Maternal Mortality in Eastern Zambia: Accessing Healthcare for Delivery and Obstetric Emergencies

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Abstract

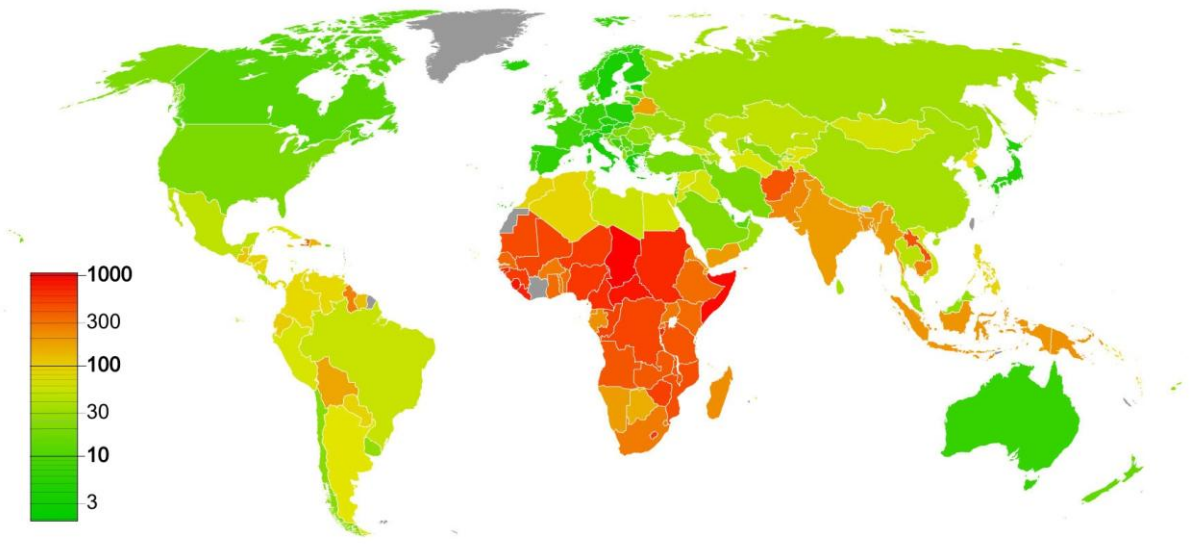
Improving maternal health and survival remains the most elusive of the Millennium Development Goals and the global disparities in maternal mortality are vast, with lifetime risks still in excess of 1 in 10 throughout much of sub-Saharan Africa. The 'three delays model', developed by Thaddeus and Maine (1994), identifies delays in recognising need for care, reaching a care facility and receiving care at the facility as crucial obstacles to improving maternal health outcomes. A new motorcycle ambulance-trailer transport intervention being introduced in Eastern Zambia seeks to address the second delay by improving access to emergency obstetric facilities and clinics.

However, interventions do not always translate into improved outcomes, since healthcare decision-making is a complex process drawing on multiple factors and perspectives. This paper reports on an anthropological study conducted in six villages in the Lundazi District, Zambia, with the aim of situating the intervention within a framework of current attitudes towards transport and use of transport, health-seeking decision-making processes and practices and barriers to service use. Based on in-depth interviews and focus groups with women of reproductive age and their families, combined with participant observation, this paper demonstrates that while poor transport is an important barrier, taking into account the economic and socio-cultural context is also crucial to improved maternal health. This underlines the importance of detailed qualitative research *before* project implementation and the benefits of inter-disciplinary collaboration between engineering and social sciences in improving health in the Global South.

Background

Maternal mortality rates in sub-Saharan Africa (SSA) are the highest in the world. Women have a 1 in 39 lifetime risk of maternal mortality, compared with 1 in 3800 in developed regions (World Health Organisation, 2012), making it the greatest global disparity of any public health measure (Ronsmans & Graham, 2006; Shen & Williamson, 1999). WHO defines maternal mortality as "the death of a woman while pregnant or within 42 days of termination of pregnancy"(World Health Organisation, 2012, p. 14). In 2010, 56% of the 287,000 maternal deaths worldwide were in SSA (World Health Organisation, 2012). MDG5 aims to reduce the maternal mortality ratio (MMR)[1] by 75% from 1990 to 2015 and achieve universal access to reproductive health services (U.N., 2012). Although there has been a 47% global reduction in MMR since 1990, many countries, especially in SSA, will not meet MDG5. These figures pose urgent questions about how best to reduce maternal mortality in the region.

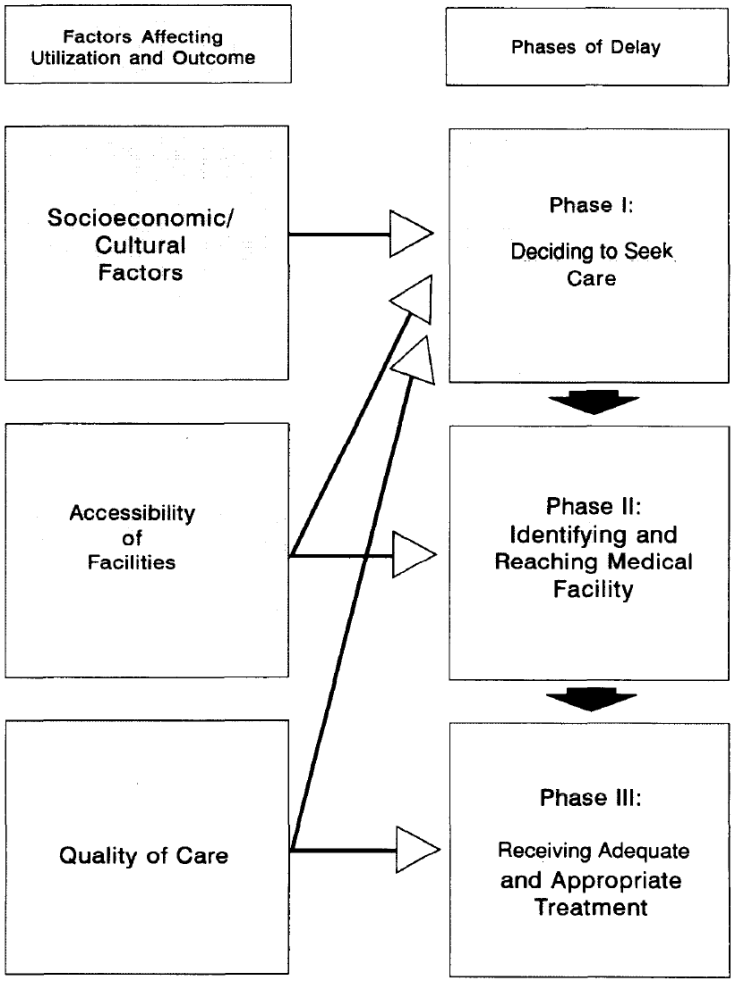
Figure 1: Map of Worldwide Maternal Mortality Rates per 100,000
(Wikimedia Commons, 2012)



[1] Defined as the "global ratio of maternal deaths to live births" (Ronsmans & Graham, 2006, p. 1).

