 (0.6%)	315 (99.4%)
Pulse machine	2 (0.6%)	315 (99.4%)
Thermometer	2 (0.6%)	315 (99.4%)
Sphygmamometer	5 (1.6%)	312 (98.4%)
Zoom	20 (6.3%)	297 (93.7%)
WhatsApp	28 (8.8%)	289 (91.2%)
Google Meet	29 (9.1%)	288 (90.9%)
Telemedicine	18 (5.7%)	299 (94.3%)
Telegraphy session	5 (1.6%)	312 (98.4%)
Multimedia	1 (0.3%)	316 (99.7%)
Glucometer	1 (0.3%)	316 (99.7%)
Skype	1 (0.3%)	316 (99.7%)

Table 6.3 contains data on the frequencies and percentages of clients who used or did not use various digital technologies. The data showed that the most widely used digital technology among respondents was Google Meet with 29 respondents (9.1% of the total) and WhatsApp and calls used by 28 respondents (8.8% of the total). Other utilized digital technologies were Telemedicine and Zoom, which had usage rates of 5.7% and 6.3%, respectively.

However, it should be noted that certain technologies were used less frequently. For example, the Glucometer, Skype, and Multimedia had lower usage rates of 0.3%. In contrast, some technologies, such as the BP machine, Telegraphy, Pulse machine, Thermometer, and Sphygmamometer, were used by a relatively small proportion of respondents.

6.3.8 Pearson Chi-Square Analysis

6.3.8.1 Pearson Chi-square test on years of experience and utilization of digital technologies

This section presents the findings from the analysis of the Pearson Chi-square. Pearson Chi-square established if there is a relationship between HCPs' years of experience and the use of digital technologies. The significance level, also known as the p-value, is 0.875, which is greater than the commonly used threshold of 0.05 ($p < 0.05$). This indicates that there is no statistically significant association between years of professional experience and the utilization of effective digital technologies to provide mental healthcare and well-being being analyzed, as the p-value is above the threshold. In other words, the difference between the observed and expected frequencies in the contingency table is not significant, and any observed relationship between the variables may be due to chance. The conclusion reached using the Likelihood Ratio test is consistent with the conclusion from the Pearson Chi-Square test.

6.3.8.2 Pearson Chi-square test on area of specialization and utilization of digital technology

This section presents findings from the Pearson Chi-square analysis on HCPs' area of specialization and the use of digital technologies. The significance level, also known as the p-value, is 0.000, which is less than the commonly used threshold of 0.05 ($p < 0.05$). This indicates that there is a statistically significant association between HCPs' area of specialization and the utilization of digital technologies being analyzed, as the p-value is below the threshold. In other words, the difference between the observed and expected frequencies in the contingency table is significant, and any observed relationship between the variables may not be due to chance. The conclusion reached using the Likelihood Ratio test is consistent with the conclusion from the Pearson Chi-Square test.

6.4 SECTION B: DIGITAL TECHNOLOGIES THAT COULD BE EFFECTIVELY UTILIZED TO PROVIDE MENTAL HEALTHCARE SERVICES AND WELLBEING IN PUBLIC HEALTHCARE DURING NATURAL DISASTERS AND HEALTH EMERGENCIES

Objective 2: Analyze digital technologies that could be effectively utilized to provide mental healthcare services and wellbeing in public healthcare during natural disasters and health emergencies.

Section B is a 12-items scale, which elicits responses from participants on the digital tools that can be successfully deployed in the provision of mental healthcare services. Responses are provided on a 5 Likert scale which ranges from strongly agree (5), agree (4), moderately agree (3), disagree (2) to strongly disagree (1). Mean and standard deviation was computed.

Table 6.4: The descriptive statistics for effective digital technologies that could be utilized to provide mental healthcare services and wellbeing

S/N	Items	Mean	Standard deviation
1	Wearable digital technologies such as smart-watches and digital bracelets can be effectively utilized to track heart rate, skin temperature, and electrodermal activity that help to assess an individual's well-being.	4.24	0.751
2	Digital biomarker applications can be used effectively to collect physiological data via a range of different methods to assess and improve mental health.	4.15	0.720
3	Smartphone applications can be effective in providing different types of psychotherapies to different mental and behavioural disorders.	4.10	0.837
4	Social media platforms (Facebook, WhatsApp, Instagram, Twitter, Telegram, etc.) can be effectively used to provide mental healthcare services and wellbeing.	3.39	1.322
5	Smartphone and tablets can be used to self-report mood or record voice as a means to gauge emotional state, and provide appropriate intervention instruction to improve mental health and wellbeing.	3.76	0.976
6	Actigraphy devices, Remote Sensors, Fitness Trackers, and monitoring devices are some of the effective digital technologies that provide significant data that will help in providing mental healthcare services and wellbeing.	3.77	1.003
7	Text messaging instructions using non-internet enabled cellphones can be effective to providing mental healthcare services and wellbeing to clients.	3.61	1.001
8	Internet-delivered CBT can be effective in providing mental healthcare services and wellbeing to clients.	3.83	0.952
9	Computerized CBT packages delivered in CDs, VCDs, or Flash Drive can be effective to providing mental healthcare services and wellbeing to clients.	3.73	0.860
10	Utilizing specially designed websites for therapeutic or psychiatry interventions can be effective to providing mental healthcare services and wellbeing to clients.	4.01	0.871
11	Where it is necessary, utilizing video technology for one on one or group consultation can be effective to providing mental healthcare services and wellbeing to clients.	3.99	0.857
12	Radio and Television call-in programmes featuring mental health professionals can be effective to providing mental healthcare services and wellbeing to individuals and groups.	4.11	0.860

Table 6.4 shows the average (mean) rating given by the participants for the effectiveness of the technology/platform. Overall, the mean ratings for all items in Table 6.9 are above three, indicating that the participants generally found the technologies/platforms to be at least somewhat effective in providing mental healthcare services and promoting well-being. The highest mean rating is for question 1 (wearable digital technologies), while the lowest mean rating was for question 4 (social media platforms).

The standard deviations range from 0.720 to 1.322, with most items having a standard deviation around 0.8 to 1.0. This suggests that there was some variability in the ratings, and the participants generally agreed on the effectiveness of technologies/platforms to a reasonable extent.

6.5 SECTION C: PERCEPTIONS OF HEALTH WORKERS TOWARDS THE UTILIZATION OF DIGITAL TECHNOLOGIES TO IMPROVE MENTAL HEALTHCARE SERVICES

Objective 3: Explore perceptions of the community and health workers towards the utilization of digital technologies to improve mental healthcare services.

The questionnaire used to measure HCPs' perception of the utilization of digital technologies to improve mental health care services is a 30-item scale. HCPs respond to each item by indicating their agreement with 'Yes' or 'No' to each of the item measuring their perception to the utilization of digital tools. The percentages are presented in Table 6.5.

Table 6.5: Percentages on Perception of mental workers towards the utilization of digital technologies to improve mental health care services

Items	Yes (percentages)	No (percentages)
The impact of digital technologies on clients' mental health will be positive.	285 (90%)	31 (10%)
Digital technologies for providing mental healthcare services will do more good to clients.	271 (85%)	46 (15%)
The use of digital technologies to provide mental healthcare services is pleasant.	279 (89%)	36 (11%)
The use of digital technologies for clients' mental health will be highly beneficial.	284 (90%)	32 (10%%)
Digital interventions for clients' mental health will be credible.	279 (90%)	32 (10%)
When using digital technologies, the personal information provided by clients is mostly secured.	252 (80%)	64 (20%)
Regardless of the severity of symptoms, digital interventions are typically effective.	80 (25%)	235 (75%)
A strong working alliance with client is achievable when using digital technologies to provide mental healthcare services.	208 (67%)	104 (33%)
When digital interventions are combined with face-to-face therapies, they can be more effective.	305 (97%)	11 (3%)
A mental health professional should have complete control over whether to use digital technologies with clients or not.	253 (80%)	64 (20%)
There is confidence generally in the ability of mental health professionals to use digital technologies with clients.	178 (56%)	139 (44%)
It is mostly up to mental healthcare professionals whether they decide to use digital technologies with clients or not.	215 (68%)	102 (32%)
Most mental healthcare professionals can use digital technologies to provide mental healthcare services for clients.	227 (72%)	89 (28%)
A mental health professional should be confident in their ability to use digital technologies to deliver mental health interventions to clients.	294 (93%)	22 (7%)
The required technical knowledge to use digital interventions for clients' mental healthcare needs is necessary.	288 (91%)	28 (9%)
Most mental healthcare professionals across other geographies are using digital technology effectively with their clients.	258 (82%)	58 (18%)

Most mental healthcare professionals would support the use of digital technology with clients.	257 (81%)	59 (19%)
It is important for 'mental health professional bodies' to support the use of digital technology within practice.	297 (94%)	19 (6%)
Most mental healthcare professionals would approve of the use of digital interventions with clients.	273 (87%)	42 (13%)
Most mental healthcare professionals would support the use of digital technology in therapy.	264 (84%)	52 (16%)
Digital interventions are effective in treating mental health concerns.	253 (81%)	58 (19%)
Compared to face-to-face therapy, digital technologies are equally effective in treating mental health concerns.	211 (67%)	102 (33%)
The use of digital interventions with clients should be encouraged to continue.	275 (87%)	40 (13%)
It is important to have a plan to use digital technology for mental healthcare services with clients.	279 (89%)	34 (11%)
It is ideal to use digital technology with clients when face-to-face therapy is not feasible.	292 (93%)	23 (7%)
It is becoming more likely that the use of digital interventions for clients' mental healthcare will be inevitable.	272 (86%)	44 (14%)
Having the necessary resources to use digital technology with clients is important.	301 (96%)	12 (4%)
Learning more about digital technologies in mental healthcare service provision is important.	304 (96%)	12 (4%)
It is important to make time to learn about digital interventions for mental healthcare services.	293 (93%)	23 (7%)
Clients will like to use digital interventions to address their mental health concerns.	259 (82%)	55 (18%)

Table 6.5 provides insights into the attitudes and perceptions of mental healthcare professionals towards the use of digital technologies in the provision of mental health services. The survey indicates that the vast majority (85-97%) of mental healthcare professionals agree that digital technologies have a

positive impact on clients' mental health and that digital interventions can be highly beneficial, credible and secure.

Furthermore, majority of the respondents (67-93%) agree that a strong working alliance can be achieved when digital interventions are combined with face-to-face therapy, and that mental healthcare professionals should have control over the use of digital technologies with clients. Interestingly, respondents also agree that having the necessary technical knowledge to use digital interventions for mental healthcare is necessary and that learning more about digital technologies in mental healthcare service provision is important. However, the survey also highlights some concerns and reservations regarding the use of digital technologies in mental health services. For example, only a little over half of respondents (56%) have confidence in the ability of mental health professionals to use digital technologies with clients, and 68% of respondents believe that it is mostly up to mental healthcare professionals to decide whether to use digital technologies with clients or not. Additionally, two-third of respondents (67%) believe that digital technologies are equally effective in treating mental health concerns compared to face-to-face therapy.

Overall, the data suggest that while there is a general positive attitude towards the use of digital technologies in mental healthcare, there is also a need for further education and training for mental healthcare professionals to ensure that they have the necessary skills and confidence to use these technologies effectively. Additionally, concerns about the effectiveness and appropriateness of digital interventions for all mental health concerns should be addressed to ensure that clients receive the best possible care. Standard deviations range from 0.720 to 1.322, with most items having a standard deviation around 0.8 to 1.0. This suggests that there was some variability in the ratings and the participants generally agreed on the effectiveness of the technologies/platforms to a reasonable extent.

6.6 SECTION D: BARRIERS AND CHALLENGES IMPEDING THE PROVISION OF MENTAL HEALTHCARE SERVICES AND WELLBEING THROUGH DIGITAL TECHNOLOGIES

Objective 4: Determine barriers and challenges impeding the provision of mental healthcare services and wellbeing through digital technologies.

Hindrances to the provision of mental health services through the use of digital technologies was measured with an 18-items scale. HCPs indicated their view on a 5-point Likert scale which ranges from strongly agree (5) to strongly disagree. The mean, mode and standard deviation was computed on the data and the result from the analysis is presented in Table 6.6.

Table 6.6: The analysis of the barriers to the provision of mental healthcare services and wellbeing through digital technologies

S/N	Items	Mean	Standard deviation
1	Lack of public awareness on digital technologies for mental healthcare services is a barrier to service provision.	4.15	0.821
2	Lack of knowledge about how to use digital technologies by mental health professionals is a barrier to the provision of mental healthcare services.	4.03	0.913
3	Digital technology for mental healthcare services usually has navigation problems due to having too many options.	3.35	1.176
4	A major challenge with digital technology for mental healthcare services is that they are quite complicated to use.	2.73	1.056
5	Digital technology for mental healthcare services often encounter technical malfunction.	2.92	1.152
6	The battery life of the device may be a barrier to the use of digital technologies for mental health service.	3.20	1.167
7	Digital technologies for mental health services have too much synchronization demands hence difficult to use.	2.79	1.050
8	Digital technologies for mental healthcare services are not logical and practical.	2.54	0.968
9	Digital technologies for mental healthcare services are not correct.	2.32	0.935

10	Digital technologies for mental healthcare services are not accurate.	2.27	0.979
11	Digital technologies for mental healthcare services are not efficient.	2.26	0.930
12	Available digital technologies for mental healthcare services are not effective and there is the need to obtain a better one.	2.79	1.178
13	Subscription cost for digital technology is very high and unaffordable for an average client.	3.35	1.008
14	Digital technologies for mental healthcare services involves heavy data usage, and that might be too expensive for an average client.	3.49	0.993
15	Digital technologies for mental healthcare services are robotic in nature and boring due to lack of face to face interaction between therapist and client.	2.82	1.183
16	Available digital technologies for mental healthcare services are time consuming to input answers to all questions asked.	2.53	1.085
17	My organization's rules are against the utilization of digital technologies for the provision of mental healthcare services and wellbeing.	2.14	1.045
18	My professional association is against the utilization of digital technology for the provision of mental health services.	2.12	0.997

Table 6.6 presents the results of a survey on the barriers to the provision of mental healthcare services using digital technologies. The respondents were asked to rate their level of agreement with statements on the scale using a Likert scale ranging from 1 (strongly disagree) to 5 (strongly agree). The mean scores, modes, and standard deviations for each statement are presented in the Table 6.6.

The results showed that lack of public awareness on digital technologies for mental healthcare services is a significant barrier to service provision, with a mean score of 4.15. Lack of knowledge about how to use digital technologies by mental health professionals is also a barrier, with a mean score of 4.03. On the other hand, the statement "Digital technologies for mental healthcare services are not efficient" received the lowest mean score of 2.26, indicating that the respondents mostly disagreed with the statement.

Some of the other barriers identified include technical malfunctions, high subscription costs, and heavy data usage, which can be too expensive for an average client. The results also indicate that some organizations and professional associations have rules against the use of digital technologies for mental healthcare services, which could limit their adoption and use. Overall, the results suggest that while digital technologies hold significant promise for the provision of mental healthcare services, several barriers need to be addressed to facilitate their effective and efficient use. These barriers range from technical issues to organizational and professional constraints and require a multi-stakeholder approach to overcome.

6.7 SECTION E: FACTORS AFFECTING THE PROVISION OF MENTAL HEALTH SERVICES AND WELLBEING IN PUBLIC HEALTHCARE

Objective 1: Determine factors affecting the provision of mental health services and wellbeing in public healthcare.

Findings from the analysis of the 18 items on the scale that measures the factors that are affecting the provision of mental health services and wellbeing in public healthcare is presented in this section. The items on the scale elicit responses from HCPs on the availability of infrastructure, policies and human resources as likely factors in the provision of mental health services. HCPs indicate their view on the items by using a 4-point Likert scale ranging from not a challenge (1) to serious challenge (4). Mean, mode and standard deviation was computed on the findings and results from the analysis are presented in Table 6.7.

Table 6.7: The analysis of factors affecting the provision of mental health services and wellbeing in public healthcare

S/N	Items	Mean	Standard deviation
1	Inadequate training and capacity development for mental healthworkers.	3.11	0.706
2	Lack of skilled mental health workers.	2.93	0.848
3	Poor budgetary allocation to mental health institutions and services.	3.30	0.683
4	Poor support for digital technology to improve mental healthcare services.	3.13	0.722
5	Poor/inappropriate mental healthcare policies by government.	3.27	0.741
6	Poor implementation/management of mental healthcare policies/programmes.	3.27	0.698
7	Lack of political will and motivation for mental health workers.	3.25	0.709
8	Insufficient mental healthcare facilities and equipment.	3.31	0.694
9	Insufficient mental healthcare professionals.	3.35	0.846
10	Long waiting hours at mental healthcare facilities.	2.96	0.823
11	Poor advocacy/awareness about mental health and treatment approach.	3.20	0.779
12	Accessibility of mental healthcare services.	3.17	0.790
13	High cost of mental healthcare services.	3.19	0.737
14	Misconceptions about mental health.	3.34	0.737
15	Community rejection of mentally ill persons.	3.38	0.727
16	Social stigma and poor social support systems.	3.44	0.700
17	Negative cultural perceptions about mental health.	3.41	0.682
18	Educational status attached to the mentally ill.	3.28	0.809

Based on the data provided in Table 6.7, the factors affecting the provision of mental health services and wellbeing in public healthcare are varied and significant. The respondents were asked to rate different factors on a scale of 1 to 4, with 1 indicating "not a challenge" and 4 indicating "serious challenge".

The results in Table 6.7 show that the most significant challenges are related to the insufficient number of mental healthcare professionals (mean=3.35), negative cultural perceptions about mental health (mean=3.41), social stigma and poor social support systems (mean=3.44), and community rejection of mentally ill persons (mean=3.38). Other notable challenges include poor

budgetary allocation to mental health institutions and services (mean=3.30), poor implementation/management of mental healthcare policies/programmes (mean=3.27), and poor/inappropriate mental healthcare policies by the government (mean=3.27). On the other hand, factors such as long waiting hours at mental healthcare facilities (mean=2.96) and lack of skilled mental health workers (mean=2.93) were rated as relatively less challenging. Overall, the standard deviations for the different factors range from 0.682 to 0.848, indicating that the responses were generally consistent across the sample and the mean.

6.8 STRUCTURAL EQUATION MODELLING (SEM)

This section presents the findings from the Structural Equation Modelling (SEM). SEM was computed to test both direct and indirect influence among identified variables on the two models used. The model used in this study is Unified Theory of Acceptance and Use of Technology (UTAUT) Model and Health Belief Model (HBM). Structural equation modelling (SEM) can be approached either as covariance-based SEM or partial least squares SEM (PLS-SEM) or variance-based SEM. This study used SMART-PLS version 4 with a Structural Equation Model (SEM) approach to test the SEM model hypotheses and assess the statistical significance of the path coefficients in the UTAUT and HBM standard model respectively. This approach is frequently used in social science studies because of its accuracy in psychometric model analysis (Kim and Lee 2020: 1). Based on existing studies, the SMART-PLS is used for the following reasons: (1) hypothesis testing can be performed when the distribution is abnormal; (2) it can be used once the element is less than three (3) factors; and (3) it can be used without thinking about the number of samples (Alghazi *et al.* 2021: 1856).

The partial least squares–structural equation model (PLS-SEM) step consists of reflective measurement and structural model assessments. The reflective measurement model assessment reveals reflective indicator loading, internal

consistency reliability consisting of Cronbach's alpha and composite reliability, convergent validity through Average Variance Extracted, and discriminant validity using the Heterotrait–Monotrait ratio (HTMT). Meanwhile, statistical assessments such as Variation Inflation Factor (VIF) value, path coefficients, t-statistics, sample mean, standard deviations, the relationships and p-values are used to evaluate the structural model (Kim and Lee 2020: 1; Nikou and Aavakare 2021: 3893). The path coefficient, t-statistic and the p-value were used to compare the actual behaviour of the HCPs use of digital technologies tools for mental health service delivery and wellbeing in South-West Nigeria.

6.8.1 UTAUT Model Analysis

The UTAUT model was used to determine Healthcare professionals' intentions, and the use of digital technologies for mental health service delivery and wellbeing in South-West Nigeria. The following hypothesis was formulated based on the UTAUT Model standard framework:

Hypothesis 1 (H1): Behavioural Intention (BI) influences user Behaviour (UB) to use digital technologies for mental health services and wellbeing.

Hypothesis 2 (H2): Expectancy (EE) influences BI to use digital technologies for mental health services and wellbeing.

Hypothesis 3 (H3): Facilitating Condition (FC) influences UB to use digital technologies for mental health services and wellbeing.

Hypothesis 4 (H4): Performance Expectancy (PE) influences BI to use digital technologies for mental health services and wellbeing.

Hypothesis 5 (H5): Social Influence (SI) influences BI to use digital technologies for mental health services and wellbeing.

Hypothesis 6 (H6): Demographics characteristics influences all the constructs to use digital technologies for mental health services and wellbeing.

6.8.1.1 Results on UTAUT Model

The result from the findings and the analysis of the reflective measurement of the UTAUT Model are presented below. The analysis is computed in two stages. Furthermore, an evaluation of the structural model and the hypotheses examination of the UTAUT Model are also presented below.

6.8.1.1.1 Measurement Model First Stage

The structural model produced was shown by the outcomes in the measurement model in first stage. There is relationship between the variables loading factor in this structural model and it is presented by the diagram in Figure 6.6.

stage of the analysis as shown in Figure 6.7 (Hair *et al.* 2016). As a result, some items under the FC construct A7(calls FC1, BP machines FC2, Pulse machine FC3, thermometer FC4, sphygmomanometer FC5, Zoom FC6, WhatsApp FC7, Google Meet FC8, telemedicine FC9, teletherapy session FC10, multimedia FC11, glucometer FC12, skype FC13), C26(FC14), C27(FC15)) were eliminated and use fewer items (FC6, FC7, FC8). Likewise, one item (PE5) under PE constructs (PE1, PE2, PE3, PE4, PE5, PE6, PE7) was eliminated. One item (BI1) was eliminated under the BI construct (BI1, BI2, BI3) and also an item (SI1) was eliminated under the SI construct (SI1, SI2, SI3, SI4). This procedure allowed the researchers to detect and to remove insignificant questions from the questionnaire and prove that the remaining items are adequate to measure the model.

6.8.1.1.2 Reliability and validity of construct variables

The reliability and validity of the construct variables test in this study were estimated with the use of composite reliability (rho_a), composite reliability (rho_c) and Average Variance Extracted (AVE) as presented in Table 6.9. It is important to note that for PLS-SEM, composite reliability (CR) and AVE are usually preferred instead of Cronbach alpha (Dijkstra and Henseler 2015: 297).

Table 6.8: Construct Reliability and Validity (First Stage Factor Analysis)

Latent variables	Composite reliability(rho_a)	Composite reliability(rho_c)	AVE
BI	0.369	0.604	0.407
EE	0.599	0.809	0.679
FC	0.355	0.038	0.105
PE	0.900	0.858	0.492
SI	0.764	0.741	0.443
UB	0.610	0.752	0.439

Table 6.8 showed each construct had composite reliability (ρ_c) greater than 0.5 and good internal consistency (Fornell and Larcker 1981: 39; Sanmukhiya, 2020) except FC construct. EE, PE and SI constructs only have values greater than 0.5 under the composite reliability (ρ_a). Furthermore, the AVE for EE construct only had values greater than 0.5, which can be improved in the second stage.

6.8.1.1.3 Variation Inflation Factor for Collinearity Statistics (Factor Analysis First Stage)

The Variation Inflation Factor (VIF) measured the strength of relationship among items under each construct on the model. The value of each indicator's Variation Inflation Factor (VIF), which assesses multicollinearity, was <5 (Lei and Lomax 2005: 1) as shown in Table 6.9.

Table 6.9: Result from Variation Inflation Factor (first stage)

	VIF
BI1	1.035
BI2	1.049
BI3	1.083
EE1	1.147
EE2	1.147
FC1	1.026
FC10	1.008
FC11	1.006
FC12	1.351
FC13	1.072
FC14	1.026
FC15	1.086
FC2	1.423
FC3	1.637

FC4	1.179
FC5	1.755
FC6	1.296
FC7	1.536
FC8	1.761
FC9	1.023
PE1	1.951
PE2	1.845
PE3	3.198
PE4	2.941
PE5	1.019
PE6	1.905
PE7	1.427
SI1	1.057
SI2	1.183
SI3	1.272
SI4	1.456
UB1	1.123
UB2	1.311
UB3	1.100
UB4	1.356

The VIF value of each construct presented in Table 6.9 ranged from 1.006 to 3.198, which was within the acceptable range of less than five. The results show that the strength of the linear relationship between the items and constructs are not false positive.

6.8.1.1.4 Discriminant validity (Factor Analysis First Stage)

Discriminant validity measures if constructs that should not correlate theoretically are related. Discriminant validity can be evaluated using Fornell and Larcker's (1981:39) criteria, Cross-loadings and the Heterotrait-Monotrait Method (HTMT). In this study, Cross-loadings and HTMT were used. The constructs on the UTAUT model are measured and the result is presented on Table 6.10.

Table 6.10: Heterotrait-Monotrait ratio (HTMT) – Matrix (first stage)

	BI	EE	FC	PE	SI	UB
BI						
EE	0.559					
FC	0.851	0.576				
PE	0.573	0.817	0.425			
SI	0.755	0.835	0.574	0.976		
UB	0.435	1.177	0.639	0.919	0.965	

Naveed *et al.* (2020: 8618) and Teo *et al.* (2008: 99) state that the threshold value maximal value for HTMT is 0.9. On Table 6.10, the highlighted value less than 0.9, indicates that the constructs should not be theoretically related while constructs not highlighted should be theoretically related, according to UTAUT standard model but they are not. The HTMT matrix found discriminant validity challenges with four inter-construct correlation. UB and EE, SI and PE, UB and PE likewise, UB and SI should correlate theoretically but they do not.

6.8.1.1.5 Model Fit (Factor Analysis First Stage)

Standardized Root Means Square Residual (SRMR) was used to assess the fit in the Partial least square (PLS) model. A good fit is defined by an SRMR value less than 0.10 (Hu and Bentler 1998; Kline 2005). SRMR value in this study was 0.102 for the first stage even though some items will be discarded due to low loadings.

6.8.1.1.6 Hypothesis testing for first stage using path analysis

To test the hypotheses, the relationships between items were investigated using path coefficients as shown in Figure 6.7 and Table 6.8 as the predictive power of the model (Bozan *et al.* 2016: 3105). To check the statistical significance of path coefficient relationships, *t*-test and *p*-value were used in Table 6.8 to deduce the decision. The adjusted R-squared (R^2) is indicated inside the circles, path coefficients on the arrows and *t*-statistics in brackets in Figure 6.7. The UTAUT Model for the first stage observed 40.6% of variance (adjusted R^2) in the intention to use digital technologies and 9.7% of variance in digital technologies usage for mental health service delivery and wellbeing.

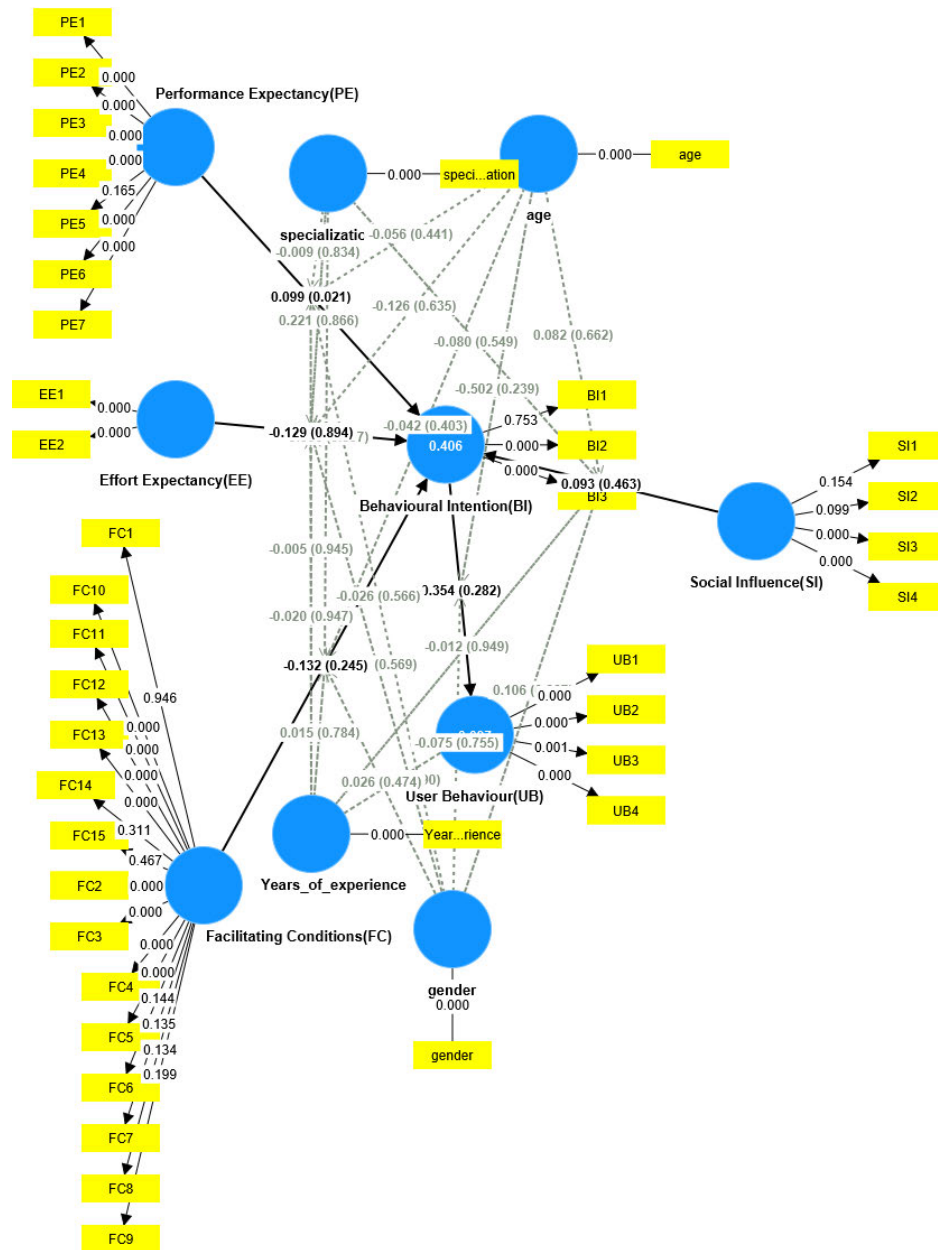


Figure 6.7: UTAUT Model path analysis for first stage

The path coefficient values on Table 6.11 are derived from Figure 6.7.

Table 6.11: Hypothesis testing first stage

Relationship	Path coefficient	Sample Mean	Standard deviation	t-statistics	p-value	Decision
BI→UB	0.354	0.388	0.329	1.076	0.282	Insignificant
EE→BI	-0.129	-0.114	0.967	0.134	0.894	Insignificant
FC→UB	-0.132	-0.096	0.113	1.164	0.245	Insignificant
PE→BI	0.099	0.077	0.043	2.315	0.021	Significant
SI→BI	0.093	0.168	0.127	0.734	0.463	Insignificant

Table 6.11 shows the values of the path coefficient, sample mean, standard deviation, t-statistic, the p-value and the relationship. Since some t-statistics are greater than 1.96 and some p-value is less than 0.05 then only one pathway exhibits significant results (Graham 2020: 749)

BI shows insignificant influence on UB, which rejects the first hypothesis.

Hypothesis 1 (H1): Behavioural Intention (BI) influences user Behaviour (UB) to use digital technologies for mental health services and wellbeing.

EE shows insignificant influence on BI thereby rejecting the second hypothesis.

Hypothesis 2 (H2): Export Expectancy (EE) influences BI to use digital technologies for mental health services and wellbeing.

FC shows insignificant influence on BI thereby rejecting the third hypothesis.

Hypothesis 3 (H3): Facilitating Condition (FC) influences BI to use digital technologies for mental health services and wellbeing.

PE shows significant influence on BI, which accept the fourth hypothesis.

Hypothesis 4 (H4): Performance Expectancy (PE) influences BI to use digital technologies for mental health services and wellbeing.

SI shows insignificant influence on BI, rejecting the fifth hypothesis.

Hypothesis 5 (H5): Social Influence (SI) influences BI to use digital technologies for mental health services and wellbeing.

All demographics characteristics shows insignificant influence on all the constructs, rejecting the sixth hypothesis.

Hypothesis 6 (H6): All demographics' characteristics influence all constructs to use digital technologies for mental health services and wellbeing.

Effort expectancy and facilitating conditions are negatively associated with HCPs' behavioural intention to use digital technologies for mental health services and wellbeing but statistically insignificant.

Performance Expectancy and Social influence are positively associated with HCPs' behavioural intention to use digital technologies for mental health services and wellbeing but only social influence is statistically insignificant.

HCPs' behavioural intention to utilize digital technologies was positively related to User behaviour but statistically insignificant.

6.8.1.1.7 Reflective Measurement Model Second Stage

The outcome of the analysis of the items with indicator reliability exceeding 0.4 in the first stage of the structural model was retained for further analysis and investigation in the second stage. The variables in this range are presented in Figure 6.8 as shown below.

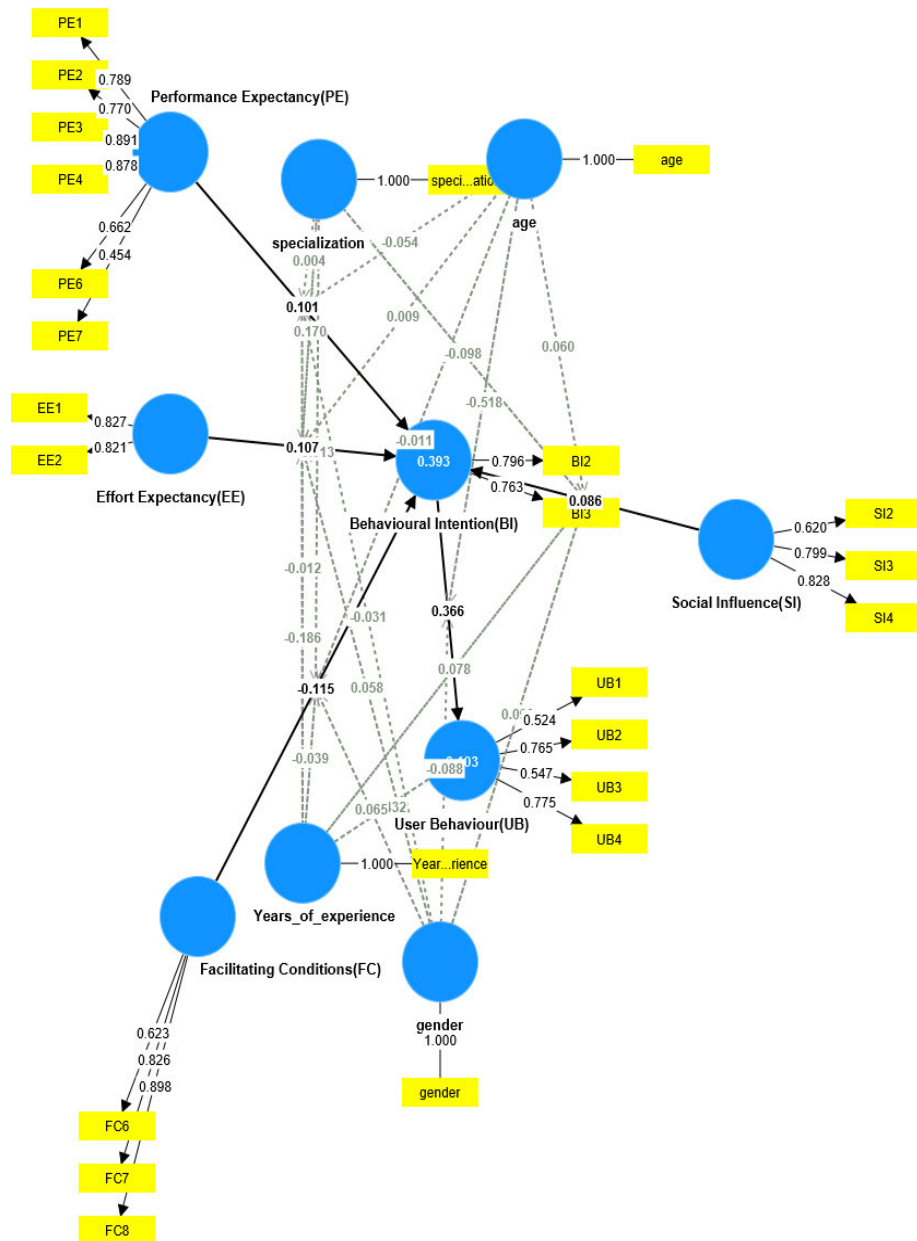


Figure 6.8: Second stage UTAUT Model using factor analysis

Figure 6.8 shows the loading factor for each variable in the range of 0.454 to 0.898, which is a satisfactory value. Each variable shows a value that is almost evenly distributed and consistent. This means that the observed variables should be able to explain the latent variables.

6.8.1.1.8 Construct reliability and validity (Factor Analysis Second Stage)

Construct reliability and validity as presented in Table 6.12 had composite reliability (rho_a) and composite reliability (rho_c) greater than 0.5 and showing good internal consistency except for FC.

Table 6.12: Construct Reliability and Validity (Second Stage Factor Analysis)

Latent variables	Composite reliability(rho_a)	Composite reliability(rho_c)	AVE
BI	0.409	0.756	0.608
EE	0.602	0.809	0.679
FC	0.800	0.831	0.626
PE	0.907	0.885	0.571
SI	0.739	0.796	0.569
UB	0.606	0.752	0.440

The composite reliability and AVE significantly improved in the second stage as compared to the first stage. This can be seen in Table 6.8 and Table 6.12 respectively. Furthermore, the AVE in first stage had only one construct greater than 0.5 but in second stage, five constructs has value greater than 0.5 as shown in Table 6.8 and Table 6.12. This shows an improvement in the second stage of the analysis.

6.8.1.1.9 Variation inflation factor for collinearity statistics (Factor analysis second stage)

The value of each indicator's Variation Inflation Factor (VIF), which assesses multicollinearity, was <5 as shown in Table 6.13.

Table 6.13: Result from Variation Inflation Factor (Second Stage)

	VIF
BI2	1.049
BI3	1.049
EE1	1.147
EE2	1.147
FC6	1.279
FC7	1.465
FC8	1.650
PE1	1.948
PE2	1.844
PE3	3.198
PE4	2.940
PE6	1.902
PE7	1.423
SI2	1.179
SI3	1.265
SI4	1.414
UB1	1.123
UB2	1.311
UB3	1.100
UB4	1.356

The VIF value of each construct as shown in Table 6.13 was ranged from 1.0049 to 3.198 which was within the acceptable range of less than five. This shows the strength of relationship among items of each construct has improved.

6.8.1.1.10 Discriminant validity

Table 6.14 shows the HTMT statistics discriminant validity. All the highlighted values in Table 6.14 are less than 0.9 except UB and EE.

Table 6.14: Heterotrait-Monotrait ratio (HTMT) – Matrix (second stage)

	BI	EE	FC	PE	SI	UB
BI						
EE	0.570					
FC	0.473	0.203				
PE	0.575	0.804	0.197			
SI	0.615	0.787	0.253	0.796		
UB	0.393	1.177	0.349	0.913	0.828	

If the HTMT value is below 0.9, discriminant validity has been established between two reflective constructs. In the first stage of discriminant validity, HTMT indicates four inter-constructs' correlation problem, however, two out of the four inter-constructs were eliminated. UB and EE, UB and PE constructs are not theoretically related in second stage just as indicated in First stage discriminant validity on UTAUT standard model.

6.8.1.1.11 Model fit for factor analysis second stage

The SRMR for the second stage in this study is 0.097. The model fit in the second stage is better than the model fit in the first stage. This implies that the introduction of the moderating variables contributed positively to influence the constructs.

6.8.1.1.12 Hypothesis testing for second stage using path analysis

To test the hypotheses, the relationships between items were investigated using path coefficients as shown in Figure 6.9 and Table 6.15 as the predictive power of the model. To check the statistical significance of path coefficient relationships, *t*-test and p-value was used in Table 6.12 to deduce the decision. The adjusted R-squared (R^2) is indicated inside the circles, path coefficients on the arrows and t-statistics in brackets in Figure 6.9. The path coefficient values on Table 6.15 is derived from Figure 6.9. The UTAUT model observe 39.3% of variance (adjusted R^2) in the intention to use digital technologies and 10.3% of variance in digital technologies usage for mental health service delivery and wellbeing.

Table 6.15: Hypothesis testing for second stage

Relationship	Path coefficient	Sample Mean	Standard deviation	t-statistics	p-value	Decision
BI→UB	0.366	0.402	0.339	1.081	0.280	Insignificant
EE→BI	0.107	0.075	7.856	0.014	0.989	Insignificant
FC→UB	-0.115	-0.116	0.036	3.165	0.002	Significant
PE→BI	0.101	0.087	0.044	2.319	0.020	Significant
SI→BI	0.086	0.114	0.126	0.687	0.492	Insignificant
GenderXFC→ BI	0.065	0.062	0.028	2.294	0.022	Significant

Table 6.15 shows the values of the path coefficient, sample mean, standard deviation, t-statistic, the p-value and the relationship. Given that some t-statistics are greater than 1.96 and some p-value is less than 0.05 then only three pathways exhibit significant results.

BI shows insignificant influence on UB which refutes the first hypothesis.

Hypothesis 1 (H1): Behavioural Intention (BI) influences user Behaviour (UB) to use digital technologies for mental health services and wellbeing.

EE shows insignificant influence on BI which refutes the second hypothesis.

Hypothesis 2 (H2): Export Expectancy (EE) influences BI to use digital technologies for mental health services and wellbeing.

FC shows significant influence on UB which accepts the third hypothesis.

Hypothesis 3 (H3): Facilitating Condition (FC) influences BI to use digital technologies for mental health services and wellbeing.

PE shows significant influence on BI which accepts the fourth hypothesis.

Hypothesis 4 (H4): Performance Expectancy (PE) influences BI to use digital technologies for mental health services and wellbeing.

SI shows insignificant influence on BI, which refutes the fifth hypothesis.

Hypothesis 5 (H5): Social Influence (SI) influences BI to use digital technologies for mental health services and wellbeing.

Gender is the only moderating variable that combines with FC to show significant influence on BI which accept the sixth hypothesis.

Hypothesis 6 (H6): Gender and Facilitating Conditions (FC) influences BI to use digital technologies for mental health services and wellbeing.

Two hypotheses have positive influence on the use of digital technologies while one hypothesis has negative influence on the use of digital technologies. These hypotheses are statistically significant from the standard framework of UTAUT. They are H4, H6 and H3 respectively. Effort expectancy, and social influence correlates positively to HCPs' behavioural intention to use digital technologies for mental health services and wellbeing but they are not statistically significant.

6.8.2 Modified UTAUT Model

From the above discussion, there is need to propose a modified model in order to capture some important constructs that were relevant and an improvement to the standard UTAUT. The study proposed MMH-UTAUT (Modified Mental Health-UTAUT) model as the modified version of the standard UTAUT to enhance HCPs' behavioural intention to use digital technologies for mental healthcare service delivery and wellbeing. Prior studies have broadened the standard UTAUT model by integrating new constructs and moderating variables (Riffai *et al.* 2012: 239). A new construct Therapeutic Approach (TA) and two new moderating variables' specialization after hours of meeting with clients were introduced in the modified MMH-UTAUT model. Therapeutic Approach was not originally a construct in the standard UTAUT model but was identified in the study as an important construct in the utilization of digital technologies. More so, TA was not eliminated in the first and second stage of factor and path analysis of UTAUT model.

The following hypothesis were identified in the development of MMH-UTAUT model which are stated as follows:

Hypothesis 1 (HU1): Behavioural Intention (BI) influences user Behaviour (UB) to use digital technologies for mental health services and wellbeing.

Hypothesis 2 (HU2): Export Expectancy (EE) influences BI to use digital technologies for mental health services and wellbeing.

Hypothesis 3 (HU3): Facilitating Condition (FC) influences UB to use digital technologies for mental health services and wellbeing

Hypothesis 4 (HU4): Performance Expectancy (PE) influences Behavioural intention of HCPs to use digital technologies for mental health services and wellbeing.

