Knowledge, attitude, and behaviour towards nutrition radio programmes in mothers of children under five years with severe acute malnutrition in Northern Nigeria

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ABSTRACT

Introduction: Although the mass media are increasingly becoming a platform for disseminating health messages to promote attitude and behavioural changes, little is known about how radio programmes influence safe child feeding practices among mothers of infants and children. Consequently, this study examined the knowledge, attitude and behaviour towards food and nutrition radio programmes in mothers of children under five years with severe acute malnutrition in Northern Nigeria. **Methods**: This study employed a survey research design using data derived from a structured questionnaire undertaken with mothers (*N*=402) of children suffering from severe acute malnutrition (SAM) and who have been listening to radio programmes on tackling malnutrition within six months to the time of the fieldwork. **Results**: Findings revealed that while mothers appeared to have a higher comprehension of child feeding programmes on the radio, their attitude and actual uptake of the messages were not encouraging. Furthermore, being young, having few children, having a primary education, and frequent listening to SAM-related messages on the radio were associated with mothers' positive knowledge, attitude and actual uptake of the messages disseminated. **Conclusion**: The findings provided a link between demographic characteristics of mothers and how they comprehend, believe and act on the messages they received from these radio programmes. It is therefore argued that the understanding of this link might inform the focus of future intervention aimed at promoting best child feeding practices in Northern Nigeria.

Keywords: health education, intervention, malnutrition, mothers, radio programmes

INTRODUCTION

Campaigns, which aim at providing supplementary foods for children affected by varying grades of malnutrition, are globally recognised as an important part of health intervention (Satiawati & Januraga, 2018). However, one crucial aspect which accounts for the success of nutritional interventions on malnutrition in children under five years is the knowledge and trust that caregivers have in the likely benefits

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the programme has to offer (Satiawati & Januraga, 2018). A study conducted in Burkina Faso revealed that these attributes (knowledge and trust) played a significant role in effective supplemental food provision (Iuel-Brockdorf *et al.*, 2016). Other studies like that of Rogers *et al.* (2015) also reported that lack of community awareness alongside low recognition of child acute malnutrition and inadequate knowledge of existing intervention programmes on the part of caregivers accounted for the expected success of these programmes. To this end, Satiawati & Januraga (2018) and Iuel-Brockdorf *et al.* (2016) concluded that interventions that are poorly received could result in caregivers using foods that are not rich in nutrients, thereby leading to a decrease in the nutritional status of children, as well as wasting resources.

As a result, it is important to continue to examine how knowledge, attitude and behaviour of caregivers towards supplemental food interventions against acute malnutrition in children affect the successes and impacts of such initiatives. It is maintained that broader understanding of the subject under study could inform an evidence-based approach which is capable of improving future interventions that will guarantee better child malnutrition outcomes. In this study, we examined knowledge, attitude, and behaviour towards radio nutrition assistance programmes in mothers of children under five years with severe acute malnutrition in Nigeria – a place where the condition is prevalent.

Research context
This research was undertaken in Northern Nigeria with an estimated population of 90 million people over a total land area of 660,000 km². The region is divided into three major geopolitical zones, which are further sub-divided into 19 states. It is estimated that the

region has 3,900 to 6,200 health clinics in each zone (Sato, 2019). The region has the highest level of malnutrition among children in Nigeria. For example, Northern Nigeria has about 88 percent of Nigeria's acute malnourished children (Abubakar, 2018). Also, relative to other geopolitical zones in the country, the North West (55.0%), North East (42.0%), and North Central (29.0%) have the highest proportion of children who are malnourished (USAID, 2018).

This situation had earlier made the government and other stakeholders to declare a public health emergency on acute malnutrition in some parts of the northern region (Leidman *et al.*, 2016). Disseminating messages through the media has been an intervention tool adopted in Northern Nigeria. The messages disseminated through these channels are generally about giving out basic information regarding the importance of preparing nutritive food with available resources, necessary information about how to get help from local community volunteers, suggest practices and present testimonies that could inform listeners and motivate them to action (ACF International, 2015).

