

ORIGINAL ARTICLE

Reviewing maternal mortality in rural Ethiopia: using the verbal autopsy approach

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Background: Maternal mortality and morbidity in Ethiopia are among the highest in the world and stem from a range of socio-economic, political and demographic factors. Verbal autopsy is one approach used to review maternal deaths in settings where hospital-based audits and confidential enquires are not possible.

Objectives: This study aimed at analyzing the cultural, social, economic, behavioral and biological factors that influence maternal mortality in Ethiopia.

Methods: In this study, verbal autopsies were employed as part of a larger community-based safe motherhood study which gathered qualitative data from communities distributed across Ethiopia's eleven regions in 2005. Following discussions with community members about recent maternal deaths, researchers contacted the families and requested an interview with them. In total seventeen verbal autopsies on maternal deaths were carried out. Verbal autopsy is a method used to record events leading up to the cause of death. It is widely used in countries where vital registration and death certification systems are weak and most women die at home without medical certification of the cause of death.

Results: Of the seventeen verbal autopsies, seven were recorded from Southern Nationalities Nations and Peoples Region (SNNPR); four were recorded from Tigray and three from both Oromiya and Amhara Regions. Ages of women who died ranged from 20 to 49. All women except one were married. Just over half of the women (nine) attended antenatal care (ANC) in a health facility and perceived that because there were no problems during pregnancy, they could deliver at home. The remaining seven did not attend any health care during pregnancy. Most women (12) gave birth at home; three on the way to the facility, two in the facility (although one failed to deliver before she died). Sixteen out of the 17 women who died started labour at home, and the delivery was initially attended by female relatives or traditional birth attendants (TBAs). Half of the women (9) were delivered by a relative, six by a TBA and two by a nurse midwife. Eight of the women who died were said to have been in poor health prior to delivery. Majority of women were multiparous: six women had six pregnancies, and four women had 3-5 pregnancies. Two were giving birth to their second child. Only two young women died as a result of their first pregnancy. Five of the women died almost immediately after giving birth.

Conclusion: Although these verbal autopsies failed to identify the specific medical causes of maternal deaths, they clearly showed that women continue to have limited access to emergency obstetric care (EMOC). Single solutions such as the promotion of ANC and use of TBAs have not resulted in reductions in maternal mortality. Although the Health Extension Program is underway more is required to save mother's lives such as ensuring skilled birth attendance and swift referral for EmOC services to achieve better results for mothers and newborns in the country.

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Introduction

Maternal and neonatal morbidity and mortality rates in Ethiopia are among the highest in the world and stem from a range of socio-economic, political and demographic factors. Many of these deaths are preventable, and the technology necessary is available and not expensive. In 2000 less than 30 % of women attended antenatal care (ANC) and less than 10% delivered with a skilled attendant or in a health facility (1). In the same report, out of the expected 2.9 million deliveries a year, 2.6 million are likely to occur at home with assistance of traditional birth attendants (TBAs) (26%), relatives (58%), or alone (6%). Only 3.5 % of these women receive any postnatal care. Maternal mortality in Ethiopia (between 1999 and 2005) is estimated at 720 per 100,000 live births (2).

The burden of maternal mortality frequently falls on the rural poor who have many hurdles to overcome to access timely care: lack of transport infrastructure, distance to health facilities, misinformation on available services, perceived negative attitudes of health providers, lack of basic services and lack of adequate means to pay for either transport or the services at the point of care. In addition there is a pervading belief in divine intervention as well as reliance on traditional measures and remedies.

As a signatory to the Program of Action of the 1994 International Conference on Population and Development (ICPD), the Government of Ethiopia is committed to improving the reproductive health (RH) status of women, men and young people in the country. The National RH Strategy built on a number of notable initiatives undertaken to serve the health needs of all Ethiopians (3). Included among these is the 1993-health policy, which was followed by the formulation of a comprehensive Health Sector Development Program (HSDP) in 1998, and the recent 2005 Health Extension Program (HEP) (4, 5, 6).

