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**MATERNAL MORTALITY RATE AND ASSOCIATED RISK FACTORS:
PERCEPTIONS OF BIRTH ATTENDANTS, IN ABUDWAK DISTRICT, GALGUDUD
REGION CENTRAL SOMALIA**

By

Maryan A Dualle, B.S.
Degree to be awarded: M.P.H
Masters of Public Health
Executive MPH

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MATERNAL MORTALITY RATE AND ASSOCIATED RISK FACTORS: PERCEPTIONS OF BIRTH ATTENDANTS, IN ABUDWAK DISTRICT, GALGUDUD REGION CENTRAL SOMALIA

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An abstract of

A thesis submitted to the Faculty of the
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Abstract

MATERNAL MORTALITY RATE AND ASSOCIATED RISK FACTORS: PERCEPTIONS OF BIRTH ATTENDANTS, IN ABUDWAK DISTRICT, GALGUDUD REGION CENTRAL SOMALIA

By
Maryan A. Dualle

Background: Maternal mortality is the leading cause of death for women in developing countries. Approximately 289,000 mothers died in the world in 2013, of which 62% occurred in Sub-Saharan Africa. Somalia has the 4th highest maternal mortality ratio (MMR) in the world at 850 maternal deaths per 100,000 live births. There is a paucity of research examining birth attendants' perceptions of maternal mortality and the associated determinants both on a global level as well as within Somalia. The goals of this study are to investigate birth attendants' perceptions of maternal mortality rate and the associated determinants in Abudwak district; to solicit their input on how to improve these determinants; and to compare findings with globally known maternal mortality determinants. An additional goal is to identify other key maternal mortality indicators such as availability of SBAs, birth attendants' educational background, and referral practices of complicated pregnancies.

Methods: A mixed method approach was employed. Purposive sampling was utilized to recruit participants. Observation, closed-ended questionnaires and in-depth semi-structured interview data collection tools were used. Data were analyzed with SPSS data analysis software and manual content analysis.

Results: The majority of the birth attendants in this study are older females, illiterate (76.2%), lived in the community over 10 years (81%), have > 10 years of experience (81%), assisted > 10 births in 2013 (90.5%), have > 5 children (95.2%) and referred (71.4%) complicated pregnancies to a higher level of care. Skilled birth attendants (SBAs) and trained traditional birth attendants (TTBAs) have better pregnancy risk recognition and higher referrals than traditional birth attendants (TBAs). TBAs in this study had no training/apprenticeship before they started practicing. All participants thought maternal mortality is high in Abudwak district and lack of competent health professionals and nutrition have been identified as the top determinants for maternal mortality in Abudwak.

Conclusions: These findings highlight the effect of lack of nutrition on pregnant women from this district; the district's urgent need for competent health professionals; and the importance of training TBAs. More pragmatic strategies that incorporate TBAs in the health system are needed for Somalia and beyond to reduce maternal mortality.

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Introduction

General background

Maternal mortality is the leading cause of death for women in developing countries. Maternal mortality is defined by The World Health Organization [WHO] as "the death of a woman while pregnant or within 42 days of termination of pregnancy, irrespective of the duration and site of the pregnancy, from any cause related to or aggravated by the pregnancy or its management but not from accidental or incidental causes". The world has recognized this preventable cause of death for women and the Millennium Development Goal (MDG) 5 (to improve maternal mortality) was adopted in the year 2000 at the WHO sponsored Millennium Summit. MDG5 targets are a) to reduce the 1990 maternal mortality ratio by three quarters by 2015, and b) to achieve universal access to reproductive health by 2015. While the campaign to meet MDG 5 created momentum for reducing maternal mortality and several countries have been successful, maternal mortality remains high in Sub-Saharan Africa [SSA]. There were an estimated 289,000 maternal deaths in the world in 2013 of which 99% (286,000) were from developing countries. However, there are vast disparities in maternal mortality in different regions of the world and among the developing countries as shown on Figure 1. Sub-Saharan Africa leads the world in maternal death (179,000) and accounts for 62% of the world's maternal death followed by Southern Asia (69,000). [1,2,3]

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[1] The World Health Organization [WHO]. (2014). Health statistics and information systems. http://www.who.int/healthinfo/statistics/indmaternalmortality/en/. Retrieved July 12, 2014.

[2] United Nations. (2000). UN Millennium Development Goals. http://www.un.org/millenniumgoals/. Retrieved July 12, 2014.

[3] Khan K.S., Wojdyla, D., Say, L., Gülmezoglu, A. M., Van Look, P.FA. (2006). WHO analysis of causes of maternal death: a systematic review. Lancet, 367, 1066–74, DOI: 10.1016/S0140-6736(06)68397-9.

Figure 1: Map with countries by category according to their maternal mortality ratio (MMR, death per 100 000 live births), 2013.
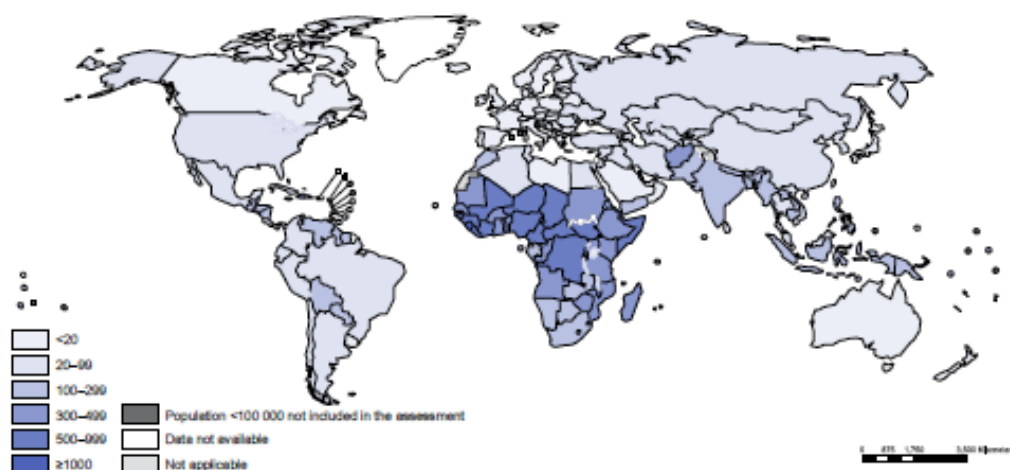
Source: **WHO [Intra-agent report]. (2014). Trends in Maternal Mortality: 1990 to 2013.**

Although the exact number of maternal deaths in Somalia is unknown due to lack of national health data, the latest intra-agency maternal mortality report estimates Somalia to have the second highest maternal mortality ratio (MMR) in the world at 850 maternal deaths per 100,000 live births. Another measure that highlights the maternal mortality disparity among the world regions, sub-regions, and countries within each region is the lifetime risk of maternal death. Lifetime risk of maternal death is defined by WHO as "the probability of a 15-year-old woman eventually dying from a maternal cause, assuming she is subjected throughout her lifetime to the age-specific risks of maternal death observed for a given population in a given year". This risk is directly correlated with maternal death, thus high lifetime risk of maternal death is an indicator for maternal death. For example, women in the entire world have a 1 in 190 lifetime risk of maternal death. However, when the world is divided into developed, developing, regions, sub-regions and countries there are significant differences in the lifetime risk of maternal death for women in the developed (1 in 3700) and developing (1 in 152) countries, and those in Northern Africa (1 in 430)

and SSA (1in 38). When compared to the women from SSA, Somali women have an even higher lifetime risk of 1 in 18.[4,5]

The risk factors that contribute to maternal mortality in low-resource countries like Somalia are well known: per capita income, female secondary school enrolment, skilled birth attendance, contraceptive use, and health expenditures as percent of gross domestic product (GDP). Specifically, in SSA skilled birth attendance, health expenditure as percent of GDP and life expectancy are strongly associated with maternal mortality. These determinants are interrelated and best health outcomes are achieved when they are all at optimal levels. For example, a higher percentage of health expenditure leads to a more sound health infrastructure, better staffed facilities, and access to more technologically advanced equipment. Similarly, higher income per capita means that more of the population can afford health care services, transportation to health facilities, and education for children, including girls. While all of these determinants are important, girls' education, especially secondary education, is particularly vital. Education is the foundation for women's empowerment by increasing access to and understanding of health information in order to make better maternal health decisions (e.g. delaying age of marriage, contraceptive use, accessing antenatal care, and utilizing skilled birth attendants during childbirth).[6,7]

The above mentioned determinants are further complicated by regional and country specific socio-economic and cultural factors that affect different levels of mother's health seeking

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[4] WHO [Intra-agent report]. (2014). Trends in Maternal Mortality: 1990 to 2013, Estimates by WHO, UNICEF, UNFPA, the World Bank and the United Nations Population Division.
[5] Sorbye, I. & Leigh, B. (2009). Somalia Reproductive Health: National Strategy and Action Plan 2010 – 2015, Intra-agency report [UNFPA, WHO, UNICEF, UKaid and the EC]. http://www.unicef.org/somalia/health_11684.html. Retrieved March 2, 2014
[6] BUOR, D. & BREAM, k. (2004). An Analysis of the Determinants of Maternal Mortality in Sub-Saharan Africa. JOURNAL OF WOMEN'S HEALTH, 13 (8), 926-938
[7] Farah, A. & Rasheed, H. (2009). Determinants of Cross-Country Variation in Maternal Mortality in Developing Countries. http://www.aitrs.org/Portals/_PCBS/Documents/sasc_res/res42.pdf. Retrieved January 16, 2014

behaviors which affect maternal mortality risk. The salient risk factors produced by the above determinants are termed the "three delays". These are defined as a delay in deciding to seek medical care, a delay in reaching a health facility in time, and delay of receiving adequate care in a timely fashion. Each one of these delays is further complicated by community, family, and individual circumstantial factors such as decision-making processes at the household level, financial ability to pay for transportation and medical care, distance from the health care facility, area security, road conditions, and the availability of adequately functioning emergency obstetric care [EmOC] facilities. According to the Monitoring Emergency Obstetric Care Handbook by WHO and its partners (AMDD, UNPFA and UNICEF), adequately functioning EmOC facilities are equipped, staffed, and appropriately perform the basic signal functions shown on Table 1.[8,9,10]

Table 1: EmOC signal functions

1. Administer parenteral antibiotics
2. Administer uterotonic drugs
3. Administer parenteral anticonvulsants for preeclampsia and eclampsia
4. Manually remove the placenta
5. Remove retained products
6. Perform assisted vaginal delivery
7. Perform basic neonatal resuscitation

adopted from: Monitoring emergency obstetric care handbook (2009).

Research question(s)

Maternal mortality and contributing risk factor data are limited in Somalia and a paucity of maternal morality research has been completed in the country to date. In particular, there are no published qualitative or mixed method studies examining birth attendants' perceptions about

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[8] Nour, N. (2008). An Introduction to Maternal Mortality. Reviews in Obstetrics & Gynecology, 1 (2), 77-81
[9] Thaddeus, S. Maine D. (1994) Too far to walk: maternal mortality in context. Social Science and Medicine, 38(8), 1091-110.
[10] WHO. (2009). Monitoring emergency obstetric care: a handbook.

maternal mortality rates and the associated risk factors in the country. This thesis aims to answer the following questions:

- What are birth attendants' perceptions of maternal mortality rate and associated risk factors in Abudwak district in Somalia?

- Is there a difference between skilled, traditional trained and untrained traditional birth attendants' perceptions about the maternal mortality rate and associated risk factors in Abudwak district?

- Is there a difference between key informants and birth attendants' perceptions of maternal mortality and associated risk factors?

- How do the risk factors identified by the birth attendants in this district compare to the globally recognized maternal mortality risk factors for similar settings?

Problem overview and review of previous research

Maternal mortality is a preventable cause of death for thousands of women around the world, and it disproportionately affects women in developing countries. There is abundance of published literature related to the causes and risk factors of maternal mortality globally and in low-resource countries. There is a consensus among researchers, international health agencies (e.g. WHO) and health care providers about the main causes (direct and indirect) of maternal mortality. However, the attributing determinants vary and are highly influenced by regional and country specific socio-economic and cultural factors. Nonetheless, there are common determinants that can be used as general indicators. Maternal related causes of death are globally the same, however,

they are more common in the developing countries where 99% of maternal death occurs due to complex developmental problems.[11]

Maternal causes of death

Approximately 80% of all maternal deaths are directly caused by hemorrhage (severe bleeding), hypertension during pregnancy (pre-eclampsia and eclampsia), sepsis (postpartum infection), unsafe abortion, and other direct causes (e.g. obstructed labor).[12,13,14]

Hemorrhage and hypertension are by far the biggest contributors to maternal mortality in developing countries. There are regional variations in the prevalence of these contributors; for example, hemorrhage is the leading cause of death in Africa and Asia, where hypertension is the leading cause of death in Latin America and in the Caribbean. Indirect causes account for the rest of the maternal deaths and include co-morbidities such as HIV/AIDS, malaria, and other medical conditions. Due to the lack of accurate data, underreporting, misclassification, and the fact that many women in low-resource countries do not utilize antenatal care, it is extremely difficult to measure disease specific effects of maternal mortality in the low-resource countries. Nevertheless, research indicates that HIV/AIDS indirectly contributes to 6% of the maternal mortality in SSA. HIV/AIDS impacts maternal mortality, and this is particularly evident in countries with high HIV/AIDS prevalence such as Zimbabwe and South Africa. HIV/AIDS can aggravate and be aggravated by other conditions (e.g. anemia and tuberculosis) and pregnancy itself by way of

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[11] WHO [Intra-agent report]. (2012). Trends in Maternal Mortality: 1990 to 2010.
[12] WHO. (2012) Maternal Mortality: Fact sheet Nº 348. http://www.who.int/mediacentre/factsheets/fs348/en/
[13] Prata, N., Sreenivas, A. Vahidnia, F., Potts, M. (2009). Saving maternal lives in resource-poor settings: Facing reality. *Health Policy*, 89 (2009) 131–148.
[14] Evance, Godfrey, Honorati and Kahn. (2013). Causes and Risk Factors for Maternal Mortality in Rural Tanzania - Case of Rufiji Health and Demographic Surveillance Site (HDSS. African Journal of Reproductive Health, 17(3), 119 - 130

immune suppression and nutrient malabsorption. Other factors that contribute to maternal mortality in SSA are malaria, which is endemic in many countries and anemia.[15,16,17]

Somalia has the second highest maternal mortality ratio (850 per 100,000 live birth) in the world and the most prevalent causes of death are similar to the global and regional causes of maternal death. There are many country specific contributing factors such as poverty, longstanding civil war, and harmful cultural practices that are thought to explain Somalia's extremely high maternal mortality ratio. Somalia has not had a central government for over 22 years, and all social service sectors were destroyed during the collapse of the central government in 1991. The civil war resulted in the death of one million Somalis, forced internal and external displacements, caused isolated communities due to insecurity, and left the population vulnerable to chronic and communicable diseases. Maternal health has been performing at a substandard level for the last 22 years. Thus, there are numerous internal and external factors that affect the MMR in Somalia. [18,19]

Determinants of maternal death

Current research identifies a plethora of interconnected cultural, social, medical, and environmental factors that directly or indirectly contribute to maternal mortality as shown on Figure 2. Numerous national and regional studies on maternal mortality determinants found that absence of skilled birth attendants at birth, low income per capita, low health care expenditure as a percentage the GDP, high fertility rate, low female literacy rate, high HIV/AIDS rate, older women (30-39 years) pregnancies, and other cultural factors are the leading factors that increase

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[15] Khan, K.S., Wojdyla, D., Say, L., Gülmezoglu, M.A., & Van Look, P.F. (2006). WHO analysis of causes of maternal death: a systematic review. The Lancet, 367 (9516), 1066 – 1074. doi:10.1016/S0140-6736(06)68397-9
[16] Ronsmans, C., Graham, W.J. (2006). Maternal mortality: who, when, where, and why. Lancet,368, 1189–200
[17] Khan, K.S., Wojdyla, D., Say, L., Gülmezoglu, M.A., & Van Look, P.F. (2006). WHO analysis of causes of maternal death: a systematic review. The Lancet, 367 (9516), 1066 – 1074. doi:10.1016/S0140-6736(06)68397-9
[18] WHO. (2006). Health system profile-Somalia. Regional Health Systems Observatory- EMRO, 1-78
[19] World Bank. (2006). Somalia: from resilience towards recovery and development: a country economic memorandum for Somalia. World Bank Report.

maternal mortality in low-resource countries, especially in SSA. A recent (2013) review by Evans et al., examined values, beliefs, norms, patterns, and cultural practices that negatively impact childbirth and increase maternal mortality risk. They identified and categorized the factors into direct harm (e.g. burning, cutting, nutrient restriction, exposure to infectious agents, etc.), inaction (lack of recognition and misconception of the cause of pregnant complication), use of care (cultural practices that delay or prevent women from seeking care (e.g. the belief that prolonged labor is due to diet and infidelity), and social status (pressure to be strong and have many kids). The findings confirm the complexity and interconnectedness of different determinants and their influence on the "three delays". [20,21]

Figure 2: Determinants of Maternal Death:
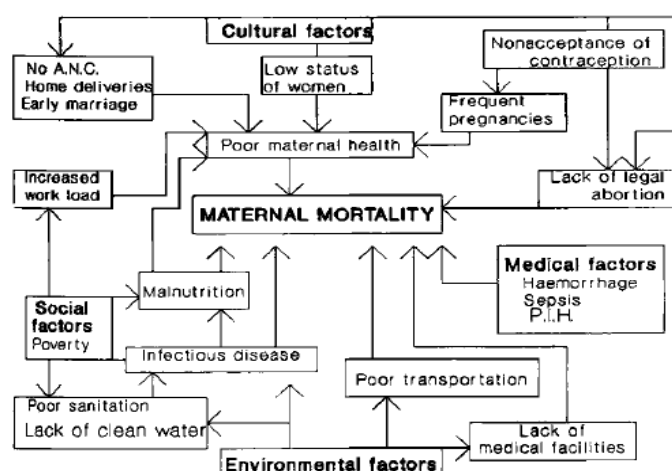
Source: Ausr, N.Z. Journal of Obstetric Gynecology 1991; 31: 1: 8

Examining the above-mentioned leading global maternal mortality determinants for low-resource countries in the context of Somalia could further elucidate how these determinants affect

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[20] Evance, I., Godfrey, M., Honorati, M., and Kahn, K. (2013). Causes and Risk Factors for Maternal Mortality in Rural Tanzania - Case of Rufiji Health and Demographic Surveillance Site (HDSS. African Journal of Reproductive Health, 17(3), 119 - 130

[21] BUOR, D. and BREAM, k. (2004). An Analysis of the Determinants of Maternal Mortality in Sub-Saharan Africa. Journal of Women's Health, 13 (8) 926-938

the "three delays" and contribute to the country's high maternal mortality rate. In the next few sections, each of the above determinants will be examined in the context of Somalia to demonstrate its impact on maternal mortality.

