Utilization of Information and Communication Technologies for Nutrition Education Among Community Health Workers in Imo State, Nigeria

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ABSTRACT

Purpose: *Nutrition education through low cost information and communication technologies could improve the quality of health service delivery and build up health workers' capacity especially at the primary health care level. The study examined the utilization of Information and Communication Technologies (ICT) for nutrition education in Imo state, Nigeria.* ***Methods:*** *Multi-stage sampling procedure was used to select 111 community health workers, out of which 95 were subjected to analysis. Questionnaire was used to collect primary data from community health workers. Data were analysed using descriptive and inferential statistics at* $\alpha_{0.05}$. ***Results:*** *The respondents' age was 37.74 ±8.49 years; data obtained indicated that there were more female community health workers (85.3%) than male (14.7%). All the respondents had more than one year of working experience with 29.5% of them having between six to ten years work experience. Respondents had low usage (9.83±6.90) of ICTs for nutrition education, however Global System for Mobile (GSM) communication ranked highest (1.74 ± 0.65) among the available ICTs used. Nutritional knowledge of community health workers was high, and most of them had favorable perception to the use of ICTs. Inadequate instructors ranked as the highest limiting factor to use of ICTs (*$\bar{X}$ *= 1.34). Availability of ICTs was significantly (r = 0.433) related to utilization of ICTs for nutrition education, while there is no significant difference (t = -1.55) in the utilization of ICTs for nutrition education between community health workers that received in-service training and those that did not.* ***Conclusion:*** *Respondents' were favorably disposed to ICTs' use for nutrition education, but its utilization was low.*

Keywords: *Information and communication technologies, nutrition education, community health workers.*

INTRODUCTION

The direct impact of malnutrition on health is an issue of global concerns. Among the myriad of challenges that are confronting communities across the world today, only few match the scale of malnutrition, a condition which affects one in three people directly (International Food Policy Research Institute, 2016). Malnutrition is described as deficiencies, excesses or imbalance in an individual's intake of nutrients and energy which affects specific functions in the body

(WHO, 2018). It is usually associated with poor eating habits. An unhealthy dietary intake is one of the key risk factors for non-communicable diseases. For instance, inadequate consumption of fruits and vegetables predisposes one to the risk of cardiovascular diseases, while high salt consumption is an important determinant of high blood pressure, cardiovascular risk and increase in the risk of stomach cancer. In order words, when the body's nutrient intake is inadequate or when the nutrient reserve is depleted, it can lead to malnutrition, affecting the health and well-being of an individual (Achinihu *et al*., 2016). Malnutrition is prevalent in developing countries like Nigeria, to which Oot *et al*. (2016) stated has significant negative impacts, especially as it relates to poor human health, lost human capital and decreased economic productivity.

The health care sector greatly affirms that nutrition plays a significant role in health maintenance and disease prevention. Based on this, proper knowledge of nutrition is a prereq-uisite to healthy living. According to Satyapriya *et al*. (2015), nutrition education is paramount to attaining the social and behavioral change required for any improvement in nutrition practices. The nutritional outcomes of a child, for instance, are partly affected by the educational level of the mother and the availability of information (Save the Children Fund, 2016), which to an extent highlights the importance of nutrition knowledge. Nutrition education is a combination of educational strategies, accom-panied by environmental supports, designed to facilitate voluntary adoption of food choices and other food and nutrition-related behaviors conducive to health and well-being (Cotento, 2016). It is a form of education that provides people with knowledge, skills and confidence to change harmful food habits while adopting positive and lasting healthy nutritional practices. It considers current knowledge and how to improve that knowledge which involves promoting healthier eating habits within cultural boundaries.

Incidences of malnutrition in Nigeria as a result of poor or complete absence of nutrition education for correct nutritional choices are alarmingly high (Christopher *et al*, 2014). The national campaign on the need to educate Nigerians on quality dietary intake through various interventions such as food fortification, micronutrients supple-mentation and school feeding program demands the integration of technologies that can enhance message delivery to its audience. Hence, information and communication technologies (ICTs) have been advanced as a cost-effective and interactive way of promoting healthy nutrition behaviors (do Amaral e Melo *et al*., 2017). In as much as nutrition education comprises activities at the individual, community and policy levels (Cotento, 2016) and Nigeria being a country that is in need of rapid communication solutions, particularly in the health sector (Adekunle, 2016), ICTs can be deployed for service delivery by community health workers (CHWs) in primary health centers (PHCs) mostly located in rural areas.

