A qualitative field assessment of MAZA's role in solving urgent/emergent health transportation crises in the Bunkpurugu-Yunyoo District (BYD) in the Northern Region of Ghana

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Introduction

Though Ghana made considerable progress towards achieving the Millennium Development Goals (MDGs) 4 and 5, its maternal mortality and child mortality rates continue to be high and fall short of meeting the goals.[1,2] In 2015, Ghana's maternal mortality ratio (MMR) was 319 deaths per 100,000 births.[3] Approximately 65% of the preventable maternal deaths in Ghana are attributable to hemorrhage, hypertensive disorders, abortion, and sepsis.[4] The United Nations predicts that these deaths could be more than halved by access to reproductive health services including skilled attendance at birth and family planning.[4] The MDG 5 Acceleration Framework is one of the initiatives the Government of Ghana put forth to promulgate the use of family planning and to expand access to skilled attendance at birth.[4] Since 2007, the proportion of births in the nation attended to by a skilled provider increased from 55% to 79% in 2017.[5] In 2017, the Ghana Maternal Health Survey (GMHS) reported 98% of women received antenatal care from a skilled provider and 89% attended four or more antenatal care visits. [5]

Attending ANC visits has been positively correlated with deliveries in a health care facility and deliveries assisted by a skilled provider.[6] The 2014 GDHS reports 81% of respondents who attended four or more ANC visits had their deliveries assisted by a skilled provider, 44.9% of respondents who attended 1-3 ANC visits had their deliveries assisted by a skilled provider, and 18% who did not attend any ANC visits had their deliveries assisted by a skilled provider.[6]

Attending ANC visits, however, is not the only determining factor in the decision to deliver in a health care facility or to utilize skilled birth attendants (SBAs) by pregnant women and their families in rural Ghana. Other factors include family decision-making regarding place of delivery, transportation, age of pregnancy, place of residence, socioeconomic status, level of education of woman and partner, and access to health insurance.[7] The literature reports more women delivered in a healthcare facility than at home in Ghana for the first time on a national level in 2008.[8,9] Facility deliveries in Ghana have increased from 54% in 2007 to 79% in 2017 according to the GMHS. Yeetey and colleagues found healthcare provider's influence to be another deciding factor in health facility delivery.[7] In their study population, they found that women who were influenced by a health care provider on their decision regarding place of delivery had 13.47 times the odds of delivering at a health facility than those that were influenced by a non-healthcare provider.[7] Another notable factor in the decision to deliver at a healthcare facility is distance. Geographic accessibility remains a strong influence on the use of healthcare facilities for delivery and other emergencies in many low and middle-income countries (LMICs).[10] Gething and colleagues found in their study of geographical access to care in Ghana that approximately 90% of women of childbearing age (WoCBA) in Ghana lived within a two hour journey to the nearest birth center, with 66% within two hours of a basic care emergency obstetric and neonatal care facility and 55% within two hours of a comprehensive emergency obstetric and neonatal care facility.[11] In a study by Nesbitt and colleagues on the influence of distance and quality of care on place of delivery in rural Ghana, they found 29% of women living more than 10 km from a healthcare facility had a facility delivery compared to 79% of women living within 1 km of a healthcare facility who had a facility delivery.[10] Another study by Cofie and colleagues also revealed high costs of traveling to health facilities and distance to health facilities as reasons for preferred homebirths by participants.[8] These participants also tended to wait till onset of pregnancy complications before seeking care at health care facilities.[8] In addition, Nesbitt and colleagues found there were 68%

lower odds of delivering in a facility for women who lived between 1 km and 5 km of a facility compared to those within 1 km of a facility.[10] These data show us the role the second delay in the three delays model – delay in reaching care – plays in facility delivery for many women in rural Ghana and other LMICs.