Income per capita & health expenditures as percent of GDP

As previously mentioned, both income per capita and health expenditure as a percentage of GPD are determinants of maternal mortality. Insufficient health expenditure restricts government's investment in health infrastructure and in turn limits the availability of health care services. Similarly, low income per capita impacts the affordability of health care services. Somalia is one of the poorest countries in the world. In 2012, the income per capita was $631.87, which makes Somalia the fifth poorest country in the world. The current total expenditure of health care as a percentage of GPD is not available due to lack of data, however, the most recent data from WHO estimates the total expenditure on health per-capita to be $17 (USD), or 2.3% of GDP. Foreign aid for health care has been steadily increasing in the last 10 years. A recent (2011) World Bank (WB) report indicated that most of health financing in Somalia comes from foreign aid, and the Somali government contributes less than 1%. The increase in foreign aid financing in the health sector has not led to improved health care access for the majority of the country's population because 80% of the population have very little access to health care services. In addition, the country has one of the worst health indicators in the world. This can be attributed to numerous factors, including vertical program focus by the United Nations (UN), other international agencies and non-governmental organization. A vertical approach is disease focused and fails to provide comprehensive health services to the entire population. A substantial amount of the foreign health care aid is channeled to emergency programs, TB, HIV, malaria, nutrition, and polio which together account for over 75% of the funding. Less than 25% of the funding goes toward primary

health care including maternal and child health and health system strengthening. Despite the high aid per-capita financing for the health sector, patients' out of pocket payments account for 80% of the total health care expenditure. Thus, the majority of the available health care services in Somalia are fee based. This is an indication that a high percent of the population are without access to health care, since almost half of the county's population (43%) live in extreme poverty (under $1USD a day) and 73% of them survive on under US$2 a day. In particular, vulnerable groups such as women, children, poor and rural residents have very little, if any, access to health care. As a result of underfunding health care, the entire health care system and its vital components (e.g. health facilities and health workforce) are negatively affected.[22, 23, 24, 25]

Health care system

A functioning and efficient health care system is fundamental to the good health of any community and facilitates access to health care services for the entire population. Furthermore, this impacts the availability, affordability and accessibility of health services in the community. One key strategy to reduce maternal mortality is for every woman to have access to adequate emergency obstetric care (EmOC) services. Adequate EmOC services means a) EmOC facilities are geographically close (< 2hr drive) to pregnant women, b) services are free and or affordable to all women, c) facilities are staffed with appropriate number of health professionals, and d) facilities are equipped with the necessary tools for EmOC services. This target is a distant dream for many women who live in low-resource countries, where distance to EmOC facilities, road conditions, security issues and lack of transportation are constant barriers to accessing EmOC services. Like

[22] http://www.statisticbrain.com/poorest-countries-by-gdp-per-capita/.
[23] World Health Organization (WHO). Country Statistics: Somalia, http://www.who.int/countries/som/en/
[24] World Bank (WB). A Decade of Aid to the Health Sector in Somalia, 2000 -2009. (2011).
[25] WB. (2008). Somali reconstruction and development programme: deepening peace and reducing poverty. http://www.worldbank.org/en/country/somalia/research/all, retrieved July 13, 2014.

other low-resource countries, Somalia lacks many elements necessary for providing adequate EmOC services. The number of EmOC facilities in an area, their geographic distribution and utilization of EmOC services (if pregnant women, especially those with complications use the facilities) are among the indicators to measure if adequate EmOC services are being provided. Most Somalis, including pregnant women, have limited access to health care services due to the underfunded and fragmented health care system. Some of the indicators that demonstrate Somalia's deteriorated health care system include lack of functioning health care facilities and shortage of health workforce. Thus, the lack of adequate health care facilities and competent health care providers increases the risk for the "third delay" and contribute to increased maternal mortality.[26,27]

Health facilities

Somalia as a whole is facing a severe lack of functioning health care facilities, but more so in the Central and Southern regions which are home to over 50% (>5 million) of the country's population. According to a 2012 survey by The United Nations Office for the Coordination of Humanitarian Affairs [OCHA], there are currently less than 650 health facilities in Central and South Somalia including: hospitals (37), health centers (282), health posts (226), mobile clinics, primary healthcare and TB center. For a population of over 5 million this translates to over 135,000 people per hospital and over 17,000 people per health center. These facility population ratios meet the international Inter-Agency Standing Committee (IASC) standards for health facilities and population ratio in crisis indicated on Table 2. However, these facilities are not equally distributed in the different regions and sub-districts and are mainly concentrated in large cities. For instance,

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[26] Prata, N., Sreenivas, A. Vahidnia, F., Potts, M. (2009). Saving maternal lives in resource-poor settings: Facing reality. Health Policy, 89 (2009) 131–148.
[27] WHO. Monitoring emergency obstetric care: a handbook. (2009).

Banadir, the largest and most populated region in Somalia, has 4-13 times more hospitals than other regions of the same zones (Central and South). Adding to the complexity of the problem is the lack of standards for health service and delivery of care amongst healthcare facilities in Somalia, thus the quality of service provided also varies. There are specific global standards by WHO and its partners for EmOC facilities and population ratio, which cover more people than the IASC standards. The acceptable level of EmOC facility and population ratio is at least four basic emergency obstetric care [BEmOC] and one comprehensive emergency obstetric care [CEmOC] facilities per 500,000 population. Somalia meets these minimum standards. Again, even if the facilities are available the required functioning, access and quality are barely there. The lack of adequately functioning health facilities overwhelms the system and health provisions (access and service quality) are negatively impacted. [28,29]

Table 2: Global health cluster suggested set of core indicators and benchmarks by category

Category	#	Name of indicator	Type	Data collection method	Benchmarks	Comments
	A.1	Average population per functioning health facility (HF), by type of HF and by administrative unit	Input, proxy	HeRAMS	SPHERE standards: 10 000 for1 Health Unit, 50 000 for 1 Health Centre, 250 000 for 1 Rural/District Hospital	Proxy indicator of geographical accessibility, and of equity in availability of health facilities across different administrative units within the crisis areas.
	A.2	Number of HF with Basic Emergency Obstetric Care/ 500 000 population, by administrative unit	Input, proxy	HeRAMS	>= 4 BEmOC/500 000	Proxy indicators for the physical availability and geographical accessibility of emergency obstetric services and their distribution across districts in the affected areas. An unbalance between the availability of BEmOC and CEmOC (with too few BEmOC) is often observed.
	A.3	Number of HF with Comprehensive Emergency Obstetric Care/500 000 population, by administrative unit	Input	HeRAMS	>= 1 CEmOC/500 000	

Source: Inter-Agency Standing Committee (IASC), 2010.

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[28] WB. (2007). Somali joint needs assessment: social services and protection of vulnerable groups Cluster report. http://www.worldbank.org/en/country/somalia, retrieved July 13, 2014

[29] Inter-Agency Standing Committee: Global health cluster suggested set of core indicators and benchmarks by category (2010).
http://www.who.int/hac/network/global_health_cluster/iasc_global_health_cluster_core_indicators_9apr10.pdf.

Health workforce

A lack of competent health workforce (number and distribution) hinders the achievement of health related MDGs in many countries around the world, especially in SSA. Since it is impossible to provide quality health care services without adequate and competent health care providers, health workforce is arguably the single greatest indicator of health service provision. Currently, there is a well-documented global health workforce shortage "crisis". However, the crisis is more noticeable in low-income countries. The health worker density metric is used globally to monitor health workforce shortage. The health worker density ratio is based on the number of health workers physicians, nurses, and midwives per 1,000 people. The minimum ratio to deliver the minimum standard maternal and child health services is 23 health workers per 10,000 population. Countries that do not meet this threshold fail to provide adequate health care services to a high percentage of pregnant women, newborns, and young children (under five years old) and as a result have high maternal and child mortality rates. The SSA region has the highest health worker shortage in the world, which is exacerbated by HIV/AIDS related deaths and disability, health professional "brain drain" (migration of health professionals to developed countries for better opportunities), and health professionals' movement from public sector to the private sector and international organizations for higher pay. In addition, most SSA countries have a lower health professional graduation rate and high population growth, which further complicates the health workforce shortage. Furthermore, there is a large inequality in the availability of health professionals between urban and rural and rich and poor communities. As a result of the aforementioned factors coupled with high fertility rate, Somalia has an exceptionally high health worker shortage, hence the reason it is at the bottom of the list of low-income countries that fall below the critical threshold for health worker density ratio. As shown on Figure 2, every 10,000 Somalis have access to only two (2) health workers as compared to135 health workers per 10,000

in Uzbekistan. Among other factors, the health worker density ratio difference of the two countries

is reflected on their maternal mortality ratio (850 vs. 30 per 100,000 live birth). Lastly, skilled

birth attendance is positively correlated with reducing maternal mortality rates, therefore low

skilled birth attendance is associated with high maternal mortality. [30,31,32,33]

Figure 3: Density of medical doctors, nurses and midwives in the 49 priority countries
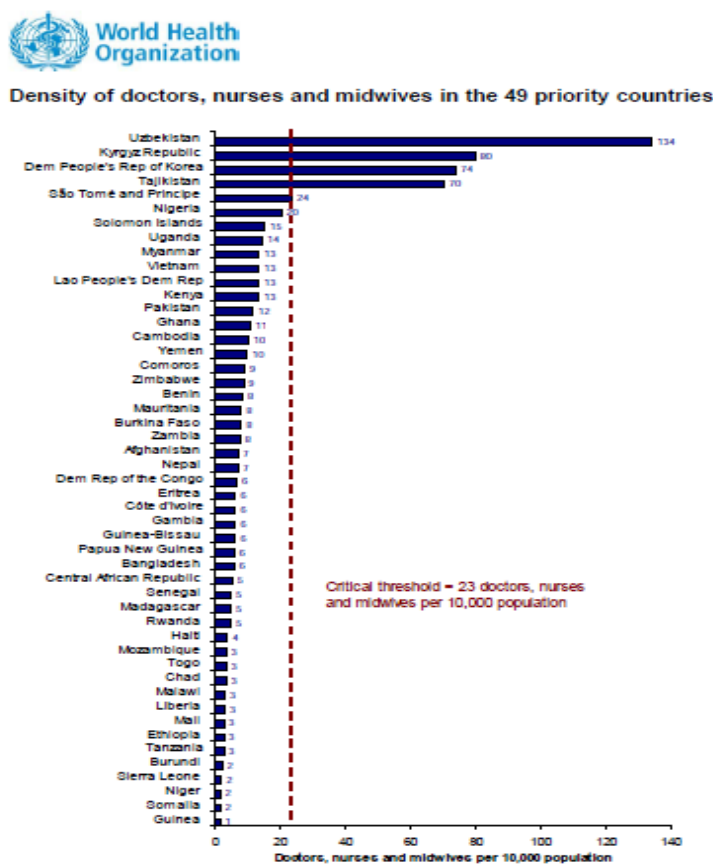
Source: http://www.who.int/hrh/fig_density.pdf

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[30] WHO. (2014). Achieving the health-related MDGs. It takes a workforce!
http://www.who.int/hrh/workforce_mdgs/en/.

[31] Gerein, N., Green, A. & Pearson, S. (2006). The Implications of Shortages of Health Professionals
For Maternal Health in Sub-Saharan Africa. Reproductive Health Matters, 14(27), 40–50.

[32] Capacityplus. (2011). Technical Briefing: Population Growth and the Global Health
Workforce Crisis. www.Capacityplus.com.

[33] UNICEF. (2012). Country profile Uzbekistan: Maternal, Newborn & Child Survival.
http://www.childinfo.org/files/maternal/DI%20Profile%20-%20Uzbekistan.pdf.

Skilled birth attendance

According to WHO a skilled birth attendant (SBA) is a health professional who is "trained to proficiency in the skills needed to manage normal (uncomplicated) pregnancies, childbirth and the immediate postnatal period, and in the identification, management and referral of complications in women and newborn". Supervision of all births by SBAs has been identified as a key factor in reducing maternal mortality rate. The percentage of births supervised by SBAs is a direct indicator of worldwide maternal mortality, and the goal is for 90% of the world births and 60% of births from countries with high maternal mortality to be supervised by SBAs by 2015. Research indicates that availability and utilization of SBAs is directly associated with a decrease in maternal and newborn mortality. Despite local and international efforts to increase skilled birth attendants' availability and utilization in low-resources countries, most of these countries are far from the target with less than 50% percent of all births attended by SBAs. Sub-Saharan Africa and South and Southeast Asia have the lowest skilled birth attendance rates with only 32% and 35% of all births attended by SBAs respectively. Somalia has one of the lowest indicators for skilled birth attendance in SSA, as shown on Figure 4, with only 33% (urban) and < 10% (rural) of all births attended by SBAs. Traditional birth attendants (TBA), defined by WHO as "a person who assists the mother during childbirth and who initially acquired her skills by delivering babies and over 80% of Somali babies. Thus, Somali women are at an increased risk of dying during childbirth and over the following 42 days.[34,35,36,37]

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[34] WHO. (2004).Making pregnancy safer: the critical role of the skilled attendant: a joint statement by WHO, ICM and FIGO.

[35] Graham, W.J., Bell, J.S., & Bullough, C. HW. (2001). Can skilled attendance at delivery reduce maternal mortality in developing countries? In Safe Motherhood Strategies: a Review of the Evidence. Edited by: De Brouwere V, van Lerberghe W. Antwerp, ITG Press; 97-130.

[36] Kruk, M.E., Prescott, M.R., & Galea, S. (2008). Equity of Skilled Birth Attendant Utilization in Developing Countries: Financing and Policy Determinants. *American Journal of Public Health,* 98(1), 142-147.

[37] UNICEF. Maternal, Newborn & Child Survival. (2012). UNFPA. The State of the World's Midwifery (2011).

Figure 4: Skill attendance at delivery
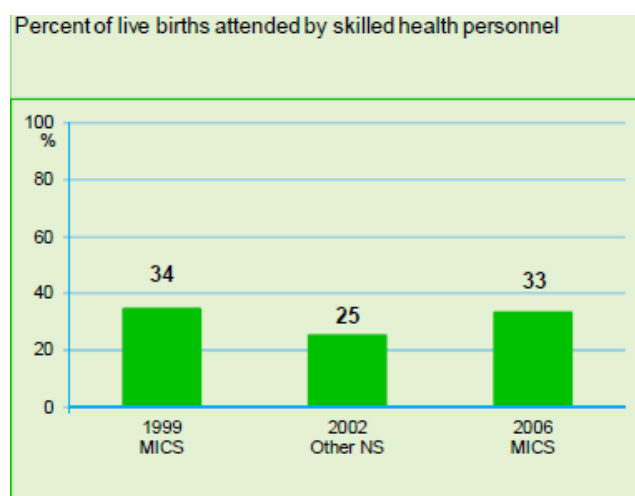
Empowering girls

Empowering girls is fundamental to reducing maternal mortality. Empowerment for girls is grounded in education. A 2011 WHO Global Survey on Maternal and Perinatal Health found an inverse relationship between the number of years of education and maternal mortality risk. As indicated in Figure 5, women without education had more than twice the maternal mortality rate of women with 8th grade education and more than four times the mortality rate of those with upper secondary and post-secondary education. These findings can be explained by the impact of education and ensuing long-term health benefits. Educated girls develop into women who are better informed about health issues and are more able and effective at accessing health and reproductive information. They are likely to have increased awareness about diseases and related risk factors. Consequently, educated girls make better and more informed decisions about a host of reproductive health related issues such as the age of marriage, antenatal care, and having a SBA at the time of delivery. Similarly, they are better aware of pregnant risks and make informed

decision to go to the hospital in a timely fashion during pregnancy complications. They are also

more likely to be financially independent and able to pay for medical services. [38,39,40,41,42]

Figure 5: Distribution of maternal death by years of maternal education
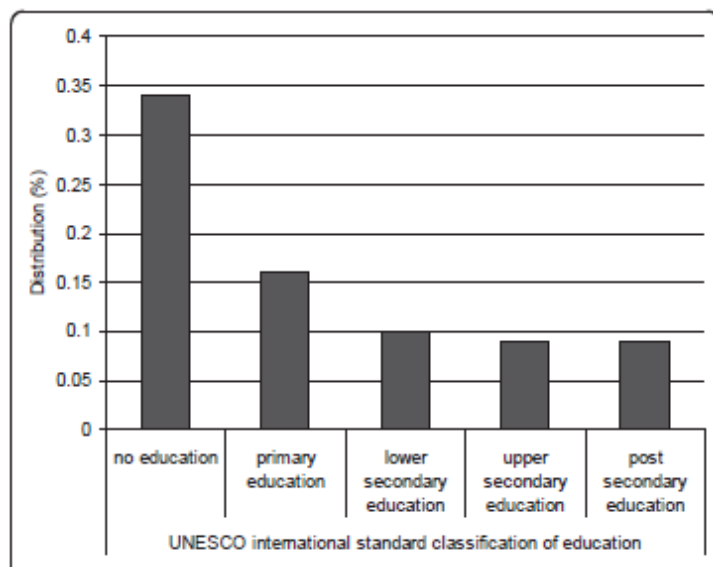
Source: Karlsen et al. 2011.