The HEP is an innovative community-based approach directed at creating a healthy environment by introducing a health extension service: strengthened primary health care services across the country, (an outreach programme with the deployment of health extension workers and community promotion programme) with referral to health centers and hospitals. In 2005 although the political commitment was there at policy level, the HEP was yet to take place on the ground in the rural hard to reach areas. Until all maternal deaths are recorded accurately and death certificates include a section on whether a woman of reproductive age was pregnant within the six weeks prior to her dying, it is impossible to know the full magnitude of maternal mortality. Therefore a number of methodologies have been developed to estimate how many women die in childbirth as well as finding out the causes leading up to the event. Verbal autopsy is a method of ascertaining probable causes of a death based on an interview with primary caregivers about the signs, symptoms and circumstances preceding that death (7). Verbal autopsies or 'community-based case reviews' of events leading up to a death are widely used in countries where vital registration and death certification is weak and most women die at home without medical certification of the cause of death (8). It is one of the options to review maternal deaths in settings where hospital-based audits and confidential enquiries are also not possible.

In 2004 WHO launched 'Beyond the Numbers- Reviewing maternal deaths and complications to make pregnancy safer' in Nairobi, Kenya in an attempt to raise awareness of the plight of women during pregnancy and childbirth (9). Maternal mortality rates and ratios hide the individual stories and heart break of families of a woman who dies in childbirth. 'Beyond the Numbers' provides guidelines for countries and programs to assess the extent of maternal death and severe morbidity in different settings.

The five most common types of assessment are: facility based maternal death reviews; confidential enquiries into maternal deaths, reviewing severe maternal morbidity; clinical audit and verbal autopsy. 'Beyond the Numbers' provides proven examples of questionnaires and tools for each assessment that can be adapted. The questionnaire used for this study is based on the verbal autopsy tool (9).

The main objectives of maternal verbal autopsy are to: identify deaths that have occurred in pregnant or recently delivered women; provide broad categories of causes of maternal death; understand the factors that may have contributed to the deaths; describe the background characteristics of women who died: age, parity, education, other social variables; and offer a tool to be used to remove obstacles to high quality obstetric care for all pregnant women.

The verbal autopsy involves interviewing people who are knowledgeable about the events leading up to the death and include family members, neighbours and TBAs (9). This study employs verbal autopsies as a method to elicit the contextual, intermediate and proximate outcomes of maternal deaths secondary to complications of pregnancy and childbirth in four major regions of the country.

Methods and Materials

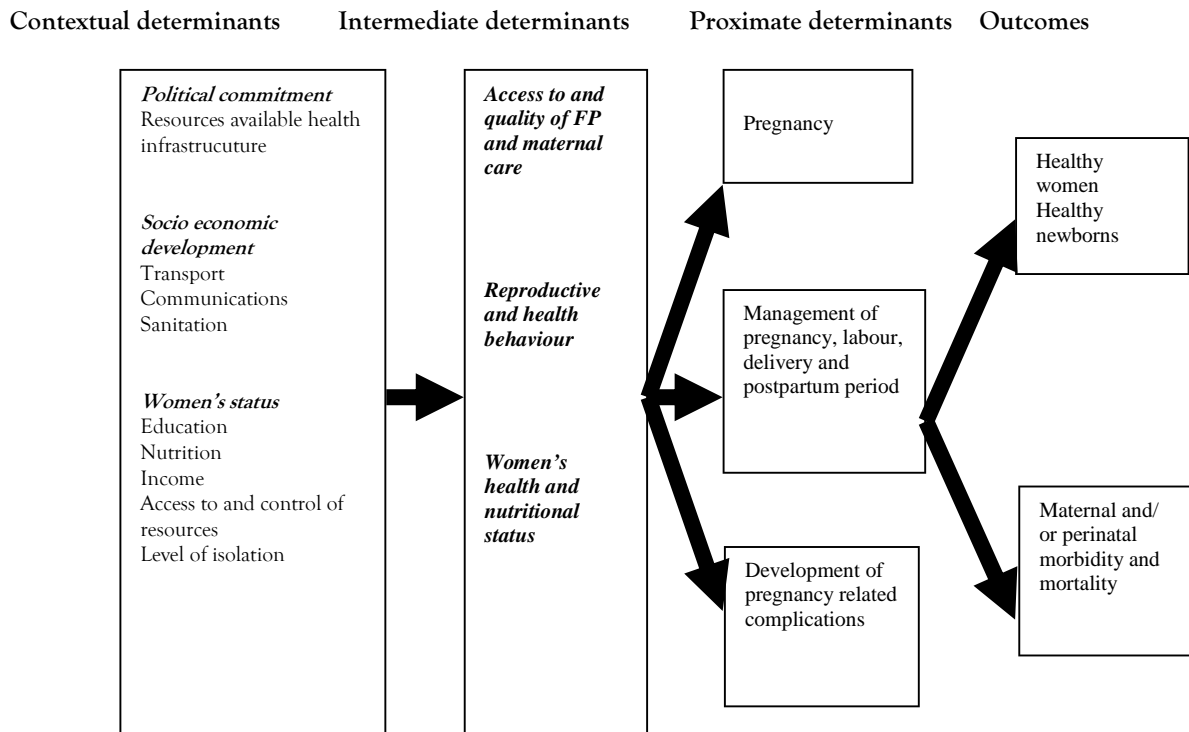
Verbal autopsies were included as part of a larger community-based safe motherhood (CBSM) study which gathered qualitative data from communities distributed across all of Ethiopia's 11 regions in 2005 (10). The study employed qualitative techniques to elicit the data which enabled researchers within the selected communities to examine issues influencing maternal and neonatal health. Focus group discussions (FGD) and in-depth interviews (IDI) were carried out with different community members (women, men and adolescents) to understand their perceptions of maternal and newborn health (MNH) services.