Although progress has been made in Ghana in women receiving skilled attendance at birth and the proportion of healthcare deliveries has increased, inequalities in the delivery of healthcare services across regions remain high. Delivery of healthcare services occurs unequally across Ghana as evident by the 38.1% of rural residents that were found to be insured under the National Health Insurance Scheme (NHIS) compared to 65.3% of urban residents.[12,13] Maternal and child health services are no exception to the unequal delivery of services across Ghana. In the Northern region, only 25% of women of childbearing age have access to comprehensive emergency obstetric and neonatal care services within a two-hour journey compared to 82% in the Greater Accra region. In addition, 50% of women of childbearing age in the Northern region live more than four hours away from these facilities, compared to 8% in the Greater Accra region.[11] The United Nations reports the distribution of health workers in Ghana is skewed in favor of more affluent regions in the southern part of the country.[4] The Greater Accra region recorded 92.1% of live births delivered by SBAs in 2017 compared with 59.3% in the Northern region.[5] Residency in rural areas has also been found to be associated with attending less than four ANC visits during pregnancy.[5,6] The 2017 Ghana Maternal Health Survey (GMHS) reports a difference of 7.5% in the prevalence of attending four ANC visits or more between urban and rural women (93.2% and 85.7% respectively).[5]

In remote rural areas of Ghana, such as the Northern Region, preferences and behaviors for seeking health care at facilities are influenced by culture, access to transportation, road conditions, cost, and perceived needs and benefits of facility delivery.[6,14] Konlan and colleagues found on their study of community factors accountable for home births in the Bunkpurugu-Yunyoo District that 93% of the pregnant women surveyed intended to give birth in a health facility yet this intent was not often realized due to obstacles to accessing a facility.[15] Seventy-five percent of residents in the Northern region of Ghana surveyed in the 2012 Ghana National Transportation Survey reported it was not important for them to consult a health care provider in cases of illness or severe injuries.[16] In situations where a health care provider was consulted, use of motorcycle, walking, and use of bicycles were the most predominant means of transportation at 34.0%, 29.4%, and 23.7% respectively.[16] Additionally, the survey found that amongst residents of the Northern region surveyed, 32% cited bad roads as the main obstacle encountered when visiting a health facility, 26.5% cited long distance to facility, and 22.4% reported difficulty getting a vehicle as their main obstacles in accessing health facilities.[16]

In the case of travel time to a health facility, only the Brong Ahafo and Northern regions had respondents who responded travelling over an hour to get to a health facility (0.2% and 0.5% respectively).[16] In times of labor and delivery, these same factors, particularly accessibility and affordability of reliable transportation presents a major barrier for pregnant women in rural areas of Ghana. Nationally, only 54% of Ghanaian women of childbearing age live within two hours of emergency obstetric and neonatal care facilities, and the Northern region falls short of this national average at only 25%.[5] In rural areas, transport was found to be reliable only 25.2% of the time, compared with 60.3% in urban areas.[14,16] The majority of births in the 2012 Ghana National

Transportation Survey delivered at home occurred in rural areas (91.9%), with 100% of reported TBA assisted births at home occurring in the rural areas, 84.7% of births occurring on the way to the health facility, and only 29% of births occurring in a hospital or clinic.[16] Overall, the National Transportation Survey showed an unmet need for reliable and efficient transportation across the country, particularly in the rural areas.[14,16] In times of emergency, women and their families resorted to borrowing motorcycles to reach the health facility.[6] This care seeking behavior by pregnant women in rural areas of Ghana is further supported by the results of the 2017 Ghana Maternal Health Survey which found the percentage of mothers in rural areas delivering in health care facilities to be 68.2% compared to 90% in urban areas.[5] Specifically, in the Northern Region, only 59.2% of deliveries occurred in health facilities.[5]

With regards to sick infants, care seeking behaviors are influenced by similar factors explored above for labor and delivery, among other factors. In a study by Bazzano and colleagues, financial problems, labelling of illness as "not for hospital," preference for traditional methods, and previous negative experiences with health care services are some of the factors found to influence care seeking behaviors for sick infants.[17] Families preferred traditional methods of care as a first line of action before medical care partially because of the increased cost of seeking care at a facility that is likely a considerable distance away.[17] Financial problems were consistently reported to be the main constraint to seeking hospital or medical care for newborn illnesses.[17] Out of the 59 newborns with a serious illness involved in this study, care outside the home was sought for 61% of them, with 39% being at a hospital or from a doctor and 25% being from a traditional healer.[17] There's limited data on care seeking behaviors for sick infants in rural areas of Ghana, particularly the Northern region. However, one research study in Uganda related to this topic found the major contributors to delays in care that resulted in newborn death to be caretaker delays in problem recognition or deciding to seek care, delay in receiving quality care, and delay in transportation at 50%, 30%, and 20% respectively.[18] More research is needed on this topic in rural areas of African nations, including Ghana.