As with health care services, education in Somalia has been negatively affected by the

ongoing civil war and the lack of central government in the past 22 years. Somalia has one of the

lowest primary school enrollment rates in the world. Only 42% of the primary school age children

are enrolled in school of which only 23-36% are girls. The data highlight the disparate exclusion

of girls from the education system in Somalia. Secondary school enrollment is less than 10% and

girls have an approximately 6% enrollment rate. There are multiple and complex socio-economic

and cultural factors that contribute to the low education rate for girls and the disparity in education

[38] Karlsen, S., Say, L., Souza. J.P., Hogue, C.J., Calles, D.L., Gülmezoglu, M.A., & Raine, R. (2011). The relationship between maternal education and mortality among women giving birth in health care institutions: Analysis of the cross sectional WHO Global Survey on Maternal and Perinatal. BMC Public Health, 11:606.
[39] Yego, F., D'Este, C., Byles, J., Stewart Williams, J., & Nyongesa, P. (2014). Risk factors for maternal mortality in a Tertiary Hospital in Kenya: a case control study. BMC Pregnancy and Childbirth, 14:38.
[40] http://www.unfpa.org/gender/empowerment2.htm , Retrieved July 13, 2014
[41] Shen, C., Williamson J.B. (1999). Maternal mortality, women's status, and economic dependency in less developed countries: a cross-national analysis. Social Science & Medicine 49(2), 197-214.
[42] Paul, B. K., & Rumsey, D. J. (2002). Utilization of health facilities and trained birth attendants for childbirth in rural Bangladesh: an empirical study, *Social Science & Medicine,* 54, 1755–1765.

between urban/rural and wealthy/poor children. Somali children in urban communities are 11 and 38 times more likely go to primary and secondary school, respectively than children in rural communities. Consequently, the literacy rate is only 20% with 35% of that in urban areas and 11% in rural areas. Women 15-24 years-of-age have slightly higher literacy rate (25%) than the general public due to recent campaigns promoting education of females. Of the 25%, the breakdown is 44% in urban areas and 10% in rural areas. Low literacy, especially low secondary education for girls, is one of the key contributors to Somali's high maternal mortality rate. [43,44, 45]

Contraceptive use

One of the MDG 5 goals is universal access to contraceptive services. Contraceptive services empower women and couples to choose the number and timing of births. Contraceptive use is one of the key indicators for the availability and utilization of reproductive health. Stover & Ross found that contraceptive use lowered high-risk births such as high-parity births (number of babies a women carries to gestational age) and averted 1.2 million maternal deaths between 1990 and 2005. Ahmed et al. argue that "family planning directly reduces the number of maternal deaths because it reduces the chance of pregnancy and the associated complications (exposure reduction), lowers the risk of having an unsafe abortion (vulnerability reduction), delays first pregnancy in young women who might have premature pelvic development, and reduces hazards of frailty from high parity and closely spaced pregnancies". Thus, contraceptive use is a vital and effective primary prevention strategy to reduce maternal mortality in developing countries. The strategy also entails advising countries with high MMRs to focus on reducing unmet contraceptive needs.

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[43] WB. (2007). Somali joint needs assessment: social services and protection of vulnerable groups
Cluster report. http://www.worldbank.org/en/country/somalia, retrieved July 13, 2014
[44] UNICEF, Division of Policy and Practice, Statistics and Monitoring Section. (2008). Education statistics:
Somalia.
[45] Sorbye & Leigh. (2011). Reproductive Health National Strategy & Action Plan 2010-2015.

Currently in Somalia only 15% of married reproductive age women use contraceptives. Furthermore, less than 2% of those women use modern contraceptive methods. Women from the Northwestern Zone (Somaliland) are twice as likely to use any method of contraceptives as women from Northeastern (Puntland) and Central South Zones of Somalia. A plethora of factors contribute to the country's low contraceptive use, including lack of resources, low literacy rate, misconception of modern birth spacing methods, fear of sterilization, lack of community awareness and education about contraceptive benefits, and most importantly a culture that frowns upon contraceptive use.[46,47,48]

Traditionally, Somalis are a very fertile society with an average fertility rate of 6.2 - 6.7 children per family. Most marriages are motivated by the prospect of having children rather than love and companionship. Most Somalis are Muslims, and Islamic teaching encourages having as many children as possible as Allah will take care of them regardless of financial status. In other words, having children is every Muslim's duty. Children are also viewed as an asset for the family and community workforce. A different viewpoint is that the high child mortality rate in low-income countries motivates parents to have more children in the hopes that at least some will survive. In the teachings of Islam, deliberate pregnancy prevention or contraceptive use is only allowed if the mother's life is in danger. However, the spacing of pregnancies up to two years is acceptable and recommended. There are traditional and religiously acceptable ways to space pregnancies including breastfeeding for the first two years of life. Impediments to contraceptive

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[46] Darroch, J. E., Singh, S. (2013). Trends in contraceptive need and use in developing countries in 2003, 2008, and 2012: an analysis of national surveys. Lancet, 381: 1756–62.

[47] Stover, J., Ross, J. (2010). How Increased Contraceptive Use has Reduced Mortality. Maternal and Child Health Journal (2010) 14, 687–695 DOI 10.1007/s10995-009-0505.

[48] UNDP. (2012). Improve maternal health: Tracking progress. http://www.so.undp.org/content/somalia/en/home/mdgoverview/overview/mdg5/. Retrieved September 20, 2014.

use in Somalia will exist until these cultural and religious issues are addressed and holistically integrated into the country's contraceptive strategy. [49,50,51]

Harmful cultural practices

In addition, to the aforementioned high-risk indicators, there are harmful cultural practices that increase MMR and endanger Somali women's lives. These cultural practices include female genital mutilation (FGM), early marriage and childbearing, and the societal suppression of women. Unfortunately, these harmful cultural practices are pervasive in Somalia.[52]

FGM includes partial or complete removal of the external female genitals for non-medical reasons. There are four types of FGM (in ascending severity order) that are commonly practiced shown on Table 3. FGM health risks include: severe bleeding, infections, infertility and complications in childbirth, which increases risk of maternal and newborn deaths. According to the latest Somalia Multiple Indicator Cluster Survey (MICS) in 2006, 98% of Somali women have experienced FGM. As a measure to curb pre-marital sexual activity, FGM and adolescent marriage are commonly practiced in Somalia. According to the International Center for research on Women (ICRW), 45% of Somali girls under the age of 18 get married before their 18th birthday, and Somalia has one of the highest child (girls < 18 years of age) marriage rates in the world. Child marriage is influenced by poverty and lack of education. Girls from poor families and those with no or little education are more likely to get married before their 18th birthday. Child marriage

[49] Sorbye, I.K. (2009). A situation analysis of reproductive health in Somalia.
[50] http://islamqa.info/en/13492. Retrieved August 8, 2014.
[51] http://www.missionislam.com/family/familyplanning.htm. Retrieved August 8, 2014.

increases the risk of HIV, sexual and physical abuse, and pregnancy. In fact, pregnancy is the leading cause of death for girls 15-19 years of age worldwide. [53,54,55,56,57]

Table 3: Types of FGM

Type	Description
Type I	Clitoridectomy, or 'sunna'. The hood of skin that sits over the clitoris (prepuce) is removed. The clitoris may or may not be removed in part or in total.
Type II	Clitoridectomy, 'sunna' or excision and circumcision. The entire clitoris is removed. The inner lips (labia minora) are either partially or totally removed.
Type III	Infibulation, Somalian circumcision or Pharaonic circumcision. The external genitals are partly or totally removed and the wound stitched together, leaving a small gap to allow the passage of menstrual fluid and urine.
Type IV	Other practices including piercing, cauterising, scraping or using corrosive substances designed to scar and narrow the vagina

Adopted from: General Assembly resolution 34/180 of 18 December 1979.

Societal suppression of women leads to women's lack of decision-making authority. Therefore, their husbands, brothers, mothers and mother in-laws make all of the important decisions for them, including the decision to seek emergency obstetric care during pregnancy complications. Women's lack of decision-making authority exacerbates the indecision or the delay to seek care and increases women's risk of maternal morbidity and mortality.[58]

Summary

Maternal mortality risk factors are extremely complex and require a comprehensive approach that addresses difficult social issues such as poverty, women's status, and education. Similarly, the link between the low levels of the leading determinants for maternal mortality and the "three delays" can easily be identified, whether it is the impact of low health expenditure on

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[53] UNICEF. (2006). Somalia MICS 2006 Report: Multiple Indicator Cluster Surveys (MICS) and Millennium Development Goals (MDG). http://www.childinfo.org/mics/mics3, retrieved August 17, 2014.
[54] WHO. (2014). Female genital mutilation: Fact sheet N°241. http://www.who.int/mediacentre/factsheets/fs241/en/, Retrieved August 17, 2014.
[55] WHO. (2008). Classification of female genital mutilation.
[56] Better health Channel. (2013). Female genital mutilation (FGM). http://www.betterhealthchannel.com.au. Retrieved August 17, 2014.
[57] http://www.icrw.org/child-marriage-facts-and-figures. Retrieved August 17, 2014.
[58] Sorbye, I.K. (2009).A situation analysis for reproductive health in Somalia.

health care system or how the lack of girls' empowerment leads to limited decision making authority for women. Each, in turn, increases the likelihood for one or more of the "three delays". All of these, coupled with harmful cultural practices, could explain Somali's high maternal mortality rate.

Purpose of the study

There is a paucity of research examining birth attendants' perceptions/beliefs of MMR and the associated risk factors both on a global level as well as within Somalia. Birth attendants, a fundamental stakeholder in maternal health, seem to be missing from the maternal mortality discussion. Of course, there is countless research examining their practice, belief, knowledge and attitudes in relation to safe childbirth, and there is an ongoing debate whether TBAs should be integrated in to the formal health system or not, however they are not being included in the discussion. We could not find any study that asks birth attendants' input on how to reduce maternal morbidity and mortality. TBAs are always at the center of the maternal health discussion, but are rarely represented in the discussion.[59,60,61]

The goals of this study are a) to investigate birth attendants' perception of maternal mortality rate and the associated risk factors in Abudwak and the surrounding villages, b) to solicit birth attendants' input on how to improve maternal mortality in this district, and c) to compare perceptions of birth attendants with perceptions of key informants and ultimately with globally

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[59] Verderese, M. D. (1975). The Traditional birth attendant in maternal and child health and family planning: A guide to her training and utilization. WHO, Geneva.

[60] Vyagusa, D.B., Mubyazi, G.M., & Masatu, M. (2013). Involving traditional birth attendants in emergency obstetric care in Tanzania: policy implications of a study of their knowledge and practices in Kigoma Rural District. *International Journal for Equity in Health*, 12 (83), 1-14.

[61] Sibley, L., Sipe, T.A, & Koblinsky, M. (2004). Does traditional birth attendant training improve referral of women with obstetric complications: a review of the evidence. Social Science & Medicine, 59, 1757–1768. doi:10.1016/j.socscimed.2004.02.009.

known maternal mortality risk factors. Another goal is to identify other key maternal mortality indicators such as availability of SBAs, birth attendants' educational background, and referral practices of complicated pregnancies to higher levels of medical care.

Significance and rationale

Birth attendants, especially TBAs are the first line of contact for the majority of pregnant Somali women and their number one choice for childbirth assistance. Thus, TBA's expertise, competency and perception of maternal mortality risk factors have a direct impact on maternal mortality. However, birth attendant's perception of maternal mortality rates and associated risk factors and their potential implications for maternal mortality have not been studied in Somalia. Knowledge of maternal mortality risk factors, their implications, and management are vital skills for birth attendants. Furthermore, if birth attendants perceive that maternal mortality is high in their community, they may have heightened awareness about risk factors and may be able to more effectively manage birth complications. Conversely, if they are unaware of MMR they may be less likely to improve their knowledge and competence and will not be able to change their practice to improve maternal outcome. This study is important because it identifies birth attendants' experience, educational background, referral practices of complicated pregnancies, and their perception of maternal mortality rates and associated risk factors in the target area. In addition, it brings to the surface very important, yet neglected stakeholder's (birth attendant) ideas on how to improve maternal mortality in their community. Current findings are significant for strategies to reduce maternal mortality in Abudwak and the surrounding villages and may be extrapolated to the rest of Somalia and other areas in SSA. Lastly, the identification of birth attendants' competence gaps will aid in informing future maternal health policies, funding allocation, and MMR reduction strategy, prioritization, and advocacy.

Theoretical framework

Figure 6: Analyzing the determinants of maternal mortality: Birth attendants' perception
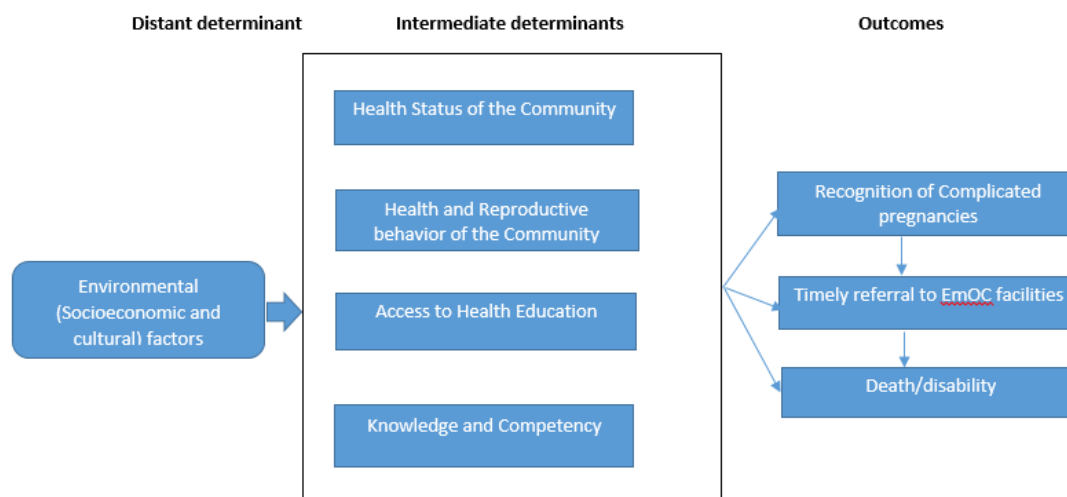
Adopted from: McCarthy, J., & Maine, D. (1992). A Framework for Analyzing the Determinants of Maternal Mortality.

The theoretical framework used for this study is adopted from McCarthy and Maine's 1991 framework for "analyzing the determinants of maternal mortality". However, it is modified to focus on birth attendants rather than the health consumers (patients). The framework on Figure 6, illustrates the basic, underlying, and direct factors that influence birth attendants' practice, perception and ultimately their handling of complicated deliveries. Environmental factors such as government stability, GDP, health expenditure as percentage of GDP, and health policy, have direct impact on community's health status, reproductive behavior, and access to education. This further affects birth attendants' education attainment, competence, their recognition of complicated pregnancies, and their timely referrals of complicated pregnancies to higher level of medical care and ultimately maternal outcome.[62]

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[62] McCarthy, J., & Maine, D. (1992). A Framework for Analyzing the Determinants of Maternal Mortality. Studies in Family Planning, 23(1), 23-33. http://www.jstor.org/stable/1966825, Retrieved June 18, 2014.

Target journal

The African Journal of Reproductive Health (AJRH) was chosen as the most appropriate Journal for this article, because of the subject and the country in which the study was conducted. AJRH is a multidisciplinary, international journal published quarterly by the Women's Health and Action Research Centre, a Non-governmental Organization in Nigeria. The journal focus includes original research and it strives to provide a forum for both international and local researchers working in Africa to share findings related to reproductive health. AJRH is indexed in Index Medicus/MEDLINE and abstracts and full-text are published online by AJOL and Bioline International. All these additional publications increase the accessibility of the article and the potential to share the study's findings with researchers, health practitioners and other stakeholders around the world. Finally, the publishing requirements for AJRH such as manuscript length which is set at 4,000 words and five pages of figures and/or tables adding up to no more than 5,000 words are clear and reasonable.[63]

Literature review

Keywords

Birth attendants, perception, attitude, maternal mortality, risk factors, belief, knowledge, skilled birth and traditional birth attendants.

Introduction

This section of the thesis provides a thorough review of literature on birth attendants' perception, beliefs, knowledge, attitude and practice of maternal mortality rate and the associated

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[63] http://www.ajrh.info/home/. Retrieved June 18, 2014.

risk factors. Although there is a myriad of maternal mortality research that examines mothers/patients, communities and other stakeholders' perceptions, beliefs and attitudes of various maternal mortality risk factors, EmOC facility access and service quality, and EmOC utilization, there is sparse research that specifically examines birth attendants' perceptions, practice, beliefs, attitudes and knowledge of maternal mortality rate and associated risk factors.

Using the above key words, twelve studies related to birth attendants' perception, practice, belief, attitude and knowledge of maternal mortality risk factors have been identified. Eleven of the twelve studies are focused on TBAs' perceptions, practice and beliefs, and one study examined SBAs' perception, practice and belief. The methodology, key findings, and limitations of each study are summarizes on Table 4 below. This section will conclude with a discussion of how the current study relates to aforementioned previous research.

