Original Article

Re-Engineering Access to Specialty Care through the Adoption of Mobile Health Technologies in Obstetric Care in Rural Ghana

Isaac Ayirebi [1]*, Akosua Acheampomaah Ansah [2], Anabel Brown [3], Constance Amponsah [4], Emmanuel Dartey [5], Akua Amponsah Osei [6]

1. Euracare Advanced Diagnostics and Heart Center. ST. Pauline Catholic Clinic, Ghana.
2. Euracare Advanced Diagnostics. Heart Center. Pharmaceutical Society of Ghana, Ghana
3. The Bank of Ghana Hospital, Ghana.
4. Korle-Bu Teaching Hospital. Euracare Advanced Diagnostics and Heart Center, Ghana.
5. Greater Accra Regional Hospital. Euracare Advanced Diagnostics and Heart Center, Ghana.
6. Euracare Advanced Diagnostics and Heart Center. Nurses and Midwifery Council Ghana.

* Correspondence: isaac.ayirebi21@gmail.com

Abstract: Access to Specialty Care for Obstetric patients in Sunyani Municipality is a challenge. Obstetric care needs special attention and access should not be limited to only Obstetric patient who resides close to a health facility with Specialty Care because adverse maternal health care can lead to mortality and all Obstetric patients should have unlimited access to Specialty Care. This study assessed the prospect of using mobile health technologies in supporting access to Specialty Care in Obstetric care in Sunyani Municipality. A descriptive cross-sectional, community-based study was conducted among Obstetric patients in Sunyani Municipality. Requisite retrospective data was gathered to describe Obstetric care distribution in Sunyani Municipality. A sample size of 282 Obstetric clients was recruited for the study. Respondents' answered questions on perception on awareness of mobile health technologies, level of satisfaction of usage of mobile health technologies, challenges of the current methods of accessing Specialty care and effect of proximity of healthcare facilities to client's location. Logistic regression analysis of awareness of Mobile Health Technologies and Frequency of Access to Specialty Care showed that the Odds of Obstetric clients who access Specialty care many times in a month to be aware of mobile health technologies has 5.833 odds more, compared to Obstetric clients who access specialty care once a month (P-value of 0.054 within a confidence interval of 0.803 to 24.285) is however statistically not significant. All Health facilities with Specialty Care are located in Sunyani central thus all Obstetric clients who require Specialty Care have to travel to Sunyani Municipality. Time spent traveling and waiting to see a Specialist is a disincentive to Obstetric clients. On average Obstetric Clients in Sunyani Municipality spend 2 hours traveling to seek Specialty Care and also spend 2 hours waiting in queue to access the Specialist. The time constraint discourages Obstetric clients anytime they are referred to seek Specialty Care. Adopting mobile health technologies in Sunyani Municipality will ameliorate the quality of health services and help save the lives of pregnant women in Sunyani Municipality which is in line with Sustainable Development Goal (SDG), Goal 3.

Keywords: mobile, health technologies, obstetric care

1. INTRODUCTION

Distance does not impede access to healthcare and everyone in need of healthcare can access irrespective of the person's location. Health systems in Ghana are currently adopting new ways and