Purpose

In April of 2018, MAZA's independent evaluation team at the University for Development Studies (UDS) in Tamale completed an end-line evaluation of MAZA's program in Bunkpurugu-Yunyoo. The evaluators interviewed 347 respondents from seventeen communities in three-subdistricts in the Bunkpurugu-Yunyoo District (BYD). They collected both quantitative and qualitative data in the form of a survey, focus group discussions, and key informant interviews. They learned at the end of the evaluation that almost three-quarters (74%) of respondents lived within 1 kilometer of a MAZA driver's home and 23% lived 1 to 5 kilometers of a MAZA driver.[19] This 74% value was of interest to MAZA team members as they questioned what could be limiting MAZA reaching people outside of 1 km of MAZA drivers' homes. This was the primary motivation behind the field assessment. The general purpose was to follow up on these findings from the UDS team to ascertain what programmatic changes, if any, needed to be made. The goal was to identify reasons why people living more than 1 km away from MAZA drivers were not utilizing the service as compared to those within 1 km of the drivers.

Methodology

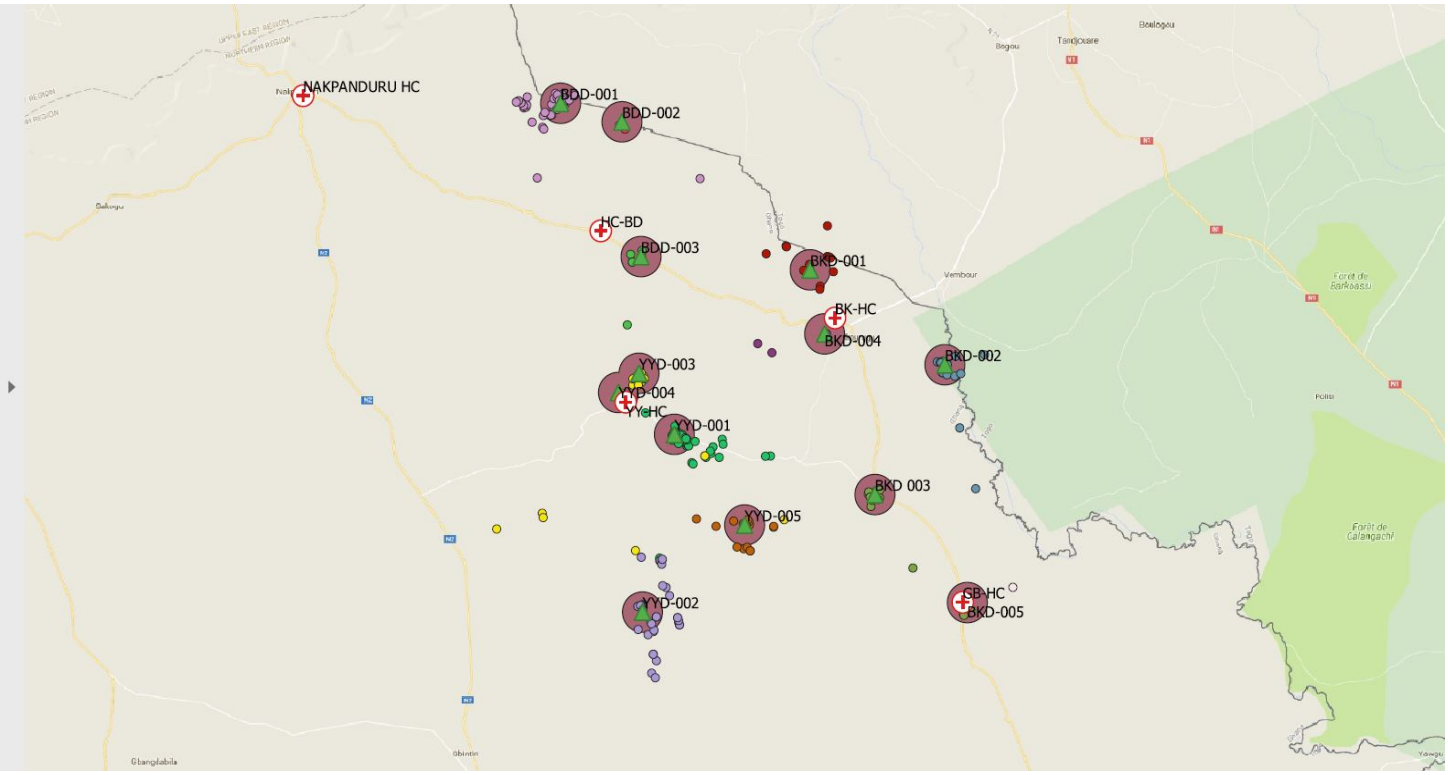
The field assessment took place in two parts. The first was aimed at confirming the findings from the UDS independent evaluation about the majority of MAZA passengers living within a 1 km radius of a MAZA driver. Since the independent evaluation data was captured via self-reporting of passengers, we sought to confirm this by actually measuring the physical distance between MAZA drivers' houses and their passengers' houses. This was done by measuring the distance between the GPS coordinates of the drivers' and passengers' homes. A Garmin eTrex 20x GPS handheld device was used. We first located the driver's home and captured the GPS coordinates of their house. With the help of the driver or another community member (sometimes a family member or close friend) who knew the residence of the driver's passengers, we visited each passenger's home to acquire their GPS coordinates as well. We did this for 13 of MAZA's 14 past and current drivers and their passengers across three subdistricts (Bunkpurugu, Binde, and Yunyoo). QGIS 3.0.2 was then used to map the locations of each driver and passenger, and a buffer analysis with a 1 km radius around each driver's location was performed (map 1). Next, we identified the drivers with greater than 50% of their passengers living within a 1 km radius of them. The catchment areas of these drivers were the target for the second part of the assessment.