Zambia is one of the least developed countries in the world, ranked 164/187 in the Human Development Index (United Nations Development Programme, 2011). It faces many health challenges, including some of the highest rates of maternal and infant mortality. In Zambia 53% of women deliver at home with no access to skilled attendants (UNICEF, 2012a). Transport is also a major difficulty in rural areas, with fewer than 30% of women living within 15km of an emergency obstetric care facility (Gabrysch, Simushi, & Campbell, 2011). Quality and speed of care also contribute directly to chances of survival (Ronsmans & Graham, 2006). The "three delays model"(Thaddeus & Maine, 1994) suggests a framework to understand the barriers to receiving maternal health services: deciding to attend a healthcare facility, reaching the facility and being treated at the facility.

Figure 2: The Three Delays Model by Thaddeus and Maine



Source: Thaddeus, S. & Maine, D., 1994. Too far to walk: maternal mortality in context. Social Science & Medicine, 38(8), page 1093

Over the last decade increased importance has been given to improving infrastructure and transport links to reduce maternal mortality (Babinard & Roberts, 2006; Goodburn & Campbell, 2001; Sachs et al., 2004; Sub-Saharan Africa Transport Program, 2005). Transport and distance to healthcare facilities directly affect access to emergency and preventative maternal health services. 75% of maternal deaths are from direct causes, such as sepsis, eclampsia (AbouZahr, 2003), and obstetric haemorrhage which is the most common cause of maternal mortality worldwide (Ronsmans & Graham, 2006). Most of these obstetric complications can be prevented by rapid medical attention (Thaddeus & Maine, 1994). However, barriers to accessing healthcare include not only lack of infrastructure, but also absence of emergency transport (Transaid, 2008) and inability to afford transport (Razzak & Kellermann, 2002).

Numerous interventions address maternal access to healthcare facilities. For instance, a novel transport solution in Nigeria created partnerships with local transport owners (Shehu, Ikeh, & Kuna, 1997), demonstrating how health access can be improved before large-scale infrastructure projects have been completed; and in Sierra Leone, a combination of improved communication systems and investment in transport resulted in a 50% decrease in maternal mortality (Razzak & Kellermann, 2002). In rural regions of Africa, organisations have introduced vehicles, including motorcycles, to ensure healthcare delivery independent of terrain (Coleman, Howard, & Jenkinson, 2011). However, analysis of feasibility across regions is difficult as most are individual community-based interventions (Babinard & Roberts, 2006). While accepting that transport, communication and infrastructure all have a role to play, most authors believe that maternal death is a result of an extended sequence of events and delays (Bhutta, Darmstadt, Hasan, & Haws, 2005; Cham, Sundby, & Vangen, 2005; Stekelenburg, Kyanamina, Mukelabai, Wolffers, & van Roosmalen, 2004).

Issues surrounding maternal mortality must be understood within the context of larger societal barriers which constrain agency and cause structural violence (Farmer, 2001; Galtung, 1969). Many papers have demonstrated the impact of economic and political factors on maternal mortality (Gil-González, 2006; Jamisse, Songane, Libombo, Bique, & Faúndes, 2004; C. Janes & Chuluundorj, 2004; Spangler, 2011). Poor infrastructure not only contributes to high MMR, but significantly impedes a country's development and economic

growth (Limao & Venables, 2001; Sachs et al., 2004). Tropical SSA has under 0.1 km per 1000 population of paved roads, as compared with an average of 4.2 in the developing world (Sachs et al., 2004). Therefore uneven distribution of health technology, services (C. R. Janes & Corbett, 2009) and infrastructure continue to perpetuate global imbalances in maternal health.

Women's reproductive experiences and decisions also exist within a complex web of socio-cultural, economic and political issues (Lewis & Kieffer, 1994). Gender inequality and gender-based discrimination mean that women are less able to: access education and healthcare (Porter, 2007), make decisions during emergency obstetric referrals (Pembe et al., 2008) or use family planning and contraception (Wegs, Feyisetan, Alaii, Cheeba, & Mbewe, 2011). Women's low economic status and educational achievements result in a cycle of further discrimination and limited choices. It has been argued that progress towards MDG5 depends on addressing these fundamental socio-economic issues alongside healthcare improvements (Foley, 2007; Inhorn, 2003; C. Janes & Chuluundorj, 2004; Lawoyin, Lawoyin, & Adewole, 2007).

Research Focus and Aims

In 2011 Developing Technologies[2], in partnership with The Africa Community Access Programme and funded by the UK Department for International Development , started a programme to improve rural maternal health care access in Eastern Zambia through the introduction of motorcycle-ambulance trailers (MAT). The programme aims to improve emergency access to health services, particularly for emergency obstetric cases, from rural Tumbuka and Chewa[3] villages. This anthropological study was conducted prior to the MATs' introduction in August 2012.

The overall aim of the study was to understand how the burden of maternal mortality in Zambia could be reduced through increasing access to healthcare facilities. The objectives were:

The objectives of this study were to:

i. Identify current access to healthcare facilities for delivery and obstetric emergencies, including transport and infrastructure challenges.

[2] A UK engineering charity.

[3] Tumbuka and Chewa are the two major ethnic groups in this area of Eastern Zambia.

ii. Explore the interacting factors which affect women's pregnancy and delivery care.

iii. Situate maternal mortality within the ethnographic context of the beliefs and practices relating to health and childbirth.

iv. Understand the impact that transport interventions might have on maternal mortality.

