Coverage Assessment for Community-based Management of Acute Malnutrition in Rural and Urban Ghana: A Comparative Cross Sectional Study

Joana Apenkwa

Kwame Nkrumah University of Science and Technology (School of Public Health)

Sam K Newton

Kwame Nkrumah University of Science and Technology (School of Public Health)

Samuel Kofi Amponsah (✉ skamponsah001@st.ug.edu.gh)

St. John of God Hospital, Duayaw Nkwanta <https://orcid.org/0000-0001-6204-3063>

Reuben Osei-Antwi

Ghana Health Service

Emmanuel Nakua

Kwame Nkrumah University of Science and Technology (School of Public Health)

Anthony K. Edusei

Kwame Nkrumah University of Science and Technology (School of Public Health)

Easmon Otupiri

Kwame Nkrumah University of Science and Technology (School of Public Health)

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Abstract

Background

Ghana for years has implemented the Community-based Management of Acute Malnutrition (CMAM) among children in order to reduce malnutrition prevalence. However, the prevalence of malnutrition remains high. This study aimed to determine coverage levels of CMAM in Ahafo Ano South (AAS), a rural district, and Kumasi Subin sub-metropolis (KSSM), an urban district.

Methods

The study was a cross-sectional comparative study with a mixed-methods approach. In all, 497 mother/caregiver and child under-five pairs were surveyed using a quantitative approach while qualitative methods were used to study 25 service providers and 40 mother/ caregivers who did not participate in the quantitative survey. Four types of coverage indicators were assessed: point coverage (defined as the number of Severe Acute Malnutrition cases [SAM] in treatment divided by total number of Severe Acute Malnutrition cases in the study district), geographical coverage (defined as total number of health facilities delivering treatment for SAM divided by total number of healthcare facilities in the study district), and treatment coverage (defined as children with SAM receiving therapeutic care divided by total number of SAM children in the study district) and program coverage (defined as number of SAM cases in the CMAM programme ÷ Number of SAM cases that should be in the programme). The qualitative approach was used to support the assessment of the coverage indicators. Data were analyzed using STATA version 14, and Atlas.ti, version 7.5.

Results

Treatment coverage in the urban and rural districts were 73% and 6% respectively. Geographically, only 6% of the facilities in the urban communities were participating in the CMAM programme as against 29% in rural district facilities. The two districts had point coverage of 81% and 71% for the urban and rural districts respectively. The number of children enrolled in CMAM was higher among the AAS respondents when compared with KSSM; 56.9% and 90% respectively. The qualitative approach showed that coverage improvement in both districts is hampered by barriers such: distance, transportation cost, lack of trained personnel in the communities for community mobilization and home visits, and insufficient feeds.

Conclusion

To improve CMAM coverage, there is the need to train health workers to embark on aggressive health education strategies to encourage mothers/caregivers of malnourished children to utilize CMAM while ensuring that services reach those who need them.

Trial registration:

This study is approved and registered with The Kwame Nkrumah University of Science and Technology Committee on Human Research, Ethics and Publications (CHRPE/AP/314/15)

Introduction

Over the last two decades, the globe has recorded important reductions in under-five mortality. Nevertheless, some 5.3 million children under-five died in 2018 with the highest burden in sub-Saharan Africa (SSA); nutrition-related factors account for nearly 45% of the global deaths [1], with the triple burden of malnutrition (undernutrition, hidden hunger and overweight/obesity accounting for the two-in-five children under-five who are not growing well in West and Central Africa. [2] Globally, Severe Acute Malnutrition (SAM) is one of the commonest causes of morbidity and mortality among children under-five as it affects at least 19 million children,[3] and accounts for 8.0% of annual child deaths worldwide.[4] A severely wasted child is nine times more likely to die than a child who is not wasted.[5] Developing countries account for 14.5% of the cases of malnutrition and 45% of annual deaths stemming from malnutrition in children under-five years.[6] Additionally, in developing countries, about 100 million children are underweight and one-in-four are stunted.[6] Moreover, according to the United Nations Children's Fund (UNICEF), the World Health Organization (WHO) and the World Bank, approximately two thirds of all wasted children live in Asia, and almost one third in Africa.[7] In Ghana, according to the recent Demographic and Health Survey, among children under-five years, 19.0% were stunted, 5.0% were wasted, 11.0% were underweight and 4.0% were overweight.[8] The importance of addressing childhood malnutrition is a prerequisite for achieving internationally agreed goals, such as targets 2.2 and 3.2 of the Sustainable Development Goals (SDG) 2 and 3 respectively.