strategies which include systems engineering mechanisms to bring into fusion more desirable health care processes that are rendered to patients or clients. Structured social systems developed for the delivery of health care services have been able to ameliorate accessibility, quality and safety of care through the reduction of variation and ensuring the delivery of practical application of findings of current health systems research, this is helping to reduce health care costs by eliminating waste and increasing productivity [1].Reengineering is not a solution or remedy for all difficulties or diseases, it is a vital capability and required dexterity for health care organizations to thrive under controlled care. Improving access to healthcare in a rural health care setting is difficult because the motive of improvement will run against what the indigenes feel to be true even without conscious reasoning to the deeply held beliefs [2].The major barriers to improvement in accessibility to health care are fear of change and confidence in the existing resources able to meet the required care. Efforts on access to healthcare by patients should focus on how systems and procedures for faster, more efficient, patient-focused access meet the complex needs of patients receiving health care [3]. Mobile health technology (mHealth) is part of electronic health (E-Health). E-health is the use of information and communication technologies for health [4]. Mobile health technology is defined as the use of portable devices capable of creating, storing, retrieving, and transmitting data in real-time between end-users to improve patient safety and quality of care [5]. As the most ubiquitous ICT platform in the developing world, mobile health offers a unique opportunity to address access to Specialty Care in Obstetrics [6]. Unlimited access to timely healthcare providers contributes to the wellbeing of Obstetric clients before and after delivery. In Africa, long-held beliefs of physical contact in seeking healthcare are a difficult scenario to alter because of the level of formal education of people. Mobile health in Africa is an innovative approach to delivering health services [7].The increased use of Mobile health technology (mHealth) in the health sector is believed to have enabled a reduction in healthcare costs, provision of access to relevant health information, improvement in efficiency in health delivery, advancement in clinical care as well as promotion of behavioral change in patients [8].Most women in Africa access healthcare within their community of residence through Traditional Birth Attendant, the collaborative nature of healthcare providers in the community with the Traditional Birth Attendants has made it possible for Obstetric clients to seek care from healthcare providers in their community. A specialty healthcare provider is a physician or a medical practitioner with a specific area of expertise who assumes care (other than primary care) of a client upon a referral from a Primary Care Provider [9].According to Ghana Statistical Service (GSS), the medium projection of Ghana's population indicates that the number of young people between the ages of 15 years to 24 years will continue to grow much more rapidly, the population has grown from 4.5 million in 2010 and nearly 5.6 million in 2020 [10].The percentage of the rural population in Ghana in 2016 was reported at 45.32 %, according to the development indicators collected by the World Bank, women living in the rural area represent approximately 23 percent of the nation's population. Obstetrical health care is offered primarily by nurses who work at Community Health Planning Services (CHPS) and Traditional Birth Attendants in the various communities [11]. There are inadequate Specialty Care providers who offer Obstetrical services to rural dwellers in Ghana. There is a need for primary providers to comprehend medical illness and management of pregnancy, including appropriate contraception, preconception counselling and patient education and collaboration with subspecialists in Obstetric care. Pregnancy is likely to bring about chronic disease, glucose intolerance, renal dysfunction, hypercoagulable states, valvular heart disease, and Cerebral aneurysm [12].Multiple medical challenges can evolve during pregnancy and the key to diagnosis in pregnancy is clinical vigilance and appropriate laboratory investigation or imaging studies [13].This study assess the prospect of using mobile health technologies in supporting access to Specialty Care in Obstetric care in rural Ghana and to recommend possible solutions, to assess the awareness of Obstetric Clients on existing mobile health technologies that can be used to access healthcare in rural Ghana, to assess the level and satisfaction of usage of existing mobile health technologies by Obstetric clients in rural Ghana, to

identify the challenges of the current methods of accessing Specialty Care in Obstetric care in rural Ghana, to map health facilities with Specialty Care Services using GIS software and analyze the proximity of the health facilities to clients' locations, whether the current methods of accessing Specialty Care influences Obstetric morbidity and mortality.

2. MATERIALS & METHOD

This study used a descriptive cross-sectional, community-based study design that focused on the extent to which Obstetric Clients have access to Specialty Care, Proximity of Healthcare facilities to clients' location and the knowledge of Obstetric clients on mobile health technologies in Sunyani Municipality. The dependent variable for the study was Access to Specialty Care in Obstetric Care (Morbidity, Mortality). The independent variable are awareness of Obstetric Client (Knowledge of Mobile Health Technologies, Risk perception and Cue to action),level of Satisfaction of usage of Mobile Health Technologies (Service quality, Cost and Value), Challenges of current methods of accessing Specialty care (Proximity of Health facilities, Cost and Time),the proximity of Healthcare facilities to clients location (Location of Clients and Location of Health facilities),mobile Health Technologies (Communication Service provider, consumer (client) and healthcare worker communication services). There are Seventy-six (76) Health facilities within Sunyani Municipality. These include thirty-four (34) Community Health Planning Services (CHPS), thirty-four (34) Clinics, five (5) Hospitals and three (3) Maternity Homes. The population for this study was Obstetric patients in the Sunyani Municipality.