Information on any recent maternal deaths was obtained from the community discussions. Researchers then contacted the families and requested an interview with them. Following consent from the family member a semi structured questionnaire (17 in total) adapted from WHO guidelines for carrying out maternal verbal autopsy was administered (9). Data collectors were sourced primarily from the College of Social Sciences at Addis Ababa University, and selected for their qualitative research skills and experience, and regional language abilities.

All data collectors underwent a rigorous three-stage filtering and interview process followed by a week of intensive training in Addis Ababa. This aimed to foster a broad contextual understanding of maternal and newborn health issues, to orient them in the principles and concepts of participatory data collection, and to enable them to confidently utilize a range of tools in a field situation. The transcription of data, and translation into English, was conducted by the researchers employed on the study, as they were familiar with the themes and nuances of the material.

A safe motherhood conceptual framework was used to analyze the cultural, social, economic, behavioral and biological factors that influence maternal mortality (Fig. 1). The 1992 McCarthy and Maine framework (11) is recommended in the WHO 'Beyond the Numbers' guidelines for analysis of the avoidable factors. However this analysis uses an adapted version of McCarthy and Maine's framework initially used for a maternal health project in Kenya which provides more details (12). The sequence of events leading up to a maternal death is directly influenced by five sets of determinants: the health status of the woman; her reproductive status; her access to health care; her health care behavior; and asset of unknown factors. Additionally socio-economic and cultural factors may also influence the death (12).

Fig. 1: Safe motherhood conceptual framework (12) adapted from McCarthy and Maine 1992



Results

Seventeen verbal autopsies on maternal deaths were carried out during the period of data collection for the larger study (4 week period). Seven were recorded from Southern Nationalities Nations and Peoples Region (SNNPR); four were recorded from Tigray and three from both Oromiya and Amhara Regions.

Contextual determinants

Political commitment

A number of policy documents on improving RH in Ethiopia have now been developed. However in 2005 (when data was collected) although the political commitment was there at policy level, the RH strategy was in draft form and the HEP was yet to take place off in the rural hard to reach areas.

Socio-economic development of community

One of the key constraints that rural women face in accessing safe delivery care is the lack of an adequate transport infrastructure – including the availability of all weather roads and public service vehicles. Very few of the communities had a supply of electricity or telephone facilities.

Communication with the ‘outside world’ is very limited. In the mountainous regions in Ethiopia reaching a major town is a challenge. Access to water varied: some more urban villages have piped water, while others in more remote areas have to walk for more than two hours to collect water. Some districts in the study relied quite heavily on food aid (Tigray, Oromiya) while others were able to manage to support their families by selling excess farm produce and animals.

Health posts and health centers as well as few private practitioners existed in some of the communities, but most are not immediately accessible.

The most commonly available 'health' providers are TBAs (both trained and untrained) and herbalists. Female relatives are the most common form of birth attendant who may subsequently call a trained TBA if complications occur. Frequently traditional remedies and belief in divine intervention are relied on if complications occur.