Table 4: Review of previous research

Study	Author(s)/year	Country(s)	Methodology	Key Findings	Limitations
Traditional birth attendants and their practices in the State of Pernambuco rural area, Brazil, 1996	Carvalho, et al. (1998).	Brazil	Interviewed 127 TBAs who participated in a training with Grupo Curumim in 1996, before the training. Descriptive approach using closed-ended questionnaires.	Most TBAs are Older women > 34yrs with no or little education and are very poor. Most of them have had children in hospitals and they like having children. Most of them learned to attend birth from other TBAs. 57% of them deliver babies with women laying on their back, 53% used sterilized surgical material and 37% never use gloves while delivering.	Only women who came to participate in the TBA training were interviewed. This group of TBAs may be different than those who did not attend. Also, only one type of data collection tool (closed-ended questionnaires) was used, which could impact the studies validity.
The Beliefs and Practices of Traditional Birth Attendants in the Manxili Area of KwaZulu, South Africa: A Qualitative Study	Selepe and Thomas. (2000).	South Africa	**Sample:** 7 Zulu BTAs. **Data collection**: Qualitative study using, individual semi-structured interviews, simulations and nonparticipant observational checklist.	**Beneficial Customs—Prenatal Period:** TBAs prohibited alcohol and smoking during pregnancy, estimated gestational period by lunar months and advised pregnant women to seek antennal care. **Beneficial Customs—Labor and Delivery:** All TBAs confirmed labor by checking for slightly blood-stained mucous, washed their hands with soap and boiled water before vaginal examination.	Very small sample sizes.

Study	Author(s)/year	Country(s)	Methodology	Key Findings	Limitations
				Harmful Customs—Labor and Delivery: TBAs encouraged women to take traditional medicine, cut the cord with unsterile instrument, milk the cord and resuscitated babies unsafe ways.	
Recognition of High Risk Pregnancies and Referral Practices among Traditional Birth Attendants in Mkuranga District, Coast Region, Tanzania	Hussein and Mpembeni (2005)	Tanzania	504 TBAs from randomly selected 11 wards and 50 villages of Mkuranga District were interviewed using a questionnaire that contained both close and open-ended questions.	Majority of the TBAs in Mkuranga District are over 50 years of age, have no formal education, have very little midwife training, have been practicing about 15 yrs. and have learned their skills from female relatives. All TBAs have very low recondition of pregnancy and delivery danger signs, they all transfer complicated pregnancies to higher level of care, however trained TBAs were more likely to refer complicated pregnancies than non-trained TBAs	None found
Practices of skilled birth attendants during labour, birth and the immediate postpartum period in Cambodia	Ith, et al. (2013)	Cambodia	A descriptive qualitative design was undertaken using a naturalistic inquiry approach. Purposefully selected sample of SBA from Public maternity settings in the provincial hospital, two	Average age of respondent was 44yrs and most of them had 10 yrs. The practices of skilled birth attendants in one province of Cambodia are not always consistent with recommended technical guidelines. Factors	Since, respondents volunteer to participate they might not represent all of the SBA in the target area. Also it is not clear from

Study	Author(s)/year	Country(s)	Methodology	Key Findings	Limitations
			referral hospitals and two health centers in one province of Cambodia were invited. Total of 25 (8 primary midwifes, 13 secondary midwifes, 1 nurse and 3 doctors) SBA voluntarily responded and participated in the study. Data was collected using individual in-depth interview and focus group discussions.	affecting SBA practice included financial pressures, staff workload, fear of lawsuits unreliable drug supply and poor facilities. Also, individual factors such as knowledge, attitudes And skills and intractable systemic factors, including; in adequate remuneration and financial incentives provided by the government for services influenced SBA behaviors.	the article what the respond rate was (low, normal, or high).
Practices of Traditional Birth Attendants in Machakos District, Kenya	Kaingu, et al., (2011).	Kenya	Cross-sectional study of the practicing TBAs (men and women) in the target area. Systematic random sampling method was used to identify 200 TBAs and their clients (women who had home birth in the last 3-months. Structured questionnaires, key informant interviews and focus group discussions were used to collect data.	Majority of TBAs (84%) were female. Most TBAs (male and female) were over 40 years of age, were married (63 vs. 68.8%), had more 4-6 children (67.8 vs. 75%), male TBAs had higher education attainment than female TBAs and female TBAs had attended to more pregnant women then male TBAs (75% of female TBAs attended over 200 pregnancies vs. 6.2% of male TBAs). Significant number of TBAs used herbal remedy rather than refer pregnancy complication to a higher level of care. TBAs with primary education or	None found

Study	Author(s)/year	Country(s)	Methodology	Key Findings	Limitations
				higher referred more complicated pregnancies to hospitals than TBAs without formal education. TBAs hardly used gloves when helping mothers during parturition.	
Maternal and newborn care: practices and beliefs of traditional birth attendants in Sindh, Pakistan	Fatmi, et al., (1998).	Pakistan	Between September to November 1998, 17 TBAs, 6 community members, 2 hakim and 4 staff members of rural health centers were interviewed. Also, focus group discussions were hosted with TBAs.	All TBAs were female, married or widowed, with no formal schooling and of low socioeconomic status. All had learned to deliver babies from senior TBAs. Their ages ranged from 30 to 80 years (mean age = 49 years). TBAs did not provide antenatal care and women contact them to only confirm their pregnancies. TBAs do not wash their hands or instruments or clean the perineal surface of the pregnant woman. TBAs use *"Butreeh"* medicines prepared and provided by the *hakim*.	None found
Knowledge, attitudes and practices of trained traditional birth attendants in the Gambia in the prevention, recognition and	Vaate, et al., (2002).	Gambia	The study was carried out between May and July of 2000. 12 primary health care (PHC) villages of the North Bank East Health Division, The Gambia, West Africa. Twenty-two TBAs were identified in the 12 PHC villages supervised by two of the CHNMs. Semi-structured	Most TBAs were middle-aged or elderly, illiterate, were trained by relative female TBAs, were widowed and had given birth to several children. All TBAs had initial training sometime from 1980 to 97 and most of them attended continued education programs. The training about the essential actions in the third	As noted by the authors' respondents' answers might have been biased (providing information the data collects might want to hear).

Study	Author(s)/year	Country(s)	Methodology	Key Findings	Limitations
management of postpartum hemorrhage			interviews and group discussions were used. Interviews took place in the homes of the TBAs and took 45-60 minutes.	stage of labor was well understood and incorporated in most TBAs' practice. The TBAs seem capable of recognizing dangerous situations such as retained placenta and PPH and they were aware of the need to refer these women to a health facility	
Characteristics of traditional midwives and their beliefs and practices in rural Bangladesh	Amin & Khan, (1989).	Bangladesh	Retrospective study using data collected by Christian Commission for Development in Bangladesh (CCDB) by interviewing 242 traditional midwives from its seven multipurpose project areas in rural Bangladesh before they participate a midwifery training in 1986.	Majority of TBAs were over 30, married or widowed, had no formal education, had low socioeconomic status, had more than 5 years of experience and learned their midwifery skills from female relative TBA. Majority (80.1%) did not mention any sign of complication during pregnancy. All TBA tied the umbilical cord of the newly born baby by thread. Majority (61.4%) of them did not sterilize the thread and most use razor blade to cut the cord. Midwifes used varies methods to pull the placenta (put hands in the womb, induce vomiting, etc.) and they impose dietary restrictions during and after pregnancy.	None found.

Study	Author(s)/year	Country(s)	Methodology	Key Findings	Limitations
Characteristics of traditional birth attendants and their beliefs and practices in the Offot Clan, Nigeria	Itina, (1997).	Nigeria	A mixture of opened and closed-ended questionnaires was administered to 52 TBAs identified in the 21 villages of the clan. Data was analyzed manually.	Majority of the TBAs were women, average age was 45, they were either married or widowed, they were illiterate and those who got TBA training (19) received it from other female TBAs in the form of apprenticeship. 98% of them agreed that there is a need for training before commencing independent practice. 88% of them wanted training conducted by government health worker and 96% of them realized need for regular monitoring. TBAs did not recognize possible causes of antepartum bleeding. Most TBAs used several clinical features to diagnose onset of labor, good progress in labor, and imminent delivery. All TBAs waited the delivery of placenta before cutting the cord and they used herbal medicine, induced vomiting, manual compression of the uterus and manual removal of the placenta.	None found
Attitudes and practices of traditional birth attendants	Nicholas, et al., (1976).	Ghana	Questionnaire was administered to a sample of the TBAs registered (all the TBAs in study Area I, and 17% of those registered in	Majority of the TBAs (94%) were illiterate, All engaged in a period of apprenticeship for starting solo practices. 34% of those interview were men,	None found

Study	Author(s)/year	Country(s)	Methodology	Key Findings	Limitations
in rural Ghana: implications for training in Africa			study Areas II and III). 60% of the TBAs in Area I were asked to demonstrate some of their diagnostic and treatment methods.	majority (79% of male TBAs were herbalist compare with 11% of female TBAs. Most TBAs prayed before beginning a consultation. Most had seen heavy bleeding during labor and believe it is due to disease in the womb and excess blood in the mother. Majority of them thought loss of more than 500ml of blood postpartum was abnormal. 58% replaced blood by giving herbal medicine and 50% referred complications of pregnancy, labor, and the postpartum period to hospitals. Most TBAs used a new razor blade to cut the Cord.	
A qualitative study of conceptions and attitudes regarding maternal mortality among traditional birth attendants in rural Guatemala	Roost. et al., (2004).	Guatemala	13 TBAs from 11 villages in San Miguel Ixtahuaca´n were interviewed between June and July of 2002. Interviews included semi-structured, thematic, open-ended Questions. All interviews were tape recorded, transcribed and systematically analyzed.	Pregnant women rather than the traditional birth attendants make the decision of how to manage a complication, based on moralistically and fatalistically influenced thoughts about the nature of complications, in combination with a fear of caesarean section, maltreatment and discrimination at the hospital level.	Sample selection is not clear.
Involving traditional birth attendants in	Vyagusa, et al. (2013)	Tanzania	157 TBAs were identified from several villages in 2005, interviewed and observed on	57.3% of TBAs were aged 50+, 50% had no formal education.	None found

Study	Author(s)/year	Country(s)	Methodology	Key Findings	Limitations
emergency obstetric care in Tanzania: policy implications of a study of their knowledge and practices in Kigoma Rural District			their knowledge and practice in relation to EmOC. Quantitative and qualitative techniques were used for data collection and analysis depending on the nature of the information required	71.2% of them attended complicated pregnancies, 58% knew symptoms and signs of pregnancy complications. 5.7% of them knew little about HIV risk during delivery. 21.1% reused gloves of successful deliveries. 27.6% of them used unsafe delivery materials (herbs and pieces of cloth) to protect themselves against HIV. .	

Summary

The aforementioned studies are similar in general design, topics of investigation, target population, and most conclusions. All investigate birth attendants' perceptions, belief, practice, attitude and knowledge of maternal and newborn health, but utilize different methodology. Similarly, their target populations were birth attendants. Yet, these studies are considerably different in their target geographical area and methodology. Geographically the studies are predominantly from Africa (7/12 or 58%) and Asia (3/12 or 25%) and the rest are from Central (1-Guatemala) and South (1- Brazil) America. All of the seven studies from Africa are from countries in SSA, which is encouraging, since SSA accounts for 56% of the world's maternal mortality and TBAs attend the majority of births. This is an indication that these countries and the continent in general are aware of their extremely high maternal mortality rates and are working to ascertain its root causes, so they can reduce maternal mortality. The fact that most of the previous research is from low-resource countries and predominantly from Africa, especially in SSA, has been extremely helpful in the design of the current study. Somalia shares many socio-economic, demographic, health infrastructure, political and developmental characteristics with most of the SSA countries. There are marked differences among the previous studies' methodologies, therefore the current study does not adhere or exclusively use anyone of the aforementioned methodologies.[64]

A majority of the studies used descriptive mixed method research and they utilized a host of data collection methods (e.g. individual respondent interviews, in-depth interviews, key informant interviews, focus group discussions, simulations and observations). Various tailored

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[64] Khan K. S., Wojdyla, D., Say, L., Gülmezoglu, A. M., Van Look, P.FA. (2006). WHO analysis of causes of maternal death: a systematic review. Lancet, 367, 1066–74, DOI: 10.1016/S0140-6736(06)68397-9.

data collection tools such as questionnaires, interview guides, and checklists designed to complement one-another and strengthen findings were used as well. In contrast, sample size and recruitment of target audience was not similar in these studies. The greatest difference was the size of the respondents ranging from 7 to 504 and an average of approximately 115 respondents as evident on Table 4. This could be explained by the target areas differences in land mass and population and the number of birth attendant's in each target area. Even though purposeful sampling method emerges as the prevailing recruitment method, there is some variation among the studies. Some engaged census sampling where all the birth attendants were identified and uniformly interviewed. Others employed purposeful and convenient sampling methods.

The current study's purpose is to investigate birth attendants' perception of maternal mortality rate and the associated risk factors in Abudwak and the surrounding villages. It uses a descriptive mixed method approach and employs individual in-depth interviews and observation with birth attendants and key informants. Questionnaires and interview guides were used to collect data. Recruitment of respondents and the sample size for this study were influenced by pre-set geographical perimeter and the availability of birth attendants in the target area (see methodology section).

Data collection, analysis, and result

Methodology

Very few studies globally and regionally have examined perceptions of birth attendants regarding maternal mortality rate and associated risk factors, and none have enlisted birth attendants' input on how to improve maternal mortality. The proposed study is informed by a thorough review of previous research and sparse maternal, child and general health assessments

and/or studies in the target country. Emory Institutional Review Board (IRB) deemed this study exempt from further IRB review and approval (see appendix A). A mixed method approach that collects both quantitative and qualitative data has been used. In-depth interviews and observation were used to collect data. Each respondent signed an oral informed consent form before conducting an interview (see appendix B).

Design

The study target area is in a remote part of Somalia where most of the population lives in rural or nomadic settings. It was hard to ascertain the exact number of birth attendants in the district and it was difficult to reach all of the birth attendants in this district due to time, resources and security constraints. Therefore, probability sample method was not used, instead, purposive sampling method that combined both convenient and snowball sampling methods was used.[65]

Sampling frame

The estimated number of birth attendants (less than 40 birth attendants) in the target area was used as the sampling frame.

Sample size

21 birth attendants and 6 key informants (government, health, community, and local organization leaders) in Abudwak and in a 30-mile radius were interviewed. The 27 respondents represented six Abudwak cities and four nearby villages.

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[65] Price, M. (2013). Convenience Samples: What they are, and what they should (and should not) be used for. Human Rights Data Analysis Group [HRDAG]. https://hrdag.org/convenience-samples-what-they-are/. Retrieved September 30, 2013.

Inclusion and recruitment

Only individuals identified by the community as birth attendants (skilled or traditional) or government or health officials and community leaders were interviewed. Since the target population was predefined (birth attendants and key informants) and there was no registry or other systematic way to identify all of the target population in the target area, participants were recruited with the help of a community gatekeeper (the Mayor of Abudwak) and referrals from respondents utilizing a snowball sampling method. The mayor introduced the author to the local health officials and hospital and health clinic managers. Each of the new acquaintances was asked if they would like to participate in the study (see appendix C), and if he/she could introduce the author to the birth attendants in their facilities. Similarly, each birth attendant was asked if he/she would like to participate in the study and if he/she knew other birth attendants who could participate in the study as well. This snowball method of recruitment continued until the majority of the birth attendants in the target area were contacted. Thirty two birth attendants and 10 key informants were contacted and 21 birth attendants and six key informants were interviewed. The rest of them could not participate for various reasons (e.g. lack of time, lived far away, did not want to talk to anyone, security concerns, etc.). The recruitment was performed both by phone and in person depending on how far the respondent lived from the author. Also, respondents' availability, if they had access to phone, and if the contact person had their phone number or not influenced the mode of contact with the respondents. Key informants were recruited using snowballing method as well. Three health officials and hospital and clinic managers that the mayor introduced the author to were among the key informants. Other respondents also referred the rest to us, because they were community leaders that advocated for women and children.

Procedures

A semi-structured in-depth interview in different settings, such as respondent's home, workplace, or an agreed upon meeting place depending on each interviewee's preference were conducted. Interviews were conducted in Somali (see Appendix F and G). Similar questionnaires and interview guides were used for all birth attendants regardless of their background (skilled or traditional). Slightly different interview guides and questionnaires were used for key informants. The interview consisted of closed-ended questions and an interview guide (see Appendix D and E). Each interview lasted approximately 20-30 minutes. The interviewer noted on the questionnaires/interview guides the respondent's characteristics, emotions, and information she observed and thought were important to the study. In-depth interviews were recorded or noted on the interview guide. Eleven of the respondents did not want their voices recorded.

Data analysis

The majority of the target audiences (21 birth attendants and 6 key informants) in the target area were interviewed. This approach is meant to increase the likelihood of interviewing somewhat representative sample of the target population. Similarly, interviewing as many birth attendants and key informants as possible allowed for collecting a diverse and representative maternal mortality rates and associated risk data from the target area. In turn this improved the quality of the data.[66]

Data management and statistical analysis

Data from the closed-ended questionnaires was entered into SPSS data editor and SPSS analysis software was used to analyze the data. In particular, descriptive data analysis options,

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[66] Taylor, S. J., Bogdan, R., (1998). Introduction to Qualitative Research Methods: A Guidebook and Resource. New York, NY: John Wiley & Sons, INC.

such as frequency, cross tabulation and correlations to analyze the distribution of the data and summarize the study findings were used. Frequency allowed for the identification of respondents' education level, experience, how long they lived in the community, if they have children, etc. This answered questions like how many of the respondents have a four-year college education or equivalent. On the other hand, cross-tabulation was used to investigate if there was a relationship between birth attendant's formal education, years of experience, number of deliveries assisted in 2013, their referral practices and the numbers of maternal death they encounter in 2013 during delivery or in the following 42 days.[67,68]

Data from the in-depth interviews and the observations was transcribed by the author. Thematic content analysis of transcribed interviews and observations was used. Textual data was thoroughly read and emerging themes were identified and annotated. Further analysis of the emerging themes allowed for categorization of the themes. Since nearly half of the in-depth interviews were not recorded, manual content analysis was used to analyze the in-depth interviews responses. Findings from the demographic data, in-depth interviews and observations, when combined revealed respondents' perception of maternal mortality rate and associated risk factors in this district influenced by their live and work experiences.