Research Methods and Context

Fieldwork Location and People

Table 1: Zambia Country Statistics (UNICEFa 2012)

Population (2010): 13,089,000
GNI per capita (2010): US$1070
Life expectancy at birth (2010): 49 years
Under-5 mortality rate (2010): 111
Maternal mortality ratio (2008): 470
Estimated adult HIV/AIDS prevalence (2009): 13.5%

Zambia is a sparsely populated, landlocked country in Southern Africa bordered by eight countries including Democratic Republic of Congo, Zimbabwe and Malawi.

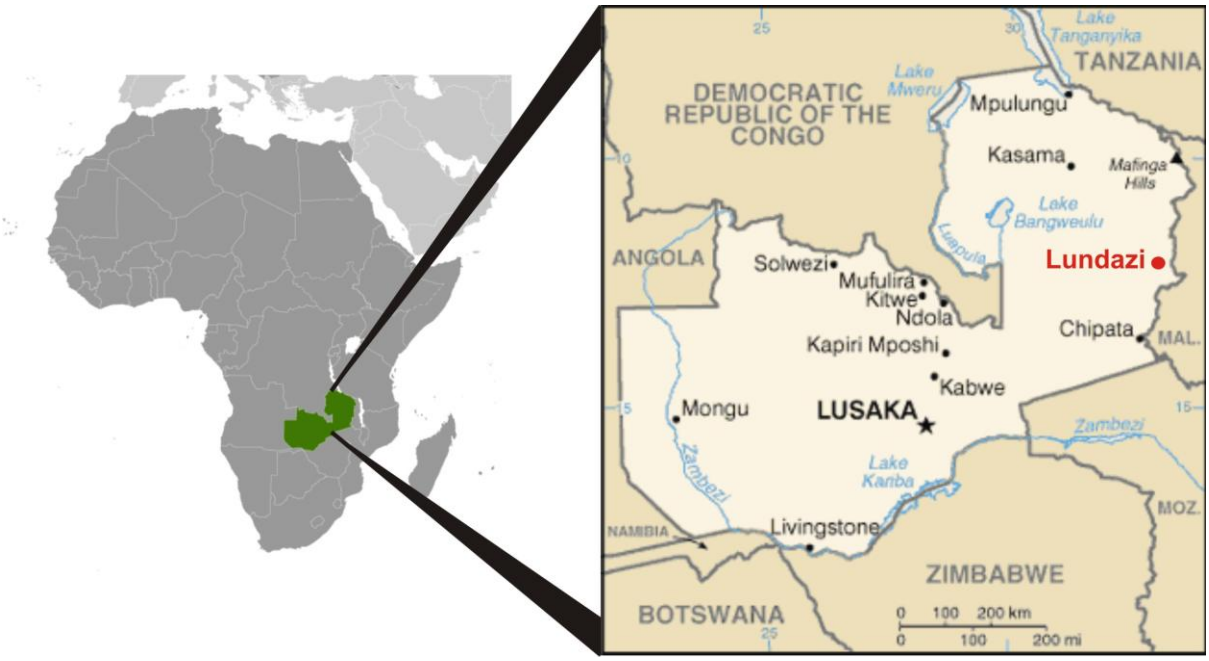


Figure 3: Reference Map of Republic of Zambia
(Edited from the CIA Factbook, Washington DC: Central Intelligence Agency 2009)

The country's population is concentrated around the capital, Lusaka, and the Copperbelt. Fieldwork was conducted in the rural Lundazi District, in Eastern Zambia. Lundazi is isolated from the nearest large town, Chipata, by 170 km of unpaved dirt road. The main tribes in the Lundazi District are Tumbuka, Chewa and Ngoni and the language most commonly spoken is Tumbuka[4]. The land in the area has mostly been cleared of trees for subsistence farming to grow crops such as corn and cotton. The region is prone to flooding and food insecurity, especially in January, the month of highest rainfall. In the villages there is no electricity, running water or waste disposal system.

Research design

i. Site selection

A qualitative anthropological study was conducted for four weeks from June to July 2012, in six Tumbuka and Chewa tribal villages in Mwase-Lundazi and Kanyanga, two rural health areas where the motorcycle ambulances were to be introduced. The villages were chosen to encompass a range of characteristics at different distances from the clinic, with varying populations, modes of transport and accessibility. The six villages chosen were: Malavula, Chikumbe, Chimugondolo, Keyala, Emusa and Mesula. I spent four days living in each of the first three villages and the other three villages were visited on day or overnight trips from the Kanyanga clinic.

[4] Tumbuka is only used as a predominant language by 2.5% of the population in Zambia (Marten & Kula, 2008).

