

## Factors Affecting Home Delivery among Women Living in Remote Areas of Rural Zambia: A Cross-Sectional, Mixed-Methods Analysis

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### Abstract

*Luapula Province has the highest maternal mortality and one of the lowest facility-based births in Zambia. The distance to facilities limits facility-based births for women in rural areas. In 2013, the government incorporated maternity homes into the health system at the community level to increase facility-based births and reduce maternal mortality. Despite the policy to stopping traditional birth attendants from conducting deliveries at home and encouraging all women to give birth at the health facility under skilled care, many women still give birth at home. An exploratory cross section survey was used to gather data by conducting structured interviews with 50 women of childbearing age who had a recent or previous home delivery. The following factors were found to be associated with home deliveries in surrounding villages in kashikishi; abrupt onset/precipitate labor, long distance/transport difficulties to reach the nearest health facility, having had successful HD, poverty/low income and gender though having a small percentage. Parity in which the majority were multiparas' women, attitude was also associated with home deliveries and other unforeseen circumstances such as a funeral and being alone at home at the onset of labour.*

**Keywords:** *Traditional birth attendants; Home Deliveries; Skilled Care.*

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### Introduction

Labor is a natural physiological process that any normal pregnant woman undergoes in order to deliver the fetus, placenta and its membranes and other products of conception. As such, most women find it very difficult to accept the fact that they should deliver from a health facility because labor commences spontaneously whether from home or at a health facility. Besides, their mothers and other relatives or neighbors who have delivered before think that they have all the necessary knowledge and experience to be able to conduct one. But little do they know that every pregnancy is a risk to both the mother and the fetus and that pregnancy at times comes with complications such as pre-eclampsia, eclampsia, fetal distress, obstructed labor, placental previa, hemorrhage or even death if not properly managed. Most of these complications don't just need an experienced relative or TBA to manage them but qualified medical personnel with more scientific knowledge and experience. Besides all these risks, one cannot be too sure that a home environment is clean or safe enough for a delivery and that sterile instruments are being used to cut

and tie the cord or if aseptic technique is being used and if the person conducting the delivery can manage complications when they arise. The continuing rise of maternal mortality ratio (MMR) is mostly affecting the developing countries. It is estimated that 47% of global maternal mortalities occur in Africa with highest levels in sub-Saharan countries. 85% are direct results of complications arising during pregnancy, delivery or puerperium. In these countries over 60% of home deliveries are taking place in rural areas with unskilled attendants. About 35% of women in developing countries have no antenatal care during pregnancy, almost 50% give birth without skilled attendants and 70% receive no postpartum care. WHO also further estimates that about 800 women die in childbirth every day adding up to about 300, 000 in a year. Various factors such as social-economic conditions, the three delays - delay at home or in the community, delay getting to a health centre or hospital and delay at the health facility in providing adequate obstetric care and poor accessibility to maternal health care have been implicated in home deliveries.

Maternal mortality rate remains to be challenging to health system Worldwide. Therefore globally, there has been rising concerns to promote safe deliveries. For example, policy intervention for maternal mortality began with the Safe Motherhood Initiative in 1987, a response to growing recognition that primary health-care programs in many developing countries were not adequately focusing on maternal health and safe delivery.

However, the bulk of these deaths (99%) still come from developing countries and the sub Saharan African region still accounts for the majority of deaths by region (640 per 100 000 live births) followed by south Asia which had an estimated 280 deaths per 100 000 live births in 2008 (WHO 2010). Maternal deaths have been shown to contribute to adverse perinatal outcomes such as stillbirths and interventions to reduce stillbirths are likely to reduce maternal mortality as well (Goldenberg, McClure and Belizán 2009).

Stillbirths have been attributed to the care provided at delivery and the place where delivery occurs. Furthermore, TBAs who largely assist deliveries in developing countries, mostly at home have been shown to be unable to contribute to the reduction of maternal mortality (WHO 2004; WHO 2006; The Lancet Maternal Survival Series Steering group 2006; CSO, MOH, TDRC, IIPS and Macro International 2007; NIPS [Pakistan] and Macro International Inc. 2007; University of Zambia and Macro International Inc. 2009) <sup>[5]</sup>. On the global scale, home deliveries in the developed western countries constitute a very marginal share of total deliveries, being mainly below 2% with the exception of Netherlands where home deliveries are above 30%. On the other hand, in developing countries home deliveries constitute a larger share of all deliveries with statistics usually above 50%.

Following the 1994 International Conference on Population and Development strengthened international commitment to reproductive health. The focus on maternal mortality was sharpened when reduction in maternal mortality became one of eight goals for development in the Millennium declaration (millennium development goal (obaid ta, 2009). the number of women dying due to pregnancy and childbirth has decreased by 34% from an estimated 546 000 in 1990 to 358 000 in 2008, although the progress is notable, but the

annual decline rate is less than half of what is needed to achieve the millennium development goals. to achieve millennium development goal the annual decline rate should be 5.5% instead of the current one of 2.3% in average.