Extant literature has posited that mothers and caregivers often lack optimum knowledge on how to properly prepare nutritious food and feed their children effectively due to lack of health education (Groce *et al.*, 2014). Invariably, studies have demonstrated that even when mothers and caregivers are exposed to a high level of media awareness regarding supplementary nutrition interventions, comprehension, belief, and feasibility of implementing these recommended behaviours may remain a challenge, as awareness does not always translate into acceptability, which influences their attitude. As a result, it is advocated by studies that promoters of nutrition programmes should place an emphasis on caregivers'

implementation of interventions. (Kim *et al.*, 2018). Studies have equally linked issues on knowledge and uptake of mass media campaigns targeted against malnutrition in children to the personal characteristics of caregivers and mothers (Asare *et al.*, 2018; Griaudze *et al.*, 2020; Kim *et al.*, 2018). For example, being young, highly educated, owning and frequently watching a TV, and receipt of at least one home visit from community mobilisers were associated with higher odds of comprehending mass media messages targeted towards malnutrition in children (Kim *et al.*, 2018).

While it is a fact that mass media are continuously being used to disseminate health messages to promote healthy behavioural changes due to their capacity to improve knowledge and attitude of a large number of people, their effect on behavioural changes are varied and well documented in several studies (Kim *et al.*, 2018). Despite these various outcomes, evidence showing how exposure to mass media information impacts a set of nutritional practices for infants is scanty (Kim *et al.*, 2018). More specifically, little is known about the influence of media intervention on knowledge, attitude and behaviour of mothers and caregivers on the prevention and management of malnutrition in children under five years in a country like Nigeria. This study specifically focused on severe acute malnutrition (SAM) because very few (i.e., two out of every ten) out of the estimated two million children suffering from this condition is currently reached with treatment (UNICEF, 2020).

Therefore, by examining the influence of radio awareness campaigns on mothers with children suffering from SAM in Northern Nigeria, we might begin to understand the process through which nutrition knowledge, attitude and behaviour change occur. Also, situating mothers' knowledge, attitude and behaviour regarding these radio messages within the context of certain personal characteristics could inform the focus of future interventions in the region.

Study objectives
As a result, this study attempts to:
1. Examine the influence of radio awareness campaigns on knowledge, attitude and behaviour of mothers with children with severe acute malnutrition.
2. Identify the factors influencing the uptake of these messages on popular radio stations in the northern region of the country.

Child feeding and SAM-related radio interventions in Northern Nigeria
There are a number of radio stations, such as BBC Hausa, VOA Hausa, Vision FM, Rahama Radio, and Radio Kano, which air a 15-minute child health programme, with particular focus on malnutrition on a weekly basis. The stations equally air advertisement spots that raise awareness on the same subject. The programmes and spots are produced in the Hausa language. Many of the programmes are BBC sponsored. One popular programme that is common in the region is called: *LafiyaZinariya*, which literarily means that 'health is wealth'. This particular programme is presented by Fauziyya, Kabir Tukur to educate residents in Northern Nigeria about their health, especially caregivers on proper nutrition for their children. Other radio stations that disseminate various health programmes that sometimes focus on malnutrition messages include Freedom Radio and Arewa Radio, which are two of the most influential radio stations in Kano (state with the highest population in Northern Nigeria). According to statistics, the influence of these radio stations cut across some 2.5 million ardent listeners

(Misbanu, 2020). Further to this, the BBC weekly radio programme -*Ya Take Ne Arewa* (What's happening in the North) also focuses on health issues that affect common health realities in communities. This programme in particular reaches more than 8.6 million listeners weekly across 15 states of Northern Nigeria. The thirty-minute weekly programme, which discusses topics, such as malnutrition, antenatal care, and family planning issues, is mainly targeted at parents and caregivers. In fact, a recent broadcast of Future Assured Half Hour was transmitted across several radio platforms in Northern Nigeria on the 1st of August 2020. The major highlights of the programme included discussions on the importance of early initiation of breastfeeding within the first hour, the need for exclusive breastfeeding for up to six months and continuing to two years, among others.

These programmes, which we consider as listener-led, are so popular in Northern Nigeria that people form separate listening groups in some states to discuss issues treated on air. Participation in these groups informs feedbacks on the part of radio presenters, who then use the groups' input to shape future conversations on radio.