Figure 4: Map of Study Villages in Lundazi District

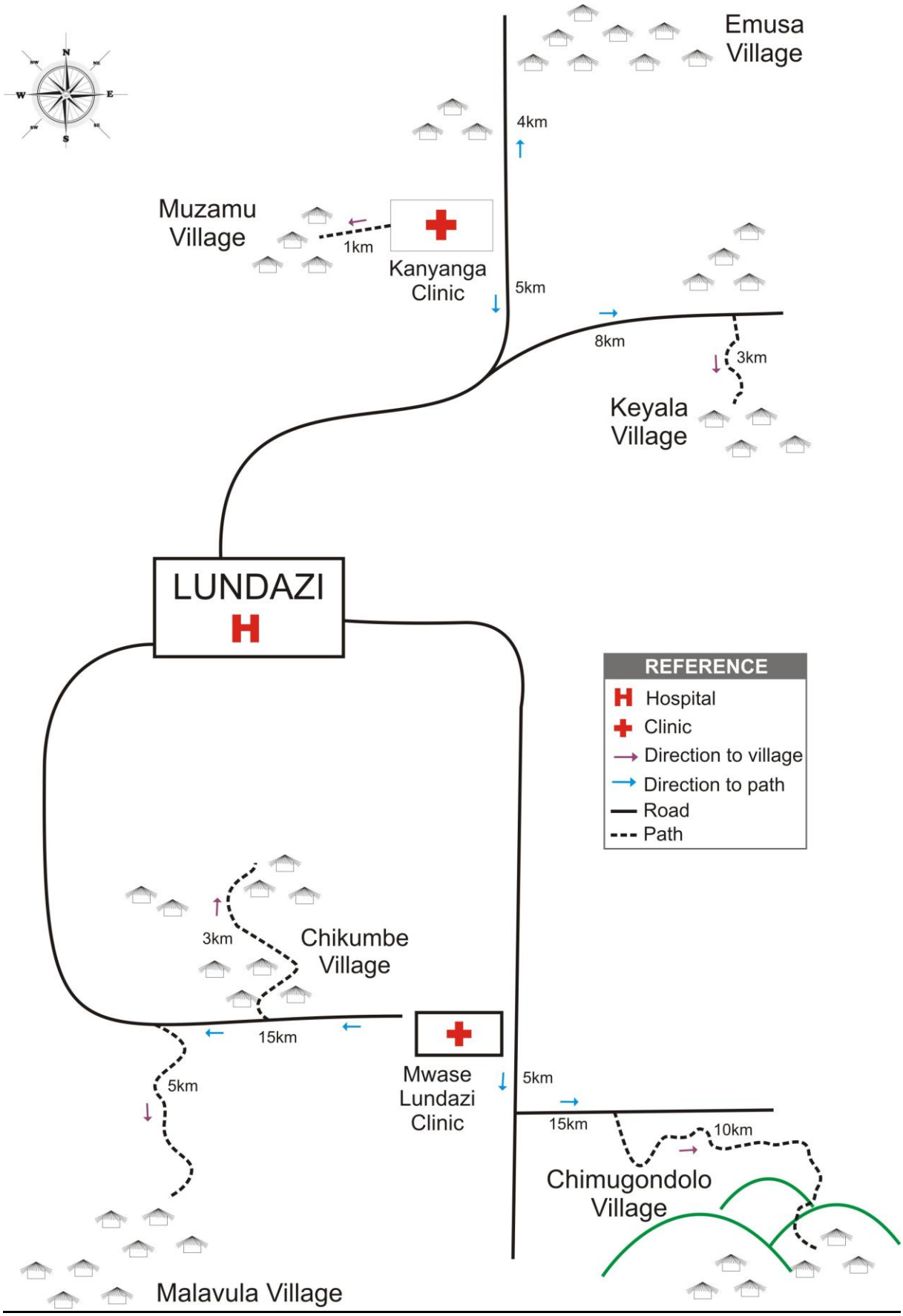


Table 2: Infrastructure and Transport Options in Each Village

Villlage/Clinic	*Transport, infrastructure and communication*
Malavula	20 km from the clinic. Accessible on the unpaved main road and then a narrow path. There was no access to bicycle ambulances. The main forms of transport used to reach the clinic were ox-cart and walking. No method of communication available, apart from one mobile phone which was irregularly charged.
Chikumbe	15 km from the clinic. Accessible on an unpaved main road and then a ten-minute walk. Two bicycle ambulances were based in the village. The main forms of transport used to reach the clinic were bicycle ambulance and walking. Approximately four people had access to mobile phones.
Chimugondolo	30 km from the clinic. Accessible through a narrow mountain path and over a narrow bridge which floods in the rainy season. There was no access to bicycle ambulances. The main forms of transport used to reach the clinic were bicycle and ox-cart. Due to remoteness of the village most women give birth at home. No method of communication, apart from one mobile phone in the neighbouring hamlet.
Keyala	13 km from the clinic. Accessible on the unpaved main road and then along three kilometres of sandy path. There was no access to bicycle ambulances. The main form of transport used to reach the clinic was bicycle. The jeep ambulance sometimes collected women from the village. The community health workers had access to mobile phones (four within the village).
Muzamu	One kilometre from the clinic. Located directly behind the clinic. The bridge over the river between the clinic and village often floods in the rainy season. The only form of transport used to reach the clinic was walking.

Emusa	Four kilometres from the clinic. Located beside the main unpaved road and with some access to vehicles from a small town nearby. The main forms of transport used to reach the clinic were walking, bicycle and vehicle. The community health worker had access to a mobile phone.
Mwase-Lundazi Clinic (Government-run clinic)	Eleven health posts and 20,000 people within the clinic catchment area. Facilities: mother's shelter, women's and men's wards with six beds each, obstetric ward. Approximately 25 to 40 maternal cases were seen each month. The clinic is 31 km from Lundazi District Hospital, along a graded dirt road (approximately one hour by vehicle). The clinic had access to one jeep ambulance.
Kanyanga Clinic (Government clinic run by Catholic Mission)	Six clinics and health posts within the catchment area, serving 25,000 people. Facilities: operating theatre, mother's shelter, women's and men's wards with ten beds each, paediatric ward, obstetric ward. Approximately 70 to 200 maternal cases were seen each month. The clinic is 40 km from Lundazi District Hospital along an ungraded dirt road (one to two hours travel time by vehicle). The clinic had access to one functioning jeep ambulance, the other two ambulances were out of service.
Lundazi District Hospital	150 bed hospital serving a catchment area of 100,000 people. Only two doctors worked at the hospital.

Sample selection and data collection

The first introduction, and offering of foodstuff as gifts, was to the headman to ask his permission to live and carry out research in the village; all the headmen agreed to this. Participant observation was conducted throughout in order to gain a deep understanding of the community (Frey & Fontana, 1994). Participants were recruited through the use of the headman as gatekeepers; they would send a message to the hamlets to inform them of the first focus groups. Subsequently snowball recruitment (Hennink, Hutter, & Bailey, 2011) was utilised to identify women who would be suitable and willing to participate in interviews. A total of twelve focus groups were carried out, one to three in each village and surrounding hamlets. The composition of focus groups has been found to affect interactions (Hennink, 2007; Krueger & Casey, 2009; Morgan, 1997) therefore separate

focus groups were carried out with women of reproductive age and men. While running the first men's focus groups, I found they preferred to talk about sensitive issues with my male partner. Therefore, in the subsequent three, my partner conducted the men's focus groups in a different location to ensure that gender-sensitive issues could be discussed[5]. Through the focus groups I was able to gain insight into the social context of ideas and decisions (Kitzinger, 1994) through collection of "rich experiential data" (Asbury, 1995, p. 414) in a short amount of time (Frey & Fontana, 1994).