Results

A total of 27 respondents were interviewed (21 birth attendants and 6 key informants). All of the birth attendants were female. The key informants were comprised of 4 males and 2 females. Although age and income were not specifically assessed, observations indicated that the majority

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[67] UCLA. (2013) Descriptive statistics. http://www.ats.ucla.edu/stat/spss/modules/descript.htm. Retrieved September 25, 2013.
[68] Walker, I. (2010). Research Methods and Statistics. New York, NY: Palgrave Macmillan.

of birth attendants were between 40 – 60 years of age and of a low socio-economic status. Similarly, the majority (5/6) of key informants were also approximately between 40-60 years of age accept for one respondent who was in his early 30s, but they were of a higher socio-economic status than birth attendants.

Birth attendants' characteristics

As shown on the frequency tables 1-11, most of the birth attendants had no formal education (76.2%), lived in the town/village they practice at over 10 years (81%), had more than ten years of experience (81%), assisted over ten births in 2013 (90.5%), had children of their own (95.2%), had more than five children (95.2%), referred (71.4%) complicated pregnancy to higher level of care and had experienced miscarriage and/or miscarriage and stillbirth (57.1% and 14.3% respectively). One birth attendant had less than 8th grade education, one had 9th to 12th grade education, two had some college or technical training less than two years and one had a two-year nursing and or midwifery degree or diploma. Women did not make the decision to be referred to higher medical care for themselves. Greater than half (12/21) of the birth attendants made the decision to refer women to higher medical care, however they also noted that ultimately it is up to the women's family, in particular the husband whether to take them or not, since birth attendants do not have the resources or the authority. Eight of the birth attendants said the women's husband is the decision-maker and only one birth attendant said women make the decision for themselves. Six of the birth attendants did not refer any complicated pregnancies in 2013, eleven referred one to five complicated pregnancies, two referred between six and ten complicated pregnancies, and two referred more than ten complicated pregnancies. The majority of the birth attendants (90.5%) knew one or more signs of complicated pregnancies (e.g. abnormal presentation, placenta problems, anemia, blood loss, etc.). Over 50% of them knew three or more complicated pregnant

signs and the most recognized complicated pregnancy risk factors identified were a) placenta problems, b) abnormal presentation, c) prolonged labor, d) bleeding, e) anemia, and f) eclampsia. There were only two birth attendants who did not know any signs of complicated pregnancies. As indicated on 12, 65% (11/17) of birth attendants with no formal education and those with less than 8th grade education combined referred women with complicated pregnancies to higher medical care and 35% of them admitted to encountering a maternal death of a patient during labor or the following 42 days in 2013. Conversely, 100% of birth attendants with 9th grade and higher education referred women with complicated pregnancies to higher medical care and they have reported zero maternal death in the same year.

Frequency tables 1-11

Table 1: Year lived in town (YRLTOWN)

Valid Responses	Frequency	Percent (%)	Valid %	Cumulative %
a. < 5 years	1	4.8	4.8	4.8
b. 5-10 years	3	14.3	14.3	19.0
c. >10 years	17	81.0	81.0	100.0
Total	21	100.0	100.0	

Table 2: Years attending birth

Valid Responses	Frequency	Percent (%)	Valid %	Cumulative %
b. 1-5 years	2	9.5	9.5	9.5
c. 6-10 years	2	9.5	9.5	19.0
d. > 10 years	17	81.0	81.0	100.0
Total	21	100.0	100.0	

Table 3: Level of education (LOFEDU)

Valid Responses	Frequency	Percent (%)	Valid %	Cumulative %
a. No formal education	16	76.2	76.2	76.2
b. <8th grade	1	4.8	4.8	81.0
c. 9th to 12th grade	1	4.8	4.8	85.7
d. Some coll. /tech. training. < 2 yrs.	2	9.5	9.5	95.2
e. 2 yrs. degree/dip.	1	4.8	4.8	100.0
Total	21	100.0	100.0	

Table 4: Children (CHLDRN)

Valid Responses	Frequency	Percent (%)	Valid %	Cumulative %
Yes	20	95.2	95.2	95.2
No	1	4.8	4.8	100.0
Total	21	100.0	100.0	

Table 5: Number of children (NOFCHLDRN)

Valid Responses	Frequency	Percent (%)	Valid %	Cumulative %
f. More than 5	20	95.2	95.2	95.2
g. N/A	1	4.8	4.8	100.0
Total	21	100.0	100.0	

Table 6: Pregnancy outcome (PREGOUTCOME)

Valid Responses	Frequency	Percent (%)	Valid %	Cumulative %
b. miscarriage	12	57.1	57.1	57.1
c. Both	3	14.3	14.3	71.4
d. Neither	5	23.8	23.8	95.2
e. N/A	1	4.8	4.8	100.0
Total	21	100.0	100.0	

Table 7: Number of births assisted (NBRTHASST)

Valid Responses	Frequency	Percent (%)	Valid %	Cumulative %
a. <5	1	4.8	4.8	4.8
b. 5-10	1	4.8	4.8	9.5
c. >10	19	90.5	90.5	100.0
Total	21	100.0	100.0	

Table 8: Number of referrals (NOREFERRAL)

Valid Responses	Frequency	Percent (%)	Valid %	Cumulative %
a. None	6	28.6	28.6	28.6
b. 1-5	11	52.4	52.4	81.0
c. 6-10	2	9.5	9.5	90.5
>10	2	9.5	9.5	100.0
Total	21	100.0	100.0	

Table 9: Referral signs (REFSIGNS)

Valid Responses	Frequency	Percent (%)	Valid %	Cumulative %
j. a, b, & d	1	4.8	4.8	4.8
k. d, b, & c	3	14.3	14.3	19.0
l. a, b, c, & d	1	4.8	4.8	23.8
m. b, c, e, & f	1	4.8	4.8	28.6
n. b, e, & f	1	4.8	4.8	33.3
o. b & c	3	14.3	14.3	47.6
p. a & b	1	4.8	4.8	52.4
r. do not know any signs	2	9.5	9.5	61.9
c. Prolonged labor	3	14.3	14.3	76.2
g. a, b, & c	3	14.3	14.3	90.5
h. c, d, & f	1	4.8	4.8	95.2
i. a, b, d, & e	1	4.8	4.8	100.0
Total	21	100.0	100.0	

Table 10: Referral decision

Valid Responses	Frequency	Percent (%)	Valid %	Cumulative %
a. The mother herself	1	4.8	4.8	4.8
b. Her husband	8	38.1	38.1	42.9
e. You/ other prof.	12	57.1	57.1	100.0
Total	21	100.0	100.0	

Table 11: Number of mothers died (NOFMDEID)

Valid Responses	Frequency	Percent (%)	Valid %	Cumulative %
a. None	15	71.4	71.4	71.4
b. 1-5	4	19.0	19.0	90.5
c. 6-10	2	9.5	9.5	100.0
Total	21	100.0	100.0	

Table 12: Level of education and referral cross tabulation

LOFEDU	NOREFERRALS				
	a. None	b. 1-5	c. 6-10	d. > 10	Total
a. No formal education	5	9	1	1	16
b. <8th grade	1	0	0	0	1
c. 9th to 12th grade	0	1	0	0	1
d. Coll. /tech. trnng < 2 yrs.	0	0	1	1	2
e. 2 yrs. degree/dip.	0	1	0	0	1
Total	6	11	2	2	21

The in-depth interview revealed that fourteen of the birth attendants became birth attendants by accident. In other words, they did not plan to become a birth attendant; rather, they were put in a situation where they had to deliver a baby without previous experience. They often had this experience at a very young age and continued to practice after the initial incident. One of the respondents summed this up by saying "*I was a young woman the first time I helped someone give birth. I dropped the baby because I did not know what I was doing. I did not want to be a birth attendant, rather it was unexpected situation that happen to me*" (6TBAUbax). Four of the birth attendants wanted to become birth attendants as girls and consequently were the only birth attendants with 9th grade or higher education. Becoming a birth attendant was a rite of passage for the remaining three birth attendants because all the women in their families were birth attendants and they learned from their mothers or grandmothers.

Birth attendants' perceptions

When asked what they thought of the maternal mortality status of Abudwak and the surrounding villages, four (19%) of the birth attendants thought maternal mortality was very high, twelve (57%) thought it was high, four (19%) thought it was normal and one (5%) birth attendant thought it was low.

Birth attendants gave a plethora of answers when asked about factors they thought caused or contributed to maternal mortality during labor or the following 42 days. Their answers were categorized into nine main themes including: Act of Allah (God), blood issues, challenges getting to the hospital, delivery issues, eclampsia, general health issues, lack of competent health professionals, lack of nutrition and others. Risk factors were listed in the general health care issues if they were systematic health issue and were mentioned less than four times. Some of the more pronounced general health care issues included women not getting antenatal care and malpractice. Similarly, factors were listed in the other category if they were distal behavioral or environmental factors, such as poverty, insecurity, suspicious about medicine, etc. Three of the categories had overwhelming responses, which were: lack of nutrition, lack of competent health professionals, and act of Allah. Lack of nutrition led the list with 16 entries of which twelve of them were "anemia", few respondents mentioned both anemia and lack of nutrition or being weak, which were counted as one entry. Many of the birth attendants echoed birth attendant 6TBAUbah's thoughts about anemia's effect on pregnant women, when she said, *"if a person is anemic and weak it is hard for her to survive labor".* The second highest category was lack of competent health professionals, which had eleven entries of which ten of them were "lack of doctors". The third highest response was Act of Allah, which had eight responses. Eight out of the 21 birth attendants (38%) believed that maternal mortality was unavoidable for women who die during childbirth and the following 42 days, because it was Allah's will for them. Some of these birth attendants mentioned other contributing risk factors, such as anemia and lack of physicians, however they believed ultimately it was act of Allah that women died during labor and the following 42 days, as elaborated by birth attendant 4TBAHodan *"It was their time, no one can stop when the time comes, and if they have more time left for them they would not have died"*. Act

of Allah as a maternal mortality risk factor was unexpected because it is not in the literature and it is outside the known medical, behavioral, and environmental maternal mortality risk factors. This new discovery led to further investigation of what it "act of Allah" meant and what were the characteristics of the birth attendants who cited.

When questioned about what they thought were the most important factor (s) that need to be improved in order to improve the maternal mortality rate for their town/village and the district in general, lack of competent health professionals and lack of nutrition were the top two factors. Lack of competent health professionals was number one this time with seven responses, followed by lack of nutrition, which had six responses. The third response was not answered or skipped questions, which had four entries.

Finally, when their suggestions were solicited on how to improve the most important factor(s), birth attendants gave a variety of answers, however one third (33%) of them did not answer this question. The rest of the responses included training birth attendants and other medical staff (24%), improve women's nutrition (14%) and general health issues (29%) such as increase pregnant women's awareness and antenatal care use and to rebuild health care system and health facilities.

The above-mentioned perception results are general and do not differentiate the perception of different types of birth attendants. The types of birth attendants who participated in the study and whether there were differences among their perceptions as it related to the in-depth interview guide will be explored on the next section.

Different types of birth attendants

Initially, the author presumed she would only encounter traditional and skilled birth attendants, however after the first week of interviews it was apparent that there were trained traditional birth attendants (TTBA) in the target area as well. In fact, 50% (9/18) of the unskilled birth attendants who participated in the study received at least one midwifery seminar/training since they started practicing. This encouraged examining not only the maternal mortality rate and associated risk factors perception and practice differences of TBA and SBA, but also the maternal mortality rate and risk factor perception for all three groups (TBAs, TTBAs and SBAs) and key informants. In this context, birth attendants who do not have any (formal or informal) midwifery or other medical training are considered TBAs. Birth attendants who do not have formal midwifery or other medical education and or training but who received some type of informal modern medical training (1-6 months) that aims to reduce maternal and child mortality and improve reproductive health are considered TTBA. Conversely, birth attendants who have formal midwifery or other medical training that lasted between one to two year and who are educated and trained proficiently in the skills needed to handle normal childbirth and the immediate postnatal period are consider SBA. [69,70,71, 72]

TBAs' perception

Nine (43%) of all the birth attendants and 50% of the none-skilled birth attendant were consider TBAs since they had no formal education or any midwifery or other medical training. All

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[69] http://www.unfpa.org/public/mothers/pid/4383.

[70] WHO. (2004).Making pregnancy safer: the critical role of the skilled attendant: a joint statement by WHO, ICM and FIGO. Geneva.

[71] Kamal, I.T. (1998). The traditional birth attendant: a reality and a challenge. International Journal of Gynecology & Obstetrics 63 Suppl. 1, 43-52.

[72] Sibley, L.M., Sipe, T. A., Brown, C.M., Diallo, M. M., McNatt, K. & Habarta, N., (2009). Traditional birth attendant training for improving health behaviours and pregnancy outcomes. Published by John Wiley & Sons, Ltd, 2, 1 - 49. DOI: 10.1002/14651858.CD005460.pub2.

(100%) of them became birth attendants unexpectedly, as stated by birth attendant 4TBAHodan *"My neighbor was in labor one day and we could not find birth attendant anywhere, so I said I will do it. God helped me save her and her baby and that is how I became birth attendant"*, and they kept practicing because the community needed them and they needed the income they generated from delivering babies. According to birth attendant 16TBAAl-Amin *"First time I help a women. I was with women who went into labor. It was necessary and unplanned. Then the word got out and I was called to assist more women"*.

 TBAs were divided in their answers regarding maternal mortality status of Abudwak and the surrounding villages, however, their perceptions were very similar to the previous results from all the birth attendants for the same question. Two (22.22%) of TBAs thought maternal mortality was very high, four (44.44%) thought it was high, two (22.22%) thought it was normal and one (11.11%) thought it was low.

 TBAs' perceptions about factors they thought caused or contributed to maternal mortality were similar to the perceptions of all birth attendants. Lack of nutrition, lack of competent health professional and act of Allah were the three top responses. Lack of nutrition was still the number one response with six entries, however this time act of Allah was the second highest response with five entries and lack of competent health professionals was number three with only three responses. Those who cited "act of Allah" as a cause strongly belief it, as TBA16-Al-Amin put it "*People die because it is Allah's will for them, nothing else*". It is worth noting that five out of the nine (56%) birth attendant who believed "Act of Allah" was the ultimate risk factor for maternal mortality were TBAs compared 38% of all the birth attendants put together.

 When asked which risk factor(s) they thought was the most important and need to be improved in order to improve maternal mortality, some of the TBAs list more than one risk factor.

Nonetheless their responses were very similar to the previous responses from all of the birth attendants for the same topic. Lack of nutrition and lack of competent health professionals were number one, each with three responses followed by skipped or no answer category with two responses.

When they were asked what their suggestions were on how to improve the most important risk factor(s), almost half (4/9) of the TBAs did not answer this question. Two of them thought maternal mortality can be improved by improving pregnant women's nutritional status. Another two of them thought training birth attendants and other medical staff will improve maternal mortality and one of them thought if they community worked together maternal mortality will improve.

TTBAs' Perception

Half of the unskilled birth attendants and (43%) of all the interviewed birth attendants were considered TTBAs, for they had no formal midwifery or other medical training, but they had some informal training and or seminars during their practice. Unlike TBAs only five (56%) of the TTBAs became birth attendants by accident. The rest of the TTBAs wanted to become birth attendants, as pointed out by birth attendant 1TTBAHurshe who said, *"I always wanted to be a birth attendant".* Two went to school with the intention to learn midwifery, however were not able to finish school. One was trained by her mother, a traditional birth attendant herself, birth attendant 2TTBABalicad very proudly said *"My mother was a birth attendant and I wanted to become one. I learned from my mother and took a test at Burco hospital"*, and one took a six month seminar before she started practicing.

In regards to the maternal mortality status of Abudwak and surrounding villages, two of the TTBAs thought it was very high, six TTBAs thought it was high and one thought it was normal.

These results show that similar numbers of TBAs and TTBAs thought maternal morality was very high in this district, however more TTBAs (six vs. four) thought it was high, fewer TTBAs (one vs. two) thought it was normal and none of the TTBAs thought maternal mortality was low in this district.

In terms of risk factor (s) that TTBAs thought caused or contributed to maternal mortality, Lack of nutrition and competent health care professionals were still the two leading risk factors. Lack of nutrition was number one with eight responses and lack of competent health professionals was number two with five responses. This group's third highest risk factor was blood issues, which had four responses, rather than act of Allah as we previously seen with both all the birth attendants and TBAs. Act of Allah had only two responses and was fifth in this group's risk priority.

In selecting the most important risk factor(s) that needed to improve in order to reduce maternal mortality, TTBAs had mix responses. Concurrent with responses from previous groups, lack of nutrition (anemia) and lack of competent health care professionals were still in the top each with two responses. In addition, lack of health facility/health system was in the top three with two responses, which had not been list in the top three before.

Similar to TBAs almost half (4/9) of the TTBAs did not answer when they were asked what their suggestions were on how to improve the most important risk factor (s). These who answered had multiple answers, as evident by birth attendant 1TTBAHurshe response to this question *"Good doctors and pregnant women getting antenatal care while pregnant"*, yet general health issues (e.g. rebuilding health system) and the other category (e.g. Educated people like you who are from this district need to help their country and people) had most responses.