Nutrition education will produce the desired behavioral change if the intended messages are organized to suit the targeted individuals' or groups' needs. One of the ways to achieve this is through the provision of adequate nutritional information via appropriate media that make health information accessible to rural people. Community health workers can take advantage of available ICTs for optimum dissemination of nutritional information. Despite the potentials of nutrition education to reduce the level of malnutrition, the manpower required to make it a reality is grossly deficient. The ratio of CHWs to rural populace in Imo State was 1:2000 within 2011-2015 (Imo State Ministry of Health, 2016). Promoting the use of low cost ICTs for nutrition education in Imo State therefore becomes logical. This is coupled with the reality of the economic downturn which practically limits any chance of employing more CHWs.

Achinihu *et al*. (2016) reported low nutrient intake of most rural dwellers farmers of Imo State due to inadequate number of CHWs, to which ICTs could be used to bridge the gap required to sensitize and mobilize rural dwellers on the benefits of proper nutritional habits. This is coupled with the fact that there is dearth of information on the extent to which ICTs are currently being used for nutrition education in Imo State. Consequently, the study examined the utilization of ICTs for nutrition education among CHWs in rural areas of Imo State, Nigeria.

Objectives of the Study

The broad objective of the study was the utilization of ICTs for nutrition education among

CHWs in rural areas of Imo State, Nigeria. The specific objectives were to:

i. determine the personal and job characteristics of the respondents in Imo state;
ii. identify the available ICTs for nutrition education delivery in the study area;
iii. examine the nutritional knowledge level of the respondents;
iv. describe the perceptions of community health workers to the use of ICTs for nutrition education;
v. delineate the constraints encountered in the use of ICTs for nutrition education; and to
vi. ascertain the level of utilisation of ICTs for nutrition education in the study area.

METHODS

The study was carried out in Imo State, Nigeria. The state, which lies within latitudes $4^0 45^1$N and $7^0 15^1$N, and longitudes $6^0 50^1$E and $7^0 25^1$E, has a land area of about 5,530km^2 (2140 square mile). It is surrounded by Abia, Anambra, Ebonyi and Rivers States to the east, west, north and south respectively. Imo State is located within the tropical rain forest ecological zone, with a dense forest in the south. An average annual temperature above 20^0C (68.0^0F) creates an annual relative humidity of 75%. The major occupations of the people in the area are trading and farming.

The total number of health care facilities across the 27 Local Government Areas (LGAs) of the state is about 1338 (Makinde *et al*., 2014; and Imo state health facility listing, Undated). Out of this number, 805 are Primary Health Care facilities which are mostly owned by government; 28 are Secondary Health Care facilities which are mostly owned by private individuals. Only 2 Tertiary Health Care facilities are present in the state of which they are privately owned.

The population of this study consisted of all CHWs in the rural communities of Imo State. the approval for this study was secured from the Health Management Board of Imo State Ministry of Health, while the Institutional Review Board of Federal University of Technology Owerri and University of Ibadan, Nigeria certified the survey instrument (questionnaire). Survey participants were provided with informed consents explaining the purpose, risks, benefits, protection of privacy. Assurance of voluntary involvement was given, and that participation in the survey will not affect their job in any way. Survey participants were told that they had liberty to withdraw from the exercise at any point.

The summary of the sampling procedure is shown in Table 1. Multi-stage sampling procedure was used to select respondents from the targeted population in the study area as follows:

i. Random sampling of 20% of LGAs in the rural areas of Imo state, which were: Ideato South, Onuimo, Ikeduru, Ideato North and Njaba.
ii. Purposive sampling of 40% of PHCs based on the concentration of health personnel in them. This represented 7, 5, 10, 9 and 6 PHCs from Ideato South, Onuimo, Ikeduru, Ideato North and Njaba LGAs, respectively.
iii. Random sampling of 100% community health workers in the PHCs. This represented 21, 15, 30, 27 and 18 health workers from Ideato South, Onuimo, Ikeduru, Ideato North and Njaba LGAs, respectively.
iv. The above statistics summed up to a total of 111 respondents. However, only 95 respondents were included in this study because the rural health centres had less community health personnel compared to the number on staff record due to poor funding by government.

Data Collection Instrument

Primary data was obtained from CHWs who responded to a structured questionnaire validated by experts' judgment in the department of Agricultural Extension and Rural Development, Faculty of Agriculture and Forestry, University of Ibadan. Afterwards, 20 health workers were randomly selected from Primary Health Center in Isiala Mbano for questionnaire pre-test and a reliability coefficient value of 0.75 was obtained using (split half/Cronbach alpha) reliability test.