MATERIALS AND METHODS

This study employed a survey research design using data derived from a structured questionnaire undertaken with mothers (N=402) of children suffering from SAM and who have been listening to radio programmes on tackling malnutrition within six months to the time of the field work. An initial quantitative sample size of 384 was statistically (using Cochran's formula) derived. With 95% level of confidence, an estimated level of listenership to radio programmes on how to respond to child malnutrition at 50% (0.5), and

a permitted margin of error at 0.05 (5% points), we determined the sample size (Cochran, 1963, p. 75) using the following steps:

$$n= \frac{[Z/_2]^2\ (p\ q)}{e^2} \quad n= \frac{[Z/_2]^2\ (P)(1\text{-}P)}{e^2}$$

Where: n= sample size, Z^2= confidence level, p= rate of occurrence or prevalence (the estimated proportion of an attribute that is present in a population), q= complement of p, and e= margin of error. Therefore;

$$n= \frac{[1.96]^2 0.5\ (1\ \text{-}\ 0.5)}{0.05^2} \quad n= \frac{3.8416\ (0.25)}{0.0025}$$

$n= 384$

Furthermore, an adjusted 5% non-response rate was added and resulted in 404, where n* (adjusted non-response rate) = 384/0.95 = 404. The sample size was considered adequate to collect data that are sufficient to perform statistical analysis that could allow for inferences. The research adopted a multi-stage sampling procedure to select the samples for the study. At the first stage, three states (Kano, Yobe, and Niger) were purposively selected from the 19 states in the region. The states were selected because they share a disproportionately high burden of wasting in their respective sub-regions. Under a naturally stratified condition, we selected one senatorial district from each of the states (i.e., Kano North, Yobe East, and Niger West) using a simple random sampling approach (balloting). Furthermore, by adopting a purposive sampling, one local government area (LGA) – Bida, Damaturu, and Gwarzo was selected from each of the senatorial districts. The prevalence rate of severe acute malnutrition and the public level of exposure to media campaigns on the need to eradicate malnutrition informed the selection. A simple random sampling approach was afterwards adopted to select households, which eventually

provided the mothers who responded to the questionnaire items. However, eligibility criteria for interview included: (1) must be a mother of child/children under five years, with a self-reported history of or currently suffering from severe acute malnutrition, and (2) must have been a listener [whether active or passive] to radio programmes within the past six months. We obtained ethical clearance from the Health Research Ethics Committee (HREC), which is the institutional review body domicile at the University of Nigeria Teaching Hospital, Ituku-Ozalla, Enugu. Signed informed consent was obtained from each of the respondents during the field work.

Measurement

Knowledge

Knowledge is operationalised as the level of comprehension that mothers possess following their exposure to radio spots or programmes on malnutrition prevention and management. Knowledge was measured using a scale with seven statements/questions. For example, one of the items was worded: 'It is mass media health message that inform on how to ensure household foods have the needed nutrients, vitamins and minerals for their nutrition'. Scores of each item were totalled, with the score ranging from 2 to 28. Response options ranged from 'strongly disagree' (1) to 'strongly agree' (4). Cronbach's coefficient of 0.87 was derived and was found to be highly reliable.

Attitude

As for attitude, the variable was defined within the context of the present study as the level of credibility and feasibility possessed by mothers towards radio spots or programmes on malnutrition prevention and management. Attitude was therefore measured using a scale that had seven statements/questions. An example of one of the items was: 'I

believe in the healthy nutrition message advocated by the radio awareness campaign on SAM'. Response options ranged from 'strongly disagree' (1) to 'strongly agree' (4). By summing up scores for each item, the total score was found to range from 6 to 32. The Cronbach's coefficient was found to be reliable (0.74).

Behaviours

Self-reported behaviours were measured in the study context as the level of preventive and management practices adopted by mothers owing to their exposure to the programmes. Behaviour was measured on a scale with seven items/statements with the following examples: 'To a large extent, the healthy nutrition message promoted by the media awareness campaign have helped my household to get rid of taking unbalanced diets', 'I regularly play my own part in the community mobilisation efforts towards prevention and management of SAM regarding my child/children', etc. Response options ranged from 'strongly disagree' (1) to 'strongly agree' (4). A total score ranging from 4 to 28 was calculated by summing up scores for each of the items in the scale. The Cronbach's coefficient was found to be highly reliable (0.96). Further to this, respondents were asked to give a categorical assessment as to whether they consistently adopt at least four of these practices since they have started listening to messages on SAM prevention and management.