Hypothesis 5 (HU5): Social Influence (SI) influences BI to use digital technologies for mental health services and wellbeing.

Hypothesis 6 (HU6): therapeutic approach (TA) influences UB to use digital technologies for mental health services and wellbeing.

Hypothesis 7 (HU7): Years of experience influences HCPs' Behavioural Intention (BI) to use digital technologies for mental health services and wellbeing.

Hypothesis 8 (HU8): Years of experience influences HCPs' User Behaviour (UB) to use digital technologies for mental health services and wellbeing.

Hypothesis 9 (HU9): Age influences HCPs' Behavioural Intention (BI) to use digital technologies for mental health services and wellbeing.

Hypothesis 10 (HU10): Age influences HCPs' User Behaviour (UB) to use digital technologies for mental health services and wellbeing.

Hypothesis 11 (HU11): Gender influences HCPs' Behavioural Intention (BI) to use digital technologies for mental health services and wellbeing.

Hypothesis 12 (HU12): Gender influences HCPs' user Behaviour (UB) to use digital technologies for mental health services and wellbeing.

Hypothesis 13 (HU13): Specialization influences HCPs' Behavioural Intention (BI) to use digital technologies for mental health services and wellbeing.

Hypothesis 14 (HU14): Specialization influences HCPs' user Behaviour (UB) to use digital technologies for mental health services and wellbeing.

Hypothesis 15 (HU15): Gender and therapeutic approach (TA) influences HCPs' user behaviour (UB) to use digital technologies for mental health services and wellbeing.

Hypothesis 16 (HU16): Specialization and Facilitating Conditions (FC) influences HCPs' user behaviour (UB) to use digital technologies for mental health services and wellbeing.

6.8.2.1 Result on modified MH-UTAUT Model

The result from the findings and the analysis of the reflective measurement of the MMH-UTAUT model are presented below. The first and second stage of factor and path analysis has eliminated redundant constructs, therefore analysis is computed in one stage. Furthermore, an evaluation of the structural model and the hypotheses examination of the modified MH-UTAUT model are also presented.

6.8.2.1.1 Reflective Measurement Model

The structural model produced was shown by the outcomes in the measurement model. There is relationship between the variables loading factor in this structural model and it is presented by the diagram in Figure 6.10.

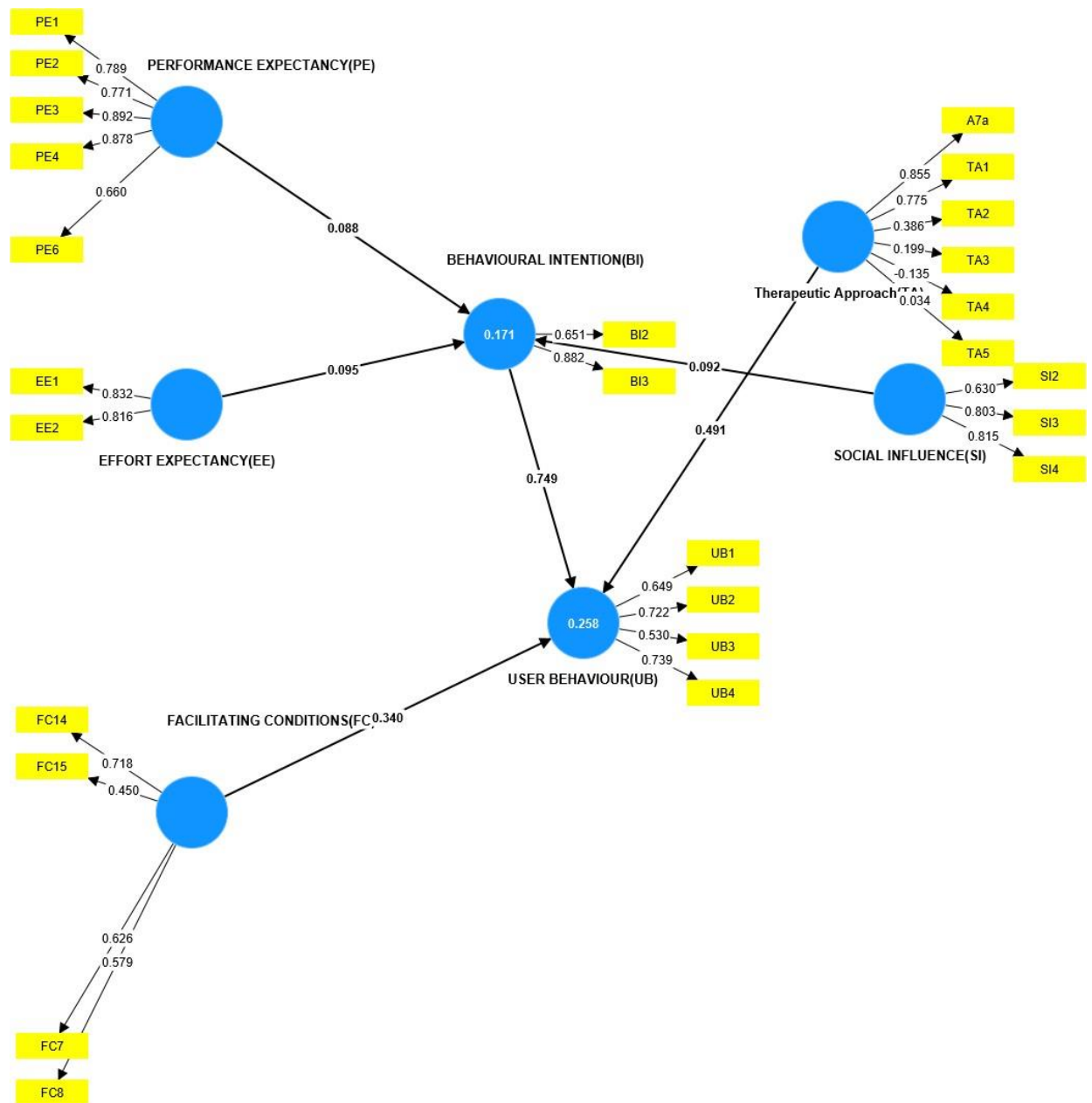


Figure 6.10: Factor analysis of the MH-UTAUT model

Figure 6.10 showed the outer loading and the path coefficients using factor analysis with all the items for all modified UTAUT constructs displayed.

6.8.2.1.2 Reliability and validity of construct variables

The reliability and validity of the construct variables test in the study were estimated with the use of composite reliability (rho_a), composite reliability (rho_c) and Average Variance Extracted (AVE) as presented in Table 6.16.

Table 6.16: Construct Reliability and Validity (Factor Analysis)

Latent variables	Composite reliability(rho_a)	Composite reliability(rho_c)	AVE
BI	0.607	0.746	0.601
EE	0.593	0.809	0.679
FC	0.447	0.688	0.361
PE	0.897	0.899	0.644
SI	0.752	0.796	0.569
TA	0.603	0.500	0.256
UB	0.586	0.757	0.442

Table 6.16 showed each construct had composite reliability (rho_a) greater than 0.5 and good internal consistency except FC construct. EE, PE, TA and SI constructs having values greater than 0.5 under the composite reliability (rho_a). All the constructs values are greater than 0.5 under the composite reliability (rho_c) which shows an improvement in the MMH-UTAUT model. Furthermore, the AVE for BI, EE, PE and SI constructs had values greater than 0.5.

6.8.2.1.3 Variation inflation factor for collinearity statistics (Factor analysis)

The Variation Inflation Factor (VIF) measured the strength of relationship among items under each construct on the model and presented in Table 6.17

Table 6.17: Result from Variation Inflation Factor

	VIF
A7a	1.271
BI2	1.049
BI3	1.049
EE1	1.147
EE2	1.147
FC14	1.015
FC15	1.042
FC7	1.485
FC8	1.451
PE1	1.946
PE2	1.840
PE3	3.198
PE4	2.931
PE6	1.606
SI2	1.179
SI3	1.265
SI4	1.414
TA1	1.284
TA2	1.182
TA3	1.090
TA4	1.229
TA5	1.186
UB1	1.123
UB2	1.311
UB3	1.100
UB4	1.356

The VIF value of each construct presented in Table 6.17 ranged from 1.015 to 3.198, which was within the acceptable range of less than five. The results show that the strength of the linear relationship between the items and constructs are not false positive.

6.8.2.1.4 Discriminant validity

The constructs on the MMH-UTAUT model are measured and the result is presented on Table 6.18.

Table 6.18: Heterotrait-Monotrait ratio (HTMT) – Matrix

	BI	EE	FC	PE	SI	TA	UB
BI							
EE	0.570						
FC	0.815	0.805					
PE	0.633	0.809	0.370				
SI	0.615	0.787	0.506	0.789			
TA	0.529	0.316	0.692	0.173	0.347		
UB	0.393	1.177	0.754	0.860	0.828	0.504	

The HTMT matrix found discriminant validity challenges with one inter-construct correlation UB and EE. The two constructs were expected to correlate theoretically but the findings show both constructs do not.

6.8.2.1.5 Model Fit

Standardized Root Means Square Residual (SRMR) was used to assess the fit in the Partial least square (PLS) model. The SRMR value in the modified MMH-UTAUT model was 0.098.

6.8.2.1.6 Hypothesis Testing Using Path Analysis

To test the hypotheses, the relationships between items were investigated using path coefficients as shown in Figure 6.11 and Table 6.19 as the predictive power of the model (Bozan *et al.* 2016: 3105) based on Bootstrapping. To check the statistical significance of path coefficient relationships, *t*-test and *p*-value were used in Table 6.19 to reach the decision. The MMH-UTAUT model observed 26.7% of variance in the intention to use digital technologies and 41% of variance in digital technologies' usage for mental health service delivery and wellbeing.

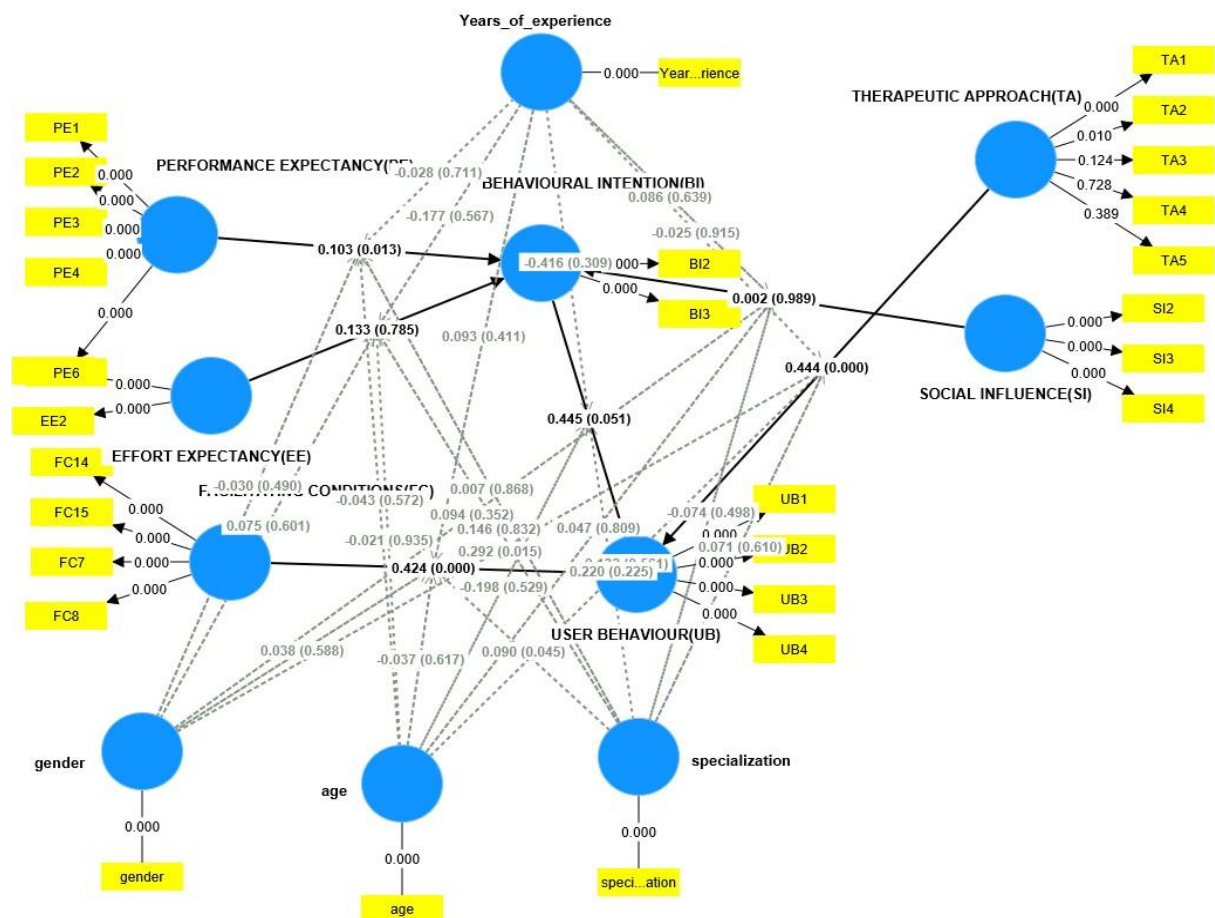


Figure 6.11: MMH-UTAUT MODEL PATH ANALYSIS

The path coefficient values on Table 6.19 is derived from Figure 6.11.

Table 6.19: MH-UTAUT Hypothesis testing

Hypothesis	Relationship	Path coefficient (β)	Sample Mean	Standard deviation	t-statistics (t)	p-value	Decision
HU1	BI→UB	0.445	0.446	0.228	1.951	0.051	Insignificant (not supported)
HU2	EE→BI	0.133	0.124	0.488	0.273	0.785	insignificant (not supported)
HU3	FC→UB	0.424	0.429	0.061	6.918	0.000	Significant (supported)
HU4	PE→BI	0.103	0.090	0.041	2.496	0.013	Significant (supported)
HU5	SI→BI	0.002	0.026	0.114	0.014	0.989	Insignificant (not supported)
HU6	TA→UB	0.444	0.473	0.123	3.617	0.000	Significant (supported)
HU7	Years of experience→BI	0.092	0.135	0.403	0.229	0.819	Insignificant (not supported)
HU8	Years of experience→UB	0.323	0.350	0.479	0.674	0.500	Insignificant (not supported)
HU9	Age→BI	-0.008	-0.033	0.341	0.023	0.981	Insignificant (not supported)
HU10	Age→UB	0.190	0.120	0.374	0.509	0.611	Insignificant (not supported)
HU11	Gender→BI	-0.190	-0.156	0.193	0.980	0.327	Insignificant (not supported)
HU12	Gender→UB	-0.182	-0.159	0.087	2.103	0.036	Significant (supported)
HU13	Specialisation→BI	-0.005	-0.003	0.703	0.008	0.994	Insignificant (not supported)
HU14	Specialisation→UB	-0.255	-0.239	0.233	1.097	0.273	Insignificant (not supported)
HU15	SpecialisationXFC→BI	0.090	0.091	0.045	2.003	0.045	Significant (supported)

HU16	Gender XTA→U B	0.292	0.267	0.120	2.442	0.015	Significant (supported)

Table 6.19 shows the values of the path coefficient, sample mean, standard deviation, t-statistic, the p-value and the relationship (path). Some t-statistic are greater than 1.96 and some p-value is less than 0.05, but only six pathways exhibit significant results (Graham, 2020).

Behavioural Intention (BI) does not influence user Behaviour (UB) to use digital technologies for mental health services and wellbeing. First hypothesis is rejected.

Hypothesis 1 (HU1): Behavioural Intention (BI) influences user Behaviour (UB) to use digital technologies for mental health services and wellbeing.

Export Expectancy (EE) does not influence BI to use digital technologies for mental health services and wellbeing. Second hypothesis is rejected.

Hypothesis 2 (HU2): Export Expectancy (EE) influences BI to use digital technologies for mental health services and wellbeing.

Facilitating Condition (FC) influences UB to use digital technologies for mental health services and wellbeing. Third hypothesis is accepted.

Hypothesis 3 (HU3): Facilitating Condition (FC) influences UB to use digital technologies for mental health services and wellbeing.

Performance Expectancy (PE) influences Behavioural intention of HCPs to use digital technologies for mental health services and wellbeing. Fourth hypothesis is accepted.

Hypothesis 4 (HU4): Performance Expectancy (PE) influences Behavioural intention of HCPs to use digital technologies for mental health services and wellbeing.

Social Influence (SI) does not influence BI to use digital technologies for mental health services and wellbeing. The fifth hypothesis is rejected.

Hypothesis 5 (HU5): Social Influence (SI) influences BI to use digital technologies for mental health services and wellbeing.

Therapeutic approach (TA) influences UB to use digital technologies for mental health services and wellbeing. The sixth hypothesis is accepted.

Hypothesis 6 (HU6): therapeutic approach (TA) influences UB to use digital technologies for mental health services and wellbeing.

Years of experience does not influence HCPs' Behavioural Intention (BI) to use digital technologies for mental health services and wellbeing. The seventh hypothesis is rejected.

Hypothesis 7 (HU7): Years of experience influences HCPs' Behavioural Intention (BI) to use digital technologies for mental health services and wellbeing.

Years of experience does not influence HCPs' User Behaviour (UB) to use digital technologies for mental health services and wellbeing. The eighth hypothesis is rejected.

Hypothesis 8 (HU8): Years of experience influences HCPs' User Behaviour (UB) to use digital technologies for mental health services and wellbeing.

Age does not influence HCPs' Behavioural Intention (BI) to use digital technologies for mental health services and wellbeing. The ninth hypothesis is rejected.

Hypothesis 9 (HU9): Age influences HCPs' Behavioural Intention (BI) to use digital technologies for mental health services and wellbeing.

Age does not influence HCPs' User Behaviour (UB) to use digital technologies for mental health services and wellbeing. The tenth hypothesis is rejected.

Hypothesis 10 (HU10): Age influences HCPs' User Behaviour (UB) to use digital technologies for mental health services and wellbeing.

Gender does not influence HCPs' Behavioural Intention (BI) to use digital technologies for mental health services and wellbeing. The eleventh hypothesis is rejected.

Hypothesis 11 (HU11): Gender influences HCPs' Behavioural Intention (BI) to use digital technologies for mental health services and wellbeing.

Gender influences HCPs' user Behaviour (UB) to use digital technologies for mental health services and wellbeing. The twelfth hypothesis is accepted.

Hypothesis 12 (HU12): Gender influences HCPs' user Behaviour (UB) to use digital technologies for mental health services and wellbeing.

Specialization does not influence HCPs' Behavioural Intention (BI) to use digital technologies for mental health services and wellbeing. The thirteenth hypothesis is rejected.

Hypothesis 13 (HU13): Specialization influences HCPs' Behavioural Intention (BI) to use digital technologies for mental health services and wellbeing.

Specialization does not influence HCPs' user Behaviour (UB) to use digital technologies for mental health services and wellbeing. The fourteenth hypothesis is rejected.

Hypothesis 14 (HU14): Specialization influences HCPs' user Behaviour (UB) to use digital technologies for mental health services and wellbeing.

Gender and therapeutic approach (TA) influences HCPs' user behaviour (UB) to use digital technologies for mental health services and wellbeing. The fifteenth hypothesis is accepted.

Hypothesis 15 (HU15): Gender and therapeutic approach (TA) influences HCPs' user behaviour (UB) to use digital technologies for mental health services and wellbeing.

Specialization and Facilitating Conditions (FC) influences HCPs' user behaviour (UB) to use digital technologies for mental health services and wellbeing. The sixteenth hypothesis is accepted.

Hypothesis 16 (HU16): Specialization and Facilitating Conditions (FC) influences HCPs' user behaviour (UB) to use digital technologies for mental health services and wellbeing.

Facilitating conditions and therapeutic approach are positively associated and statistically significant to HCPs' user behaviour to use digital technologies for mental health services and wellbeing, but Behavioural intention is statistically insignificant to HCPs' user behaviour to use digital technologies for mental health services and wellbeing.

Performance Expectancy is positively associated and statistically significant to HCPs' behavioural intention to use digital technologies for mental health services and wellbeing but Effort Expectancy and Social Influence are statistically insignificant to HCPs' behavioural intention to use digital technologies for mental health services and wellbeing.

HCPs' behavioural intention to utilize digital technologies was positively related to User behaviour but statistically insignificant.

Gender is the only moderator that influence HCPs' user behaviour to use digital technologies for mental health services and wellbeing.

6.8.3 HBM Model Analysis

The HBM Model was utilized in establishing association between health behaviour and practises and the use of digital technology. Based on the HBM standard framework, our proposed hypotheses are as follows:

Hypothesis 1(H1). Cue of Actions (COA) influences Perceived Susceptibility (PSUS) to use digital technologies.

Hypothesis 2(H2). Digital Technologies (DT) influences Behavioural Intention (BI) to use digital technologies.

Hypothesis 3(H3). Moderating Variables (MV) influences BI to use digital technologies.

Hypothesis 4(H4). Perceived Severity (PSE) influences BI to use digital technologies.

Hypothesis 5(H5). Perceived Barriers (PBA) influences BI to use digital technologies.

Hypothesis 6(H6). Perceived Benefits (PBEN) influences BI to use digital technologies.

Hypothesis 7(H7). Perceived Susceptibility (PSUS) influences BI to use digital technologies.

Hypothesis 8(H8). Self-Efficacy (SEF) influences BI to use digital technologies. The HBM model was used to determine Healthcare professionals' behaviour, practices and the actual use of digital technologies for mental healthcare.

6.8.3.1 Results of HBM Model

The analysis of the reflective measurement of the HBM Model is presented in first and second stage. Furthermore, an evaluation of the structural model and findings from the hypotheses formulated from the HBM model is also presented.

6.8.3.1.1 Reflective Measurement Model First Stage

This section presents findings from the structural model as shown by measurement model. The relationship between the variables was highlighted by the loading factor in this structural model. Figure 6.12 shows the outer loading and the path coefficients using factor analysis with all the items for all the HBM constructs displayed. In the first stage, some items were eliminated from each construct due to low loadings, also, any construct with only one item was also eliminated based on the construct reliability and validity test in Figure 6.12 (for the reflective constructs). Only items with indicator reliability exceeding 0.4 (Hulland, 1999) were retained for further analysis. This procedure allows the detection and removal of insignificant questions from the questionnaire.

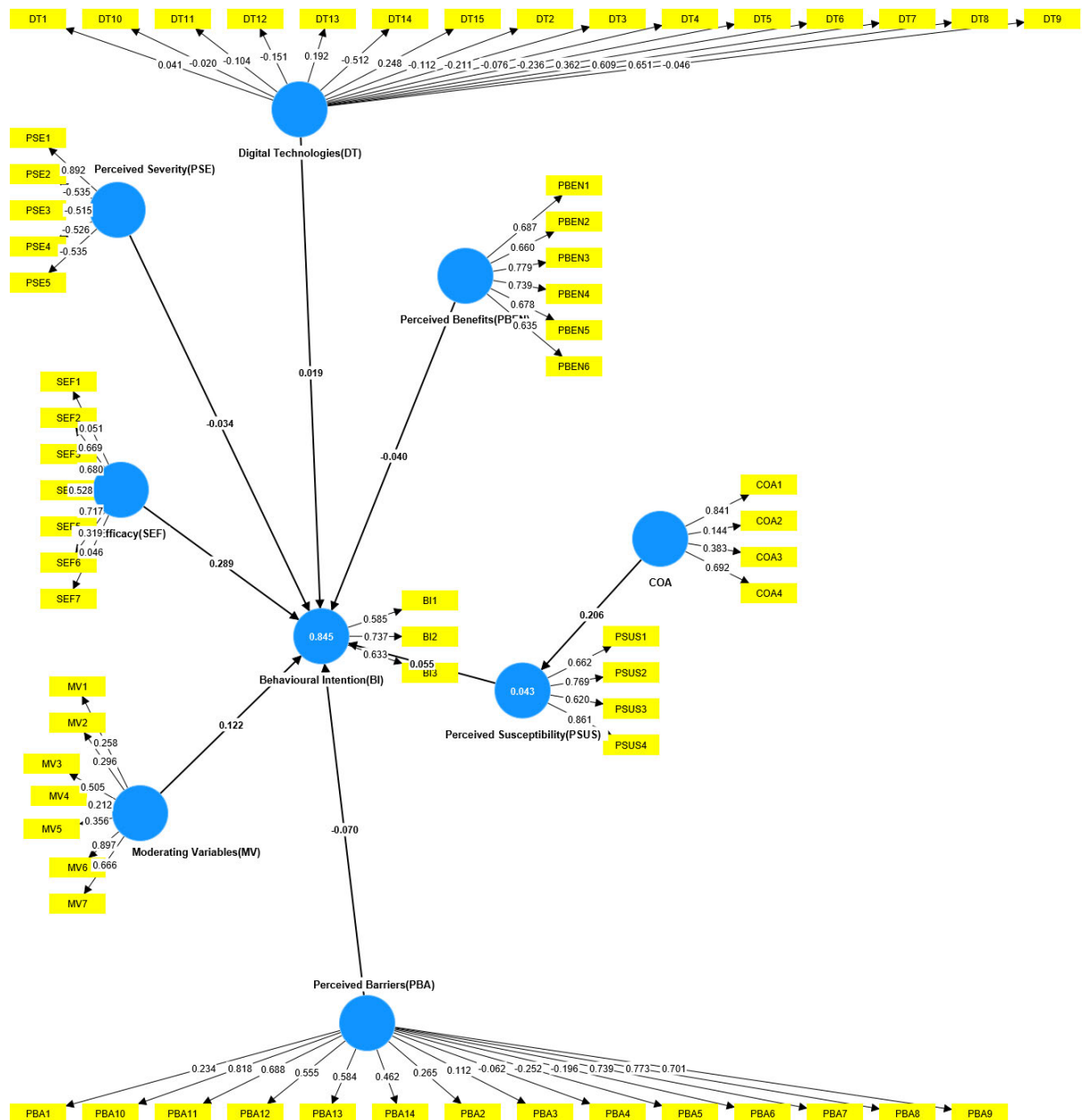


Figure 6.12: First stage HBM Model using factor analysis

For item reliability, Composite reliability was used. The factor loadings for each item were checked. Any loading factor for each item that was less than 0.4 must be discarded and discontinued in the second stage of the analysis as shown in Figure 6.12 (Hair *et al.* 2016).

6.8.3.1.2 Reliability and Validity of Construct Variables First Stage

Table 6.20 shows composite reliability (ρ_a) and composite reliability (ρ_c) greater than 0.5 which shows good internal consistency reliability among the latent variables (Fornell and Larcker 1981: 39). Furthermore, the AVE of only one constructs had values greater than 0.5 which can be improved in the second stage.

Table 6.20: Construct reliability and validity (First stage factor analysis)

Latent variables	Composite reliability(ρ_a)	Composite reliability(ρ_c)	AVE
BI	0.374	0.690	0.428
COA	0.484	0.616	0.338
DT	0.245	0.029	0.096
MV	0.876	0.663	0.261
PBA	0.794	0.744	0.277
PBEN	0.815	0.850	0.487
PSE	1.054	0.325	0.382
PSUS	0.843	0.821	0.539
SEF	0.570	0.636	0.258

6.8.3.1.3 Variation Inflation Factor for Collinearity Statistics (Factor Analysis First Stage)

The value of each indicator's Variation Inflation Factor (VIF), which assesses multicollinearity, was <5 (Lei and Lomax 2005: 1) as shown in Table 6. 21. The VIF value of each construct ranged from 1.006 to 3.484 which laid within the acceptable range of <5 .

Table 6.21: Result from Variation Inflation Factor (First Stage)

	VIF
BI1	1.035
BI2	1.049
BI3	1.083
COA1	1.101
COA2	1.064
COA3	1.275
COA4	1.371
DT1	1.026
DT10	1.008
DT11	1.006
DT12	1.351
DT13	1.072
DT14	1.026
DT15	1.086
DT2	1.423
DT3	1.637
DT4	1.179
DT5	1.755
DT6	1.296
DT7	1.536
DT8	1.761
DT9	1.023
MV1	1.420
MV2	1.473
MV3	1.442
MV4	1.378
MV5	1.108
MV6	1.319
MV7	1.303

PBA1	1.844
PBA10	2.902
PBA11	2.286
PBA12	1.622
PBA13	1.566
PBA14	1.454
PBA2	1.869
PBA3	2.234
PBA4	2.410
PBA5	3.484
PBA6	3.154
PBA7	1.961
PBA8	2.706
PBA9	1.765
PBEN1	1.482
PBEN2	2.177
PBEN3	1.615
PBEN4	2.257
PBEN5	1.771
PBEN6	1.159
PSE1	1.054
PSE2	2.672
PSE3	2.538
PSE4	2.541
PSE5	1.613
PSUS1	1.287
PSUS2	1.782
PSUS3	1.621
PSUS4	1.365
SEF1	1.130
SEF2	1.506

SEF3	1.572
SEF4	1.389
SEF5	1.300
SEF6	1.355
SEF7	1.276

The VIF value of each construct as shown in Table 6.21 was ranged from 1.0061 to 3.484. These values fall within the satisfactory range of > 5 and indicates improvement in strength of relationship among items under each construct.

6.8.3.1.4 Discriminant validity

Table 6.22 shows the HTMT statistics, which provides support for the existence of discriminant validity. All the highlighted values under DT are less than 0.9.

Table 6.22: Heterotrait-Monotrait ratio (HTMT) – Matrix (first stage)

	BI	COA	DT	MV	PBA	PBEN	PSE	PSUS	SEF
BI									
COA	1.200								
DT	0.851	0.788							
MV	1.057	0.973	0.711						
PBA	0.647	0.692	0.624	0.509					
PBEN	0.515	1.024	0.573	0.984	0.238				
PSE	0.214	0.272	0.499	0.171	0.716	0.147			
PSUS	0.314	0.300	0.565	0.431	0.783	0.160	0.638		
SEF	1.627	1.338	0.974	1.022	0.649	0.755	0.380	0.371	

If the HTMT value is below 0.9, discriminant validity has been established between two reflective constructs.

6.8.3.1.5 Model Fit for Factor Analysis First Stage

A good fit is defined by an SRMR value less than 0.10 according to Hu and Bentler, (1998) and Kline, (2005). The SRMR value was 0.140 but should improve in second stage. Items with low loading are removed.

6.8.3.1.6 Hypothesis Testing for First Stage Using Path Analysis

To test the hypotheses, the relationships between items were investigated using path coefficients as shown in Figure 6.13 and Table 6.23 as the predictive power of the model (Bozan *et al.* 2016: 3105). To check the statistical significance of path coefficient relationships, the *t*-test and the *p*-value were used in Table 6.23 to reach the decision. The adjusted R-squared (R^2) is indicated inside the circles, path coefficients on the arrows and *t*-statistics in brackets in Figure 6.13. The HBM model for the first stage observed 84% of variance (adjusted R^2) in the use of digital technologies and 4.3% of variance in perceived susceptibility for mental health issues.

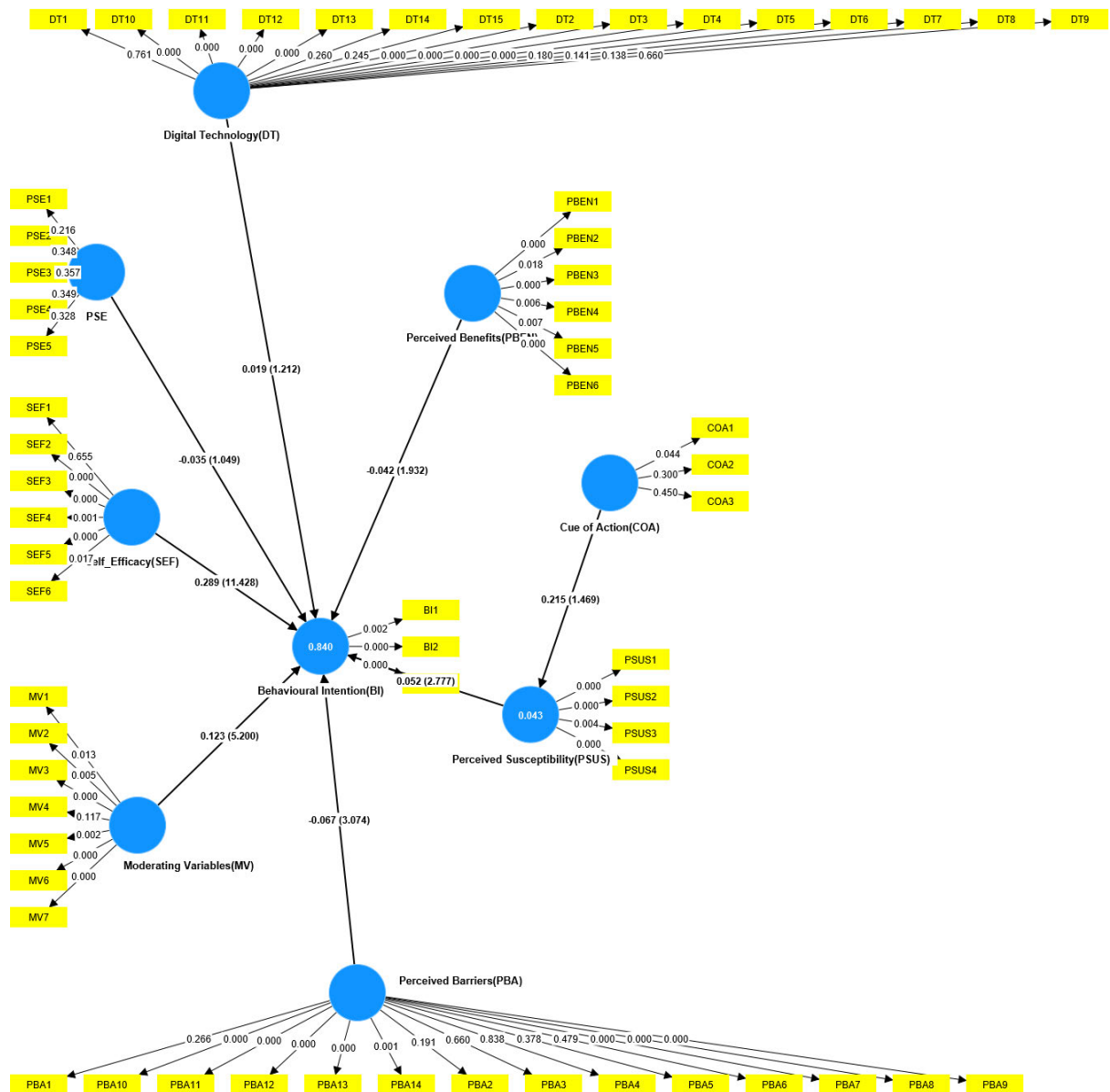


Figure 6.13: HBM Model path analysis for first stage

The path coefficient values on Table 6.23 was derived from Figure 6.13.

Table 6.23: Hypothesis testing first stage

Relationship	Path coefficient	Sample Mean	Standard deviation	t-statistics	p-value	Decision
COA→PSUS	0.215	0.238	0.072	2.878	0.004	Significant
DT→BI	0.019	0.005	0.017	1.250	0.211	Insignificant
MV→BI	0.123	0.118	0.022	5.359	0.000	Significant
PSE→BI	-0.035	0.002	0.035	1.075	0.282	Insignificant
PBA→BI	-0.067	-0.065	0.018	3.853	0.000	Significant
PBEN→BI	-0.042	-0.033	0.023	1.782	0.075	Insignificant
PSUS→BI	0.052	0.048	0.017	3.303	0.001	Significant
SEF→BI	0.289	0.285	0.024	12.386	0.000	Significant

Table 6.23 showed the values of path coefficient, sample mean, standard deviation, t-statistic, p-value and the relationship. Since some t-statistic are greater than 1.96 and some p-value is less than 0.05 then only four pathways exhibit significant results (Graham 2020: 749).

COA shows significant influence on PSUS, which accept the first hypothesis.

Hypothesis 1(H1). Cue of Actions (COA) influences Perceived Susceptibility (PSUS) to use digital technologies.

DT shows insignificant influence on BI, which refutes the second hypothesis.

Hypothesis 2(H2). Digital Technologies (DT) influences Behavioural Intention (BI) to use digital technologies.

MV shows significant influence on BI which accepts the third hypothesis.

Hypothesis 3(H3). Moderating Variables (MV) influences BI to use digital technologies.

PSE shows insignificant influence on BI which refutes the fourth hypothesis.

Hypothesis 4(H4). Perceived Severity (PSE) influences BI to use digital technologies.

PBA shows significant influence on BI which accepts the fifth hypothesis.

Hypothesis 5(H5). Perceived Barriers (PBA) influences BI to use digital technologies.

PBEN shows insignificant influence on BI which refutes the sixth hypothesis.

Hypothesis 6(H6). Perceived Benefits (PBEN) influences BI to use digital technologies.

PSUS shows significant influence on BI which accepts the seventh hypothesis.

Hypothesis 7(H7). Perceived Susceptibility (PSUS) influences BI to use digital technologies.

SEF shows significant influence on BI which supports the eighth hypothesis.

Hypothesis 8(H8). Self-Efficacy (SEF) influences BI to use digital technologies.

PSE, PBA, and PBEN were negatively correlated to HCPs' behavioural intention to use digital technologies for mental health services and wellbeing, furthermore, PSE and PBEN are not statistically significant but PBA was statistically significant. PSUS, DT, MV and SEF correlates positively to HCPs' behavioural intention to use digital technologies. MV, PSUS and SEF were statistically significant but DT is statistically insignificant.

6.8.3.1.7 Reflective Measurement Model Second Stage

Although some loading factor values are still less than 0.7, they should be greater than 0.7, as noted by Hair *et al.* (2012). This means that the observed variables should be able to explain the latent variables.

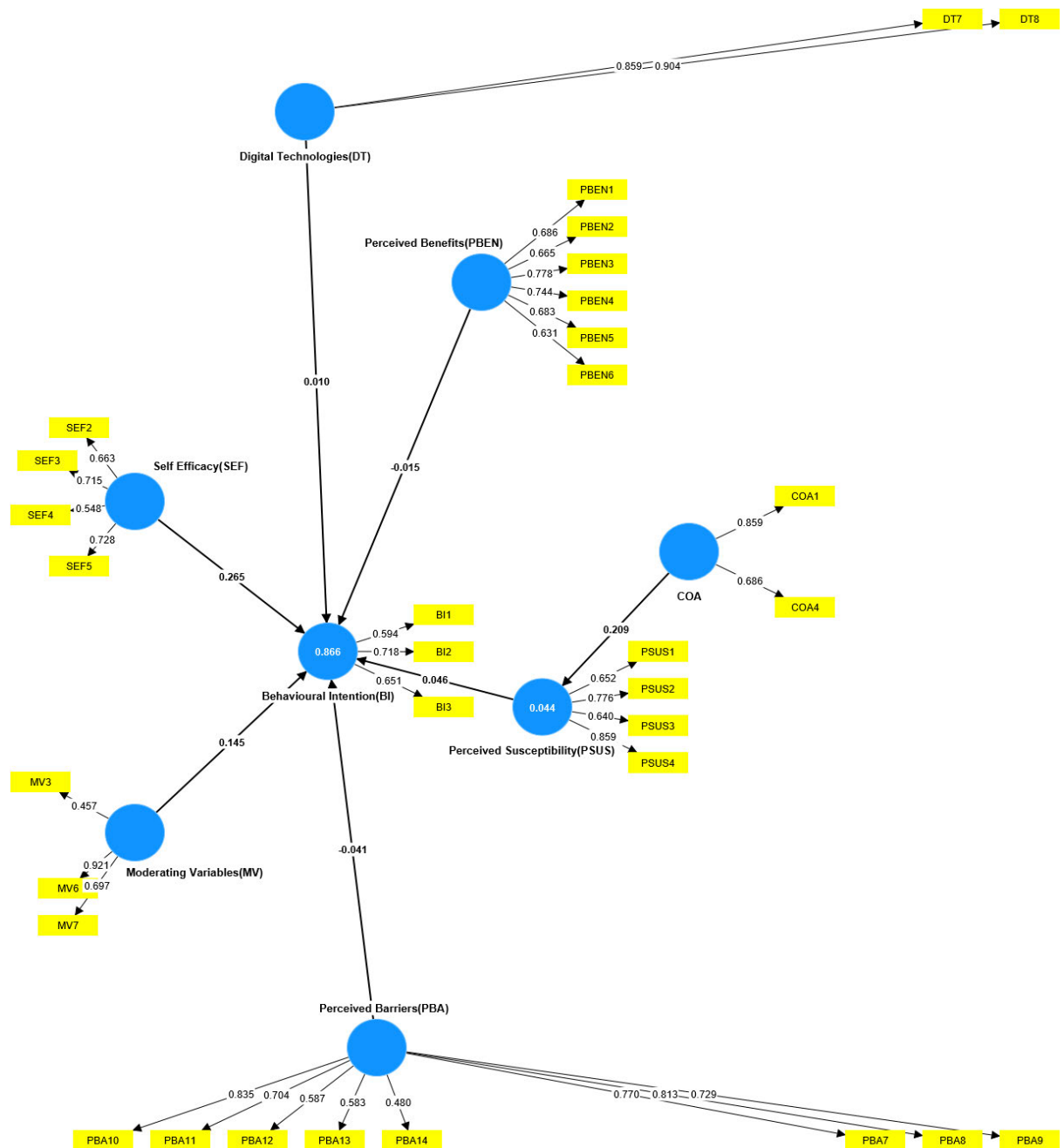


Figure 6.14: Second stage HBM Model using factor analysis

The findings in Figure 6.14 shows five latent variables. COA, DT, MV, SEF and PBA use fewer items in second stage as compared to first stage. The loading factor for each variable is in the range of 0.457 to 0.921 which are good values. Each variable shows a value that is almost evenly distributed and consistent.

6.8.3.1.8 Reliability and Validity of Construct Variables Second Stage

The result from the reliability and validity of construct variables is presented in Table 6.24. Each construct had composite reliability (rho_c) greater than 0.7 except BI, showing good internal consistency reliability among the latent variables. Table 6.24 is presented below.

Table 6.24: Construct Reliability and Validity (Second Stage Factor Analysis)

Latent variables	Composite reliability(rho_a)	Composite reliability(rho_c)	AVE
BI	0.381	0.692	0.430
COA	0.381	0.751	0.604
DT	0.731	0.875	0.777
MV	0.823	0.747	0.514
PBA	0.875	0.881	0.487
PBEN	0.815	0.851	0.489
PSUS	0.857	0.824	0.544
SEF	0.581	0.761	0.445

Table 6.24 showed that the PSE construct with only one item was removed automatically. The composite reliability improved in the second stage as compare to the first stage. Furthermore, the AVE of four constructs had values greater than 0.5. There was an improvement on the AVE in the second stage as compare to the first stage.

6.8.3.1.9 Variation Inflation Factor for Collinearity Statistics (Factor Analysis Second Stage)

The value of each indicator's Variation Inflation Factor (VIF), which assesses multicollinearity, was <5 as shown in Table 6.25.

Table 6.25: Result from Variation Inflation Factor (Second Stage)

	VIF
BI1	1.035
BI2	1.049
BI3	1.083
COA1	1.049
COA4	1.049
DT7	1.449
DT8	1.449
MV3	1.071
MV6	1.276
MV7	1.254
PBA10	2.773
PBA11	2.132
PBA12	1.539
PBA13	1.509
PBA14	1.419
PBA7	1.930
PBA8	2.593
PBA9	1.746
PBEN1	1.482
PBEN2	2.177
PBEN3	1.615
PBEN4	2.257
PBEN5	1.771
PBEN6	1.159
PSUS1	1.287
PSUS2	1.782
PSUS3	1.621
PSUS4	1.365
SEF2	1.447
SEF3	1.526

SEF4	1.336
SEF5	1.298

The VIF value of each construct ranged from 1.035 to 2.773 which is within the acceptable range of < 5 . These values fall within the satisfactory range of < 5 and indicate improvement in strength of relationship among items under each construct.

6.8.3.1.10 Discriminant validity (Second Stage)

Table 6.26 presents the HTMT statistics, which provides support for the existence of discriminant validity. All the highlighted values in Table 6.26 are less than 0.9.