In order to curb the problem early at the community/household level, the Community-based Management of Acute Malnutrition (CMAM) concept was introduced as both a successful and a cost-effective approach for the management of uncomplicated severe acute malnutrition (SAM).[9] However, inadequate human resources, especially Community Health Workers CHWs), perception of caregivers that Ready-to-Use Therapeutic Foods (RUTFs) were being sold as a commodity, inadequate provision and unintended use of RUTFs, lack of antibiotics and inappropriate exit of children from the CMAM programmes have been some of the challenges to the implementation of CMAM.[10] These factors militate against the original objective for the introduction of CMAM, which are to help identify early signs of SAM, check for pedal edema, provide home visits, and refer to the out-patient therapeutic clinic.[11] CMAM encourages malnourished children without medical complications to be treated in their own homes without being taken to hospital for treatment. The advantage here is that the whole family is involved, and can also continue with their daily activities. This increases access and participation in the programme leading to higher coverage and better outcomes.[12] In addition, CMAM is both a successful and a cost effective way of allowing a wider coverage to the majority of children by engaging and mobilizing the community.[13] This approach is also effective with decreased chances of cross infections.[14]

Until recently, CMAM coverage assessments have been few. Even in the midst of evidence paucity, the review of assessment reports by Rogers *et al.* leaves much to be desired.[15] Between July 2012 and June 2013, they reviewed 44 coverage reports from 21 countries with emphasis on the treatment of SAM.

Using context specific SPHERE standards, 38 out of the 44 assessments did not meet minimum standards. The average coverage level of all 44 programmes was 38.3%. The contrasting results in coverage as projected, compared with the assessment reports, and reveals the conceivability of certain barriers to the implementation of CMAM. These barriers, according to Rogers and colleagues, included the lack of awareness of malnutrition and the CMAM programme among others.[15] It is important to conduct a similar study to ascertain the coverage level of CMAM within the Ghanaian setting to inform policy and programing.

Methods

Participants and methods

We conducted an analytical cross-sectional study with a mixed-methods approach - a combination of qualitative and quantitative data collection techniques – in an urban setting (Kumasi Subin sub-metropolis), and a rural setting (Ahafo Ano South district). The study adopted the Simplified Lot Quality Assurance Sampling Evaluation of Access and Coverage (SLEAC) method to sample communities for the study. A small sample size ($n \leq 40$) is usually required to make an accurate and reliable classification. The SLEAC sampling method is a quick non-expensive method, which classifies coverage at the community level. The community could be a health center, a Community-based Health Planning and Services (CHPS) compound or zone, a sub-district, a district, a region or a country; any clearly defined cluster. This method was adopted because it reaches a wider study area therefore making the sample a true representation of the population under study.

With the SLEAC method, the health districts (Ahafo Ano South - AAS and Kumasi Subin sub-metropolis - KSSM) were considered as sampling zones with a sample size of 40 communities each. The minimum numbers of communities to be sampled were calculated using the Spatially Stratified Sampling Method provided by the Coverage Monitoring Network (CMN).[16, 17] In AAS, because there were no available maps for the area to show all the communities, the Spatially Stratified Sampling Method was used to select the study communities. All the names of the sub-districts together with their CHPS zones were listed, then all the communities under the zones were also listed. The grouping of the communities under the various zones ensured a spatially representative sample.[18] The sampling interval was then calculated by dividing the total number of communities by the sample size ($141 \div 40 = 3.525$ which was rounded up to 4). A random number was generated with Excel (3) which served as the starting point for the counting and identification of sampled communities. The third community on the list was chosen as the starting point and the sampling interval was applied till the sample size was achieved. These calculations were not done for KSSM because the communities were not many so all the 66 communities were included in the study sample. KSSM has 10 CHPS zones with 66 communities and AAS has 32 CHPS zones with 141 communities.