Data analysis

Initially, a Cronbach's alpha reliability test was conducted using the Statistical Package for Social Sciences (SPSS 23). Reliability scores with 70% and above were considered as highly consistent. We also used correlation analysis to ascertain the relationships between the outcome variables (knowledge,

attitude, and behaviour). Furthermore, linear multiple regression and logistic regression analysis were used to examine relationships raised between variables in the study. While multiple linear regression was used to examine the relationship between continuous variables (knowledge, attitude, practice, KAP scores) and demographic variables, binary logistic regression was used to examine the likelihood of having adopted the behaviours by demographic characteristics, which were all defined as categorical variables.

RESULTS

A 99.5% response rate was recorded, which was considered very good and suitable for analysing the elicited data. Results showed that mothers were between the ages of 15 and 49 years (mean= 33.12 years, standard deviation, *SD*= 5.21 years). An overwhelming majority of the women (74.4%) were married; 53.5% of the mothers had either seven or more children and 53.0% did not have any formal education. This was not surprising in that it reflected the reality that half of the young women in Northern Nigeria have no formal education (Education Policy and Data Centre, 2014). As to the extent of exposure to SAM messages on radio in the past six months (at the time of the field work), results revealed that 57.0% of the mothers listened to these messages occasionally, while the remaining 43.0% listened to the messages very often.

Correlation analysis was further conducted. As shown in Table 2, correlation analysis showed that significant positive associations existed

Table 1. Characteristics of the respondents

Variables	n	%
Age (years)		
15-24	95	23.6
25-34	130	32.3
35-44	169	42.0
45-49	8	2.0
Marital status		
Single	16	4.0
Married	299	74.4
Divorced	31	7.7
Widowed	47	11.7
Separated	9	2.2
Number of children		
1-3	47	11.7
4-6	81	20.1
7 and above	215	53.5
None	59	14.7
Education level		
No education	213	53.0
Primary	189	47.0
Extent of exposure to SAM messages on radio in the past 6 months		
Very often	173	43.0
Occasionally	229	57.0

Table 2. Descriptive statistics, Cronbach's alpha values and correlation output among respondents' knowledge, attitude and behaviour towards SAM messages on radio in the past six months

Variable	Mean±SD	Cronbach's alpha	Knowledge	Attitude	Behaviour
Knowledge	35.4±5.6	0.872	1		
Attitude	14.6±10.9	0.740	0.312**	1	
Behaviour	8.4±17.2	0.961	0.403**	0.341**	1

Two-tailed Pearson correlation significant at **$p<0.01$

between mothers' knowledge and attitude, knowledge and behaviour, as well as attitude and behaviour owing to their exposure to SAM spots and programmes on the radio. A closer look at the mean in the table also suggested that women scored lower in their attitude and behaviour compared to their knowledge score. This might imply that despite a good level of comprehension of the messages women listened to, the messages might not have had an important influence on their attitude and most especially, their practices of proper preventive and management measures of SAM.

Demographic influence on mothers' knowledge regarding radio spots or programmes on SAM prevention and management
The predictive factors accounted for 61.3% of the variation in message comprehension among mothers of children under five years. Comprehension of SAM messages was negatively predicted by age and number of children, but positively predicted by education and exposure to SAM messages on the radio (Table 3). However, marital status coefficient was not significant.

Demographic influence on mothers' attitude towards radio spots or programmes on SAM prevention and management
The predictive factors accounted for 46.2% of the variation in the mothers' attitude towards the SAM messages they listened to. Attitude towards SAM messages was negatively predicted by age and number of children, but positively predicted by education and exposure to SAM messages on the radio (Table 4). Nonetheless, marital status coefficient did not reach statistical significance.