Measurements of Variables

The independent variables comprised the personal and job characteristics of CHWs, availability of ICTs to CHWs, nutritional knowledge of CHWs, perceptions of CHWs to the use of ICTs, and perceived constraints limiting the use of ICTs by CHWs. The

dependent variable was utilization of ICTs for nutrition education (See Table 2).

Measurement of Available ICTs for Nutrition Education

Respondents were asked to indicate the available ICT platforms used for nutrition education from a list of twelve items provided in Table 5. Respondents were asked to indicate the available ICTs used for nutrition education on a three-point scale of 'Always Available (AA)', 'Sometimes Available (SA)', and 'Never Available (NA)'. These were scored 2, 1, and 0, respectively. The maximum obtainable score was 24 and the minimum obtainable score was 0. The mean scores for each of the ICT platforms were computed and used to rank them in order of their availability. The grand mean was also computed and used to categorize the respondents into high availability (≥ mean) and low availability (< mean) of ICTs.

Measurement of Knowledge about Nutrition

Correct answers were sought from the responses of respondents on a list of sixteen statements presented to them to ascertain their nutritional knowledge as shown in Table 6b. The responses were grouped into 'correct' and 'incorrect' responses and scored 1 and 0, respectively. Maximum obtainable score was 16 and the minimum obtainable score was 0. The grand mean was computed and used to categorize the respondents into high (≥ mean) and low (< mean) knowledge on nutrition.

Measurement of Perceptions of CHWs toward the use of ICTs for Nutrition Education

A list of seventeen statements that expressed the perception of CHWs to the use of ICTs for nutrition education was provided to the respondents. It was measured using a 5-point Likert scale of 'Strongly Agree (SA)', 'Agree (A)', 'Undecided (U)', 'Disagree (D)', and 'Strongly Disagree (SD)' with scores of 5, 4, 3, 2, and 1 assigned, respectively for the positive statements and 1, 2, 3, 4 and 5 for negative statements. The maximum obtainable score was 75 and the minimum obtainable score was 17. Respondents were categorized into two, using the mean score as the benchmark, such that scores below the mean have unfavorable perception while scores equal to or above the mean score have favorable perception. The grand mean was computed and used to categorize the respondents into favorable (≥ mean) and unfavorable (< mean) perceptions toward the use of ICTs for nutrition education.

Measurement of Constraints to ICTs Usage for Nutrition Education

The respondents were asked to indicate probable constraints to the use ICTs for nutrition education from a list fourteen items provided in Table 8, with response options of: 'Severe Constraint (SC)' scored 2, 'Moderate Constraint (MC)' scored 1, and 'Not a Constraint (NC)' scored 0. The maximum obtainable score was 28, while minimum obtainable score was 0. The mean scores for each of the constraint items were computed and used to rank them in order of their severity.

Measurement of use of ICTs for Nutrition Education

Respondents were presented with a list of twelve ICT platforms as indicated in Table 8b. They were asked to indicate the extent to which they used them for nutrition education on a three-point scale of 'Frequently Used (FU)', 'Seldomly Used (SU)' and 'Not Used (NU)', with scores of 2, 1, and 0 assigned, respectively. The maximum obtainable score was 24, while the minimum obtainable score was 0. The mean scores for each of the ICT platforms were computed and used to rank them in order of their use. The grand mean was also computed and used to categorize the respondents into high (≥ mean) and low (< mean) use of ICTs for nutrition education.

RESULTS

Personal Characteristics of CHWs

Findings in Table 3 show the distribution of the respondents' personal characteristics. The age of the respondents ranged between 20 and 62 years ($\bar{X}$ =37.74±8.49). This indicates that the CHWs were young and in their active years, and are thus expected to possess the requisite strength to perform their job-related respons-ibilities. A higher proportion of the respondents (66.3%) being in their active years could be responsible for the favorable disposition toward the use of ICTs for nutrition education that was subsequently observed in this study. Ikpeme *et al* (2013) in a similar study on the work profile of community health extension workers in Cross Rivers State, Nigeria found that a sizeable proportion (42.5%) of the respondents were within the ages of 35-39 years.