The minimum sample size required was determined as follows based on Cochran's formula:

$$n = t^2 \times p\,(1-p)$$

m^2

Where: n = sample size, t^2 = confidence level at 95%, m^2 = margin of error at 5%

p = estimated prevalence of pregnancy in Sunyani Municipality is 24.15% (Sunyani Municipal Health Directorate, 2019)

Hence:

$n = 1.96^2 \times 0.2415\,(1-0.2415)\,0.05^2$

n=282

ANC attendance for 2019 was 50,345. The population as per the 2010 Population and Housing census was 208,496. A sample size of 282 Obstetric clients was recruited for the study. In research work, investigating the entire population under study can be very expensive and time- consuming. This makes sampling a portion of the population for the research necessary. The purposive technique was employed to select Obstetric clients who seek health care in the Sunyani Municipality. Two main instruments were used for data collection and these were the questionnaire and an inventory method. The study required the use of archived secondary data containing information on Obstetric patients from 2015 to 2019. Questionnaires were used to elicit information from clients on their awareness of existing mobile health technologies, level of usage of mobile health technologies, challenges of accessing Specialty Care and influence of the proximity of health facilities on Obstetric patients. This study involved the use of primary and secondary data to understand Obstetric care and the outcomes as well as identifying the effect of patients' proximity to a health facility and how to improve access to Specialty Care in the Municipality. The process involved reviewing patient data collected from 2015 to

2019 from the Antenatal register and postnatal register. The Antenatal register contains all data on each patient including information on demographics, Obstetric history which includes Gravida, para, and abortions whether spontaneous or induced, frequency of attendance for care, and care outcome for each pregnant woman. For the GIS analysis, Sunyani Municipal base Maps were obtained from the GIS unit of the Ghana Statistical Service. The maps included Sunyani Municipal boundary, towns, settlements and road network maps. For accessibility of the data, permission was sought from the Municipal Director of Health Services. The questionnaire had been certified by the research supervisor for the main data collection from Obstetric clients identified. Approval was given for data collection by Sunyani Municipal Health Directorate. Two research assistants were employed to help the researcher with data collection using a questionnaire that lasted for two weeks. Data obtained from completed questionnaires were coded and entered into the computer through the statistical package for Social Science software for analysis. These were the manual analysis procedures, which included coding of the responses whereby each of them was given code numbers for easy input into the electronic software SPSS V20. After all the responses had been duly coded, they were keyed into the variable view of the SPSS V20 using the coding key. The geo-coded data created from the hospital records were exported into the ArcGIS 10.2 software and overlaid with Sunyani Municipal base maps (shapefile format). The description of the data spatially was in the view to understand spatial patterns and relationships. Service area analysis was employed to ascertain how easy or difficult Obstetric clients get access to Specialty Care in the Municipality. Assessing the distance travelled by patients to health facilities where Specialty Care is rendered and the spatial distribution of maternal morbidity within the Municipality help to assess the impact this will have on outcomes of Obstetric care. This will highly contribute to improvement in Obstetric care in the Municipality because it will help ascertain whether Obstetric clients who are at high risk of mortality get access to Specialty Care using mobile health technologies.

3. RESULTS & DISCUSSION

A total of 2,135 women attended both ANC and PNC Clinics at the seven (7) selected facilities on the days of collection of data. A sample of 282 was invited to participate in the study, 282 out of 282 questionnaires received responses these represent a 100% response rate.

The data is primarily presented in tables and charts but few of the responses were presented in prose.

Table 01: Sociodemographic Characteristics and Status of Obstetric Clients

Variable	Frequency (n)	Percentage (%)
Age (years)		
18 and below	8	2.8
19 – 29	138	48.9
30 – 40	114	40.4
41 and above	22	7.8
Religion		
Christianity	208	73.8
Islam	74	26.2
Employment Status		
Employed	176	62.4
Unemployed	106	37.6
Education Level		

No Education	24	12.1			
Primary 29	10.3				
JSS / JHS			53		18.8
Secondary / Vocational	93	33			
Tertiary 73	25.9				
Status Of Client					
Prenatal	150	53.2			
Postnatal	132	46.8			

Antenatal care is a constant check-up that allows healthcare providers to forestall probable health problems and give medical care or attention throughout pregnancy and actively encourage healthy lifestyles that are helpful to both the unborn child and the mother. When a woman attends an ANC clinic that allows healthcare providers to detect and treat disease/abnormality, screening and diagnose preeclampsia which is high blood pressure and counselling on enabling Obstetric clients to increase control and improve their health. The table below shows the ANC registrants from 2015 – 2019 within Sunyani Municipal which shows the coverage of more than 100% of the target for each year, this is because pregnant women from neighboring districts travel to Sunyani Municipality to access ANC and PNC services. There is no Hospital within Sunyani West District with Specialty care so most pregnant women within Sunyani West access Specialty care in Sunyani Municipality.