Critical incident interviews were conducted with twenty-five women of child-bearing age and past child-bearing age to collect personal narratives (Hennink et al., 2011) and elicit reproductive histories pinpointing key stories regarding use of transport, childbirth or obstetric emergencies. They were based on a semi-structured interview guide. Interviews were also conducted with family members of women of child-bearing age and past child-bearing age, with four community health workers, one nurse and two midwives. I carried out four interviews with my translator on Tumbuka traditions and cultural practices. Notes were taken during most interviews and focus groups; in some larger focus groups I utilised a voice recorder and transcribed afterwards. The data was subsequently coded and analysed; while analysing the data I was aware of the importance of self-censorship and maintaining the integrity of the respondents viewpoint (Fontana & Prokos, 2007). Using three different methods of collecting data ensured triangulation of methods (Johnson, 1997) and enabled me to gain a greater objective and subjective understanding of the community. Ethical approval was granted from the Durham University Anthropology Department before the project commenced. All participants were informed of details of the study before research started and verbal consent was gained from everyone involved.

Village life

Tumbuka society is a polygamous, socio-centric one and there are larger community social structures which limit society members to particular roles. Therefore each individual member of the community must carry out work every day to provide food for the extended family by working in the fields. There is little notion of separate units of the community and

[5] These focus groups were voice recorded so that I was able to analyse the data afterwards.

all families support each other in fulfilling daily roles. Power relations, roles and divisions of labour are defined by gender; the separation of women and men is at the centre of daily life. A woman's worth within society is defined by the amount of physical work that she is able to do. The ideal is to have many children in order to able to expand the influence of one's family and village. If a woman is not fulfilling her role of being a good wife, which includes being hard working, looking after her husband well and providing her husband with children, there will be repercussions; for example her husband may take a new wife.

Transport and clinic access

Modes and use of transport

The following table summarizes views relating to transport during pregnancy, expressed in almost every interview and focus group in each village. There was little variety in perspectives on these topics and villagers of all ages and genders agreed on the main points.

Table 3: Transport Modes and Use

Mode of transport	**Advantages**	**Disadvantages**
Walking	*Reliability:* Walking was deemed to be more reliable than other modes of transport. *Expense:* There is no expense incurred. *Infrastructure:* It is possible to walk on any path or road, regardless of condition of the road.	*Speed:* It takes a long time for women to reach the clinic, especially when they are heavily pregnant or in labour. *Comfort:* It can be uncomfortable and difficult for women to walk such long distances when they are often already in labour.
Bicycles *Owned by individual families and used mainly by men or boys to do*	*Expense:* Some families own their own bicycle. *Speed:* It is quicker to reach the clinic on a bicycle than by walking. *Infrastructure:* It is possible to use a bicycle on most roads and paths, although there may be some paths	*Comfort:* The surface of the roads are uneven and the pregnant woman will be sitting sideways on the back of the bike so it can be uncomfortable and difficult for her to sit for such a long time. Women find they are unable to use the bicycle effectively once they are in

chores in nearby villages.	which are too narrow or rocky.	labour. *Rider:* Someone needs to be free to ride the bike, this will usually be the woman's husband but they may need to wait until he returns from the field. *Reliability:* Bicycles regularly get punctures on the rocky paths and roads between the villages.
Ox-carts *Owned by individual families and used on a day to day basis in the fields, for example to collect corn.*	*Comfort:* Women are at least able to sit down in the back of the ox-cart.	*Expense*: The cost of borrowing an ox-cart if your family does not own one can be 5,000 to 10,000 Kwachas (70p to £1.40). *Comfort:* The surfaces of the roads are uneven and there are no mattresses for the woman to lie on in the cart therefore it can be uncomfortable. *Speed:* The ox-carts are slow and therefore may not be suitable if the woman is already in labour; from many of the more remote villages it can take four to five hours to reach the clinic in an ox-cart. *Reliability:* The ox can be uncooperative and it may take longer to get to the clinic than expected. *Availability:* The ox-cart will often be in use in the field and therefore will have to be brought back to the village, taking valuable time. *Infrastructure:* Although it is possible to use an ox-cart on most roads and paths there may be some paths which an ox-cart cannot travel. During the rainy season bridges and paths may be impassable.

<u>Jeep ambulances and vehicles</u> *Jeep ambulances are based at the clinics. Vehicles may sometimes be found in some slightly larger towns nearby.*	*Speed:* This can be the fastest mode of transport, depending on the condition of the roads. *Comfort:* This is the most comfortable of all modes of transport. *Reliability:* Vehicles and jeep ambulances are usually reliable, and should reach the clinic. *Availability of vehicles:* Although families in the villages do not own cars, there are taxi drivers who work in the towns where the clinics are based. However, they often cannot reach some of the most remote villages, so this may not always be an option.	*Expense:* These are the most expensive modes of transport. • To book a vehicle from a village 5 km away it will usually cost 30,000 Kwachas (£4.16). • The cost of using the ambulance in the Kanyanga district is 60,000 (£8.32) Kwacha per journey if you have not been referred from a health-post. Therefore most women who are going for delivery will have to pay the full fee, even if it is an emergency case. *Communication:* With little access to mobile phones it may be difficult for most villagers to book a vehicle or contact the jeep ambulance. *Infrastructure:* Roads and paths may not be wide enough or in sufficiently good condition for a vehicle to pass. Fuel, oil and breakdowns can always cause difficulties and in the rainy season paths and bridges may be impassable. *Availability of jeep ambulances:* Each clinic has access to only one or two jeep ambulances and they have to serve a large catchment area. It therefore might not always be free when initially called.
<u>Bicycle ambulances</u> *Donated recently by NGOs to some of the villages and entrusted to one of the community health works*	*Expense:* There is no expense incurred by the women using the bicycle ambulances. *Speed*: These are quicker than walking and ox-carts. Additionally they are quicker than normal bicycles as now the woman are lying in a trailer at the back, rather than sitting sideways. *Comfort*: Women lie on a stretcher in a	*Availability:* There is one bicycle ambulance in some villages in each catchment area. *Reliability:* Bicycles can sometimes get punctures on the rocky roads and during the rainy season paths and bridges may be impassable. *Infrastructure:* The bicycle ambulances have been designed to work on paths