Majority (85.30%) of the respondents were female, suggesting there are more female CHWs than male in the study area. The peculiarities of the job makes it a female dominated-profession in Nigeria, and this finding is in line with that of Ikpeme *et al* (2013) who observed that female constitute the majority (71.60%) of CHWs in Cross Rivers State, Nigeria. It suggests that more female CHWs are expected to use ICTs for nutrition education than their male counterparts.

With respect to religious inclinations, 97.90% of the community health workers were Christians. This is indicative of the fact that Christianity is the predominant religion in the study area.

Furthermore, an overview of the respondents' educational attainment revealed that a higher proportion of the CHWs had different levels of tertiary education i.e. Bachelor of Science (BSc) degree (38.90%), Higher National Diploma-HND (26.30%), Ordinary National Diploma-OND (22.10%), Master of Science-MSc (2.10%) and Doctor of Philosophy-PhD (1.10%). Some had primary education or First School Leaving Certificate (1.10%), while others had secondary education or West African Senior School Certificate Education (8.40%). It can be said that the CHWs were literate and this is expected to translate to better technical know-how towards the use ICTs for nutrition education. Deen-Swarray (2016) pointed out that higher literacy can help individuals develop necessary skills for ICTs use. Additionally, the high rate of literacy among health workers increases the possibility of them having favorable perceptions about the use of ICTs (Thomas and Adeniyi, 2013).

Data showed that 59.00% had 6-15 years of work experience ($\bar{X}$ =11.90±6.95 years). The average work experience indicates that most of the CHWs are experienced in their profession. It is assumed that the respondents would appreciate the use of ICTs which can facilitate their job by increasing the number of rural dwellers they can reach, compared to work years when ICTs were not deployed for nutrition education.

Job Characteristics of CHWs

The distribution of the respondents by their job characteristics (Table 4) shows that 96.80% of them had nutrition education as part of their training during their time in medical school, which to an extent qualifies them to function as nutrition educationists in the rural communities where they operate. Consequently, 97.90% had taught their patients nutritional tips, with group teaching method (63.30%) being the most common method used to educate community members on nutritional tips. It was further revealed that 73.70% received in-service training relating to the use of ICTs for nutrition education, which would have been enhanced by the high literacy level earlier reported among the respondents. This is because higher literacy can help individuals to develop necessary skills for ICT use (Deen-Swarray, 2016). In-service training can boost the technical capacity of CHWs (e.g. towards the use of ICTs for nutrition education) and make them more proficient when performing their job responsibilities.

Availability of ICTs for Nutrition Education

Table 5 shows the order of ICTs used for nutrition education in the study area based on their availability. Global System for Mobile communication (GSM) ($\bar{X}$ =1.74±0.65), Radio ($\bar{X}$ =1.52±0.66), Short Message Service (SMS) ($\bar{X}$=1.34±0.74), Facebook ($\bar{X}$ =1.29±0.66) WhatsApp ($\bar{X}$ =1.22±0.78), Internet ($\bar{X}$ =1.11 ±0.76, and Billboard ($\bar{X}$ =1.07±0.82) were more available for use by the CHWs. The high availability of these ITCs may be because they are more conventional, user friendly and have been used in the health sector with different results ensuing. As such most people are familiar with them, implying they can be used to get across information. For instance, the rapid spread of GSM in developing countries (Aker, 2010) makes it a readily available means for spreading nutritional knowledge for the purpose of changing eating behavior. The low availability of ICTs such as email, Digital Versatile Disc (DVD), and MP3 Player for nutrition education as indicated in the table may be due to the poor technical know-how by the CHWs. It suffices to say that the deployment of ICTs in the health sector will be affected by their availability to health personnel (Adekunle, 2016).

Knowledge on Nutrition

From Table 6a, it is seen that most (58.90%) of the respondents possessed high knowledge on nutrition ($\bar{X}$=13.61±2.24). This could be because of a continual exposure to adequate information about the different food items available in the study area either for personal or

professional purpose. The high nutrition knowledge displayed by most of the respondents is also traceable to the correct responses they gave to most of the knowledge questions in Table 6b. For instance, majority (82.10%) knew that carbohydrate is required in the diet of a weak person for the supply of energy, 84.20% were aware that eating yam, rice and bread as breakfast, lunch and dinner, respectively is not a good dietary habit. With respect to breastfeeding, almost of them (98.90%) correctly answered that exclusive breastfeeding for infants should be practiced for the first six months after childbirth, while 92.60% correctly answered that a diabetic patient should avoid eating too much carbohydrate. It is important for health workers to possess adequate nutritional knowledge so that they would be able to provide nutritional guidance and support to community members who may be having nutrition problems. However, a related study in Ghana found that more than half of the health workers surveyed had poor knowledge scores with regards to recommended infant feeding practices (Gyampoh, 2014). There is therefore, among other things, the need for health workers to undergo regularly training on nutrition.