In a study conducted by Gwamaka Samson (2012) in Tanzania on the utilization and factors affecting delivery in health facility among recent delivered women in Nkasi District found that although 70% of women lived closer to health facilities only 44.0% deliver in health facility; this means there were other factors which hinders delivery in health facility apart from distance. health facility might be physically accessible by pregnant mothers but if human resource, drugs and medical equipment are not available women are not likely to deliver in health facility.

In Zambia about 50% of women delivered in health facilities and 48% are delivered at home, there is an increase in health facilities delivery from 47% in 2004 to 50% in 2010. However, it has been noted that more can be done to narrow down home deliveries cases. The major perceived barriers to women access to health care services are lack of money (24%), distance to health facilities (19%), Not willing to go alone (11%) while only 2% of women cite obtaining permission as big problem (Onah HE, et al (2006) :). Several strategies have been done in our country to improve the access to maternal health care since the initiative of safe motherhood program in 1987, this initiative has improved pregnant mother to access antenatal care and slightly improve delivery in health facilities, and however there is higher difference among the regions despite the higher attendance of antenatal clinics in both regions.

Zambia is one of the sub-Saharan African countries with a high maternal mortality ratio (MMR). The latest demographic and health survey (DHS) showed that the country's MMR is 591 maternal deaths per 100 000 live births. Moreover, more than half (53%) of the women in Zambia, do not receive skilled birth attendance, the survey further showed that these numbers are even higher in rural areas where more than seventy percent of the women give birth at home, outside the health facility, and are often assisted by TBAs. The World Health Organization (WHO) has defined TBAs as persons who assist the mother during childbirth and learns her skills through apprenticeship that involves both observation and imitation, and is often highly

regarded by the community that chooses her to assist women in childbirth. Reviews and studies conducted in Zambia and other developing countries have reported the effectiveness of TBAs in improving maternal and new-born health outcomes. For example, Gill and colleagues showed that training TBAs to manage common perinatal conditions significantly reduced neonatal mortality in lufwanyama, Zambia. Although training TBAs may provide them with basic midwifery skills, most TBAs, have no access to the requisite clean delivery tools such as supply of drugs and equipment for obstetric care, this may increase the risk for infections during childbirth. Moreover, the TBAs have no access to referral services in case of complications during and after birth. Consequently, there has been a policy change in many developing countries including Zambia to stop the funding and training of TBA programs. Rather, all women are recommended to use facility-based delivery services provided by trained and skilled health care staff. This change in policy has resulted in TBAs not being recognized as part of the providers of essential obstetric care in Zambia. Nevertheless, many women in rural Zambia still give birth at home and TBAs are still seen as essential providers of obstetric care. Statement of the Problem.

According to Zambia Health & Demographic Survey preliminary report (2010) indicates that mortality rate in urban and rural areas does not show significant difference. Since 28 deaths are recorded per 1000 births in urban areas while 38 deaths are recorded per 1000 births in rural areas. However, more home deliveries still appear more in rural as compared to urban areas.

Some factors Contributing to the Problem Education Some studies have shown that women who are less educated or illiterate are associated with having home deliveries. Lukumar, et al. showed that low maternal education of less than grade 5 was significantly associated to a home delivery. Other studies were also able to illustrate that mother education levels that were lower than primary or indeed of those that had not attended school at all, as being associated to delivering at home. The odds of a home delivery were 3.2 times higher among women who were illiterate than those who were literate. Parity Women with home deliveries are more likely to be multiparous. This association was also shown by Lukumar, et al. who found that women with more

than three children delivered at home. Thine, et al. also found home deliveries by women to be associated with a birth higher order, as did Adikari, et al. whose study showed that the odds for home deliveries was 2.5 times higher among multiparous women compared to primi-parous women. Gender Gender also plays a role in determining a place where a woman should deliver in that most women have little or no say in family matters were a man is seen as the head of the family and were tradition does not support women to argue with decisions made by their husbands. The gender of the head of the family was significantly associated with the place of delivery. This was also demonstrated by Hodgkin, who demonstrated that households that delivered in the formal (health facility) sector were less likely to be headed by a male. Distance Distance comes with a lot of challenges in terms of mode of transport to reach the health facility and the income to get there. At times the mode of transport might be available but the driver may not be around or there may be no money for fuel as was with the case of a woman we interviewed in katondwe who delivered from home.

### **Statement of the problem**

Delivery in health facilities is still challenging in developing countries in which higher number of women attend antenatal clinic but about half of them they deliver home without assistance of skilled professional which is likely to leads to high morbidity and maternal mortality and increase the risk of transmission of HIV/AIDS to relatives or traditional birth attendants who conduct deliveries without protective clothing (Moore et al 2011).

