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The Deadly Trio of Malaria, Pneumonia and Diarrhea: Assessing Community Knowledge Gaps and Beliefs within Integrated Community Case Management (iCCM) Practice in a Nigerian State

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Abstract

The trio of Integrated Community Case Management (iCCM) target conditions, malaria, pneumonia and diarrhea, constitute a devastating global disease burden killing over 1 million under-5 children annually. Nigeria accounts for almost 15% of global under-5 mortality. The World Health Organization is promoting iCCM in resource-constrained societies. Therefore, this study assesses the knowledge of community members on iCCM target conditions. Health belief model serves as a theoretical guide for the study, which was conducted in three purposively selected Local Government Areas in Sokoto State, Nigeria. The study found that there are still some significant misconceptions despite the high prevalence of these diseases. About one-quarter of the respondents did not believe any of the diseases could kill a child. Socio-demographic variables have a significant effect on the knowledge gaps constituting barriers to the uptake of iCCM services. Despite the high usage of insecticide-treated bed-net, 68.9% of the respondents disclosed perceived malaria within the last 30 days preceding the survey. In all, 85.4% of the respondents have some religious barriers to attending health facilities. The study concluded that the diseases' misconceptions limit the uptake of iCCM services where available. Therefore, knowledge of community members on iCCM needs to be improved.

Keywords: Community knowledge, Integrated Community Case Management (iCCM), malaria, diarrhea, Nigeria

Introduction

The trio of Integrated Community Case Management (iCCM) target conditions, malaria, pneumonia and diarrhea, constitute a devastating global disease burden affecting under-5 children. Of the 405,000 deaths due to malaria in 2018, 70% were children under-five years (UNICEF, 2016; WHO, 2019). Every day, pneumonia and diarrhea kill more than 4,000 children

worldwide, with the highest toll in developing countries (AIDS United, 2015; Sibbald, 2016; IVAC and JHBSPH, 2018). In sub-Saharan Africa (SSA), Nigeria accounts for 14% of global under-five mortality due to malaria (WHO, 2017); 15% of under-5 mortality from diarrhea (Carvajal-Vélez et al. 2016); and 133,200 deaths of under-5 due to pneumonia (Sibbald, 2016). Children rely entirely on parents, caregivers, community health workers, and significant others for the general prevention and management of these diseases, which can be easily managed at affordable costs. In a resource-constrained country like Nigeria, there is the need to deploy the integrated community case management (iCCM), which has empirically proven to be an effective and easily accessible community strategy based on experience in different countries (Adebayo et al. 2017). “Integrated Community Case Management (iCCM) is an equity-focused strategy that complements and extends the reach of public health services by providing timely and effective treatment of malaria, pneumonia, and diarrhea to populations with limited access to facility-based healthcare providers, and especially to children under-5” (WHO, 2012).

The production of child health can be preventive and curative, yet the child is merely a passive recipient of the action of these 'others' in the production and maintenance of their healthcare. There is a need to equip stakeholders in the production of the child's health to posit them for the adequate performance of their roles. The children under-five are susceptible to death, not only because of disease impact but also because of inadequate knowledge, attitude and practice among stakeholders who are concerned with the production of child health (Amzat and Omololu, 2009; Amzat, 2011). Studies (Christopher, Le May, Lewin & Ross, 2011; Ekpo, 2016; Ezech, Agho, Dibley Hall & Page, 2015) reported that more than half of under-5 mortality in Africa are due to the iCCM target conditions despite the availability of relatively affordable and effective interventions. According to WHO/UNICEF (2009), poverty and limited access to health services partly explain the high burden of infectious diseases.

In Nigeria, a basic understanding of risk factors, effective treatment, and proper care-seeking choices to iCCM conditions are generally poor (Do et al., 2018; Ekpo, 2016; Glenton et al., 2013). There is a need to improve knowledge and general competence of stakeholders if significant progress must be made in the management and control of child health problems, particularly in improving child survival, especially in rural areas where the highest-burden abound (Ekpo, 2016; Ezech et al., 2015). Although primary healthcare has been generally recognized as a useful framework for delivery healthcare, there is the need to strengthen the program in its current form, if the tide of these problems must be curtailed (Christopher et al., 2011). In this regard, WHO/UNICEF (2009) stressed the importance of iCCM in improving access to essential health services for under-5 children. This study used health belief model as a theoretical guide (see Strecher and Rosenstock, 1997; Amzat and Razum, 2014). The model takes into account the socio-cultural contexts, including health-related beliefs (including perceived susceptibility to a disease; perceived