Women's status

Ages of women who died ranged from 20 to 49 years. Eight died aged 20 to 29 years, three aged 30 -34 years and 35 - 39 years and two of the women who died were over 40 years. The husbands or partners of the women were older than their wives. The youngest were 25 to 29 years (3). Four men were 30 to 39 years, three 40 to 49 years and five of the husbands were over 50 years old. Out of the 17 verbal autopsies, most of the women (n=12) who died had not attended school at all; four attended primary school and one attended secondary school. Seven women were peasant farmers, five were housewives and four were petty traders/casual labor and one was a former domestic worker. Women interviewed during the larger safe motherhood survey describe how some husbands refuse to let their wives attend ANC or seek care at a health facility when complications occur - mainly due to the expense. Many women survive by luck.

The families of the women were generally, illiterate: two thirds of the husbands had not attended school, the remaining third attended primary school only. Three quarters of the husbands were farmers and the rest were small traders and one retired soldier. In addition, there was little or no spare cash for seeking health care. Although the support network of family and friends was readily available, limited knowledge impeded early decision making for health seeking behavior. The husbands and senior female family members, neighbors and TBAs appeared to make most of the decisions as to when and whether to seek health care.

Intermediate determinants:

Access to and quality of family planning and maternal care

The location of the health facilities within the kebeles ranged from within easy reach to 'very far'. Most of the local facilities were health posts/stations that provided preventative care (ANC, child welfare clinics, immunizations, family planning (FP) and treatment for the 'walking sick'.

While benefits of ANC and facility based care were generally known and relatively accessible (if planned ahead), the majority of women did not seek facility care until complications started (13, 14, 15,16). Emergency obstetric care (EMoC) was usually far and relatively inaccessible due poor terrain, limited transport and poverty.

The quality of care described by the relatives of the dead women was questionable. Among the families (ten) who tried to take their wives to health facilities, most were told that the condition was too serious and the patient needed to be transferred on to hospital some distance away. The most common response by health facility personnel or 'treatment' given was to give intravenous (IV) glucose before referral, although in one facility the nurse was unable to find a vein for the IV glucose. Ergometrine is described as being given in one case (unsuccessfully) to stop bleeding. The majority of families used homemade stretchers to transport the women. Limited understanding, reliance on TBAs and poor health seeking behavior contributed to the delays in seeking care early.

Reproductive and health behaviour

All women except one (girl of 21 years working as a housemaid) were married. Two women had attempted to avert pregnancy in the past; one with the support of her husband – they slept apart for five years and one who used a FP method against her husband's wishes because she had experienced bleeding in a previous pregnancy and was worried about it. Data from the wider CBSM study shows that acceptance of FP is increasing but there is still resistance among some communities (10).

Half of the women were delivered by a relative (mother, mother in law, aunt), six by a TBA (trained or untrained) and two by a nurse midwife. For two thirds of the women their labor lasted 8 hours or less. Most women (n=12) gave birth at home; three on the way to the facility, two in the facility (although one did not deliver before dying).

Health and nutritional status:

Eight of the women who died were perceived by relatives to have been in poor health prior to delivery. Four women were described to have been tired a lot which may imply anemia and poor nutritional status. Women in the FGDs from the larger study also made reference to the fact that as many of them are poor they are not able to afford nutritious foods (10).

Three women had suffered from malaria or fever, and two reportedly had worms. Two women from (Central Tigray and Wolaita, SNNPR) had a Caesarean section for a previous pregnancy and one was concerned because she had bled in a previous childbirth and had told the midwife in the health centre (South Gondar, SNNPR). One woman (West Haraghe, Oromiya) experienced 'body swelling' prior to the birth and another one (Wolaita, SNNPR) experienced headaches the day before delivery.

Proximate Determinants

Pregnancy

Majority of women were multi-parous: six women had six pregnancies, and four women had 3-5 pregnancies. Two were giving birth to their second child. For five women the full number of pregnancies was not recorded but they were all experiencing at least their second pregnancy. Only two young women died as a result of their first pregnancy.

Management of Pregnancy

The mother's health is absorbed into the overall strategy for securing a healthy outcome for the pregnancy. Many recognize there are benefits of medical care during pregnancy but due to distances and poverty women will forgo accessing ANC – especially if they have had a normal pregnancy in the past. Just over half of the women (nine) attended ANC at the local health facility or with a TBA and perceived that because there were no problems during pregnancy: the decision was therefore made to give birth at home.