Table 3. Linear multiple regression analysis on the influence of age, marital status, number of children, education, and exposure to SAM messages on knowledge (comprehension) of the messages

Model	Unstandardised coefficients		t	Sig.
	β	Std. error		
Age	-5.412	0.763	-2.231	<0.001
Marital status	0.372	0.525	0.251	0.890
Number of children	-3.711	0.700	-3.412	<0.001
Education	3.152	0.416	2.462	0.001
Exposure to SAM messages	2.532	0.662	5.515	0.001
R^2	0.613			
ΔF	349.113**			

**$p<0.01$

Table 4. Linear multiple regression analysis on the influence of age, marital status, number of children, education, and exposure to SAM messages on attitude (believability and credibility) of the messages

Model	Unstandardised coefficients		t	Sig.
	β	Std. error		
Age	-4.132	0.813	-12.101	0.001
Marital status	0.031	0.410	0.300	0.610
Number of children	-5.310	0.312	-6.339	0.000
Education	4.311	0.527	3.116	0.008
Exposure to SAM messages	3.131	0.329	4.331	0.002
R^2	0.462			
ΔF	268.012**			

**p<0.01

Demographic influence on mothers' self-reported behaviour regarding radio spots or programmes on SAM prevention and management

Results of the binary logistic regression showed that mothers who were 25-34 years old were 1.56 times more likely to adopt the practices according to the SAM messages than mothers who were 15-24 years (95%CI: 1.91–3.55; *p*<0.001). We also found that mothers who were maritally stable (i.e., married) were 2.48 times more likely to adopt the practices according to SAM messages compared to single mothers (95%CI: 1.13–4.72; *p*<0.001). Furthermore, results revealed that mothers with 4-6 children were 3.61 times more likely to report practising SAM messages relative to those who have between one and three children (95%CI: 1.89–3.35; *p*<0.01). Also, mothers with primary education were 2.56 times more likely to practise SAM messages accessed on radio compared to mothers with no education. Finally, findings showed that those who accessed SAM messages very often on radio within the past six months were 5.21 times more likely to practise SAM messages compared to those who had access occasionally (95%CI: 4.10–9.86; *p*<0.001).

DISCUSSION

The study examined the influence of radio awareness campaigns on knowledge, attitude and behaviour of mothers with children with severe acute malnutrition. From the results of the descriptive analysis, there were reasons to indicate that even though data on exposure to SAM messages on popular radio channels were based on self-report, there was a decline in the attitude and behaviour of mothers towards SAM messages despite their occasional and consistent exposure to the messages when compared to their level of knowledge. Findings suggested that a notable improvement was only noticed in mothers' knowledge (comprehension) and attitude (believability) towards the SAM messages on radio. Previous studies have highlighted the media effects of campaigns focusing on nutrition towards mothers and caregivers' knowledge, attitude, intentions, and practices about nutritional issues (Abdul-Fadi, 2012; Alnasser *et al.*, 2018; Msiska *et al.*, 2017). Also, studies highlighting the difference between knowledge and attitude, as well as practices of good nutritional behaviours exist (Mogre *et al.*, 2016; Vijayalakshmi

Table 5. Binary logistic regression analysis for possible influences of age, marital status, number of children, education, and exposure to SAM messages on behaviour (actual practices) of the messages

Variable	OR	95% CI	
		Lower	Upper
Age			
15-24 years (Reference)	1		
25-34 years	1.56***	1.91	3.55
35-44 years	0.35	0.43	1.75
45-49 years	0.82	0.38	2.10
Marital status			
Single (Reference)	1		
Married	2.48***	1.31	4.72
Divorced	0.31	0.52	2.03
Widowed	0.76	0.17	1.34
Separated	0.81	0.37	1.98
Number of Children			
1-3 (Reference)	1		
4-6	3.61**	1.89	3.35
7 and above	0.43	0.74	1.32
None	0.23	0.62	3.70
Educational Level			
No education (Reference)	1		
Primary	2.56***	2.34	7.83
Extent of exposure to SAM messages on radio in the past 6 months			
Occasionally (Reference)	1		
Very often	5.21***	4.10	9.86

**p<0.01
***p<0.001

et al., 2015). These studies showed that while knowledge and attitude of good nutrition was high among mothers and caregivers, their nutritional behaviours were discouraging. This implies that the actual practice of what is being learnt might become difficult for mothers and caregivers across various samples.