severity of a disease; perceived benefits of preventive or curative measures; self-efficacy [to implement action]; cues to [health-related] action; and perceived barriers to action), behavioral patterns and practices, which shape perception or knowledge of a disease, and subsequent preventive or curative measures. The iCCM, as argued, will not only bring treatment closer home while increasing coverage and access to child health services. This study examines knowledge gaps, beliefs, or behavioral patterns and practices that create barriers to iCCM services uptake.

Methods

This is a cross-sectional survey on knowledge and practices (KAP) of households and community members on integrated community case management (iCCM) target conditions. The methodological design involves the use of a questionnaire. Three LGAs, Bodinga (northwest), Wammakko (northcentral), and Gwadabawa (northeast) LGAs were randomly selected for this study. The population figures are as follows: Bodinga: 174,302 [female: 86,458]; Wammako: 179,246 [87,780]; and Gwadabawa: 231,569 [115,269], making a total of 585,117 [female: 289, 507] (NPC, 2006).

This is a KAP study regarding iCCM conditions (malaria, pneumonia and diarrhea). The cross-sectional survey focused on mothers, who are the caregivers of under-five children. One of the important strategies in controlling iCCM conditions is appropriate home management, although with several concerns including non-adherence, inappropriate etiologic perception, low utilization of preventive measures and so on. Diagnosis of iCCM conditions at home is usually presumptive (based on perceived signs and symptoms). It is important to note that mothers are central in the control of iCCM conditions. There is a need for mothers to have the capability to recognize and treat iCCM conditions in order to reduce child mortality. Up to 90% of childhood illnesses are first perceived, defined, and treated at home, the first "hospital." Knowledge or local understanding, perception and practices of caregivers regarding the management of childhood health conditions are required for better disease control. It is imperative to curtail the deadly impacts these diseases among the under-five children in Nigeria and other endemic areas (Colvin et al., 2013; Bedford and Sharkey, 2014; Oyekale, 2015; Carvajal-Vélez et al., 2016). Therefore, mothers of under-5 constitute this research's primary study population.

A multi-stage cluster sampling technique was used for the quantitative aspect of the survey. Sokoto state was clustered into three Constituencies, further clustered into LGAs from which one LGA was selected from each Constituency. Then, three communities were randomly selected from each LGA selected where questionnaires were systematically administered. The demographic estimate of mothers of under-five children is 25% of the female population: Bodinga: 21,615; Wammako: 21,945; and Gwadabawa: 28,817 making a total of 72,377 mothers of under-five children. The study relied on an online sample calculator (confidence level and a confidence interval of 95%

and 5%, respectively, to select 382 mothers. The study used a representative sample of 382 mothers of under-five children: Bodinga: 114; Wammako: 116; and Gwabada: 152.

This is a quantitative study involving the administration of a questionnaire. The questionnaire consisted of various sections in line with the specific objectives of the study. Some sociodemographic characteristics were also collected. Such social variables are important in sociological studies because they could influence certain study outcomes. During the survey, data collectors used the personal interview method in administering the 382 questionnaires. The method involved face-face asking and recording of respondents' responses. The method is usually helpful where many respondents might not be literate enough to fill the questionnaires. Quantitative data analysis involved the use of relevant statistical tools—both descriptive and inferential statistics (with a level of significance at 0.05) were deployed using statistical package for social sciences (SPSS). The inferential statistics used included chi-square and regression. Every respondent in this study granted a verbal informed consent before the administration of the questionnaire.

Results

Out of 382 administered questionnaires, 376 questionnaires (98%) were returned. The high return rate was because the questionnaire was administered in the form of a personal interview. The questionnaires were distributed as follows: Bodinga, Gwabada and Wamakko, accounting for 29.3%, 40.4% and 30.3%, respectively.