Perception to Use of ICTs for Nutrition Education

As shown in Table 7, most of the respondents had favorable perceptions (58.90%) toward the use of ICTs for nutrition education ($\bar{X}$=60.26±5.79). Thomas and Adeniyi (2013) similarly observed favorable perceptions among health personnel's use of social media for healthcare delivery system in Oyo State, Nigeria. The positive disposition may be as a result of good access to available ICTs by the CHWs. Access to available ICTs is expected to translate to greater interaction with the platforms, which can lead to better knowledge on how to use them. This in turn can lead to favorable perceptions toward their deployment for nutrition education to community members. Research suggests that there is a growing popularity of electronic medical record (Kate, 2012), implying there will be a greater need to incorporate ICTs for nutrition education in the foreseeable future. However, it is worth nothing that the perceptions of health workers toward the importance of ICTs to their work, as well as their willingness to support their use, will definitely determine the deployment of ICTs in the heath sector (Adekunle, 2016).

Constraints to of Use of ICTs for Nutrition Education

Identified factors constraining the use of ICTs for nutrition education among the respondents are shown in Table 8. Shortage of ICT instructors ($\bar{X}$=1.34±0.80) was reckoned as the foremost constraint to the use of ICTs for nutrition education. Though it was earlier observed that the respondents had in-service training in which they were trained on how to use ICTs, it could be said that the training was not adequate enough and the CHWs do not yet possess the capacity to use available ICTs independently. This is the more reason why inadequate number of sufficiently trained ICT health personnel ($\bar{X}$=1.32±0.72) was identified as the second most important constraint. These limitations suggest that the CHWs must possess the requisite skills for before they can effectively use available ICTs for nutrition education. In line with this, Afolayan and Oyekunle (2014) retorted that making ICTs available is not enough, but necessary training on their use should be provided in order to ensure adequate technical know-how and proper maintenance. Poor funding of ICTs' usage for nutrition education ($\bar{X}$=1.24±0.71) was ranked as the third constraint. This is not difficult to relate with considering the problem is rife across the African continent. Unfortunately, adequate funding is needed to acquire and maintain ICTs. Specifically, Adekunle (2016) alluded to this by saying that poor funding hinders effective utilization of ICTs for sustainable development in Nigeria.

Utilization of ICTs for Nutrition Education

The result in Table 9a shows that up to half (50.50%) of the respondents were characterized as lower users of ICTs for nutrition education ($\bar{X}$=9.83±6.90). A related study in Ethiopia likewise found out that more than half of the health workers had poor use of ICTs, notwithstanding the pivotal role ICTs play in the delivery of timely and evidence-based quality healthcare services (Asemahagn, 2015). This finding is not unexpected considering the constraining factors identified in Table 7, to which some were explained above. The high proportion of non-users of ICTs for nutrition education may also be connected to the culture of ICTs use operating within the PHCs in which the CHWs work. If there is an in-house policy that supports the use of ICTs, the level of their deployment for nutrition education will be high. A policy that supports the use of ICTs will

favorably influence the health workers' perception as well as their willingness to use ICTs for their work.

Hypotheses of the study

I. There is no significant relationship between availability and utilization of ICTs for nutrition education

Table 10 reveals a significant relationship between the availability and utilization of ICTs for nutrition education (r=0.433). This implies that the more ICTs are available to CHWs, the greater the probability that they will be used for getting across nutritional information by CHWs to community members. In order words, ICTs must first be available before they can be used even though availability does not always translate to utilization. An individual would tend to use a technology that is available and become familiarized with it overtime. Non-availability was implicated as the reason for health workers not showing serious interest that resulted in widespread negative perceptions towards the ICTs' use (Afolayan and Oyekunle, 2014).

II. There is no significant difference in the utilization of ICTs for nutrition education between Community Health Workers that received in-service training and those that did not

As shown in Table 11, there was no significant difference in the utilization of ICTs for nutrition education between CHWs that received in-service training and those who did not receive in-service training (t=-1.55). It could be said that the in-service training was not effective or inadequate, given that the CHWs do not yet possess the capacity to use available ICTs independently. As such the difference in know-ledge on how to use ICTs between them was marginal.