who is then in charge of collecting any maternity cases and bringing them to the local clinic.	trailer behind the bicycle; this is therefore more comfortable than other modes of transport. *Availability:* The rider is a trained volunteer so is usually available. However, they may already be collecting another woman or working in the fields so it may take some time to reach the woman. *Communication:* The bicycle ambulances and riders are based in the villages so it is easier for women to contact them.	and roads which are uneven but may not be able to reach all hamlets.
<u>Motorcycle ambulances</u> *Two motorcycle ambulances were introduced to the Mwase-Lundazi and Kanyanga clinic areas in August 2012. These views were therefore expressed before introduction of the MATs.*	*Reliability:* The drivers are fully trained so will be able to repair any breakdowns. However, during the rainy season paths and bridges may be impassable *Expense:* There is no expense incurred by the woman. *Speed:* This is one of the fastest modes of transport, and may even be faster than a vehicle as it can drive down smaller paths. *Comfort:* This should be one of the most comfortable modes of transport for the women, as there is a trailer at the back of the motorcycle with a stretcher inside. *Rider:* Riders have been specifically trained for the job.	*Communication:* Villagers often do not have mobiles to be able to communicate with the motorcycle ambulance. *Availability:* There is only one motorcycle ambulance for each clinic catchment area so it may not be available to collect each patient. *Infrastructure:* The roads and paths are often very uneven and this may be unsuitable, or even dangerous, for the motorcycle ambulance, making some of the villages inaccessible.

Most villages only have access to a couple of modes of transport and many women must still walk between one to forty kilometres to reach the clinic. If women do have a choice of which transport to use, their comfort, speed and reliability are key factors in

decision-making. For example, many women commented on the disadvantages of going by bicycle or ox-cart when they are pregnant:

> *"Bikes are not good as they are bumpy and uncomfortable. In pregnancy women can't sit for a long time on a bike." (WFG, ten women, 16km)*

> *"Most people walk to the clinic, but it is very far. Ox-carts and bicycles are not very effective for pregnant women and are risky to use in pregnancy because there are lots of bumps and breakdowns." (WFG, eighteen women, 30km)*

Although many women were unable to choose the fastest forms of transport due to cost and availability, speed was seen as an important factor:

> *"The bicycle is better than the ox-cart because it is faster. By ox-cart the child might even die because you give birth on the way." (WFG, ten women, 16km)*

The bicycle ambulances, which have been recently introduced into some villages, were mainly viewed positively by both men and women:

> *"The bike-ambulance is more comfortable than a bicycle" (Interview, 26y woman)*

However, most villagers also thought there were too few of them:

> *"There are too few bicycle-ambulances, as many people are pregnant at the same time. It would be better with two or three bicycle-ambulances and maybe another form of transport apart from bicycles." (MFG[6], 15 men, 20km)*

Transport, infrastructure and communication

Access to clinics is hampered by poor transport, infrastructure and communication and current cultural and health-related practices will be vital in decision-making processes about whether to visit the clinic. The following case study, from an interview, summarises some of the main barriers women faced in reaching the clinic, in particular cost, distance, poor infrastructure and reliability of transport.

[6] Men's focus group.

CASE STUDY 1 – TRANSPORT TO THE CLINIC

Mrs Nyambambu was a fifty-five-year-old from a remote village who delivered seven children at home, four of whom are still alive. Her five grandchildren were all born at home with the help of a TBA. "Giving birth at home is better because of transport costs and lack of transport, but now we have to pay if we don't give birth at the clinic. The ox-cart is the only transport available. Other transport such as bicycles cannot reach here. You have to hire the ox-cart for 10,000 to 20,000 Kwachas (£1.40 to £2.80) to reach the clinic. It takes about three hours to get there. So people here don't trouble themselves to go to the clinic as it is a long way, it is better to have bed rest at home. If there are complications at home women contact people who know about traditional medicine in the area. If the transport was better women would prefer to use the clinic. It is a very big health problem that the villagers cannot reach the clinic. It would be best to have a vehicle for going to the clinic, but the road network is poor and it would be difficult with fuel and oil. If the bridge was better maybe a bicycle ambulance could reach. But you can never trust a bicycle. I am asthmatic and last week I was admitted to the clinic. I tried to go to the clinic earlier but the bicycle I travelled on had a puncture so I had to stay at home with the asthma attack for two days. Bicycles are not reliable transport."

This echoes the views held by many women in each village: that there was little point trying to reach the clinic, due to numerous barriers. Women in a focus group 16 kilometres from the clinic typified this perspective, saying:

> *"The reliability of transport is really bad. Sometimes we give up hope." (WFG, ten women, 16km)*

Many women mentioned lack of transport as the key barrier to delivering at the clinic; for example one woman who delivered her last child at home said:

"If the transport was better I would deliver from there [the clinic]" (Interview, 30y woman, 30 km)[7]

One woman even went as far as saying that in her village:

"The main cause of death is lack of transport" (Interview, 40y woman, 30km)

Cost was the primary limiting factor in accessing the clinic in many villages, particularly those closer to roads. At one of the clinics, the jeep-ambulances operated a system of selective charging where they did not charge for any referral cases from health-posts, but did charge to pick up directly from villages. The charge was 60,000 Kwachas (£8.30) for one way transport, even in health or obstetric emergencies.

Many women found the cost of transport prohibitive:

"My husband supports delivering at home to avoid transport costs" (Interview, 20y woman, 30 km)

All women felt they could not afford jeep ambulance transfer. Families therefore had to prioritise to decide whether they felt the woman actually had to visit the clinic.

Poor infrastructure and communication were also major barriers to clinic access. Villages furthest from the main road faced the most obstacles, but even villagers closer to the clinic could have difficulty:

"In the rainy season we cannot cross over to the clinic and we have to come back. There is no way of getting over the river." (WFG, eight women, 1km)

The condition of the roads made it particularly difficult to reach the clinic by bicycle or ox-cart and most villagers felt that this not only increased the discomfort, but also lengthened the journey and meant women were more likely to deliver by the road. Even if villagers have access to adequate infrastructure and transport, one of the impediments was lack of communication. None of the villages had electricity and frequently no one owned a mobile phone and struggled to arrange appropriate transport. One participant commented:

"The biggest problem is not being able to contact or call transport". (WFG, 30km)

[7] This woman had had five children all delivered at home, apart from one who was delivered whilst travelling to the clinic.