SBAs' perception

Three out 21 birth attendants (14%) were consider SBA's, for they had formal midwifery or other medical training that lasted between one to two years and they stated they were educated and trained proficiently in the skills needed to handle normal childbirth and the immediate postnatal period. All three SBAs wanted to become birth attendants and went to school for it. Birth attendant 5SBACelsucudi was animated as she *said, "I always want to become a birth attendant. I loved the maternity ward as a child. I was allowed to be a volunteer at Banadir hospital maternity while I was in school"* remembering how she became a birth attendant.

Two of the SBAs thought maternal mortality in Abudwak and the surrounding villages was high, and one thought it was normal. Similar to previous responses, SBAs thought lack of competent health professionals (three responses) and lack of nutrition (two responses) caused or contributed to maternal mortality respectively. Act of Allah, general health issues and other categories all had one response each. Some of the SBAs provided many risk factors for this topic, which included medical, environment and behavioral, for example, birth attendant 5SBACelsucudi said "(*The causes of maternal mortality include: Birth attendants' lack of experience (for instance, when the mother is brought to you, if you don't if the baby is transverse, breach, if the mother anemic and you don't know what she has, and you just sit there and wait for the baby to come, that is lack of experience. Poverty (pregnant do not have food/nutrition) and we know an antenatal mother needs to eat more nutritious foods, she doesn't have that and if she has moms are soft and she will give it to her children. Confusion/stress (lack of safety and their husbands marring other women), lack of risk recognition (e.g. referring mother for C-section if baby is abnormal presentation), mother are not aware of the pregnancy risk and challenges getting to hospital (e.g. lack of transportation).*

Like their forerunners, SBAs thought lack of competent health professionals was the most important risk factor that needed to be improved in order to improve maternal mortality rate in this district. Lack of competent health professionals had two responses followed by anemia and poor communities, which were the only other risk factors that this group mentioned, each with one response.

Skilled birth attendants had various ideas on how to improve the most important risk factor (s). One of the SBAs thought improving women's nutritional status will be the way to go, another one thought it will be to training birth attendants and other medical staff and the last SBA thought a mix method such as "*Raising pregnant women's awareness about seeing a physician early in their pregnancy and to control their diet intake*" (6SBAShimbirole), will be the answer.

Key informants' characteristics

Almost all of the key informants (5/6) lived in the town they were representing over ten years, 66.7% (4/6) of them were in their current position for over ten year and 50% of them had graduate level degree/diploma.

Key informant perceptions

In response to what they thought of the maternal mortality status of their town and in Abudwak district as a whole, key informants responses were very similar to the birth attendants' responses. The only notable difference was that none of the key informants believed maternal mortality was low in this district. Two of the key informants thought it was very high, two thought it was high and last two believed it was normal.

The majority of the key informants believed that more systematic health issues such as lack of emergency obstetric facilities and hospital and the government's inability to take health care to

every village, caused or contributed to maternal mortality in Abudwak. The second most popular risk factor for this group was lack of competent health professionals. The third most entries included items such as lack of government in the last 21 years and poverty. The key informants' point of view in the topic of maternal mortality risk factors for Abudwak and the surrounding villages was summarized by key informant from Hawalwadag city when he said *"It includes: lack of government in the last 21 years; lack of emergency obstetric and hospitals; lack of public awareness about the benefits of health care; Traditional birth attendants' lack of training and tools; and the current government's inability to take health care to every village."* (2KIHawalwadag). Lack of nutrition and act of Allah, which were number one and number three risk factors for birth attendants were not mentioned by this group.

In contrast to birth attendants' responses, when they were asked which risk factor they thought was the most important and needed to be improved in order to improve maternal mortality, key informants' number one choice was lack of competent health professionals followed by general health care issues (e.g. providing maternal and child health care in every place that people live).

Key informants suggested investment in emergency obstetric and newborn care facilities needs to occur before educating health workers and improving women's nutrition status. Similarly, this was completely different than what birth attendants in general and the different types of birth attendants responded with, which was always either improving pregnant women's nutritional status or educating health professional. However, key informants also highlighted the importance of competent health professionals by listing educating health workers as their second choice.

Discussion

The majority of birth attendants in the study area are uneducated women over 40 years of age, who have lived in the area more than 10 years. Most (95.2%) of them have had more than five children and have experienced miscarriage and/or miscarriage and stillbirth (71.4%). These birth attendants' characteristics are common in low-resource countries, particularly in Africa, and are consistent with findings from previous research in Kenya, Tanzania, Pakistan, and Gambia. Contrary to the majority of previous findings (that most TBAs receive prolonged apprenticeship before they start practicing) and similar to findings by Itina in Nigeria, the majority (14/21) of the birth attendants in this study became birth attendants unintentionally and without any prior training or apprenticeship. Key informants were very similar to birth attendants in terms of age and years lived in the community, however most of them were well educated unlike birth attendants. [73,74,75,76]

The level of education did not influence the number of births attended in 2013, since the majority of birth attendants attended more than 10 births in 2013 regardless of education level. Approximately 90.5% of the birth attendants knew at least one sign of complicated pregnancy and over 50% of them knew of at least three signs of complicated pregnancy/labor. Similar to findings from previous studies by Hussein, et al., (1998) and Kaingu, et al., (2011), both birth attendants with 9th grade or higher education and TTBAs had better recognition of signs of complicated pregnancies and higher referrals rates than TBAs. Unlike women from Guatemala, pregnant

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[73] Hussein, A.K., & Mpembeni, R. (2005). Recognition of High Risk Pregnancies and Referral Practices among Traditional Birth Attendants in Mkuranga District, Coast Region, Tanzania. African Journal of Reproductive Health 9 (1), 113-122.

[74] Kaingu, C.K, Oduma, J.A., & Kanui, T.I. (2011), Practices of Traditional Birth Attendants in Machakos District, Kenya. Journal of Ethnopharmacology 137, 495– 502.

[75] DeVaate, A.B., Coleman, R., Manneh, H. & Walraven, G. (2002). Knowledge, attitudes and practices of trained traditional birth attendants in the Gambia in the prevention, recognition and management of postpartum haemorrhage. *Midwifery* 18, 3-11, doi:10.1054/midw.2001.0289.

[76] Itina, S.M. (1997). Characteristics of traditional birth attendants and their beliefs and practices in the Offot Clan, Nigeria, *Bulletin of the World Health Organization*, 75 (6), 563-567.

women from this district have little input on whether they are referred to higher medical care or not. Over 50% of the birth attendants made the decision to refer women with complicated pregnancies to a higher level of medical care, however ultimately is up to the woman's husband whether she is taken to the hospital or not. Figure 7 below shows that one hundred percent of birth attendants with 9th grade education and higher referred complicated pregnancies to a higher level of care and they referred a higher number of women (6-10 or > 10). In comparison, only 59% of birth attendants with 8th grade education or less referred women to a higher level of care and the majority of their referrals were between 1-5 women for the year. Few of the unskilled birth attendants' noted prolonged wait times prior to referral and managed complicated pregnancies themselves. They claimed to have delivered transverse, large, and breached babies. This might explain the difference in maternal mortality between the two groups in 2013. Approximately 35% (6/17) of birth attendants with 8th grade or less education reported maternal death in 2013 compared to none of the birth attendants with 9th grade or higher education. The difference in maternal death could also be related to birth attendants' different skill sets; SBAs in general are proficiently trained to handle uncomplicated births and to recognize risk pregnancies. They are also more resourceful than unskilled birth attendants and have better access to information, allowing timely referrals to the most appropriate health facilities. For instance, all of the SBAs who participated in this study indicated they have worked in one of the local hospitals onetime in their life and had a working relationship with the area physicians.[77,78]

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[77] Ro¨o¨st, M., Johnsdotter, S., Liljestrand, J., & Esse´n, B. (2004). A qualitative study of conceptions and attitudes regarding maternal mortality among traditional birth attendants in rural Guatemala. *An International Journal of Obstetrics and Gynaecology,* 111, 1372–1377. DOI: 10.1111/ j.1471-0528.2004.00270.

[78] WHO. (2004).Making pregnancy safer: the critical role of the skilled attendant: a joint statement by WHO, ICM and FIGO.

Figure 7: Birth attendants' level of education and the number of maternal death cross tabulation
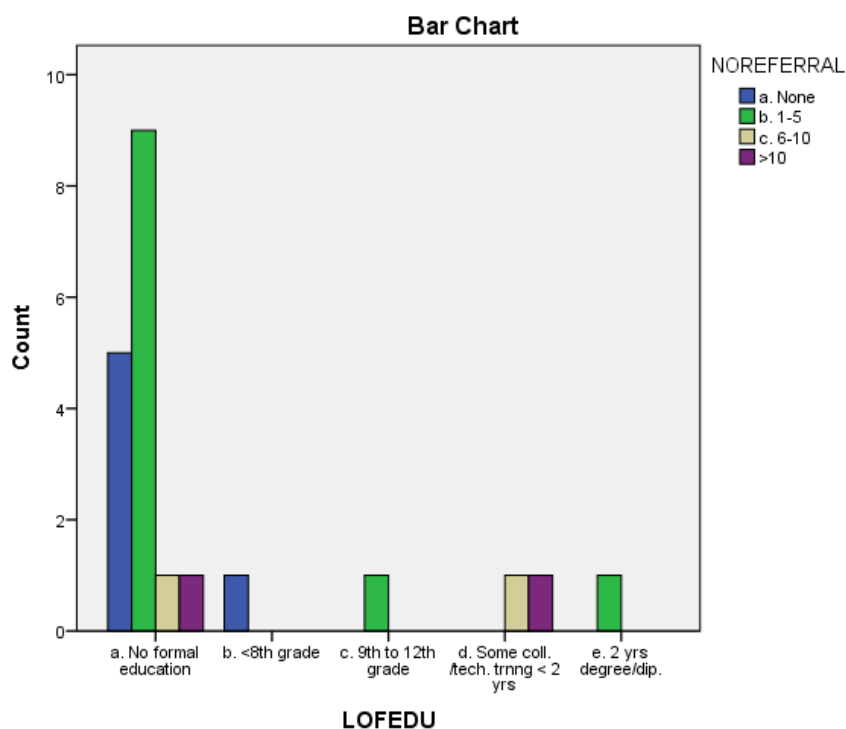
Birth attendants' perception differences of maternal mortality and associated risk factors were more obvious in the in-depth interview. Birth attendants were divided to TBAs, TTBAs and SBAs and their perception of the in-depth interview topics were compared. The majority of birth attendants thought that maternal mortality in Abudwak district was high. There was no major difference in different birth attendants' response on this topic, however, none of the TTBAs and SBAs thought birth attendant was low in this district. On the other hand, one TBA believed maternal mortality was low in this district. Overwhelmingly, birth attendants (TBAs, TTBA, and SBAs) believed that lack of nutrition and competent health professionals were the greatest risk factors for maternal mortality in Abudwak and the surrounding villages. The most noticeable maternal mortality risk perception difference noted among the different birth attendants was the mentioning of "Act of Allah". Act of Allah (God) is defined as *"an overwhelming event caused exclusively by natural forces whose effects could not possibly be prevented"* and was cited as a

maternal mortality risk factor by 38% of all birth attendants, making it the third highest response from all birth attendants. However, further analysis of different birth attendants' responses highlighted that more than half (5/9) of TBAs believed act of Allah was a major maternal mortality risk factor compared to only two TTBAs and one SBA. The above findings indicate that both formal education and TBA trainings improve birth attendants' risk recognition and reduce their acceptance of maternal death as a natural cause. Previous research by Hussein, et al found that *"trained TBAs were more likely to refer complicated pregnancies than non-trained TBAs"*. Similarly, recent qualitative research by Temesgen, et al., highlighted TTBAs ability to recognized complicated pregnancies, their referral behavior due to their training and their importance in the fight against maternal mortality. Nonetheless, it is difficult to be certain of the impact of TBA trainings on birth attendants' complicated pregnancy risk recognition and referral practices. Sibley et al, found non-significant positive association between training and TBA knowledge of complicated pregnancy risk factors and conditions requiring referral.[79,80,81,82]

Furthermore, birth attendants reported that lack of nutrition and competent health professionals are the most needed areas of improvement in order to reduce maternal mortality. Lack of competent health professionals (referred to as skilled attendance) is a globally known determinant for maternal mortality. Regardless of skill set, birth attendants in Abudwak district are frustrated with the lack of obstetricians in their towns and villages, and they frequently cited

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[79] http://www.law.cornell.edu/wex/act_of_god.

[80] Hussein, A.K. & Mpembeni, R. (2005). Recognition of High Risk Pregnancies and Referral Practices among Traditional Birth Attendants in Mkuranga District, Coast Region, Tanzania. *African Journal of Reproductive Health*, 9[1], 113-122.

[81] Temesgen, T.M., Umer, J.Y., Buda, D. S., & Haregu, T. N. (2012). Contribution of traditional birth attendants to the formal health system in Ethiopia: the case of Afar region, *Pan African Medical Journal*, 13(1):15, 1-5.

[82] Sibley, L., Sipe, T.A, & Koblinsky, M. (2004). Does traditional birth attendant training improve referral of women with obstetric complications: a review of the evidence. Social Science & Medicine, 59, 1757–1768. doi:10.1016/j.socscimed.2004.02.009.

how women and children die every day while in-route to seek emergency obstetric care in neighboring districts (e.g. Galkacyo and Hargiesa, a 7-16 hour drive in rough road conditions). There were only three trained medical doctors in the entire district in May, 2014. Unfortunately, one physician was killed in a car bomb explosion in Mogadishu in October, 2014. While medical doctors have the skills required to manage pregnancy complications, they lack many of the resources necessary for EmOC services. Other risk factors that birth attendants cited on numerous occasions were the lack of health facilities, challenges of transportation and/or distance to get women to hospitals, and cost of transportation. Like the rest of Central and South Somalia, Abudwak district has endured consistent intertribal fighting for many years. In addition, this part of the country is land-locked with minimal land access and no air or sea access. Thus, Abudwak has been both politically and geographically isolated and has received little international aid in the last 22 years. Hence, the lack of EmOC facilities (which are usually funded by international donors) is more pervasive in Abudwak than other districts in the region (e.g. Galkacyo and Dhusamareb). Distance to the nearest EmOC facilities and lack of transportation (due to poor infrastructure and prohibitive cost of transportation) both exacerbate the delay of getting to health facility on time (the second delay) and increase the risk for maternal death. There are no public hospitals in Abudwak district and the few private hospitals in the district do not provide free or low cost health services and lack emergency transportation. There are six private hospitals with diverse capacities to provide EmOC service in the study area. During the study a new hospital opened in May, 2014, which provides minimal emergency transportation free of charge. However, these emergency vehicles only function within Abudwak city limits and do not go out to the

villages. Due to lack of EmOC resources women from Abudwak are taken to other districts in the event of a complication, provided the family is able to afford transportation and care.[83,84,85]

A recent loss of a colleague has branded the inadequacy of EmOC services, especially the lack of obstetrician in this district on the minds of birth attendants. On May 18, 2014, Abudwak district suffered the tragic loss of one of its most skilled TBAs who died from complications of retained placenta after delivering a stillbirth baby girl. The author briefly met her a couple days prior to her death, and she was on bed-rest with her 13th pregnancy. In that brief encounter, she recalled that she was in high school when the civil war started in Somalia and wanted to become a midwife. Unfortunately, she did not finish high school or go to midwife school due to the civil war. However, she pursued her dream by initially voluntarily working with health organizations and acquiring multiple midwife training certificates. She was trained by and worked with Amerf Health Africa, Medecins Sans Frontieres (MSF) and the International Red Crescent, among other organizations. During the study recruitment of birth attendants, numerous birth attendants and community members recommended this individual. They described her as a warrior for maternal and child health and very competent midwife who has saved thousands of lives. Her smile, energy, and passion were her trademarks. Her death vibrated throughout the district, and she was mourned for weeks. Afterwards, most of the birth attendants interviewed used her as an example of the lack of competent physicians in the district, because she was taken to multiple hospitals before she died and none of them were able to suction the retained placenta from her.

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[83] Thaddeus, S. & Maine, D. (1994). Too far to walk: Maternal mortality in context. *Social Science Medical*, 38(8), 1091-1110.
[84] Gabrysch, S., & Campbell, O.M. (2009). Still too far to walk: Literature review of the determinants of delivery service use. *BMC Pregnancy and Childbirth*, doi:10.1186/1471-2393-9-34
[85] FSAU (2009). Post Deyr analysis, FSAU Technical Series, 17, 1-134.