The second portion of the field assessment aimed at identifying reasons why people outside a 1 km radius of the selected drivers (with greater than 50% of their passengers living within a 1 km radius) did not utilize MAZA's services. The objective was to interview women living more than 1 km radius away from a MAZA driver's home who had delivered or had a sick infant in the past year for which they visited a health facility. From the buffer analysis, we identified 10 drivers who had greater than 50% of their passengers living within 1 km of their house. Out of these 10 drivers, 1 was a new driver with only one passenger and the other had picked up all his passengers from Yunyoo Health Center to Binde Hospital since they were referrals. Because of this, only 8 of the drivers' catchment areas were targeted for the interviews. More specifically, we identified from the 1 km buffer zone of the drivers' home, the cardinal directions with little to no previous MAZA passengers. We then aimed to interview 3-4 participants per driver zone for a total of 24-32 participants. With the qualitative nature of the interview, we determined a sample size of 24-32 participants would be sufficient to reach saturation. Participants were selected randomly once team members arrived in the community.

First, we visited the home of the driver, then using the Garmin eTrex GPS device, we located the cardinal directions from which the driver had the least passengers. With the help of the driver or a trusted community member, we assessed if there were established communities in those directions. If there were communities, we engaged a trusted community member or MAZA volunteer familiar with MAZA but not a MAZA driver who acted as our community guide and translator. The community guide also facilitated the interview to allow for a more streamlined and efficient interview process. Prior to visiting homes, the community guide was briefed on the goals and objectives of the field work, and read and discussed the interview questions with the team. Upon arriving in these communities, we asked for households with women who had delivered in the past year or had a sick infant for whom they sought care at a health facility. The questionnaire was administered to women or households who fit the criteria. For four of the eight drivers, there were no settlements up to 2-3 km of the cardinal direction of interest of their home. Most often

after driving 3 km outside of the driver's home, we entered another driver's catchment area. Overall, the questionnaire was administered to 14 participants from the three subdistricts.

Map 1: 1 Km Radius Buffer Analysis of Drivers, Passengers, and Health Facility Locations



Health Care Centers Driver's Home Location 1 km buffer radius Passenger's location (Note: different colors represent the passengers for specific drivers)