Demographic Characteristics of the Respondents

The age distribution of the respondents shows almost equal distribution between older (>35 years old) and younger mothers (<35 years old) with 47.3% and 48.9%, respectively. The community is predominantly Hausa-speaking of Nigeria, constituting about 67% of the respondents, followed by Fulani 24.7%. The Hausas and Fulanis are also predominantly Muslims. Hence, the Muslims constituted 93% of the respondents. Most of the respondents (72.6%) have attended a gathering where child health issues were discussed, although mostly in the clinic (37.2%), also within the community (18.1%). Only 27.4% of the respondents had never been in any gathering where child issues were discussed. In terms of formal education, up to 43.9% of the respondents had no formal education. In contrast, the remaining, slightly more than half (56.1%) had some forms of formal education.

A majority of the respondents (69.4%) were full-time housewives. This reflects the cultural tradition and gender inequality in the study area, limiting the participation of women in the public spheres. Most women do not engage in paid employment in the study area, as most are often in *kulle* (purdah). About 7 out of 10 respondents were married, while the remaining were divorced (17%), separate (7.4%) or widow(ed) (6.6%). The study collected basic information about the last born of the respondents. A majority of the

respondents gave birth outside the formal health sector and without any skilled attendant. Home delivery alone constituted 32.7%, home with a traditional birth attendant (TBA) and home with a community health worker (CHW) constituted 30.6% and 14.1%, respectively. Delivery at TBA's place and health facilities were 8.8% and 13.8%, respectively. Delivery without a skilled birth attendant at home is strongly linked to maternal mortality and child survival. Despite the high home delivery, 9 out of 10 respondents reported that their children had a vaccination card, which is probably due to the state vaccination campaign, mostly at the community level.

Table 1: Knowledge of pneumonia, malaria and diarrhea

	Response	Frequency	Percentage
Which of these do you suspect your child had in the last 2 weeks	Pneumonia	48	12.8
	Malaria	240	63.8
	Diarrhea	52	13.8
	All of the above	8	2.1
	None at all	28	7.4
	Total	376	100.0
Perceived cause of pneumonia	Infection	153	40.7
	Environment/dust	136	36.2
	Jin/witchcraft	41	10.9
	Don't know	46	12.2
	Total	376	100.0
Perceived cause of diarrhea)	Infection	88	23.4
	Bad water/food	215	57.2
	Jin/witchcraft	17	4.5
	Don't know	56	14.9
	Total	376	100.0
Perceived cause of malaria	Heat	78	20.7
	Bad water/food	52	13.8
	Mosquitoes bites	203	54.0
	Jin/witchcraft	19	5.1
	Don't know	24	6.4
	Total	376	100.0
Do you think pneumonia can kill a child	Yes	277	73.7
	No	99	26.3
	Total	376	100.0
Do you think diarrhea (stooling) can kill a child	Yes	252	67.0
	No	124	33.0
	Total	376	100.0
Do you think malaria can kill a child?	Yes	281	74.7
	No	95	25.3
	Total	376	100.0

Furthermore, only 4 out of 10 respondents reported that their children's vaccination was up to date. The implication is glaring; there is still the problem of vaccine hesitancy or resistance among many of the respondents, which

accounts for the vulnerability of under-five children to vaccine-preventable diseases. There was also low adherence to exclusive breastfeeding of children. Only 3 out of 10 mothers reported adherence to exclusive breastfeeding. Others (65.2%) either did not breastfeed at all (26.6%) or partially breastfed their children (38.6%). This is a particular pathetic trend in a place with a high burden of stunting, underweight and child mortality. It is ironical that the region with a deficiency in the food supply could not utilize the abundance of (free) breastmilk for infant food needs.

Knowledge Gaps and beliefs as barriers to iCCM

The trio of diarrhea, pneumonia and malaria constitutes significant illness in the study area. The question about perceived illness in the last two weeks before the survey showed that 63.8% of mothers of under-five children perceived their children had malaria (63.8%), pneumonia (12.8%) and diarrhea (13.8%). The study also investigated some gaps and beliefs constituting barriers to iCCM in the study area (see Table 1). Only 40.7% of the respondents believed that pneumonia is a result of infection, while about 60% remaining believed in other causes, including witchcraft (10.9%), dust (36.2%), and others do not know (12.2%). About 57.2% of the respondents attributed bad water to diarrhea, 23.4% to infection, 4.5% to witchcraft, while 14.9% did not know the cause. Slightly more than half of the respondents (54%) attributed malaria to mosquito bites. Other causes mentioned include heat (20.7%), bad water (13.8%), and witchcraft (5.1%). Perceived cause is a primary measure of perception of diseases.

