

DIGITAL HEALTH USAGE AS COMPLEMENTARY HEALTHCARE SERVICE DELIVERY IN NIGERIA: THE AGRARIAN PERSPECTIVE

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Abstract

The global trend in digital usage is not an exception in the healthcare system. There had been a challenge on its usage among farm-families due to the associated perceived challenges. This study examined awareness level, perceived challenges and solutions to digital health usage among farmers in Odeda Local Government Area of Ogun State, Nigeria. Purposive selections of six (6) communities with absence of health institutions but within radius 4-5km to primary health centre were done. Random sampling technique was used in respondents' selection. Data were analyzed using descriptive and inferential statistics (means, frequency count, percentages and Pearson Product Moment Correlation) analysis. Result revealed the respondents mean age ($\bar{x} = 55$ years), farming experience ($\bar{x} = 23$ years) household income ($\bar{x} = \text{₦}187,771.4$) and household size ($\bar{x} = 4$ persons) respectively. Result also indicated that 55.2% of the respondents were aware of digital health. Human risk error ($\bar{x} = 3.9$), inability to purchase Smartphone ($\bar{x} = 4.1$) were the perceived challenges hindering mobile health usage. Correlation results show that age ($r = 0.25, p < 0.001$), average annual income ($r = 0.39, p < 0.000$) significantly influenced farmers perception. The study recommends advocacy on digital health usage as complementary healthcare service in agrarian communities

Keywords: Perception, Agrarian, Advocacy, Confidentiality, Complementary,
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Introduction

The new trend in health sector includes digital health usage in areas which include telemedicine, telehealth and e-health (Behmanesh *et. al.*, 2022). The trend had warranted the use of digital /Information Communication and Technology (ICT) as form of healthcare services through information exchange between parties which include patients and specialists (Behmanesh *et. al.*, 2022). According to

Van (2014), increase in efficacy and effectiveness; accessibility and quality as well as productivity of ICT have greatly reduced health care cost. Despite the benefits associated with digital health usage, the inadequate accessibility of infrastructural facilities and telecommunication technology which include equipped and functional health centres, regular electricity supply and internet accessibility is a major challenge in rural communities.

WHO (2009), accentuated that access to increase healthcare services due to geographical barriers are overcome by the use of Information and Communication Technologies (ICTs), due to its benefits for rural and underserved communities in developing countries especially the groups that suffer from lack of access to health care. Mobile health can therefore be viewed as a component of telemedicine which uses information and communication technologies in research and evaluation, exchange of information for diagnosis, treatment, prevention of diseases and injuries in the interest of advancing individuals and communities' health where distance is a critical factor as well as continuous education of healthcare providers (WHO, 2010).

Therefore, healthcare technology such as mobile health could improve rural health by facilitating information exchange between patients and specialists through information and communication technology (ICT). Furthermore, Liezl (2014) affirmed that mobile health could also increase accessibility, quality, productivity, efficacy and effectiveness. However, absence of policy and political will, inadequate funding, cost of sustenance of telehealth services, bias and willingness to pay are the challenges confronting telehealth in many subSaharan African countries despite its usage in the developed countries (Babalola *et. al.*, 2017; Arize, *et. al.*, 2017).

Therefore, with a decline in quality healthcare services and lack of qualified healthcare personnel in rural Nigeria, there is need to introduce digital health usage as a supportive system of healthcare delivery in ameliorating challenges associated with rural health systems. There is dearth of information on digital health usage as healthcare delivery service in rural Southwest Nigeria, probably because there has been little or no public sensitization on mobile health usage by relevant stakeholders in the study area. Therefore, the study answers the following research question;

- i. examine respondents awareness concerning digital health usage
- ii. identify the perceived challenges that could militate against the use of digital health
- iii. possible solution to challenges militating against digital health usage as tool for service delivery

The study hypothesized that there is no significant relationship between socio- economic characteristics of the respondents and the perception on mobile health usage as rural healthcare service delivery

Materials and Methods

The research was conducted in Odeda Local Government Area of Ogun State (7°12’ 60.00”N 3°31’ 59.99”E) Nigeria. It is predominantly covered by tropical rainforest and wooden savannah in northwest. The study area has a land area of 1263, 45 square kilometer (NPC, 2006), a projected population of 183,600 which is 3.4% annual population change from 2006 to 2022 (National Population Commission (NPC), 2006; National Bureau of Statistics (NBS), 2023; Solanke, 2015). Information was elicited from a randomly selected 105 household male and female heads

Population of the study and Data Collections

A simple random sampling technique was used to select household male and female heads from each

community. The sample size was obtained from 50% of total number of household heads from each of the six (6) communities.