Three approaches were used to ensure that all the households (census) in the study communities were visited, and all children aged 6–59 months were screened for their nutritional status with the aid of the United Nations Children’s Fund (UNICEF) mid-upper arm circumference (MUAC) tape; the children were classified under either severe acute malnutrition (SAM) cases or Moderate Acute Malnutrition (MAM) cases or not malnourished. First, the names of mothers/caregivers captured in the community-based CMAM attendance register were followed up to their homes where they were invited to participate in the study if they consented to be studied, and if any of the children under-five was assessed to be SAM or MAM. Second, a snow balling sampling approach was also used to reach mothers/caregivers whose children were malnourished. The snow balling was facilitated by the mothers/caregivers who had been identified in the register, followed up and interviewed; these mothers/caregivers directed the research team to another mother until the last person was interviewed. Third, the rest of the households within the study communities, which had not been reached either through the register or through snow balling, were identified, and the children under-five in these households were assessed so that the mothers/caregivers with malnourished children were surveyed.

Eight enumerators were trained to use a structured questionnaire to survey mothers/caregivers of the 497 malnourished children identified in both districts (240 in KSSM and 257 in AAS). The respondents decided on a suitable time and place for the interviews. The interviews were conducted in English or Twi as preferred by the respondent; the interviews lasted up to 30 minutes. A data capture form was used to obtain additional data on coverage through a review of consulting room registers, Child Welfare Clinic (CWC) registers, monthly CWC reports, and CMAM registers at the CMAM centres. Qualitative interviews, in the form of knowledgeable informant interviews (KIIs) and focus group discussions (FGDs), were carried out among service providers and mothers/caregivers respectively. The knowledgeable informants were purposefully selected due to their in-depth knowledge about the topic as service providers; one paediatrician and one physician assistant, five nutritionists, 12 Community Health Officers/Nurses (CHOs/Ns) and six nurses all drawn from the two study sites. The KIIs assessed the perceived coverage and barriers to coverage. These interviews, as well as the FGDs, investigated the acceptability, accessibility and availability of CMAM services. The mothers/caregivers who participated in the focus groups were not studied in the quantitative survey; they were invited to participate in the FGDs as they accessed services at the CMAM centers. The data collection period was from July, 2017 to January, 2018.

Data analysis

Quantitative data were double-entered into a Microsoft Access 2007 database and, validated after range and consistency checks were done. Data were cleaned and transferred to Stata 14.0 (Stata Corporation, Texas, and USA) for statistical analyses. Descriptive analyses were conducted to determine the frequencies of study variables of interest.

Coverage was computed as: point coverage, program coverage, treatment coverage and geographical coverage as follows:

- I. Point coverage = number of SAM cases in treatment ÷ total number of SAM cases in the study district

- II. Treatment coverage = children with SAM receiving therapeutic care ÷ total number of SAM children in the study districts.
- III. Geographical coverage = number of health facilities delivering treatment for SAM ÷ total number of healthcare facilities in the study district.
- IV. Program coverage =

A series of steps were followed during the qualitative data analysis; the process began by generating a priori, a list of organizing themes based on the study objectives. The coding of transcripts was guided by list of organizing themes (deductive) which was modified and expanded based on information derived from reading the transcripts (inductive). Two people coded all transcripts. After coding, a review of generated codes was done to ensure consistency in coding (constant comparison approach). The process continued with a more nuanced linkage of codes, this was done by the relationship between codes and the underlying meaning across codes. Representative quotes that best captured the idea was presented for illustration and the data analyzed with Atlas.ti, version 7.5 (Scientific Software Development GmbH, Berlin).

Results

Demographic data

While being a petty trader was the most common occupation in the urban setting (47.9%), the study participants in the rural setting were more likely to be farmers (64.6%). Unemployment was marginally higher (14%) in AAS than in KSSM (11.7%). In both districts, the dominant ethnic group was Asante. Even though a higher proportion of the study sample in AAS, when compared with KSSM, had education higher than middle school/junior high school (39.3% versus 15.4%), the mothers/caregivers in AAS were also more likely to have had an education lower than junior high school/middle school (25.4% versus 37.0%). The maternal modal age group in both settings was 20–35.