Table 6.26: Heterotrait-Monotrait ratio (HTMT) – Matrix (second stage)

	BI	COA	DT	MV	PBA	PBEN	PSUS	SEF
BI								
COA	0.725							
DT	0.492	0.444						
MV	1.357	0.786	0.130					
PBA	0.404	0.364	0.206	0.161				
PBEN	0.515	1.141	0.382	0.742	0.155			
PSUS	0.314	0.341	0.305	0.158	0.920	0.160		
SEF	1.773	0.443	0.560	0.562	0.385	0.262	0.355	

If the HTMT value is below 0.9, discriminant validity has been established between two reflective constructs.

6.8.3.1.11 Model fit for Factor Analysis second stage

The SRMR for the second stage is 0.124. The model fit in the second stage improved as compared to the model fit in the first stage.

6.8.3.1.12 Hypothesis Testing for Second Stage Using Path Analysis

The relationships between items were investigated using path coefficients as shown in Figure 6.15 and Table 6.27 as the predictive power of the model to test the hypotheses.

To check the statistical significance of path coefficient relationships, *t*-test and *p*-value were used in Table 6.27 to deduce the decision. The adjusted R-squared (R^2) is indicated inside the circles, path coefficients on the arrows and *t*-statistics in brackets in Figure 6.15. The path coefficient values on Table 6.27 is derived from Figure 6.15. The HBM model observes 86.6% of variance (adjusted R^2) on the HCPs' behavioural intention to use digital technologies and 4.4% of variance in perceived susceptibility for mental health problems.

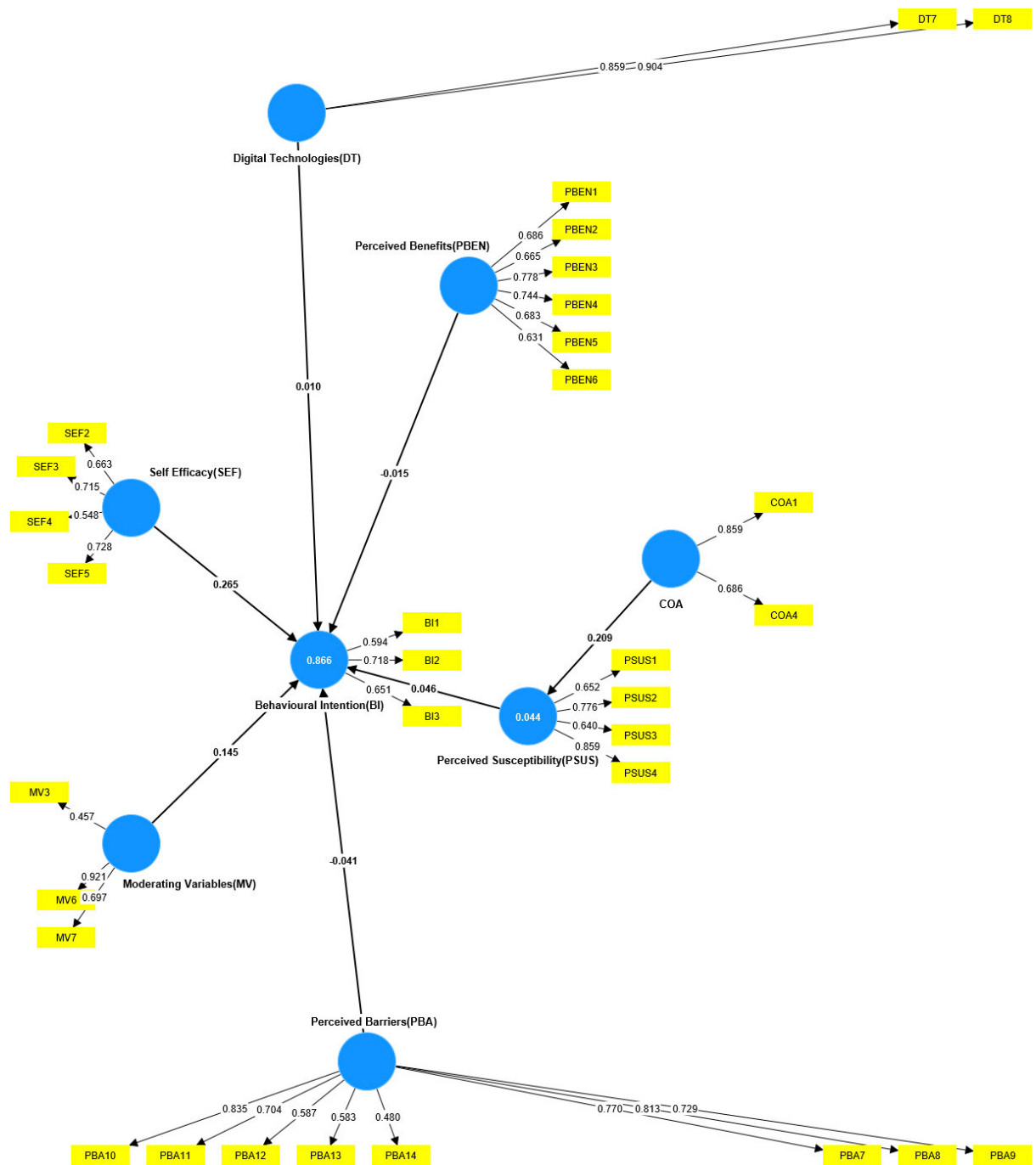


Figure 6.15: HBM Model path analysis for second stage

Table 6.27: Hypothesis testing second stage

Relationship	Path coefficient	Sample Mean	Standard deviation	t-statistics	p-value	Decision
COA→PSUS	0.209	0.230	0.053	3.930	0.000	Significant
DT→BI	0.010	0.009	0.011	0.929	0.353	Insignificant
MV→BI	0.145	0.142	0.018	8.099	0.000	Significant
PBA→BI	-0.041	-0.040	0.012	3.515	0.000	Significant
PBEN→BI	-0.015	-0.011	0.012	1.323	0.186	Insignificant
PSUS→BI	0.046	0.043	0.013	3.574	0.000	Significant
SEF→BI	0.265	0.263	0.018	15.145	0.000	Significant

Table 6.27 shows the values of the path coefficient, sample mean, standard deviation, t-statistic, the p-value and the relationship. Since some t-statistics are greater than 1.96 and some p-value is less than 0.05 then only five pathways exhibit significant results.

COA shows significant influence on PSUS, which accept the first hypothesis.

Hypothesis 1(H1). Cue of Actions (COA) influences Perceived Susceptibility (PSUS) to use digital technologies.

DT shows insignificant influence on BI, which refutes the second hypothesis.

Hypothesis 2(H2). Digital Technologies (DT) influences Behavioural Intention (BI) to use digital technologies.

MV shows significant influence on BI which accepts the third hypothesis.

Hypothesis 3(H3). Moderating Variables (MV) influences BI to use digital technologies.

PBA shows significant influence on BI which accepts the fourth hypothesis.

Hypothesis 4(H4). Perceived Severity (PSE) influences BI to use digital technologies.

PBEN shows insignificant influence on BI which refutes the fifth hypothesis.

Hypothesis 5(H5). Perceived Barriers (PBA) influences BI to use digital technologies.

PSUS shows significant influence on BI which accepts the sixth hypothesis.

Hypothesis 6(H6). Perceived Benefits (PBEN) influences BI to use digital technologies.

SEF shows significant influence on BI which supports the seventh hypothesis.

Hypothesis 7(H7). Perceived Susceptibility (PSUS) influences BI to use digital technologies.

Hypothesis 8 was eliminated in the first stage of the SEM analysis due to poor reliability and validity.

PBA and PBEN are negatively correlated to HCPs' behavioural intention to use digital technologies and PBA is statistically significant while PBEN is statistically insignificant. PSUS, DT, MV and SEF correlate positively to HCPs' behavioural intention to use digital technologies. It is noted that MV, PSUS and SEF are statistically significant, but DT statistically insignificant.

6.8.4 Modified HBM Model

The study highlighted the necessity for a modified HBM model which integrates the identified constructs and moderating variables. The proposed modified model is MMH-HBM (modified mental health HBM) model. The MMH-HBM integrates two new constructs (therapeutic approach and digital technologies tools) and two new moderators (specialization and Hours of meeting with clients). The constructs and moderating variables were identified in the analysis.

The MMH-HBM model identified the following hypotheses that were tested.

Hypothesis 1 (HH1): Cues of Actions (COA) influences Perceived Benefits (PBEN) to use digital technologies for mental health services and wellbeing.

Hypothesis 2 (HH2): Digital Technologies tools (DT) influence Behavioural Intention (BI) to use digital technologies for mental health services and wellbeing.

Hypothesis 3 (HH3): Perceived Barriers (PBA) influence BI to use digital technologies for mental health services and wellbeing.

Hypothesis 4 (HH4): Perceived Benefits (PBEN) influences use of Digital Technologies tools (DT) by Healthcare professionals (HCPs) for mental health services and wellbeing.

Hypothesis 5 (HH5): Therapeutic Approach (TA) influences HCPs' Behavioural Intention (BI) to use digital technologies for mental health services and wellbeing.

Hypothesis 6 (HH6): Years of experience influences HCPs' Behavioural Intention (BI) to use digital technologies for mental health services and wellbeing.

Hypothesis 7 (HH7): Years of experience influences use of Digital Technologies tools (DT) by Healthcare professionals (HCPs) for mental health services and wellbeing.

Hypothesis 8 (HH8): Years of experience influences HCPs' Perceived benefits (PBEN) to use digital technologies for mental health services and wellbeing.

Hypothesis 9 (HH9): Age influences HCPs' Behavioural Intention (BI) to use digital technologies for mental health services and wellbeing.

Hypothesis 10 (HH10): Age influences use of Digital Technologies tools (DT) by Healthcare professionals (HCPs) for mental health services and wellbeing.

Hypothesis 11 (HH11): Gender influences HCPs' Behavioural Intention (BI) to use digital technologies for mental health services and wellbeing.

Hypothesis 12 (HH12): Gender influences use of Digital Technologies tools (DT) by Healthcare professionals (HCPs) for mental health services and wellbeing.

Hypothesis 13 (HH13): Gender influences HCPs' Perceived benefits (PBEN) to use digital technologies for mental health services and wellbeing.

Hypothesis 14 (HH14): Age and use of digital technologies tools (DT) influences HCPs' Behavioural Intention (BI) to use digital technologies for mental health services and wellbeing.

Hypothesis 15 (HH15): Gender and perceived barriers (PBA) influences HCPs' Behavioural Intention (BI) to use digital technologies for mental health services and wellbeing.

Hypothesis 16 (HH16): Gender and use of digital technologies tools (DT) influences HCPs' Behavioural Intention (BI) to use digital technologies for mental health services and wellbeing.

Hypothesis 17 (HH17): Years of Experience and HCPs' Perceived benefits (PBEN) influences use of digital technologies tools (DT) for mental health services and wellbeing.

Hypothesis 18 (HH18): Years of Experience and HCPs' Perceived barriers (PBA) influences HCPs' Behavioural Intention (BI) to use digital technologies for mental health services and wellbeing.

6.8.4.1 Results on Modified HBM Model

The result from the findings and the analysis of the reflective measurement of the MMH-HBM Model are presented below.

6.8.4.1.1 Reflective Measurement Model

The structural model produced was shown by the outcomes in the measurement model. There is relationship between the variables loading factor in this structural model and it is presented by the diagram in Figure 6.16

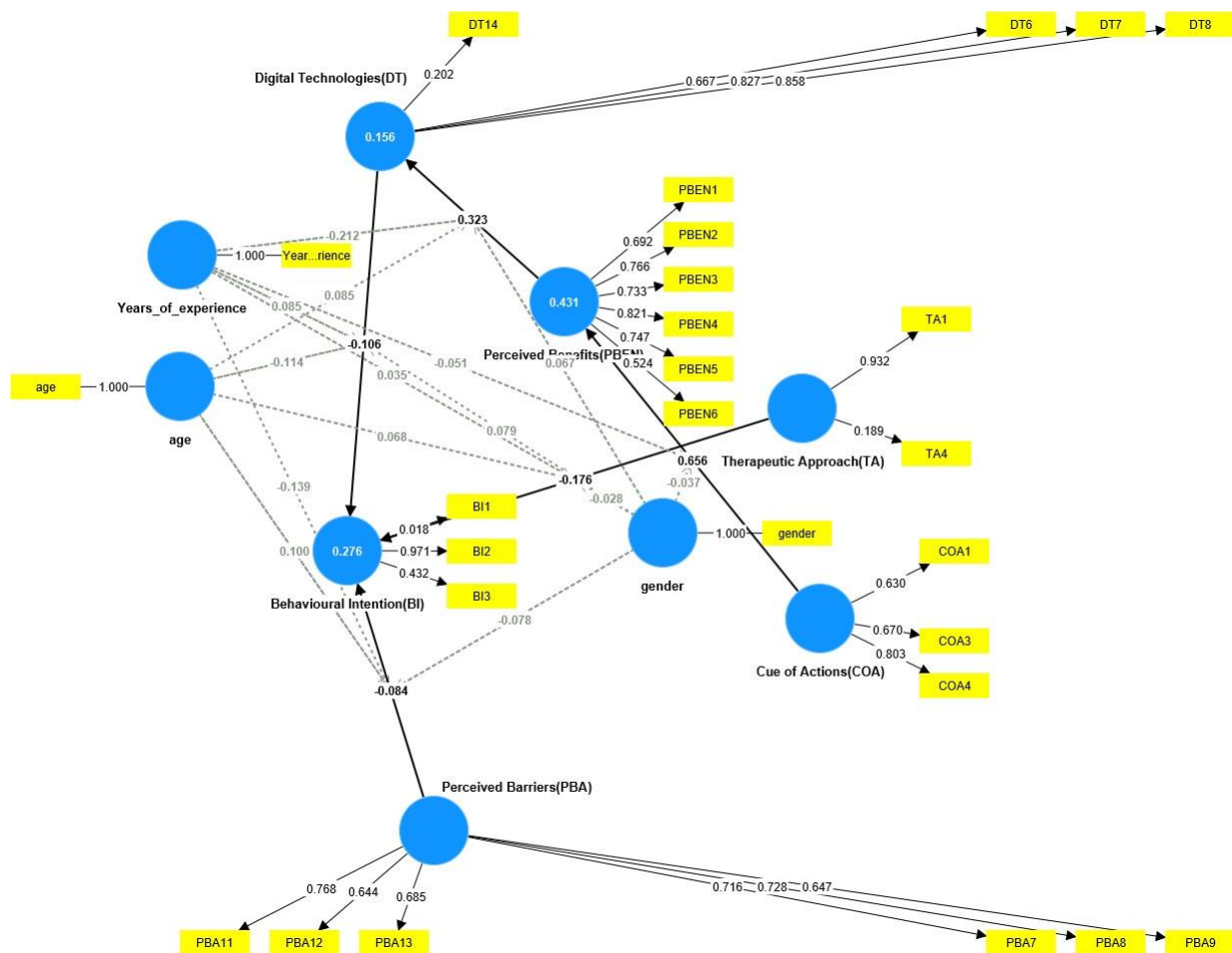


Figure 6.16: MMH-HBM MODEL USING FACTOR ANALYSIS

Figure 6.16 showed the outer loading and the path coefficients using factor analysis with all the items for all modified HBM constructs displayed.

6.8.4.1.2 Reliability and Validity of Construct Variables

The reliability and validity of the construct variables test in this study were estimated with the use of composite reliability (ρ_a), composite reliability (ρ_c) and Average Variance Extracted (AVE) as presented in Table 6.28.

Table 6.28: MMH-HBM Construct Reliability and Validity (Factor Analysis)

Latent variables	Composite reliability(rho_a)	Composite reliability(rho_c)	AVE
BI	0.425	0.519	0.377
COA	0.489	0.746	0.497
DT	0.724	0.757	0.476
PBA	0.826	0.851	0.489
PBEN	0.805	0.864	0.518
TA	-0.622	0.534	0.452

Table 6.28 showed that only three constructs had composite reliability (rho_a) greater than 0.5 and good internal consistency, except BI, COA and TA construct. DT, PBA and PBEN constructs only has values greater than 0.5 under the composite reliability (rho_a). All the constructs' values are greater than 0.5 under the composite reliability (rho_c) which shows an improvement in the modified HBM model. Furthermore, the AVE for PBEN construct only had values greater than 0.5.

6.8.4.1.3 Variation Inflation Factor for Collinearity Statistics (Factor Analysis)

The Variation Inflation Factor (VIF) measured the strength of relationship among items under each construct on the model. The value of each indicator's Variation Inflation Factor (VIF), which assesses multicollinearity, as shown in Table 6.29.

Table 6.29: Result from Variation Inflation Factor

	VIF
BI1	1.035
BI2	1.049
BI3	1.083
COA1	1.052
COA3	1.270
COA4	1.329
DT14	1.006
DT6	1.279
DT7	1.466
DT8	1.651
PBA11	1.634
PBA12	1.506
PBA13	1.313
PBA7	1.912
PBA8	2.329
PBA9	1.585
PBEN1	1.482
PBEN2	2.177
PBEN3	1.615
PBEN4	2.257
PBEN5	1.771
PBEN6	1.159
TA1	1.034
TA4	1.034
Years_of_experience	1.000
Age	1.000
Gender	1.000
gender x Therapeutic Approach(TA)	1.000
Years_of_experience x Digital Technologies(DT)	1.000
gender x Perceived Benefits(PBEN)	1.000
Years_of_experience x Cue of Actions(COA)	1.000
age x Therapeutic Approach(TA)	1.000
gender x Cue of Actions(COA)	1.000
Years_of_experience x Therapeutic Approach(TA)	1.000
gender x Digital Technologies(DT)	1.000
Years_of_experience x Perceived Barriers(PBA)	1.000
age x Digital Technologies(DT)	1.000

Years_of_experience x Perceived Benefits(PBEN)	1.000
age x Perceived Benefits(PBEN)	1.000
gender x Perceived Barriers(PBA)	1.000
age x Perceived Barriers(PBA)	1.000

The VIF value of each construct presented in Table 6.29 ranged from 1.000 to 2.329, which was within the acceptable range of less than five. The results shows that the strength of the linear relationship between the items and constructs are not false positive.

6.8.4.1.4 Discriminant validity

Discriminant validity measures if constructs that should not correlate theoretically do. Discriminant validity was evaluated through Cross-loadings and the Heterotrait-Monotrait Method (HTMT). In the study, Cross-loadings and HTMT were used. The constructs on the modified HBM model are measured and the result is presented on Table 6.30.

Table 6.30: Heterotrait-Monotrait ratio (HTMT) – Matrix

	BI	COA	DT	PBA	PBEN	TA	YOE	AGE	GENDER
BI									
COA	0.629								
DT	0.690	0.617							
PBA	0.428	0.335	0.255						
PBEN	0.515	1.008	0.573	0.132					
TA	0.790	0.754	0.555	0.324	0.620				
YOE	0.098	0.308	0.201	0.143	0.202	0.183			
AGE	0.209	0.212	0.156	0.125	0.161	0.230	0.817		
GENDER	0.182	0.092	0.127	0.108	0.071	0.178	0.078	0.103	

Naveed *et al.* (2020) and Theo *et al.* (2008) states that the threshold value maximal value for HTMT is 0.9. On Table 6.30, highlighted value less than 0.9, indicates that the constructs should not be theoretically related while construct not highlighted should be theoretically related according to HBM standard model but they are not. The HTMT matrix found discriminant validity challenges with one inter-construct correlation. PBEN and COA should correlate theoretically but they are not.

6.8.4.1.5 Model Fit

Standardized Root Means Square Residual (SRMR) was used to assess the fit in the Partial least square (PLS) model. A good fit is defined by an SRMR value less than 0.10. SRMR value in this study was 0.103.

6.8.4.1.6 Hypothesis Testing Using Path Analysis

To test the hypotheses, the relationships between items were investigated using path coefficients as shown in Figure 6.17 and Table 6.31. The MMH-HBM model observed 43.1% as variance of perceived benefits, and 27.6% of variance in the intention to use digital technologies and 15.6% as the current usage of the digital technologies' tools by HCPs for mental health service delivery and wellbeing.

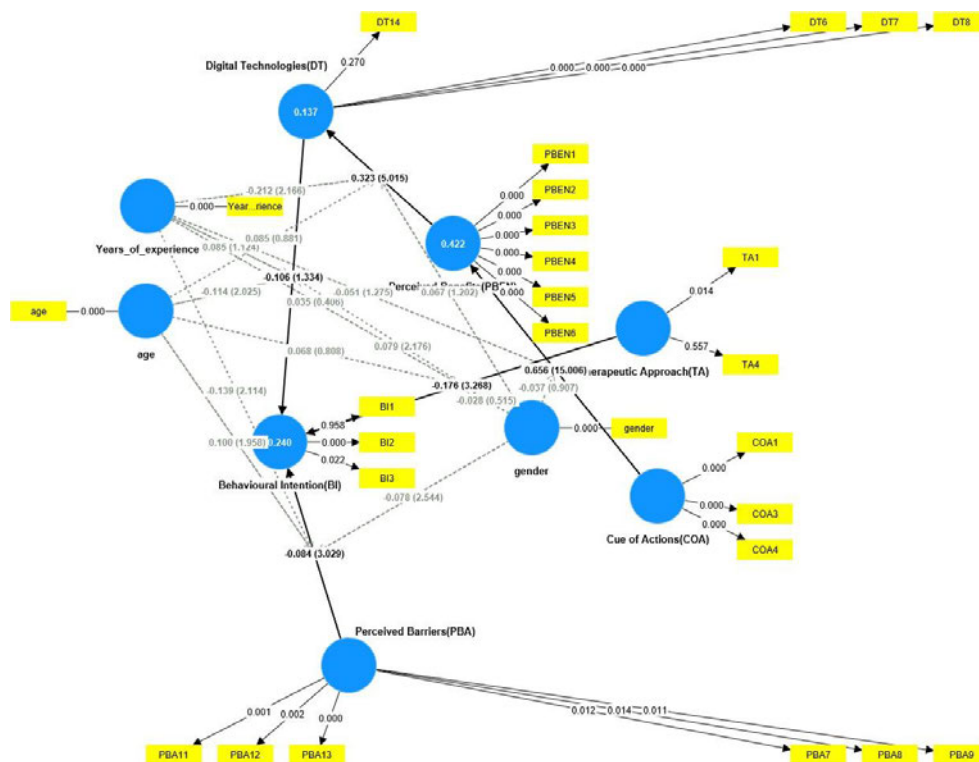


Figure 6.17: MMH-HBM MODEL PATH ANALYSIS

The path coefficient values on Table 6.31 is derived from Figure 6.17.

Table 6.31: MMH-HBM model Hypothesis testing

Hypothesis	Relationship	Path coefficient (β)	Sample Mean	Standard deviation	t-statistics (t)	p-value	Decision
HH1	COA → PBE N	0.656	0.660	0.044	15.006	0.000	Significant (Supported)
HH2	DT → BI	-0.106	-0.076	0.079	1.334	0.182	Insignificant (Not Supported)
HH3	PBA → BI	-0.084	-0.092	0.028	3.029	0.002	Significant (Supported)
HH4	PBEN → DT	0.323	0.343	0.065	5.015	0.000	Significant (Supported)

HH5	TA→BI	-0.176	-0.177	0.054	3.268	0.001	Significant (Supported)
HH6	Years of experience → BI	-0.111	-0.088	0.076	1.462	0.144	Insignificant (Not Supported)
HH7	Years of experience →BI	-0.141	-0.129	0.080	1.755	0.079	Insignificant (Not Supported)
HH8	Years of experience →DT	-0.061	-0.062	0.040	1.506	0.132	Insignificant (Not Supported)
HH9	Age→BI	0.048	0.044	0.061	0.785	0.433	Insignificant (Not Supported)
HH10	Age→DT	0.014	0.009	0.092	0.149	0.882	Insignificant (Not Supported)
HH11	Gender→BI	0.020	0.011	0.041	0.502	0.615	Insignificant (Not Supported)
HH12	Gender→D T	0.086	0.086	0.052	1.667	0.095	Insignificant (Not Supported)
HH13	gender→ PBEN	0.021	0.019	0.043	0.486	0.627	Insignificant (Not Supported)
HH14	AgeXDT→B I	-0.114	-0.087	0.056	2.025	0.043	Significant (Supported)
HH15	GenderXPB A→BI	-0.078	-0.065	0.031	2.544	0.011	Significant (Supported)

HH16	GenderXDT →BI	0.079	0.060	0.036	2.176	0.030	Significant (Supported)
HH17	Years of experience PBEN→DT	-0.212	-0.222	0.098	2.166	0.030	Significant (Supported)
HH18	Years of experience PBA→BI	-0.139	-0.116	0.066	2.114	0.035	Significant (Supported)

Table 6.31 shows the values of the path coefficient, sample mean, standard deviation, t-statistic, the p-value and the relationship (path). Since some t-statistic are greater than 1.96 and some p-value is less than 0.05, only nine pathways exhibit significant results.

Cues of Actions (COA) influences Perceived Benefits (PBEN) to use digital technologies for mental health services and wellbeing. First hypothesis is accepted.

Hypothesis 1 (HH1): Cues of Actions (COA) influences Perceived Benefits (PBEN) to use digital technologies for mental health services and wellbeing.

Digital Technologies tools (DT) does not influences Behavioural Intention (BI) to use digital technologies for mental health services and wellbeing. *Second hypothesis is rejected.*

Hypothesis 2 (HH2): Digital Technologies tools (DT) influences Behavioural Intention (BI) to use digital technologies for mental health services and wellbeing.

Perceived Barriers (PBA) influences BI to use digital technologies for mental health services and wellbeing. Third hypothesis is accepted.

Hypothesis 3 (HH3): Perceived Barriers (PBA) influence BI to use digital technologies for mental health services and wellbeing.

Perceived Benefits (PBEN) influences use of Digital Technologies tools (DT) by Healthcare professionals (HCPs) for mental health services and wellbeing. Fourth hypothesis is accepted.

Hypothesis 4 (HH4): Perceived Benefits (PBEN) influences use of Digital Technologies tools (DT) by HCPs for mental health services and wellbeing.

Therapeutic Approach (TA) influences HCPs' Behavioural Intention (BI) to use digital technologies for mental health services and wellbeing. The fifth hypothesis is accepted.

Hypothesis 5 (HH5): Therapeutic Approach (TA) influences HCPs' Behavioural Intention (BI) to use digital technologies for mental health services and wellbeing.

Years of experience does not influence HCPs' Behavioural Intention (BI) to use digital technologies for mental health services and wellbeing. The sixth hypothesis is rejected.

Hypothesis 6 (HH6): Years of experience influences HCPs' Behavioural Intention (BI) to use digital technologies for mental health services and wellbeing.

Years of experience does not influence use of Digital Technologies tools (DT) by Healthcare professionals (HCPs) for mental health services and wellbeing. The seventh hypothesis is rejected.

Hypothesis 7 (HH7): Years of experience influences use of Digital Technologies tools (DT) by HCPs for mental health services and wellbeing.

Years of experience do not influence HCPs Perceived benefits (PBEN) to use digital technologies for mental health services and wellbeing. The eighth hypothesis is rejected.

Hypothesis 8 (HH8): Years of experience influences HCPs' Perceived benefits (PBEN) to use digital technologies for mental health services and wellbeing.

Age does not influence HCPs' Behavioural Intention (BI) to use digital technologies for mental health services and wellbeing. The ninth hypothesis is rejected.

Hypothesis 9 (HH9): Age influences HCPs' Behavioural Intention (BI) to use digital technologies for mental health services and wellbeing.

Age does not influence use of Digital Technologies tools (DT) by HCPs for mental health services and wellbeing. The tenth hypothesis is rejected.

Hypothesis 10 (HH10): Age influences use of Digital Technologies tools (DT) by HCPs for mental health services and wellbeing.

Gender does not influence HCPs Behavioural Intention (BI) to use digital technologies for mental health services and wellbeing. The eleventh hypothesis is rejected.

Hypothesis 11 (HH11): Gender influences HCPs Behavioural Intention (BI) to use digital technologies for mental health services and wellbeing.

Gender does not influence use of Digital Technologies tools (DT) by HCPs for mental health services and wellbeing. The twelfth hypothesis is rejected.

Hypothesis 12 (HH12): Gender influences use of Digital Technologies tools (DT) by HCPs for mental health services and wellbeing.

Gender does not influence HCPs Perceived benefits (PBEN) to use digital technologies for mental health services and wellbeing. The thirteenth hypothesis is rejected.

Hypothesis 13 (HH13): Gender influences HCPs Perceived benefits (PBEN) to use digital technologies for mental health services and wellbeing.

Age and use of digital technologies tools (DT) influences HCPs' Behavioural Intention (BI) to use digital technologies for mental health services and wellbeing. The fourteenth hypothesis is accepted.

Hypothesis 14 (HH14): Age and use of digital technologies tools (DT) influences HCPs' Behavioural Intention (BI) to use digital technologies for mental health services and wellbeing.

Gender and perceived barriers (PBA) influences HCPs' Behavioural Intention (BI) to use digital technologies for mental health services and wellbeing. The fifteenth hypothesis is accepted.

Hypothesis 15 (HH15): Gender and perceived barriers (PBA) influences HCPs' Behavioural Intention (BI) to use digital technologies for mental health services and wellbeing.

Gender and use of digital technologies tools (DT) influences HCPs' Behavioural Intention (BI) to use digital technologies for mental health services and wellbeing. The sixteenth hypothesis is accepted.

Hypothesis 16 (HH16): Gender and use of digital technologies tools (DT) influences HCPs' Behavioural Intention (BI) to use digital technologies for mental health services and wellbeing.

Years of Experience and HCPs' Perceived benefits (PBEN) influences use of digital technologies tools (DT) for mental health services and wellbeing. The seventeenth hypothesis is accepted.

Hypothesis 17 (HH17): Years of Experience and HCPs' Perceived benefits (PBEN) influences use of digital technologies tools (DT) for mental health services and wellbeing.

Years of Experience and HCPs' Perceived barriers (PBA) influences HCPs' Behavioural Intention (BI) to use digital technologies for mental health services and wellbeing. The eighteenth hypothesis is accepted.

Hypothesis 18 (HH18): Years of Experience and HCPs' Perceived barriers (PBA) influences HCPs' Behavioural Intention (BI) to use digital technologies for mental health services and wellbeing.

Perceived barriers and therapeutic approach are negatively associated and statistically significant to HCPs behavioural intention to use digital technologies for mental health services and wellbeing.

Perceived benefit is positively associated and statistically significant to the use digital technologies tools for mental health services and wellbeing.

Cues of action is positively associated and statistically significant to HCPS perceived benefits to use digital technologies for mental health services and wellbeing.

Age, gender and years of experience influences HCPs' behavioural intention when combined with digital technologies tools and perceived barriers to use digital technologies for mental health services and wellbeing.

Years of experience and perceived benefits can influence use of digital technologies tools for mental health services and wellbeing.

6.9 SUMMARY OF THE CHAPTER

This chapter presented the result of the analysed quantitative data obtained from 317 HCPs selected from four Neuropsychiatric hospitals from the South-West region of Nigeria. Descriptive statistics and Structural Equation Modelling (SEM) were employed for data analysis. Based on the UTAUT and HBM model, hypotheses were formulated and tested to validate the models. Chapter 7 presents the integration of the findings from both qualitative and quantitative data.

CHAPTER 7: INTEGRATION OF THE RESULTS FROM QUALITATIVE AND QUANTITATIVE DATA

7.1 INTRODUCTION

The findings from the qualitative analysis, which are the findings from the analysis of the in-depth interview, were presented in Chapter 5, while Chapter 6 presented the result from the quantitative data analysis. This research employed convergent mixed method, that is, both qualitative (in-depth interview) and quantitative (questionnaires) data that were collected concurrently and analysed independently. Findings from the analysed qualitative and quantitative data were then compared to understand if the results corroborate each other or not. The findings from qualitative and quantitative data analysis that complements each other were merged and discussed. Integration of the qualitative and quantitative data is represented with the diagram in Figure 7.1 below.

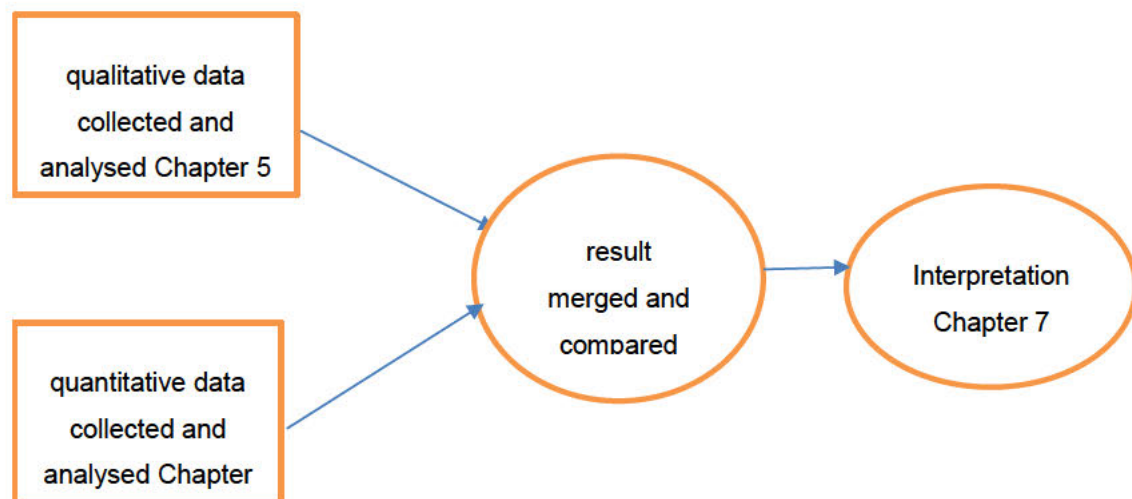


Figure 7.1: Triangulation of qualitative and quantitative data (Adapted from Creswell and Plano Clark 2017)

Findings from quantitative and qualitative data is triangulated to view the overall perspective of the result and provide answers to the research questions and guide the development of the model in mental healthcare. The research objectives, UTAUT and the HBM model guide the development of items on the questionnaire (Appendix 9) and the semi-structured interview guide (Appendix 8a and 8b). The combination and comparison of the results and findings from HCPs are discussed.

7.2 INTERPRETATION OF THE INTEGRATED FINDINGS

The objectives that guided the study are to: (1) determine factors affecting the provision of mental health services and wellbeing in public healthcare, (2) analyse digital technologies that could be effectively utilized to provide mental healthcare services and wellbeing in public healthcare during natural disasters and health emergencies, (3) explore perceptions of health workers towards the utilization of digital technologies to improve mental healthcare services, and (4) to determine barriers and challenges impeding the provision of mental healthcare services and wellbeing through digital technologies. Semi-structured interview and survey questionnaire with a 5-point Likert scale were utilized for data collection to achieve the above objectives.

The in-depth interview guided the identified themes and sub-themes. The qualitative analysis identified nine themes and 24 sub-themes. Findings were discussed in Chapter 5. Furthermore, a proportional stratified sampling technique was used in the selection of participants for quantitative study. Entrenched within the population of HCPs are unequal number of HCPs in each unit and the number varies from one facility to another. To increase the chances of equal representation from all the units in the four selected facilities, the researcher employed Probability Proportion to Size (PPS) method. PPS gave units with smaller number of participants equal chances of representation in the study as units with a higher number of participants. The survey questionnaire had five sections and 337 survey questionnaires were distributed. 317

completed questionnaires were retrieved. Results from the analysed quantitative data were presented in Chapter 6. In view of these contentions, the researchers, therefore, drew up the integrated research results based on the two methodological approaches.

7.3 FACTORS AFFECTING THE PROVISION OF MENTAL HEALTH SERVICES AND WELLBEING IN PUBLIC HEALTHCARE

Objective 1: Determine factors affecting the provision of mental health services and wellbeing in public healthcare.

This section examined the factors that are affecting the smooth provision of mental healthcare. Findings from quantitative data analysis showed there is significant challenge with the number of HCPs in Neuropsychiatric hospitals in the country. Impeding factors such as insufficient number of HCPs professional (mean = 3.35, SD=0.846), negative cultural perceptions (mean =3.41, SD=0.682), poor support systems and stigmatization (mean=3.44, SD=0.700) and negative attitudes towards the mentally ill by the community (mean=3.38, 0.727) were identified. The two main themes identified by qualitative data are human resource challenges and poor infrastructure as factors affecting the provision of mental health services and wellbeing in public healthcare. Sub-themes identified were brain drain, high patient-HCP ratio, strain on HCPs, shortfall in services, inadequate facilities and lack of spacious offices (Table 5.2). Findings from the sub-themes are discussed below.

7.3.1 Human resource challenges

One of the main themes identified by qualitative analysis as a challenge being faced in the daily provision of mental health services is the inadequacy of HCPs within the mental health sector. This is exacerbated by the fact that the sector

keeps losing HCPs. The few available HCPs must overwork themselves to attend to patients who are present at the various mental health facilities. Quantitative analysis findings indicate that HCPs lack adequate training and capacity development (mean=3.11, SD=0.706), there is a shortage of skilled personnel (mean= 2.93, SD=0.848) and the number of available skilled professionals is very few (mean=3.35, SD=0.846). The sub-themes: brain drain, high patient-HCP ratio, strain on HCPs and shortfall in services revealed the following.

7.3.1.1 Brain drain

The quantitative analysis shows that respondents agree that the fact of insufficient mental healthcare professionals (mean =3.35, SD= 0.846) is a major barrier to the provision of mental health services. The demand for mental health services is high in the study areas. However, this demand far exceeds the ability to take care of all patients. It presents as a huge challenge in the provision of mental health services especially if the country is serious about reducing the prevalence of mental health cases in Nigeria. The qualitative study also agrees with the quantitative findings and identified inadequacy of personnel as a recurring theme in all the interviews conducted. This was especially in relation to HCPs leaving the country in search of greener pastures. This was partly due to the poor working conditions prevalent in the mental health sector as well as poor remuneration.

The increasing number of HCPs leaving the healthcare system to look for work overseas continues to burden service delivery in mental healthcare. Sadly, the government has not stepped forward with any plan in addressing the problem, which unfortunately has exacerbated the challenges of services delivery in neuropsychiatric hospitals. Findings from qualitative analysis corroborated the result from quantitative analysis on the challenges of brain drain in the healthcare sector.

7.3.1.2 Strain on health care workers

Lack of skilled mental health workers, according to the quantitative analysis, is a major drawback on the provision of mental health services (mean=2.93, SD=0.848). This puts a strain on the current skilled workers on the job, thereby lowering their productivity and effectiveness. The qualitative study states that it causes a burdensome daily routine for HCPs who are often overworked. From the account of the HCPs, they always run through patients quickly to be able to attend to everyone present and this high demand for mental health services often means that some of the HCPs are unable to take their annual leave to allow them have needful rest.

Findings from qualitative and quantitative analysis showed that strain on HCPs is significant and impacts the provision of adequate mental healthcare services. The inadequacy of HCPs within the mental health sector is as a result of the incessant brain drain in the health sector and the available few must overwork themselves to attend to patients who are physically present at various mental health facilities, which unfortunately affects the provision of quality services to patients.

7.3.1.3 Shortfall in services

Shortfall in mental health services poses a challenge to the successful provision of mental health service. The quantitative analysis showed that respondents agreed that mental health services are not accessible (mean=3.17, SD= 0.790), patients need to wait in long queues before accessing services (mean=2.96, SD=0.823) and the cost of these services is steep (mean=3.19, SD=0.737). HCPs also indicated the low level of awareness and advocacy about mental health and methods of treatment (mean=3.20, SD=0.779). Lack of awareness amongst HCPs and patients on how digital technologies can enhance public health care delivery is another shortfall.

Quantitative analysis further showed that respondents (mean=4.15, SD=0.821) agreed that lack of public awareness on digital technologies for mental healthcare services is a challenge. Individuals in need of mental health services do not have adequate knowledge on what they are suffering from, what to do and how to go about getting help. The qualitative analysis captured this by stating that mental health patients are not receiving the best care and treatment they ought to. This is primarily due to the limited number of trained HCPs. Shortfall in services is valid and significant in both qualitative and quantitative analysis. Patients are disadvantaged in receiving adequate mental healthcare and for those who are likely to get the care, need to wait in long queues.

7.3.2 Poor infrastructure

Infrastructures in mental health facilities are appalling across the study area in qualitative findings. The ambience ought to aid in healing and enhance treatment but the reverse is the case. The environment is disadvantageous both for HCPs and the patients. In one of the study areas for qualitative study, a participant indicated that there is overgrown bush around the offices used for therapy. The participant further highlighted that snakes could be hiding in the bush which endangers the lives of both patients and HCPs.

The inadequacy of infrastructures in mental health facilities has been worsened by COVID-19 and increased the demand for mental health services. Unfortunately, quantitative analysis findings correlate with qualitative findings that the available infrastructures cannot handle the current demand and government budgetary allocation is insufficient (mean 3.30, SD= 0.683), consequently, getting needed equipment to improve services will be almost impossible. Similarly, the availability of adequate infrastructure will influence patients' intention to use digital technologies (p-value=0.022, t-stat= 2.294). It has become necessary that the government revamps these infrastructures across neuropsychiatric facilities in Nigeria.

7.3.2.1 Inadequate facilities

Participants in the qualitative study reported that infrastructure in most facilities is in a horrendous condition. The current neuropsychiatric facilities are servicing people both within and outside their states and unfortunately could not meet up with demand. HCPs recommended a need for an overhaul of infrastructure. The quantitative research also showed that respondents agree that there is insufficiency of mental healthcare facilities (mean= 3.31, SD= 0.694) needed for the provision of services and to enhance wellbeing.

Findings from qualitative analysis correlates with results from quantitative analysis evidencing that there is need for the establishment of more neuropsychiatric hospitals. The available facilities have not been able to handle the current demand, which makes it imperative to establish more mental health facilities across the country to make it possible for those in need of such services to be able to easily access it. The lack of adequate facilities has led to the inconvenience of HCPs sharing offices which is impacting the day-to-day provision of mental health services across all the study areas. Some of the offices doubled as therapy rooms, thus, making it difficult for HCPs to effectively discharge their duties. According to some respondents, HCPs had to rush through therapy sessions within these shared offices because their colleagues would need to conduct their sessions as well. As unfortunate as it is, it is beyond HCPs' control.

7.4 DIGITAL TECHNOLOGIES THAT COULD BE EFFECTIVELY UTILIZED TO PROVIDE MENTAL HEALTHCARE SERVICES DURING HEALTH EMERGENCIES

Objective 2: Analyze digital technologies that could be effectively utilized to provide mental healthcare services and wellbeing in public healthcare during natural disasters and health emergencies.

HCPs highlighted that the integration of digital tools to the mental healthcare system in Nigeria will complement the traditional method of therapy and could be used during health emergencies. The qualitative analysis derived three themes and eight sub-themes from the objectives. The major themes that emanated were HCPs' knowledge on digital technologies, the digital technologies currently employed in service delivery and benefits of digital technologies for mental health service provision. Identified digital technologies range from social media, computerized CBT packages, video calls, smartphone applications to wearable devices. Having a low mean value of 3.39, SD 1.322 social media platforms such as Facebook, Instagram, Twitter, Telegram, are not perceived as an appropriate medium of effective and efficient mental health service delivery but wearable digital tools (mean =4.24, SD= 0.751) are perceived to be effective and could be utilized for mental health and wellbeing. Substantial findings that emerged from both qualitative and quantitative analysis are discussed below.

7.4.1 Knowledge on digital technologies

Digital technologies have gained a lot of prominence following COVID-19. They reduced the barriers associated with communication and made it easier to communicate with patients irrespective of location. For HCPs, it made their work easier as they could better assist patients with timely information. From qualitative findings, HCPs reported the use of digital technologies before the pandemic, which indicates their knowledge of the tools. HCPs are aware of WhatsApp's both for calls and chat, Zoom, telephone, Google Meet, Electronic Medical Record System, Telemedicine and media platforms to mention a few. Despite having adequate knowledge about these digital tools, its use is very minimal. A psychiatric nurse indicated that he has been using online platforms with his patients for almost a decade now. Qualitative findings are further validated by the result from quantitative analysis (Table 6.7) where almost 50% of respondents indicated the use of digital tools. Although, COVID-19 pandemic

made the use of digital technologies popular, HCPs had adequate knowledge of the available digital tools before the pandemic.