Therefore, a total of 105 respondents were selected. Raw data were collected through administration of interview guide Results were presented using descriptive and inferential statistics. Responses on perceived challenges on digital health usage were measured on a 5-point Likert rating scale; Strongly Agree (5), Agreed (4), Undecided (3), Disagree (2) and Strongly Disagree (1), as cited by Vogt (1999). Furthermore, digital health awareness was measured as Aware (1) and Not Aware (2). Pearson Product Moment Correlation (PPMC) was used for hypothesis testing measured at 5% (0.05) significance level. The responses with mean value ≥ 4.07 indicated respondent’s statements that were perceived as challenges as well as respondents solutions to the challenges respectively.

Results

Socioeconomic Characteristics

Table 1 revealed respondents mean age and standard deviation of ($\bar{x} = 52.5 \pm 13.3$). The results show that more than half of the respondents (70.5%) could be referred to as young adults (46 – 55years). Moreover, 53% and 47% of respondents had primary and no formal education respectively. The mean of farming experience was 23.7 years and respondents mean household size of 5 persons. The respondent’s average annual income was ₦187,771k. The study further reveals that the monthly income of the resource-poor farmers who are the backbone of Agriculture is ₦15,647.6k and is equivalent to US\$37.07. Therefore, the economic situation of farm-families may disallow Smartphone purchase and the associated maintenance cost (air-time).

Table 1: Socio-economic Characteristics of the Respondents (n = 105)

Variables	Frequency	Percentage	\bar{x}	SD
Sex				
Male	60.0	57.1		
Female	45.0	42.9		
Marital Status				
Married	67.0	63.8		
Separated	38.0	36.2		
Age (Years)				
25 – 35	14.0	13.3		
36 – 45	17.0	16.2	52.53	13.30
46 – 55	74.0	70.5		
Farming Experience				
1-15	18.0	17.1		
16- 30	38.0	36.2	23.77	14.94

31- 45	49.0	46.7		
Household size(Persons)				
1- 2	19.0	18.1		
3- 4	37.0	35.2	4.60	2.15
5- 6	49.0	46.7		
Average annual income				
(₦)10,000 - 100,000	66.0	62.9		
101,000 - 200,000	22.0	21.0	187,771.43	26375.81
201,000 - 300,000	17.0	16.2		
Educational level				
No formal education	43.0	41.0		
Primary education	62.0	59.0		
Digital Health Awareness				
Yes	58.0	55.2		
No	47.0	44.8		

Do you belong to any livelihood association?

Yes	93.0	88.6
No	12.0	11.4

\bar{x} = Mean SD = Standard Deviation

Awareness of Digital Health Usage

Table 2 results show that 44.8% of respondents were not aware of mobile health and its usage, the implication is that there is/are little interaction and/ or low knowledge sharing on health related issues between the agrarian communities and health service providers especially the primary healthcare. Majority (72.4%) respondents were not aware that

telemedicine is a technological advancement in solving problems associated with health challenges. Furthermore, most (60.0%) respondents were not aware that efficiency and provision of improved quality healthcare was the target of digital health usage. Moreover, majority (71.0%) of the respondents were not aware that digital health usage is a tool for illness diagnosis.

Table 2: Digital Health Awareness as source of Healthcare Service (n = 105)

Awareness Statements	Aware %	Freq	Not Aware %	Freq
Are you aware of the innovation called mobile /digital health?	58.0	55.2	47.0	44.8
Are you aware that telemedicine is the use of technological advancements in solving health issues?	52.0	49.5	53.0	50.5
Do you know that telemedicine technology provides new opportunities for continuous education that can assist healthcare professionals?	29.0	27.6	76.0	72.4
Are you aware that teleconsultation is another tool for illness diagnosis	34.0	32.4	71.0	67.6
Mobile health usage helps to consult specialists for quality patient care.	43.0	41.0	62.0	59.0
Mobile health awareness can be a useful tool for peer education and ensures proper channeling for referrals?	37.0	35.2	68.0	64.8
Treatment through information technology, rather than direct personal contact with the patient(s) is what mobile health is all about?	44.0	41.9	61.0	58.1