Clinic and Pregnancy Perceptions

Most women felt worried during pregnancy because they perceived it as dangerous. They were aware that complications can occur and had heard of maternal death in surrounding villages. There were also perceptions about poor treatment and high mortality at the clinic. Some women expressed concern about the lack of staff and supplies:

> *"The operations in the hospital [caesarean sections] are very risky and dangerous… often the baby dies. The electricity can go off during the operation and also there are too few doctors, so you are always waiting for the doctor." (Interview, 38y woman, 30km)*

> *"It would be very good if there was more transport and staff at the clinic. The clinic is a problem because we travel far and then there is no staff. Therefore we prefer to use traditional medicine." (WFG, twenty women, 15km)*

There were also various stories about women being treated badly at the clinic due to discrimination:

> *"The nurses at the clinic can be stern with patients, or rude to people from the village. This can prevent women from going to the clinic, and they may prefer to give birth at home." (Interview, 28y woman, 30 km)*

All of these factors may dissuade women from visiting the clinic, and present an additional barrier to the existing lack of transport and infrastructure.

A reoccurring theme was the distance from the village to the clinic, with everyone commenting that the clinic was very far away and difficult to reach. This perception did not vary according to actual distance, as women who were only one kilometre from the clinic expressed the same opinions as those thirty kilometres away:

> *"Walking to the clinic is a bit far. Many deliver on the way." (WFG, 1km)*

Equally, there were always women in every village who reported delivering by the road on the way to the clinic (irrespective of distance):

> *"The clinic is very far away. Most people deliver on the way." (Mixed FG, 15km)*

Midwives at the clinics confirmed that this was a very frequent occurrence.

One reason women may deliver on the way was because of leaving the decision to visit the clinic until the last moment:

> *"We don't go before to wait at the clinic because it is difficult to leave family and children. So we go immediately we feel labour pains." (WFG, twenty women, 20km)*

Women may also perceive the clinic as further away than it actually is because their daily mobility is limited. Although most women went to the clinic when they felt labour starting, some delayed until it was too late:

> *"I delivered all my children at home. The clinic was a bit far, by the time I was saying we should go to the clinic I was already delivering." (Interview, 35y woman, 15 km)*

Delays in going to the clinic, transport, cost barriers and decision-making are all demonstrated by the following case study:

CASE STUDY 2 – DECISION-MAKING

Mrs Nyachirwa was a thirty-five-year-old woman from a village twenty miles from the clinic. She had married into the village when she was fifteen and had six children and three previous miscarriages. Four of her children were delivered at the clinic and two at home, because she delayed going to the clinic. In her second pregnancy she had an obstructed labour and after ten hours of labour went to the clinic. She always travels to the clinic by foot, which takes an hour and a half, and decides to go when she feels labour starting. When she travels to the clinic for delivery, she goes with her mother-in-law and husband and has to leave her children at home alone. "That is why I only go as soon as labour starts. If I had someone to leave the children with I would go earlier to wait there." She thinks the distance to the clinic is very far but that it is important to go to the clinic so they can check the labour is going well and look after any complications. She does not know how many more children she will have. She would like to stop having children but needs permission from her husband, and he does not want to stop and does not want to use contraceptives.

Discussion

In Eastern Zambia women's ability to access healthcare is restricted by a variety of social, cultural, economic and political factors.

Gender Inequality and Society

Both societal structure and cultural beliefs influence women's decision-making and access to healthcare facilities. Just as Good has argued that illness is linked to "underlying social relations or relations of power" (Good, 1990, p. 57), pregnancy perceptions and experience will also relate to these (Foley 2007). Women's social identity and power-relations are determined by their roles in the patrilineal society. Women in this respect are unequal to men, who are viewed as the heads of the family and community and hold power in decision-making. Therefore when considering women's decision-making during pregnancy, gender inequality can be seen to lead to reduced agency (Farmer, 2001).

During pregnancy and labour, time and freedom to present at the clinic are of utmost importance. There may therefore be friction between a woman's gender role within the community and the autonomous role that she needs to take on in order to protect her health. Without support from her husband or other community members, women may struggle to break out of their everyday roles in order to be able to visit the clinic, and will often prioritise the immediate need to provide enough food for their families over reaching the clinic. As has been noted in other contexts, women often prioritise the health and nutrition of their family over their own (Lewis & Kieffer, 1994).

This is particularly evident if we look at the broader context in which these villages are placed. Surviving on subsistence farming and with no other sources of income, they have little money circulating and are also dependent on rainfall and crops which may vary each year. There is no guarantee of adequate food for the year, and every year the region experiences shortages in staple foods. With no waste disposal systems, infectious diseases, and especially diarrhoeal disease, are particularly common and this reduces productivity (United Nations Secretary-General, 2010) and leads to high rates of infant mortality. The villagers' logic is therefore understandable: they need to have bigger families so that if some of the children die, they will still have enough children to help them on the land. These

harm reduction strategies have been demonstrated to exist in all cultures (Nichter, 2003). Conversely, this results in more pregnancies and deliveries and leads to an increased likelihood of complications and death. Women in Eastern Zambia are therefore born into circumstances which constrain agency and mean they are at high risk of dying in pregnancy or labour.

Local Perceptions and Community Structures

Local perceptions towards mobility and the clinic play a role in women's decision-making about when and how to present to the clinic, if at all. However, these secondary factors exist upon a base of gender inequality and societal expectations. An understanding and appreciation of villagers' social worlds, traditions and culture will aid in developing culturally-sensitive health and transport interventions, whilst addressing the individual needs of the communities. Working with local people to identify their needs and implement relevant programmes, using existing community structures, would ensure the sustainability of any long-term health gains (Costello, Azad, & Barnett, 2006). Additionally, working with local communities should reduce the power-differentials which are often created when organisations "carry out" interventions or research "for" the local people. Not only can this impede collaboration, but also issues of consent may surface, where locals feel obliged to take part in the study or intervention. Community elders, herbalists and husbands already play a large role in any women's experience of pregnancy in the village. Rather than marginalising and isolating them through implementation of clinical or public health interventions without discussion, they should be consulted and active participation encouraged (Lawoyin et al., 2007; Pembe et al., 2008). The definition of community in each village and how the characteristics of community relate to health should also be considered, in order to effectively implement health interventions (Wayland & Crowder, 2002). By using the existing community health network, interventions will in the process gain a larger and more disseminated informal healthcare workforce already based in the community. Therefore, it is essential to work *with* rather than against the existing community structures and pregnancy perceptions.