7.4.2 Digital technologies used

The use of digital technologies also makes it easier for HCPs to schedule and conduct therapy sessions online without the hassle of catering to patients in-person. This was particularly helpful during the pandemic and continues to be of much help in present times. This is also observed in the qualitative analysis where the respondents pointed out that not only do digital tools reduce time spent in the hospitals, but they also make treatment relatively easier and seamless. Only 137 (43.2%) HCPs indicated that they do use digital tools in their day to day provision of services while 178 (56.2%) said they do not use digital technologies in their day to day provision of services (Table 6.7). Digital technologies frequently used by HCPs ranges from Google Meet (9.1%), WhatsApp call (8.8%), to Zoom (6.3%) but Skype, multimedia, and telegraphy had low usage (< 0.3) (Table 6.8).

The utilization of digital tools unfortunately is not dependent on the number of years an individual has been working as a healthcare professional. There is no significant relationship between HCPs' years of experience and their use of digital technologies in service delivery ($p\text{-value}=0.875$). Being in the mental health sector for decades does not necessarily mean such healthcare providers will use digital technologies in service delivery. Furthermore, HCPs' area of specialization and the use of digital tools showed significant association ($p\text{-value}=0.000$). The implication of this is that HCPs' area of specialization determines if they will use or not use digital tools. HCPs' capacity to use digital technologies (self-efficacy) influences patient's intention to use digital technologies ($p\text{-value}=0.000$, $t\text{-stat}=15.145$). These findings corroborate the findings from qualitative analysis that some HCPs have formed therapeutic relationship with their patients, therefore the use of digital technologies

strengthened this relationship and eased communication between patient and therapist.

7.4.3 Benefits of digital technologies for mental health service provision

The convenience digital technologies give both to patients and HCPs is unmatched. Patients are able to make enquiries and get clarification on their health. Using these technologies also affords HCPs the opportunity to promptly attend to emergencies even if the patient is in a different location. Findings from descriptive statistics showed that about 285 (90%) of HCPs indicated that digital technologies will have a positive impact on patient mental health. In situation where patients forget to ask pertinent questions or are uncomfortable asking questions in-person, these digital technologies come to their rescue. About 271 (85%) HCPs believed digital technologies would do more good than harm to patients. A simple WhatsApp call or Zoom call would suffice rather than travelling many kilometres and hours to visit the health facility. Likewise, 279 (89%) of HCPs thought that service delivery will be pleasant with digital tools and will increase the likelihood of patients using digital technologies (p-value=0.020, t-stat= 2.319). The use of these technologies affords patients the chance to get almost immediate responses to their ailments, especially when they are in distress or during an emergency. The sub-themes that emerged from the main theme are discussed below.

7.4.3.1 Accessibility

Analysis from both research methods indicated that the use of digital technologies such as phones, social media and other forms of digital communications can be easily accessed by both the patients and the HCPs. From survey findings, 258 (82%) respondents indicated that healthcare professionals around the world are embracing the use of digital interventions for service delivery and about 211 (67%) respondents perceived digital platforms as being as effective as face-to-face consultation. Furthermore,

findings indicated that the media, support system, and radio and television programmes (cues of action) influence patients' choice of behaviour (perceived susceptibility) ($p=0.000$, $t\text{-stat}=3.930$) in reducing their vulnerability and enhancing their use of digital technologies. Digital technologies are not location bound, some participants in the interview indicated that there are patients who are residing outside the country who could not get adequate mental health intervention in their current location due to cultural variation and language barriers but are able to connect with healthcare professionals in their home countries.

7.4.3.2 Continuity of service provision

Quantitative analysis findings showed that about 275 (87%) respondents would want the continuous use of digital technologies in service delivery. The COVID-19 pandemic sprung up on the world unexpectedly, but with the integration and continuous utilization of digital intervention, the mental health sector will be well prepared for any health outbreak or emergencies. The survey analysis showed that about 292 (93%) respondents are of the opinion that digital technologies should be the necessary option especially when face-to-face interventions are not possible. This was noted during the compulsory lockdown during the recent pandemic. Patients were unable to seek necessary treatment due to restriction of movement and only critical cases were attended to mental health facilities. Qualitative findings correlate with quantitative findings on the continuous use of digital technologies in service provision.

Access to mobile phones, and location of healthcare facilities (modifying variables) also influence patients' behavioural intention ($p\text{-value}=0.000$, $t\text{-stat}=8.099$) to use digital technologies. A psychiatric nurse's response further highlighted this when she said that some of their outpatients want to join a support group after discharge to prevent relapse and enhance support. When patients perceived themselves to be susceptible to relapse, mental breakdown or hospitalization, they will embrace the use of digital technologies to improve

their wellbeing (p-value=0.000, t-stat=3.574). The use of digital tools makes it easy to connect both patients and HCPs when help is needed and patients do not need to terminate their treatment because of relocation or job transfers.

7.4.3.3 Reduced patient travel cost

The quantitative analysis captured this through 271 (85%) respondents who stated that digital technologies will be more advantageous to patients (Table 6.10). Patients are expected to visit the facility to be able to access health care but with the use of digital tools such as Zoom and WhatsApp, it will place less financial burden on the patients as well as their therapists. Furthermore, findings showed that 272 (86%) respondents indicated that they believe the use of digital technologies will become inevitable in attending to patient's mental health care. Equally, the qualitative findings stated that with the introduction of digital technologies, travel costs for patients and HCPs would be reduced. Findings from both analyses suggest that the use of digital technologies will reduce travel costs on the patients as well as the HCPs.

7.4.3.4 Eliminate stigmatization

The quantitative and qualitative analyses suggest that the use of digital technologies will eliminate stigmatization of the mental health patient. In the quantitative analysis, 252 (80%) respondents stated that personal information of the mental health patient is mostly secured (Table 6.10) thereby eliminating stigmatization. Additionally, 271 (85%) respondents highlighted that digital technologies will enable patients to ask questions and discuss their mental health challenges anonymously without fear of being labelled. The qualitative findings encapsulate this by stating that patients (and their families or caretakers) do not need to be physically present to have access to mental health services. This means less visibility with little to no association with mental health facilities.

In the communities, there is a lot of misconception about mental illness and mental health facilities (mean 3.34, SD= 0.737). These include: social stigma (mean=3.44, SD= 0.700), total rejection of mentally ill (mean=3.38, SD=0.727) and cruel cultural perceptions of persons with mental illness (mean=3.41, SD=0.682). These misconceptions unfortunately lead to stigmatizations, which sadly precede missed appointments or in some extreme situations, termination of treatment. As captured in the qualitative analysis, patients and relatives would not need to panic when in need of mental healthcare.

7.5 PERCEPTIONS OF HEALTH WORKERS TOWARDS THE UTILIZATION OF DIGITAL TECHNOLOGIES TO IMPROVE MENTAL HEALTHCARE SERVICES

Objective 3: Explore perceptions of the community and health workers towards the utilization of digital technologies to improve mental healthcare services.

The qualitative and quantitative analysis evaluated HCPs' attitudes and perception towards the utilization of digital technologies in mental healthcare. Two main themes and five sub-themes emanated from the qualitative findings. The two main themes are perception of digital tools and emerging operational issues while the five sub-themes are attitude towards digital tools, acceptability, patient care, policy and perceived extra burden on HCPs. Findings from the sub-themes are discussed below.

7.5.1 Perception of digital tools

The survey showed that about 307 (97%) of HCPs (Table 6.10) agreed that digital tools will be effective in assisting patients in need of mental health services and about 272 (86%) indicated that the use of digital technologies for intervention is unavoidable because the world is fast becoming a global village. Additionally, about 253 (81%) respondents agree that a meaningful relationship

could be achieved between HCPs and patients with digital intervention. Digital platforms create an easy avenue for both patients and HCPs to seamlessly connect. This relationship can play a huge role in the sustainability of treatment. Participants in qualitative findings are of the opinion that HCPs are receptive to digital tools and have a positive attitude towards its use which validates the findings from quantitative analysis.

7.5.1.1 Attitude towards digital tools

Quantitative analysis revealed that HCPs have positive attitudes towards the use of digital technologies. Findings from the quantitative results indicate a considerable number of HCPs (90%) had positive attitudes to the use of digital technologies and perceived that digital technologies would be very beneficial to patients. Similarly, about 264 (84%) respondents indicated that healthcare professionals will support the utilization of digital intervention and 292 (93%) respondents have confidence in HCPs' capacity to use digital technologies in providing services.

However, reports from qualitative analysis showed some discrepancies with the quantitative analysis. Qualitative findings found that some HCPs are not open to the use of digital tools in service delivery. They believe the traditional mode of intervention is the only way to assist people with mental health challenges and that important cues could easily be missed or hidden when using digital technologies. A participant noted that signs of anxiety could easily be camouflaged on digital platforms, facial cues could go undetected, which is why some HCPs are very rigid about the utilization of digital technologies. This is enhancing resistance to the integration of digital technologies in mental healthcare service delivery.

7.5.1.2 Acceptability

In the quantitative survey analysis, 273 (87%) participants indicated that healthcare professionals will support the adoption and use of digital technologies for interventions (Table 6.10). This means that the acceptability of digital tools by HCPs is high. In addition, digital technologies give a credible way to make enquiries and get information on mental health issues. Patients do not have to wait till their next appointment before getting assistance (67%). Qualitative findings support results from quantitative data on the acceptability of digital technologies since it alleviates HCPs' long and tiring working hours and reduces risky exposures as with face-to-face consultations. The qualitative and quantitative analyses revealed that HCPs view the use of digital technologies as good and acceptable.

7.5.1.3 Patient care

In as much as digital technologies are beneficial to both patients and HCPs, some are of the view that it is inadequate. This is simply because using these digital technologies has the likelihood of masking certain cues, bodily movements and expressions which are all necessary in making an accurate diagnosis. These concerns emanated from qualitative analysis on the utilization of digital technologies for consultation. Sweaty palms, shaking hands or some subtle facial cues can be easily missed on digital platforms but when such sessions are conducted physically, the healthcare provider can easily pick such cues. Patients can easily hide their emotions and their frustrations on online platforms, which unfortunately could hamper treatment.

Quantitative findings showed that 235 (75%) respondents agreed that the use of digital technologies would not be effective in managing some severe level of illness and symptoms although about 80 (25%) respondents still hold that digital technologies could be utilized at any level of treatment. Quantitative analysis results correlate with qualitative findings on patient care.

7.5.2 Emerging operational issues

Qualitative findings showed that patients having access to HCPs often serves as an inconvenience to the HCPs, although understandable due to patients' mental state. However, it makes the work of these HCPs tedious since they need to properly manage these kinds of situations so that they don't escalate. Likewise, both patients and HCPs have a challenge with high subscription rates (mean=3.35, SD=1.008), high data consumption (mean=3.49, SD= 0.993), inefficiency of the current digital tools in mental health facilities (mean=2.26, SD=0.930) and navigation problems due to several options on the app (mean=3.35, SD=1.176). The two sub-themes that emanated are discussed as follows.

7.5.2.1 Policy

HCPs had concern with regulation and policy implementations so as to protect themselves. According to qualitative findings, the integration of digital tools is not a bad idea, however, there should be appropriate policy and regulations to protect both the HCPs and patients. The few HCPs using telephone calls or WhatsApp with their patients are doing so at their own risk. The quantitative analysis result showed poor and inappropriate mental healthcare policies (mean=3.27, SD= 0.741) and lack of implementation of mental health policies (mean=3.27, SD=0.698) by the government, which is a barrier to a better mental health service provision in Nigeria. Consequently, this has led some organizations and professional bodies forbidding the use of digital tools for service delivery so as to protect themselves (mean= 2.14, SD=1.045; mean=2.12, SD=0.997). Qualitative findings further strengthened findings from quantitative analysis on the need for policy and prompt implementation of policies.

The use of digital technologies can give patients unwarranted access to HCPs. Having the contact details of the HCPs creates a personal bond between HCPs

and the patients which could often be misconstrued. The patient could call at ungodly hours, bombard the HCP with messages or create a non-existent bond in his/her mind due to their mental state. This is why there is the need to put in place a controlled and regulated system to ensure this does not happen.

7.5.2.2 Perceived extra burden on health care workers

The qualitative analysis extensively covered the perceived burden of the use of technologies on HCPs. HCPs need to shift from their comfort zone and engage in rigorous training to efficiently and effectively use digital technologies. There were discrepancies from interviewed respondents. Some viewed the extra effort needed to get acquainted with digital technologies as an extra burden while some felt it is way of self-development since the world is fast becoming digitalized. A respondent specifically said HCPs would not perceive the integration of digital tools as extra burden if there are incentives attached. Furthermore, training on the use of digital technologies is unanimously agreed on in the qualitative findings. The need for training is important because HCPs need to have adequate knowledge of the different technologies to be used.

Results from qualitative data findings correspond to quantitative data analysis findings. In quantitative analysis, HCPs highlighted that some digital tools are complicated to use (mean=2.73, SD=1.056), needed more time and extra effort to understand while some apps do easily develop technical malfunctions which can be seen as extra burden for HCPs. Lack of motivation for HCPs (mean=3.25, SD=0.709), poor training and capacity development (mean=3.11, SD=0.706) and inadequate knowledge on how to use some digital applications were emphasized as extra burdens to HCPs and could jeopardize the use of digital technologies in mental healthcare.

7.6 BARRIERS AND CHALLENGES IMPEDING THE PROVISION OF MENTAL HEALTHCARE SERVICES AND WELLBEING THROUGH DIGITAL TECHNOLOGIES

Objective 4: Determine barriers and challenges impeding the provision of mental healthcare services and wellbeing through digital technologies.

Qualitative analysis identified two main themes and five sub-themes as the barriers and challenges hampering the provision of mental healthcare services through digital technologies. Financial challenges. technological concerns are the two main themes while the identified sub-themes are high cost of setting up, extra cost to patients, poor network connectivity, inconsistent power supply and possibility of being hacked. The following sections presented findings from the sub-themes.

7.6.1 Financial challenges

Financial challenge is one of the main themes that emanated from qualitative findings. Finance is one of the major restrictions to the provision of mental health services using digital technologies in Nigeria. The cost involved in the deployment of digital technologies in public mental health facilities is high. High cost of setting up and extra cost to patients are the two sub-themes and are discussed below.

7.6.1.1 High cost of setting up

Quantitative data analysis showed that subscription costs for digital technologies is very high (mean=3.35, SD=1.008) and that there is a lack of equipment needed for quality service delivery (mean=3.31, SD= 0.694). Equally in the qualitative findings, respondents noted that the quotations received from service providers for the deployment of digital technologies services in mental health facilities is very expensive. Unfortunately, the budget allocated to these

facilities is not sufficient to meet the needs of these facilities. More so, neuropsychiatric hospitals could not generate funds internally to augment the allocation from government to meet the needs of these facilities, which is a major barrier to the integration of digital tools into mental healthcare. HCPs opined that inadequate funding of mental health sector (perceived barrier) stands as a huge obstacle to patients embracing the use of digital technologies (behavioural intention) ($p\text{-value}=0.000$, $t\text{-stat}=3.515$). Results from both analyses confirms that digital technologies cost a lot to set up, especially for mental health facilities in Nigeria.

It is worth mentioning that some psychologists in the interview believe that digital technologies should not be integrated into mental health service provision. It is believed that the infrastructure needed to support its use needs to be put in place first. Quantitative analysis findings validate this view. About 301 (96%) respondents in the survey support the need to have the necessary resources in place before the deployment of digital technologies in mental healthcare.

7.6.1.2 Extra cost to patients

The use of digital technologies poses an extra cost to the patient who must maintain the digital tool so as to communicate with their therapist. The quantitative analysis reveals that respondents agreed that digital technologies for mental healthcare services involves heavy data usage ($\text{mean}=3.49$, $\text{SD}=0.993$), and that such might be too expensive for an average client. Qualitative analysis captures this by stating that the inability to acquire the tools required for therapy such as android phones and the unaffordability of data for online sessions can discourage patients from accepting digital intervention. The majority of HCPs also called for the gradual introduction of digital technologies to complement physical assessments considering the extra burden integration will predispose them to. HCPs might have the needed tools but when the

patients do not have the required tools, it poses a barrier to the utilization of digital intervention.

7.6.2 Technological concerns

The theme of technological concern identified three sub-themes which are poor network connectivity, inconsistent power supply and the possibility of being hacked. Although patients and HCPs should enjoy a seamless digitalized session and consultation, the Nigerian factor stands in the way. There is a constant cyber security threat and unwarranted intruders which threatens the existence and smooth running of digital platforms.

7.6.2.1 Poor network connectivity

Poor network connectivity is a concern when discussing the barriers to the provision of mental health services through digital technologies in Nigeria. Survey findings reiterate that the integration of digital technologies in mental health intervention is impracticable and not logical (mean=2.54, SD=0.968), considering the fact that Nigeria as a country has a problem with network connectivity and battles with inconsistent power supply. HCPs highlighted in the qualitative findings stated that therapy sessions cannot be conducted without disruption and that sometimes sessions might terminate unexpectedly due to bad network connectivity. Findings from qualitative analysis corroborated the results from quantitative analysis. Also, these disruptions affect the schedules of HCPs, increase time spent online by patient and healthcare providers and interrupt the online appointment of other patients.

7.6.2.2 Inconsistent power supply

The quantitative analysis result pointed to the problem of inconsistent power supply. Charging of digital technologies prior to a therapy session may be a challenge (mean= 3.20. SD= 1.167) due to erratic power supply. Furthermore,

the qualitative findings were quick to point out the challenge of inconsistent power supply, corroborates findings from quantitative analysis. Respondents in the interview pointed out that Nigeria is a country with constant power cuts, which hinders the smooth running of Wi-Fi. Inconsistent electricity supply is also another major barrier to effective digital intervention. Psychiatric hospitals need stable power supply to function.

Using an alternative power supply is not a realistic option because of the low budgetary allocation to these facilities. According to a psychiatric nurse, hospital management can only sustain the use of generators for very few hours daily. Invariably, HCPs, in-patients and out-patients are plunged into darkness and will not be able to access services that need electricity.

7.6.2.3 Possibility of being hacked

The qualitative analysis was clear on the possibility of these digital technologies being hacked and patients' data tampered with. Unwarranted internet intrusion is another challenge pointed out by qualitative findings. There are strong possibilities that hackers can gain access to patient information and use it against them. Sometimes these hackers use it as a weapon of blackmail so as to extort money or valuables from the patients. Political opposition parties can also use this information against their opponents in their quest for power. A psychologist indicated that if there is end-to-end encryption, patient information should be secured. Most participants highlighted that online databases are prone to hackers and unwanted intruders. The quantitative analysis findings disagree with the findings from the qualitative analysis. About 252 (80%) respondents (Table 6.10) strongly believe that patients' information is secure on digital platforms. It is believed that any information stored on digital platform is safe from intrusion.

One way to address the challenges in the healthcare sector is to increase investment in mental healthcare. This would include funding for training mental

health professionals, improving infrastructure, and raising awareness about mental health issues. Another way to address these challenges is to make mental healthcare more affordable. This could be done by increasing insurance coverage for mental healthcare, subsidizing the cost of medication, and providing transportation assistance to people who need to travel to and from healthcare facilities. By addressing these challenges, there can be improved access to quality mental healthcare for all Nigerians. This will help to improve the mental health of the population, which will have a positive impact on individuals, families, and communities.

7.7 SUMMARY OF THE CHAPTER

This section presented the integration of findings from qualitative and quantitative data analysis. Convergent mixed method was utilized in this study. The findings from the identified themes and sub-themes were integrated with quantitative analysis result to gain a better understanding of the study. Discrepancies and agreements were identified from the integration. Discussion of findings is presented in the next chapter.

CHAPTER 8: DISCUSSION OF FINDINGS

8.1 INTRODUCTION

This chapter presents the discussion of the integration of qualitative and quantitative findings from Chapter 7. The discussions presented in this Chapter were guided by the research objectives, reviewed literature in Chapter 2 and the HBM and the UTAUT Models. The models guided the perspective on the motivators that influenced the intention to utilize digital technologies in improving mental health and wellbeing in Nigerian public healthcare. In addition, hypotheses related to the research questions were developed using a modified version of the UTAUT Model and HBM based on this study. The research proposed modified a UTAUT Model that identified hypotheses based on an additional construct (therapeutic approach) and two modified moderating variables (specialization and hours of meeting with clients). Also, the two modifying variables (specialization and hours of meeting with clients) and construct (therapeutic approach), was also integrated into the modified HBM Model and led to the development of hypotheses. This chapter discusses the findings of the statistical analyses (Descriptive, correlation and SEM) in relation to the research questions and associated hypotheses. The discussions of the identified themes are presented under each objective to provide an overall picture of the findings in comparison to the literature.

8.2 FACTORS AFFECTING THE PROVISION OF MENTAL HEALTH SERVICES AND WELLBEING IN PUBLIC HEALTHCARE

The issue of mental health was a key issue in Africa even before the recent pandemic. The thematic analysis and the descriptive analysis revealed factors such as human resource challenges, brain drain, shortfall in services and lack of infrastructure, as well as strain on HCPs as factors hampering the provision of effective and efficient services in Nigeria mental healthcare facilities. The themes and sub-themes are further discussed.

8.2.1 Human resource challenges

There is a serious challenge with the number of healthcare professionals in Nigeria's mental health facilities as noted in this study, which hampers the provision of adequate and efficient services at mental healthcare facilities. The number of psychiatrists, clinical psychologists, occupational therapists and psychiatrist nurses in the survey area are too small in relation to the number of patients that need mental health services daily. This is also supported by Ewebande *et al.* (2023:1)'s study which found that one of the problems with Nigeria's healthcare sector is caused by the shortage of healthcare professionals. The inadequate work force in Nigeria's public mental healthcare facilities exacerbates the challenges in the healthcare sector. Olumade *et al.* (2020: 736) also affirmed that Nigeria's healthcare sector is battling with human resources challenges, consequently performing below the WHO's recommendation on the ratio of HCPs to patients for developing countries.

This study found that the dearth in the number of professionals is majorly due to the massive migration rocking Nigeria's healthcare system. This is noted in Essien and Asamoah's (2020: 2531) study, which showed that healthcare professionals, such as nurses, midwives and doctors, are in short supply in South Africa due to high migration rate from developing to a developed world.

These healthcare professionals are crucial in emergency response in public healthcare system in Nigeria and shortages affects the preparedness for health emergencies and outbreak. There is need for direct intervention from the government in retaining HCPs to prevent possible collapse in the healthcare sector. The trend is having a detrimental effect on the functionality of the healthcare system.

8.2.1.1 Brain drain

There is high migration of HCPs, which created a gap in the healthcare sector most especially in the mental healthcare sector as established in this study. Skilled physicians are in short supply with many hospitals having to cancel or delay procedures due to lack of professionals, impacting the sector negatively with devastating consequences. A study conducted by Wade *et al.* (2021: 1) also confirmed that there is a high level of HCPs seeking better working conditions beyond the shores of Nigeria. The massive migration in the healthcare sector is not pertinent to Nigeria alone but in most African countries (Olumade *et al.* 2020: 736). The high level of migration has precipitated a brain drain in the sector, which affects the standard of care in healthcare. This is in line with Essien and Asamoah's (2020: 2531) report that South African health sector faces significant challenges with infrastructure, resources and skilled professional due to government's nonchalant behaviour towards HCPs' working conditions and insufficient investment in infrastructure. Similarly, Abdulmalik *et al.* (2019:38) found that a large number of HCPs have left Nigeria to work in countries with better working conditions.

It is evident in this study that the high demand for mental health services surpasses the capacity of the available HCPs. Patients in need of mental healthcare services either use expensive private healthcare providers or use the limited services provided by the few HCPs available. The available few had to work under difficult conditions due to the shortage of professionals caused

by the gradual brain drain, consequently worsening mental health service delivery.

8.2.1.2 Strain on health care workers

A shortage of skilled mental health professionals put strain on competent professionals and decreased efficiencies. The Federal Government in one of its National Conferences on e-Health and Telemedicine acknowledged that HCPs are incapacitated which has created the need to build capacity (Egenti *et al.* 2022:1; Adebayo and Ofoegbu 2014: 36; Mbamalu 2019). This study agreed that HCPs are subjected to onerous day-to-day tasks in order to attend to all the patients that come for consultation leading to risk of burnout due to the enormous demand for their services. This finding supports Benjamin *et al.* (2021: 365)'s study that, with the high number of South African HCPs leaving the healthcare sector, those remaining in the country were overburdened with work, leading to burnout and desire to leave the job. Castro (2023) further submits that the diminishing number of professionals increased the number of patients per HCP and leads to exhaustion or work-related stress among healthcare providers. The brain drain in the mental health sector has created a snowball effect and impacts negatively on the quality of care.

8.2.1.3 Shortfall in services

HCPs indicated a high influx of patients to public mental health facilities which increases their waiting hours at mental health facilities. A study conducted by Abiodun and Olu-Abiodun (2014: 274) confirmed that Nigerian public healthcare facilities have a high daily volume of patients, which in turn increases queuing time at healthcare facilities. This study established that patients can easily get discouraged or discontinue their treatment due to the endless queues and long waiting hours. Likewise, the influx of these patients affects the day-to-day effectiveness and efficiencies of HCPs' service delivery. A study by Mbamalu (2019) revealed that 30 minutes therapy session with patients has

been reduced to less than five minutes in Nigeria's public mental healthcare system due to the inadequate number of professionals.

This study also identified HCPs' lack of sufficient information on the ease digital technologies can provide in services delivery, which can assist patients in making investigating their symptoms and navigating their treatment. Digital technologies can also assist in reducing the expenses of mental health treatment, and provide adequate knowledge of mental health and available mode of treatments.

8.2.1.4 Poor infrastructure

The COVID-19 pandemic created a surge in the need for mental health services all around the world. However, the current infrastructure in Nigeria's mental health facilities is not adequately equipped to handle such a surge. Adebayo and Ofoegbu (2014: 36)'s study substantiates this, finding a lack of technological amenities and infrastructure to support use of technologies in Oyo State Nigeria. Ewebande *et al.* (2023: 1)'s and Babalola *et al.* (2021: 46)'s studies established that neuropsychiatric hospitals' infrastructures are in a pathetic state across the country and in other African countries. More so, this study found that the ambience of mental health facilities does not enhance treatment but is actually detrimental to the wellbeing of both HCPs and the patients. Furthermore, the ventilation in some admission wards and nurses' offices is poor, while some structures are dilapidated with dangers lurking around. Babalola *et al.* (2021: 46)'s and Olumade *et al.* (2020: 736)'s studies showed that the environment of Nigerian healthcare facilities does not contribute positively to patient wellbeing. Using the UTAUT construct, facilitating conditions (FC) was found to have a positive and significant relationship on user behaviour (UTAUT construct) in this study ($\beta = -0.424$). This means that the availability of basic infrastructure such as laptops, internet enabled phones, airtime, Wi-Fi, and constant electricity will facilitate the acceptance and use of digital technologies among HCPs.

8.2.1.5 Inadequate facilities

Nigeria is a populous country but has about eight federal neuropsychiatric hospitals that service the entire population (Mbamalu 2019). The findings revealed that the number of neuropsychiatric hospitals in the country is fundamentally incapable of providing adequate services for the entire populace. This study found that the number of mental health facilities in each state is not sufficient to cater for the need of each state. Lagos State is a populous state but has just two public mental health facilities (Yaba neuropsychiatric hospital and its Oshodi annex) which provide mental health services for the state. Likewise, Ondo State only has Akure neuropsychiatric hospital to serve its needs as well as that of its environs. Accessing services at these facilities is difficult because of its huge daily influx.

This study further emphasized the challenges (such as lack of accessibility, and the need to travel long distance) posed by the limited number of neuropsychiatric hospitals across the country as well as the crucial need to establish more mental health facilities. This is further alluded by Wada *et al.* (2021: 1)'s and Babalola *et al.* (2021: 46)'s studies on the inadequacy of the number of mental health facilities and its inefficient services. Limited facilities as noted in this study, unfortunately led to the sharing of office and lack of dedicated therapy rooms.

8.3 DIGITAL TECHNOLOGIES THAT COULD BE EFFECTIVELY UTILIZED TO PROVIDE MENTAL HEALTHCARE SERVICES DURING HEALTH EMERGENCIES

Thematic analysis identifies themes such as knowledge on digital technologies and digital technologies used. The descriptive analysis revealed that digital technologies are sparingly utilized in healthcare service delivery. The themes and sub-themes that emanated from the analysis are discussed as follows.

8.3.1 Knowledge of digital technologies

The Nigeria healthcare system is not prepared for the next pandemic or public health emergencies. However, the integration of digital technologies into mental healthcare will bridge the gap in service delivery (Olumade *et al.* 2020: 736; Muhammad *et al.* 2017: 6). Oladimeji and Fatusi (2022) cited the advancement in digital technologies in the past decade so authenticating the appropriateness, workability and benefits for individuals in need of mental healthcare interventions.

Nigerian non-governmental mental health service providers like Mentally Aware Nigeria Initiative (MANI) and PsyndUp harnessed the benefit of digital technologies in reaching as many people as possible in providing mental health services during the pandemic and beyond (Adepoju 2020:571; Wada *et al.* 2021: 1). Adebayo and Ofoegbu (2014:36) posit that the integration of e-health in the public healthcare sector allows easy access to physicians and medications and allows a larger portion of the population easy access to care. This study agreed that the UTAUT construct of performance expectancy (PE) has a strong significant impact on Behavioural intention to use digital technologies. This implies that, if HCPs perceive digital technologies to be beneficial, favourable and have a positive influence on patients, then, it will encourage them to adopt digital technologies for service delivery. This is demonstrated by Pan and Gao (2021: 228)'s study that if healthcare providers

perceive digital technologies to be positive, pleasant and beneficial, then the possibility of use will be high.

8.3.2 Digital technologies used

The number of HCPs using digital technologies for service delivery are few, and the few that do, do so due to a therapeutic relationship with their patient that has developed over years. Few HCPs do follow-ups using phone calls, sending SMSes, or even using the WhatsApp chat which is noted in the HBM construct (behavioural intention) that HCPs' intention to use digital technologies is fair ($R^2=27.6\%$). The few utilized digital technologies among HCPs according to this study are: phone calls (8.8%), Zoom (6.3%), WhatsApp (8.8%), Google Meet (9.1%) and telemedicine (5.7%). Despite the low utilization of digital technologies among healthcare providers, Ben-Zeev *et al.* (2012: 340)'s survey found a higher utilization of mobile phones among people with serious mental illness in the Chicago region in USA. Those without a mobile desire to access mental healthcare through digital technologies. It is evident in this study that patients prefer virtual therapy sessions and follow-up rather than coming to the facility.

The UTAUT construct of social influence (SI) is found to be important in the adoption and utilization of digital technologies ($\beta=0.002$, $p\text{-value}=0.989$). That is, people tend to use new technologies if they find out people around them also use the same technologies with no problems encountered and with utmost safety. Consequently, the few HCPs utilizing digital technologies can positively influence those that are yet to use them. The correlation analysis in this study found that HCPs' years of experience does not determine if HCPs will utilize digital tools ($p\text{-value}=0.875$) but HCPs' area of specialization determines the level of utilization of digital tools ($p\text{-value}=0.000$). This denotes that having 20 years on the job experience does not mean the professional will utilize digital technologies but digital technologies' adoption and use is determined by

whether the HCPs is a psychiatrist, clinical psychologist or as a psychiatrist nurse.

The SEM analysis further showed HCPs' years of experience (HBM and UTAUT moderators) is not significant with behavioural intention (BI) to use digital technologies ($\beta=0.092$, $p\text{-value}=0.819$; $\beta=-0.111$, $p\text{-value}=0.144$). Additionally, the gender (HBM and UTAUT moderators) of HCPs also has no significant relationship on HCPs' Behavioural intention (HBM and UTAUT constructs) to use digital technologies ($\beta=-0.190$, $p\text{-value}=0.327$; $\beta=-0.020$, $p\text{-value}=0.615$) for mental healthcare service delivery, that is, being male or female does not influence the use of digital technologies. This support Zhu *et al.* (2023: 3139)'s findings that the gender of both patients and physicians has no significant association on behaviour and intention to use m-Health applications. Furthermore, age of HCPs (HBM and UTAUT moderator) has no significant relationship on behavioural intention to use digital technologies ($\beta=0.048$, $p\text{-value}=0.433$; $\beta=-0.008$, $p\text{-value}=0.981$) for service delivery. The implication is that both older and younger HCPs have the same behavioural intention to utilize digital technologies. This supports Zhu *et al.* (2023: 3139)'s findings that the age of HCPs has no relationship to peoples' behavioural intention to use m-Health.

8.3.3 Benefits of digital technologies for mental health service provision

The ease of communication between HCPs and patients with digital technologies is unequal. The Perceived benefit (HBM construct) of the use of digital technologies for mental health service delivery and wellbeing is $R=43.1\%$ in this study. When HCPs perceived the benefit, digital technologies can offer both to them and their patients, then, the utilization will increase. This is supported by the findings of a study conducted by Adepoju (2020: 571) which showed that the utilization of digital technologies in Nigeria's healthcare system reduced HCPs cost of travelling to physical offices to attend to patients. Consequently, more patients can be reached on digital platforms and HCPs

can take on more clients without the stress of moving from one location to the other. Additionally, patients will have easy access to HCPs without the stress of travelling down to healthcare facilities, they can ask pertinent questions anonymously and there will be increased patient privacy in situations when the questions are very sensitive. Digital technologies allow mental health service to be delivered promptly to those in need at diverse locations, thereby augmenting the limited resources in Africa's mental health sector (Adepoju 2020: 571).

This study pointed out that therapeutic alliances are maintained for a considerable period with digital technologies and timely intervention is provided to negate hospitalization and exacerbated symptoms. Rees and Stone (2005: 649) and Mgnolia *et al.* (2022: 241) took issue with the findings of this study noting that the therapeutic alliance is disrupted on digital tools and cannot be maintained virtually. This study however found that digital technologies have an overall positive and pleasant influence on patient wellbeing and mental health. The derived themes are discussed as follows.

8.3.3.1 Accessibility

The availability of digital tools makes digital communication between HCPs and patients easy. This study found that the media played a crucial role in the level of awareness and increased patients' choice to use digital technologies. The study conducted by Olumade *et al.* (2020: 736) confirmed that the media play a crucial role in the dissemination of correct and current information about occurrences where community members' fears were alleviated and dispelling untrue views about any situation among Nigerians. Naik *et al.* (2022) highlighted that media played a crucial role in disseminating information during the pandemic. Social media did however disperse some misinformation about COVID-19, which created a lot of tension and apprehension among the populace leading to psychological disturbance and anxiety. This is also supported by Annan *et al.* (2017: 546)'s findings that HCPs in the Ashanti community in Ghana relied on the radio as the only source of credible

information during the Ebola outbreak. Digital tools such as Telegram chatbox were employed in correcting misleading and distorted information regarding COVID-19 in Ghana (Adepoju 2020: 571). Mental illness and mental health facilities are plagued by so many myths, but the media can assist in demystifying mental illness, and mental health facilities. Likewise, people with mental illness and those in need of mental health services can access services without any restrictions or barriers from any location in the world.

The findings of this study reveal a need to shift from the traditional method of therapy to digitalized intervention in Nigeria. Prior studies such as WISH (2020) and Zhang *et al.* (2021: 2552) also found that in the developed world new applications in mental healthcare are constantly being developed to provide needed, effective, and accessible services to every individual in need. Mobile phones and social media are very popular and readily accessible. There are about 2.4 billion social media (Facebook, WhatsApp, Instagram, Snapchat) users all over the world (Zhang *et al.* 2021: 2552), indicating how robust the platforms are. The level of coverage and reach it can attain when harnessed for treatment is enormous.

8.3.3.2 Continuity of service provision

The shift from in-person consultation during COVID-19 pandemic aided the preparedness of the mental health sector for health emergencies. HCPs are receptive to the continuous use of digital technologies in service delivery. Digital technologies are an essential option during health emergencies or when in-person consultations are impossible. Studies conducted in Zimbabwe and South Africa (Chibanda *et al.* 2015: 830; Sibiya and Ramlucken 2020) showed HCPs' continued utilization of mobile technologies such as SMSes and calls strengthened patient therapy and treatment adherence and reduced missed appointments. Also, HCPs are able to receive assistance and support when tackling difficult situations. HCPs indicated in this study that patients are eager

to use digital technologies for the continuous management of their condition, preclude relapse and to improve their support system.

8.3.3.3 Reduced patient travel cost

Patients need to get to neuropsychiatric facilities to book appointments, review their medications, raise any concerns and for follow-ups as highlighted in this study. These placed financial burdens on the patients because some need to travel a long distance to get to the facilities. Therefore, patients will benefit immensely from the integration of digital technologies into mental healthcare service delivery. This is supported by Adenuga (2020: 1321) who argue that the integration of telemedicine in Nigeria healthcare system reduces clinicians' travel time, eases travel cost, and allows severe cases to be attended to virtually. Similarly, the integration of digital technologies will ease the financial burden on patients by reducing the number of times they need to visit the facilities. Follow-ups, consultation around concerns, change of medications, bookings and enquiries can be done via digital platforms.

8.3.3.4 Eliminate stigmatization

Stigmatization is a huge barrier to continued care in mental health facilities. Perceived severity (HBM construct) was eliminated in this study, which may be due to the high level of stigmatization with mental illness. This connoted that people in need of mental health services may not seek help despite perceiving the severity of their symptoms. In a study conducted by Adepoju (2020: 571), it was shown that stigmatization in mental healthcare extends beyond the patient to mental health care workers, which discourages a physician from specializing in psychiatry. Prior studies such as Aguwa *et al.* (2021: 739) and Sheikh *et al.* (2015: 244) support this study that persons with mental illness, their family members and mental healthcare providers do face stigmatization. The findings of this study are supported by Subu *et al.* (2021: 77) who wrote on different types of stigma among Indonesians. The identified stigma includes 'self-stigma'

(feeling of hopelessness), 'public stigma' (prevents patients with mental illness from working, functioning and interacting freely in the community), 'family attitudes' (rejection and lack of acceptance from family members due to humiliation from the community), and 'professional stigma' (HCPs' negative attitudes due to lack of clear understanding of patient mental illness and cultural perception on the transmissibility of mental illness to mental health providers). All these forms of stigma are prevalent among patients with mental illness, their families and mental health care service providers.

However, this study found that digital technologies allow confidentiality and anonymity for patients. Family members can become part of the patient's therapeutic journey without the fear of labelling. Additionally, the integration of digital technologies minimizes the risk of exposure in case there is any outbreak and information about patients is secured. Social stigma is attached to the mentally ill and mental health facilities; often causing rejection and cruelty towards those in need of mental health services. Digital technologies liberate patients since they allow patients the freedom to attend online sessions at their convenience and maintain their privacy.

8.4 PERCEPTIONS OF HEALTH WORKERS TOWARDS THE UTILIZATION OF DIGITAL TECHNOLOGIES TO IMPROVE MENTAL HEALTHCARE SERVICES

The thematic analysis identified themes such as perception of digital tools and emerging operational issues. Sub-themes such as the attitude towards digital tools, acceptability, patient care, policy and perceived extra burden on HCPs were also deduced from the main themes. The discussion presented below were from the identified themes and sub-themes.

8.4.1 Perception of digital tools

HCPs perceived digital technologies as supporting patient mental health. It was seen to aid in the maintenance and sustenance of therapeutic alliance between

HCPs and their patients. This study also confirmed that therapeutic alliance aids sustainability of treatment, which in turn assists patients to cope with daily challenges. This is evident in Barron *et al.* (2018: 1)'s evaluation of the MomConnect initiative, in South Africa. The MomConnect platform assisted over one million pregnant mothers with appropriate health information that reduced mortality and increased wellbeing. The helpdesk attended to more than 600 queries daily. Feedback was provided at an effective rate and can assist a lot of moms and moms-to-be. In addition, Berry *et al.* (2017) revealed that the #WhyWeTweetMH, an online mental health support group has users from different countries like South Africa, Canada and United States. This twitter group user developed a sense of mutual connection, self-management and support to decrease loneliness and stigmatization. The platform provides opportunities for queries, enhances mental health awareness and provides resources that are beneficial. Also, users can respond to posts or ruminate on tweets to evaluate their feelings.

This study emphasized the need for constant training of HCPs on emerging technologies in order to utilize them effectively in-service delivery. This is in line with the studies conducted by Adenuga (2020: 1321) and Egbewande (2023: 1) which maintain that management needs to constantly train clinicians on technological gadgets to aid their adeptness in telemedicine. Wada *et al.* (2021: 1) and Egenti *et al.* (2022: 1) highlighted the need to constantly educate the populace about mental health. Professional medical bodies also need to engage HCPs in regular training.

8.4.1.1 Attitude towards digital tools

This study found that while some HCPs have a positive attitude towards the use of digital technologies in service delivery, others do not. Quite a number of HCPs are open to the use digital technologies with their patients while some are totally against the use of digital technologies for service delivery. HCPs' quote inability to view bodily cues (leg shaking, palm sweating), and patients'

camouflaging of their emotions, as some of the reasons why the use of digital technologies would be disadvantageous in-service delivery. This is supported by Magnolia *et al.* (2022: 241)'s findings that certain treatment cannot be conducted on digital technologies. Adenuga (2020: 1321) findings suggested that the adoption and use of technologies is influenced by social factors and care is embedded in human touch. Furthermore, some clinician viewed touch as crucial in treatment (Egenti *et al.* 2022: 1), while some think colleagues' perceptions influence a clinician to utilize technologies (Adenuga 2020: 1321).

This study identified factors such as reliance on the manual way of doing things, lack of awareness/education on digital health and lack of incentives as possible reasons for HCPs' resistance. Additionally, this study identified HCPs' concern about the level of protection clinicians have in case of diagnosing slip-up/mistake on digital platform. This corroborates Adenuga's finding that HCPs are concerned about the level of protection available for clinicians in case of misdiagnosing or misinforming patients. Information stored on the technological platforms cannot be erased or altered easily, thereby, influencing HCPs' attitude towards digital technologies (2020:1321).

8.4.1.2 Acceptability

The level of acceptability of digital technologies is high among HCPs in this study. HCPs believe digital technologies are a much needed and timely intervention for patients in diverse locations. HCPs can conduct sessions and consultations at a convenient time for their patients. It reduces HCPs' long tiring working hours, prevents unsafe exposures and affords a reliable way of communicating with healthcare providers while credible information is guaranteed. This is supported by Adepoju *et al.* (2017)'s argument that health workers view m-Health as effective in healthcare service delivery. Furthermore, in Sub-Saharan Africa (SSA), HCPs are receptive towards m-Health (Osei and Mashamba-Thompson 2021; Kenny *et al.* 2017: 809; Eze *et al.* 2018: 1). However, studies conducted by Abolfotouh *et al.* (2019: 45) and Ramos *et al.*

(2015: 186) in Saudi Arabia contrast these findings and found low level of m-Health acceptability among health workers.

8.4.1.3 Patient care

This study revealed that some HCPs are worried about the digital technologies' integration in service delivery, for instance with anxiety disorder. There are certain cues that are extremely important and which should be observed during face-to-face interactions, which assists with the treatment plan. The study conducted by Adepoju (2020: 571) claimed that some Nigerian psychiatrists think therapy sessions on digital technologies are as effective as face-to-face sessions. Similarly, this study found that some HCPs believed the severity of the illness determines if such sessions, consultation or treatment could be conducted via digital platforms.

8.4.2 Emerging operational issues

African countries face some emerging issues that around developing a legislative framework to safeguard mental health in the population and enhancing quality assurance to ensure the effective implementation of policies. Emerging operational issues range from lack of policy to perceived extra burden. The discussion on the identified issues are presented as follows.