The remaining eight did not attend any health care during pregnancy. Some attended ANC up to three times and were told everything was fine. "She was not sick during her pregnancy, she used to take antenatal care" (Husband, South Gondar) and "...they told her (at the facility) that her pregnancy was normal (free) and made her go home" (Husband, Oromiya). Most of the women who died had an uneventful pregnancy, although four women made additional visits to health facility because they were unwell: three suffered from malaria; one woman started to bleed during her 8th month of pregnancy; and one who was treated with '17 or 18 ampoules of injections in one month' following an x-ray (Arsi, Oromiya).

The family clearly had no idea as to what the treatment was for. One woman from Humbo in the SNNPR was hospitalized during her 8th month: she delivered in hospital "with good medical treatment" and was then sent home after five days. After three weeks she became ill again and died.

Development of complications

The complications that all the 17 women suffered, directly contributed to their untimely deaths. Malaria and anemia indirectly contribute to death in pregnant women by decreasing the likelihood of surviving hemorrhage. Sixteen out of the 17 women who died started labour at home and attended to by female relatives or TBAs. Five of the women died almost immediately after giving birth. One woman from South Wollo gave birth normally and the placenta was delivered without any problem. However shortly afterwards she started bleeding excessively, she died while they were deciding to seek care. Another young woman from Hawzen, in Tigray died immediately after childbirth. Information from one man said that his son came to tell him that his wife was experiencing prolonged labour. On arrival home his wife eventually delivered but bled excessively and died two hours later. This particular woman did not attend ANC and did not try to seek care: *'in spite of her condition, no one advised to do anything expect praying'* (Gedeo SNNPR).

In contrast another woman from Gedeo, SNNPR who started bleeding in her 8th month was rushed to Yirge Chefe health centre where she was given some medicines and injection to stop the bleeding. They returned home but after a week the bleeding increased and the woman was taken back to the health centre and then referred to Dira Hospital. She was given IV glucose, but no explanation was given to the family. The woman insisted on going home 'to die', so they left the hospital. The husband desperate to do something else so save his wife's life, then sought out a TBA who was unable to help and the family then decided to take her to another hospital. Unfortunately she died as they were carrying her to the vehicle that would take her to Yiegalem Hospital. The husband paid 300 Birr, sold an oxen for additional transport costs as well as contributions from friends. Information from six of the verbal autopsies describe how the women died *'on the way'* to health a facility.

Two women from Tigray died after giving birth 'on the road'. However on four occasions having arrived at the health post or health centre relatives were informed that it was *'beyond the capacity'* of that health facility to assist and were therefore referred to a hospital. All four of these women died while transport was being found. On one occasion a midwife from South Gondar tried her utmost to save the woman's life, but she did not have sufficient equipment or medicine to assist. The midwife delivered the infant (stillborn) and gave ergometrine to try to stop the bleeding. She had advised the family to take the woman to hospital immediately, but because of the rainy season and poor roads and husband's lack of money for transport, the woman died.

Two of the husbands made arrangements to take their wives to health facility to deliver but they gave birth before the transport arrived. Both were referred to a hospital, one died before finding transport (West Showa) and the other was admitted for three weeks but discharged herself home. The family then took her back to hospital because she was very weak but she died at the hospital gates. Another man from West Showa described how he and his wife had slept apart for five years because she had experienced problems during her 5th pregnancy. Even with the final pregnancy he escorted her to ANC three times where they were assured *'everything was fine'*. When labour started he made arrangements to take her to the health centre to deliver but she gave birth very quickly, and then experienced retained placenta and bleeding. The husband and neighbors carried her for three hours to the nearest health post on a locally made stretcher. However the health providers told him it was too late to do anything but they should go to the hospital. They took her to a relatives' home nearby where she died before they could find money to transport her to hospital.