The result of the linear multiple regression revealed that being young could translate to becoming more knowledgeable about SAM messages on the radio. Previous studies like that of Kim *et al.* (2018) have shown an association between younger maternal

age and higher comprehension of TV spot messages on child feeding in Bangladesh. Our result therefore extends previous findings by showing how knowledge/ comprehension of SAM messages could be understood within the context of age in a different sample, where the radio serves as a common health information channel.

Findings equally implied that mothers with fewer children have the capacity to understand more of the SAM messages compared to those with larger number of children. This highlights the importance of family size on the ability or capacity

to comprehend details of child feeding campaigns. As an example, the Central Statistical Agency & ICF International (2012) found that larger family size influenced the inadequate knowledge of mothers on infant and young child feeding (IYCF) recommendations in an Ethiopian sample. Put together, plausible explanation for the present outcome might be that mothers and caregivers are probably overwhelmed with the responsibility of providing scarce food and resources to feed their many children, consequently gave less concern to some radio programmes.

Furthermore, findings showed that knowledge of SAM messages was positively predicted by education and the extent to which they listened to the radio messages. These outcomes are consistent with previous findings elsewhere (e.g., Central Statistical Agency & ICF International, 2012; Demilew, 2017). For example, in a cross-sectional assessment of knowledge among mothers resulting from their exposure to IYCF recommendations in an Ethiopian city, Demilew (2017) revealed that positive knowledge from the child feeding campaign was significantly associated with mothers who had above primary education and was in possession of a radio. Although such positive knowledge correlated with mothers' education level in our study, it was only noticed in mothers with primary education. In practical terms, this output should be interpreted with caution because a primary education could still be classified as very low education status. Recall that it was stated in the study that women and girls are disproportionately disadvantaged in terms of access to formal education.

The findings on the influence of mothers' age and education are in agreement with extant research showing that being young, having higher education level, and frequent

TV watching impacted the believability of mass media intervention to improve child feeding in Bangladesh (Kim *et al.*, 2018). Such findings extend the results of previous studies as they highlight how demographic variables could impact the ways these messages are received in different populations. We also observed that young mothers can be encouraged to form or participate in listening groups (i.e., targeting those who do not own a radio, but could join others who own one to listen along). While radio programmes could be designed to encourage listeners to form listening groups, child feeding attitudinal change strategies (as obtained from episodes of these programmes) could be incorporated and taught by knowledgeable members of the group.

Finally, being young, married, having 4-6 children, having a primary education, and listening to SAM-related messages on the radio impacted the likelihood of practising SAM messages. These findings corroborate earlier findings (Aswathy *et al.*, 2020; Kim *et al.*, 2018). Related studies have also looked at the influence of marital instability on proper child feeding practices and stunting (Neji *et al.*, 2015; Ntoimo & Odimegwu, 2014). Our finding on marital influence extends this evidence by showing that marital status might also have an impact on the ways and manners in which mothers act on mass media information that encourage best child feeding practices.

Limitations of the study
It is a fact that no work is immune to limitations. Therefore, our study is no different. One of the limitations of this study was our reliance on self-report with regards to radio listenership on SAM-related topics, as well as behaviours related to the messages in the northern region. Since we did not design the radio programme, as well as control variables for experimental purposes, we resolved to relying on self-report measures, which

allowed us to select mothers who have actually been exposed to SAM-related radio programmes over a period of six months to the time of the field work. The study was equally limited because we did not adopt an experimental approach, which could have enabled us to ascertain causality and actual effects. The study also did not focus on the experience of fathers. The study was restricted to only three out of the 19 northern states in the country, thus could only be generalised to areas with high prevalence of SAM and access to radio messages. Nevertheless, future research could strengthen the study outcomes by addressing these limitations.

CONCLUSION

Based on the study, the likely influence of radio intervention was mostly observed on mothers' comprehension of the messages disseminated. However, mothers' attitude (believability of the messages) and actual practice of what was heard on the radio was not encouraging. While the study showed that the influence of SAM-related radio spots or programmes on mothers' knowledge, attitude and behaviour might be minimal, the findings provided a link between demographic characteristics of mothers and how they comprehended and acted on the messages they received from the radio programmes. We argue that the understanding of this link might inform the focus of future interventions aiming to promote best child feeding practices in Northern Nigeria.