Anemia as an indirect risk factor for maternal mortality is well noted in the maternal mortality literature. In the current study, the role of anemia was more prominent than in the literature. Lack of nutrition, namely anemia, was consistently number one or two in terms of listed risk factors and the most important risk factor(s) that needed to be improved. Poverty, multiple and frequent pregnancies, and low Iron supplement intake increase the risk for anemia during pregnancy. Somalia is one of the poorest countries in the world and a large percent of the population of Abudwak district are pastoralists whose occupation is herding camels, cattle and goats and are very poor. The urban community is highly dependent on livestock and economic stimulation from the pastoralist community. Food insecurity has increased in the past 10 years in particular, due to constant tribal fighting and inconsistent rainy seasons for the last 22 years. Frequent droughts have caused water shortage and diseases resulting in massive loss of livestock, which hinders the livelihood of the entire district and exacerbates food shortage. Iron supplement intake is a foreign concept to Somali women. These complex factors may explain why many pregnant women from this district are said to be anemic and are at high risk for maternal mortality.[86,87,88,89]

Key informants' perceptions on most in-depth interview topics were similar to birth attendants' perceptions. In particular, key informants' responses on many topics (e.g. maternal mortality status) were more similar to TTBAs and SBAs responses than those of all birth attendants' or TBAs. For instance, none of the key informants believed maternal mortality was low in the district or that act of Allah was a risk factor for maternal death. The perception

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[86] Alene, K.A & Dohe, A.M. (2014). Prevalence of Anemia and Associated Factors among Pregnant Women in an Urban Area of Eastern Ethiopia. *Hindawi Publishing Corporation*, 2014 (ID 561567), 1-7, http://dx.doi.org/10.1155/2014/561567

[87] http://www.statisticbrain.com/poorest-countries-by-gdp-per-capita/

[88] http://www.unsystem.org/scn/archives/rnis31/ch2.htm

[89] FSAU (2009). Post Dyer analysis, FSAU Technical Series, 17, 1-134

similarities of the TTBAs, SBAs and key informants over TBAs could still be credited to education and training, as most of the key informants are well educated. On the other hand, key informants favored rebuilding the health system and improving health care facilities over improving nutritional status in pregnancy. The difference in the two groups on how to improve the most important risk factor(s) could be explained by the difference in their roles and responsibilities and their interaction with pregnant women. Birth attendants are among the community, are respected, trusted and viewed like an elderly relative. They are the first contact and the number one choice of attendance for pregnant women from this district, especially for very poor and rural women. Furthermore, they attend to women at their homes and perform other duties such as cooking, cleaning, and childcare. This acceptance and access gives birth attendants first-hand knowledge of their patient' livelihood and economic status. Therefore, it is natural that they would want to improve pregnant women's nutritional status. On the other hand, key informants that included medical doctors and organization/community leaders have very little knowledge of the economic status and livelihood of pregnant women. However, this professional subgroup can advocate for general access to health care for the entire district and are more keenly aware of the inadequacies of the current health care system and that is why they are more focused on improving health care systems and availability of health facilities.[90]

Finally, this study indicates that birth attendants from this district are well aware of the high maternal mortality rate of their community, most of them understand the salient risk factors that contribute to the high maternal mortality rate, they are concerned about the situation and they have effective ideas on how to improve it. Moreover, most of the risk factors they cited (lack of

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[90] Kamal I.T. (1998). The traditional birth attendant: a reality and a challenge, *International Journal of Gynecology & Obstetrics*, 63 (1), 43-52

competent health professionals, lack of nutrition, poor health infrastructure, lack of health facilities, blood loss, etc.) are similar to the globally known risk factors for maternal mortality. The interventions they recommend (increasing the availability of competent health professionals and improving pregnant women's nutritional status) on how to improve maternal mortality are among the currently recommended maternal health interventions.

Limitations

This study has several limitations. Purposive sampling that combined both convenient and snowball sampling methods was utilized to recruit participants. This method increases the potential for subgroup overrepresentation in which respondents refer their friends or alike individuals. This means that those who participated in the study are potentially different than those who did not participate because they could not be reached in the same sampling method. Due to time, security and resource constraints, all the birth attendants in the area were not interviewed, although more than 50% of the estimated number of birth attendants were included in the study. In addition, the birth attendants' interviews reached the point of saturation (no new information was introduced after this point) after 15 interviews, therefore this study minimized any missed findings that could be based on the number of birth attendants interviewed. The direct word for word analysis of the transcribed interviews was limited since all of the in-depth interviews could not be recorded as planned. The recorded interviews had more details, even though they were not necessarily more relevant to interview guide topics. Nonetheless, more emotions and background information was discerned from the recorded interviews than the notes. Finally, including age and income in the

questionnaire could have provided further analysis as to how age and income impacted perceptions of maternal morality and associated risk factors.[91]

Conclusion

This study is unique in that it examined perceptions of birth attendants on maternal mortality rate and associated risk factors and invites them to think about the problem and propose a solution for it. It contrasts perspectives' of different stakeholders who practice in different settings against a backdrop of established. Congruent with previous studies, this study also found that birth attendants with education and training have better pregnancy risk recognition and higher referral rates than birth attendants with no training or education (TBAs). Furthermore, TBAs were overwhelmingly more accepting of maternal mortality as inevitable event (act of Allah) than other birth attendants. Underlying religious belief and/or a cultural practice may explain this mindset. It also, highlights the need for traditional birth attendants' training in this district. Some of TBAs are unaware of the signs of risk pregnancy and many only refer women at the last minute. Their acceptance of maternal death as inevitable event could negatively affect their perception of the value of referring women to higher medical care and can lead to inaction.

Birth attendant and key informants from this district uniformly recognized and highlighted the lack of medical doctors and other trained medical professional in the area. Birth attendants reported their patient population to be weak, anemic pregnant women with very little chance to survive a normal delivery let alone a complicated birth. Considering the consistent food crisis in Somalia and the harsh lifestyle of the target community, it is not surprising that birth attendants in

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[91] http://www.socialresearchmethods.net/kb/sampnon.php.

this district suggest improving women's nutritional status as a strategy to reduce maternal mortality.

The findings of this study highlight, a) the effect of lack of nutrition on pregnant women from the target area, b) the district's urgent need for competent health professionals, in particularly obstetricians, and c) the importance of training TBAs, as TTBA's had better pregnancy risk management than TBAs. This last point further indicates that TBAs are not culpable for maternal morality and they are not simple by standers of the fight against maternal mortality. Far-from-it, they are the only hope millions of women from Somalia and others from similar settings have at safe childbirth. TBAs genuinely care about the health of their patients, they are concern about maternal mortality and they are capable of offering sound interventions to reduce maternal mortality. Findings from this study and many previous studies show that TBAs' pregnancy risk recognition and referral practice can be improved with training. Therefore, their exclusion and alienation from the health care system is a disservice to those mothers who do not have other options. In realizing that the recommended utilization of SBAs at birth in many low-resources countries is a distant and long term goal, more pragmatic strategies that incorporate TBAs into the health system is needed in Somalia and beyond in order to reduce maternal mortality. Strategies that utilize TBA's strengths, build on their established community relationships and improve their weakness are needed. These recommendations echo Okonfua and Ogus' call for paradigm shift, which states that "African countries would need to pursue policies on integrating TBAs to formal systems of health care, not necessarily for the purpose of achieving immediate maternal mortality reductions, but to achieve scale and improved intermediate outcomes for maternal health".[92]

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[92] Okonofua, F., & Ogu, M. (2014). Traditional Versus Birth Attendants in Provision of Maternity Care: Call for Paradigm Shift. *African Journal of Reproductive Health*, 18(1), 11-15.

Further research in this area is suggested to completely understand the individual, socio-economic and environmental factors that influence birth attendants' perception and practices.

Future research

As there is very limited maternal mortality research in Somalia and none in this district, further future research is needed in many aspects of maternal mortality. More comprehensive research that takes into account the number of EmOC facilities in the district and their geographical distribution, facility functionality, knowledge and competence of the current health workers, TBA trainings availability in the area and their curriculum, TBAs' integration with the health care system, TBAs' acceptance and the willingness to participate midwifery training among other things (e.g. socioeconomic and cultural factor) is needed. In particular, further research that includes birth attendants in the maternal mortality discussion, invites their input and evaluates how, if any, training, religious belief and culture impact their pregnancy risk perception and referral practices is suggested.

Journal article

Maternal mortality rate and associated risk factors:
Perceptions of birth attendants Abudwak.

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Abstract

Somalia has the fourth highest maternal mortality ratio (MMR) in the world. The goals of this study are to investigate birth attendants' (BA) perception of MMR and the associated determinants in Abudwak, to solicit their input on how to improve it, and to compare their perceptions to globally known determinants. A mixed method was employed. Purposive sampling was utilized to recruit participants. Observation, closed-ended questionnaires and in-depth semi-structured interview data collection tools were used. Data was analyzed with SPSS data analysis software and manual content analysis. The majority of the BAs in this study were female over 40 years of age, illiterate, had over 10 years of experience, assisted > 10 births in 2013, had > five children. Current findings highlight the effect of lack of nutrition on pregnant women from the target area, the district's urgent need for competent health professionals, particularly obstetricians, and the importance of training traditional birth attendants (TBAs).

Introduction

General background

Maternal mortality is the leading cause of death for women in developing countries. Maternal mortality is defined by The World Health Organization [WHO] as "the death of a woman while pregnant or within 42 days of termination of pregnancy, irrespective of the duration and site of the pregnancy, from any cause related to or aggravated by the pregnancy or its management but not from accidental or incidental causes".[1] The world has recognized this preventable cause of death for women and the Millennium Development Goal (MDG) 5 (to improve maternal mortality) was adopted in the year 2000 at the WHO sponsored Millennium Summit. MDG5 targets are a) to reduce the 1990 maternal mortality ratio by three quarters by 2015 and b) to achieve universal access to reproductive health by 2015.[2] While the campaign to meet MDG 5 created momentum for reducing maternal mortality and several countries have been successful, maternal mortality remains high in Sub-Saharan Africa [SSA]. There were an estimated 289,000 maternal deaths in the world in 2013, of which 99% (286,000) were from developing countries. However, there are vast disparities in maternal mortality in developing countries. Sub-Saharan Africa leads the world in maternal death followed by Southern Asia accounting for (62% and 24%) maternal death respectively. Although the exact number of maternal deaths in Somalia is uncertain due to lack of national health data, the latest intra-agency maternal mortality trends report estimates Somalia to have the fourth highest maternal mortality ratio (MMR) in the world at 850 maternal deaths per 100,000 live births.[3]

Lifetime risk of maternal death which is defined by WHO as "the probability of a 15-year-old woman eventually dying from a maternal cause, assuming she is subjected throughout her lifetime to the age-specific risks of maternal death observed for a given population in a given

year", Also highlights the maternal mortality disparities among the world regions, sub-regions, and countries with in each region. This risk is directly correlated with maternal death, thus high lifetime risk of maternal death is an indicator of high maternal mortality. For example, women in the entire world have a 1 in 190 lifetime risk of maternal death. However, when the world is divided into developed, developing, regions, sub-regions and countries there are significant differences in the lifetime risk of maternal death for women in the developed (1 in 3700) and developing (1 in 152) countries, and those in Northern Africa (1 in 430) and SSA (1in 38). When compared to the women from SSA, Somali women have even higher lifetime risk of 1 in 18.[4]

Research question (s)

Maternal mortality rate, causes of death, and contributing risk factors' data are limited in Somalia and a paucity of maternal morality research has been completed in the country to date. In particular, there are no published qualitative or mixed method studies examining birth attendants' perceptions about maternal mortality rates and the associated risk factors in the country. This thesis aims to answer the following questions:

- What are birth attendants' perception of maternal mortality rate and associated risk factors in Abudwak district in Somalia?

- Is there a difference between skilled, traditional trained and untrained traditional birth attendants' perceptions about the maternal mortality rate and associated risk factors in Abudwak district?

- Is there a difference between key informants and birth attendants' perceptions of maternal mortality and associated risk factors?

- How do the risk factors identified by the birth attendants in this district compare to the globally known maternal mortality risk factors for similar settings?

Problem statement

Causes of death and contributing risk factors for maternal mortality in low-resource countries like Somalia are well known. Hemorrhaging, hypertension during pregnancy, sepsis, unsafe abortion, and other direct causes (e.g. obstructed labor) are the leading cause of death for women in low-resource countries. Indirect causes such as HIV/AIDS, malaria, anemia and other comorbidities also aggravate maternal deaths in these countries.[5,6,7] Per capita income, female secondary school enrolment, skilled birth attendance, contraceptive use, and health expenditure as a percent of gross domestic product (GDP) are common determinants for maternal mortality in low-resource countries. In addition, life expectancy and fertility rate are strongly associated with maternal mortality in SSA. The abovementioned causes and determinants are interrelated and best maternal outcomes are achieved when all determinants are at an optimal level.[8,9]

Somalia's high maternal mortality rate is attributed to a host of factors including poverty, longstanding civil war, and harmful cultural practices. Somalia has been without a central government for over 22 years; all social service sectors were destroyed during the collapse of the central government in 1991. The civil war resulted in the death of one million civilians, forced internal and external displacements, caused isolated communities due to insecurity, and left the population vulnerable to chronic and communicable diseases.[10] Maternal health has been performing at a substandard level for the last 22 years, and there are numerous internal and external factors that affect the MMR in Somalia.

Income per capita & health expenditures as percent of GDP

Somalia is the fifth poorest countries in the world, with income per capita of $631.87.[11] The current total expenditure of health care as a percentage of GPD is not available due to lack of data, however, the most recent estimates from WHO put the total expenditure on health per-

capita at $17 (USD), or 2.3% of GDP.[12] Most of the 2.3% health financing in Somalia comes

from foreign aid, and the Somali government contributes less than 1%. Despite the high aid per-

capita health financing, patients' out of pocket payments account for 80% of the total health care

expenditure. This indicates that the majority of the available health care services in Somalia are

fee based and a high percent of the population are without access to health care, since almost half

of the county's population (43%) live in extreme poverty (under $1USD a day) and 73% of them

survive on under US$2 a day.[13] In particular, vulnerable groups such as women, children, poor

and rural residents have very little, if any, access to health care.

Health care system and health facilities

A key strategy to reduce maternal mortality is for every woman to have access to

adequate emergency obstetric care (EmOC) services. Adequate EmOC services means a) EmOC

facilities are geographically close (< 2hr drive) to pregnant women, b) services are free and/or

affordable to all women, c) facilities are staffed with appropriate number of health professionals,

and d) facilities are equipped with the necessary tools for EmOC services.[14,15] This target is a

distant dream for the majority of Somali women whom distance to EmOC facilities, poor road

conditions, insecurity and lack of transportation are constant barriers to their accessing of EmOC

services. Central and South Somalia, in particular, the Galgudud region lacks many elements

necessary for providing adequate EmOC services. A limited number of functioning health

facilities exist in this region. In addition, geographical distribution of these facilities and their

lack of basic functional capacity make them inaccessible to the majority of the population.

Health workforce

Health worker shortage (number and distribution) hinders the achievement of health

related MDGs in SSA. The health worker density metric is used to monitor health workforce

shortage. The health worker density ratio is based on the number of health workers physicians, nurses, and midwives per 1,000 people. The minimum ratio to deliver the minimum standard maternal and child health services is 23 health workers per 10,000 population. Somalia is in a state of health worker crisis with only two health workers for every 10,000 Somalis.[16] The situation is even worse in rural and hard to reach districts such as Abudwak were the ratio drops to one health worker for 30,000 population. In particular, health workers with midwifery skills are in short supply. Supervision of all births by skilled birth attendants (SBAs) defined by WHO as "a health professional who is trained to proficiency in the skills needed to manage normal (uncomplicated) pregnancies, childbirth and the immediate postnatal period, and in the identification, management and referral of complications in women and newborn", has been recognized as a key determinant in reducing maternal mortality rate.[17] The percentage of births supervised by SBAs is a direct indicator of the worldwide maternal mortality, and a goal has been set for 90% of the world births and 60% of births from countries with high MMR to be supervised by SBAs in the year 2015.[18,19] Despite local and international efforts to increase skilled birth attendants' availability and utilization in SSA, most countries in this region are far from this goal with less than 50% percent of all births attended by SBAs.[20] Somalia has one of the lowest indicators for skilled birth attendance in SSA with only 33% (urban) and < 10% (rural) of all births attended by SBAs.[21,22,23] Traditional birth attendants (TBA) defined by WHO as "a person who assists the mother during childbirth and who initially acquired her skills by delivering babies herself or by working with other TBAs", [24] deliver over 75% of babies in the developing countries and over 80% of Somali babies.[25] Thus, Somali women are at an increased risk for maternal morbidity and mortality.

Empowering girls

A recent WHO Global Survey on Maternal and Perinatal Health found an inverse relationship between the number of years of education and maternal mortality rate. Women without education have more than twice the maternal mortality rate of women with 8th grade education and more than four times the mortality rate of those with upper secondary and post-secondary education.[26] Educated girls make better and more informed decisions about a host of reproductive health related issues such as the age of marriage, antenatal care, and having a SBA at the time of delivery. In addition, they have more authority in household decision-making and are more likely to be financially independent and able to pay for transportation and medical services.[27, 28] As with health care services, education in Somalia has been negatively affected by the ongoing civil war and the lack of central government in the past 22 years. Somalia has one of the lowest primary school enrollment rates in the world. Only 42% of the primary school age children are enrolled in school of which only 23-36% are girls. Secondary school enrollment is less than 10% and girls have an approximate 6% enrollment rate.[29] This data highlights the disparate exclusion of girls from the education system in Somalia. Multiple and complex socio-economic and cultural factors contribute to the low education rate for girls and the disparity in education between urban/rural and wealthy /poor children. Children from urban communities are 11 and 38 times more likely go to primary and secondary school, respectively than children in rural communities. Consequently, the country's literacy rate is very low at 20% (35% and 11%) urban and rural respectively.[30]

Contraceptive use

One of the MDG 5 goals is universal access to reproductive health including contraceptive services. Contraceptive services allow women and couples to choose the number

and timing of births. Stover & Ross found that contraceptive use lowered high-risk births such

high-parity births (number of babies a women carries to gestational age) and averted 1.2 million

maternal deaths between 1990 and 2005.[31] Only 15% of married reproductive age women in

Somalia use contraceptives. Less than 2% of them use modern contraceptive methods. A

plethora of factors contribute to the country's low contraceptive use, including lack of resources,

low literacy rate, misconceptions about modern birth spacing methods, fear of sterilization, lack

of community awareness and education about contraceptive benefits, and most importantly, a

culture that frowns on modern contraceptive use.[32,33]

Harmful cultural practices

Harmful cultural practices such as female genital mutilation (FGM) and early marriage

and childbearing are pervasive in Somalia. Most (98%) Somali women have experienced

FGM.[34,35] As a measure to curb pre-marital sexual activity, FGM and adolescent marriage are

commonly practiced in Somalia. Early marriage is prevalent in Somalia and 45% of Somali girls

under the age of 18 get married before their 18th birthday. Girls from poor families and those

with no or little education are more likely to get married before their 18th birthday.[36]

Summary

Maternal mortality risk factors are extremely complex and include difficult social issues

such as poverty, education and harmful cultural practices. Contextualizing these risk factors

highlights how they aggravate the "three delays" in Somalia. Furthermore, the cumulative effects

of the abovementioned maternal mortality determinants put Somali women, especially those

from rural communities at increased risk for maternal mortality. The current study examines the

maternal mortality rate and associated risk factors perceptions of birth attendants and community

leaders from Abudwak against a backdrop of the abovementioned determinants.