CONCLUSIONS

Findings of the study revealed that the CHWs were characterized by low utilization of ICTs for nutrition education in the study area, even though their perception toward the use of available ICTs was favorable. The favorable disposition toward the use of ICTs for nutrition education was consequent on the fact that they available ICTs are more conventional, user friendly and they are more familiar with them. The low utilization of ICTs was due to overwhelming constraints, paramount among which are shortage of ICT instructors, inadequate number of sufficiently trained ICT health personnel, and poor funding of ICTs' usage for nutrition education.

Whereas the CHWs possess adequate nutritional knowledge, which places in a vantage position of providing nutritional guidance and support to community members who may be having nutrition problems, however their low utilization of ICTs for nutrition education will hinder effective service delivery to community members. Hence, it is suggested that an in-house policy that mandates the use of ICTs at every level within the health sector be established, as it will enhance the service delivery of health workers. Additionally, to bridge the gap created by the insufficient number of trained ICT health personnel to drive nutrition education in the study area, relevant stake-holders should focus more on ICTs health personnel training and increase budgetary allocation to the sector, as this will make ICTs readily available to community health workers' familiarization and utilization for health education.

Furthermore, given that the utilization of ICTs for nutrition education among CHWs that received in-service training on ICTs' usage for nutrition education and those that did not receive in-service training was not statistically different, indicating the effect of the training was marginal, adequate and content-relevant trainings should be organized on a regular basis for CHWs. By this the CHWs' health/technological knowledge will not just be updated, but their capacity to render effect service to community members will also be enhanced.

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Table 1: Pattern of Respondents' Selection from the Study Area

(A): LGAs	(B): No of PHC on Record	(C): Selected % of PHC	(D): No of PHC Selected	(E): Average No of CHW/PHC on Record	(F): Selected % of CHW/PHC	(G): No of CHW Selected Per PHC	(H): No of CHW Selected Per LGA (D×G)
Ideato South	17	40%	7	3	100%	3	21
Onuimo	12	40%	5	3	100%	3	15
Ikeduru	25	40%	10	3	100%	3	30
Ideato North	22	40%	9	3	100%	3	27
Njaba	14	40%	6	3	100%	3	18
Total							**111**

Table 2: Measurement of Personal and Job Characteristics of CHWs

Variables	**Measurement**	**Measurement level**
Age	Actual age stated in years	Interval
Sex	Male = 1 Female = 2	Nominal
Religion	Christianity = 1 Islam = 2 Traditional = 3	Nominal
Educational attainment	First School Leaving Certificate = 1 WASSCE = 2 OND = 3 HND = 4 B.Sc. = 5 M.Sc. = 6 Ph.D. = 7	Ordinal
Years of work experience	Actual number of years spent on the job	Interval
Communities covered	Actual number of communities under the purview of a primary health worker	Interval
Teaching methods	Individual method = 1 Group method = 2 Mass method = 3	Nominal
On-the-job training	Undergone job training (Yes) = 1 Not had job training (No) = 0	Nominal

Table 3: Distribution of the Respondents According to Their Personal Characteristics; n = 95

Variables	Frequency	Percent (%)
Age Group (in years)		
20 – 29	13	13.70
30 – 45	63	66.30
46 – 62	19	20.00
Sex		
Male	14	14.70
Female	81	85.30
Religion		
Christianity	93	97.90
Islam	0	0
Traditional	2	2.10
Educational Qualification		
First School Leaving Certificate	1	1.10
WASSCE	8	8.40
OND	21	22.10
HND	25	26.30
B.Sc.	37	38.90
M.Sc.	2	2.10
Ph.D.	1	1.10
Years of Work Experience		
1-5	18	18.90
6-10	28	29.50
11-15	28	29.50
16-20	9	9.50
21-25	8	8.40
26-30	4	4.20

Source: Field Survey, 2017.