Based on the findings of this study, it is recommended that campaign developers focus more on age-specific factors, as well as improve on language and concepts that could be appealing to all age categories. We also advise the adoption of interventions and continuous introduction of family planning as one of the measures to make intending parents consider their family size relative to available food resources. In addition, radio programmes on SAM should be redesigned to focus more on mothers who are illiterate. Programme designers could tap into relatable languages and ideas that could attract this demographic. Complementary child feeding attitudinal change communication through existing SAM-related radio programmes should be timely. For example, by designing such attitudinal change communication to focus more on mothers who are older, illiterate, listen to SAM messages occasionally, and have large family size, we might begin to motivate significant attitudinal change towards believing in these messages. Finally, intervention approaches should encourage mothers to form radio listening groups where they can motivate one another to always listen to these SAM-related programmes.

Authors' contributions

OAE and ALI, principal investigators, conceptualised and designed the study, led the data collection in Northern Nigeria; IOO, co-led the data analysis and interpretation; BBM, co-led the data analysis and interpretation; LBF, prepared the manuscript and assisted in data collection; OV, compiled the draft and reviewed the manuscript.

Conflict of interest

The authors report no conflict of interest. The authors alone are responsible for the content and writing of the manuscript.

References

Abdul-Fadi AT (2012). Evaluation of mothers knowledge, attitude and practice towrads ten steps to successful breastfeeding in Egypt. *Br Med J* 7(3):173-178.

Abubakar B (2018). *Peanuts, millets, beans: simple foods helping to stem Kano's malnutrition crisis.* From https://nigeriahealthwatch.com/peanuts-millet-beans-simple-foods-helping-to-stem-kanos-malnutrition-crisis/ [Retrieved April 12 2020]

ACF International (2015). *Severe acute malnutrition management in Nigeria: Challenges, lessons and the road ahead.* From https://ciff.org/documents/72/ACF_SevereAcuteMalnutritionNigeria_evaluation.pdf [Retrieved May 1 2020]

Alnasser Y, Almasoud N Aljohni D Almisned R Alsuwaine BAlohali R Almutairi O &Alhezayen R (2018). Impact of attitude aand knowledge on intention to breastfeed: Can mHealth based education influence decision to breastfeed exclusively? *Ann Med Surg* 35:6-12.

Asare BYA, Preko JV, Baafi D &Dwumfour-Asare B (2018). Breastfeeding practices and determinants of exclusive breastfeeding in a cross-sectional study ata child welfare clinicinTemaManhean, Ghana. *Int Breastfeed J* 13:12. doi: 10.1186/s13006-018-0156-y

Aswathy S, Panicker KN, Rajani G Nimitha P &Anvar R (2020). Infant and Young Child Feeding Practices: An Interventional Behaviour Change Communication Approach. *J Clin Diagnostic Res* 14(2):17-21.

Central Statistical Agency [Ethiopia] ICF International (2012). *Ethiopia demographic and health survey 2011.* Central Statistical Agency and ICF International, Addis Ababa and Cleverton.

Demilew YM (2017). Factors associated with mothers' knowledge on infant and young child feeding recommendation in slum areas of Bahir Dar City, Ethiopia: cross sectional study. *BMC Res Notes* 10(191):1-7.

Griaudze DH, Kieffer EC Domoff SE Hess K Feinstein S Frank A Pike D &Pesch MH (2020). The influence of social media on child feeding practices and beliefs among Hispanic mothers: A mixed methods study. *Eat Behav* 36:1-7.

Groce N, Challenger E Berman-Bieler R Farkas A Yilmaz N Schultink W, Clark D, Kaplan C&Kerac M (2014). Malnutrition and disability: unexplored opportunities for collaboration. *Paediatr Int Child Health* 34(4):308–314.

Iuel-Brockdorf AS, Draebel TA, Ritz C,Fabiansen C,Cichon B, Christensen VB,YameogoC, OummaniR, BriendA, MichaelsenKF, AshornP, Filteau S&Friis H (2016). Evaluation of the acceptability of improved supplementary foods for the treatment of moderate acute malnutrition in Burkina Faso using a mixed method approach. *Appetite* 99: 34–45.