Table 2: Personal characteristics and perceived severity of malaria and pneumonia

Highest level of education	Do you think pneumonia can kill a child			
		Yes	No	Total
No formal education		50 (13.3%)	14 (3.7%)	64 (17.0%)
Quranic education only		87 (23.1%)	14 (3.7%)	101 (26.9%)
Primary		41 (10.9%)	26 (6.9%)	67 (17.8%)
Secondary		35 (9.3%)	17 (4.5%)	52 (13.8%)
Post-secondary		64 (17.0%)	28 (7.4%)	92 (24.5%)
Total		277 (73.7%)	99 (26.3%)	376 (100%)
Chi-Square computed Value = 16.010 ^a , Critical Value = 9.49 , df =4, α @0.05				
Any meeting of pregnant/nursing mothers at the health post	Do you think pneumonia can kill a child			
		Yes	No	Total
Yes, many times		126 (34.4%)	42 (11.5%)	168 (45.9%)
Yes, a long time ago		112 (30.6%)	24 (6.6%)	136 (45.9%)
No, never		39 (10.7%)	23 (6.3%)	62 (37.2%)
Total		277 (75.7%)	89 (24.3%)	366 (100%)
Chi-Square computed Value = 8.832 ^a , Critical Value = 5.99, df =2, α @0.05				

There are still some significant misconceptions despite the high prevalence of these diseases in the study area. Misconception affects preventive and controls efforts adversely. Hence, some mothers resort to traditional healers or do not use recommended preventive and curative measures such as oral rehydration solution (ORS) or ITN. Part of the responsibilities of the LLHWs (incorporated into the iCCM) is to provide information to address such misconceptions. Public enlightenment is also the essence of some outreach programs of the LLHWs. Beyond the perceived causes, there is also perceived severity, which signifies the seriousness of the consequences of a disease. There is a likelihood of adopting an appropriate preventive or curative behavior if there is high perceived severity. About one-quarter of the respondents believed malaria (25.3%), pneumonia (26.3%) and diarrhea (33%) could not kill a child. Such a belief implies that such mothers might not give deserving serious attention when the child is sick. The study shows that educational qualification is significantly associated with the perception of difficulty in breathing (pneumonia). Respondents with postsecondary education believed the infection was responsible for pneumonia (significant at 0.05).

Table 2 shows that level of education exerts a significant influence on the belief whether pneumonia can kill a child. From the Table, meeting with pregnant/nursing mothers at the health post is significantly associated with a belief in whether pneumonia could kill a child. Hence, 65% of the mothers who have ever attended meetings of pregnant/nursing mothers at the health post also perceived that pneumonia could kill a child. As the level of education increases, more people believed that pneumonia could kill a child.

Basic Home Remedies for iCCM Target Conditions

Table 3 shows data about basic home remedies, mostly used as first aid at home. Most times, the LLHWs often encourage primary care-givers to have home first aid for iCCM target conditions, especially in resource-constrained communities where a primary healthcare center might not be available. The primary caregivers often have some form of first aid, including oral rehydration solution (ORS) at home. ORS is a major first aid for diarrhea. About 66.8% of the mother had ORS at home during the survey, and about 90% could do home-made ORS (see Table 2).

Table 3: Basic home remedies for iCCM target conditions

Characteristics	Response	Frequency	Percentage
Do you have a packet of ORS (salt-sugar water) at home	Yes	251	66.8
	No	125	33.2
	Total	376	100.0
Do you know how to make ORS (salt-sugar solution) at home	Yes	342	90.9
	No	21	5.8
	No response	13	3.5
	Total	376	100.0
If yes to... who taught you	Community health worker	126	36.8
	Family/friends	90	26.3
	Self-learning	126	36.8
	Total	342	100
During this last episode of diarrhea, did your child take any of the following	Breast milk	174	46.3
	ORS (salt-sugar water)	110	29.3
	Fresh or powdered milk	25	6.6
	Pudding/mashed/solid food	11	2.9
	Herb	13	3.5
	Others	12	3.2
	No response	31	8.2
	Total	376	100.0
Type of drinking water sources	Piped water into dwelling	120	31.9
	Public tap or standpipe	81	21.5
	Well	57	15.2
	River	35	9.3
	Water vendors/ <i>mai-ruwa</i>	67	17.8
	Others	16	4.3
	Total	376	100
Under-five sleep under an insecticide-treated bednet	Yes	345	91.8
	No	21	5.6
	Total	376	100.0
Sources of the insecticide-treated bednet	Husband or self-purchased	90	23.9
	Community distribution	93	24.7
	From health facility	122	32.4
	Gift from family/friends	40	10.6
	No response	31	8.2
	Total	376	100.0
When the last child had perceived malaria	1-14 days	98	26.1
	15-30 days	161	42.8
	More than 31 days ago	76	20.2
	No response	41	10.9
	Total	376	100.0