Results

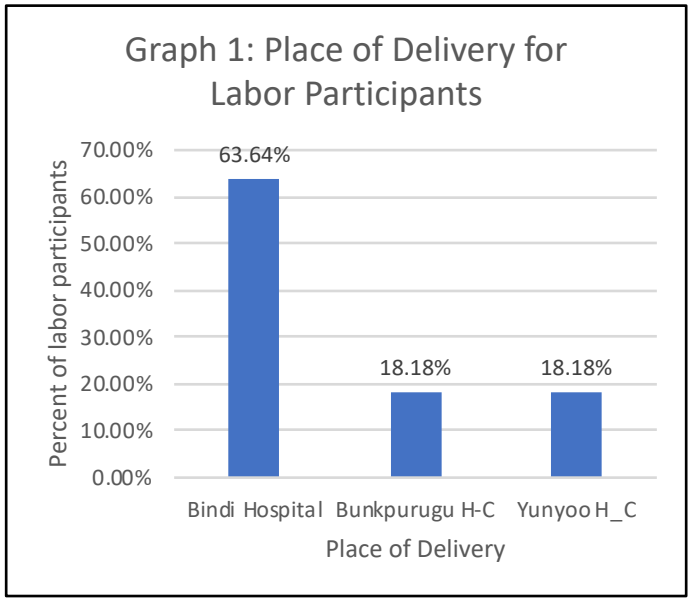
Demographic Characteristics

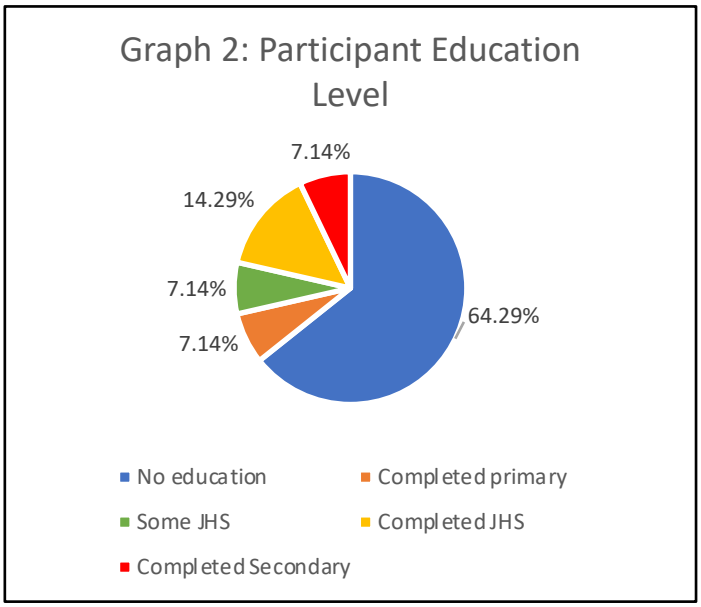
Out of the 14 participants, four were from the Binde Subdistrict, seven from Bunkpurugu, and three from Yunyoo. Seven out of the eleven labor participants reported delivering at Binde Hospital, two at Bunkpurugu Health Center, and two at Yunyoo Health Center as shown in Graph 1. Table 1 lists the demographic characteristics of the participants. None of the participants were previous MAZA passengers. The median age of the mothers who participated in the questionnaire was 29.5 years, with a minimum of 18 years and a maximum of 40 years. All the mothers who participated in the questionnaire were married. Most participants, 64%, did not have any formal education as shown in Graph 2. Heads of households reported were either husbands (92.86%) or a father in-law (7.14%), and as Graph 3 shows, the median household size was 8 and the median number of wives in each household is 1.

Eleven of the 14 participants (78.57%) were labor cases. That is, they had delivered a child in the past year. 3 out of the 14 participants (21.43%) were sick infant cases – that is, their infant had been sick in the past year and they had sought care for that infant at a health facility. Data on age of infants was only collected for participants who had delivered a child in the past year. Of this observed 11, the median age of infants was 2 months old, with a minimum of 1 month and a maximum of 11 months old.

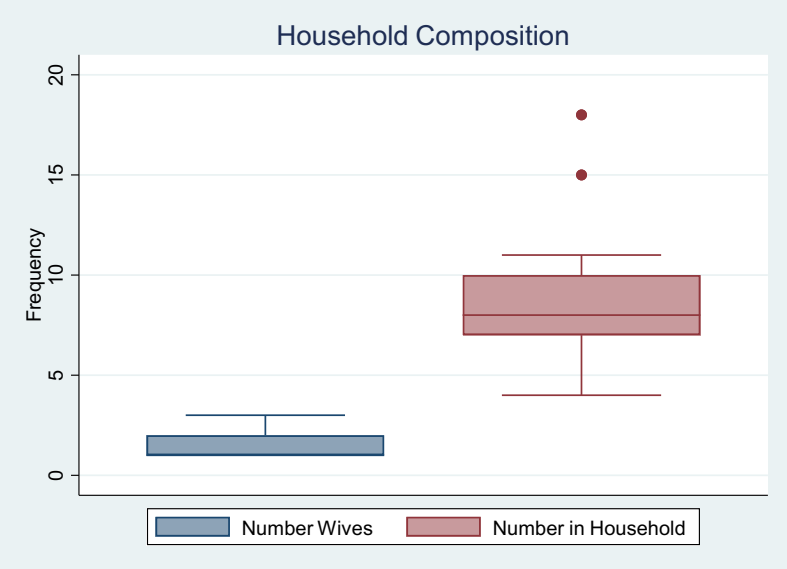
Table 1: Demographic Characteristics of Respondents