The children under-five of the mothers/caregivers in the rural study were more likely to be older than the children under-five in the urban study site; 89.9% of the children in AAS were at least 1 year old while in KSSM, 25.8% of the children were less than a year old. However, the mothers/caregivers in AAS were more likely to have had a higher number of children under-five years; only 49.8% of mothers/caregivers in AAS had less than two children under-five while 69.6% of their KSSM counterparts had less than two. (Table 1).

Table 1
Demographic characteristics of mothers/caregivers

	KSSM		AAS	
Characteristics	Frequency 240	Percentage 100	Frequency 257	Percentage 100
Respondent's Occupation				
Artisan	65	27.1	13	5.1
Farmer	32	13.3	166	64.6
Trader	115	47.9	41	16.0
Unemployed	28	11.7	37	14.4
Respondent's Ethnicity				
Asante	144	60.0	142	55.3
Others	96	40.0	115	44.7
Respondent's Education Level				
Below JHS/MSLC	61	25.4	95	37.0
JHS/MSLC	142	59.2	61	23.7
Above JHS/MSLS	37	15.4	101	39.3
Relationship with Child				
Caregiver	16	6.7	102	39.7
Mother	224	93.3	155	60.3
Respondent's Religion				
Christian	187	77.9	206	80.2
Islam	53	22.1	51	19.8
Respondent's Age				
< 20	17	7.1	15	5.8
20–35	168	70.0	179	69.7
36+	55	22.9	63	24.5
Child's Age (months)				
0–11	62	25.8	26	10.1
12–23	94	39.2	124	48.3

	KSSM		AAS	
24–59	84	35.0	107	41.6
Number of Children Alive				
1	79	32.9	31	12.1
2	63	26.3	49	19.1
3	40	16.7	55	21.4
4	27	11.3	51	19.8
5 or more	31	12.9	71	27.6
Number of Children Under-five				
Less than 2	167	69.6	128	49.8
Two or more	73	30.4	129	50.2

Coverage of CMAM

Of the 497 malnourished children surveyed, 217 were SAM cases (125 in KSSM and 92 in AAS) while 280 were MAM cases (115 in KSSM and 165 in AAS); only the SAM cases were used in the coverage indicator calculations. Overall, when compared with the rural district, the urban district recorded much higher coverage indicators. The urban district had a point coverage of 40.9% compared with a very low figure of 9.8% for the rural district. Geographical coverage, probably the indicator for all three coverage types, was low in both districts but was nearly five times higher in the rural district when compared with the urban setting; 29% versus 6%. Programme coverage in the urban district (40.9%) was nearly four times that recorded in AAS (9.8%). There were no data on SAM children on therapeutic care so it was impossible to calculate treatment coverage.

When secondary data for the study period (2016/2017) were retrieved from the District Health Information Management System (DHIMS-2) and computed for the same coverage indicators, we observed a trend similar to that reported from the primary data; except for geographical coverage, the urban district had better coverage indicators. In general, when compared with the primary data, the secondary data provided higher coverage indicators in both districts. Point coverage in KSSM was 10 percentage points higher than in AAS; 81% versus 71%. The secondary data figures for geographical coverage stayed the same as the primary data figures – 6% in KSSM and 29% in AAS. Treatment coverage was much higher in the urban district (71%), when compared with the rural site (6%). (Table 2)

Table 2
Coverage of CMAM

Indicators (OPC data)	KSSM (DHIMS-2)	KSSM (FIELD DATA)	AAS (DHIMS-2)	AAS (FIELD DATA)
Point coverage	80.9%	40.9%	71%	9.8%
Treatment coverage	73%		6%	
Geographic coverage	6%	6%	29%	29%
Programme coverage	80.9%	40.9%	71.%	9.8%