Are you aware that within the medical practice, mobile health is extensively employed in diagnosis?	46.0	43.8	59.0	56.2
Digitizing images, telecommunication, tediagnosis, and referral systems can be used in an electronic health record	46.0	43.8	59.0	56.2
All the applications used in mobile health are targeted towards efficiency, <u>and provision of improved quality healthcare.</u>	45.0	<u>42.9</u>	<u>60.0</u>	<u>57.1</u>

Perceived Challenges and Solutions to Digital Health Usage

The grand mean value of 4.1 indicates the responses that were perceived as challenges militating against mobile health usage. The challenges include but not limited to; inaccessibility of regular and /or sources of electricity supply (\bar{x} = 4.1), extra cost of purchasing airtime credit for Smartphone (\bar{x} = 4.1), low literacy level (\bar{x} = 4.1) and the risk of human error, (\bar{x} = 4.2). Others include, non-availability and/or irregular network associated with loading of air-time especially during emergency period (\bar{x} = 4.1) and the respondent’s traditional belief about health issues (\bar{x} = 4.1). Public sensitization on the benefits of digital health usage (\bar{x} = 4.2), accessibility to improved and stable rural electrification (\bar{x} = 4.2) and organization of workshops at grassroots level by

the relevant health institutions (\bar{x} = 4.4) are some of the solutions to challenges associated with digital health usage.

Hypothesis Result

A significant and positive relationship existed between respondent’s age (r = 0.25, p = 0.001), annual average income (r = 0.39, p = 0.000) and perception at (p < 0.05). An inverse relationship existed between work experience (r = -0.31, p = 0.000) and perception on the use of mobile health. Furthermore, the Chi square (χ^2 = 10.04, p < 0.04) and (χ^2 = 8.82, p<0.03) results show a positive association existing between farmers educational level and awareness; livelihood association and awareness respectively.

Table 3: Perceived Challenges and Solutions on Digital Health Usage as Healthcare Service Delivery (n = 105)

Statements	SA Freq (%)	A Freq (%)	D Freq (%)	SD Freq (%)	–	<u>Std</u>	The extra cost
associated with the purchase of airtime for a virtual discussion on android	38.0	56.0	8.0	3.0			
phone could be a limiting factor to digital health usage	(36.2)	(45.7)	(7.6)	(2.9)	4.1	1.0	
The use of digital health as an innovation can't be adopted by farm-families because of unavailability or poor electricity supply which has always been a challenge in rural areas	42.0	45.0	16.0	2.0			
Non-availability and/or irregular network associated with loading of air-time especially during emergency period	(40.0)	(42.9)	(15.2)	(1.9)	4.1	0.9	
The exchange of physical with virtual consultation during interaction with health personnel would prevent total confidentiality	42.0	39.0	12.0	12.0			
The resource poor farmers might not be interested in using it because of family's low income	(40.0)	(37.1)	(11.4)	(11.4)	4.1	1.1	
	51.0	44.0	7.0	3.0			
	(48.6)	(41.9)	(6.7)	(2.9)	4.3	0.9	
	55.0	36.0	11.0	3.0			
The introduction of human error is a risk factor that could be introduced when digital health is used as a service delivery	(52.4)	(34.3)	(10.5)	(2.9)	4.2	1.1	
	54.0	39.0	10.0	2.0			
Traditional belief about health issues could limit the successful operation of digital health usage	(51.4)	(37.1)	(9.5)	(1.9)	4.2	1.1	
Low literacy among farmers could be a limiting factor to ICT machine usage, especially Smartphone (Whatsapp, voice notes)	52.0	38.0	10.0	5.0			
	(49.5)	(36.2)	(9.5)	(4.8)	4.2	1.1	
Solutions	59.0	24.0	11.0	7.0			
Workshops in form of health education should be organized at grassroots level for proper sensitization	(56.2)	(22.9)	(10.5)	(6.7)	4.1	1.3	
Rural health workers should be financially mobilized, and supplied with all necessary health equipments that would be needed for healthcare	62.0	28.0	12.0	3.0	4.4	0.9	
Rural infrastructure especially electricity and stable network should be available, this would reduce communication bottleneck for Smartphone owners	(59.0)	(26.7)	(11.4)	(2.9)			
	48.0	49.0	5.0	3.0	4.2	1.0	
Smartphones cost should be subsidized by the Federal government so that farm-families can purchase and able to discuss with medical professionals in their comfort zones	(45.7)	(46.7)	(4.8)	(2.9)			
	61.0	28.0	11.0	5.0	4.2	1.2	
Involvement of Agricultural Extension officers during health workshop on digital health <u>usage is important for effective adoption and usage in agrarian communities</u>	(58.1)	(26.7)	(10.5)	(4.8)			
	43.0	47.0	10.0	5.0	4.1	1.2	
	(41.0)	(44.8)	(9.5)	(4.8)			
	68.0	26.0	7.0	4.0	<u>4.1</u>	<u>1.1</u>	
	<u>(64.8)</u>	<u>(24.8)</u>	<u>(6.7)</u>	<u>(3.8)</u>			