Table 4: Distribution of the Respondents According to Their Job Characteristics; n = 95

Variables	Frequency	Percent (%)
Nutrition Education as Part of Your Training in the Medical school		
Yes	92	96.80
Have You Taught Your Patients Nutritional tips		
Yes	93	97.90
Number of Communities Taught Nutrition tips		
1-20	92	96.80
21-40	2	2.10
41-60	0	0
61-80	0	0
81-100	0	0
101-120	1	1.10
Teaching Methods		
Nil	1	1.10
Individual	25	26.30
Group	60	63.20
Mass	2	2.10
Individual and Group	5	5.30
Group and Mass	2	2.10
On-the-job Training Relating to the use of ICTs for Nutrition Education		
Yes	70	73.70

Source: Field Survey, 2017

Table 5: Availability of ICTs for Nutrition Education; n = 95

ICTs used for Nutrition Education	AA	SA	NA	SD	Mean ($\bar{X}$)	Ranks
GSM	9(9.50)	53(55.80)	33(34.70)	0.65	1.74*	1st
Radio	59(62.10)	27(28.40)	9(9.50)	0.66	1.52*	2nd
SMS	48(50.50)	32(33.70)	15(15.80)	0.74	1.34*	3rd
Facebook	39(41.10)	45(47.40)	11(11.60)	0.66	1.29*	4th
WhatsApp	42(44.20)	32(33.70)	21(22.10)	0.78	1.22*	5th
Internet	34(35.80)	38(40.00)	23(24.20)	0.76	1.11*	6th
Billboard	36(37.90)	30(31.60)	29(30.50)	0.82	1.07*	7th
Email	27(28.40)	31(32.60)	37(38.90)	0.81	0.89	8th
DVD	22(23.20)	38(40.00)	35(36.80)	0.76	0.86	9th
Twitter	12(12.60)	47(49.50)	36(37.90)	0.66	0.74	10th
MP3 Player	13(13.70)	43(45.30)	39(41.10)	0.69	0.72	11th
Instagram	12(12.60)	32(33.70)	51(53.70)	0.70	0.58	12th

Source: Field Survey, 2017. Figures in brackets are the % while figures outside brackets are the Freq. *Highly Available ($\bar{X} \geq 1$). AA= Always Available, SA= Sometimes Available, NA= Not Available

Table 6a: Nutritional Knowledge Categories of Community Health Workers; n = 95

	Nutritional Knowledge Categories	Frequency	Percent (%)
Valid	Low (< mean)	39 (0 - 13)	41.10
	High (≥ mean)	56 (14 - 16)	58.90
	Total	**95**	**100**

Source: Field Survey, 2017.

Table 6b: Nutritional Knowledge of CHWs; n = 95

Nutritional knowledge questions	Correct answer	Incorrect answer
Carbohydrate is recommended in the diet of a weak person for provision of Energy	78(82.10)	17(17.90)
Eating yam, rice and bread as breakfast, lunch and dinner respectively is not a good dietary Habit	80(84.20)	15(15.80)
Exclusive breastfeeding is between birth and six months	94(98.90)	1(1.10)
Fruits and vegetables are sources of vitamins	94(98.90)	1(1.10)
Preservation helps to prolong the shelf life of food	82(86.30)	13(13.70)
Milk, chicken and fish contain high biological value proteins	78(82.10)	17(17.90)
The main reason for including egg, milk, soy bean, meat and beans in the diet of a growing baby is because they provide protein	89(93.70)	6(6.30)
Mineral elements are essential for development of bone	83(87.40)	12(12.60)
Marasmus and kwashiorkor are nutritional disorders	82(86.30)	13(13.70)
Engaging in activities that aid improper digestion of food is not a good dietary habit	67(70.50)	28(29.50)
Washing hands before and after handling food materials is one of the ways of maintaining hygienic condition a within cooking environment	90(94.70)	5(5.30)
A diabetic patient should avoid eating too much of carbohydrate	88(92.60)	7(7.40)
Taking a balanced diet involves taking adequate nutrients in their right proportion according to body weight	79(83.20)	16(16.80)
Feeding a child with vitamins and carbohydrate only cannot be described as eating balanced diet	73(76.80)	22(23.20)
Eating freshly prepared meal (such as freshly prepared vegetable soup) should be Encouraged	90(94.70)	5(5.30)
A person's nutritional requirements increase following chronic disease	46(48.40)	49(51.60)

Source: Field Survey, 2017. Figures in bracket are the % while figures outside bracket are the Freq.