Enrollment of SAM cases (coverage) into the CMAM programme was generally low; of the 125 SAM cases in KSSM, only 40.8% had enrolled in CMAM while in AAS, a paltry 9.8% of the 92 cases were in the programme. We also assessed the knowledge of mothers/caregivers about the CMAM programme and, 51 and 30 mothers/caregivers from KSSM and AAS respectively demonstrated adequate knowledge; we proceeded to further interview this sub-sample on issues related to programme utilization as part of the coverage assessment. In both districts, the CHO/N was the most likely person to have ensured the enrollment of the malnourished child. Only six children (three in each district), had enrolled more than once. While the vast majority (93.3%) of the women in the rural setting treated their children with either home-prepared or industry-prepared therapeutic foods, the children in the urban setting were not that lucky - only 23.5% of these children received these foods. In both districts, there was a clear distancing away from resorting to faith-based treatment; only 3.3% of the women in AAS had ever followed that path of treatment. Similarly, the women whose children were enrolled in CMAM, very rarely ever bought medications from the open market or consulted traditional healers. Even though health workers, such as CHOs/Ns, play a key role in the community-based components of the CMAM programme, the majority (70%) of the women in the urban communities did not have such health workers in their communities. The presence of a health worker in the community did not appear to have translated into frequent home visits and subsequently guidance on feeding practices; very few women were likely to have been visited more than once a month – none in AAS and 20% in KSSM (Table 3).

Table 3
Coverage of CMAM among Children Enrolled

Variables	KSSM		AAS	
	Coverage of CMAM		Coverage of CMAM	
	Frequency	Percentage	Frequency	Percentage
	51	(100%)	30	(100%)
How Child was Enrolled	29	56.9	27	90.0
CHN/CHO	8	15.7	0	0.0
Parent	14	27.5	3	10.0
Prescriber				
First Time Child was Enrolled	48	94.1	27	90.0
Yes	3	5.9	3	10.0
No				
Number of Times	3	100.0	2	66.7
Two	0	0.0	1	33.3
Three				
Why Child Discontinued	2	66.7	1	33.3
Child not growing well	1	33.3	2	66.7
Travelled				
Treatment with Herbs	0	0.0	8	26.7
Yes	51	100.0	22	73.3
No				
Treatment with home-prepared or industrially prepared therapeutic foods	12	23.5	28	93.3
Yes	39	76.5	2	6.7
No				
Ever resorted to faith-based treatment	0	0.00	1	3.3
Yes	51	100.0	29	96.7
No				

Variables	KSSM		AAS	
	Coverage of CMAM		Coverage of CMAM	
	Frequency	Percentage	Frequency	Percentage
	51	(100%)	30	(100%)
Ever purchased medication from open market	1	2.0	1	3.3
Yes	50	98.0	29	96.7
No				
Ever purchased medication from pharmacy	17	33.3	2	6.7
	34	66.7	28	93.3
Yes				
No				
Ever consulted traditional healer	2	4.0	0	0.0
Yes	49	96.0	30	100.0
No				
Choice of treatment	13	25.5	3	10.0
Father	38	74.5	27	90.0
Myself				
Health worker in the community	15	30.0	25	83.3
Yes	35	70.0	5	16.7
No				
Number of health workers	4	26.7	4	16.0
1	7	46.7	21	84.0
2	3	20.0	0	0.0
3	1	6.7	0	0.0
4				

Variables	KSSM		AAS	
	Coverage of CMAM		Coverage of CMAM	
	Frequency	Percentage	Frequency	Percentage
	51	(100%)	30	(100%)
Regularity of house to house visits	3	20.0	0	0.0
Twice weekly	12	80.0	25	100.0
Monthly				
Health workers guide feeding practices at home	4	73.3	0	0.0
Yes	11	26.7	25	100.0
No				

Acceptability, accessibility and availability coverage levels of CMAM

During the FGDs and KIs, coverage was also looked at in three aspects: acceptability, accessibility and availability of services. Focus group discussants opined that the CMAM programme did not go against their culture and so was acceptable to them

"We accepted the program because it is part of the hospital services and not against our culture and religion that is why our husbands and leaders have not stopped us from coming here. Our people don't have problem with us using the hospital. "[Focus group discussion 1, KSSM] .