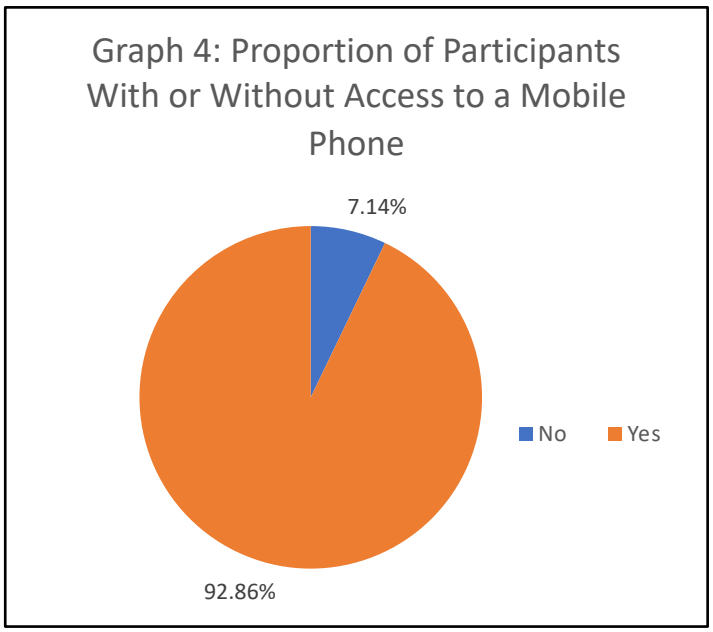
Characteristic	N (%)
Marital Status	
Married	14 (100%)
Education Level	
No Education	9 (64.29%)
Completed Primary	1 (7.14%)
Some JHS	1 (7.14%)
Completed JHS	2 (14.29%)
Completed Secondary	1 (7.14%)
Head of Household	
Husband	13 (92.86%)
Father In-Law	1 (7.14%)
Access to Phone	
No	1 (7.14%)
Yes	13 (92.86%)
Participant Type	
Labor	11 (78.57%)
Sick Infant	3 (21.43%)
Knowledge of MAZA	
No	4 (28.57%)
Yes	10 (71.43%)
Previous Use of MAZA	
No	14 (100%)
Yes	0 (0%)

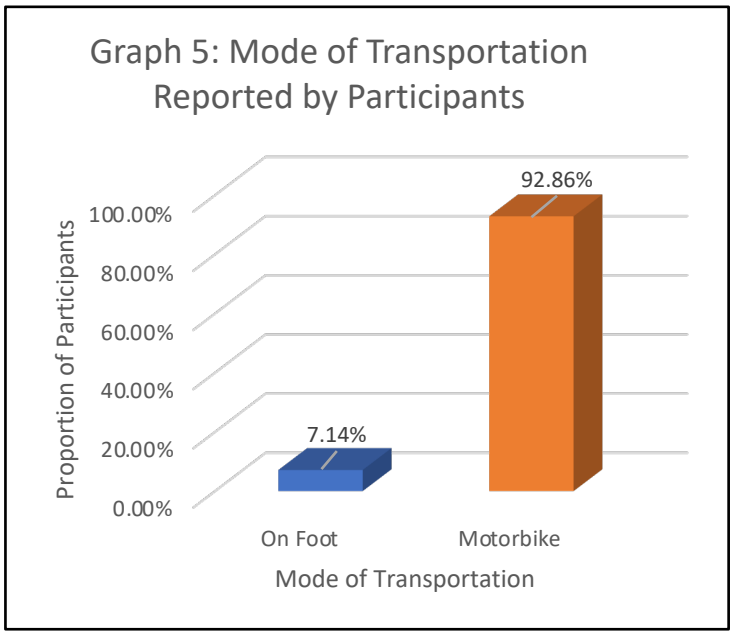




Graph 3: Household Composition







Mobile Phone Access

As shown in Graph 4, out of 14 participants, only 1 (7.14%) reported not having access to a mobile phone (either personally or someone else in the household), and 13 (92.86%) reported having access to a mobile phone in the house (either they personally had a mobile phone or someone else in the household had a mobile phone). Of the 13 participants who reported having access to a mobile phone in the house, 1 reported the mobile phone was her own (mother = participant), 8 reported the mobile phone was their husbands', 3 reported both they and their husbands had a mobile phone, and 1 reported their brother in-law had a mobile phone.