In Zambia home deliveries accounted for 52% of all births in the five-year period preceding the health survey of 2007. At the provincial level, 68.4% of the deliveries in Northern Province occurred at home followed by Central Province and Luapula Province at 66.1% and 64.3% respectively <sup>[5]</sup>. Births occurring outside the health facility in Zambia are more likely to have pregnancy complications that may result in maternal and foetal deaths due to lack of skilled attendance. In Luapula and Northern Province, 45 and 41% of births respectively, were more likely to be assisted by TBAs than other provinces in Zambia.

The government of Zambia has made many efforts to reduce home deliveries, for example the

introduction of mother's shelter where expecting women are made to stay while waiting for delivery to avoid home deliveries. However, according to the Zambia Demographic Health Survey (2007) there is a significant difference between those who deliver at home and in health facilities. It was found that 79% urban women give birth in public health facilities while only 27.7% of women give birth in public health facilities in rural areas. It was further established that only 15% are home deliveries in urban while 68.7% were home deliveries in rural areas. Therefore, home deliveries are still high in rural areas. Most of the women giving birth outside health facilities were attended to by traditional birth attendants accounting for 42.9% while those attended to by their relatives represented 47.5%. Some, 8.8% indicated are however, not attended to by anyone during child delivery. The factors contributing to home deliveries are unknown. Therefore, our study will seek to assess the factors that contribute to home deliveries among women of child bearing age (15-45) in kashikishi surrounding villages.

### **General Objective**

The aim of the study is to assess the factors contributing to home deliveries among women of Child bearing age (15-45) in kashikishi surrounding villages.

### **Specific objectives**

1. To find out if demographic factors contribute to home delivery choices among women of child bearing age.
2. To determine socio economic factors that contributes to home deliveries among women of kashikishi surrounding villages.
3. To determine health service factors that may contribute to home deliveries among women of child bearing age in kashikishi surrounding villages.

### **Research questions**

1. What demographic factors contribute to home deliveries among women of child bearing age?
2. What socio-economic factors that contributes to home deliveries among women of kashikishi surrounding villages.?

3. Are there any health services factors that may contribute to home deliveries among women of child bearing age in kashikishi surrounding villages.