Kim SS,Roopnaraine T, Nguyen PH,Saha KK, Bhuiyan MI & Menon P (2018). Factors influencing the uptake of a mass media intervention to improve child feeding in Bangladesh. *Matern Child Nutr* 14(3):e12603.

Kristjansson E, Francis D Liberato S Greenhalgh T Welch V Jandu MB, Batal M, Rader T, Noonan E, Janzen L, Shea B, Wells GA &Petticrew M (2016). *Supplementary Feeding for Improving the Health of Disadvantaged Infants and Children: What Works and Why? 3ie Systematic Review Summary 5.* International Initiative for Impact Evaluation (3ie), London.

Leidman E, Tromble E YerimaA Johnston R Isokpunwu C Adeniran A & Bulti A (2016). Acute malnutrition among children, mortality, and humanitarian interventions in conflict-affected regions – Nigeria, October 2016-2017. *MMWR Morb Mortal Wkly Rep 66*: 1332-1335.

Misbanu E (2020). *Rayuwa Da Korona: How two local radio stations are responding to COVID-19 in Kano State.* From https://nigeriahealthwatch.com/rayuwa-da-korona-how-two-local-radio-stations-are-responding-to-covid-19-in-kano-state/ [Retrieved May 2 2020]

Mogre V, Dery M &Gaa PK (2016). Knowledge, attitude and determinants of exclusive breastfeeding practice among Ghanaian rural lactating mothers. *Int Breastfeed J* 11(12). https://doi.org/10.1186/s13006-016-0071-z

Msiska FB, Mtimuni B, Kabambe O &Mchakulu JE (2017). Knowledge, attitude and practices on infant and young child feeding: A comparative study radio listening club members and non-club members of MudziWathu Community Radio in Mchinji District, Malawi. *Journal of Communication and Development Studies* 5(2):22-34.

Neji IO, Nkemdilim OC & Ferdinand NF (2015). Factors influencing the practice of exclusive breastfeeding among mothers in tertiary health facility in Calabar, Cross River State, Nigeria. *Am J Nurs Sci* 4(1):16-21.

Ntoimo LFC &Odimegwu CO (2014). Health effects of single motherhood on children in sub-Saharan Africa: a cross sectional study. *BMC Public Health* 14(1145). https://doi.org/10.1186/1471-2458-14-1145

Olsen MF, Iuel-Brockdorff A,Yame´ogo CW,Cichon B,Fabiansen C,Filteau S, Phelan K,Oue´draogo A,Michaelsen KF, Gladstone M,Ashorn P,Briend A, Ritz C,Friis H& Christensen VB (2020). Impact of food supplements on early child development in children with moderate acute malnutrition: A randomised 2 x 2 x 3 factorial trial in Burkina Faso. *PLoS Med* 17(12):e1003442.

Rogers E, Myatt M Woodhead S Guerrero S & Alvarez JL (2015). Coverage of Community-Based Management of Severe Acute Malnutrition Programmes in Twenty-One Countries, 2012-2013. *PLOS ONE* 10(6): e0128666.

Sato R (2019). The impacts of quantity and quality of health clinics on health behaviors and outcomes in Nigeria: analysis of health clinic census data. *BMC Health Serv Res* 19(377). https://doi.org/10.1186/s12913-019-4141-y

Satiawati KD &Januraga PP (2018). Attitudes toward supplemental nutrition assistance programs in caregivers of children with moderate–acute malnutrition younger than 5 years in Denpasar, Bali: A qualitative study. *Food Nutr Bull* 39(3):465-474. doi: 10.1177/0379572118788663

UNICEF (2020). *Nutrition.* From https://www.unicef.org/nigeria/nutrition#:~:text=An%20estimated%202%20million%20children,also%20suffer%20from%20acute%20malnutrition [Retrieved April 17 2020]

Vijayalakshmi P, SusheelaT &Mythili D (2015). Knowledge, attitudes, and breastfeeding practices of postnatal mothers: A cross sectional survey. *Int J Health Sci* 9(4):364-374.