Some focus groups bemoaned geographical and financial challenges to accessing the CMAM services. Women in a focus group in the Ahafo Ano South district shared this view:

" We spend the little money on transportation to come here which sometimes we are unable to afford. Coming all the way here also means not doing any productive work to earn the little proceeds we get from selling. There are many hospitals in the communities that I can walk there even when I don't have money for transportation." [Focus group discussion 4, AAS]

Service availability drew some strong comments in one of the focus groups in the rural district:

“Nutrition programme should be in all the hospitals/CHPS compound. We travel to the directorate sometime on motor bike because there are no vehicles in our communities, only to come and get no supplies. Treatment should be effective, support and encouragement of a community health worker is required, and programme staff should be friendly and patient towards us.” [Focus group discussion 3, AAS]

The knowledgeable informants in both districts suggested a positive attitude towards the CMAM programme. One knowledgeable informant mentioned that those who came to their facility were always happy with their services. She noted:

As whether the barrier is money for transportation or lack of information, one cannot tell; but those who come here are mostly happy with us.” [Pediatrician, Urban area]

In the rural district, long distances and high costs of transportation to the CMAM centre for review and collection of RUTF, the lack of trained personnel in the communities for community mobilization and home visits, and, insufficient RUTF and other feeds were some factors limiting community access to the CMAM centre.

“Our district is located in a farming area so most of the mothers do not earn any income. They consume what they grow. Coming to the district capital is a big challenge to most of them because they do not have money to take care of transportation if the road is good. During rainy season too some communities can only be reached through the use of motor bike which makes commuting very difficult. Poor compliance especially during farming and rainy seasons are another challenge. Because we don’t have community workers but CHNs and CHOs only, they do not practice home visits to complement our efforts” [Nutrition Officer 1, Rural area].

One respondent mentioned that not all mothers can access the programme because they live far from the facility and this brings a lot of financial strain on them.

“Hmmm... not every mother can access the programme. So we have a challenge with accessibility because some mothers have to travel for some hours to reach the facility, because of the distance we face problems of financial complaints. Some mothers can’t afford lorry fare to come to the facility. So the facility is not that accessible to all the clients. [Nutrition Officer1, Urban area]

The CHNOs/Ns who work very closely with the mothers noted that most parents were poor and cannot commute to the CMAM centre weekly for their supplies amidst seasonal barriers such as rains and poor road network.

“Most of the parents (90%) are poor and cannot afford to be commuting to the directorates weekly or twice a week for their supplies. In addition, seasonal barriers like rains, poor road networks, planting of crops and so on are barriers for the parents. Culture, religion and gender issues are not barriers to the people in our catchment areas” [CHO 4, rural area]

According to a knowledgeable informant the lack of an in-patient unit, a pediatrician and technical training on CMAM as well as sporadic shortages of RUTFs coupled with zero means of transport to follow up cases

within the community, reduced service availability to the mothers/caregivers and the children who needed the services most. One respondent mentioned that within her facility, services were available in the in-patient care unit until it run out of supplies, this she explained has led to referral cases for parents who could not afford to buy the foods. She noted this:

"We are always here for the impatient service; we refer new cases to KATH when our wards are full or when the client cannot afford some of the services which is rare. The service is not available in the communities but everyone who comes here is attended to. Since we don't have enough community health workers, the parents who cannot come here are left out. [Pediatrician, Urban]"

CHOs highlighted that inadequate staff for CHPS zones, the lack of staff training in CMAM and, lack of modern tools and equipment for the full implementation of CMAM as issues that affect the availability of the services within programme. One of them indicated this:

"Our numbers are not adequate in the CHPs Zones/compounds. Most of us are the only health staff living in the compound so we cannot leave the compound for home visits. The government should pay allowances to the Community Health Workers so that they can help with the community visits and supervised feeding of the children. We the staff should also be given allowances and more staff added to our numbers for community visits and we shall do the community component. Also, the directorates should be supplied with more Plumpy Nuts so that they can give some to us at the Zonal levels so that the parents can access them without travelling to the directorate. Most of the parents can walk to the CHPS compound for the feeds even when they do not have money for transportation." [CHO 5, Rural area]"