Table 7: Perceptions of CHWs to use of ICT for Nutrition Education; n = 95

	Perception Categories	Frequency	Percent (%)
Valid	Unfavorable (< mean)	39 (15 – 59)	41.10
	Favorable (≥ mean)	56 (60 – 75)	58.90
	Total	**95**	**100**

Source: Field Survey, 2017. Mean score = 60.26; Standard deviation = 5.79

Table 8: Constraints to Use of ICTs for Nutrition Education; n = 95

Constraints in the Use of ICTs for nutrition education	SC	MC	NC	SD	Mean	Rank
Shortage of ICT instructors	53(55.80)	22(23.20)	20(21.10)	0.80	1.34*	1st
Inadequate number of sufficiently trained ICT health personnel	45(47.40)	36(37.90)	14(14.70)	0.72	1.32*	2nd
Poor funding of ICT use for nutrition education	38(40.00)	42(44.20)	15(15.80)	0.71	1.24*	3rd
Inability of the state legislation to meet up with the speed of changes in technology	48(50.50)	20(21.10)	27(28.40)	0.88	1.22*	4th
Lack of competence in handling ICT facilities for nutrition education	40(42.10)	36(37.90)	19(20.00)	0.76	1.22*	4th
Inappropriate content of ICT messages that do not meet the nutritional needs of the community members	40(42.10)	35(36.80)	20(21.10)	0.77	1.21*	6th
Cost of maintaining ICT services	38(40.00)	37(38.90)	20(21.10)	0.76	1.18*	7th
Lack of expertise by the CHWs in using ICT for nutrition education	38(40.00)	37(38.90)	20(21.10)	0.76	1.18*	7th
Technophobia (fear of technology)	42(44.20)	25(26.30)	28(29.50)	0.85	1.14*	9th
Erratic power supply	43(45.30)	21(22.10)	31(32.60)	0.87	1.12*	10th
Lack of policy support	42(44.20)	20(21.10)	33(34.70)	0.88	1.09*	11th
Bureaucracy in the use of ICT for nutrition education	37(38.90)	20(21.10)	38(40.00)	0.89	0.98	12th
Complexity of ICTs use	31(32.60)	24(25.30)	40(42.10)	0.86	0.90	13th
The negative norms and beliefs of Imo State citizens against ICT use	29(30.50)	25(26.30)	41(43.20)	0.85	0.87	14th

Source: Field Survey, 2017. Figures in bracket are the % while figures outside bracket are the freq. *Severe constraint (mean ≥ 1). SC= Severe Constraint, MC= Mild Constraint, NC= Not a Constraint

Table 9a: Utilization Categories of ICTs for Nutrition Education; n = 95

	Utilization Categories	Frequency	Percent (%)
Valid	Low (< mean)	48 (0 - 9)	50.50
	High (≥mean)	47 (10 - 24)	49.50
	Total	95	100

Source: Field Survey, 2017.

Table 9b: Utilization of ICTs for Nutrition Education; n = 95

ICTs used for Nutrition Education	FU	SU	NU	SD	Mean	Rank
GSM	58(61.10)	20(21.10)	17(17.90)	0.78	1.43*	1st
Radio	59(62.10)	11(11.60)	25(26.30)	0.87	1.35*	2nd
SMS	38(40.00)	26(27.40)	31(32.60)	0.85	1.07*	3rd
Internet	35(36.80)	16(16.80)	44(46.30)	0.91	0.90	4th
Billboard	33(34.70)	19(20.00)	43(45.30)	0.89	0.89	5th
Facebook	26(27.40)	32(33.70)	37(38.90)	0.81	0.88	6th
WhatsApp	35(36.80)	14(14.70)	46(48.40)	0.92	0.88	6th
MP3 Player	13(13.70)	25(26.30)	57(60.00)	0.72	0.53	8th
DVD	14(14.70)	21(22.10)	60(63.20)	0.74	0.51	8th
Email	13(13.70)	20(21.10)	62(65.30)	0.72	0.48	10th
Instagram	13(13.70)	19(20.00)	63(66.30)	0.72	0.47	11th
Twitter	11(11.60)	15(15.80)	69(72.60)	0.68	0.38	12th

Source: Field Survey, 2017. Figures in brackets are the % while figures outside bracket are the Freq. *Highly Utilized ICT (mean ≥ 1). FU= Fully Utilized, SU= Sometimes Utilized, NU= Not Utilized

Table 10: Test of Relationship between Availability and Utilization of ICTs for Nutrition Education

	Utilization of ICTs for nutrition education		
Variables	**R**	**p-value**	**Decision**
Availability of ICTs	0.433*	0.000	S

*Significant @ ≤ 0.05

Table 11: Test of Difference in the Utilization of ICTs for Nutrition Education between CHWs that received In-service Training and those who did not; n = 95

Variables	F	$\bar{X}$	SD	Mean difference	t-value	df	p-value	Decision
Did not received in-service training	25	8.00	6.12	-2.48	-1.55	93	0.123	NS
Received in-service training	70	10.48	7.08					