Three women died 2-3 weeks after giving birth. All three had been hospitalized; two discharged themselves against medical advice. One was seriously sick *"her stomach became very big after delivery"* and advised by Jinka Hospital (South Omo) to take her to Tikur Anbessa Hospital in Addis Ababa but did not assist in transferring her there. *"At Jinka Hospital the doctors examined her and told me that her case is very serious which they couldn't manage and even a referral Arbanich Hospital couldn't have the capacity to treat her to and they referred her to Tikur Anbessa Hospital which is found in Addis Ababa"* (Husband South Omo). Due to lack of money to hire a car: *"she was too sick to go by bus with other passengers"* (he had already spent 2400 Birr on transport) and with no support from his wife's family he had no choice but to take her home where she died two weeks later.

A woman from Humbo, SNNPR who complained of headache and backache prior to labour delivered normally with the help of her mother in law. Although the placenta delayed for two hours there was no excessive bleeding. However after delivery she appeared weak: *'...she did not pick up her baby, she did not even look at her, she could not talk and did not reply when spoken too'* The family took her to a private doctor who examined her and gave her an injection and medicines and told them she would be fine. However, she did not respond to anyone, did not eat, or breastfeed her baby. *'...her facial expression was void of any emotion'*. Three days after giving birth she died.

For further illustration, MaCarthy and Maine's conceptual framework for safe motherhood (14) was used to analyze the distant and intermediate determinants as well as outcomes that influenced maternal deaths. Fig 2 outlines one maternal death in Tigray.