Up to one-third of the respondents claimed that LLHWs taught them how to make ORS at home. Others claimed they were taught by friends (26.3%) and self-learned (36.8%). The study also investigated measures taken during the last episode of diarrhea. Despite a high percentage with ORS at home, only

29.3% administered it, but 46.3% gave the child breastmilk. Other administered herbs and complementary foods. Diarrhea is closely related to the type of drinking water. Among the respondents, only half had access to pipe-borne water: 31.9 percentage had piped water into a dwelling while 21.5% had access to public tap water. The remaining half of the respondents depended on other sources of water, including well (15.2%), river (9.3%), water vendors (17.8%), among others. Meanwhile, 9 out of 10 mothers claimed that their children sleep under ITN with a majority claiming that they obtain the ITN through community distribution (24.7%) and health facility (32.4%). The state government malaria program might be responsible for the high usage of ITN among the respondents. Despite the high ITN usage, 68.9% of the respondents disclosed perceived malaria within the last 30 days preceding the survey.

Table 4: Some attributes and whether the mother has a packet of ORS at home

	Do you have a packet of ORS (salt-sugar water) at home				X - cal	df	X -tab
		Yes	No	Total			
Is the vaccination up to date	Yes	122 (35.1%)	43 (12.4%)	165 (47.4%)	9.227 ^a	1	3.84
	No	107 (30.7%)	76 (21.8%)	183 (52.6%)			
	Total	229 (65.8%)	119 (34.2%)	348 (100%)			
Age of mother	less than 35	116 (30.9%)	62 (16.5%)	178 (47.3%)	.384 ^a	1	3.84
	more than 35	135 (35.9%)	63 (16.8%)	198 (52.7%)			
	Total	251 (66.8%)	125 (33.2%)	376 (100%)			

Table 4 shows that whether vaccination is up-to-date is significantly associated with whether they have ORS at home. From the result, 35.1% of the respondents whose vaccination was up to date have a packet of ORS at home. The result shows that the mother's age is not significantly associated with whether they have a packet of ORS at home. Almost the same percentage of mothers less and more than 35 years old did not have a packet of ORS at home.

Knowledge about treatment

Respondents were further asked about the best treatment option for a sick child (see Table 5). While almost half of the respondents (49.5%) still preferred modern healthcare posts to other options. The other half of the respondents mentioned alternative medicine, including faith-based healing. Traditional health practitioners constitute a significant alternative healthcare provider in most developing nations. They mostly provide herbal medicine, which can be readily used in communities where modern healthcare is deficient. The traditional healers are those recognized in the community who can provide alternative care using local materials (such as vegetables and mineral resources). The faith-based healers are also part of the traditional healers.

More respondents (67.6%) sometimes felt it is unnecessary to access modern healthcare when their children are sick. All the respondents gave reasons they sometimes avoid taking their sick wards to the hospital. Inadequate income (24.5%), long-distance (25.5%), and lack of husband's approval (19.1%) were significant reasons. Nigerian has a high incidence of poverty in Nigeria, and the study area is one of the poorest states. It was not surprising that some respondents mentioned a lack of financial means as a barrier to accessing healthcare. Healthcare expenditure is still significantly borne out of the pocket in Nigeria. One-quarter of the respondents complained about long-distance; in many communities, healthcare might not be available. Hence, people have to travel a long distance, which often discourages them. In most developing countries, patriarchal norms require that a wife takes permission from the male partner to attend a health facility or appear in a public space. Due to many personal reasons, the husband sometimes does not grant such a request. About 17.3% also reported time-wasting at the health facility to explain why they did not usually take their wards to the health facility.