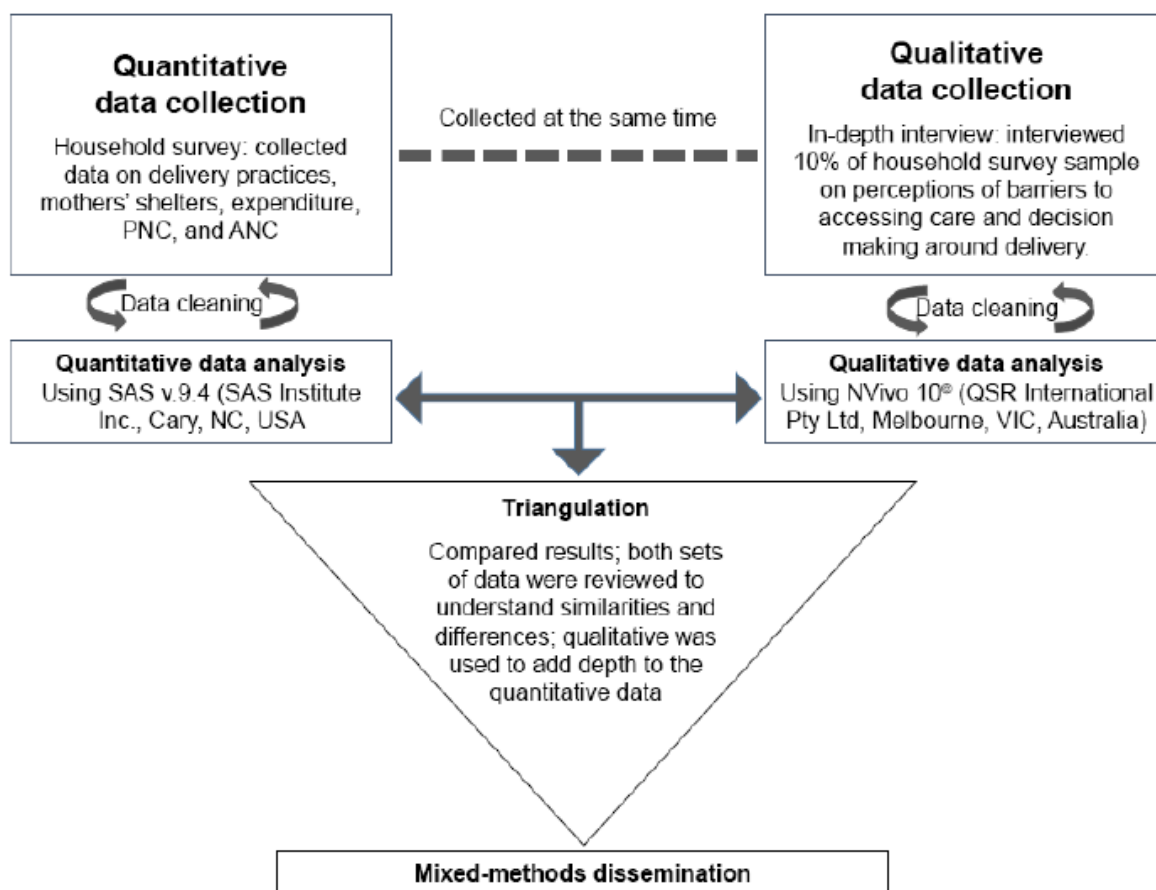
### **Significance of the research**

Understanding factors that hinders delivery in health facilities are particularly important in order to narrow the existing gaps among regions and improve quality of health service delivered to pregnant mothers to reduce maternal morbidity, mortality and disabilities that are related to pregnancy and childbirth. The existence of gap among regions in health facilities delivery being very low in rural region compared to other regions in urban areas in Zambia. Therefore, the need to find out factors that have to be considered significant to improve delivery in health facilities in rural areas particularly residences surrounding kashikishi surrounding villages in luapula Province. There has been lack of studies in this area. The study aims at findings useful information that prevents women to deliver in health facilities while large number of them attend antenatal clinic at least once in their period of pregnancy and less than half deliver in health facilities. The information obtained will be useful for the community and decision makes at the district and regional level in planning, implementing and evaluating various interventions related to research findings to reduce maternal mortality rate and achieve millennium development goals.

### **Methods**

#### **Study design**

This study utilized a cross-sectional, concurrent triangulation mixed-methods design to cross-validate findings, Data for this analysis were collected for the baseline observation of an impact evaluation (NCT 02620436) of a maternity waiting home (MWH) intervention designed from formative research being implemented in 40 primary health facility catchment areas (HFCAs) within seven districts across Zambia. A quantitative HHS was administered and qualitative IDIs were conducted concurrently to triangulate and corroborate findings.



**Figure 1.** Illustration of the MAHMAZ concurrent mixed- methods study design

**Abbreviations:** ANC, antenatal care, PNC, Postnatal Care.

### Study setting

Data collection was done districts in Luapula Province. The districts are primarily rural with Long distances, poor road networks, and the cost and lack of transport are documented barriers to accessing maternal health services in rural Zambia. The average distance from a rural health center (RHC) to the district health office in the study districts, a proxy for a referral hospital which is usually situated next door or just down the road, ranges from 43 found the average travel time for women in the poorest quintile to reach a health facility for delivery was 94 minutes, using a variety of transport modes; overall, only 57% of women used motorized transport Generally in Zambia, ambulances are scarce and not equally distributed among the provinces. Only half of the district health offices have vehicles that are suitable for use on the roads and ~30% of rural health facilities use motor bikes or bicycles as a means of transport in the same district, community members self-reported that having no ambulance, no available transport, and long

distances were challenges for pregnant women in the communities. At the time of data collection, all RHCs in the districts offered ANC and over 85% of RHCs offered delivery services. Although there are no formal fees for obstetric services by facility, women are reportedly asked to bring supplies necessary for delivery including clean cloth, soap, disinfectant, a bucket, and baby clothes this districts is also target sites for the Saving Mothers, Giving Life (SMGL) initiative, a public-private partnership aimed at accelerating reductions in maternal mortality by improving health systems and addressing the delays in seeking, reaching, and receiving care in Nigeria, Uganda, and Zambia. In addition to general health system-strengthening approaches, key activities of SMGL include: 1) community mobilization activities to increase demand through community leaders and volunteers trained in delivering messages and supporting pregnant women, known as Safe Motherhood Action Groups (SMAGs);2) infrastructure development and improvements to transport and communication systems to increase access to and

availability of services; and 3) strengthening health facility capacity to manage obstetric complications and improve quality of care. The first proof-of-concept phase of SMGL was launched in 2012.

It is essential that the RHCs that are affiliated with the MWHs have the capacity to manage basic emergency obstetric and neonatal complications, and be physically located within a reasonable travel time to a higher-level referral hospital. As such, the 4 sites in this program are located within 2 hours travel time by vehicle to a comprehensive emergency obstetric and newborn care referral facility, conduct a minimum of 150 deliveries per year, and either 1) have the capacity to provide at least five of seven basic emergency obstetric and newborn care signal functions or 2) have at least one skilled birth attendant on staff, routinely practice active management of third stage labor, and have had no reported stock-outs of oxytocin or magnesium sulfate in the 12 months prior to the study. Two sets of criteria were necessary as consistent data were not available across all districts during the site selection process.

### **Eligibility and sampling approach**

Eligibility criteria to participate in the area included: the respondent had delivered a baby within the past 12 months; was aged 15 or older (guardian available for consent if under 18); and was a resident of the village identified for sampling. If the eligible respondent in the household had died, the household was eligible if a proxy respondent was available and at least 18 years of age.