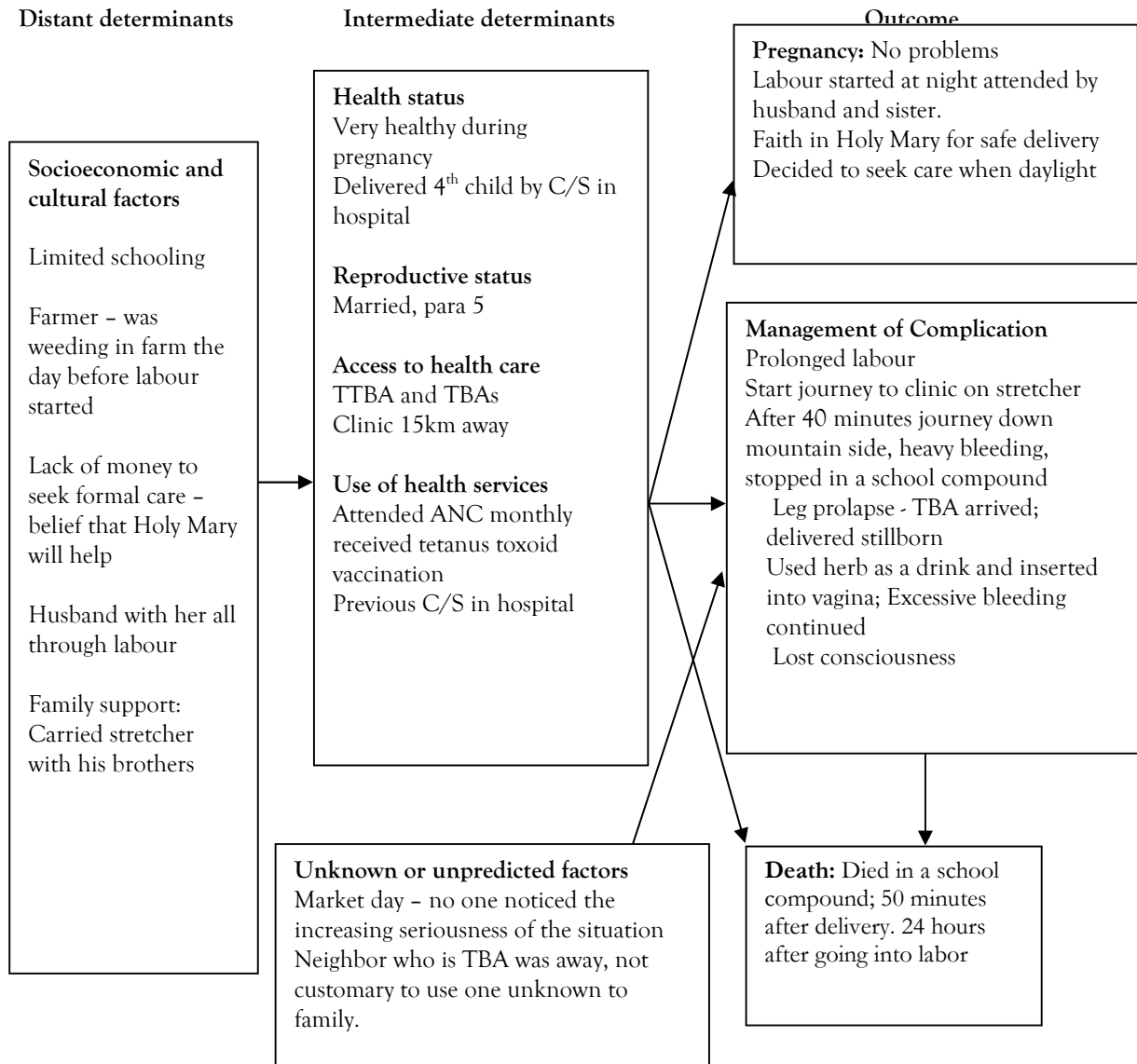
Discussion

The verbal autopsy methodology does have limitations in identifying the medical causes of death but reconfirms the major factors that influence the health seeking pathways that often lead to death among poor women. Some studies have used predefined algorithms for assigning the cause of death but these are not used consistently and comparability with other studies. Nevertheless if verbal autopsy methodology was used for every maternal death and linked to facility based clinical audit an improved picture of maternal mortality would emerge. In addition, Health managers and programmers can use the information for raising awareness and designing programs to reduce maternal mortality.

The majority of pregnancies in Ethiopia - both in and outside of marriage - are unplanned. Positive attitudes towards pregnancy correlate with adequate birth spacing and the age of the mother, while emotionally and physically immature women are considered unprepared for pregnancy. Ethiopian women demonstrate strong awareness of the associations between high parity and early childbearing, and the increased risks of maternal morbidity and mortality (10).

Although expectant mothers benefit from high levels of community support, both moral and practical during pregnancy and childbirth, very few decide on delivering with a skilled attendant. Many prefer delivering at home in the company of known and trusted relatives and friends where customs and traditions can be observed. Contingencies for potential complications are rarely discussed or made. Such that most families hope or pray that things will turn out well. When things go wrong precious time is lost in finding resources and man power to assist in the transfer to a health facility. In addition, the actual distance to the health facility on foot carrying a distressed woman cannot be easy.

Fig. 2: Determinants of maternal mortality findings from one verbal autopsy, Tigray



Majority of deliveries were first attended by female relatives, TBAs or trained TBAs. Delays occurred due to labour and complications occurring at night and then delays in finding transport and or carrying women to nearest health facility. Some men could not find the money and the women just died at home. On three occasions the women died while transport was being arranged. Too many women suffered uncontrolled bleeding with no understanding of how to make it stop.

The capacity of the more peripheral health facilities is questionable. Many of the families said they were not given any information as to what the problem might be just told to take the woman to the next level of care, but not one was assisted by an ambulance or vehicle to take her there. It seems that providers just say: 'it is beyond our capacity'. Confidential enquiries into maternal deaths in a diverse range of countries, together with findings from clinical audits, suggest that more than a third of maternal deaths are attributable to substandard care (18).

The over-reliance on health providers who say their pregnancy is normal during ANC care gives false confidence to women and their families who feel they can easily deliver at home. Tetanus vaccination is also perceived to protect the woman and give a safe delivery. Physical distance from expert care is a well recognized factor contributing to maternal death (19). In addition, shortages of trained personnel, lack of equipment, drugs and other commodities mean that when women and their families do seek care, the nearest facilities are ill equipped to deal with the problems and have to be referred elsewhere. Financial barriers also impede timely management of obstetric complications. Medical interventions are only sought, after all else has failed: prayer, herbalists and traditional solutions.

Historically, single solutions over the last few decades such as the promotion of ANC and use of TBAs have not resulted in reductions in maternal mortality (20, 21). While it is recognized that EmOC can save lives, delays in deciding to seek care and reach care mean that these services are underutilized. The HEP currently underway under the guidance of the FMoH will go some way to reducing maternal mortality but until more women have access to skilled attendance and swift referral to emergency care we will continue to see many more women die unnecessarily. Substantial and sustained reduction of risk of dying once pregnant requires an effective continuum of care from the community to first referral and supported by an education program (22). Finally recording and reviewing every maternal death through facility reviews and verbal autopsy can help build a picture of where deaths are happening most frequently and raise the awareness at all levels.

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