Table 5: Knowledge about treatment

	Response	Frequency	Percentage
What is the best treatment for child ill-health?	Hospital/Health post	186	49.5
	Traditional herbal medicine	93	24.7
	Faith-based healing	97	25.8
	Total	376	100.0
Do you sometimes feel it is not necessary to visit the hospital?	yes	254	67.6
	No	71	18.9
	Total	325	86.4
	No response	51	13.6
	Total	376	100.0
Why don't you want to visit the hospital?	No money	92	24.5
	Long-distance	96	25.5
	Lack of husband approval	72	19.1
	Time wasting	65	17.3
	Others	34	9.0
	No response	17	4.5
	Total	376	100.0
Do you have any religious issues attending health facilities	Yes, no female worker	124	33.0
	Yes, mingling with the opposite sex	113	30.1
	Yes, some non-religious acts	84	22.3
	No, not at all	55	14.6
	Total	376	100.0

Table 6: Occupation, age and treatment options

		What is the best treatment for a child with ill-health?			
		Hospital/ Health post	Traditional medicine	Faith-based healing	Total
Occupation	Housewife	148 (39.4%)	68 (18.1%)	45 (12.0%)	261 (69.4%)
	Unemployed	6 (1.6%)	2 (0.5%)	5 (1.3%)	13 (3.5%)
	Petty trading	7 (1.9%)	13 (3.5%)	8 (2.1%)	28 (7.4%)
	Studying (formal)	4 (1.1%)	5 (1.3%)	17 (4.5%)	26 (6.9%)
	Civil service	20 (5.3%)	0 (0.0%)	10 (2.7%)	30 (8.0%)
	Artisanship	1 (0.3%)	5 (1.3%)	12 (3.2%)	18 (4.8%)
	Total	186 (49.5%)	93 (24.7%)	97 (25.8%)	376 (100%)
		X – cal = 71.281 ^a ; df = 10; X -tab = 18.31			
Age of mother	less than 35	74 (19.7%)	61 (16.2%)	43 (11.4%)	178(47.3%)
	more than 35	112 (29.8%)	32 (8.5%)	54 (14.4%)	198(52.7%)
	Total	186 (49.5%)	93 (24.7%)	97 (25.8%)	376(100%)
		X – cal = 17.038 ^a ; df = 2; X -tab = 5.99			

The study area is a religious (Islamic) society; hence the study further asked for religious issues preventing attendance at the health facilities. One-third of the respondents mentioned a lack of gender concordance in the health facilities. There are often more male health workers, and most women (in Islamic societies) want a female health worker to attend to them. Another 30.1% of the respondents also mentioned mingling with the opposite sex as a religious barrier in attending health facilities. Some other respondents (22.3%) complained of other non-religious acts. In all, 85.4% of the respondents have some religious barriers to attending health facilities. Only 14.6% (of the respondents) did not have any religious reasons not to attend health facilities.

Table 6 shows that the wife's occupation is associated with the choice of treatment for a child with ill-health. From the result, 39.4% of housewives viewed the hospital/health post as the best option of treatment for a child with ill-health. In the same vein, the mother's age is significantly associated with the choice treatment for a child with ill-health. To this end, 29.8% of mothers who were more than 35 years see the hospital/health post as the best place of treatment for a child with ill-health.

Table 7: Summary of regression analysis of the combination of four socio-demographic factors and Knowledge gaps and beliefs constituting barriers to uptake of ICCM

		B	Std. Error	Beta	t	Sig.
1	(Constant)	3.145	.221		14.257	.000
	Age of mother	-.215	.110	-.101	-1.953	.052
	level of education	.051	.043	.068	1.188	.236
	Place of delivery	-.136	.044	-.176	-3.106	.002
	Primary occupation	.002	.038	.004	.066	.947
	R = .192; Adjusted R2 = .026; F= 3.534; Sig. 0.008; df = 4					