8.4.2.1 Policy

The issue of policy is a huge challenge as identified in this study. The policy should guide both HCPs and patients on their limits and expectations on the use of digital technologies. SSA lacks a policy that regulates when and how to use digital technologies with patients (Adenuga 2020: 1321). Likewise, Adebayo and Ofoegbu (2014: 36) highlighted that the healthcare sector is visibly underfunded, lacks appropriate policies and is plagued with non-implementation of policies due to political will/interest. Wada *et al.* (2021: 1) further revealed the lack of policies in the mental health sector which is evident

in the Lunacy Act revisited in 1958 (allows HCPs and magistrates to confine mentally unstable individuals). However, the Act has undergone many amendments between 2003 and 2013 but the government has not signed the Act into law. Wada *et al.* (2021: 1) found that the 2019 Mental and Substance Abuse Bill aimed to strengthen budget allocated to mental healthcare sector and improve services still remained unsigned. Wada *et al.* (2021: 1) also posits that the WHO stipulated that by 2020, most countries would have launched or revised their mental health acts in accordance with the international human rights instrument set by the WHO Mental Health Action Plan 2013-2020. Additionally, obsolete mental health laws should be reformed for effectiveness in service delivery and new policies must be created to protect and support Nigerians who require mental health services.

Unfortunately, due to lack of policies, this study found some professional bodies and organizations do not allow the use of digital technologies in service delivery. This study also found that very few HCPs are currently utilizing digital technologies in service delivery and they are doing so at the risk of their jobs. The non-implementation of these policies impacts negatively on mental health service delivery in Nigeria. The few HCPs in public sectors utilizing digital technologies are overwhelmed with unnecessary access by patients. Patients often misunderstand and violate the therapeutic alliance between HCPs and patients but with the necessary policies in place, such a situation can be averted.

8.4.2.2 Perceived extra burden on health care workers

This study noted varying opinions. Some HCPs perceived the use of digital technologies as an extra burden and some do not. HCPs that perceived the use of digital technologies as being difficult highlighted complicated mobile applications, extra time and effort to use, technological malfunctions, constantly charging of digital equipment, lack of incentives, poor capacity development and lack of technical know-how as some of the reasons for perceiving digital technologies as an extra burden. This is supported by Barron *et al.* (2018: 1)'s

study that notes that helpdesk officers view the MomConnect platform as burdensome. Furthermore, this study also found that not all HCPs viewed the training involved in the use of some digital tools as rigorous. The training is considered as self-development as the world is fast moving towards digitalization.

The advancement in service delivery via telemedicine and information technology can be possible when all knowledgeable experts appropriately utilize e-Health but, sadly, healthcare providers lack sufficient knowledge in the utilization of e-Health which precipitates aversion to the integration of digital technologies (Egenti *et al.* 2022: 1).

8.5 BARRIERS AND CHALLENGES IMPEDING THE PROVISION OF MENTAL HEALTHCARE SERVICES AND WELLBEING THROUGH DIGITAL TECHNOLOGIES

SSA is yet to fully adopt tele-Health despite its robust benefit to healthcare service delivery. The adoption is hindered due to the high cost of implementation, network challenges, poor/lack of policies and political will, and lack of amenities and infrastructures (Babalola *et al.* 2021: 46). This study identified several factors that may likely hinder digital technology utilization in the provision of services in mental health. The themes and sub-themes were identified from the research objectives and are discussed below.

8.5.1 Financial challenges

Patient out-of-pocket expenses is one of the themes that stood out in this study when utilizing digital technologies for service delivery. HCPs revealed that in public healthcare facilities, the deployment cost of digital technologies is expensive which hampers the integration. The identified sub-themes are further discussed.

8.5.1.1 High cost of setting up

This study revealed that the budget allocated to neuropsychiatric hospitals is inadequate. This implies that purchasing the needed equipment for service delivery is impossible. Unfortunately, the option of generating funds within the healthcare system is unachievable. This finding is supported by Babalola *et al.* (2021: 46) and Ewebande *et al.* (2023:1) that SSA's healthcare sector grapples with insufficient funding. Its total dependency on the government for funding creates drawbacks in service delivery. Additionally, Olumade *et al.* (2020: 736)'s findings also showed that the Nigerian healthcare system receives a budgetary allocation that is less than 6% of the total budget. This study also confirmed that the government placed the deployment of digital tools in the hands of underfunded facilities, which created a barrier to the adoption and utilization of digital technologies in mental health service delivery. HCPs lack the basic digital tools such as laptops, internet, and tablets needed, making services delivery very unrealistic. These barriers make HCPs reluctant to integrate digital technologies until the appropriate infrastructure is in place.

8.5.1.2 Extra cost to patients

This study highlighted that patients need to have adequate data when using digital technologies with their service providers. This increases their financial burden. Although the use of digital technologies reduces transportation costs, data bundle subscriptions are an added cost and a barrier to patients' utilization of digital technologies. The unaffordability of data is corroborated by Goldschmidt *et al.* (2012: 314)'s finding which showed a high cost of data in South Africa compounded with the high rate of unemployment due to COVID-19 lockdown. Nigeria is a country battling with a high level of poverty and her citizens live on less than \$2 per day (Abdulmalik *et al.* 2019:38). According to World Bank human capital ranking index, Nigeria ranked 150 out of 157 countries, denoting human and infrastructural development challenges (World Bank 2022). In Nigeria, between 2020 and 2022, the economy has been

affected by inflation, which further increased household poverty levels (Abdulmalik *et al.* 2019:38; World Bank 2022).

Patients that visited public mental health facilities do so because they could not afford private healthcare providers, consequently, added extra cost could impede their access to essential healthcare services. Access to care is not readily available and if available, the out-of-pocket expenses discouraged the interest in these services. Egenti *et al.* (2022:1) posit that the overall cost of telemedicine remains prohibitively expensive for many Nigerians, particularly those in rural and remote communities. Furthermore, the high unemployment rate continues to burden the already fragile mental healthcare sector and increases anxiety and suicide rates in the populace.

8.5.2 Technological concerns

There are also technological concerns as identified in the themes derived from the fourth objective. The identified sub-themes concern issues of network inconsistencies, unreliable power supply and likely exposure to internet hackers and intruders, which are a serious threat to the existence of digital technologies. The identified sub-themes are discussed below.

8.5.2.1 Poor network connectivity

The findings of this study revealed that the issue of incessant power failure disrupts network connections and most times truncates online therapy sessions. Previous studies by Egenti *et al.* (2022: 1) and Magnolia *et al.* (2022: 241) also alluded to the fact that countries like Nigeria and South Africa battle with network connectivity issues. The performance of digital tools is determined by the level of network connectivity. Benson (2011:1)'s findings further strengthen the theory that network challenges hinders the integration of hospital information system (HIS) in Nigeria's healthcare system. Adenuga (2020: 1321) also found unreliable network connectivity and data charges as hindrance to

the adoption and utilization of technologies. This study agreed that network problems can prolong therapy sessions unnecessarily, increase data usage, extend time spent on digital tools and interfere with both HCPs' and patients' schedules. Most importantly due to fluctuations in network connectivity information can get lost and conversations become unproductive.

8.5.2.2 Inconsistent power supply

The constant power supply is fundamental to the integration of digital technologies into mental health service delivery. This study revealed that healthcare facilities struggle to sustain daily services due to power failure. HCPs and patients are plunged into darkness due to power cuts and patients cannot access services, which renders digital technologies ineffective. More so, gadgets and equipment such as computers, internet Wi-Fi, radio, and television need stable power supply to work effectively. This is corroborated by Egenti *et al.* (2022: 1)'s and Ewebande *et al.* (2023: 1)'s studies that power generation and distribution is a challenge and a hindrance to industrial and technological development in Nigeria. The study conducted by Benson (2011: 1) also found that that constant power cuts damage digital equipment and makes tools ineffectual. The erratic supply of electricity and poor internet connection negatively influences the use of digital technologies in Nigeria's mental health system (Pantuvo *et al.* 2011: 39; Ross *et al.* 2016:146).

The erratic power supply in both rural and urban settlement impedes the successful integration of e-Health in Nigeria and cripples the smooth running and operation of technological gadgets and equipment (Egenti *et al.* 2022: 1). This is also highlighted in a study by Innocent *et al.* (2014) that basic infrastructure is lacking in rural area such as unstable power supply, therefore, such facilities will underperform. Adebayo and Ofoegbu (2014: 36)'s findings also highlighted the need for improved electricity supply and infrastructure to aid the adoption of e-health. The issue of consistent power supply is a key determinant of the integration of digital technologies into mental healthcare

service delivery. More so, the provision of cheaper, fast internet service, and stable electricity influences HCPs' intentions to use digital technologies, therefore, the government and management of mental health facilities in South-west Nigeria need to make this a priority.

8.5.2.3 Possibility of being hacked

Nigeria ranked high on cybercrime watch (Frank and Odunayo 2013:100), therefore, the issue of security and internet intruders/hackers is important in the management of patient information (Adenuga 2020: 1321). This study identified hackers as a threat to the integration of digital technologies in mental healthcare. A patient's information is stored on an online database system and will be accessed by HCPs when necessary, but the availability of data on online/offline platforms is prone to unauthorised access. The transitioning from conventional methods to an online base system of service delivery may increase the vulnerability of patient information to hackers. Hackers can access patient information on digital platforms and use it as a weapon of blackmail to extort money or valuables.

A report from Deloitte (2022) states that Nigeria lost billions of naira to compromised cybersecurity due to data theft between 2013 and 2014. Likewise, in 2022 Nigeria experienced a high level of cybersecurity attacks on most organisational databases such as phishing and ransomware. Deloitte (2022) also highlights that Nigerian parastatals need to ensure robust cybersecurity protection to safeguard patient identification and crucial mental health information. This corroborates the view of some HCPs that if appropriate safeguards are in place and access to patient information is restricted, patient mental health information will be secured.

8.6 SUMMARY OF THE CHAPTER

This chapter presented the discussion from the findings of qualitative and quantitative analysis. The qualitative analysis led to the development of themes and sub-themes and the quantitative data was analysed using descriptive statistics and SEM. The findings from qualitative and quantitative analysis were integrated to gain a better understanding of the study. The integrated findings were compared with literature to gain an overall perspective on the study.

CHAPTER 9: A CONTEMPORARY MODEL FOR INTEGRATING DIGITAL TECHNOLOGIES TO IMPROVE MENTAL HEALTH SERVICES AND WELLBEING IN PUBLIC HEALTHCARE

9.1 INTRODUCTION

This chapter presents the proposed model that could be used in the public healthcare system in Nigeria to integrate digital technologies to improve mental health service delivery and wellbeing. This addresses the fifth objective of the study which is the development of a contemporary model, which was guided by the modified UTAUT and the modified HBM Models. The study found factors that could enhance the integration of digital technologies for mental healthcare service delivery and wellbeing in Nigeria.

9.2 INTEGRATION OF UTAUT AND HBM MODEL

UTAUT Model focuses on technology acceptance issues and the HBM model focuses on the association that exists between health behaviours, practices and utilization of health care services. These modified UTAUT constructs (Effort Expectancy, Performance Expectancy, Social Influence, Facilitating Condition, and Therapeutic Approach) and modified HBM construct (Perceived Barriers, Perceived Benefit, Therapeutic Approach, Cues of Action and Digital Technologies tools) were significant in influencing the utilization of digital technologies. This study further focused on understanding the factors that explain HCPs' behavioural intentions and user behaviour on the use of digital technologies for mental healthcare service delivery and wellbeing. The UTAUT and the HBM model are integrated for a robust output.

9.3 RESULTS OF THE INTEGRATED UTAUT AND HBM MODEL (UTAUT-HBM)

The result from the findings and the analysis of the reflective measurement of the UTAUT-HBM model are presented in Figure 9.1. The analysis is computed based on the findings from the modified UTAUT and modified HBM in Chapter 6. Furthermore, an evaluation of the structural model is also presented in Table 9.1.

9.3.1 Reflective Measurement Model

The outcome of the analysis of the items with the indicator reliability exceeding 0.7 were retained and the variable range is presented in Figure 9.1.

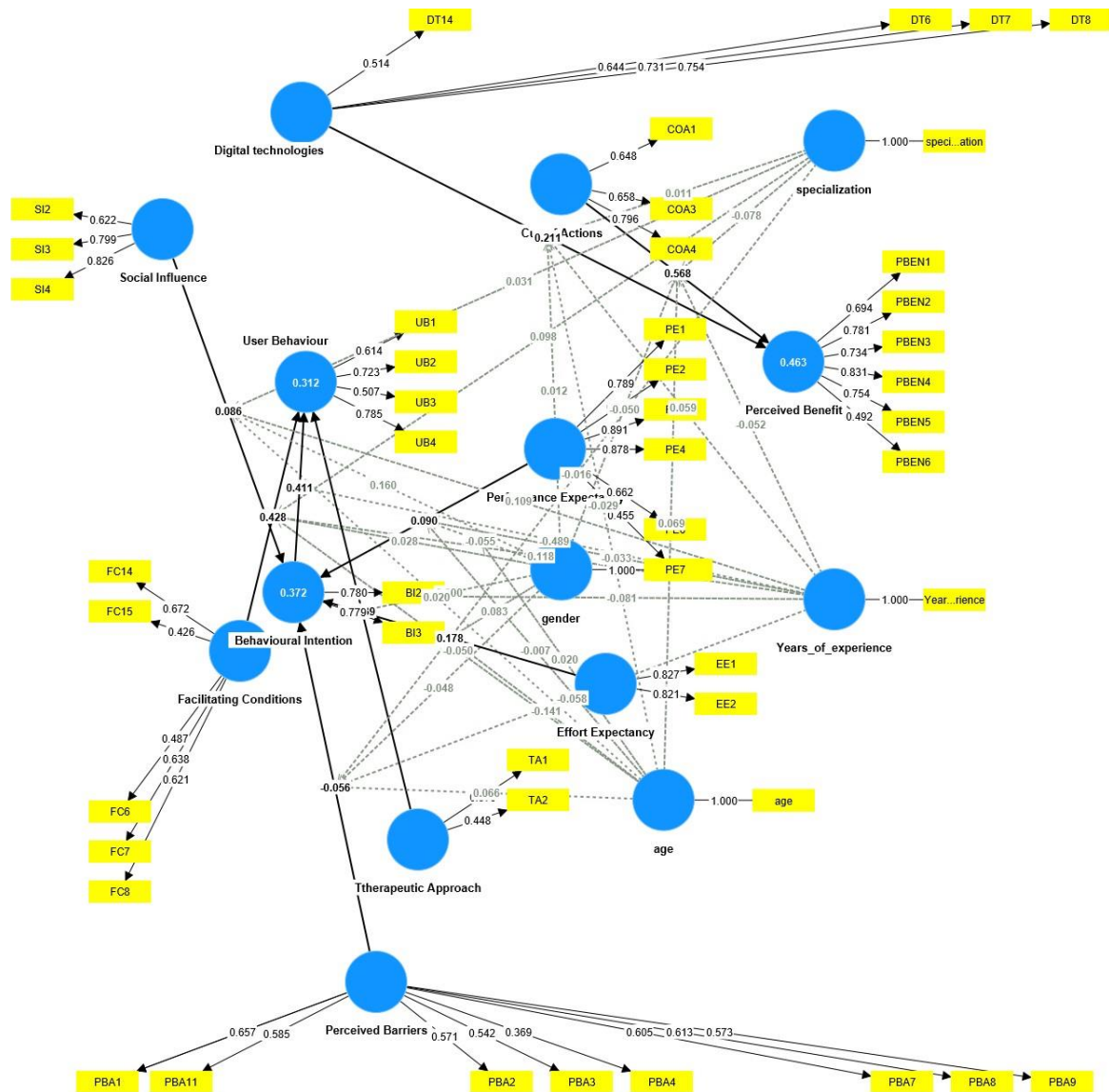


Figure 9.1: UTAUT-HBM Model using factor analysis

The construct reliability and validity presented in Table 9.1 below is generated based on Figure 9.1.

Table 9.1: construct reliability and validity for all UTAUT-HBM variables (n=317)

Construct	Cronbach's alpha	Composite Reliability (rho_a)	Composite Reliability(rho_c)	AVE
BI	0.355	0.424	0.756	0.608
COA	0.488	0.486	0.745	0.495
DT	0.0577	0.554	0.759	0.446
EE	0.527	0.601	0.809	0.679
FC	0.545	0.527	0.708	0.333
PBA	0.724	0.730	0.803	0.315
PBEN	0.808	0.812	0.865	0.522
PE	0.854	0.906	0.885	0.571
SI	0.622	0.741	0.796	0.569
TA	0.408	0.940	0.708	0.580
UB	0.573	0.603	0.756	0.443

Table 9.1 and Figure 9.1 showed that all the constructs used in the integrated model (UTAUT-HBM) had composite reliability (rho_c) greater than 0.7 which shows good internal consistency and outperforms the results from the modified UTAUT and modified HBM in Chapter 6. It is only two constructs (BI and COA) that do not have values greater than 0.5 under the composite reliability (rho_a). Furthermore, the AVE for BI, EE, PBEN, PE, SI, and TA construct had values greater than 0.5 in the UTAUT-HBM model which was an improvement over the modified UTAUT and modified HBM model in Chapter 6. The Variation Inflation Factor (VIF) measured is presented in Table 9.2 below.

9.3.2 Variation inflation factor for collinearity statistics

The Variation Inflation Factor (VIF) measured the strength of the relationship among items under each construct in the integrated model. The value of each indicator's Variation Inflation Factor (VIF) is shown in Table 9.2.

Table 9.2: Result of UTAUT-HBM model from Variation Inflation Factor

	VIF
BI2	1.049
BI3	1.049
COA1	1.052
COA3	1.270
COA4	1.329
DT14	1.006
DT6	1.279
DT7	1.466
DT8	1.651
EE1	1.147
EE2	1.147
FC14	1.016
FC15	1.042
FC6	1.279
FC7	1.501
FC8	1.651
PBA1	1.798
PBA10	2.724
PBA11	1.949
PBA2	1.854
PBA3	2.070
PBA4	1.797
PBA7	1.903
PBA8	2.496
PBA9	1.600
PBEN1	1.482
PBEN2	2.177
PBEN3	1.615
PBEN4	2.257
PBEN5	1.771
PBEN6	1.159
PE1	1.948
PE2	1.844
PE3	3.198
PE4	2.940
PE6	1.902
PE7	1.423
SI2	1.179
SI3	1.265
SI4	1.414

TA1	1.070
TA2	1.070
UB1	1.123
UB2	1.311
UB3	1.100
UB4	1.356
Years_of_experience	1.000
Age	1.000
gender	1.000
specialization	1.000
age x Digital technologies	1.000
age x Facilitating Conditions	1.000
gender x Effort Expectancy	1.000
age x gender	1.000
Years_of_experience x Cue of Actions	1.000
Years_of_experience x Performance Expectancy	1.000
Years_of_experience x Social Influence	1.000
Years_of_experience x age x Social Influence	1.000
specialization x Social Influence	1.000
specialization x Cue of Actions	1.000
gender x Social Influence	1.000
gender x Digital technologies	1.000
gender x Perceived Barriers	1.000
age x gender x Performance Expectancy	1.000
gender x Therapeutic Approach	1.000
specialization x Perceived Barriers	1.000
gender x Performance Expectancy	1.000
age x Cue of Actions	1.000
gender x Facilitating Conditions	1.000
Years_of_experience x Behavioural Intention	1.000
Years_of_experience x Perceived Barriers	1.000
age x Performance Expectancy	1.000
specialization x Digital technologies	1.000
Years_of_experience x Digital technologies	1.000
Years_of_experience x age	1.000
gender x Cue of Actions	1.000
Years_of_experience x Facilitating Conditions	1.000
age x Perceived Barriers	1.000
age x Effort Expectancy	1.000
age x Social Influence	1.000

The VIF value of each construct presented in Table 9.2 ranged from 1.000 to 3.198, which was within the acceptable range of less than five. The results show that the strength of the linear relationships between the items and constructs are not false positive. Table 9.3 below presents the discriminant validity.

9.3.3 Discriminant validity

The constructs on the UTAUT-HBM Model are measured and the result is presented in Table 9.3 below.

Table 9.3: Heterotrait-Monotrait ratio (HTMT) – Matrix

	BI	COA	DT	EE	FC	PBA	PBEN	PE	SI	TA	UB	EXP.	AGE	GENDER	SPEC.
BI															
COA	0.561														
DT	0.688	0.617													
EE	0.570	1.103	0.624												
FC	0.697	0.627	1.682	0.667											
PBA	0.498	0.649	0.331	0.409	0.477										
PBEN	0.414	1.008	0.573	0.623	0.561	0.241									
PE	0.575	0.941	0.349	0.804	0.357	0.267	0.655								

SI	0.615	0.851	0.465	0.787	0.450	0.294	0.564	0.796							
TA	0.514	0.681	0.494	0.263	0.456	0.327	0.489	0.190	0.273						
UB	0.393	1.268	0.603	1.177	0.652	0.502	0.863	0.913	0.828	0.413					
EXP	0.120	0.308	0.201	0.187	0.207	0.133	0.202	0.123	0.091	0.189	0.250				
AGE	0.256	0.212	0.156	0.133	0.144	0.119	0.161	0.101	0.088	0.154	0.167	0.817			
GEN DER	0.170	0.092	0.127	0.070	0.166	0.102	0.071	0.113	0.178	0.239	0.117	0.078	0.103		
SPE C	0.529	0.274	0.366	0.090	0.377	0.176	0.242	0.090	0.148	0.834	0.163	0.294	0.309	0.159	

Table 9.3 highlighted value less than 0.9, which indicate that the constructs should not be theoretically related while the construct not highlighted should be theoretically related according to the UTAUT-HBM model. The HTMT matrix found discriminant validity challenges with seven inter-construct correlations. EE and COA, FC and DT, PBEN and COA, PE and COA, UB and COA, UB and EE likewise, UB and PE should correlate theoretically but they did not.

9.3.4 UTAUT-HBM Model Fit

Standardized Root Means Square Residual (SRMR) was used to assess the fit in the Partial least square (PLS) model. SRMR value in this study was 0.128.

9.3.5 Path Analysis

To check the statistical significance of path coefficient relationships in Figure 9.2, the p-value was used in Table 9.4 to deduce the decision. The adjusted R-

squared (R^2) is indicated inside the circles, path coefficients are indicated on the arrows and t-statistics are shown in the brackets in Figure 9.2 below. The UTAUT-HBM model found 37.2% of variance (adjusted R^2) in the intention to use digital technologies and 31.2% of variance in digital technologies usage for mental health service delivery and wellbeing.

Overall, the integrated UTAUT-HBM Model R-square values show that HCPs' behavioural intention to use digital technologies for mental healthcare delivery and wellbeing is 37.2%, perceived benefit of digital technologies is 46.3% and HCPs' user behaviour towards the use of digital technologies is 31.2%.

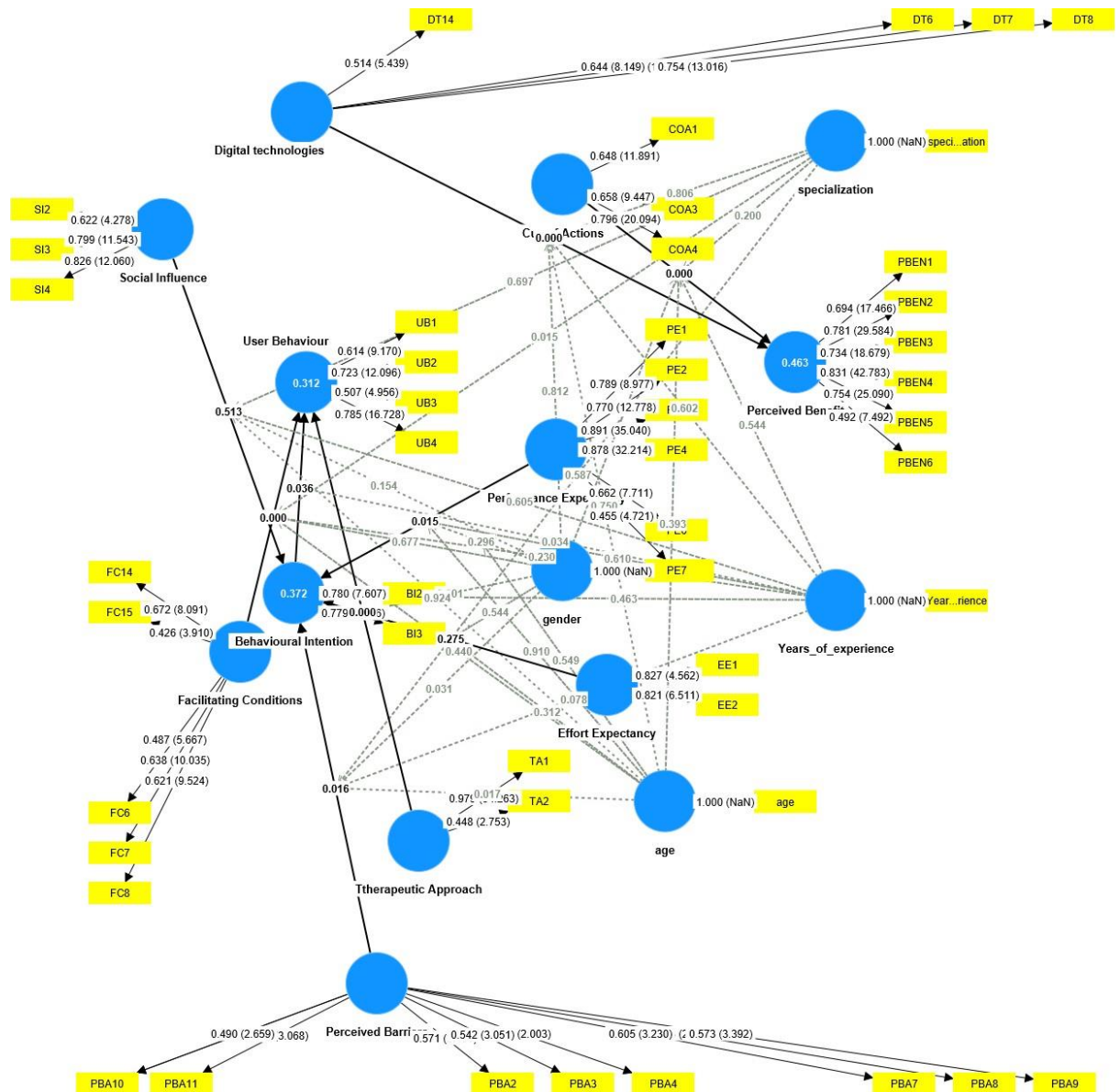


Figure 9.2: UTAUT-HBM Model path analysis

The path coefficient values in Table 9.4 below is derived from Figure 9.2.

Table 9.4: UTAUT-HBM model hypothesis testing

Hypothesis	Relationship	Path coefficient (β)	p-value	Decision
UH1	BI→UB	0.411	0.036	Significant (Supported)
UH2	COA→PBEN	0.568	0.000	Significant (Supported)
UH3	DT→PBEN	0.211	0.000	Significant (Supported)
UH4	FC→UB	0.428	0.000	Significant (Supported)
UH5	PBA→BI	-0.056	0.016	Significant (Supported)
UH6	PE→BI	0.090	0.0015	Significant (Supported)
UH7	TA→UB	0.439	0.000	Significant (Supported)
UH8	Gender→UB	-0.170	0.023	Significant (Supported)
UH9	AgexPBA→BI	0.066	0.017	Significant (Supported)
UH10	genderxPBA→BI	-0.048	0.031	Significant (Supported)
UH11	specializationxFC→UB	0.098	0.015	Significant (Supported)
UH12	genderxTA→UB	0.300	0.001	Significant - (Supported)
UH13	Years of experiencexBI→UB	-0.489	0.034	Significant (Supported)
UH14	EE→BI	0.178	0.275	Insignificant (Not Supported)
UH15	SI→BI	0.086	0.513	Insignificant (Not Supported)

Table 9.2 shows the values of the path coefficient, p-value and relationship. Since some p-value is less than 0.05 then only thirteen pathways exhibit significant results (supported).

9.4 OPERATIONAL MODEL IN PUBLIC MENTAL HEALTHCARE IN NIGERIA

The public neuropsychiatric hospital in Nigeria has a basic operational framework in the delivery of mental health services as shown in Figure 9.3. The units in these facilities are interdependent and perform collective activities in their service delivery. Psychiatric nurses are attached to different units in the facility, such as, the wards (male and female), outpatients, emergency, Clinical Psychology unit and Occupational therapist unit. Psychiatric nurses screen patients, work closely with other HCPs, assist patients in adhering to their medications and treatment plans, educate patients and family members on coping strategies. They also form therapeutic alliance with their patients to help facilitate their wellbeing.

Psychiatrist, like Psychiatrist nurses are found in the inpatients, emergency and outpatients units. They provide immediate medical assistance to mentally ill patients brought to the emergency unit, provide consultation at the outpatients unit and conduct ward rounds. Psychiatrists conduct medical screening to assess, evaluate and formulate treatment plans. Psychiatrist are trained medical doctors with specialization in psychiatry, so they prescribe medications and if there is need for psychological therapy, they refer such patients to the psychologist. Psychiatrists do prescribe and adjust medications to suit the need of the patient.

The Hospital Information Management/ Health Record Unit is the first point of contact for patients coming into the facility. Patients seeking mental health services get information at the Hospital Information and Management unit and details of such patient is registered in the Health Record Unit before the patient is referred to the appropriate unit for further services. Patients are either referred to Emergency unit or Outpatient unit. Basic information is provided at this unit. However, concise, critical and crucial information can only be obtained from HCPs in other units. Health Record Unit keeps records of all patients

attended to at the emergency unit, inpatient wards, and outpatient clinic. These records are kept in shelves in numerical and alphabetical order and the master index-cards are kept in metal cabinets. Inpatients, drug abusers, child and adolescents' records have a separate register for their record keeping. Statistics are computed for all clinical activities daily, monthly, quarterly and on a yearly basis. The unit is responsible for the recording of appointment dates and clearance or discharged patients.

Patients with serious mental health problems are referred to the Emergency Care Unit. Patients with critical mental illness are swiftly assessed and enrolled within a period of 30 minutes after arrival. Emergency Medical Officers are obligated to be on 24-hour availability and must document in a register patient history, mental condition, vital signs, weight and also provide tentative diagnosis. Patients' information is taken through to a Health Record Unit to properly document each patient. HCPs would take a prompt decision after assessment and evaluation of such patient. Decision from the assessment could be referral to the wards (male or female) for admission, out-patient unit (If patient has been attended to), to the laboratory for further investigation or to another facility (no available bed for admission). Patient-doctor interaction should be thoroughly recorded and signed. Patients referred to the inpatient unit will also be sent to the Laboratory unit for further tests and investigations.

The outpatient unit conducts a follow-up on discharged patient and also attends to new patients seeking mental health intervention. Health education programmes are conducted at the unit. As with the Emergency unit, patients' vital signs are measured for proper documentation in a register. A round of assessment is routinely conducted on patients coming to the outpatient's unit and patients are sometimes sent for laboratory evaluation. Patients can be referred for psychological evaluation, to occupational therapy, to the laboratory for tests or to a social welfare unit depending on the needs of the patient. In some situations, patients could be sent back, if HCPs' view the situation as patient seeking unnecessary attention. Consultation fee must be paid before a

patient case file is retrieved and appointment days must be strictly adhered to. To ease the long queues and delays at this unit, patient files are pulled out 48-hours prior to their appointment. Statistics of daily visit are computed at the end of each day.

The Laboratory is the unit which deals with all medical tests and service most unit in the facility. All specimens and completed tests are manually recorded in a register. A chart of all received specimens is displayed weekly and updated daily with new specimens. Result from conducted tests are sent to doctors manually within seven days but in case of emergency, results will be made available within 24 hours. From the outpatient unit, patients are referred to a psychologist, a psychiatrist, a social worker or an occupational therapist when the need arises.

Patients from the Emergency Unit are transferred to the Wards (male or female). Those admitted in the wards must meet admission conditions (signed the consent form and paid all indicated fees) and are given a care plan. Those that are admitted must be registered at the Health Record Unit after the payment of the specified fee. Patients and their relatives are taken through orientation of the ward, its staff, other patients and the environment. Patients' history, mental status, neurological examinations and required laboratory tests are rechecked 24-hours after admission. A treatment plan is formulated within 48-hours of admission. Diagnosis must be thoroughly based on DSM-V and ICD classifications and would be recorded in the register. The resident doctor does review patient medication and patient are allowed weekend leave or parole with the consent of consultant in charge. Newly admitted patients are to be submitted to the consultant in-charge. The psychiatric nurse is required to fill a ward statement in before 12am every day. The statement must include statistics of death, discharge, gender, age, weekend parole and transfers. Record must be kept of each patient's weight every fortnight until discharged. Clinical psychologist, Psychiatrist and Occupational therapist conduct ward rounds to assess and evaluate the patients. Social welfare unit are also present

during ward round in evaluating the patients. Pharmacy unit do dispense needed medications to the wards.

The Pharmacy Unit dispenses medications on the basis of doctors' prescriptions to in-patients and outpatients. Prescriptions are duly recorded in the register and a copy kept in the unit. The pharmacist must refer patients to an appropriate pharmacy to purchase their medication in case it is out of stock in the mental health facility. Doctors must be contacted in any case a particular drug needs to be substituted for outpatients. Patients in the wards report to the nurse or directly to the Doctors in case they have challenges with their medications. All medications must be duly signed and stamped by the doctor prescribing the medications. Prescriptions for medications needed in the wards should be brought to the pharmacy between 7am and 10 am and pick up should be before 3pm daily. Patients are advised on dosage and duration of drug use before leaving the unit. The staffs in this unit also try as much as possible to reduce waiting time in term of drug administrations to outpatients' prescriptions.

Clinical Psychology unit is responsible for inpatient and outpatient psychological assessment which is manually recorded for all cases. The unit keeps records and reports of all cases. The unit is appointment based but emergency cases are made for exceptions. Patients from outpatients units are also referred for psychological assessment. Referred patients must be attended to within three days of referral. The psychologists are also responsible for ward rounds for inpatients, outpatient continuous intervention and group therapy when required. The Clinical psychologist conduct evaluation and assessment, that is, they make diagnosis through interview, psychological tests, and observation on their patients. Treatment plan is formulated and therapy sessions are scheduled. Weekly meetings are held by the psychologist to discuss cases for professional opinion and advice. The Clinical psychologists conduct research to ensure up-to-date information on evolving psychological techniques and also collaborate with HCPs in other facilities.

An occupational therapy unit is also available to all patients admitted to the facility or those from outpatient unit. Occupational therapist use evidence-based techniques in supporting their patients. They identify confounding issues and provide ways to support strengthen and manage the patient. Patients are engaged in several therapeutic activities to enhance their treatment. Any patients going for occupational therapy must do so in the company of a psychiatric nurse. Referred patients either from the wards or the Clinical Psychology unit must be interviewed by the occupational therapist. An interview should be conducted within two days after referral, while outpatients should have theirs done within three days. An assessment and progress report should be documented manually. Occupational therapists meet weekly to discuss cases, treatments and improvements. The therapist is responsible for weekly safety checks and servicing of equipment used in the unit (for instance, oiling). The unit is in charge of monitoring and supervising services rendered at the annex of the facility. Furthermore, the unit is responsible for planning outings, socialisation and leisure activities. The therapist in this unit is also responsible for providing training for non-professionals in the unit on patients' handling and management.

The Social Welfare Unit keep records of all referred patients in a register and conducts interview to determine the types of disorder. Referral is made from the wards, or the occupational therapy unit to the social welfare unit. Social workers are expected to work with clinicians in conducting wards rounds, becoming involved in group therapy sessions, and giving advice on rehabilitation. Ward reviews and follow-ups are conducted based on individual needs. Home visitations are also undertaken by the social welfare unit. Patients are pre-informed and an appropriate time and day is agreed upon before such visits. Social workers are encouraged to collaborate with social workers outside their current place of employment to forge a way forward for their patients.

The Discharge Unit is the exit point which verifies that discharged patients leaving the facility premises have been properly certified and have complied

with all payments and conditions. Such patients would have been declared fit for discharge and reintegration into the community. Figure 9.3 below shows the Operating Procedure adapted from two Neuropsychiatric hospitals which were part of the four facilities utilized for the study. The arrows shown indicate the pathway of interconnectedness of one unit to the other.

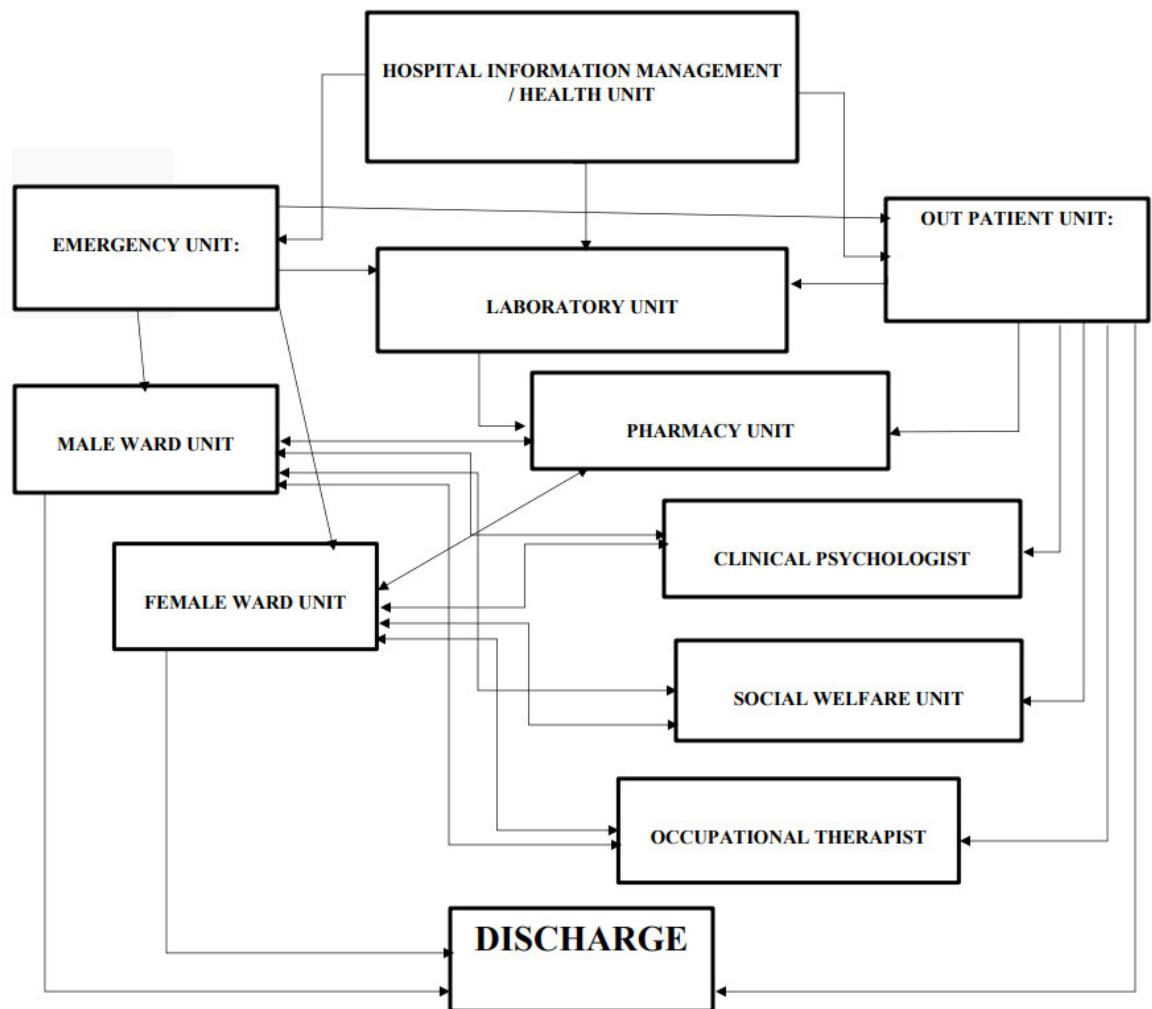


Figure 9.3: Operating Procedure (Adapted from Yaba and Akure Neuropsychiatric hospitals)

9.5 PROPOSED MODEL INTEGRATING DIGITAL TECHNOLOGIES INTO PUBLIC MENTAL HEALTHCARE IN NIGERIA

One of the objectives of this study is to develop a contemporary model for integrating digital mental healthcare interventions to improve service delivery in public mental healthcare facilities in Nigeria. The integrated UTAUT-HBM Model guided the development of the model.

9.5.1 Purpose of the Model

Research has shown that digital technologies provided timely and effective mental healthcare solutions across a wide range of platforms using mobile applications for e-therapy, m-Health, and other web-based applications. The COVID-19 pandemic provided a leverage that scaled-up these technologies (Li 2023: 1). However, research findings also suggested that these technologies were not adequately utilized in many sub-Saharan Africa countries, and their importance has not been well appreciated (Kipruto *et al.* 2022). The purpose of this model is to improve the use of digital technologies for mental health service delivery among public healthcare systems in developing countries.

9.5.2 Development of the Proposed Model

The qualitative and quantitative findings were merged to develop a model that integrate digital technologies into mental health services in public healthcare facilities in Nigeria. Dickoff, James and Weidenbach (1968: 545) practice oriented theory, guided the development of the model. The six (6) item survey list according to Dickoff *et al.* (1968: 545) explain ways of integrating digital technologies into mental health service delivery in public healthcare in Nigeria. The items are agent, recipient, context, dynamics, procedure and terminus. These items focus on:

- Who is responsible for the certain activities?
- Who are the beneficiaries of these activities?
- Within which settings would these activities be performed?
- What are the procedures that guide these activities?
- What are the dynamics of the activities?
- What are the expectations from these activities?

In this study, the Government, Hospital Management, HCPs and patients represent the agent, HCPs and patients are the recipient, mental health facilities is the context. Infrastructure and training entail the procedures, dynamics is represented by the challenges and barriers in the utilization of digital technologies for service delivery while the terminus is improved services at public mental health facilities in Nigeria.

9.5.2.1 Agent

The agent is responsible for the facilitation, coordination, planning, development of strategies and pushes for the achievement of the goal (Dickoff *et al.* 1968: 545; Dikobe *et al.* 2023: 5078; Nangombe *et al.* 2016: 46). The agent design policies that guide how digital technologies should be use, level of use, control accessibility, evaluate and address challenges and barriers in the utilization of digital technologies in mental health service delivery. In this model, those categorized as agent includes government, hospital management, HCPs and patients.

The government as an agent should put policies in place that guide the use of digital technologies in public mental healthcare. These policies protect both HCPs and patient and also provide ethics of use. There is need for the Government to provide infrastructures such as stable internet, laptops, phones, desktop, applications that will aid the easy deployment of digital technologies into public mental healthcare. The provision of these tools will improve mental

health services and wellbeing and enhance preparedness for any health emergencies.

Hospital Management should provide regular training for HCPs on the use of digital technologies and also, when new innovation in mental health evolves. This will mitigate challenges of unskilled HCPs and, importantly, enhanced preparedness in case there is any health emergencies or outbreak. HCPs will have positive attitude towards the use of digital technologies for service delivery when there is adequate training. A conducive working environment need to be in place such as a well ventilated and equipped office space, remove overgrown bushes around offices and wards to create good ambience.

HCPs and patients are also categorized as agent in this model. The HCP and patient are responsible for the acceptability and utilization of digital tools for mental health services delivery and wellbeing. HCPs can influence their patients to use digital technologies for their therapy sessions and for follow-ups. Group therapy sessions, individual sessions, psychotherapy etc can be conducted with ease on digital platforms without the need for patients and family members to travel to the facility.

9.5.2.2 Recipient

Recipients are the beneficiary of the activities (Dickoff *et al.* 1968: 545; Dikobe *et al.* 2023: 5078; Nangombe *et al.* 2016: 46). HCPs and patients are the beneficiary of the integration of digital technologies into mental health service delivery. The integration of digital technologies will enable HCPs provide effective and efficient services, reach as many clients/patients as possible, does not need to get to the facility to attend or conduct their therapy sessions with their patients. Distance will not be a barrier to the therapeutic alliance between patients and HCPs. Additionally, patients have easy access to HCPs, stigmatization associated with mental health facilities are eliminated, cost of

transportation and long queue is reduced, and therapy sessions are not terminated abruptly if there is another health emergencies or outbreak.

9.5.2.3 Context

Context is the setting in which the activities would be performed (Dickoff *et al.* 1968: 545; Dikobe *et al.* 2023: 5078; Nangombe *et al.* 2016: 46). The context in this model referred to all government owned mental health facilities at the tertiary, secondary or primary level in Nigeria.