Table 02: ANC Registrants and ANC Coverage for Sunyani Municipality

YEAR	ANC REGISTRANTS	ANC COVERAGE (%)
2015	6835	123.8
2016	6835	123.1
2017	6835	115.6
2018	6835	115.6
2019	6835	115.6

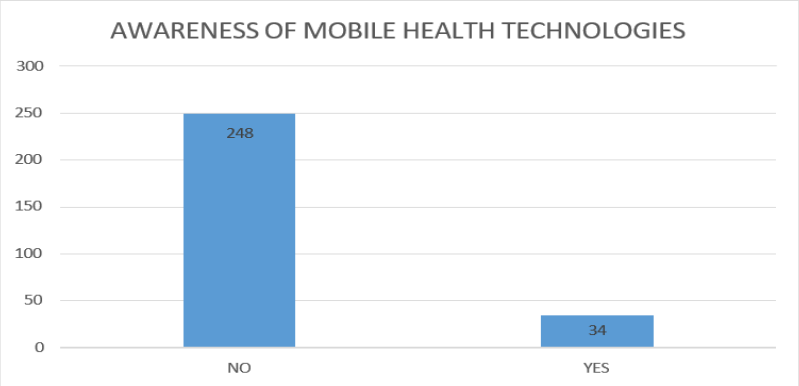

Figure 01: Awareness of Mobile Health Technologies

Table 03: Frequency of Access to Specialty care

VariableFrequency (n)	Percentage (%)
Frequency of Access to Specialty Care	
Once a month 152	53.9
Once in two Months 110	39.0
Many times, a Month 6	2.1
More than Once every Quarter 14	5

From Table 3 above,152 (53.9%) of clients frequently access Specialty Care once a month, 110 (39%) visit once in two months, 14 (5%) visit more than once every quarter and 6 (2.1%) visit many times a month. Most Obstetric clients access Specialty care by traveling with Vehicle 265 (94%) and 17 (6%) Walk to access Specialty care. The majority of respondents 180 (63.8%) spend GH 10 -20 to reach a facility with Specialty Care, 62 (22%) of respondents spend GH 21-30 while 40 (14.2%) spend less than GH 10 to reach a facility with Specialty Care.

Table 04: Accessibility, Cost, Duration to Specialty Care and Frequency of use of MHT

VariableFrequency (n)	Percentage (%)
Mode of Access to Specialty Care	
Travel with Vehicle 265	94
Walk 17	6
Cost of Accessing Specialty Care	
Less than GH10 40	14.2
GH 10 – 20 180	63.8
GH 21 – 30 62	22
Duration To Access Specialty Care	
Below 1 hour 55	19.5
1 to 2 Hours 192	68.1
3 to 4 hours 35	12.4
Frequency of Use of Mobile Health Technologies	
Rarely 4	1.4
Sometimes 1	4
Not Applicable 29	85.3

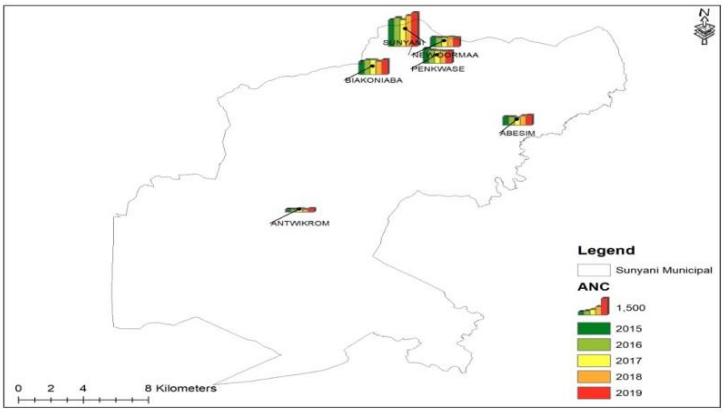

Figure 02: Sub Districts with ANC Registrants (2015 – 2019)