Decision Makers, Mode of Transportation, and Place of Delivery

Of the decision makers for place of delivery, husbands were the majority at 36.36%, the mothers themselves and mother in-laws made up 18.18%. Father in-law, Landlord, and Other (unanimous household decision) made up 9.09% each. Most participants, 92.86%, reported using a motorbike to get to the health center for their emergency/urgent care. Only one participant travelled on foot to get to the health center. Of the decision makers for mode of transportation, the mothers themselves made up 14.29%, husbands made up 78.57%, and father in-laws made up 7.14%. Out of the 14 participants, 10 (71.43%) had heard of MAZA and 4 (28.57%) had not heard of MAZA before.

Reasons for Not Utilizing MAZA's Services

The reasons cited for not utilizing a MAZA vehicle for urgent health care transportation when in labor or with a sick infant were that no one in the household at the time had a mobile phone, they did not have the MAZA tollfree number or the nearest MAZA driver's phone number, someone in the household or a neighbor had a motorbike they could access easily, or the driver's

house was too far away. Of the 10 participants that had prior knowledge of MAZA's transportation service, 3 (30%) reported having access to a motorbike, 2 (20%) reported the MAZA driver was too far away and they had access to a motorbike they could use, another 3(30%) reported not having the MAZA tollfree number or the MAZA driver's mobile phone number, 1 (10%) reported not having access to a mobile phone, and 1(10%) reported going into labor after having walked to the health center as the reasons why they did not use MAZA for urgent health care transportation.

Discussion and Conclusion

Buffer analysis of the location data showed that 10 out of the 13 (76.92%) MAZA drivers had the majority (>50%) of their passengers living within a 1 km radius of them. This finding confirmed the findings from MAZA's independent evaluators at the University of Development Studies (UDS) in Tamale. The methodology for acquiring these figures differed between this project and that of the UDS team, yet yielded similar results that begged the questions: why is this occurring and how do we address it?

This 1 km radius estimated in the buffer analysis however, is not representative of the road conditions and may underestimate the actual distance between drivers and passengers as it was calculated based on GPS coordinates. In reality, most of the roads in the communities are rough and impassable especially after heavy rainfall. Drivers often use back roads that may take longer to get to their destination. Secondly, the field assessment revealed geographic barriers such as uninhabited lands and rivers that limit MAZA's ability to reach people living in communities further from drivers' catchment areas. Out of the 8 selected drivers' catchment areas, only 4 had existing communities in the cardinal areas where they lacked passengers due to these geographical barriers or absence of communities. Considering the low population density of the rural areas of the Northern region, this is not surprising. For example, BYD has a population density of about 100 people per square kilometer while neighboring Chereponi district, MAZA's first district has only about 40 people per square kilometer, as opposed to rural districts in southern Ghana which tend to be more dense.[20]

The questionnaire brought more context to the problems of equitable access to MAZA's services and geographical limitations in BYD. Although 71.43% of the respondents had heard of MAZA, none had used MAZA's transportation services before for various reasons including: not having access to a phone, not having the driver's phone number or the toll-free number, the driver living too far away, and having access to a motorbike either through family or a neighbor. Barriers to accessing MAZA's services such as not having the driver's phone number, not having the MAZA toll-free number, and distance between the driver's home and participant's home should be addressed by MAZA's team moving forward in order to address concerns of equity. Additionally, the fact that 93% of the respondents had access to a motorbike to go to the health center brings up a question of need for MAZA's transportation services in those communities. These findings should be taken into consideration as MAZA expands its program in Bunkpurugu-Yunyoo and other districts.

Limitations

The biggest limitation in this project was the inability to capture a true 1 km radius around the drivers' homes. The geographic and climatic characteristics described in the discussion section are not captured by the coordinate system, which influences the distance calculated in the buffer analysis. This must be kept in mind as data is interpreted and decisions are made regarding any programmatic changes. Another limitation was the dependency on the translators who facilitated the interviews. Though the translators were briefed prior to the interviews on the project's aims and goals, and the questions were carefully explained to them, there's room for error in translation and interpretation.

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