9.5.2.4 Procedure

Procedure according to Dickoff *et al.* (1968: 545) are the steps to achieve successful, effective and efficient activities. The procedure for the integration of digital technologies into mental health service delivery and wellbeing is guided by both qualitative and quantitative findings.

Assessment and need analysis must be conducted at all mental health facilities to access the level of need. This will enable the Government to identify gaps in service delivery and infrastructural need peculiar to each facility. The infrastructure will entail robust internet connection; reliable power generators; digital tools and necessary hardware's. Government should have a collaborative consultation with stakeholders, network providers, Hospital management and HCPs to have a holistic approach, generate funding for sustainability and provide context-specific solutions. Government facilitate the development of policy and framework to support the use of digital technologies for mental service delivery that critically address data security, privacy and ethics. Evidence-based digital technologies appropriate for each mental health facility are selected and customised to align with cultural norm, languages and user preferences. Awareness and education are conducted to educate patients and the general public on the available digital tools for mental health services and the benefits (access to correct and up-to-date information, reduce

stigmatization, easy access to HCPs) of utilizing these digital platforms. Hospital Management need to regularly evaluate and collate feedback from HCPs and patients on the effectiveness of the integrated digital technologies in mental health intervention. The feedback is utilized in refining productivity and improve service delivery.

9.5.2.5 Dynamics

The dynamics are the barriers and challenges that hinders the integration of digital technologies into mental health service delivery and wellbeing. The dynamics identified from qualitative and quantitative findings were network issue, inconsistent power supply, poor infrastructure, lack of policy and framework, high cost of setting up, network issues and problem of hackers. Currently, there is no policy that regulate how HCPs use digital technologies in providing services to their patients. More so, the deplorable state of infrastructure at public health threatens the successful integration of digital technologies into public healthcare system in Nigeria, which is further hampered by the low budget allocation. There is need for a collaborative effort between the Government, Hospital management and network providers.

9.5.2.6 Terminus

This is the last of Dickoff et al. (1968:575) survey list. This denotes the endpoint of the model, that is, it is the outcome of the integration of digital technologies in providing mental health services in public healthcare in Nigeria. HCPs are able to effectively carry out therapy sessions, demonstrate the competencies in digital skills, problem of distance is conquered, and they are able to reach more patients. Patients no longer face stigmatization, financial challenges, long queue at the facility is eliminated and mental health services is easily accessible. The agents are key in the success of the model.

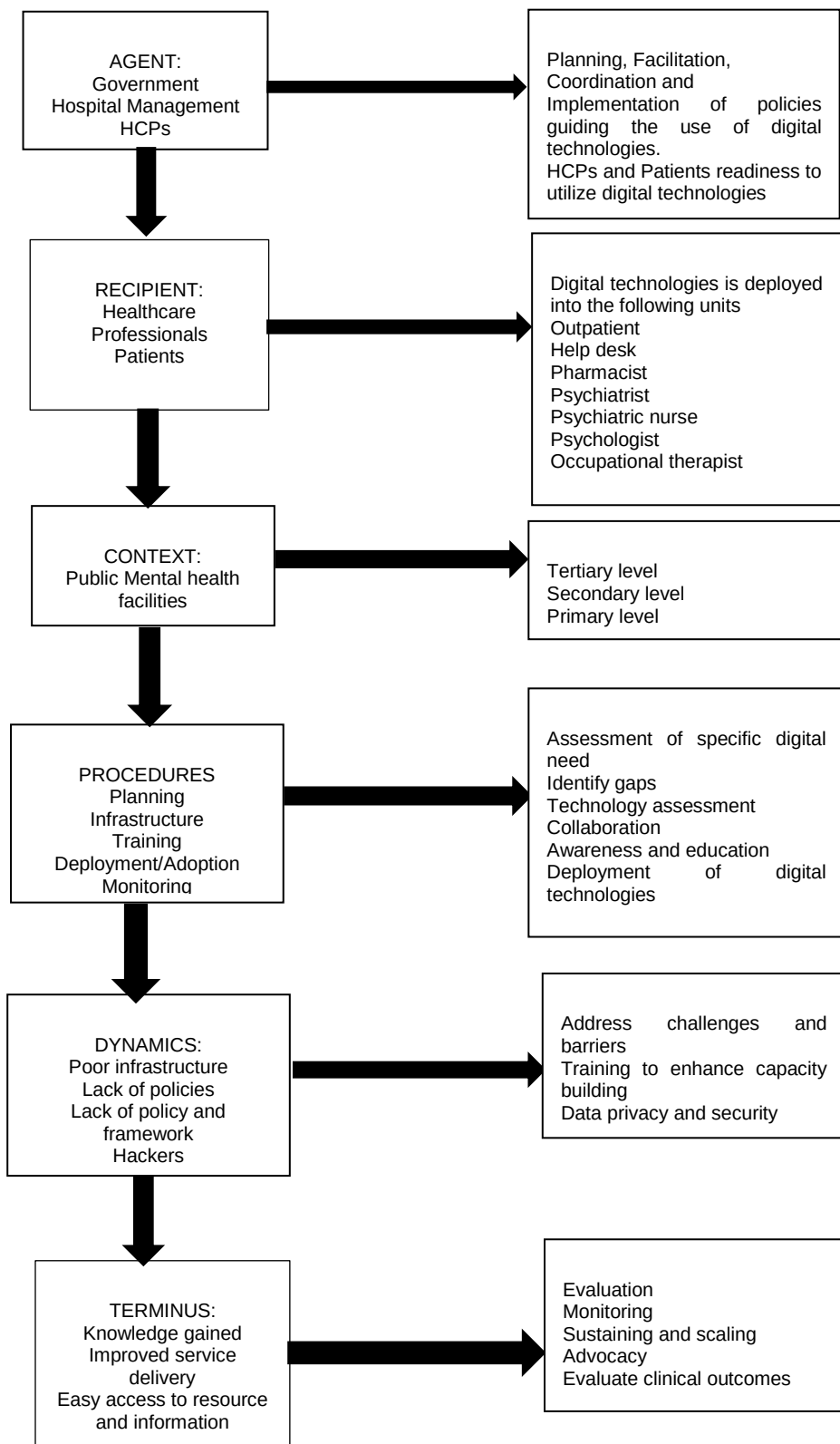


Figure 9.4 Proposed contemporary model adapted from Dickoff *et al.* (1968: 575)

The findings from the theoretical paradigms utilized in this study supports Dickoff *et al.* (1968:575) Practice-Oriented Theory. For instance, the construct of facilitating conditions have a significant positive relationship on user behaviour. This implies that, the availability of basic infrastructures such as laptops, internet enabled phones, airtime, Wi-Fi, and constant electricity facilitates the acceptance and use of digital technologies among HCPs in public mental healthcare facilities in Nigeria, the More so, performance expectancy construct has a strong significant impact on behavioural intention to use digital technologies. The implication is that HCPs perceived the use of digital technologies to be beneficial, favourable and have a positive influence on patient. The UTAUT construct of social influence is important in the adoption and utilization of digital technologies among HCPs in Nigeria due to the fact that, more HCPs will embrace the use digital technologies if their colleagues are using the same technologies with no problems encountered and with utmost safety. The perceive benefit construct of the HBM has a significant positive relationship on the use of digital technologies for mental health service delivery and wellbeing. The finding strongly suggests that as HCPs in Nigeria perceive the benefits that digital technologies offer both to them and their patients, then, the utilization will increase. This outcome informed and guided the development of an operational pathway integrating digital technologies into public mental healthcare in Nigeria.

9.5.3 Description of the Model Integrating Digital Technologies into Mental Healthcare Service Delivery in public healthcare facilities in Nigeria

The model was developed based on the few digital technologies (Phone call, WhatsApp, Zoom, Google Meet, and Telemedicine) utilized among HCPs in the selected facilities. The adoption and use of these technologies also satisfied the performance expectancy; effort expectancy; facilitating conditions; social influence and therapeutic approach constructs of the modified UTAUT Model as well as the perceived susceptibility; therapeutic approach and perceived benefits constructs of the modified HBM Model. This study found that the

adoption and use of these digital technologies have a significant positive relationship with these theoretical constructs. Therefore, the developed model adapted the operational model for mental healthcare service delivery in public facilities in Nigeria, and associated type(s) of digital technologies utilized. The structure of the operational pathways is described below and presented in Figure 9.5.

9.5.3.1 Hospital Information Management/Health Records Unit

The personnel in the Hospital Information Management/Health Records unit need to be equipped with digital technologies for effective and efficient services which will promote precise and well documented patients' records. Electronic health records (EHR) promote seamless medical workflow and have been incorporated into some tertiary healthcare in Nigeria to mitigate the challenges of paper-based record system (Adedeji *et al.* 2022; Ebenso *et al.* 2018; Odekunle *et al.* 2017: 59). Nguyen *et al.* (2014: 779) described EHR as “*a repository of information regarding the health status of a subject of care, in computer processable form*”. Desktop or laptop computers and database management application packages will be used to document, manage, utilize and preserve patients' information and records. Furthermore, the recruitment of a helpdesk officer will ease the number of patient queuing for services at mental health facilities. Services will be rendered online or via telephone applications by the helpdesk officer so as to reach more patients in a short time and also reducing the inflow of patients into the facilities. The helpdesk officer will be able to attend to patients with pertinent questions concerning mental health and wellness, book appointments, provide basic mental health interventions and give information on how to promote mental wellness.

9.5.3.2 Emergency Care Unit

The Emergency care unit is saddled with the responsibility of providing swift action for patients under severe or profound conditions. Psychiatric doctors among other emergency medical officers are obligated to be on 24-hour standby to take records of patients' histories, mental conditions, vital signs, and to make tentative diagnoses, and also to provide quick medical interventions. Emergency unit should be equipped with digital technologies to enable easy accessibility to those in extreme need of mental health services despite location barriers. In situations when the location of the mental health facility is far from a patient's location especially during emergencies, digital technologies can be utilized in mitigating the situation to prevent exacerbated conditions. HCPs indicated that digital technologies such as Telemedicine, Zoom, and Google Meet could be effectively utilized, and easily facilitated patient/caregiver-doctor interactions during emergencies.

9.5.3.3 The outpatient

Psychiatric doctors and nurses are the major HCPs providing services in the outpatient unit. HCPs acknowledged that service delivery would improve and increase wider patient outreach when digital technologies such as Zoom and Google Meet were utilized to provide health education programmes. The level of errors with manual register is reduced when desktop, laptop computers and application enabled phones are utilized. This will also provide timely feedback on test results instead of waiting seven days with manual process.

9.5.3.4 Pharmacy Unit

Pharmacy Unit will undoubtedly function more effectively by using tools such as computers and telephones with appropriate applications (WhatsApp, Zoom and Google Meet) which will accurately record and keep prescriptions. The unit can promptly refer patients to the appropriate pharmacy to purchase their

medications in case they are out of stock in the mental health facility. So too, it can contact doctors in case of medication substitution; and properly advise patients on appropriate dosage and duration of drug use when they are in different locations.

9.5.3.5 Clinical Psychology Unit

Clinical Psychologists in this study confirmed that they have at various times utilized phone calls, WhatsApp, Zoom, and Google Meet to provide effective therapeutic interventions to patients in another location and provide timely intervention and follow-ups. HCPs confirmed that patients preferred digital interventions to eliminate stigmatization associated with physical visits to a mental health facility and provide opportunity to remain anonymous. Clinical Psychologist in this study strongly agreed that the use of digital technologies addresses several challenges including: travel cost, accessibility to the few available mental healthcare facilities, and reduced waiting time at a facility. Digital technologies facilitate global professional collaboration among HCPs.

9.5.3.6 Occupational Therapy Unit

Occupational therapists provide special mental health services. The findings of this study imply that the utilization of digital technologies such as WhatsApp, Zoom, and Google Meet, and Phone calls, will enable the Occupational Therapist to effectively provide training on patients' handling and management to non-professionals in the unit, and to plan socialization and leisure activities at ease.

9.5.3.7 The Social Welfare Unit

Patients in need of casework are referred from both in-patients and outpatients unit to the Social Welfare unit. The prescribed form for referral to the unit ought to be duly recorded. The unit is required to work with other HCPs in conducting

daily ward rounds, reviews and evaluation. Also, the unit constantly assesses the patient to determine their fitness, getting involved in home visits to patients within the community to facilitate rehabilitation and reintegration. The study indicates that digital technologies (WhatsApp, Zoom, and Google Meet, and Phone calls) enable HCPs to conduct interviews, manage records of cases, participate in group therapy sessions and conduct follow-ups, as well as collaborate with colleagues around the world virtually on best patient care and practices.

9.5.3.8 The Discharge Unit

This unit should be an extension of the Hospital Information Management where the discharge staff monitors patients by putting calls through to the patients, or through WhatsApp (audio/video calls, or text messages) applications. In situations whereby, patients are referred to another facility for further treatment and management, personnel at the discharge unit can follow-up on such referrals.

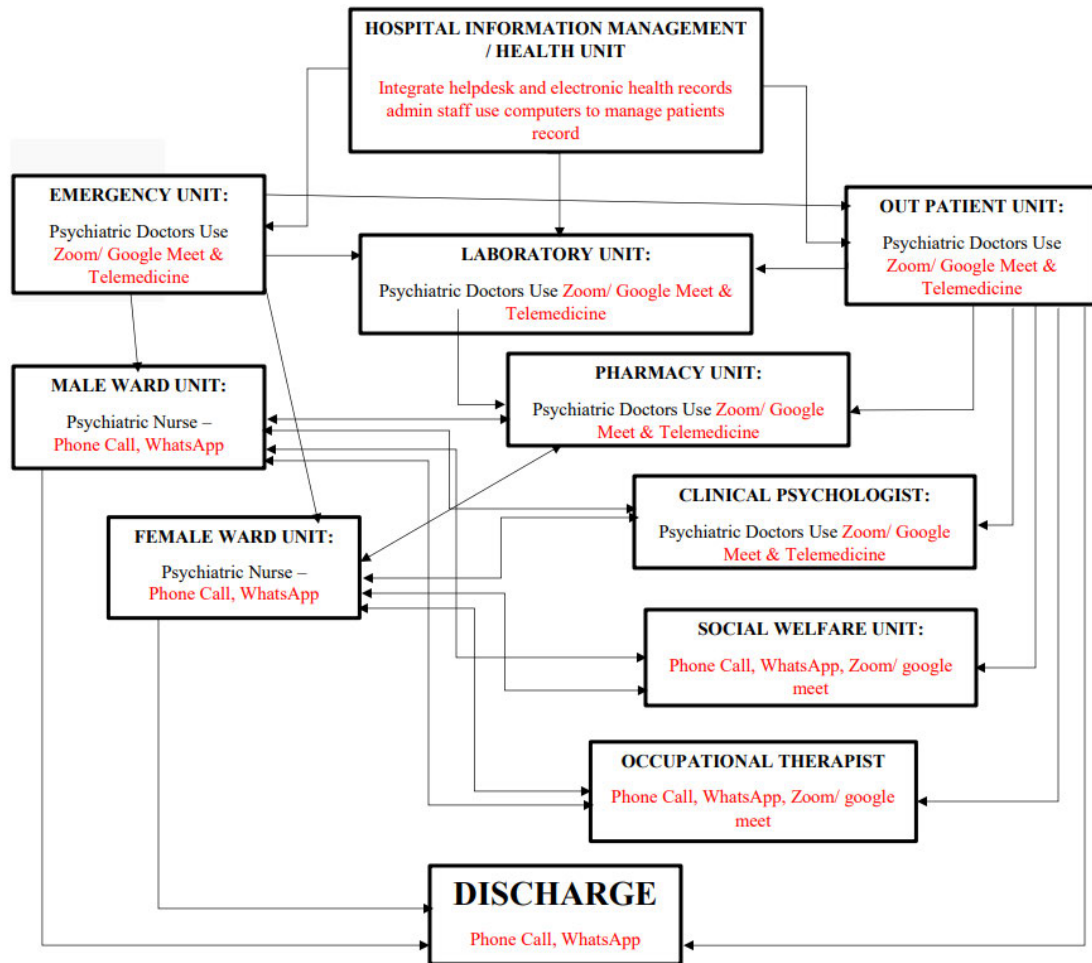


Figure 9.5: Proposed operational pathways Integrating Digital Technologies into Public Mental Healthcare in Nigeria

9.6 SUMMARY OF THE CHAPTER

This chapter presented the process of the integrated model development for improving mental healthcare service delivery in public healthcare facilities in Nigeria. The data used to design the model was obtained from both qualitative and quantitative findings of this study, in alignment with relevant theoretical constructs of UTAUT-HBM Model.

CHAPTER 10: SUMMARY, LIMITATIONS, RECOMMENDATIONS AND CONCLUDING REMARKS OF THE STUDY

10.1 INTRODUCTION

The previous chapter presented the development of a contemporary model integrating digital technologies into mental healthcare to improve services and wellbeing in the public healthcare system. Data was collected using convergent mixed method and findings from the study aided the development of the model. This Chapter concludes the study, highlighting the limitations and indicating recommendations in relation to the results from the study. The study seeks to provide answer to the research questions by providing HCPs with in-depth knowledge and perception of digital technology, and identifies challenges and barriers that hinder the provision of services through the utilization of digital technologies.

10.2 SUMMARY OF THE STUDY

The study highlighted the lack of adequate HCPs in Nigeria healthcare system, showing that those HCPs that remained in the system had to work under indigent conditions due to the shortage of HCPs. The Nigeria mental healthcare sector is gradually experiencing brain drain due to high migration, which has worsened mental health service delivery. The government can mitigate the high level of migration in mental health sector by improving HCPs' working conditions, providing appropriate incentives and enhanced capacity building and human development. The improvement in working conditions will attract more personnel to the mental health sector. Furthermore, the study found that the mental healthcare sector is plagued by infrastructural challenges, which

contribute to poor service delivery. The government needs to channel adequate resources to mental health facilities to renovate the ailing infrastructure, such as the provision of suitable spacious and offices with a serene, conducive ambience. Additionally, the number of public neuropsychiatric hospitals in Nigeria is grossly inadequate, there is need for the establishment of more public mental health facilities and the full integration of psychiatric care into primary healthcare to reach more people in need of mental health services.

Digital technologies have the potential to offer vast opportunities to transform Nigeria's healthcare system by helping scarce psychiatrists and other mental health practitioners do more with less. The development and adoption of digital technologies, therefore, offers the opportunity to immensely advance mental healthcare services, while at the same time decreasing treatment costs. HCPs are the strong determinant of either the continuous use of the traditional method of service delivery or a blended mental health service delivery. Laptops, desktop computers, tablets, internet enabled mobile phones and reliable internet services need to be made available to HCPs for ease of adoption and utilization of digital technologies. More so, the Nigerian Government needs to increase the budget allocated to mental health sector to fund the acquisition of these gadgets. Similarly, the government needs to collaborate with management of mental health facilities in providing subsidized sustainable internet services to aid continuity, which foster preparedness in any case of any health emergencies.

Digital technologies bridge the link when either the HCPs or the patients cannot be present physically for therapy. The study found that the utilization of digital technologies decreases time spent at mental health facilities and facilitates easy access to treatment. Unfortunately, fewer HCPs utilized digital technologies in their daily provision of services. HCPs are aware of digital technologies (WhatsApp, Zoom, telephone, Google Meet, telemedicine and media platforms) but the level of utilization is very low among HCPs. The adoption and utilization is fraught with the high cost of implementation, network

challenges, lack of policies and framework and dearth in amenities and infrastructures. Digital technologies can leverage the challenges faced by HCPs and enhance service delivery in the mental healthcare system in Nigeria. The Federal Government can collaborate with donors, sponsors, NGOs, and Information Technology (IT) firms to develop affordable technological platforms for mental health services.

The study identified numerous benefits of using digital technologies in the provision of healthcare services, such as enhanced and continued service delivery despite geographical barriers, ease of transportation cost, easy accessibility to concise and correct mental health information and mitigation of the problem of stigmatization attached to mental health facilities. Despite the pros of digital technologies, some cons were highlighted by HCPs in the study, which were lack of policy and framework, low budget allocation, unrestricted/unwarranted access by patients, electricity issues, network issues and problem of hackers. More so, bad experiences may create an impression about a particular digital technology used, which in turn informs a general perception about digital technologies. The problem of unwarranted access can be moderated by providing dedicated phone numbers to patients. These numbers will be available for calls between the stipulated working hours and after-hours access will be only through text messages. Additionally, a dedicated line will be open from after hours for emergencies only. The use of password, proper storage of patient data and restricted access can reduce the incidences of hackers. The study concluded that digital technologies hold promises to bridge the healthcare service gap beyond the COVID-19 pandemic.

10.3 LIMITATIONS

Limitation are drawbacks as a result of the research methodology, design and sampling technique which could influence the results of the study and also reduce the scope of generalization (Susan and Gray 2019: 72). The study identified some limitations in the course of the study which are presented as follows:

- The study was conducted on HCPs in South-West (Ondo, Ogun, Lagos and Oyo states) Nigeria, therefore, the findings cannot be generalized to all HCPs in Nigeria. Research needs to be conducted in other geo-political zones of Nigeria to ascertain the similarities of challenges and barriers.
- Non-governmental organizations and privately-owned mental health facilities were not included in this study, so it limits the scope of generalization.
- HCPs with less than two years work experience and social workers were excluded from this study, therefore the findings from this study could not be generalized to all mental HCPs.
- The use of an unequal number of participants for qualitative and quantitative data collection also stands as limitation. Findings from the few interviewed participants provides less information as compared to the larger number of participants used for quantitative study.

10.4 RECOMMENDATIONS

The study suggests the following recommendations in relation to the findings of the study.

10.4.1 Federal Government

- There is the need for government at all levels to channel adequate resources to renovate the ailing infrastructure and provide more spacious and conducive office space to create a serene workplace environment in the few existing mental health facilities in Nigeria. There is also a dire need to establish more public mental healthcare facilities as well as to oversee the full integration of psychiatric care into primary healthcare in order to reach more people in need of mental healthcare services. This will reduce the current influx of patients to tertiary mental healthcare facilities.
- The Nigerian Government can mitigate the high level of migration of HCPs by improving HCPs' working conditions, providing a competitive work incentive, enhanced capacity building and human development. The improvement in working conditions will attract more personnel to the mental health sector.
- Stable electricity supply has an economic implication for every society. The government needs to increase power generation to facilitate smooth operation in the mental healthcare sector and other sectors in the country.
- There is an urgent need for Government to put an effective policy and framework in place to encourage the utilization of digital technologies among HCPs. Furthermore, the Nigerian Government through the Ministry of Science, Information and Communication Technology, needs to collaborate with Network Service provider to provide sustainable and subsidized internet services and efficient technology devices with adequate data protection features to enhance mental healthcare service delivery and ensure preparedness for health emergencies.
- Moreover, Nigeria's Government needs to increase budgetary allocations to the mental health sector to fund the acquisition of technological gadgets. Laptops, desktop computers, tablets, and internet-enabled

mobile phones and reliable internet services need to be made available to HCPs for ease of adoption and utilization of digital technologies.

- The problem of hackers is increasingly becoming a threat to digitized tools and records. IT designers should be engaged to develop solutions with mitigation techniques in mind from the very onset. These techniques could, for instance, include; storing minimal personally identifiable patient data, regularly deleting patient session transcripts following analysis, and encrypting all patient-doctor communication, as well as data stored on the server.
- Lastly, based on the study's findings, a standard operational framework is lacking in some public mental healthcare systems in Nigeria. It is instructive to recommend that the Nigerian Government should adopt and utilize the framework developed from this study in the integration of digital technologies for mental healthcare service delivery in public mental healthcare facilities in Nigeria.

10.4.2 Management

- A dedicated helpdesk needs to be incorporated into public mental health facilities to disseminate up-to-date, correct and concise mental health information to the community. This will also facilitate an easy process for appointment bookings, and send SMS reminders to patients so as to reduce missed appointments. The helpdesk will ease the extra burden on HCPS.
- There is an urgent need for training and re-training of HCPs on the proper use of the available digital technologies and Applications so as to facilitate easy and smooth integration of digital technologies into mental health service delivery. Thus, the human resource development plan in the public health sector should provide for workshops and seminal presentations on knowledge and use of digital technologies in mental healthcare service delivery. Adequate training will improve the usage of digital technologies for mental healthcare service delivery.

10.4.3 Future research

- There is need to conduct research on the readiness for, level of acceptance and utilization of digital technologies among mental health patients in Nigeria. The successful adoption and utilization is somewhat dependant on patients as end users.
- The study should also be conducted in other regions in Nigeria to gain an insight into the level of acceptance and intention to utilize digital technologies among HCPs.
- The model needs to be validated.

10.5 CONCLUDING REMARKS

Grove and Gray (2019: 411) define conclusion as synthesis of findings. Conclusions are drawn based on the findings obtained from investigation, which is important for maintaining the integrity and validity of the research. The objectives of the study formed the basis for the conclusion of this study. Mental health is an important aspect of overall wellbeing and it has been widely recognized that digital technologies can play a significant role in improving mental healthcare. Transition from traditional/conventional space of mental healthcare service delivery to digital space requires a collaborative approach with Computer scientists (software developers, database administrators), Data scientist, investors, stakeholders and mental healthcare professionals. The proposed model serves as a contemporary framework that Government, policy makers in the Ministry of Health and Management of mental health facilities in Nigeria can adopt which will provide the needed awareness on the benefit of technological intervention. Furthermore, the model can be utilized to revise the existing policy and Standard Operating Procedures in public mental health sector. The integration of digital technologies in public healthcare can improve services at mental health facilities and most importantly mitigate the impact of pandemic outbreaks and other health emergencies. The proposed model

utilized basic technological tools which, are cost effective, efficient and can be easily deployed.

REFERENCES

- Abbott, Andrew. 2004. *Methods of Discovery: Heuristics for the Social Sciences*. New York: W. W. Norton.
- Abdulmalik, J., Olayiwola, S., Docrat, S., Lund, C., Chisholm, D. and Gureje, O. 2019. Sustainable financing mechanisms for strengthening mental health systems in Nigeria. *International Journal of Mental Health Systems*, 13(1): 38.
- Abdulmalik, J., Kola, L., Fadahunsi, W., Adebayo, K., Yasamy, M. T., Musa, E., and Gureje, O. 2013. Country contextualization of the mental health gap action programme intervention guide: a case study from Nigeria. *PLoS Medicine*, 10(8): e1001501.
- Abolfotouh, M. A., Almutairi, A. F., Almutairi, Z., Salam, M., Alhashem, A., Adlan, A. A. and Modayfer, O. 2019. Attitudes toward mental illness, mentally ill persons, and help-seeking among the Saudi public and sociodemographic correlates. *Psychology Research and Behaviour Management*, 12: 45-54.
- Abiodun, O. A. and Olu-Abiodun, O. O. 2014. The Determinant of Choice of Health Facility in Sagamu, South-West, Nigeria. *Scholars Journal of Applied Medical Sciences*. 2(1C): 274-282.
- Aching., G. I, Kur, J. T. and Gyoh, S. K. 2013. 'Lassa fever Outbreak in Makurdi, North Central Nigeria: What you need to know'. *IOSR-Journal of Dental and Medical Science* 7(5): 42-46.
- Adebayo, J. K. and Ofoegbu, O. E. 2014. Issues on e-Health adoption in Nigeria. *International Journal of Modern Education and Computer Science*, 6(9): 36-46.

Adedeji, T., Fraser, H. and Scott, P. 2022. Implementing electronic health records in primary care using the Theory of Change: Nigerian case study. *Journal of Medical Internet Research Medical Informatics*, 10(8), e33491.

Adenuga, K. I., Iahad, N. A. and Miskon, S. 2017. Towards reinforcing telemedicine adoption amongst clinicians in Nigeria. *International Journal of Medical Informatics*; 104: 84-96.

Adenuga, K. I., Iahad, N. A. and Miskon, S. 2020. Telemedicine system. Service adoption and implementation issues in Nigeria. *India Journal of Science and Technology*, 13(12): 1321-7.

Adepoju, P. 2020. Africa turns to telemedicine to close mental health gap. *Lancet Digit Health*, 2(11): E571-E572.

Adewale, O. S. 2004. An internet-based telemedicine system in Nigeria. *International Journal of Information Management*; 24: 221-234.

Afzal M. 2020. From “Western Education Is Forbidden”, To the World’s Deadliest Terrorist Group Education and Boko Haram in Nigeria. The Brookings Institution 775 Massachusetts Ave., NW Washington, D.C. 20036, Brookings.

Alobo, I. G., Soyannwo, T., Ukponwan, G., Akogu, S., Akpa, A. M., and Ayankola, K. 2020. Implementing electronic health system in Nigeria: perspective assessment in a specialist hospital. *African Health Sciences*, 20(2), 948–954. <https://doi.org/10.4314/ahs.v20i2.50> (Accessed: 16 June 2022).

Alghazi, S. S., Kamsin, A., Almaiah, M. A., Wong, S. Y. and Shuib, L. 2021. For sustainable application of mobile learning: An extended UTAUT model to examine the effect of technical factors on the usage of mobile devices as a learning tool. *Sustainability*: 13: 1856. doi:[10.3390/su13041856](https://doi.org/10.3390/su13041856) (Accessed: 20 April 2023).

Aluh, D. O. and Onu, J. U. 2020. The need for psychosocial support amid COVID-19 crises in Nigeria. *Psychological Trauma: Theory, Research, Practice, and Policy*, 12(5): 557-558.

Annan, A. A., Yar, D.D., Owusu, M., et al. 2017. Health care workers indicate ill preparedness for Ebola Virus Disease outbreak in Ashanti Region of Ghana. *BMC Public Health* 17: 546.

Andrews, G., Henderson, S. and Hall, W. 2001. Prevalence, Co-Morbidity, Disability and Service Utilisation. Overview of the Australian National Mental Health Survey. *British Journal of Psychiatry*, 178: 145-153.

Agara, A. J. and Onibi, O. E. 2007. Effects of group psychoeducation (GPE) on compliance with scheduled clinic appointments in a neuro-psychiatric hospital in southwest Nigeria: A randomised control trial (RCT). *Annals of the Academic of Medicine Singapore*, 36(4): 272-5.

Aguwa, U. T., Aguwa, C. J., Repka, M., Srikumaran, U., Woreta, F., Singman, E. L., Jenkins, S. G., and Srikumaran, D. 2021. Teleophthalmology in the Era of COVID-19: Characteristics of Early Adopters at a Large Academic Institution. *Telemedicine Journal and e-health: the official journal of the American Telemedicine Association*, 27(7), 739-746. <https://doi.org/10.1089/tmj.2020.0372> (Accessed: 16 June 2022).

Ahmadi S., Bempong N. E., De Santis O., Sheath D. and Flahault, A. 2018. The role of digital technologies in tackling the Zika outbreak: a scoping review. *Journal of Public Health Epidemiology*, 2: 20.

Ahmed, M. A. A., Gagnon, M. P., Hamelin-Brabant, L., Mbemba, L. and Alami, H. 2017. A mixed methods systematic review of success factors of m-Health and tele-Health for maternal health in Sub-Saharan Africa. *m-Health Journal*, 3: 22.

Aschbrenner, K. A., Naslund, J. A., Grinley, T., Bienvenida, J. C. M., Bartels, S. J. and Brunette, M. 2018. A survey of online and mobile technology use at peer support agencies. *Psychiatric Quarterly*, 89(3): 539-548.

Babalola, D., Anayo, M., and Itoya, D. A. 2021. Tele-Health during COVID-19: Why Sub-Sahara Africa is yet to log-in to virtual healthcare? *AIMS Medical Science*, 8(1): 46-55.

Balogun, M. R., Sekoni, A. O., Okafor, I. P., Odukoya, O. O., Ezeiru, S. S., Ogunnowo, B. E. and Campbell, P. C. 2012. Access to information technology and willingness to receive text message reminders for childhood immunisation among mothers attending a tertiary facility in Lagos, Nigeria. *South African Journal of Child Health*, 6(3): 76-80.

Bans-Akutey, A., Tiimub, B.M. 2021. Triangulation in Research. Academia Letters, Article 3392. <https://doi.org/10.20935/AL3392> (Accessed: 6 March 2024).

Barron, P., Peter, J., LeFevre, A. E., Sebidi, J., Bekker, M., Allen, R., Parsons, A. N., Benjamin, P., and Pillay, Y. 2018. Mobile health messaging service and helpdesk for South African mothers (MomConnect): history, successes and challenges. *British Medical Journal Global Health*, 3: 1-3. Available at: <https://doi.org/10.1136/bmjgh-2017-000559> (Accessed: March 2021).

Baranowski, T., Cullen, K. W., Nicklas, T., Thompson, D. and Baranowski, J. 2003. Are current health behavioural change models helpful in guiding prevention of weight gain efforts? *Obesity Research*, 11(S10): 23S-43S.

Barnett, S., Huckvale, K., Christensen, H., Venkatesh, S., Mouzakis, K. and Vasa, R. 2019. Intelligent Sensing to Inform and Learn (InSTIL): A Scalable and Governance-Aware Platform for Universal, Smartphone-Based Digital

Phenotyping for Research and Clinical Applications. *Journal of Medical Internet Research*, 21(11): e16399. doi: 10.2196/16399.

Bauer, R., Bauer, M., Spiessl, H., and Kagerbauer, T. 2013. Cyber-support: An analysis of online self-help forums (online self-help forums in bipolar disorder). *Nordic Journal of Psychiatry*, 67(3): 185-190.

Bellemo, V., Lim, Z. W., Lim, G., Nguyen, Q. D., Xie, Y., Yip, M. Y., Hamzah, H., Ho, J., Lee, X. Q., Hsu, W., Lee, M. L., Musonda, L., Chandran, M., Chipalo-Mutati, G., Muma, M., Tan, G. S., Sivaprasad, S., Menon, G., Wong, T. Y., and Ting, D. S. 2019. Artificial intelligence using deep learning to screen for referable and vision-threatening diabetic retinopathy in Africa: a clinical validation study. *Lancet Digit Health*, 1: e35-44.

Bempong, N. E., De Castañeda, R. R., Schütte, S., Bolon I., Keiser O. and Escher G. 2019. Precision global health – the case of Ebola: a scoping review. *Journal of Global Health*, 9(1): 010404.

Benson, M. B. 2011. Hospital Information Systems in Nigeria: A Review of Literature. *Journal of Global Health Care Systems*, 1(3): 1-26.

Ben-Zeev, D., Davis, K. E., Kaiser, S., Krzsos, Z. and Drake, R. E. 2012. Mobile Technologies among people with serious mental illness: Opportunities for future services. *Administration and Policy in Mental Health and Mental Health Services Research* 40(4): 340-343. doi:10.1007/s10488-012-0424-x (Accessed: 15 July 2022).

Berry, N., Lobban, F., Belousov, M., Emsley, R., Nenadic, G., and Bucci, S. 2017. # WhyWeTweetMH: understanding why people use Twitter to discuss mental health problems. *Journal of Medical Internet Research*, 19(4): e107.

Benson, M. B. 2011. Hospital Information Systems in Nigeria: A review of literature. *The Journal of Global Health Care Systems*, 1(3): 1-26.

Biliaminu, A. and Aina, J. 2020. Assessment of factors associated with treatment relapse among patients diagnosed with psychotic illness in two psychiatric hospitals in South West, Nigeria. *Assessment*, 3(5): 12-53.

Bozan, K., Parker, K. R. and Davey, B. 2016. A Closer Look at the Social Influence Construct in the UTAUT Model: An Institutional Theory Based Approach to Investigate Health IT Adoption Patterns of the Elderly. *2016 49th Hawaii International Conference on System Sciences (HICSS)*, 3105-3114. (Accessed: 11 August 2023).

Braun, V. and Clarke, V. 2006. Using thematic analysis in psychology. *Qualitative Research in Psychology*, 3: 77-101.

Brunette, M. F., Achtyes, E., Pratt, S., Stilwell, K., Opperman, M., Guarino, S. and Kay-Lambkin, F. 2019. Use of smartphones, computers and social media among people with SMI: Opportunity for intervention. *Community Mental Health Journal*, 55(6): 973-978.

Budd, J., Miller, B. S., Manning, E. M., Lampos, V., Zhuang, M., Edelstein, M., Rees, G., Emery, V. C., Stevens, M. M., Keegan, N., Short, M., Pillay, D., Manley, E. D, Cox, I. J., Heymann, D., Johnson, A. M. and Mckendry, R. A. 2020. Digital technologies in the public-health response to COVID-19. *Nature Medicine*, 26: 1183-1192.

Byass, P. 1987. Computers in Africa: appropriate technology? *Computer Bulletin*, 3: 17.

Carver, C. S and Scheier, M. F. 2005. Optimism. In Synder C. R and Lopez S. J (Eds). *Handbook of Positive Psychology*. Oxford: Oxford University Press.

Castro, H. 2023. *How AI can help alleviate the strain on the medical system*, KevinMD.com. Available at: <https://www.kevinmd.com/2023/04/how-ai-can-help-alleviate-the-strain-on-the-medical-system.html> (Accessed: 15 June 2023).

Champion, V. L, and Skinner, C. S. 2008. The Health Belief Model. In: Glanz K, Rimer BK, Viswanath K, editors. *Health behaviour and health education: Theory, research, and practice*. 4. San Francisco, CA: Jossey-Bass, John Wiley & Sons, Inc; 2008: 45-65.

Chang, H. J. 2009. Online supportive interactions: Using a network approach to examine communication patterns within a psychosis social support group in Taiwan. *Journal of the American Society for Information Science and Technology*, 60(7): 1504-1517.

Chibanda, D., Cowan, F. M., Healy, J. L., Abas, M., and Lund, C. 2015. Psychological interventions for common mental disorders for people living with HIV in low- and middle-income countries: Systematic review. *Tropical Medicine and International Health: TM&IH*, 20(7): 830-839. <https://doi.org/10.1111/tmi.12500> (Accessed: 15 June 2023).

Chitungo, M., Mhango, M., Dzobo, K., Denhere, M., Chimene, G. and Musuka, Dzinamarira T. 2021. Towards virtual doctor consultations: a call for the scale-up of telemedicine in sub-Saharan Africa during COVID-19 lockdowns and beyond. *Smart Health*, 21: 100207. 10.1016/J.SMHL.2021.100207 (Accessed: 12 July 2023).

Corrigan, P. W. and Bink, A. B. 2016. "The stigma of mental illness". *Encyclopedia of Mental Health*, 4: 230-234.

Corrigan, P. W. and Rüsch, N. 2002. Mental illness stereotypes and clinical care: do people avoid treatment because of stigma? *Psychiatric Rehabilitation Skills*, 6(3): 312-334.

Creswell, J. W. 2014. *Research design: Qualitative, quantitative and mixed methods, approaches*. 4th edition. Thousand Oaks, CA: Sage.

Creswell, J. W. and Plano Clark, V. L. 2017. *Designing and conducting mixed methods research*. 3rd edition. Sage Publication.

Creswell, J. W. and Plano Clark, V.L 2011. *Designing and Conducting Mixed Methods Research*, 2nd edition. Thousand Oaks: Sage.

Clough, B. A., Rowland, D. P., and Casey, L. M. 2019. Development of the eTAP-T: A measure of mental health professionals' attitudes and process towards e-interventions. *Internet Interventions*, 18: 1-9.

da Silva, A. G., Miranda, D. M., Diaz, A. P., Telles, A. L. S., Malloy-Diniz, L.F. and Palha, A. P. 2020. Mental health: Why it still matters in the midst of a pandemic. *Brazilian Journal of Psychiatry*, 42(3): 229-231.

Deloitte South Africa. *cybersecurity outlook 2023*. Available at: <https://www2.deloitte.com/za/en/nigeria/pages/risk/articles/nigeria-cybersecurity-outlook-2023.html> (Accessed: 13 June 2023).

Dijkstra, T. K. and Henseler J. 2015. Consistent Partial Least Squares Path Modelling. *Management Information Systems Quarterly*: 39(2): 297-316.

Dikobe, J., Moagi, M. and Sehularo, L. 2023. Conceptual Framework for the Psychosocial Support of Nurses Caring for Patients Diagnosed with COVID-19 Infection in North West Province, South Africa. *International Journal of*

Environmental Research and Public Health, 20. 5078. 10.3390/ijerph20065078 (Accessed: 8 March 2024).

Downe-Wambolt, B. 1992. Content analysis: Method, applications, and issues. *Health Care for Women International*. 13: 313-321.

Dwivedi, Y. K., Rana, N. P., Jeyaraj, A., Clement, M. and Williams, M. D. 2019. Re-examining the unified theory of acceptance and use of technology (UTAUT): Towards a revised theoretical model. *Information Systems Frontiers*, 21(3): 719-734.

Ebenso, B., Allsop, M. J., Okusanya, B., Akaba, G., Tukur, J., Okunade, K., Akeju, D., Ajepe, A., Dirisu, O., Yalma, R., Sadeeq, A. I., Okuzu, O., Ors, T., Jagger, T., Hicks, J. P., Mirzoev, T. and Newell, J. N. 2018. Impact of using e-Health tools to extend health services to rural areas of Nigeria: protocol for a mixed-method, non-randomised cluster trial. *British Medical Journal Open*;8(10): e022174.

Edward, M. I., Akinbani, O. B. and Adebayo, T. O. 2020. Prevalence and nurses' perceived predictors of mental illness among young adult admitted between 2015-2018 in Neuro Psychiatry Hospital Akure, Ondo State. *International Organization of Scientific Research, Journal of Humanities and Social Science*, 25(4): 1-6.

Egbewande, M. O., Oladipo, H. J., Olowolagba, S. A. and Iyiola, K. H. 2023. Application of Telemedicine in the Provision of Healthcare in Nigeria: An Insight from COVID-19. *Journal of Health Reports and Technology*; 9(1): 1-4. <https://doi.org/10.5812/jhrt-130916>

Egenti, B. N., Chukwudi, F. T., Igweagu, C. P., Ubajaka, C. F. and Adogu, P. O. U. 2022. E-Health and Telemedicine Practice in Nigeria (1999-2017):

Challenges and Prospects. *International Journal of General Medicine and Pharmacy*. 1(1): 1-18.

Eilert, N., Enrique, A., Wogan, R., Mooney, O., Timulak, L. and Richards, D. 2021. The effectiveness of Internet-delivered treatment for generalized anxiety disorder: an updated systematic review and meta-analysis. *Depress Anxiety*. 38: 196-219.

Ekanoye, F., Ayeni, F., Olokunde, T., Nina, V., Donalds, C, and Mbarika, V. W. A. 2017. Telemedicine diffusion in a developing country: a case of Nigeria. *Science Journal of Public Health* 5: 341-346.

Erduran, S. 2020. Science education in the era of a pandemic. *Science and Education*, 29: 233-235.

Essien, B. and Asamoah, M. K. 2020. Reviewing the Common Barriers to the Mental Healthcare Delivery in Africa. *Journal of Religion and Health*, 59(5); 2531-2555. <https://doi.org/10.1007/s10943-020-01059-8> (Accessed: 18 February 2022).

Eze, E., Gleasure, R. and Heavin, G. 2018. Mobile health solutions in developing countries: A stakeholder perspective. *Health Systems*, DOI: 10.1080/20476965.2018.1457134

Fan, Y., Chen, J., Shirkey, G., John, R., Wu, S. R., Park, H. and Shao, C. 2016. Applications of structural equation modelling (SEM) in ecological studies: an updated review. *Ecological Process*, 5(19): 1-12.

Fernandez-Álvarez, J., Díaz-García, A., Colombo, D., Botella, C., Cipresso, P. and Riva, G. 2020. Digital Technologies for the Intervention of Emotion Regulation. In: *Reference Module in Neuroscience and Biobehavioural Psychology*. Edinburgh: Elsevier.

Firth, J., Cotter, J., Torous, S., Bucci, J. A., Firth, A. R. and Yung. 2015. Mobile phone ownership and endorsement of “m-Health” among people with psychosis: a meta-analysis of cross-sectional studies. *Schizophrenia Bulletin*, 42(2): 448-455.

Fischer, A. E., Van Tonder, T., Gumede, S.B. and Lalla-Edward, S. T. 2021. Changes in Perceptions and Use of Mobile Technology and Health Communication in South Africa During the COVID-19 Lockdown: Cross-sectional Survey Study. *Journal of Medical Internet Research Formative Research*, 17: 5(5): e25273. doi: 10.2196/25273 (Accessed: 16 June 2022).