Multi-stage random sampling was used to ensure a representative sample of remote women living in the selected 4 villages across the kashikishi. First, to generate a sample frame of clusters (villages), all villages in the 4 selected villages were geocoded and those where the village center was located >10 km from their catchment area health facility by the most direct travel routes using bicycles rounding up to the nearest km, were identified. Ten kilometers was selected for comparability because it is a commonly used measure of distance in the maternal health literature. Because distance was rounded up to the nearest km, some village centers are located between 4.5 and 5km from their catchment area health facility. From the sample frame, we then randomly selected

approximately 4 villages for inclusion with probability proportional to population size. Second, all eligible households within each selected village were listed through the assistance of community members and village leadership. We then randomly ordered households and approached them for participation until the sample size (approximately six households) for that village was reached. Third, if a household had more than one eligible participant, one respondent was randomly selected by the electronic data capture system. Ten percent of households were also randomly selected to participate.

### **Data collection**

local language(s) and in English, was used in qualitative and quantitative interviewing techniques and human subjects' protection. The quantitative captured information for each respondent on household and individual demographics, barriers to accessing facilities for delivery, and service utilization. Enumerators captured survey data on encrypted tablets using SurveyCTO Collect v2.212 (Dobility, Inc, Cambridge, MA, USA). The qualitative was conducted using a semi-structured interview guide to gain a deeper understanding of the respondents' perceptions of barriers to accessing maternal care, and decision-making regarding delivery. IDIs were administered to a randomly selected subset of HHS respondents immediately following the respondents' HHS. IDIs were audio-recorded, translated from the local language into English, and then transcribed verbatim.

### **Measures**

For this analysis, the primary outcome, delivery location, was captured through women's responses about where she delivered her most recent child (index child): in a home; at any health facility; on the way to the health post/facility/hospital. Key demographic variables and variables that have been well established in the literature as predictors of delivery location were included in the analysis: age category; maternal education level categorized as none, any primary or more than primary; marital status; wealth quartile; parity; first pregnancy (primigravida); and whether she attended the recommended four or more ANC visits dichotomized as yes or no. A categorical variable

was created to control for the distance from the household's geocoded village center to the village's catchment area health facility. It is possible, however, that some households may lie closer to or farther from the facility based on their actual proximity to the geocoded village center. For those who delivered at any health facility, self-reported travel time was captured in hours and minutes, converted to hours, and presented categorically.

## Analysis

All quantitative analyses were conducted in SAS v9.4 (SAS Institute Inc., Cary, NC, USA). First, descriptive characteristics for the full study sample and IDI sub-sample were calculated from the HHS; the full sample and IDI sub-sample were compared using a chi-squared test of association. Second, the primary outcome of delivery location (at home, at any health facility, or on the way to a facility) was assessed against key sociodemographic characteristics and potential covariates as described previously in bivariate tables, using a chi-squared test of association. Lastly, multivariate logistic regression models were used to assess the relationship between predictor variables on home delivery, with the most frequent category serving as the reference in the model. Predictor variables that were significant at the  $P=0.05$  level was included in the regression model, though intended delivery location was excluded because of small cell size. Self-reported travel time was not included in the model as it was only asked of those who delivered at a facility. All analyses

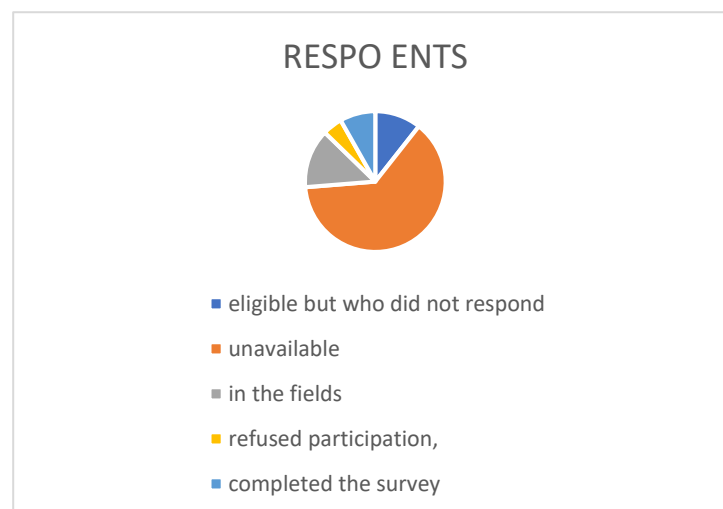
accounted for clustering in the districts using the survey analysis procedures. Quantitative data are presented as mean  $\pm$  SD or median and interquartile range (IQR). We also present unadjusted ORs and adjusted ORs (aORs), with 95% CI.

All qualitative data were systematically coded and analyzed using content analysis in NVivo 10<sup>®</sup> (QSR International Pty Ltd, Doncaster, Australia). The texts were first coded to a theme and then to directionality (positive, negative, neutral); these were then explored during analysis to identify common issues or instances mentioned in the data. Coding themes were identified a priori according to the semi-structured interview guide which contained questions regarding delivery location and barriers to facility delivery. Additional themes were included as they emerged.