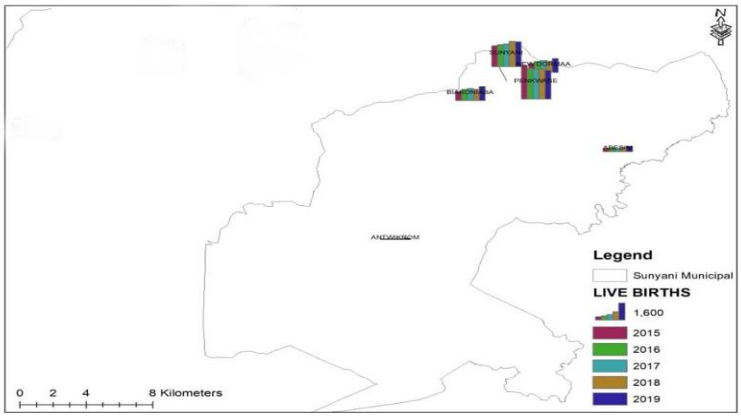

Figure 03: Sub Districts with Live Births (2015 – 2019)

Most live births were recorded at Penkwase and Sunyani Central. Pregnant women from other sub-districts are usually referred to deliver at Penkwase and Sunyani Central. Most healthcare professionals when they detect any complication do not hesitate to refer a patient to a facility with an increase in the frequency of treatment, closer monitoring, or a more structured treatment setting. The lack of capacity to handle an unanticipated problem that arises as a result of, a procedure, treatment, or illness at the lower levels is a factor resulting from referrals.

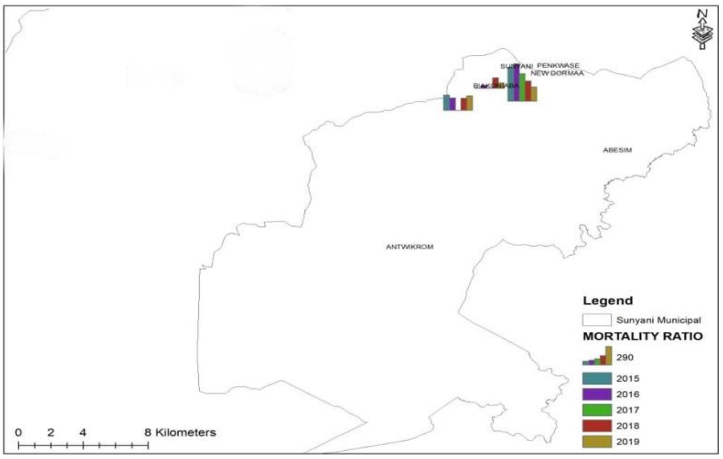

Figure 04: Sub Districts with Maternal Mortality Ratio (2015 – 2019) (Per 100,000 Live Births)

The maternal mortality ratio per 100, 000 live births were recorded due to the high live births and ANC registrants at New town- Baakoniaba, Penkwase, and Sunyani central.