Fornell, C. and Larcker, D. F. 1981. Evaluating structural equation models with unobservable variables and measurement error. *Journal of Marketing Research*, 18: 39-50.

Frame, J. D., Baldwin, J. M., Gocke, D. J, Troup, J. M. 1970. Lassa fever, a new virus disease of man from West Africa. Clinical description and pathological findings. *American Journal of Tropical Medicine and Hygiene*, 19: 670-676.

Frank, I. and Odunayo, E. 2013. Approach to Cyber Security Issues In Nigeria: Challenges And Solution. *International Journal of Cognitive Research in Science, Engineering and Education (IJCRSEE)*, 1(1): 100-110

Gething, P. W., Noor, A. M., Gikandi, P. W., Ogara, E. A. A., Hay, S. I., Nixon, M. S., Snow, R. W and Atkinson, P. M. 2006. Improving imperfect data from health management information systems in Africa using space–time geostatistics. *PLoS Medicine*, 3(6): 825-831.

Goldschmidt, L., Langa, M., Masilela, B., Goldschmidt, L., Langa, M., Masilela, B., Ndhlovu, L. M., Mncina, B., Maubane, B. and Bujela, K. 2012.

Telepsychology and the COVID-19 pandemic: the experiences of psychologists in South Africa. *South African Journal of Psychology*; 51(2): 314-324.

Gual-Montolio, P., Martínez-Borba, V., Bretón-López, J. M., Osma, J., and Suso-Ribera, C. 2020. How are information and communication technologies supporting routine outcome monitoring and measurement-based care in psychotherapy? A systematic review. *International Journal of Environmental Research and Public Health*, 17(9),3170. <https://doi.org/10.3390/ijerph17093170> (Accessed: 18 July 2023).

Gureje, O., Acha, R. A. and Odejide, O. A. 1995. Pathways to psychiatric care in Ibadan, Nigeria. *Tropical and Geographical Medicine*, 47(3): 125-9.

Guy, R., Hocking, J., Wand, H., Stott, S., Ali, H. and Kaldor, J. 2012. How effective are short message service reminders at increasing clinic attendance? A meta-analysis and systematic review. *Health Services Research*, 47(2): 614-632.

Graham, M. A. 2020. Teacher Practice and Integration of ICT: Why Are or Aren't South African Teachers Using ICTs in Their Classrooms? *International Journal of Instruction*. 13, 749–766.

Grinnell, R. M. and Unrau, Y. A. 2008. *Social work research and evaluation: Foundation of evidence-based practice*. New York: Oxford University Press.

Hair, J. F., Hult, G. T. M., Ringle, C. and Sarstedt, M. A. 2016. *Primer on Partial Least Squares Structural Equation Modeling (PLS-SEM)*; SAGE Publications: Thousand Oaks, CA, USA.

Haryati, A., Shamsul, A. S., Halim, G., Mohd, I. M. and Hasanain, F. G. 2020. Usage of Health Belief Model (HBM) in health behaviour: A systematic review. *Malaysian Journal of Medicine and Health Sciences*, 16(SUPP11): 201-209.

Helen N. and Roberta, H. 2019. Evidence Based Nursing 2019 3(22). p 67. 10.1136/ebnurs-2019-103145 (Accessed: 6 March 2024).

Heron, K. E. and Smyth, J. M. 2010. Ecological momentary intervention: incorporating mobile technology into psychosocial and health behaviour treatments. *British Journal of Health Psychology*, 15(Pt 1): 1-39.

Holloway, I. and Wheeler, S. 2002. *Qualitative research in nursing*. 2nd edition. Blackwell Science, Oxford.

Hulland, J. 1999. Use of Partial Least Squares (PLS) in Strategic Management Research A Review of Four Recent Studies. *Strategic Management Journal* 20(2): 195-204.

Hunter, J., Cookson, J. and Wyatt, J. editors. AIME 89, Second European Conference on Artificial Intelligence in Medicine, London, August 29th–31st 1989. Proceedings. In: Lecture Notes in Medical Informatics, Vol. 38. Berlin, Heidelberg: Springer Berlin Heidelberg; 1989. Available online at: <https://link.springer.com/10.1007/978-3-642-93437-7> (Accessed: 20 June 2022).

Idoga, P. 2016. A literature review of e-Health sector and challenges in Nigeria. 145-149. 10.1109/HONET.2016.7753438 (Accessed: 10 June 2023).

Ilagan, G. S., Iliakis, E. A., Wilks, C. R., Vahia, I. V. and Choi-Kain, L. W. 2020. Smartphone applications targeting borderline personality disorder symptoms: a systematic review and meta-analysis. *Borderline Personal Disorder and Emotional Dysregulation*, 7: 1-15.

Ilyasu. R and Etikan I. 2021. Comparison of quota sampling and stratified random sampling. *Biometrics and Biostatistics International Journal*, 10(1): 24-27.

Innocent, E. O., Edeh, H. C., Okala, U. A. and Ijeoma, U. B. 2014. Implications of global economics crisis on the Nigeria's health sector, 2008-2011. *Academic Journal of Interdisciplinary Studies*, 3(2281-4612 2281-3993): 6. doi:10.5901/ajis.2014.v3n6p455 (Accessed: 9 June 2023).

Institute of Medicine. 2006. *Committee on Crossing the Quality Chasm: Adaptation to mental health and addictive disorders. Improving the quality of health care for mental and substance-use conditions: Quality Chasm Series*. Washington (DC): National Academies Press.

International Telecommunication Union. 2011. *The Role of ICT in advancing growth in LDCs: Trends, challenges and opportunities*. Geneva: ITU.

Iyamu, I., Gómez-Ramírez, O., Xu, A. X., Chang, H. J., Watt, S., Mckee, G., and Gilbert, M. 2022. Challenges in the development of digital public health interventions and mapped solutions: Findings from a scoping review. *Digital Health*, 8, 20552076221102255. <http://doi.org/10.1177/20552076221102255> (Accessed: 5 March 2024).

Jalloh, M. F., Li, W., Bunnell, R. E., Ethier, K. A., O'Leary, A., Hageman, K. M., Sengeh, P., Jalloh, M. B., Morgan, O., Hersey, S., Marston, B. J., Dafee, F. and Redd, J. T. 2015. Impact of Ebola experiences and risk perceptions on mental health in Sierra Leone. *British Medical Journal Global Health*, 3: e000471.

January, J., Madhombiro, M., Chipamaunga, S., Ray, S., Chingono, A. and Abas, M. 2018. Prevalence of depression and anxiety among undergraduate university students in low- and middle-income countries: A systematic review protocol. *Systematic Reviews*, 7(1): 1-5.

Janz, N. K. and Becker, M. H. 1984. The Health Belief Model: A Decade Later. *Health Education Quarterly*, 11(1): 1-47.

Kain, T. and Fowler, R. 2019. Preparing intensive care for the next pandemic influenza. *Criteria Care*, 23(11): 337.

Kaplan-Lewis, E. and Percac-Lima, S. 2013. No-show to primary care appointments: why patients do not come. *Journal of Primary Care Community Health*, 4(4): 251-255.

Kapoor, A., Guha, S., Das, M. K., Goswami, K. C. and Yada, V. R. 2020. Digital healthcare: the only solution for better healthcare during COVID-19 pandemic? *Indian Heart Journal*, 72: 61-64.

Kasayira, J. M., and Chireshe, R. 2010. Poverty and HIV/AIDS in Sub-Saharan Africa: Implications for psychological well-being. *Journal of Psychology in Africa*, 20(2), 203–208.

Kastner, J. K., Dawson, C. R., Weiss, S. M., Kern, K. B. and Kulikowski, C. A. 1984. An expert consultation system for frontline health workers in primary eye care. *Journal of Medical System*, 8: 389-397.

Kenny, G., O'Connor, Y., Eze, E., Ndibuagu, E. O. and Heavin, C. M. 2017. A ground-up approach to m-Health in Nigeria: A study of primary Healthcare professionals' attitude to m-Health adoption. *Procedia Computer Science*, 121: 809-816.

Khan, T., Bertram, M. Y., Jina, R., Mash, B., Levitt, N. and Hofman, K. 2013. Preventing diabetes blindness: cost effectiveness of a screening programme using digital non-mydriatic fundus photography for diabetic retinopathy in a primary health care setting in South Africa. *Diabetes Research and Clinical Practice*, 101(2): 170-176.

Kilbourne, A. M., Bramlet, M., Barbaresso, M. M., Nord, K. M., Goodrich, D. E., Lai, Z., Post, E. P., Almirall, D., Verchinina, L., Duffy, S. A., and Bauer, M. S. 2014. SMI life goals: description of a randomized trial of a collaborative care model to improve outcomes for persons with serious mental illness. *Contemporary Clinical Trials*, 39(1), 74-85. <https://doi.org/10.1016/j.cct.2014.07.007> (Accessed: 16 June 2023).

Kim, J. and Lee, K. S. 2020. Conceptual model to predict Filipino teachers' adoption of ICT-based instruction in class: Using the UTAUT model. *Asia Pacific Journal of Education*, 1-15.

King, N. 2004. Using templates in the thematic analysis of text. In C. Cassell & G. Symon (Eds.). *Essential Guide to Qualitative Methods in Organizational Research*. London: Sage.

Kipruto, H., Muneene, D., Droti, B., Jepchumba, V., Okeibunor, C. J., Nabyonga-Orem, J., and Karamagi, H. C. 2022. Use of digital health interventions in Sub-Saharan Africa for health systems strengthening over the last 10 years: A scoping review protocol. *Frontiers in Digital Health*, 4: 874251.

Kline, R. B. 2005. *Principles and practice of Structural Equation Modeling*. 2nd Edition, Guilford Press, New York.

Koch, T. 1994. Establishing rigour in qualitative research: The decision trail. *Journal of Advanced Nursing*, 19: 976-986.

Kothari, C. R and Garg, G. 2019. *Research methodology: Methods and techniques*. 4th edition. New Age International Publishers. New Dheli.

Kruk, M. E. 2008. Emergency preparedness and public health systems: Lessons for developing countries. *American Journal Preventive Medicine*, 34(6): 529-534.

Langer, E. 2005. Well-being: Mindfulness versus positive evaluation. In Synder, C. R and Lopez, S. J (Eds). *Handbook of Positive Psychology*. Oxford: Oxford University Press.

Lei, M. and Lomax, R. G. 2005. The effect of varying degrees of non-normality in structural equation modelling. *Structural Equation Model*, 12, 1-27.

Leng, M., Zhao, Y., Xiao, H., Li, C. and Wang, Z. 2020 Internet-based supportive interventions for family caregivers of people with dementia: systematic review and meta-analysis. *Journal of Medical Internet Research*, 22: e19468. doi: 10.2196/19468 (Accessed: 12 September 2022).

Li, J. 2023. Digital Technologies for Mental Health Improvements in the COVID-19 Pandemic: A Scoping Review. *BMC Public Health*, 23(413), 1-10.

Limaye, R. J., Sauer, M., Ali, J., Bemstein, J., Wahl, B., Bamhill and Labrigue, A. 2020. Building trust while influencing online COVID-19 content in the social media world. *Lancet Digit Health*; 2(6): 227-228.

Lincoln, Y. and Guba, E. G. 1985. *Naturalistic inquiry*. Newbury Park, CA: Sage.

Lincoln, Y., Susan A. L., and Egon, G. G. 2011. Paradigms and perspectives in contention. In *The Sage Handbook of Qualitative Research*. Edited by Norman K. Denzin and Yvonna S. Lincoln. Thousand Oaks: Sage Publications: 91-95.

Marchewka, J. T., Liu, C. and Kostiwa, K. 2007. An application of the UTAUT Model for understanding student perceptions using course management software. *Communications of the International Information Management Association*, 7(2): 93-104.

Mbamalu, S. 2019. *Nigeria has a mental health problem*, *Health | Al Jazeera*. Available at: <https://www.aljazeera.com/economy/2019/10/2/nigeria-has-a-mental-health-problem> (Accessed: 11 May 2023).

Mbunge E. 2020. Integrating emerging technologies into COVID-19 contact tracing: Opportunities, challenges and pitfalls. *Diabetology and Metabolic Syndrome*, 14(6): 1631-1636.

Mbunge, E., Batani, J., Gaobotse, G., Muchemwa, B. 2022. Virtual healthcare services and digital health technologies deployed during coronavirus disease 2019 (COVID-19) pandemic in South Africa: A systematic review. *Global Health Journal*, 6(2); 102-113.

McIntosh, M. J. and Morse, J. M. 2015. Situating and constructing diversity in semi-structured interviews. *Global Qualitative Nursing Research*, 2(2): 1-12.

Mohindra, R., Ravaki, R., Suri, V., Bhalla, A. and Singh, S. M. 2020. Issues relevant to mental health promotion in frontline health care providers managing quarantined/isolated COVID19 patients. *Asian Journal of Psychiatry*, 51: 102084.

Monaghesh, E. and Hajizadeh, A. 2020. The role of tele-Health during COVID-19 outbreak: A systematic review based on current evidence. *BMC Public Health*, 20: 1193-1194.

Morens, D. M., Daszak, P., Markel, H. and Taubenberger, J. K. 2020. Pandemic COVID-19 Joins history's pandemic legion. *Molecular Biology*, 11(3): e00812-20.

Morens, D. M., Folkers, G. K. and Fauci, A.S. 2008. Emerging infections: A perpetual challenge. *Lancet Infectious Disease*, 8: 710-719.

Morse, J. M. 1991. Approaches to qualitative-quantitative methodological triangulation. *Nursing Research*, 40(2): 120-123.

Morgan, D. L. 2014. *Integrating qualitative and quantitative methods: A pragmatic approach*. Thousand Oaks: Sage.

Moule, P and Goodman, M. 2014. *Nursing research: An introduction*. 2nd Edition. London: SAGE.

Moyo, S., Doan, T. N., Yun, J.A. and Tshuma, N. 2018. Application of machine learning models in predicting length of stay among Healthcare professionals in underserved communities in South Africa. *Human Resource Health*, 16: 68. 10.1186/s12960-018-0329-1.

Muhammad, F., Abdulkareem, J. H. and Chowdhury, A. A. 2017. Major Public Health Problems in Nigeria: A review. *South East Asia Journal of Public Health*, 7: 6-11.

Naik, N., Hameed B. Z., Sooriyaperakasam, N., Vinayahalingam, S., Patil, V., Smriti, K., Saxena, J., Shah, M., Ibrahim, S., Singh, A., Karimi, H., Naganathan, K., Shetty, D. K., Rai, B. P., Chlosta, P. and Somani, B. K. 2022. 'Transforming healthcare through a digital revolution: A review of Digital Healthcare Technologies and Solutions', *Frontiers in Digital Health*, 4. doi:10.3389/fdgth.2022.919985. (Accessed:16 June 2023).

Nangombe, J. and Amukugo, H. 2016. Development of the conceptual framework for a quality improvement training programme for health professionals in the ministry of health and social services in Namibia. *International Journal of Health*. 4. 46. 10.14419/ijh.v4i1.6109 (Accessed: 8 March 2024).

Naslund, J. A., Aschbrenner, K. A. and Bartels, S. J. 2016. How people living with serious mental illness use smartphones, mobile apps, and social media. *Psychiatric Rehabilitation Journal*, 39(4): 364-367.

Naslund, J. A. and Aschbrenner K. A. 2021. Technology use and interest in digital apps for mental health promotion and lifestyle intervention among young adults with serious mental illness. *Journal of Affective Disorders*. 6, <http://doi.org/10.1016/j.jadr.2021.100227> (Accessed: 5 June 2022).

Naveed, Q. N., Alam, M. M. and Tairan, N. 2020. Structural equation modelling for mobile learning acceptance by university students: An empirical study. *Sustainability*, 12, 8618.

Nguyen, L., Bellucci, E. and Nguyen, L. T. 2014. Electronic health records implementation: an evaluation of information system impact and contingency factors. *International Journal Medical Information*, 83(11): 779.

Nikou, S. and Aavakare, M. 2021. An assessment of the interplay between literacy and digital technology in higher education. *Education and Information Technologies*, 26, 3893–3915.

Nsubuga, P., White, M.E., Thacker, S. B., Anderson, M. A., Blount, S. B. and Broome, C. V. 2020. Public health surveillance: A tool for targeting and monitoring interventions. *Disease Control Priorities in Developing Countries*, 2: 997-1018.

Obasola, O. I., Mabawonku, I. and Lagunju, I. 2015. A review of e-Health interventions for maternal and child health in Sub-Sahara Africa. *Maternal and Child Health Journal*, 19: 1813-1824.

Odekunle, F. F., Odekunle, R. O. and Shankar, S. 2017. Why sub-Saharan Africa lags in electronic health record adoption and possible strategies to

increase its adoption in this region. *International Journal of Health Science*, 11(4):59-64.

Ogoina, D. 2013. Lassa fever: A clinical and epidemiological review. *Niger Delta Journal of Medicine and Medical Research*, 1(1): 1-10.

Ola, B. A. and Olibamoyo, O. 2020. Covid-19 in Nigeria: Implications for prevalent public mental health challenges. *Mental Health Review Journal*, 26(1): 32-41.

Oladehinde, G. J., Olayiwola, L. M. and Popoola, K. O. 2018. Land accessibility constraints of migrants in rural border settlements of Ogun State, Nigeria. *Environmental and Socio-Economic Studies*, 6, 46-56.

Oladimeji, O. J. and Fatusi, A. O. 2022. Realist Evaluation of the "Abiye" Safe Motherhood Initiative in Nigeria: Unveiling the Black-Box of Programme Implementation and Health System Strengthening. *Frontiers in Health Services*, 2: <http://doi.org/10.3389/frhs.2022.779130> (Accessed: 20 June 2023).

Olayiwola, J. N., Udenyi, E. D., Yusuf, G., Magana, C., Patel, R., Sajanlal, S., Potapov, A. and Kibuka. C. 2020. Leveraging electronic consultations to address severe subspecialty care access gaps in Nigeria. *Journal of National Medical Association*, 112: 97-102.

Olu, O., Muneene, D., Bataringaya, J. E., Nahimana, M. R., Ba, H., Turgeon, Y., Karamagi, H. C and Dovlo, D. 2019. How can digital health technologies contribute to sustainable attainment of universal health coverage in Africa? A Perspective. *Frontiers in Public Health*, 7: 341. doi: 10.3389/fpubh.2019.00341 (Accessed: 11 September 2022).

Olufadewa, I. I., Adesina, M. A., Oladokun, B., Baru, A., Oladele, R. I., Iyanda, T.O., Ajibade, O. J and Abudu, F. 2020 “I was scared I might die alone”: A qualitative study on the physiological and psychological experience of COVID-19 survivors and the quality of care received at health facilities. *International Journal of Travel Medicine and Global Health*, 8: 51-57.

Olumade, T. J., Adesanya, O. A., Fred-Akintunwa, I. J., Babalola, D. O., Oguzie, J. U., Ogunsanya, O. A., George, U. E., Akin-Ajani, O. D. and Osasona, D. G. 2020. Infectious disease outbreak preparedness and response in Nigeria: history, limitations and recommendations for global health policy and practice. *AIMS Public Health*, 7(4): 736-757.

Oluwakemi, S. 2020. Africa needs telemedicine to overcome its healthcare challenges. Published September, 16, 2020. Available from <http://africanews.space/africa-needs-telemedicine-to-overcome-its-medical-challenges/> (Accessed 28 February 2021).

Onwuegbuzie, A. J., and Leech, N. L. 2006. Linking research questions to mixed methods data analysis procedures. *The Qualitative Report*, 11(3), 474-498. <http://doi.org/10.46743/2160-3715/2006.1663> (Accessed: 8 June 2022).

Osei, E. and Mashamba-Thompson, T. P. 2021. Mobile health applications for disease screening and treatment support in low-and middle-income countries: A narrative review. *Heliyon*, 7(3), e06639.

Owoyemi, A., Osuchukwu, J., Azubuike, C., Ikpe, R., Nwachukwu, B., Akinde, C., Biokoro, G., Ajose, A., Nwokoma, I., Mfon, N., Benson, T., Ehimare, A., Irowa-Omoregie, D and Olaniran, S. 2022. Digital Solutions for Community and primary health workers: Lessons from implementations in Africa. *Frontiers in Digital Health*, 4. 876957. 10.3389/fdgth.2022.876957 (Accessed: 5 March 2024).

Owoyemi, A., Owoyemi, J., Osiyemi, A., and Boyd, A. 2020. Artificial Intelligence for Healthcare in Africa. *Frontiers in Digital Health*, 2: 6. doi.org/10.3389/fdgth.2020.00006 (Accessed: 6 July 2022).

Pachana, N., Beattie, E., Byrne, G. and Brodaty, H. 2020. COVID-19 and psychogeriatrics: the view from Australia. *International Psychogeriatric*, 32(10): 1135-1141.

Pantuvo, J. S., Naguib, R. and Wickramasinghe, N. 2011. Towards implementing a nationwide electronic health record system in Nigeria. *International Journal of Healthcare Delivery Reform Initiative*, 3(1): 39-55.

Perrone, G., Zerbo, S., Bilotta, C., Malta, G, and Argo, A. 2020 Telemedicine during Covid-19 pandemic: Advantage or critical issue? *Medico-Legal Journal*, 88(2): 76-77.

Perry, Y., Werner-Seidler, A., Cleave, A., Mackinnon, A., King, C., Scott, J., Merry, S., Fleming, T., Stasiak, K., Christensen, H. and Batterham, P. J. 2017. Preventing depression in final year secondary students: School-based randomized controlled trial. *Journal of Medical Internet Research*, 19(11): e369.

Peter, J. E., Barron, P. and Pillay, Y. 2015. Using mobile technology to improve maternal, child and youth health and treatment of HIV patients. *South African Medical Journal*, 106(4): 3-4.

Pfefferbaum B. and North C. S. 2020. Mental Health and the Covid-19 Pandemic. *The New England Journal of Medicine*, 383(6), 510-512.

Pillay, Y. and Motsoaledi, P. A. 2018. Digital health in South Africa: innovating to improve health. *British Medical Journal Global Health*, 3: e000722. doi:10.1136/ bmjgh-2018-000722.

Polit, D. F. and Beck, C. T. 2012. *Nursing Research: Generating and Assessing Evidence for Nursing Practice*. 9th Edition. Philadelphia: Wolters Kluwer.

Polit, D. F and Beck, C. T. 2014. *Nursing research, generating and assessing evidence for nursing practice*. Philadelphia: Lippincott Williams & Wilkins.

Rahman, A., Fisher, J., Bower, P., Luchters, S., Tran, T., Yasamy, M. T., Saxena, S., and Waheed, W. 2013. Interventions for common perinatal mental disorders in women in low- and middle-income countries: a systematic review and meta-analysis. *Bulletin of the World Health Organization*, 91(8): 593-601.

Rajkumar R. P. 2020. COVID-19 and mental health: A review of the existing literature. *Asian Journal of Psychiatry*, 52: 102066.

Ramos, R. M., Ferrer-Cheng, P. G. and Castro, F. R. 2015. Chapter # 16 Attitudes Toward m-Health: A look at general attitudinal indices among selected Filipino Undergraduates. *Medicine*; 186.

Ransing, R., Adiukwu, F., Pereira-Sanchez, V., Ramalho, R., Orsolini, L., Teixeira, A. L. S., Gonzalez-Diaz, J. M., Pinto da Costa, M., Soler-Vidal, J., Bytyçi, D. G., El Hayek, S., Larnaout, A., Shalbafan, M., Syarif, Z., Nofal, M and Kundadak, G. K. 2020. Mental health interventions during the COVID-19 pandemic: A Conceptual Framework by Early Career Psychiatrists. *Asian Journal of Psychiatry*, 51: 1-8.

Reese, C. S. and Stone, S. 2005. Therapeutic alliance in face-to-face versus video-conferenced psychotherapy. *Professional Psychology: Research and Practice*; 36: 649-653.

Rice, M. 2003. Information and communication technologies and the global digital divide: Technology transfer, development, and least developing countries. *Comparative Technology Transfer and Society*, 1(1): 72-88.

Ridout, B. and Campbell, A. 2018. The use of social networking sites in mental health interventions for young people: systematic review. *Journal of Medical Internet Research*, 20: e12244. doi: 10.2196/12244 (Accessed: 11 April 2022).

Riffai, M. M. M. A., Grant, K. and Edgar, D. 2012. Big TAM in Oman: Exploring the promise of on-line banking, its adoption by customers and the challenges of banking in Oman. *International Journal of Information Management*. 32, 239-250.

Riley, W. T., Rivera, D. E., Atienza, A. A., Nilsen, W., Allison, S. M., Mermelstein, R. 2011. Health behaviour models in the age of mobile interventions: Are our theories up to the task? *Translational behavioral medicine*. 1(1):53-71.

Ross, J., Stevenson, F., Lau, R and Murray, E. 2016. Factors that influence the implementation of e-Health: A systematic reviews (an update). *Implementation Science*, 11(1): 146.

Rotenstein, L. S., Ramos, M. A., Torre, M., Segal, J. B., Peluso, M. J., Guille, C., Sen, S. and Mata, D. A. 2016. Prevalence of depression, depressive symptoms, and suicidal ideation among medical students: A systematic review and meta-analysis. *Journal of the American Medical Association*, 316(21): 2214-2236. doi: 10.1001/jama.2016.17324 (Accessed: 10 June 2022).

Roy, A., Singh, A. K., Mishra, S., Chinnadurai, A., Mitra, A. and Bakshi, O. 2021. Mental health implications of COVID-19 pandemic and its response in India. *International Journal of Social Psychiatry*, 67(5): 587-600.

Ryan, G. K., Nwefoh, E., Aguocha, C., Ode, P.O., Okpoju, S. O., Ocheche, P., Woyengikuro, A., Abdulmalik, J. and Eaton, J. 2020. Partnership for the implementation of mental health policy in Nigeria: A case study of the

comprehensive community mental health programme in Benue State. *International Journal of Mental Health Systems*, 14: 10.

Sadig, H. 2011. Non-response weight adjustments in longitudinal surveys. In *Survey research methods and applications*. Pisa: Edizioni plus-Pisa University Press.

Särndal, C. E. and Lundström, S. 2005. *Estimation in surveys with nonresponse*. West Sussex, England: John Wiley & Sons Ltd.

Schuman, H. and Kalton, G. 1985. Survey methods. In Lindzey G., and Aronson, E (Eds.). *Handbook of Social Psychology*. 3rd edition. New York: Random House.

Sehume, O. L. and Markus E. D. 2020. A critical analysis of medical robotic assistive systems for early diagnosis of common ailments in South Africa. *International Journal of Robotics Engineering*, 9(10): 1451-1456.

Sesagiri Raamkumar, A., Tan, S. G. and Wee, H. L. 2020. Measuring the outreach efforts of public health authorities and the public response on Facebook during the COVID-19 pandemic in early 2020: Cross-country comparison. *Journal of Medical Internet Research*, 22(5): 12.

Setkowski K., Nokkenstorm, J., van Balkom, A., Franx, G., Noord, I. V, Dongelmans, D. A, Eikelenboom, M. and Gilissen, R. 2018. Feasibility and impact of data-driven learning within the suicide prevention action network of thirteen specialist mental healthcare institutions (SUPRANET Care) in the Netherlands: A study protocol. *British Medical Journal Open*, 8: 1-6.

Sequeira, L., Perrotta, S., LaGrassa, J., Merikangas, K., Kreindler, D., Kundur, D., Courtney, D. B. Szatmari, P., Battaglia, M., and Strauss, J. 2020. Mobile

and wearable technology for monitoring depressive symptoms in children and adolescents: A scoping review. *Journal of Affective Disorder*, 265: 314-324.

Sheikh, T. L., Adekeye, O., Olisah, V. O. and Mohammed, A. 2015. Stigmatisation of mental illness among employees of a Northern Nigerian University. *Nigerian Medical Journal*; 56:244-8.

Sibiya, M. N. and Ramlucken, L. 2021. Willingness and feasibility of utilising short messaging services (SMS) as reminders of follow-up care to mental health care users in the uMgungundlovu District, KwaZulu-Natal. *International Journal of Africa Nursing Sciences*, 14: 1-7.

Siddle, K. J., Eromon, P., Barnes, K. G., Mehta, S., Oguzie, J. U., Odia, I., Schaffner, S. F., Winnicki, S. M., Shah, R. R., Qu, J., Wohl, S., Brehio, P., Iruolagbe, C., Aiyepada, J., Uyigue, E., Akhilomen, P., Okonofua, G., Ye, S., Kayode, T., Ajogbasile, F., Uwanibe, J., Gaye, A., Momoh, M., Chak, B., Kotliar, D., Carter, A., Gladden-Young, A., Freije, C. A., Omoregie, O., Osiemi, B., Muoebonam, E. B., Airende, M., Enigbe, R., Ebo, B., Nosamiefan, I., Oluniyi, P., Nekoui, M., Ogbaini-Emovon, E., Garry, R. F., Sigulem, D., Ramos, M.P, and R. de Holanda Albuquerque, R. 2017. *The new medicine: From the paper medical record to the digitalized human being*. Academic Press. ISBN 978-0-12-804-591-6.

Siedner, M. J., Harling, G., Derache, Anne., Smit, T., Khoza, T., Gunda, R., Mngomezulu, T., Gareta, D., Majosi, N., Ehlers, E., Dreyer, J., Nxumalo, S., Dayi, N., Ordning-Jespersion, G., Ngwenya, N., Wong, E., Iwuji, C., Shahmanesh, M., Seeley, J., De Oliveira, T., Ndung, u, T., Hanekom, W. and Herbst, K. 2020. Protocol: Leveraging a demographic and health surveillance for Covid-19 Surveillance in rural KwaZulu-Natal. *Wellcome Open Research*, 5: 109-109.

Singla, D. R., Kohrt, B. A., Murray, L. K., Anand, A., Chorpita, B. F., and Patel, V. 2017. Psychological treatments for the world: Lessons from low- and middle-income countries. *Annual Review of Clinical Psychology*, 13: 149-181.

Singla, D. R., Weobong, B., Nadkarni, A., Chowdhary, N., Shinde, S., Anand, A., Fairburn, C. G., Dimijdan, S., Velleman, R., Weiss, H., and Patel, V. 2014. Improving the scalability of psychological treatments in developing countries: an evaluation of peer-led therapy quality assessment in Goa, India. *Behaviour Research and Therapy*, 60: 53-59.

Slade, T., Johnston, A., Mark, A., Browne, O., Andrews, G. and Whiteford, H. 2007. National Survey of Mental Health and Wellbeing: methods and key findings. *Australian and New Zealand Journal of Psychiatry*, 43(7), 594-605.

Smith, A. C., Thomas, E., Snoswell, C. L., Haydon, H., Mehrotra, A., Clemensen, J. and Caffery, L.J. 2020. Telehealth for global emergencies: Implications for coronavirus disease 2019 (COVID-19). *Journal of Telemedicine and Telecare*, 26(5): 309-313.

Sigulem, D., Ramos, M. P. and de Holanda Albuquerque A. R. 2017. The New Medicine: From the Paper Medical Record to the Digitized Human Being. (Eds): Heimar de Fátima Marin, Eduardo Massad, Marco Antonio Gutierrez, Roberto J. Rodrigues, Daniel Sigulem. *Global Health Informatics*, Academic Press: 152-167.

Subu, M. A., Wati, D. F., Netrida, N., Priscilla, V., Dias, J. M., Abraham, M. S., Slewa-Younan, S. and Al-Yateem, N. 2021. Types of stigma experienced by patients with mental illness and mental health nurses in Indonesia: A qualitative content analysis. *International Journal of Mental Health Systems*, 15(1), 77.

Sutcliffe, C. G., Thuma, P. E., van Dijk, J. H., Sinywimaanzi, K., Mweetwa, S. and Hamahuwa M. 2017. Use of mobile phones and text messaging to

decrease the turnaround time for early infant HIV diagnosis and notification in rural Zambia: an observational study. *BMC Pediatrics*, 17: 1-9.

Szlyk, H. S. and Tan, J. 2020. The role of technology and the continuum of care for youth suicidality: Systematic review. *Journal of Medical Internet Research*, 22 (10): e18672.

Taylor L. 2022. Covid-19: True global death toll from pandemic is almost 15 million, says WHO. *British Medical Journal*, 6: 377.doi: 10.1136/bmj.o1144 (Accessed: 8 June 2023).

Teo, T. S. H., Srivastava, S. C. and Jiang, L. 2008. Trust and electronic government success: An empirical study. *Journal of Management Information Systems*. 25, 99-132.

The Lancet Global Health. 2020. The time is now: Reforming Nigeria's outdated mental laws. Available: [http://doi.org/10.1016/S2214-109X\(20\)30302-8](http://doi.org/10.1016/S2214-109X(20)30302-8) (Accessed 8 June 2021).

Thomas, N., Foley, F., Lindblom, K. and Lee, S. 2017. Are people with severe mental illness ready for online interventions? Access and use of the Internet in Australian mental health service users. *Australasian Psychiatry*, 25(3): 257-261. doi:10.1177/1039856217689913 (Accessed: 6 June 2022).

Timakum, T. Xie, Q. and Song, M. 2022. Analysis of E-mental health research: mapping the relationship between information technology and mental healthcare. *BioMed Central Psychiatry*, 22(1): 57.

Tomita, A., Kandolo, K. M., Susser, E. and Burns, J. K. 2016. Use of short messaging services to assess depressive symptoms among refugees in South Africa: Implications for social services providing mental health care in resource-poor settings. *Journal of Telemedicine and Telecare*, 22(6), 369-377.

Torales, J., O'Higgins, M., Castaldelli-Maia, J. M. and Ventriglio, A. 2020. The outbreak of COVID-19 coronavirus and its impact on Global Mental Health. *International Journal of Social Psychiatry*, 66(4): 317-320.

Tracy, S. J. 2013. *Qualitative research methods: Collecting evidence, crafting analysis, communicating impact*. Chichester: Wiley-Blackwell.

Trujillo, J. L. 2015. The use of coaching sessions and a mobile reminder application to enhance medication adherence in adults at an outpatient mental health clinic. *International Journal of Nursing*, 2(2):104-127.

Uakarn, C., Chaokromthong, K and Sintao, N. 2021. Sample size estimation using Yamane and Cochran and Krejcie and Morgan and Green Formulas and Cohen statistical power Analysis by G*Power and Comparisons. *Apheit International Journal*, 10(2): 76-88.

Valenstein, M., Kavanagh, J., Lee, T., Reilly, P., Dalack, G. W., Grabowski, J., Smelson, D., Ronis, D. L., Ganoczy, D., Woltmann, E., Metreger, T., Wolschon, P., Jensen, A., Poddig, B., and Blow, F. C. 2011. Using a pharmacy-based intervention to improve antipsychotic adherence among patients with serious mental illness. *Schizophrenia Bulletin*, 37(4), 727-736. <https://doi.org/10.1093/schbul/sbp121> (Accessed: 12 July 2023).

Van Daele, T., Karekla, M., Kassianos, A. P., Compare, A., Haddouk, L., Salgado, J., Ebert, D. D., Trebbi, G., Bernaerts, S., Van Assche, E., Nele A.J and De Witt. 2020. Recommendations for policy and practice of telepsychotherapy and mental health in Europe and beyond. *Journal of Psychotherapy Integration*, 30: 160-173.

Venkatesh, V., Morris, M. G., Davis, G. B. and Davis, F. D. 2003. User acceptance of information technology: Toward a unified view. *Management Information System Quarterly*, 27(3): 425-478.

Vernig, P. M. and Repique, R. J. R. 2015. Short message service can be a promising tool for mental health patients and clinicians. *Journal of the American Mental health Nurses Association*, 21(1): 31-33.

Wada, Y. H., Rajwani, L., Anyam, E., Karikari, E., Njikizana, M., Srour, L., and Khalid, G, M. 2021. Mental health in Nigeria: A Neglected issue in public health. *Public Health in Practice*, 2: 1-3.

Wamala, D and Augustine, K. 2013. A meta-analysis of telemedicine success in Africa. *Journal of Pathology Informatics*, 4: 6-7.

Wang, Cuiyan, Riyu Pan, Xiaoyang Wan, Yilin Tan, Linkang Xu, Cyrus S. H, and Roger C. H. 2020. Immediate Psychological responses and associated factors during the initial stage of the 2019 coronavirus disease (COVID-19) epidemic among the general population in China. *International Journal of Environmental Research and Public Health*, 17(5): 1729.

Watkins, J.O.T.A., Goudge, J., Gómez-Olivé, F. X. and Griffiths, F. 2018. Mobile phone use among patients and health workers to enhance primary healthcare: A qualitative study in rural South Africa. *Social Science and Medicine*, 198: 139-147.

The Digital Mental Health Revolution - Wish Virtual. Available at: <https://2020.wish.org.qa/app/uploads/2020/09/IMPJ7849-03-Digital-Mental-Health-WISH2020-201103-WEB.pdf> (Accessed: 11 August 2023).

World Bank. *Nigeria Development Update December 2022 - Nigeria's Choice (English)*. Available at: <https://www.worldbank.org/en/country/nigeria/overview> (Accessed: 10 June 2023).

World Health Organization (WHO). 2005. *WHO Framework Convention on Tobacco Control*. Geneva: WHO.

World Health Organization (WHO). 2006. *Assessment Instrument for Mental Health Systems (WHO-AIMS)*. *Report on Mental Health Systems in Nigeria*. Geneva: WHO.

World Health Organization (WHO). 2008. *The global burden of diseases: 2004 update*. Geneva: WHO.

World Health Organization (WHO). 2011. *World Bank. World Report on Disability*. Geneva: WHO.

World Health Organization (WHO). 2016. *Global diffusion of e-Health: Making universal health coverage achievable*. WHO: Geneva. Available online at: <https://apps.who.int/iris/bitstream/10665/252529/1/9789241511780-eng.pdf?ua=1> (Accessed 21 November 2021).

Xiang Y. T., Yang Y., Li W., Zhang L., Zhang Q., and Cheung T. 2020. Timely mental healthcare for the 2019 novel coronavirus outbreak is urgently needed. *The Lancet Psychiatry*, 7: 228-229.

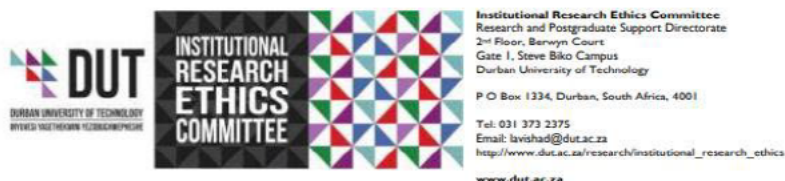
Xiao, X., Zhu, X., Fu, S., Hu, Y., Li, X. and Xiao, J. 2020. Psychological impact of Healthcare professionals in China during COVID-19 pneumonia epidemic: a multi-centre cross-sectional survey investigation. *Journal of Affective Disorder*, 274: 405-410.

Zhu, Y., Zhao, Z., Guo, J., Wang, Y., Zhang, C., Zheng, J., Zou, Z., and Liu, W. 2023. Understanding Use Intention of m-Health Applications Based on the

Unified Theory of Acceptance and Use of Technology 2 (UTAUT-2) Model in China. *International Journal of Environmental Research and Public Health*, 20(4), 3139.

APPENDICES

Appendix 1: University Ethics clearance



30 November 2022

Ms O Y Fashoto
Private Bag 4
Kwaluseni
M201

Dear Ms Fashoto

Building a contemporary model for integrating digital health technologies to improve mental health services and wellbeing in public health care system in Nigeria
Ethical Clearance number IREC 164/22

The DUT-Institutional Research Ethics Committee acknowledges receipt of your final data collection tool for review.

We are pleased to inform you that the data collection tool has been approved. Kindly ensure that participants used for the pilot study are not part of the main study.

In addition, the DUT-IREC acknowledges receipt of your gatekeeper permission letters.

Please note that **FULL APPROVAL** is granted to your research proposal. You may proceed with data collection.

Any adverse events [serious or minor] which occur in connection with this study and/or which may alter its ethical consideration must be reported to the DUT-IREC according to the DUT-IREC Standard Operating Procedures (SOP's).

Please note that any deviations from the approved proposal require the approval of the DUT-IREC as outlined in the DUT-IREC SOP's.

Yours Sincerely

Prof J K Adam
Chairperson: DUT-IREC

Appendix 2a: Letter of request for permission from Neuropsychiatric Hospital Akure

Private Bag 4
Kwaluseni
M201
[Date]

Chief Medical Director
Neuropsychiatric Hospital Akure
Akure, Ondo State

Request for Permission to Conduct Research

Dear Sir/Madam

My name is Fashoto Olubunmi Yemisi, a PhD student at the Durban University of Technology. The research I wish to conduct for my Doctoral thesis involves **Building a contemporary model for integrating digital health technologies to improve mental health services and wellbeing in public healthcare system in Nigeria.**

I am hereby seeking your consent to conduct the study.

I have provided you with a copy of my proposal which includes copies of the letter of information, consent, data collection tools to be used in the research process, as well as a copy of the approval letter which I received from the Institutional Research Ethics Committee (IREC).

If you require any further information, please do not hesitate to contact my supervisor, Prof M.N. Sibiya. Her email address is: nokuthulas@dut.ac.za

Thank you for your time and consideration in this matter.

Yours sincerely,

.....
Fashoto Olubunmi Yemisi (Ms)
Durban University of Technology
Tel: +26878170163
Email: bunmiolabodu@yahoo.com

Appendix 2b: Approval letter from Neuropsychiatric Hospital Akure

TELEGRAMS:.....
PRIVATE MAIL BAG NO:.....

TELEPHONE: 07032046192
08035689927

 **NEURO-PSYCHIATRIC SPECIALIST HOSPITAL**
AKURE

ONDO STATE OF NIGERIA

All communications should be addressed to the Chief Medical Director

Your Ref. No:.....

Our Ref. No:.....

Date: 17th Oct. 2022

NOTICE OF APPROVAL AFTER REVIEW OF SUBMITTED RESEARCH DOCUMENTS

Re: Building a contemporary model for integrating digital health technologies to improve mental health services and wellbeing in public healthcare system in Nigeria.

This is to inform you that the above mentioned research seeking to be partly carried out in our facility : Neuro Psychiatric Hospital (NPH) Akure, has been considered.

Having read through the submitted research documents, and with the knowledge that the researchers have gone through comprehensive research and ethics clearance from UI/UCH ethics committee, the management of NPH Akure, hereby give full approval to use our facility only for the purpose of the above mentioned research as reflected in the research protocols.

Dr. Akinnuoye AA.
HOSPITAL ADMINISTRATIVE SECRETARY
NEURO PSYCHIATRIC HOSPITAL
AKURE

Appendix 3a: Letter of request for permission from ARO Neuropsychiatric Hospital

Private Bag 4
Kwaluseni
M201
[Date]

Chief Medical Director
ARO Neuropsychiatric Hospital
Abeokuta, Ogun State

Request for Permission to Conduct Research

Dear Sir/Madam

My name is Fashoto Olubunmi Yemisi, a PhD student at the Durban University of Technology. The research I wish to conduct for my Doctoral thesis involves **Building a contemporary model for integrating digital health technologies to improve mental health services and wellbeing in public healthcare system in Nigeria.**

I am hereby seeking your consent to conduct the study.

I have provided you with a copy of my proposal which includes copies of the letter of information, consent, data collection tools to be used in the research process, as well as a copy of the approval letter which I received from the Institutional Research Ethics Committee (IREC).

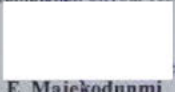
If you require any further information, please do not hesitate to contact my supervisor, Prof M.N. Sibiya. Her email address is: nokuthulas@dut.ac.za

Thank you for your time and consideration in this matter.