## Results

### Sample characteristics

The final sample included 180 women from unique households for the quantitative survey (86.9% response rate). of those eligible but who did not respond ( $n=30$ ; 13.1% of all households approached), 140 (77.8%) were unavailable to complete the survey primarily because they were in the fields for the harvest, 30 (16.7%) refused participation, and 10 (5.6%) withdrew after beginning the survey or had incomplete surveys and were dropped from the analysis. Of the respondents who completed the survey, 18 (10.1%) also completed the IDI.



Households were a median of 12.8 km (IQR 10.9, 16.2) from their catchment area health

facility, indicating that the target sample of women living at least 5 km from the health

facility had been reached. The most distant village center was 88.9 km from catchment area health facility; the distribution of households in the sample by distance. Households were generally poor, as 99.7% had no electricity, 99.5% used charcoal or wood as their primary cooking fuel, and 88.1% had earth or sand floors.

Respondents were on average 26.1 (SD 7.0) years old and had completed an average of 6.3 (SD 2.3) years of education. The mean number of pregnancies was 3.9 (SD 2.5) and mean number of births was 3.6 (SD 2.4). Nearly two thirds (64.0%) of women had attended at least three ANC visits during their last pregnancy but 18.6% of the sample still delivered outside of a health facility. The mean age of the index infants was 5.6 months (SD 3.8).

### Characteristics of women by delivery location

Nearly all respondents (98.9% overall) reported they intended to deliver at a health facility (Table 2) and the respondents who participated in the IDIs frequently discussed the value of delivering at a health facility, even among those who did not deliver at a facility themselves.

Mostly due to the problems they may encounter, because situations may differ, the child may come in a different form. And here in the village, we are not so [conversant] with these things, so it's best to go to trained health personnel to help you deliver. And also [there are] complications even after giving birth, so most women try to avoid death in such instances. [Age 29, delivered at home].

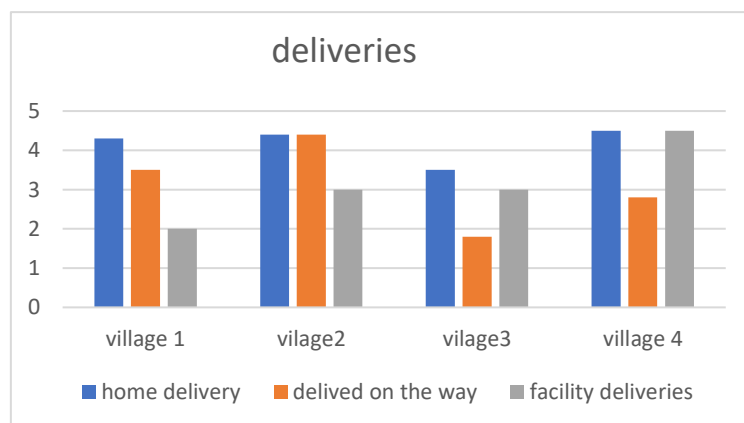
Although only 1% of respondents indicated they intended to deliver at home, 15.3% of respondents actually delivered at home and 3.2% delivered on the way to the health facility. Among those who delivered at home, only 3.6% had intended to deliver at home, compared to 0.4% of those who delivered at a facility. Among those who delivered on the way to the facility, only one respondent (1.3%) had intended to deliver at home.

Village 1 home deliveries 4.3, delivered on the way 3.5% and delivered at the facility 2%.

Village 2 home deliveries 4.4, delivered on the way 4.4% and delivered at the facility 3%.

Village 3 home deliveries 3.3, delivered on the way 1.8% and delivered at the facility 3%.

Village 4 home deliveries 4.5, delivered on the way 2.8% and delivered at the facility 4.5%.



Overall, there were statistically significant independent associations between a woman's age ( $P<0.001$ ), education ( $P=0.007$ ), parity ( $P<0.001$ ), first pregnancy (primigravida) ( $P<0.001$ ), and having attended four or more ANC visits ( $P<0.001$ ), with her place of delivery. There was a significant association between distance from the village center to the health facility and place of delivery ( $P=0.054$ ). Not unexpectedly, the use of an MWH while awaiting delivery was also strongly associated with place

of delivery ( $P<0.001$ ). A higher proportion of those who delivered on the route to a facility was in the lowest wealth index quartile (36.6%) compared to those who delivered at home (25.1%) or at any facility (24.2%), but the relationship was not significant. Of those who delivered at any facility, 53% used a bicycle or walked and for over half, it took between 1 and 3 hours to reach the health facility. SMGL exposure was also significantly associated with delivery location, with 12.3% of respondents in SMGL-



exposed areas and 30.1% of respondents in SMGL-unexposed areas delivering at home ( $P < 0.001$ ) (data not shown).