Table 4: Relationship between Socio-economic Characteristics and Perception of Respondents on Mobile Health Usage

Socio-economic Characteristics and Awareness					
	Variables	χ^2	Df	P-value	Decision
	Educational level	10.04	4	0.04	Significant
	Membership of Association	8.82	1	0.03	Significant
Socio-economic Characteristics and Perception (PPMC)					
	Variables	Coefficient (r)		P-value	Decision
	Age	0.25		0.001	Significant
	Annual Average Income	0.39		0.000	Significant
	Work Experience	- 0.31		0.000	Significant

Discussion

The implication of socioeconomic characteristics of the study is that educational status often influences an individual’s level of decision. This statement is buttressed by Adeyeye *et.al.* (2019) asserted that literacy level could enhance decision-making on innovation due to an individual’s perception. The mean household size is an indication that farming activities predominantly rest on the household members and this may prevent involvement of hired labour, The reason could be attributed to low household income, which according to Babalola *et.al* (2021) submission that low income level may hinder individual from digital health usage since patients’ willingness to pay for a telehealth service in sub-Saharan Africa is low. Low farmers awareness attributed to lack of information is supported by Arize *et. al.*, (2017) study which confirmed low level of awareness on telemedicine service in Southeast, Nigeria. Low farmers awareness attributed to lack of information is supported by Arize *et. al.*, (2017) study which confirmed low level of awareness on telemedicine service in Southeast, Nigeria

The factors associated with perceived challenges that serve as limitations to digital health usage as corroborated by Behmanesh *et.al.*, (2022), included unstable power supply, insufficient communication networks, and inadequate or unreliable internet connectivity with limited bandwidth as limitations to where and the extent to which telemedicine initiatives could be applied in developing countries. Furthermore, this study is buttressed by the World Health Organization (2010), assertion that human and cultural factors, as well as resistance in adoption of services models that differ from traditional approaches or the indigenous practices are the challenges associated with telemedicine.

Moreover, respondent’s preference for physical over virtual consultation with the medical personnel could be attributed to the confidentiality of the health report. This is affirmed by World Bank Group (2018), that preference could also be associated with the respondents’ believe that effective treatment is

achieved when an individual has physical contact with the physician. The positive and inverse relationship between socio-economic characteristics and perception according to Solanke (2015), implies that the resource-poor farmers would have adopted digital health usage as a healthcare service delivery if the daily income is above the absolute poverty line. Farmers’ awareness had no positive impact on perception considering the digital health usage because of the associated perceived challenges. Therefore, farmers’ attitude could positively be influenced through proper sensitization.

Conclusion

Introduction of digital health usage as part of healthcare delivery system can be achieved if farmers are appropriately sensitized through advocacy on its benefits. Moreover, respondents literacy level which is a factor that could hinder digital health usage can be overcome with proper consultation and training on ICT machine usage. Furthermore, farm-families inclusion into the National Health Insurance Scheme (NHIS) by the relevant government agency would encourage digital health usage.

Recommendation

The study recommends that mass advocacy on health literacy in the rural areas by qualified health personnel in conjunction with the relevant agricultural organizations would assist in changing the respondent’s orientation concerning digital health usage. Furthermore, reduction in bottleneck associated in assessing primary healthcare services would drastically reduce if there is/are favourable health policy targeted at the agrarian communities

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