Yours sincerely,

.....
Fashoto Olubunmi Yemisi (Ms)
Durban University of Technology
Tel: +26878170163
Email: bunmiolabodu@yahoo.com

Appendix 3b: Approval letter from ARO Neuropsychiatric Hospital

	NEUROPSYCHIATRIC HOSPITAL, ARO. RESEARCH ETHICS COMMITTEE P.M.B. 2002, ABEOKUTA, OGUN STATE, NIGERIA.	
Ref No. <u>NPHA/276/VOL.VI/045</u>	Date: <u>9th November, 2022</u>	
NPHA HREC REGISTRATION NUMBER: NHREC/08/03/2021		
NOTICE OF FULL APPROVAL AFTER FULL COMMITTEE REVIEW		
RE: BUILDING A CONTEMPORARY MODEL FOR INTEGRATING DIGITAL HEALTH TECHNOLOGIES TO IMPROVE MENTAL HEALTH SERVICES AND WELLBEING IN PUBLIC HEALTHCARE SYSTEM IN NIGERIA		
NPHA Ethic Committee Assigned Number	PRO10/22	
Name of Principal Investigator	Fashoto Olubumi Yemisi	
Address of Principal Investigator	Private Bag 4 Kwalvsemi, M201 South - Africa	
Date of Receipt of Valid Application:	19th September, 2022	
Date of meeting final determination on approval was made 8th November, 2022		
This is to inform you that research described in the submitted protocol, the consent forms and other participant information materials have been reviewed and given full approval by the Neuropsychiatric Hospital, Aro, Abeokuta, Health Research Ethic Committee (NPHA HREC)		
This approval dates from 8th November 2022 - 7th November, 2023 if there is delay in starting the research, please inform the NPHA Ethic Committee so that the date of approval can be adjust accordingly. Note that no participant accrual or activity related to this research may be conducted outside of these date. All informed consent form used in this study the NPHA HREC assigned number and duration of NPHA HREC approval of the study. It is expected that submit your annual report as well as an annual request for the project renewal to the NPHA HREC early in order to obtain renewal of your approval to avoid disruption of your research.		
The National Code of Health Research Ethic requires you to comply with all institutional guidelines, rules and regulations and with the tenets of the code including ensuring that all adverse events are reported promptly to NPHA HREC. No change are permitted in the research without prior approval by NPHA HREC except in circumstance in the Code. The NPHA HREC reserves the right to conduct compliance visit to your research site without pervious notification.		
You are to submit a copy of your report to the committee for vetting before any peer review examination defense upon completion of your research,		
 Dr O. E. Majekodunmi <i>Chairman NPHA HREC</i>		
E-mail: hrec@neuroaro.com		Phone No: +234 - 8133970504

Appendix 4a: Letter of request for permission from University of Ibadan Teaching Hospital

Private Bag 4
Kwaluseni
M201
[Date]

Chief Medical Director
University of Ibadan Teaching Hospital
Ibadan, Oyo State

Request for Permission to Conduct Research

Dear Sir/Madam

My name is Fashoto Olubunmi Yemisi, a PhD student at the Durban University of Technology. The research I wish to conduct for my Doctoral thesis involves **Building a contemporary model for integrating digital health technologies to improve mental health services and wellbeing in public healthcare system in Nigeria.**

I am hereby seeking your consent to conduct the study.

I have provided you with a copy of my proposal which includes copies of the letter of information, consent, data collection tools to be used in the research process, as well as a copy of the approval letter which I received from the Institutional Research Ethics Committee (IREC).

If you require any further information, please do not hesitate to contact my supervisor, Prof M.N. Sibiya. Her email address is: nokuthulas@dut.ac.za

Thank you for your time and consideration in this matter.

Yours sincerely,

.....
Fashoto Olubunmi Yemisi (Ms)
Durban University of Technology
Tel: +26878170163, 22279284@dut4life.ac.za
Email: bunmiolabodu@yahoo.com

Appendix 4b: Approval letter from University of Ibadan Teaching Hospital



INSTITUTE FOR ADVANCED MEDICAL RESEARCH AND TRAINING (IAMRAT)

College of Medicine, University of Ibadan

Director: **Prof. IkeOluwapo O. Ajayi**,
MBBS (Ib), M. CI.Sc., Ph.D, MD, FMCGP, FWACP
Tel: 08023268431
E-mail: ikeajayi2003@yahoo.com



UI/UCH EC Registration Number: NHREC/05/01/2008a

NOTICE OF FULL APPROVAL AFTER FULL COMMITTEE REVIEW

Re: Assessment on the application of Information Technology in health information practice in University College Hospital, Ibadan

UI/UCH Ethics Committee assigned number: UI/EC/22/0325

Name of Principal Investigator: **Olubunmi Y. Fashoto**

Address of Principal Investigator: Department of Health Sciences
Durban University of Technology, South Africa

Date of receipt of valid application: 02/09/2022

Date of meeting when final determination on ethical approval was made: N/A

This is to inform you that the research described in the submitted protocol, the consent forms, and other participant information materials have been reviewed and *given full approval by the UI/UCH Ethics Committee*.

This approval dates from **15/09/2022 to 14/09/2023**. If there is delay in starting the research, please inform the UI/UCH Ethics Committee so that the dates of approval can be adjusted accordingly. Note that no participant accrual or activity related to this research may be conducted outside of these dates. *All informed consent forms used in this study must carry the UI/UCH EC assigned number and duration of UI/UCH EC approval of the study*. It is expected that you submit your annual report as well as an annual request for the project renewal to the UI/UCH EC at least four weeks before the expiration of this approval in order to avoid disruption of your research.

The National Code for Health Research Ethics requires you to comply with all institutional guidelines, rules and regulations and with the tenets of the Code including ensuring that all adverse events are reported promptly to the UI/UCH EC. No changes are permitted in the research without prior approval by the UI/UCH EC except in circumstances outlined in the Code. The UI/UCH EC reserves the right to conduct compliance visit to your research site without previous notification.



Professor **IkeOluwapo O. Ajayi**
Director, IAMRAT OF MEDICINE, U.I.
Chairperson, UI/UCH Research Ethics Committee
E-mail: uiuchec@gmail.com

Appendix 5a: Letter of request for permission from Yaba Neuropsychiatric Hospital

Private Bag 4
Kwaluseni
M201
[Date]

Chief Medical Director
Yaba Neuropsychiatric Hospital
Yaba
Lagos

Request for Permission to Conduct Research

Dear Sir/Madam

My name is Fashoto Olubunmi Yemisi, a PhD student at the Durban University of Technology. The research I wish to conduct for my Doctoral thesis involves **Building a contemporary model for integrating digital health technologies to improve mental health services and wellbeing in public healthcare system in Nigeria.**

I am hereby seeking your consent to conduct the study.

I have provided you with a copy of my proposal which includes copies of the letter of information, consent, data collection tools to be used in the research process, as well as a copy of the approval letter which I received from the Institutional Research Ethics Committee (IREC).

If you require any further information, please do not hesitate to contact my supervisor, Prof M.N. Sibiya. Her email address is: nokuthulas@dut.ac.za

Thank you for your time and consideration in this matter.

Yours sincerely,

.....
Fashoto Olubunmi Yemisi (Ms)
Durban University of Technology
Tel: +26878170163
Email: bunmiolabodu@yahoo.com

Appendix 5b: Approval letter from Yaba Neuropsychiatric Hospital



FEDERAL NEURO-PSYCHIATRIC HOSPITAL, YABA - LAGOS

8, Harvey Road, P.M.B. 2008 Yaba, Lagos, Nigeria. Tel: 0906 000 1907, 0815 517 0000
 E-mail: enquiries@fnphyaba.gov.ng neuropsychiatrichospitalyaba@yahoo.com
 Website: www.fnphyaba.gov.ng

DR. CHUKWUKELU J. OKAFOR
MD, FICS, FRCS
CHAIRMAN, MANAGEMENT BOARD

DR. OLUGBENGA A. OWOYE
MBChB, MRCP, MPhil, FRCPsych,
FRCS, MSc
MEDICAL DIRECTOR

DR. S. O. OLURAKIN
MBChB, FRACP, MRCP, MSc
HEAD OF CLINICAL SERVICES

ADEYINKA ANTIW
BA (Hons), MSc, PGD (Hons, Mgt),
MMP (Management Project), ANBA, PHSAN, FRM
DIRECTOR OF ADMINISTRATION

FNPHY/HREC/2022/001/08/046/B

Fashoto Olubunmi Yemisi (Ms)
Durban University of Technology,
Private Bag 4,
Kwaluseni
M201

TEL: +26878170163

RE: BUILDING A CONTEMPORARY MODEL FOR INTEGRATING DIGITAL HEALTH TECHNOLOGIES TO IMPROVE MENTAL HEALTH SERVICES AND WELLBEING IN PUBLIC HEALTHCARE SYSTEM IN NIGERIA

I am directed to inform you that your proposal has been reviewed and approved.

You are hereby granted permission to proceed with the research.

Conclusion: Approved.

A copy of this final research study should be sent to the hospital library for record purpose.

Thank you.

28th November, 2022.

Dr. T. G. IJAROGBE
Chairperson
HREC

K.O. ISEGEM
Secretary
HREC

08995

Mental Health Service Provider since 1907

Note: That this approval expires if the research is not commenced within the next one year.

Appendix 6a: Letter of information for survey participants



Title of the Research Study: Building a model for integrating digital health technologies to improve mental health and wellbeing in public healthcare system in Nigeria.

Principal Investigator/s/researcher: Ms Fashoto Olubunmi Yemisi, PhD: Health Sciences Candidate.

Co-Investigator/s/supervisor/s: Prof. M.N. Sibiya, D Tech (Supervisor): Nursing; Dr O. Oladimeji, PhD (Co-supervisor).

Brief Introduction and Purpose of the Study: Efficient response during an outbreak has been very difficult in many developing countries including Nigeria because of the fragile health care system due to several obstacles, challenges and complexities. Nigeria is among countries generally experiencing social unrest, ethnic wars coupled with outbreaks and other health emergencies such as Malaria, Ebola, and COVID-19. The emergence of natural disasters coupled with the outbreak of infectious disease poses a transformative shift towards the integration of digital technologies in the provision of much needed mental health services and wellbeing. Shortage of mental health service providers coupled with stringent restrictions and measures also exacerbate mental health challenges. There is also poor healthcare funding, which jeopardizes the effectiveness of the healthcare system. About 4.5% of the budget is allocated to the health department in 2020 which will jeopardize the efficiency towards readiness for outbreaks or public health emergencies. There is a need to prioritize and strengthen the health care sector. Notably, there is limited literature on the integration of digital technologies in mental health services especially during public

health disasters and lack of policy and guiding framework to guide the provision of mental health services in the public health system through digital technologies.

Purpose of the study: The aim of this study is to develop a model that will aid in the integration of digital technologies in public healthcare system so as to improve mental health care service delivery and wellbeing in Nigeria.

Greeting. Good morning.

Introduce yourself to the participant. I am a PhD student at DUT undertaking a research for my PhD degree in Health Sciences.

Invitation to the potential participant I would like to invite you to participate in the research Building a model to integrate digital health technologies to improve mental health and wellbeing in public healthcare system in Nigeria.

What is Research? A research is an investigation and the in-depth analysis of material to establish a fact.

Outline of the Procedures: You are encouraged to participate in this study by completing the questionnaires that will be handed to you at your workplace. The questionnaire is in English and writing pens will be provided to each participant and you are encouraged to observe COVID-19 regulations by wearing of face masks and sanitizing before commencing and after the research. The questionnaire contained five sections and may take about twenty to thirty (20-30) minutes to complete. You are encouraged to ask any questions that you might have in connection with this project at any stage and the project leader and her research assistance will gladly answer as many questions as possible in relation to the study. The researcher and research assistants will also discuss the project in detail with you. You are also encouraged to return filled questionnaires to the project leader or her assistants.

Risks or Discomforts to the Participant: There are no known consequences in participating in this study.

Explain to the participant the reasons he/she may be withdraw from the

Study: Participation in this study is voluntary and under no condition will you be forced, tricked or coerced to participate in this study. You have a right to withdraw your participation at any point without explanation from filling of the questionnaire, if you are not comfortable with the questions. If you want to terminate from the study, you can inform the researcher or research assistants of the intention to terminate and there is no need to provide reasons for wanting to terminate.

Benefits: Results from this study will be beneficial to participants and patients because the proposed digital technology model will foster wellbeing and enhance effectiveness in mental health care service delivery by bridging response time between patient and care givers.

Remuneration: There is no remuneration for participating in the study.

Costs of the Study: No cost will be covered by individuals participating in this study.

Confidentiality: Questionnaires will be distributed to participants in their offices and filling of questionnaires will be done at your convenience. You are not expected to provide your name or any information that would jeopardize your privacy. Only the researcher and research assistance will assist in the collection of completed questionnaires. Completed questionnaires will be kept in a protected cabinet and extracted data from the questionnaires will be password protected to prevent unauthorized access. Hardcopies will be destroyed and softcopies will be deleted after 5 years in accordance to Ethical regulations. Access to records that pertain to participation in the study will be restricted to persons directly involved in the research.

Results: Findings from this study will lead to the development of the proposed model which will improve mental health care services and wellbeing in public health care

system. Contributions will aid in identifying the most effective digital tool that will be efficient during health emergencies. Possible hindrances to the utilization of digital technologies will be explored and ways to minimize the effect will be identified. This will enable health care workers to reach as many clients as possible within the shortest time possible.

Research-related Injury: There is no research-related injury when participating in this research.

Storage of all electronic and hard copies including tape recordings: Hard copies of data collected will be stored in a lock protected cabinet while soft copies of data extracted from the questionnaires will be stored and password will be used. Access to the data will be very limited and consent will be sought from participant if some of the data will be made public. Duration of storage will be for 5 years and all hardcopies will be destroyed and softcopies will be permanently deleted.

Persons to contact in the Event of Any Problems or Queries: Please contact the researcher, Ms Fashoto (+26878170163), my supervisors Prof. Sibīya (+27 31 373 2284), Dr Oladimeji (+27 62 258 3986) or the Institutional Research Ethics Administrator on +27 31 373 2375. Complaints can be reported to the Director: Research and Postgraduate Support Dr L Linganiso on +27 31 373 2577 or researchdirector@dut.ac.za

Appendix 6b: A letter of information for interview participants



Title of the Research Study: Building a model for integrating digital health technologies to improve mental health and wellbeing in public healthcare system in Nigeria.

Principal Investigator/s/researcher: Ms Fashoto Olubunmi Yemisi, PhD: Health Sciences Candidate.

Co-Investigator/s/supervisor/s: Prof. M.N. Sibiya, D Tech (Supervisor): Nursing; Dr O. Oladimeji, PhD (Co-supervisor).

Brief Introduction and Purpose of the Study: Efficient response during an outbreak has been very difficult in many developing countries including Nigeria because of the fragile health care system due to several obstacles, challenges and complexities. Nigeria is among countries generally experiencing social unrest, ethnic wars coupled with outbreaks and other health emergencies such as Malaria, Ebola, and COVID-19. The emergence of natural disasters coupled with the outbreak of infectious disease poses a transformative shift towards the integration of digital technologies in the provision of much needed mental health services and wellbeing. Shortage of mental health service providers coupled with stringent restrictions and measures also exacerbate mental health challenges. There is also poor healthcare funding, which jeopardizes the effectiveness of the healthcare system. About 4.5% of the budget is allocated to the health department in 2020 which will jeopardize the efficiency towards readiness for outbreaks or public health emergencies. There is a need to prioritize and strengthen the health care sector. Notably, there is limited literature on the integration of digital technologies in mental health services especially during public

health disasters and lack of policy and guiding framework to guide the provision of mental health services in the public health system through digital technologies.

Purpose of the study: The aim of this study is to develop a model that will aid in the integration of digital technologies in public healthcare system so as to improve mental health care service delivery and wellbeing in Nigeria.

Greeting. Good morning.

Introduce yourself to the participant. I am a PhD student at DUT undertaking a research for my PhD degree in Health Sciences.

Invitation to the potential participant I would like to invite you to participate in the research Building a model to integrate digital health technologies to improve mental health and wellbeing in public healthcare system in Nigeria.

What is Research? A research is an investigation and the in-depth analysis of material to establish a fact.

Outline of the Procedures: In this study, you are kindly requested to participate in the semi-structured interview. Participation is voluntary and you do not have to give your name but it is expected that you will give very sincere response to each item. Writing pens will be provided to participants and they will be encouraged to observe COVID-19 regulations by wearing of face masks and sanitizing before commencing the research and after the research. The semi-structured interview may take about 40 minutes depending on how much information participants would like to share. The semi structure interview is designed to better understand participant's perceptions towards the utilization of digital technologies to improve mental healthcare services and wellbeing, and what factors must be addressed to enhance the use of digital technologies, especially in the wake to pandemics. it contained four sections with sub sections ranging between one and three.

Risks or Discomforts to the Participant: There are no known consequences in participating in this study.

Explain to the participant the reasons he/she may be withdraw from the Study: Participation in this study is voluntary and you can ask question pertaining to the study at any stage, under no condition will participant be forced, tricked or coerced to participate in this study. You have a right to withdraw at any point without explanation; furthermore, you can terminate the interview session if you are not comfortable with the interview questions. You have the exclusive right to decline response or withdraw your participation at any point you feel uncomfortable during the interview. If you wish to terminate from the study, please inform the researcher/interviewer of the intention to terminate and there is no need to provide reasons for wanting to terminate.

Benefits: Results from this study will be beneficial to participants and patients because the proposed digital technology model will foster wellbeing and enhance effectiveness in mental health care service delivery by bridging response time between patient and care givers.

Remuneration: There is no remuneration for participating in the study.

Costs of the Study: No cost will be covered by individuals participating in this study.

Confidentiality: Interview sessions will be done in a private room. You are not obliged to provide your name or any information that would jeopardize your privacy. Only trained research assistance will assist in data collection process. Recordings from the interview sessions will be password protected to prevent unauthorized access and deleted after 5 years in accordance with Ethical regulations. Access to records that pertain to participation in the study will be restricted to persons directly involved in the research.

Results: Findings from this study will lead to the development of the proposed model which will improve mental health care services and foster wellbeing in public health care system. Contributions will aid in identifying the most effective digital tool that will be efficient during health emergencies. Possible hindrances to the utilization of digital technologies will be explored and ways to minimize the effect will be identified. This will enable health care workers to reach as many clients as possible within the shortest time possible.

Research-related Injury: There are no anticipated injuries expected in participating in the study.

Storage of all electronic and hard copies including tape recordings: Tape recordings from the interview sessions and hand-written responses will be stored in a lock protected cabinet and password protected. Access to the data will be very limited and consent will be sought from participant if some of the data will be made public. Duration of storage will be for 5 years and all recordings and hard copies will be permanently deleted and destroyed.

Persons to contact in the Event of Any Problems or Queries: Please contact the researcher, Ms Fashoto (+26878170163), my supervisors Prof. Sibīya (+27 31 373 2284), Dr Oladimeji (+27 62 258 3986) or the Institutional Research Ethics Administrator on +27 31 373 2375. Complaints can be reported to the Director: Research and Postgraduate Support Dr L Liganiso on +27 31 373 2577 or researchdirector@dut.ac.za

Appendix 7: Consent



Full Title of the Study: Building a contemporary model for integrating digital health technologies to improve mental health services and wellbeing in public healthcare system in Nigeria.

Names of Researcher/s: Ms Olubunmi Yemisi Fashoto.

Statement of Agreement to Participate in the Research Study:

- ☐ I hereby confirm that I have been informed by the researcher, Ms Olubunmi Yemisi Fashoto, about the nature, conduct, benefits and risks of this study - Research Ethics Clearance Number: _____,
- ☐ I have also received, read and understood the above written information (Participant Letter of Information) regarding the study.
- ☐ I am aware that the results of the study, including personal details regarding my sex, age, date of birth, initials and diagnosis will be anonymously processed into a study report.
- ☐ In view of the requirements of research, I agree that the data collected during this study can be processed in a computerized system by the researcher.
- ☐ I may, at any stage, without prejudice, withdraw my consent and participation in the study.
- ☐ I have had sufficient opportunity to ask questions and (of my own free will) declare myself prepared to participate in the study.
- ☐ I understand that significant new findings developed during the course of this research which may relate to my participation will be made available to me.

Full Name of Participant

**Date
Right**

Time

Signature /

Thumbprint

I, Ms Olubunmi Y. Fashoto herewith confirm that the above participant has been fully informed about the nature, conduct and risks of the above study.

Ms Olubunmi Yemisi Fashoto

Full Name of Researcher

Date

Signature

Full Name of Witness (If applicable)

Date

Signature

Full Name of Legal Guardian (If applicable)

Date

Signature

Appendix 8a: Demographic data for the interview participants

SECTION A: DEMOGRAPHIC DATA

Please answer the following questions in the spaces provided by placing X in the most appropriate option.

1.1 Gender?

Male	
Female	
Other	

1.2 Age

20 – 30 years	
31 – 40 years	
41 – 50 years	
51 – 65 years	

1.3 Educational status

RN	
BNSc.	
B.Sc.	
MBBS	
M.Sc.	
Ph.D.	

1.4 Years of experience as a Mental Health Worker

2 -6 years	
7-11years	
12-16years	
17-21years	
Above 21years	

Appendix 8b: Interview guide

Section B: Five-item Interview guide questions

Question 1

Please explain your views about having digital technologies that could be utilized to provide mental healthcare services and wellbeing?

Prompt: if response does not capture questions below:

- Can we know the types of digital technologies that you are aware of?
- Will you recommend the use of digital technology with your clients? If yes 'why' and if no 'why'?

Can you share your concerns in your day-to-day provision of mental health service?

Probes:

- What do you think about the ratio of HCP to patients coming for therapy? Does it affect service delivery?
- What about your office current environment? Do you feel your office condition impact service delivery?
- What is your view about the number of public mental healthcare facilities in this state?

Question 2

What are your perceptions towards the utilization of digital technologies in improving mental healthcare services and wellbeing?

Prompt: if response does not capture questions below:

- What impact will digital technology have on the provision of mental healthcare services generally?
- What is your opinion about the level at which digital technology is being embraced for the provision of mental healthcare services?
- Why do you think mental health professional bodies should support the use of digital technologies for the provision of mental health services?

Please tell me about digital technologies in general

Probes:

- What types of digital technologies are you aware of?
- Have you used any of these digital technologies in service delivery?
- Can you tell me what type?
- What did you use it specifically for?
- How long did you use it for?
- What is your perception of the digital technology you used?

If answer to second bullet is NO, then these questions will be asked

- Do you think you will be comfortable to use digital technologies?
- Is there any type of digital technologies you will be comfortable with?
- Can you tell me your view on digital technologies and health emergencies?

Question 3

What do you think is/or has been a major barrier to the provision of mental healthcare services and wellbeing through digital technologies?

Prompt: if response does not capture questions below:

- What other factors or potential factors are hindering the use of digital technologies for mental healthcare services in your country?

Can you tell me about the perception of your colleagues concerning digital technologies?

Probes:

- What level of effort do you think is required to operate digital technologies and how might this influence its adoption?
- What is the level of readiness among your patients to use digital technologies?
- Do you think the age and educational background has anything to do with using digital technology? Why?

Question 4

What are the challenges to the provision of mental health services and wellbeing in public healthcare system in your state and establishment?

Prompt: if response does not capture questions below:

- What challenges must be addressed to enhance the use of digital technologies for the provision of mental healthcare services?
- Do you think patients will utilize these technologies if made available?
- What is the level of patient's preparedness to use the technology if introduced?

Tell me about foreseeable problems with the provision of mental health services through digital technologies?

Probes:

- Can digital technologies be perceived as extra burden by HCPs? How?

- Will digital technologies foster unwarranted/unnecessary access to HCP from patients?
- Do you believe HCP need to be trained in the use of some digital technologies?

Question 5

How do you think digital technology can be used to improve health services and wellbeing in the public healthcare system?

Probes:

- What do you think digital technologies can offer to patients?
- Should digital technologies be fully integrated into mental healthcare?

Thank you for participating in the interview

Appendix 9: Questionnaire

Research title: **Building a contemporary model for integrating digital health technologies to improve mental health services and wellbeing in public healthcare system in Nigeria.**

Dear Respondent,

My name is Fashoto Olubunmi Yemisi, a postgraduate student of the above-named institution, engaged in academic research that requires your participation. There are no wrong or right answers, the questions are for research purpose, and your response shall be treated confidentially. Please note that your participation is voluntary and you do not have to give your name. It is therefore expected that you will give very sincere response to each item. The questionnaire may take about twenty to thirty (20-30) minutes to complete. I appreciate your participation in my research.

Thank you.

Participant's Consent

The purpose of this study has been explained to me. I understand that I am free to discontinue at any time if I feel so to do. I hereby voluntarily give my consent to participate in this study.

Please tick ☐ to accept.

Date _____

SECTION A: Demographic Characteristics

1. Gender: Female ☐ Male ☐

2. Age:

20-29	30-39	40-49	Above 50

3. Indicate your Specialization:

Clinical Psychologist	Occupational Therapist	Psychiatric Doctor	Psychiatric Nurse

4. Experience (in years):

2-5	6-10	11-15	16-20	21-25	26-30	31-35	Above 35

5. Hours of meeting with Clients per (week):

1-5	6-10	11-15	16-20	21-25	26-30	Above 30

6. Therapeutic Approach:

CBT	Psychodynamic Therapy	Emotion Focused Therapy	Behaviour Modification	Others

If Others, Specify

7. Do you use digital technology with your Clients?

☐
☐

If Yes, Specify

SECTION B – Effective Digital Technologies that could be utilized to Provide Mental Healthcare Services and Wellbeing.

Section B: Strongly agree = 5; Agree = 4; Agree a little = 3; Disagree = 2; Strongly disagree = 1

S/N	Items	Strongly Agree	Agree	Agree a Little	Disagree	Strongly Disagree
1	Wearable digital technologies such as smart-watch and digital bracelets can be effectively utilized to track heart rate, skin temperature, and electrodermal activity that help to assess an individual's well-being.					
2	Digital biomarker applications can be used effectively to collect physiological data via a range of different methods to assess and improve mental health.					
3	Smartphone applications can be effective in providing different types of psychotherapies to different mental and behavioural disorders.					
4	Social media platforms (Facebook, Whatsapp, Instagram, Twitter, Telegram,					

	etc.) can be effectively used to provide mental healthcare services and wellbeing.					
5	Smartphone and tablets can be used to self-report mood or record voice as a means to gauge emotional state, and provide appropriate intervention instruction to improve mental health and wellbeing.					
6	Actigraphy devices, Remote Sensors, Fitness Trackers, and monitoring devices are some of the effective digital technologies that provide significant data that will help in providing mental healthcare services and wellbeing.					
7	Text messaging instructions using non-internet enabled cell phones can be effective to providing mental healthcare services and wellbeing to clients.					
8	Internet-delivered CBT can be effective in providing mental healthcare services and wellbeing to clients.					
9	Computerized CBT packages delivered in CDs, VCDs, or Flash Drive can be effective to providing mental healthcare services and wellbeing to clients.					
10	Utilizing specially designed websites for therapeutic or psychiatry interventions can be effective to providing mental healthcare services and wellbeing to clients.					
11	Where it is necessary, utilizing video technology for one on one or group consultation can be effective to providing mental healthcare services and wellbeing to clients.					
12	Radio and Television call-in programs featuring mental health professionals can be effective to providing mental healthcare services and wellbeing to individuals and groups.					

SECTION C – Perceptions of Mental Health Workers towards the Utilization of Digital Technologies to Improve Mental Healthcare Services.

Section C: Agree = 2; Disagree = 1

S/N	ITEM	Agree	Disagree
1	The impact of digital technologies on clients' mental health will be positive.		
2	Digital technologies for providing mental healthcare services will do better to clients.		
3	The use of digital technologies to provide mental healthcare services is pleasant.		
4	The use of digital technologies for clients' mental health will be highly beneficial.		
5	Digital interventions for clients' mental health will be credible		
6	When using digital technologies, the personal information provided by clients is mostly secured.		
7	Regardless of the severity of symptoms, digital interventions are typically effective.		
8	A strong working alliance with client is achievable when using digital technologies to provide mental healthcare services.		
9	When digital interventions are combined with face-to-face therapies, they can be more effective.		
10	A mental health professional should have complete control over whether to use digital technologies with clients or not.		
11	There is confidence generally in the ability of mental health professionals to use digital technologies with clients.		
12	It is mostly up to mental healthcare professionals whether they decide to use digital technologies with clients or not.		
13	Most mental healthcare professionals can use digital technologies to provide mental healthcare services for clients		
14	A mental health professional should be confident in their ability to use digital technologies to deliver mental health interventions to clients.		
15	The required technical knowledge to use digital interventions for clients' mental healthcare needs is necessary.		
16	Most mental healthcare professionals across other geographies are using digital technology effectively with their clients.		
17	Most mental healthcare professionals would support the use of digital technology with clients.		

18	It is important for 'mental health professional bodies' to support the use of digital technology within practice.		
19	Most mental healthcare professionals would approve of the use of digital interventions with clients.		
20	Most mental healthcare professionals would support the use of digital technology in therapy.		
21	Digital interventions are effective in treating mental health concerns.		
22	Compared to face-to-face therapy, digital technologies are equally effective in treating mental health concerns		
23	The use of digital interventions with clients should be encouraged to continued.		
24	It is important to have a plan to use digital technology for mental healthcare services with clients.		
25	It is ideal to use digital technology with clients when face-to-face therapy is not feasible.		
26	It is becoming more likely that the use digital interventions for clients' mental healthcare will be inevitable.		
27	Having the necessary resources to use digital technology with clients is important.		
28	Learning more about digital technologies in mental healthcare service provision is important.		
29	It is important to make time to learn about digital interventions for mental healthcare services.		
30	Clients will like to use digital interventions to address their mental health concerns.		

SECTION D- Barriers to the Provision of Mental Healthcare Services and Wellbeing through Digital Technologies.

Section D: Strongly agree = 5; Agree = 4; Agree a little = 3; Disagree = 2; Strongly disagree = 1

S/N	Items	Strongly Agree	Agree	Agree a Little	Disagree	Strongly Disagree
1	Lack of public awareness on digital technologies for mental healthcare services is a barrier to service provision.					
2	Lack of knowledge about how to use digital technologies by mental health professionals is a barrier to the provision of mental healthcare services.					
3	Digital technology for mental healthcare services usually have navigation problems due to having too many options.					
4	A major challenge with digital technology for mental healthcare services is that they are quite complicated to use.					
5	Digital technology for mental healthcare services often encounter technical malfunction.					
6	The battery life of the device may be a barrier to the use of digital technologies for mental health service.					
7	Digital technologies for mental health services have too much synchronization demands hence difficult to use.					
8	Digital technologies for mental healthcare services are not logical and practical					
9	Digital technologies for mental healthcare services are not correct.					
10	Digital technologies for mental healthcare services are not accurate.					
11	Digital technologies for mental healthcare services are not efficient.					
12	Available digital technologies for mental healthcare services are not effective and there is the need to obtain a better one.					
13	Subscription cost for digital technology is very high and unaffordable for an average client.					
14	Digital technologies for mental healthcare services involves heavy data usage, and that might be too expensive for an average client.					

15	Digital technologies for mental healthcare services are robotic in nature and boring due to lack of face to face interaction between therapist and client.					
16	Available digital technologies for mental healthcare services are time consuming to input answers to all questions asked.					
17	My organization's rules are against the utilization of digital technologies for the provision of mental healthcare services and wellbeing.					
18	My professional association is against the utilization of digital technology for the provision of mental health services.					

SECTION E- Factors affecting the provision of mental health services and wellbeing in public healthcare.

Section E: Not a challenge = 1; Little challenge = 2; Challenge = 3; Serious challenge = 4

S/N		Not a Challenge	Little Challenge	Challenge	Serious Challenge
1	Inadequate training and capacity development for mental health workers				
2	Lack of skilled mental health workers				
3	Poor budgetary allocation to mental health institutions and services				
4	Poor support for digital technology to improve mental healthcare services				
5	Poor/inappropriate mental healthcare policies by government				
6	Poor implementation/management of mental healthcare policies/programs				
7	Lack of political will and motivation for mental health workers				
8	Insufficient mental healthcare facilities and equipment				
9	Insufficient mental healthcare professionals				
10	Long waiting hours at mental healthcare facilities				
11	Poor advocacy/awareness about mental health and treatment approach				
12	Accessibility of mental healthcare services				
13	High cost of mental healthcare services				

14	Misconceptions about mental health				
15	Community rejection of mentally ill persons				
16	Social stigma and Poor social support systems				
17	Negative cultural perceptions about mental health				
18	Educational status attached to the mentally ill				

THANK YOU

Appendix 10: Ethics Training Certificate



Zertifikat Certificat Certificado Certificate

Promouvoir les plus hauts standards éthiques dans la protection des participants à la recherche biomédicale
Promoting the highest ethical standards in the protection of biomedical research participants

Certificat de formation - Training Certificate

Ce document atteste que - this document certifies that



Olubunmi Fashoto

a complété avec succès - has successfully completed

Introduction to Research Ethics

du programme de formation TRREE en évaluation éthique de la recherche
of the TRREE training programme in research ethics evaluation

Release Date: 2022/04/10
CID : L1/W/c/b/b/b

APPROVED BY



Programmes de formation continue (2 crédits)
Continuing Education Programs (2 credits)

Foederatio
Pharmaceutica
Helveticae

FPH Programmes de formation continue
Continuing Education Programs

Programmes de formation
postgraduée et continue

Ce programme est soutenu par - This program is supported by :

European and Developing Countries Clinical Trials Partnership (EDCTP) (www.edctp.org) ; Swiss National Science Foundation (www.snf.ch) ; Canadian Institutes of Health Research (<http://www.cihr-irsc.gc.ca/2801.html>) ;
Korea Academy of Medical Science (KAMS/ASMC/AMR) (www.kams.or.kr) ; Commission for Research Partnerships with Developing Countries (www.mpr.ch)

[REV : 202202/17]

Appendix 11: Sample of the interview transcript

PARTICIPANT: #P4; YAP4

Interviewer: Thank you for taking time out from your busy schedule to participate in this interview and thank you for completing section A of the interview. I will now proceed with the interview now.

Interviewer: Can you share your concerns in your day-to-day provision of mental health service?

Participant Response: as a therapist and practitioners, there are some concern in working with our clients, the rate of relapse is high, not adherence to medications despite psychoeducation, financial challenges, that is, inability to pay for mental services. Some of them go away and not return after receiving their bills. Even government funding is very minimal and commitment of staffs is also of great concern. The “japa” syndrome is very high among health care providers, that is, most are leaving the country for a greener pasture.

Interviewer: What do you think about the ratio of HCP to patients coming for therapy? Does it affect service delivery?

Participant Response: when you look at the number of patients compared to clinicians, the ratio is nothing to write home about. We have a smaller number of professionals as compared to patients. You have large number of patients to a small number of professionals, which has implication of service delivery but most of the time one has to give the best to satisfy his or her conscience. I was at the male ward and I saw just one psychiatric nurse attending to about 40 patients, the services you will give when you attend to six patients is not the same with 40 patients. She is not supposed to be attending to patient, she is a senior level officer. I am the only one here today to attend to patients in the ward and those coming for appointments. I am so overwhelmed.

Interviewer: What about your office current environment? Do you feel your office condition impact service delivery?

Participant Response: the quality of infrastructure here in this office is at a poor state as compared to offices in other location. The office plays a significant role on the perception and attitude of patients and also on caregivers. As much as the government is trying is not optimally developed, but there is need for a better office and a conducive environment. The office is not optimally developed, there is more the government need to do, so that services are provided in a well conducive environment.

Interviewer: What is your view about the number of public mental healthcare facilities in this state?

Participant Response: it is nothing to write home about. Aside Yaba and Oshodi, am yet to see any well-funded public mental facility. I heard there is one unit in a general hospital in Epe and Lasuth. When you look at the number of psychiatric hospitals in the state, they are not enough to cater for the population in need to mental services. Lagos alone has about 22million people, so with this population, two mental health facilities cannot cater for the need of those with mental health issues.

Interviewer: Please tell me about digital technologies in general

Participant Response: this is a digital age and everyone practicing in any aspect of mental healthcare should explored. It should be seen as a better option or complimentary option for the analogue method currently in use. I myself as an individual have explored the use of digital tools to ensure that as much as we do face to face, it is a way to enhance quality services. It becomes imperative that everyone need to be technology inclined even in agriculture, health, so as to know how to employ digital tool to promote services. I am conversant with the use of digital tool not only in healthcare but in other facet of life.

Interviewer: What types of digital technologies are you aware of?

Participant Response: There is Zoom, different app, WhatsApp platform either video or call, virtual reality, artificial intelligence.

Interviewer: Have you used any of these digital technologies in service delivery?

Participant Response: yes

Interviewer: Can you tell me what type?

Participant Response: Zoom, WhatsApp,

Interviewer: What did you use it specifically for?

Participant Response: For follow up and therapy

Interviewer: How long did you use it for?

Participant Response: I use it less before COVID but I use it more since COVID

Interviewer: What is your perception of the digital technology you used?

Participant Response: With my experience, I do have challenge with network issue, some cannot hear you, some cannot connect but this does not mean it is not effective. There is a program we do have in the clinic here in which our patients all over the world do connect to. We are able to reach as much people as possible despite being far away. There is the issue of electricity in Nigeria. It serves as a constraint to service delivery because those that could not charge their laptop or phones will not be able to connect. The system could also be stolen and all the stored information is gone but with face to face your mouth cannot be stolen. There are challenges but nevertheless, it is very good.

Interviewer: Can you tell me about the perception of your colleagues concerning digital technologies?

Participant Response: in this generation, when you look at age of people who are into the civil service is 20yrs and above and when you are 60yrs you exit

the system. So, when you look at 25yrs to 50yr, they are generation that are open to experience and new things. They want to know what is happening unlike when you are dealing with individuals who are 70yrs and above, their generation is recalcitrant to change, for example when you them to use an ATM, they ask you what if something happen to their money, they prefer going over to the bank and do face to face transactions. Majority of my colleagues are open to experience, want to know more and do training about what digital technology is all about because in their private practice, the knowledge and expert in the use of digital tools can improve their career and increase their finance. Some people also can who does not reside within Lagos can also benefit from their services too.

Interviewer: What level of effort do you think is required to operate digital technologies and how might this influence it adoption?

Participant Response: The advantages outweigh the disadvantages. People have been able to improvise for the shortcomings in the system, such as the case of electricity, people have generating set to provide needed electricity, some have power banks. people have now understood the advantages of digital tools such as reaching large number of people, saving transport cost and also reduce the risk of travelling considering the high insecurities on our roads. Those that need to travel from Ondo to Lagos for a session, can easily be reached online through these virtual networks. I have not been able to establish an individual who is complaining about the use of digital tools in service delivery. There may be some but from my own point of view, it does not use extra effort but far better than the conventional way of doing things, although it has its own shortcomings.

Interviewer: What is the level of readiness among your patients to use digital technologies?

Participant Response: patients are very ready although it varies. Some patients due to their condition does not want to associate with any digital tools. Some of such patient believe they are being monitored through those devices, enemies

are monitoring them through those devices and when you want to introduce them to such device, they perceive you as an accomplice to their enemies. Some due to their educational qualification, I even found out that some of our patient with substance abuse addiction are those in computer science field. I found more of our patient with substance abuse are in computer science related course, now this kind of individual because they are technologically inclined are more open to the idea of digital tools. Some due to the nature of their illness and certain characteristics and symptoms, they are averse to the use to digital technologies.

Interviewer: Do you think the age and educational background has anything to do with using digital technology? Why?

Participant Response: age and educational background contribute to it among many other things. Younger ones are more open to digital tools. Older individuals like 80 and above cannot operate the digital tools. Younger individuals are positively inclined to the use of digital technologies. They have positive attitude towards adoption and those who are educated. Exposure and educational level can understand the use and communication over the gadget. I will agree that age and educational level among many other factors impact the adoption.

Interviewer: Tell me about foreseeable problems with the provision of mental health services through digital technologies?

Participant Responses: there is nothing with advantage that do not its disadvantages. For example, in this hospital, they are planning to change all paper record to digital records, to ensure everything is done digitally. I will be here seeing my patients and am typing on the system and I sent the report to a central file. But the implication of such is that hackers can hack into the system. I was seeing a man with mental health issues and he came with his wife to be. She asked me in confidence if she could snap a certain part of the man report because she did not intend to marry him again, it old her it's against my work ethics. Hackers can go to any length to get information, so such system must

be properly secured. In politics, they do hunt for such information to bring the political candidate down. Viruses can also corrupt such file, manpower development, cybersecurity are challenges that need to be considered so that the innovation is not override.

Interviewer: Can digital technologies be perceived as extra burden by HCPs? How?

Participant Response: no. if enough training is provided, it will not be perceived as an extra burden. This is a digital age, everybody is looking for ways to improve their already acquired skills, so if digital skills are now incorporated, it makes things better. It also makes service easier, certain psychological tools are already digitalized, instructions are given digitally and a lot of work would be achieved within a short period of time. The only challenge is that it could lead to job loss, with this robotic development and artificial intelligence, if well implemented, a lot of people will not retain their job. A way to counter job loss is that those who have acquired the professional training can work more with the population in their private practice.

Interviewer: Will digital technologies foster unwarranted/unnecessary access to HCP from patients?

Participant Response: yes, it is possible but could be controlled. In a situation whereby everything is digitalized, the patients will have their therapist phone number or email. So, this could lead to unnecessary calls from patients. Alternatively, again, is that for everything the individual does, there should be a controlled system, the therapist will give a specific instruction on access. Although during emergencies, such as suicidal ideation, there should be a proviso for such case. I don't think it will be a problem but a control measure needs to be put in place.

Interviewer: Do you believe HCP need to be trained in the use of some digital technologies?

Participant Response: yes, they need to be trained. If they are not trained, they may make a lot of mistakes and blunders. this is new to everyone; they need to be train on not just doing it but doing it well to produce result.

Interviewer: How do you think digital technology can be used to improve health services and wellbeing in the public healthcare system?

Participant Response: the truth is that there should be a way the community in which Healthcare professionals are can benefit from the program of the hospital without coming to the hospital. Like awareness program, sensitization program, and community development program could all be achieved through digital tools. Before we do share flyers to send out information, but this information can be sent out through online platform. Currently, they are trying to build a digitalized structure for out-patient appointment where they can easily log in, give their complaint, get medications and if need be, get address of pharmacies to obtain these medications and also, meet with psychologist online for expert counsel. These reduces hours spent on long queues at the facilities.

Interviewer: What do you think digital technologies can offer to patients?

Participant Response: reduce cost of transportation, reduce the hours spent on queuing at the hospital, reduces the risk of travelling to the facility, ease of access, they can talk to their therapist anytime they need assistance, emergencies can easily be attended to.

Interviewer: Should digital technologies be fully integrated into mental healthcare

Participant Response: yes, but there is need for adequate training for staffs and there should be awareness to the patients and how they can connect to the system.

Appendix 12: Letter from the statistician

EDUPLUS CONSULT

Educational and statistical services

Olufemi Samuel Omoyele B.Sc. (Hons), PGDE: M.Sc. (Bus. Admin),
M.Sc. (Marketing), M.Sc.(Entrepreneurship), M.Sc.(Supply Chain Management),
MBA(Human Resource Management),Ph.D.

Cell:+23435634973

Email: olufemi5ng@gmail.com

28th September 2023

Re: Statistician consultation

I have assisted Olubunmi Fashoto (student number 22279284), whom is currently studying for a Ph.D. in Health Sciences with the research data coding and analysis.

Yours sincerely,

Dr. O.S Omoyele

Appendix 13: Letter from the professional editor

Sarah Frost

B.A. (Hons in English Literature) (UCT), Masters in English Literature (UKZN)

Editing Services

Cell: 074 384 2772

Email: sfrost@juta.co.za

19 October 2023

Re: Editing services rendered

Please be advised that I edited a thesis written by Olubunmi Yemisi Fashoto (Student number 22279284) which was written as part of her PhD degree: Health Sciences at the Durban University of Technology. The title of her thesis was: 'Building a contemporary model for integrating digital health technologies to improve mental health services and wellbeing in public healthcare system in Nigeria'.

Regards

Sarah Frost

Editor

Appendix 14: Turnitin Report

Feedback Studio - Google Chrome
https://ev.turnitin.com/app/carta/en_us/?o=2207793265&lang=en_us&u=16632674&ts=1&ro=103

feedback studio Olubunmi Yemisi Fashoto Building a contemporary model for integrating digital health technologies t... /100 1 of 15

Match Overview

2%

1 www.mdpi.com 2%
Internet Source

2

Building a contemporary model for integrating digital health technologies to improve mental health services and wellbeing in public healthcare system in Nigeria

Olubunmi Yemisi Fashoto (22279284)

Page: 1 of 333 Word Count: 72356 Text-Only Report High Resolution On