The inferential analysis shows the combined influence of the independent variables to the dependent variables was significant ($F = 3.534$; $df = 4$; 376 ; $p < 0.05$). There could be the influence of other variables not included in this particular inferential analysis. Therefore, the study concluded that socio-demographic variables have a significant effect on the knowledge gaps and cultural beliefs constituting barriers to the perception of ICCM conditions. The analysis also indicates a coefficient of multiple correlations (R) of 0.192 and a multiple adjusted r -square of 0.026. This implies that sociodemographic variables accounted for 2.6% of the variance in the knowledge gaps and perception constituting barriers to uptake of ICCM. Table 7 further indicates the relative influence of the 4 independent variables to the dependent variable, expressed as Beta weights. From the study, the place of delivery made the most significant relative contribution to the prediction of their and knowledge gaps and perception constituting barriers to uptake of ICCM ($B = -.176$, $t = -3.106$, $p < 0.05$). Therefore, hospital delivery should be encouraged.

Discussion

Knowledge of the primary caregivers (mothers of under-five children) about iCCM Conditions

This study shows that the trio of pneumonia, diarrhea and malaria still constitute significant health challenges. Most mothers of under-five children had some form of knowledge about health conditions, though such knowledge is inadequate. Inadequate knowledge of illness causation and prevention among caregivers is one of the identified barriers to effective control of childhood diseases in the country (Do et al., 2018). These are particularly evident in the insufficient understanding of the risk factors that may increase the likelihood of infection in children. Predictably, variations exist in the level of knowledge for each iCCM condition among different categories of caregivers in different social settings. A systematic review of publications on iCCM conditions across developing countries revealed that the caregivers' understanding of pneumonia-specific signs and symptoms was comparatively

lower than that of malaria and diarrhea (Bakare et al., 2020; Geldsetzer et al., 2014).

Similarly, a qualitative study among caregivers of under-five (U5) children in other parts of Nigeria (Lagos and Jigawa States) revealed that mothers in Jigawa had a wrong notion about the causes and symptoms of pneumonia in under-five children. Mothers interviewed in Lagos exhibited awareness of the condition, but they equally lacked knowledge of pneumonia symptoms. Participants in both States held the wrong belief that pneumonia is primarily caused by exposure to cold air. However, some caregivers who were conversant with the condition described it as critical. The authors revealed that inadequate knowledge of pneumonia in the study hints at poor healthcare seeking for the illness (Bakare et al., 2020). Another study among caregivers in rural and urban communities in Kaduna found their level of awareness to be high, and misconceptions about the causes of pneumonia were also high (67%). More than two-thirds (68%) of the caregivers had poor knowledge of pneumonia. The level of knowledge was said to have a significant relationship with pneumonia in under-five children (Yahaya et al., 2018).

The influence of socio-demographic characteristics is evident in this study concerning perception/beliefs and other issues (vaccination and breastfeeding) about childcare. In general, education often affects knowledge of illness condition. Ekure et al. (2012) observed that formal education influenced the knowledge of pneumonia. Sources of information about pneumonia were found to determine the caregivers' knowledge of the condition. In the same vein, a survey among mothers of U5 children in Enugu State reported a high level of awareness about pneumonia. Those who were aware understood it to be life-threatening. Social-demographic variables similarly influenced the mothers' knowledge of pneumococcal vaccine and its uptake in the study (Ndu et al. 2015). A study noted that caregivers usually mention stabbing chest pain as a sign of pneumonia (Yahaya et al., 2018). The study noted the persistent attribution of most child ill-health to Witchcraft. A similar study also noted that shared misconceptions about its cause in our environment include witchcraft and cold weather (Bakare et al., 2020).

Despite the belief that malaria is a severe ailment, the perception of caregivers about malaria severity did not reflect treatment-seeking from health facilities. The majority delayed treatment and practiced self-medication (Agu & Nwojiji, 2005). Another study in a rural community in Eastern Nigeria correspondingly observed the level of knowledge about malaria to be poor (Okeke, 2010). Orimadegun and Ilesanmi (2015) equally discovered a high rate of misconceptions about the causes of malaria in U5 children among mothers in rural Ekiti. Caregivers' misconceptions about malaria explain the high prevalence of self-medication was common (Orimadegun & Ilesanmi, 2015). Religion and place of residence were notable factors that swayed care seeking among the respondents in another setting (Do et al., 2018). Interestingly, some substantial positive changes were observed in the level of knowledge among the community caretakers following some training on malaria. Remarkable

areas of improvement are knowledge of malaria symptoms, treatment, seeking the right care when cases become serious and substantial decrease in the patronage of traditional medicine vendors (Okeke, 2010). This study also showed that mothers who have attended (at least) a meeting where health issues were discussed, and who delivered at the official health sector had better knowledge and health practice.