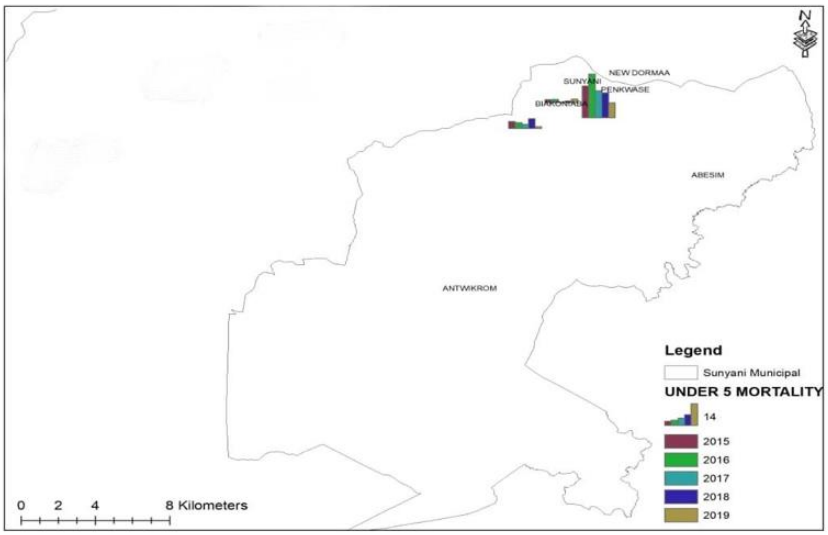

Figure 05: Sub districts with institutional under 5 mortalities

The figure above, shows there is no institutional Under 5 mortalities at Abesim, Antwikrom, and New Dormaa. All complicated cases involving children under 5 years are referred to as a sub-district closer to the Regional Hospital or to the only referral Hospital, Regional Hospital at Sunyani Central sub-district.

Table 05: Correlations between Status of Obstetric Client and Aware of Obstetric Client of Mobile Health Technologies

		AWARENESSOFMHT	STATUSOFCLIENT
	Pearson Correlation	1	.155**
AWARENESSOFMHT	Sig. (2-tailed)		.009
	N	282	282
	Pearson Correlation	.155**	1
STATUSOFCLIENT	Sig. (2-tailed)	.009	
	N	282	282

**. Correlation is significant at the 0.05 level (2-tailed).

From the Table above there is a significant positive correlation (p = 0.009) between the status of the Obstetric Client and Aware of the Obstetric Client of Mobile Health Technologies. A bivariate correlation analysis was executed to assess the association between various variables in the study and the results are presented in an intercorrelation matrix.

Table 06: Logistic Regression of Awareness of MHT and Frequency of Access to Specialty care

Awareness Of Mobile Health Technologies	Odds Ratio	Std. Err.	P>z	[95% Conf.Interval]
Frequency Of Access To Specialty Care (Once A Month)				

Many Times In A Month	5.833	5.348	0.054	0.967 - 35.178
Once In Two Months	1.842	0.754	0.136	0.826 - 4.110
More Than Once Every Quarter	6.481	4.107	0.003	1.872 - 22.443

From table above, the Odds of an Obstetric client who access Specialty care many times in a month to be aware of mobile health technologies has 5.833 odds more, compared to an Obstetric client who accesses specialty care once a month. With a P-value of 0.054 which is statistically significant within a confidence interval of 0.803 to 24.285. The Odds of an Obstetric client who access Specialty care once in two months to be aware of mobile health technologies has 1.842 odds more, compared to an Obstetric client who accesses specialty care once a month. With a P-value of 0.136 within a confidence interval of 0.826 to 4.110. The Odds of Obstetric client who access Specialty care more than once every quarter to be aware of mobile health technologies has 6.625 odds more, compared to Obstetric client who accesses specialty care once a month. With a P-value of 0.003 which is statistically significant within a confidence interval of 1.872 to 22.443.

Table 07: Logistic regression of Awareness of Mobile Health Technologies and Age of Obstetric Clients

Awareness Of Mobile Health Technologies	Odds Ratio	Std. Err.	P>|z|	[95% Conf. Interval]
AGE (18 And below)				
19-29	0.159	0.125	0.020	0.033 - 0.747
30-40	0.292	0.227	0.113	0.064 - 1.337
41& above	0.166	0.173	0.085	0.022 - 1.282

From table above, the Odds of an Obstetric Client who is within the age range 19 – 29 years to be aware of mobile health technologies has 0.159 odds more, compared to Obstetric clients within the age range 18 and below. With a P-value of 0.020 which is statistically significant within a confidence interval of 0.033 to 0.747. The Odds of an Obstetric client who is within the age range 30 – 40 years to be aware of mobile health technologies has 0.292 odds more, compared to Obstetric clients within the age range 18 and below. With a P-value of 0.113 within a confidence interval of 0.064 to 1.337. The Odds of an Obstetric client who is within the age range 41 years and above to be aware of mobile health technologies has 0.166 odds more, compared to Obstetric clients within the age range 18 and below. With a P-value of 0.085 within a confidence interval of 0.022 to 1.282.