Health and Access Inequalities

Economic factors at government level lead to poor infrastructure, road quality and road distribution at district-level and have direct trickle-down effects at clinic-level. Infrastructure in Eastern Zambia limits possible improvements in maternal health. Even within Eastern Zambia there are access inequities, with the six villages visited all exhibiting varying degrees of access. Each villager therefore faces unique difficulties in reaching the clinic, in terms of road quality or access to transport and communication. One of the major challenges is improving access universally as well as responding to the unique access challenges faced in each individual village. During pregnancy and labour, when women may experience life-threatening complications, rapid transfers from village to clinic are essential. Introduction of affordable and appropriate modes of transport may help to address this. Understanding health infrastructure in the area is also vital. Health posts, clinics and hospitals in Eastern Zambia, as in other countries in Africa (Mogobe, Tshiamo, & Boweloc, 2007), function with extremely low levels of funding and therefore staff (Gabrysch et al., 2011), supplies, medicines and ambulances. Women's use of the clinic and transport choices will be affected by these factors, creating additional economic barriers to receiving healthcare, in conjunction with the existing physical access barriers. This highlights the difficulties in service provision in these remote areas where healthcare services are over-stretched and under-funded.

Poor Infrastructure and Cost

Communities in the area are dependent on subsistence farming and women trying to reach the clinic in time for delivery are restricted by the expense of transport. The constraint of cost in use of transport has been demonstrated in other research in Africa (Pembe et al., 2008; Shehu et al., 1997). These limitations are universal across Eastern Zambia. However, as noted in previous chapters, villages were affected by different factors to varying extents. For example, women living in more remote villages had their agency constrained most by the lack of infrastructure, roads and communication; while in villages with access to slightly more infrastructure, women were constrained most by cost, both of transport and staying at the clinic. Decisions to access healthcare for women in both circumstances are therefore not based on free choice, as these were often the last in a chain

of multiple factors which constrained their agency. In villages constrained most by infrastructure or cost there therefore exists, by Paul Farmer's definition, a "differential political economy of risk" (Farmer, 2001, p.79). Gradations of poverty and varied distribution of risk for maternal mortality between villages have been created through unequal access and unequal provision of access opportunities. For example, the most remote areas have the least access to bicycle or jeep ambulances, so with fewer transport opportunities, fewer women will present to the clinic for delivery, antenatal or postnatal care and there are more likely to be complications and higher maternal mortality.

Differential risk created by variations in access can be seen using the example of one remote village where the only available transport was an ox-cart or walking while, twenty minutes away, the next village was situated closer to a road and the path leading through the village towards it was wider and more navigable. It was easier for women from this village to reach a rural health-post from which they could be referred via ambulance to the health clinic, and because they had been referred, the ambulance was free of charge. Villagers who were more impoverished were therefore disadvantaged most by the current situation: those living in remote villages with no roads or transport could not reach a clinic or a rural health-post, were therefore not entitled to free transfers and could not afford to pay the fee for the ambulance to collect them from the villages. Therefore, improving transport and access is only one aspect of larger economic challenges and it is vital to carry out qualitative research *before* implementation of any health intervention in order to understand these issues fully.

Figure 5: Recommendations

Carry out ethnographic research to:

- Understand and appreciate social contexts, local perceptions and individual needs of the communities.
- Work with local people to identify needs and implement relevant programmes, instigated and run by them to ensure long-term sustainability.
- Appreciate the diversity of traditional beliefs and practices and differentiate between harmful and harmless practices.

Carry out qualitative research before implementation of transport health projects to:

- Understand and respond to the unique infrastructure challenges faced in each village.
- Improve access universally across all villages in the region.
- Prioritise transport resources.

Implement sustainable interventions through:

- Involving existing community structures and community members.
- Collaboration between traditional knowledge and biomedicine
- Implementing efficient referral systems through local structures.

Conclusions

Social, cultural, economic and political factors in Zambia restrict women's access to healthcare facilities and result in delays at all levels of the three delay model (Thaddeus & Maine, 1994): in deciding to attend a healthcare facility, reaching the facility and being treated at the facility. The decision to attend a healthcare facility is strongly influenced by the cultural context, not only attitudes towards childbirth and pregnancy, but also local beliefs and practices and perceptions of clinic and transport. It is important to understand each aspect of women's experiences and decision-making during pregnancy. However, these individual factors and circumstances should be understood within the broader context of the structural forces which may constrain women's agency: for example, inequality and poverty, or women's social identity as defined by power-relations and gender-roles within a patrilineal society. In reaching and being treated at a healthcare facility, women also encounter broader economic constraints, affecting not only transport and access to the clinic, but treatment experience at the clinic. Therefore to understand women's decisions to access clinics, both broad societal issues and local, individual factors must be considered.

Reaching healthcare facilities is challenging in Eastern Zambia due to poor infrastructure and roads, limited transport resources, high cost of transport and lack of communication. Gradations of poverty and varied distribution of risk for maternal mortality between villages have been created through unequal health access and unequal provision of access opportunities. Improving transport and health infrastructure in Eastern Zambia to achieve universal access to healthcare facilities is therefore of the utmost importance in reducing maternal mortality. Whilst this approach is vital to improve maternal health in the long-term, options to improve the present situation, such as the introduction of affordable and appropriate modes of transport to facilitate rapid transfers to the clinic, should also be considered. Qualitative research should be carried out before implementation of any transport health intervention in order to understand the unique infrastructure challenges faced in each village, how to achieve universal access across all villages in the region and the best way to prioritise transport resources.

Maternal mortality shows the greatest global disparity of any public health measure (Ronsmans & Graham, 2006; Shen & Williamson, 1999) and worldwide progress in reaching

MDG5 is slow (U.N., 2012). Maternal mortality cannot be addressed with uniform approaches between countries or within countries; each intervention must be context-specific. By applying both an in-depth ethnographic and qualitative perspective to any public health intervention, maternal mortality and lack of access to healthcare may be addressed in a more sustainable way. Further inter-disciplinary collaboration between engineering and social sciences is therefore necessary in order to improve health in the Global South.

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