In this study, many of the respondents have basic home first aid measures for the conditions examined. For instance, 66.8% claimed they had ORS at home, while 90% could make it. Also, 9 out of 10 respondents had ITNs. Previous studies (Okeke, 2010; Osonwa et al., 2016; Dairo et al., 2017) have also confirmed some home remedies in the management of childhood diseases. Additionally, knowledge of diarrhea causation and signs and symptoms of dehydration (danger signs) in children was also high (Dairo et al., 2017). The majority knew the appropriate measures for diarrhea prevention. Again, awareness of ORS was high, but knowledge of ORS composition and preparation was suboptimal. Less than half of caregivers whose children had diarrhea episodes (in the past two years) before the study administered ORS, but their compliance with ORS therapy guidelines was poor. There are also some misconceptions regarding diarrhea. The common misconceptions about the causes of diarrhea in Nigeria include teething, weaning, and supernatural cause (witchcraft). Other identified risk factors are microbes, unclean food and water (Ogbeyi et al., 2016; Omole et al., 2019).

The relatively high possession of ITN and knowledge of ORS discovered in this study is similar in a related study in a semi-urban area of Sokoto. The study found that the knowledge of diarrhea, its mechanisms, prevention, risk factors, and home management to be adequate (Raji et al., 2017). The study also discovered that knowledge of diarrhea disease and its occurrence in U5 children were associated with the primary caregivers' educational status. Higher educational status was associated with low utilization of traditional medicine when diarrhea disease is detected (Raji et al., 2017). This study discovered some factors limiting access uptake of iCCM services among the respondents. The limitation includes religious issues, misconceptions, finances, husband approval, among others. In most part of northern Nigeria where this study took place, gender norms posed a significant obstacle to the uptake of iCCM services. Also, in this study, religious beliefs inhibit some caregivers from accessing appropriate care. In general, a multiplicity of barriers hinders Africans regarding access to healthcare.

Box 1: Key Findings and Recommendations

- ❑ Contrary to high home delivery, 9 out of 10 respondents reported that their children had a vaccination card. However, only 4 out of 10 respondents reported that the vaccination of their children was up-to-date.
- ❑ There is still the problem of vaccine hesitancy or resistance among many of the respondents, which accounts for the vulnerability of under-5 children to vaccine-preventable diseases.
- ❑ There was also low adherence to exclusive breastfeeding of children. Only 3 out of 10 mothers reported adherence to exclusive breastfeeding.
- ❑ One-third of the respondents mentioned the issue of lack of gender concordance in the health facilities. In all, 85.4% of the respondents have some religious barriers to attending health facilities, only 14.6% (of the respondents) did not have any religious reasons not to attend health facilities.
- ❑ Respondents' level of education is significantly associated with whether vaccination is up-to-date or not. Most episodes of illness is first perceived at home especially by caregivers. The study, therefore, concluded that socio-demographic variables has a significant effect on the knowledge of ICCM.

Key Recommendations

- ❑ The government needs to invest in community mobilization and engagement to institute (community) structures that would help deliver required primary health services.
- ❑ Training and supply of additional lower-level health workers would facilitate the creation and institution of community structures.
- ❑ The lower-level health workers should concentrate on and coordinate outreach programs that would address barriers to

Conclusion

There are still some misconceptions that limit the uptake of iCCM services where available. Knowledge of community members on iCCM target conditions needs to be improved. There is a need to train and supply additional lower-level health workers to facilitate the creation and institution of community structures. The community needs to be engaged with the training and supply of additional LLHWs, who can deliver specific services and information to the households. The lower-level health workers should concentrate on and coordinate outreach programs that would address barriers to accessing healthcare. It is vital to empower families to identify danger signs and seek appropriate care (WHO & UNICEF, 2009). Therefore, the government needs to invest in community mobilization and engagement to institute (community) structures that would help deliver required services (see Amzat, 2020). More importantly, the community needs to be engaged with the incorporation of lower-level healthcare workers who can deliver specific services and information to the households.

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