Of HHS respondents who delivered at home or on the way to a facility ( $n=441$ ), 54.4% reported it was because they had a short labor, and 53.9% cited transport or distance challenges, though respondents could select more than one option. All other responses were reported  $<7\%$  each, including no MWH (6.3%), cost (5.4%), no partner available to escort to the facility (4.9%), no clothes or baby clothes (4.5%), did not know the due date (3.4%), and did not have the delivery supplies required by the clinic (2.7%). The three most frequently discussed themes from the IDI respondents who delivered at home or on the way included distance or no available transport, not having the necessary supplies for the health facility, and cost of transport.

Corroborating the survey findings, IDI respondents articulated that they themselves did not make it to the health facility in time because of a short labor or insufficient time to travel, as illustrated below:

I had actually prepared to go and deliver at the clinic, but then before I could go to the facility, I delivered because it just happened at night. [Age 26, delivered at home].

I followed my usual timetable that if I get sick, like in the evenings, then the following day/morning, then I will deliver. But for this one, I didn't [know that] it would change. Cause when I got sick in the night, only a few hours when I saw that things got worse, that's when we started off and I delivered on the way. [Age 35, delivered en route to a facility].

IDI respondents most frequently mentioned transport availability and distance challenges both when referring to their own experiences and also when speaking about the norms in their communities, as illustrated below:

Yes, it does happen to some people, because sometimes some people get into labor quite quickly and for them to travel from here to go to the clinic, they might find it a bit far. [And in cases] where there is no transport, most people go by bicycle but in cases where they do not have a bicycle or they cannot find transport then they will give birth at home. [Age 32, delivered at home].

Transport is really very difficult. If you do not have, you need to look for transport so that you go to the hospital. If you do not have transport,

you cannot go to [the facility] at all and if you have to start off on foot, that's how we end up delivering along the way and that is – transport has become very difficult like that. [Age 31, delivered at home].

For my most recent child, considering I didn't have transport, and the clinic is quite far away and the time that I was due it was rainy season and there was no available transport to go to the clinic and my labor was not long, I gave birth within an hour. So, I had to give birth at home. [Age 37, delivered at home].

IDI respondents also frequently mentioned the high cost of transport and the cost of supplies that they perceive as required by the facility for delivery as reasons for home delivery:

It's because I did not have transport money and money to buy gloves and then it got too late for me to start looking for the ox cart to take me to the hospital and that's how I delivered. [Age 36, delivered at home].

They do not charge us to give birth at the clinic, but there are times when they give us a list of requirements of things that we need to come with when going to give birth. Things like gloves, JIK [disinfectant], and such. As there are times when certain women aren't able to meet these requirements, and because of that they would choose to give birth at home. [Age 37, delivered at home].

What makes people to deliver at home is because at the clinic, if you do not have all the requirements that is needed for the baby to be born, you cannot be allowed to give birth at the clinic. Even outside, you can end up delivering from outside. So, if there – you see that all the requirements are not there, they won't even attend to you. They won't even put much concern on you. So, people find it hard that they should go to the clinic because of this. [Age 21, delivered at home].

### **Predictors of home delivery among remote women**

After adjusting for confounders, women with a first pregnancy (primigravida) had 60% lower odds of delivering at home compared to women who had previous pregnancies (aOR 0.4, 95% CI: 0.2, 0.6) and women who reported staying at an MWH while awaiting delivery had 90% lower odds of delivery at home (aOR 0.1, 95% CI: 0.1, 0.2); a few women stayed at an MWH and chose to return home before delivery for unknown

reasons (3.6% of women who delivered at home, and 1.3% of women who delivered on the way reported using an MWH for delivery) (Table 3).

Women who were never married were more than twice as likely to have a home delivery compared to married women (aOR 2.1, 95% CI: 1.2, 3.7). Women who did not attend the recommended four or more ANC visits were twice as likely to have a home delivery than women who attended the recommended four ANC visits (aOR 2.0, 95% CI: 1.5, 2.5). Moreover, those living in districts not yet exposed to the SMGL program had significantly increased odds of home delivery (aOR 3.2, 95% CI: 2.3, 4.5). Older women were also 30% more likely to deliver at home (aOR 1.3, 95% CI: 0.9, 1.9).

After adjusting for confounders, having no education ( $P=0.074$ ) or more than primary education ( $P=0.123$ ) was not significantly associated with a reduced odds of home delivery compared to having some primary education, though there was a trend for those with no education toward increased odds of home delivery and those with more than primary toward decreased odds of home delivery.

Lastly, trending, though not statistically significant, women living in villages with village centers between 4.5 km and 5.0 km ( $P=0.068$ ) from the catchment area health facility had reduced odds of delivering at home compared to those living between 5–10 km away (aOR 0.7, 95% CI: 0.4, 1.1), after controlling for confounding variables including age, education, marital status, wealth, primigravida, ANC visits, MWH stay, and SMGL exposure.