"We also don't have volunteers anymore to take care of home visits because they demand money for their services and the money is not available." [PA, Rural area]"

Some services are not available on a 24/7 basis. A knowledgeable informant further explained that the in-patient unit is run throughout the week whereas the out-patient services are available only on specific days at specific times which is mostly Wednesdays. She stated this:

"We run 24/7 for the inpatient unit but for the outpatients they are given specific times to visit the facility to get the service. The clinic days for the out-patient component is held on Wednesdays". [Nutrition Officer1, Urban area]"

Predictors of CMAM utilization

In both the urban and rural sites, among the mothers/caregivers who had utilized the CMAM services, we assessed the pull factors that attracted the mothers/caregivers to the programme. In both study sites, free service (98% urban versus 100% rural) and a cured child (52.9% urban versus 83.3% rural), were the most likely pull factors to programme utilization for the mothers/caregivers. The most unlikely pull factors in both sites were access and company; all the mothers in KSSM and 93.3% of the mothers in AAS were not attracted by difficult access to the service while the company of friends at the service sites served as a pull factor for only 3.9% and 6.7% mothers/caregivers in KSSM and AAS respectively.

More than half of the urban study sample was attracted by the following factors, to utilize CMAM services: programme staff attitude (54.9%), RUTF availability (70.6%), and access to Plumpy Nuts (54.9%). On the other hand, the mothers/caregivers in AAS, had a wider variety of factors that attracted more than half of them to utilize CMAM services: funds for transport (83.3%), partner's support (86.7%), family support (76.7%), CHW support (96.7%), neighbors (80.0%), treatment type (80.0%), and treatment efficacy (76.7%) as depicted in (Table 4).

Table 4
Pull factors to CMAM utilization

Variables	KSSM		AAS	
	Coverage of CMAM		Coverage of CMAM	
	Yes	No	Yes	No
<i>Attracted by Access</i>	0.0	100.0	6.7	93.3
<i>Attracted by Funds for Transport</i>	12.2	87.8	83.3	16.7
<i>Attracted by Availability of Transport</i>	17.7	82.3	30.0	70.0
<i>Attracted by friends</i>	3.9	96.1	6.7	93.3
<i>Attracted by partner's support</i>	35.3	64.7	86.7	13.3
<i>Attracted by Family Support</i>	17.7	82.3	76.7	23.3
<i>Attracted by CMAM Parents</i>	5.9	94.1	3.3	96.7
<i>Attracted by CHW Support</i>	19.6	80.4	96.7	3.3
<i>Attracted by Neighbours</i>	2.0	98.0	80.0	20.0
<i>Attracted by community leaders</i>	13.7	86.3	23.3	76.7
<i>Attracted by community appreciation</i>	19.6	80.4	30.0	70.0
<i>Attracted by program staff</i>	54.9	45.1	30.0	70.0
<i>Attracted by RUTF available</i>	70.6	29.4	3.3	96.7
<i>Attracted by treatment type</i>	41.2	58.8	80.0	20.0
<i>Attracted by free service</i>	98.0	2.0	100.0	0.0
<i>Attracted by treatment efficacy</i>	51.0	49.0	76.7	23.3
<i>Attracted by cured child</i>	52.9	47.1	83.3	16.7
<i>Attracted by access to peanuts</i>	54.9	45.1	16.7	83.3
<i>Attracted by other</i>	33.3	66.7	0.0	100.0
Multiple responses accepted				

Discussion

Coverage in health programs/services refers to the proportion of the targeted population that receives the services or utilizes the services or knows or practices a certain behaviour. The CMAM forum reported coverage as the proportion of the targeted population that receives the CMAM services and, in this instance, it would be the proportion of SAM children who receive therapeutic care.

Several CMAM assessments have reported very low coverage; in Sierra Leone of the 13 Ministry of Health Administrative districts that were assessed for CMAM coverage in 2012, not even one was deemed to have achieved high coverage ($> 50\%$); more than 75% of the districts reported low coverage ($< 20\%$)(18). Two surveys conducted in Ghana also reported low coverage of less than 30% [19, 20].