Table 08: Logistic regression of Awareness of Mobile Health Technologies and Status of Client

Awareness Of Mobile Health Technologies	Odds Ratio	Std. Err.	P>z	[95% Conf. Interval]
Status Of Client				
Post Natal	2.666	1.035	0.012	1.246 – 5.707

From the table above, the Odds of an Obstetric client who is a post-natal client to be aware of mobile health technologies has 2.666 odds more, compared to a prenatal client. With a P-value of 0.012 which is statistically significant within a confidence interval of 1.246 to 5.707. The majority of respondents 183 (64.9%) live in a rural area, 38 (13.5) live in an urban area while 39 (13.8%) live in a semi-urban area and 22 (7.8%) live in a semi-rural area within Sunyani Municipality.

Table 09: Classification of Location of Clients

Variable	Frequency (n)	Percentage (%)
Classification of Location		
Rural	183	64.9
Urban	38	13.5
Semi-Rural	22	7.8
Semi-Urban	39	13.8

Phone availability and ownership have tremendously increased in Ghana. The increase in the usage of mobile phones in Ghana enables people in rural communities to have access to health information which can enhance healthcare delivery [14]. Phone ownership is high with Obstetric Clients, the majority of the respondents 247 (87.6%) have personal mobile phones, 22 (7.8%) of respondents have shared mobile phones while 13 (4.6%) of respondents do not have mobile phones.

Table 10: Phone Ownership and Awareness of Mobile Health Technologies

Variable	Frequency (n)	Percentage (%)
Phone Ownership		
Personal	247	87.6
Shared	22	7.8
None	13	4.6
Awareness of Mobile Health Technologies		
No	248	87.9
Yes	34	12.1

DISCUSSION

Insufficient access to prompt and quality Specialty Care for Obstetric clients can result in maternal and perinatal deaths. Unequal access to information and basic health practices increases the health risks for women.295,000 women died of maternal causes in 2017, according to the World Health Organization (WHO) [15]. Most of these mortalities could be evaded if the appropriate medical interventions are known and in place. Maternal morbidity and mortality are caused by factors such as pre-eclampsia, embolism, and anesthesia-related complications [16]. These factors or complications may arise suddenly. Investing in the human resource and the health systems to be able to offer emergency care that is accessible and prompt to Obstetric clients would help reduce maternal morbidity and mortality. Statistics from World Health Organization (WHO) indicate there are more than 8,200 deaths a day out of 2.6 million stillbirths recorded worldwide daily [17]. From this study, all Obstetric Clients who require Specialty Care have to travel to Sunyani central sub-municipality because all Health facilities with Specialty Care services are within the Municipal capital. Obstetric clients require a longer time to access a health facility with Specialty Care because of the proximity of a health facility where Specialty care can be accessed in the Sunyani central sub- municipality. Not having enough money to cover travel expenses to a health facility with Specialty Care is a source of delay for Obstetric clients to access Specialty Care at a health facility when needed. In rural areas of the Sunyani Municipality, Obstetric clients usually lack money to pay for travel expenses to access Specialty Care at health facilities [18]. The financial constraint on Obstetric clients may obstruct clients from seeking Specialty Care that is needed. An Obstetric client needs on average GH15 to pay for travel expenses to a Health facility with Specialty care. Many disorders Obstetric client experience can be prevented, a robust health system responds appropriately to meet the needs of Obstetric clients to prevent