## Discussion

This study used mixed methods to explore predictors of home delivery among a representative sample of women living in villages with a village center located more than 5km from their catchment areas' health facilities in rural Zambia. These findings suggest that first-time mothers and women who stayed at an MWH were less likely to deliver at home. Women who were older, never married, did not attend the recommended four or more ANC visits, district was more likely to deliver at home. Qualitatively, the costs associated with reaching the facility, obtaining the necessary supplies to deliver at a facility, and distance or transportation challenges may have contributed to the reasons some women

delivered at home. However, in contrast with other findings, in this study, distance to the health facility was not a predictor of delivery location, though CIs were trending toward significance with those living closer being less likely to deliver at home.

The study sample appears to comprise some of the most vulnerable women living in rural Zambia within the study districts. Compared to the rural population of Zambia in the most recent Demographic and Health Survey (DHS), households in this study were generally worse off, having larger households (7.0 household members in this study compared to 5.4 in the DHS rural population for 2013–2014) and less connection to electricity (99.7% compared to 74%).<sup>6</sup> Additionally, respondents met a community-defined definition of vulnerable in rural Zambia, as those who are poor and live far away.

Less than 1% of women self-reported that they intended to deliver at home, but just over 18% of women in this sample delivered either at home (15.3%) or on the way to a health facility (3.2%). The discordance between intention and practice is consistent with findings from previous studies in sub-Saharan Africa. Researchers in Kenya found that while 96.2% of pregnant women intended to deliver at a health facility, only 76.9% actually did, and a previous study in Zambia found 96% of women stated a preference to deliver at a facility but only 54% actually did. In the findings presented here, insufficient time, transportation challenges, and cost barriers were cited as reasons for delivering at home or on the way to a facility, which is highly consistent with existing literature. Additionally, not having appropriate supplies or not being adequately prepared was a common theme among respondents and has also been observed in Tanzania.

Generally, the findings are consistent with the well-established literature that suggests higher education, younger age, ANC use, and primigravida are drivers for seeking, reaching, and accessing maternal health services in sub-Saharan Africa. Additionally, staying at an MWH was associated with a significantly reduced odds of home delivery. This is not unexpected, as the purpose of an MWH is to put a woman within close proximity to the health facility.

Interestingly, of the women in this study – all of whom reside >5 km away from their catchment

area health facility – only 18% delivered outside of a health facility, compared to 46%, as reported in the most recent DHS. program in the study areas, which appears to have reduced maternal mortality and improved institutional delivery rates. These areas had home delivery rates of 30%, similar to pre-SMGL rates in other districts (37%). Therefore, the low proportion of home deliveries in this study is unlikely to be reflective of the general rural population living in districts which have not been exposed to intensive SMGL activities.

Interestingly, those who lived closest (9.5–10 km) or farthest (>25 km) from their catchment area health facility were less likely to deliver at home than those living in villages with centers 10–14.9 km away. Though not statistically significant, this finding challenges the working assumption that the farther away women live, the less likely they are to deliver at a health facility,<sup>10–14,39</sup> though this sample does not have a reference group of women living close to facilities. We hypothesize three potential reasons for this observation. First, this is possibly related to SMGL activities, specifically the intensive efforts to promote messaging regarding facility delivery through SMAGs and these messages are reaching the women farthest from the facilities, though a trend still remains when adjusting for SMGL exposure. Second, there was a concurrent effort from the government to encourage facility delivery and anecdotal reports that local leadership penalizes home delivery. Lastly, it is possible that those who live nearest can access facilities more readily, and those who are farthest (>25 km) are more acutely aware of the challenges in accessing facilities because of ongoing efforts and are therefore compelled to plan accordingly. Further research is warranted to explore these hypotheses in more depth, including the individual decision-making, proximity of other health facilities that are not the designated catchment facility, and the capacity of health facilities.

### **Limitations**

This study has three key limitations. First, it was a cross-sectional analysis of self-reported behavior from up to 3 months prior to the survey, which limits the ability to predict anything over time and allows for recall bias. However, the mixed quantitative and qualitative methods allowed for triangulation to confirm findings.

Second, study sites were only 4 selected villages districts, though with varying degrees of program implementation at different time-points. Nevertheless, while representative of the study district, the findings may have limited generalizability to other rural districts in Zambia.

Lastly, distance was measured using the geocoded village centers and mapping. While this is an improvement over self-reported distance, households themselves are likely to have ranged in their proximity to the village center and therefore the health facilities.

### **Conclusion**

This study is the first to describe the quantitative and qualitative determinants of home delivery for a population of women living exclusively farthest away from their catchment area's health facility in rural Zambia. These findings highlight the complexities and challenges facing women living in remote areas when it comes to intentions and behaviors regarding delivery location.

Findings elicit opportunities to reduce home deliveries. Interventions and messaging could focus on older women, unmarried women, and on increasing ANC visits and encouraging women to utilize much program. As noted, data for these analyses came from a baseline observation of an MWH intervention that seeks to understand whether MWHs can improve access to facility delivery for remote women. Though not statistically significant, the findings that women living <10 or >25 km from their catchment area health facility could be less likely to deliver at home than those 10–15 km away, require further study, but potentially indicate success of ongoing efforts and an opportunity to better target messaging regarding planning and preparation for delivery.

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