We assessed various dimensions of CMAM coverage. Firstly we used a quantitative survey to assess maternal utilization of CMAM services. Secondly, we used qualitative surveys to assess perceived coverage, challenges to coverage and maternal utilization of services. Finally, we computed coverage indicators from secondary data. Even though the CMAM services were culturally acceptable to the women/caregivers, qualitative data showed that other factors ensured the women/caregivers did not utilize the services. Although some coverage indicators showed checkered results from primary and secondary data, geographical coverage was low from all data sources. Literature on the other coverage indicators such as point and treatment is scanty, but geographical coverage, which is more commonly reported in literature, could be a pointer to programme effectiveness; if geographical coverage is high, the services reach the targeted population, and it would be the first step to ensuring that all other coverage indicators are high and programme effectiveness is achieved. The 1978 Tanahashi model of health service coverage and effectiveness presents five levels of coverage; availability, accessibility, acceptability, contact and effectiveness, [21] all of which were covered in our assessment.

In Ghana, there are inequities between rural and urban populations in terms of coverage of health services; there are many more health facilities in urban than rural Ghana. With the exception of a few services such as family planning services, (this exception is a recent development), which has a greater coverage in rural than urban Ghana [22], other health services have higher coverage in urban than rural Ghana. Our study shows that the factors that act as pull factors in the utilization of CMAM services/health services (contact coverage) differ between urban and rural populations; the rural residents had a wider range of factors when compared with the urban population.

Rodgers and others reviewed 44 coverage reports from 21 countries and arrived at an average of 38%; low by any standard. The Myatt and Guerrero model (2013): 'A vicious coverage-effectiveness cycle,' tries to explain the nexus between low coverage and poor outcomes/low effectiveness [23]. Low coverage indicators invariably will lead to low programme effectiveness.

In conclusion, CMAM coverage in both study sites was low and this would translate into low program effectiveness. In order to improve coverage, there is the need to train health workers to educate mothers/caregivers of malnourished children to utilize the services while ensuring that the services reach the doorsteps of households who need them.

There are limitations to this study. First we are unable to determine treatment coverage from primary data. Second, the recall period for some of the issues was as long as 10 years, and respondents may have been unable to accurately recollect related events. Third, we acknowledge the inherent challenges cross-sectional surveys present in determining causal effect. Despite these challenges, this study is the first in Ghana to assess CMAM coverage in urban and rural settings using a mixed methods approach which presents the added advantage of triangulation. The data allow us to draw some conclusions regarding the CMAM coverage in these two different settings as evidence to inform programing and policy.

Abbreviations

AAS Ahafo Ano South

CHN Community Health Nurse

CHO (s)/N(s) Community Health Officer (s)/ Nurse(s)

CHO Community Health Officer

CHW Community Health Worker

CHPS Community-based Health Planning and Services

CMAM Community Management of Acute Malnutrition

CMN Coverage Monitoring Network

CWC Child Welfare Clinic

DHIMS District Health Information Management System

FDG Focus Group Discussion

KII Knowledgeable Informant Interviews

KSSM Kumasi Subin-Sub Metro

MAM Moderate Acute Malnutrition

MUAC Mid-upper Arm Circumference

RUTF(s) Ready-To-Use Therapeutic Food(s)

SAM Severe Acute Malnutrition

SDG(s) Sustainable Development Goals

SLEAC Simplified Lot Quality Assurance Sampling Evaluation of Access and

Coverage

UNICEF United Nation International Children's Emergency Fund

WHO World Health Organization

Declarations

Ethical Approval:

The Kwame Nkrumah University of Science and Technology/Komfo Anokye Teaching Hospital Committee on Human Research, Publications and Ethics approved the study (**CHRPE/AP/314/15**). Administrative clearance was sought from the Regional Health Directorate and the Metropolitan/District Health Directorates as well as the Medical Directors of the study hospitals. Written and oral informed consents were obtained from study participants before any data were collected. The purpose of the study, benefits and risks (if any) were explained to study participants. Privacy and confidentiality were assured during all the data collection activities.

Consent for Publication:

Not Applicable

Availability of data and Materials:

The datasets used for the analysis of this study is available upon request from the corresponding author.

Competing Interests:

None declared

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