morbidity and mortality [19].Healthcare services should be meet the needs of Obstetric clients especially for Obstetric clients in rural areas, they are more vulnerable because of the non-available access to prompt healthcare [20].High direct obstetric mortality is a result of the long-distance an Obstetric client has to travel to seek care. The referral systems in Ghana have many barriers which impede the care delivery processes, especially for Obstetric clients. Most Maternal mortality can be a result of the referral system. When communication with healthcare professionals has improved the care that is rendered to Obstetric clients will improve. Before an Obstetric client is referred there ought to be communication between the referring facility and the destination facility [21]. An intervention can be made at the referring facility before a referral is made. Sometimes it is knowledge sharing that can help save the lives of Obstetric clients. Health professionals at the lower level are often not exposed to more cases and their knowledge on recent interventions needs to be improved. Mobile health technologies that are targeted at Obstetric clients can improve preventive maternal healthcare services [22]. Mobile health technologies for women in rural areas can potentially provide the opportunity to have health education and information needed for the required [23]. Mobile health technologies can facilitate the achievement of the Sustainable Developmental Goal in 2030 and the worldwide most favorable reproductive health. International Organizations like World Health Organization and United Nations have reported that avoidable pregnancy-related unanticipated problem has accounted for high infant and maternal mortality rates [24]. Optimal Obstetrical care protects the health of the mother and the child by offering adequate antenatal care which would forestall any associated complications. The coverage of postnatal care in lower and middle-income countries is relatively poor and only fifty-two percent of pregnant women complete the World Health Organization's recommended minimum of four (4) antenatal (ANC)visits [25]. The increased penetration rate of mobile phones has brought the potential adoption and usage of mobile health technologies to access healthcare which will ultimately improve preventive maternal healthcare services. A study from Ethiopia showed that a text messaging service component of most mobile device systems could enhance the effectiveness of healthcare providers, in the area of improving access to antenatal newborn care), Delivery Services, and PNC (prenatal newborn care) [26]. Obstetric deaths can have a direct or indirect cause. Deaths that occur as a result of pregnancy complications, giving birth and after delivery are termed as a direct cause of Obstetric death [27].When the physiological effects of pregnancy increase the severity of an existing disease before or during the pregnancy it is also called an indirect cause of Obstetric death. An indirect cause of maternal mortality is defined as a pregnancy-related death in a mother with an already existing health problem that is unrelated to the pregnancy, example of indirect causes of maternal mortality include, hypertension, and HIV/AIDS. Most of the maternal mortality is a result of indirect obstetric causes [28]

4. CONCLUSIONS

Any complication experienced by an obstetric client must not lead to mortality, the duration and distance an Obstetric client have to travel to seek Specialty can influence the care outcome during pregnancy. The proximity of health facilities where Specialty care is available and the availability of means of reaching the health facility has financial constraints on Obstetric clients especially those in the rural areas. In rural areas in Sunyani Municipality, the lack of financial resources remains a challenge in the accessibility of healthcare by Obstetric clients, due to the inability to afford the means of transportation cost. Mobile Health Technologies can be used by Obstetric clients to access Specialty Care within Sunyani Municipality. A mobile network is available throughout Sunyani Municipality, this can afford Obstetric Clients the opportunity to use their mobile phones to access Specialty Care instead of travelling to Sunyani Central. The information delivered to Obstetric Clients, who live in rural Sunyani Municipality on their mobile phones can improve their health outcomes. The use of mobile phones will increase access to perinatal and neonatal care in rural Sunyani Municipality, as well as enhance the

quality of care. An open-sourced license software can be designed and used for implementing a wide range of mobile health applications, which includes Specialty Care consultation. The service will be offered free of charge to users. A toll-free universal short code number can also be created so that Obstetric Clients can call and consult with a Specialist.

5. Recommendation

In the light of results of the study, following are recommendations that can be sgguested:

- Establishing a 24hour toll-free call center for Obstetric clients who experience any perinatal emergency. The toll-free call center should have qualified healthcare providers who can support Obstetric Clients by triaging, connecting and arranging transport to a labor and delivery unit when needed.
- There should be measures in place to expand health care provider's services to include the provision of teleconsultation with Obstetric clients irrespective of their location, with special attention of those in the rural areas because of their proximity and access to healthcare.
- Design mobile health applications which are open-sourced license software that can be used by Obstetric clients to access health education and information on Obstetric and neonatal care as well as Specialty Care consultation.
- There should be the establishment and expansion of how information is exchanged using telecommunication devices to rural clinics and health facilities across the Sunyani Municipality.
- Improving the human resource of health facilities to offer emergency obstetric care. There should be guidelines for physicians to improve on the availability and utilization of optimum obstetric care and neonatal care.
- Addressing healthcare dissimilarity and prejudice among rural providers.
- Prejudicial treatment by healthcare providers does not encourage people to seek care, because clients need to feel respected and treated equally.
- There must be training for healthcare providers so that clients can comfortably access healthcare and the healthcare providers knowledgeable enough to handle Obstetric complications.

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