Purpose of the study

There is countless research that examines birth attendants' practice, belief, knowledge and attitudes in relation to safe childbirth, and there is an ongoing debate whether TBAs should be integrated into the formal health system or not, however they are not being included in the discussion.[37,38] We could not find any study that asks birth attendants' input on how to reduce maternal morbidity and mortality. TBAs are always at the center of the maternal health discussion, but are rarely represented in these discussions. The goals of this study are a) to investigate birth attendants' perception of maternal mortality rate and the associated risk factors in Abudwak district; b) to solicit birth attendants' input on the most important risk factors for maternal mortality and how to improve the identified risk factors; c) and to compare their perceptions with the perceptions of key informants and ultimately with the globally known maternal mortality risk factors. Another goal is to identify other key maternal mortality indicators such as availability of SBAs, birth attendants' educational background, and referral practices of complicated pregnancies to higher level of medical care.

Significance

Birth attendants, especially TBAs are the first line of contact for the majority of pregnant Somali women and their number one choice for childbirth assistance. Thus, TBA's expertise, competency and perception of maternal mortality risk factors have a direct impact on maternal mortality. This study is important because it identifies birth attendants' experience, educational background, referral practices for complicated pregnancies, and their perception of maternal mortality rates and associated risk factors in the target area. In addition, it brings to the surface very important, yet neglected stakeholder's (birth attendant) ideas on how to improve maternal mortality in their community. Current findings are significant for strategies to reduce maternal

mortality in Abudwak district and may be extrapolated to the rest of Somalia and other areas in SSA. Moreover, the identification of birth attendants' competence gaps will inform future maternal health policies, funding allocation, strategies to reduce maternal mortality, intervention prioritization, and advocacy for this district.

Methodology

Very few studies globally and regionally, have examined perceptions of birth attendants regarding maternal mortality rate and associated risk factors, and none have enlisted birth attendants' input on how to improve maternal mortality. The proposed study is informed by a thorough review of previous research and sparse maternal, child and general health assessments and/or studies in the target country. Emory Institutional Review Board (IRB) deemed this study exempt (see Appendix A). A mixed method approach that collects both quantitative and qualitative data has been used. Each respondent signed an oral informed consent form before conducting an interview (see Appendix B & C).

Design

Purposive sampling method that combined both convenient and snowball sampling methods was used.[39]

Sample size

21 birth attendants and 6 key informants (government, health, community, and local organization leaders) in Abudwak and in villages within a 30-mile radius were interviewed. The 27 respondents represented six Abudwak cities and four nearby villages.

Inclusion and recruitment

Only individuals identified by the community as birth attendants (skilled or traditional), government or health officials and community leaders were interviewed. Participants were recruited with the help of the Abudwak mayor and respondents' referrals (see Appendix D).

Procedures

Semi-structured in-depth interviews in different settings (respondents' home, workplace, or meeting place) were conducted. Similar questionnaires and interview guides were used for all birth attendants regardless of their background. Slightly different interview guides and questionnaires were used for key informants. The interview consisted of closed-ended questions and an interview guide (see Appendix E & F). Interviews were conducted in Somali (see Appendix G & H). Each interview lasted approximately 20-30 minutes. The interviewer noted on the questionnaires/interview guides the respondent's characteristics, emotions, and information she observed and thought were important to the study. In-depth interviews were recorded or noted on the interview guide. Eleven of the respondents did not want their voices recorded.

Data management and statistical analysis

Data from the closed-ended questionnaires was entered into SPSS data editor and SPSS data analysis software was used to analyze the data. In particular, descriptive data analysis options, such as frequency and cross tabulation to analyze the distribution of the data and summarize the study findings were used.[40,41] the author transcribed data from the in-depth interviews and the observations. Thematic content analysis of transcribed interviews and observations was used. Textual data was thoroughly read and emerging themes were identified and annotated. Further analysis of the emerging themes allowed for categorization of the themes. Manual content analysis was used to analyze the in-depth interview responses.

Results

A total of 27 respondents were interviewed. All of the birth attendants were female. The key informants comprised of 4 males and 2 females. Although age and income were not specifically assessed, observation indicated that the majority of birth attendants were between 40 – 60 years of age and of a low socio-economic status. Similarly, the majority (5/6) of key informants were also approximately between 40-60 years of age except for one respondent who was in his early 30s, but they were of a higher socio-economic status than the birth attendants.

Birth attendants' characteristics

As shown on Tables 1-11, most of the birth attendants had no formal education (76.2%), lived in the town/village they practice at over 10 years (81%), had more than ten years of experience (81%), assisted over ten births in 2013 (90.5%), had children of their own (95.2%), had more than five children (95.2%), referred (71.4%) complicated pregnancies to higher levels of care and had experienced miscarriage and/or miscarriage and stillbirth (57.1% and 14.3% respectively). One birth attendant had less than an 8th grade education, one had a 9th to 12th grade education, two had some college or technical training less (than two years) and one had a two-year nursing and or midwifery degree or diploma.

Women did not make the decision to be referred to higher medical care for themselves. Over half (12/21) of the birth attendants said they made the decision to refer women to higher medical care, however they noted that ultimately it was up to the women's family, in particular the husband, whether they took them to the hospital or not. Eight of the birth attendants said the women's husband makes the referral decision and only one birth attendant said women make the decision for themselves. Six of the birth attendants did not refer any complicated pregnancies in

2013, eleven referred one to five complicated pregnancies, two referred between six and ten complicated pregnancies, and two referred more than ten complicated pregnancies. The majority of the birth attendants (90.5%) knew one or more signs of complicated pregnancies (e.g. abnormal presentation, placenta problems, anemia, blood loss, etc.). Over 50% of them knew three or more signs of complicated pregnancy. As shown on Tables 12 and 13, approximately 65% (11/17) of birth attendants with no formal education and those with less than an 8th grade education combined referred women with complicated pregnancies to higher medical care and 35% (6/17) of them admitted to encountering a maternal death of a patient during labor or the following 42 days in 2013. Conversely, 100% of birth attendants with 9th grade and higher education referred women with complicated pregnancies to higher medical care and they have reported zero maternal death in the same year.

The in-depth interview revealed that fourteen of the birth attendants became birth attendants inadvertently. They often had this experience at a very young age and continued to practice after the initial incident. One of the respondents summed this up by saying "*I was a young woman the first time I helped someone give birth. I dropped the baby because I did not know what I was doing. I did not want to be a birth attendant, rather it was unexpected situation that happen to me*" (6TBAUbax). Four of the birth attendants wanted to become birth attendants as girls and consequently were the only birth attendants with 9th grade or higher education. Becoming a birth attendant was a rite of passage for the remaining three birth attendants because all the women in their families were birth attendants and they learned from their mothers or grandmothers.

Birth attendants' perceptions

There are three types of birth attendants in this district, which include traditional birth attendants (TBAs), traditional trained birth attendants (TTBAs) and skilled birth attendants (SBA). When asked what they thought of the district maternal mortality status, the majority of the different birth attendant types (BAs (57%), TBAs (44%), TTBAs (67%) and SBAs (67%) respectively) thought it was high.

When asked about factors they thought caused or contributed to maternal mortality during labor or the following 42 days, the birth attendants' answers were categorized into nine main themes including: Act of Allah (God), blood issues, challenges getting to the hospital, delivery issues, eclampsia, general health issues, lack of competent health professionals, lack of nutrition and others. Risk factors were listed as general health issues if they were systematic health issues and were mentioned less than four times. Some of the general health issues included women not getting antenatal care and malpractice. Similarly, factors were listed in the other category if they were behavioral or environmental factors, such as poverty, insecurity, suspicious about medicine, etc. Lack of nutrition and lack of competent health professionals were the top two risk factors for all groups except for TBAs, which had lack of nutrition and act of Allah as their top two risk factors.

When questioned about the most important risk factor (s) that needs to be improved in order to improve the maternal mortality rate for their district, all groups overwhelmingly chose lack of competent health professionals and lack of nutrition.

Finally, when their suggestions were solicited on how to improve the most important risk factor(s), between 33 to 50% of all birth attendants, TBAs, TTBAs did not answer this question.

Those who answered and SBAs had various responses that included training birth attendants and other medical staff, improve women's nutrition status and general health issues.

Key informants' characteristics

Tables 14 to 16 show that most of the key informants (5/6) lived in the town they were representing over ten years, 66.7% (4/6) of them were in their current position for over ten year s and 50% of them had a graduate level degree/diploma.

Key informant perceptions

In response to what they thought of the maternal mortality status of the district, key informants' responses were very similar to the birth attendants' responses and the majority of them thought district maternal mortality was high.

Unlike birth attendants, the majority of the key informants believed that more systematic health issues such as lack of emergency obstetric facilities and hospitals and the government's inability to take health care to every village, caused or contributed to maternal mortality in Abudwak. The second most popular risk factor for this group was lack of competent health professionals. Key informants' point of view on this topic was summarized by a key informant from Hawalwadag city when he said *"It includes: lack of government in the last 21 years; lack of emergency obstetric and hospitals; lack of public awareness about the benefits of health care; Traditional birth attendants' lack of training and tools; and the current government's inability to take health care to every village"* (2KIHawalwadag).

Similar to birth attendants' responses, when they were asked which risk factor they thought was the most important and needed to be improved in order to improve maternal mortality, key informants' number one choice was lack of competent health professionals

followed by general health issues (e.g. providing maternal and child health care in every place that people live).

On the topic of how to improve the most important risk factor (s), key informants suggested investment in emergency obstetric and newborn care facilities needs to occur before educating health workers and improving women's nutrition status. However, key informants also highlighted the importance of competent health professionals by listing educating health workers as their second choice.

Discussion

Consistent with findings from previous research in Kenya, Tanzania, and Gambia, the majority of birth attendants in the study area are uneducated women over 40 years of age, who have lived in the community more than 10 years. Most (95.2%) of them have had more than five children and have experienced miscarriage and/or miscarriage and stillbirth (71.4%).[42,43,44] Contrary to the majority of previous findings (that most TBAs receive prolonged apprenticeship before they start practicing) and similar to findings by Itina in Nigeria, the majority (14/21) of the birth attendants in this study became birth attendants inadvertently and without any prior training or apprenticeship[45]. Key informants were very similar to birth attendants in terms of age and years lived in the community, however, unlike birth attendants, most of them were well educated as indicated on Table 16.

The majority of birth attendants and key informants thought that maternal mortality in Abudwak district was high. There was no major difference in different groups' response on this topic, overwhelmingly, all the participants believed that lack of nutrition and competent health professionals were the greatest risk factors for maternal mortality in Abudwak district. The most

noticeable maternal mortality risk perception difference noted among the different birth attendants was the mentioning of "Act of Allah". Act of Allah (God) is defined as "*an overwhelming event caused exclusively by natural forces whose effects could not possibly be prevented*",[46] and was cited as a maternal mortality risk factor by 38% of all birth attendants, making it the third highest response from all birth attendants. However, further analysis of different birth attendants' responses highlighted that more than half (5/9) of TBAs believed act of Allah was a major maternal mortality risk factor compared to only two TTBAs and one SBA. This finding highlights the need for traditional birth attendants' training in this district. Some of TBAs are unaware of the signs of risk pregnancy and many only refer women at the last minute. Their accepting of maternal death as an inevitable event could negatively affect their perception of the value of referring women to higher medical care and can lead to inaction. Since, TTBAs, SBAs and key informants did not cite act of Allah as a major risk factor for maternal mortality an argument can be made that both formal education and TBA trainings improved participants' risk recognition and reduces their acceptance of maternal death as a natural cause. Consistent with that argument, previous findings suggest that TTBA and TBAs with primary education have better complicated pregnancy risk recognition and are more likely to refer women to higher level of care than untrained TBAs.[47,48,49,50]

Birth attendants reported that lack of nutrition and competent health professionals are the most needed areas of improvement in order to reduce maternal mortality. Lack of competent health professionals (referred to as skilled attendance) is a globally known determinant for maternal mortality. Regardless of skill set, birth attendants in Abudwak district are frustrated with the lack of obstetricians in their towns and villages, and they frequently cited how women and children die every day while in-route to seek emergency obstetric care in neighboring

districts (e.g. Galkacyo and Hargiesa, a 7-16 hour drive in rough road conditions). There were only three trained medical doctors in the entire district in May, 2014. Unfortunately, one physician was killed in a car bomb explosion in Mogadishu in October, 2014. The health worker shortage in this district is apparent in these numbers. While these few medical doctors may have the skills required to manage pregnancy complications, many times they lack the resources necessary for EmOC services. Other risk factors that birth attendants cited on numerous occasions were the lack of health facilities, challenges of transportation and/or distance to get women to hospitals, and cost of transportation.[51,52]

There are no public hospitals in Abudwak district and the few private hospitals in the district do not provide free or low cost health services and lack emergency transportation. There are six private hospitals with diverse capacities to provide EmOC service in the study area. During the study a new hospital opened in May, 2014, which provides minimal emergency transportation free of charge. However, these emergency vehicles only function within Abudwak city limits and do not go out to the villages. Due to lack of EmOC resources women from Abudwak are taken to other districts in the event of a complication, provided the family is able to afford transportation and medical care.

Anemia as an indirect risk factor for maternal mortality is well noted in the maternal mortality literature. In the current study, the role of anemia is mentioned more prominently than in the literature. Lack of nutrition, namely anemia, was consistently number one or two in terms of listed risk factors and the most important risk factor(s) that needed to be improved. Poverty, multiple and frequent pregnancies, and low iron supplement intake increase the risk for anemia during pregnancy.[53] Somalia is one of the poorest countries in the world and a large percent of the population of Abudwak district are pastoralists whose occupation is herding camels, cattle

and goats and are very poor. The urban community is highly dependent on livestock and economic stimulation from the pastoralist community. Frequent droughts have caused water shortage and diseases resulting in massive loss of livestock, which hinders the livelihood of the entire district and exacerbates food shortage and increases risk for famine.[54] These complex factors may explain why many pregnant women from this district are said to be anemic and are at high risk for maternal mortality.

Limitations

This study has several limitations. Purposive sampling that combined both convenient and snowball sampling methods was utilized to recruit participants. This method increases the potential for subgroup overrepresentation in which respondents refer their friends or alike individuals. This means that those who participated in the study are potentially different than those who did not participate.[55] All of the birth attendants in the area were not interviewed, however over 50% of the estimated number of birth attendants in the area were interviewed and participants represented all the cities in Abudwak and four villages within a 30-mile radius. All of the in-depth interviews were not recorded as planned, which limited the direct word for word analysis of the transcribed interviews. The recorded interviews had more details, but were not more relevant to interview guide topics than the notes.

Conclusion

This study is unique in that it examined perceptions of birth attendants on maternal mortality rate and associated risk factors and invited them to think about the problem and propose a solution for it. It contrasted perspectives' of different stakeholders who practice in different setting against a backdrop of established risk factors.

Birth attendants from this district are well aware of the high maternal mortality rate of their community; most of them understand the salient risk factors that contribute to the high maternal mortality rate. Most of the risk factors they cited (e.g. lack of competent health professionals, lack of nutrition, poor health infrastructure, lack of health facilities, blood loss, etc.) are similar to the globally know maternal causes of death and risk factors. The interventions they recommended (e.g. increasing the availability of competent health professionals and improving pregnant women's nutritional status) on how to improve maternal mortality are among the currently recommended maternal health interventions.

Finally, the findings of this study highlight, a) the effect of lack of nutrition on pregnant women from the target area, b) the district's urgent need for competent health professionals, in particularly obstetricians, and c) the importance of training TBAs, as TTBA's had better pregnancy risk management than TBAs. This last point further indicates that TBAs are not culpable for maternal morality and they are not simple by standers of the fight against maternal mortality. Far-from-it, they are the only hope millions of women from Somalia and others from similar settings have at safe childbirth. TBAs genuinely care about the health of their patients, they are concern about the maternal mortality rate and they are capable of offering sound interventions to reduce maternal mortality. Findings from this study and many previous studies show that TBAs' pregnancy risk recognition and referral practice can be improved with training. Therefore, their exclusion and alienation from the health care system is disservice to those mothers who do not have other options. In realizing that the recommended utilization of SBAs at birth in many countries in SSA is a distant and long term goal, more pragmatic strategies that incorporate TBAs into the health system are needed in Somalia and beyond in order to reduce maternal mortality. Strategies that utilize TBA's strengths, build on their established community

relationships and improve their weakness with tools and trainings are needed. These recommendations echo Okonfua and Ogus' call for paradigm shift, which states that "African countries would need to pursue policies on integrating TBAs to formal systems of health care, not necessarily for the purpose of achieving immediate maternal mortality reductions, but to achieve scale and improved intermediate outcomes for maternal health".[56]

Future research

As there is very limited maternal mortality research in Somalia and none in this district, future research is needed in many aspects of maternal health. More comprehensive research that takes into account the number of EmOC facilities in the district and their geographical distribution, facility functionality, knowledge and competence of the current health workers, TBA trainings availability in the area and their curriculum, TBAs' acceptance and the willingness to participate midwifery training among other things (e.g. socioeconomic and cultural factor) is needed. In particular, further research that invites birth attendants' input and evaluates how, if any, training, religious beliefs and culture impact their pregnancy risk perception and referral practices is suggested.

Acknowledgements

Tables

Birth attendants' frequency tables

Table 1: Year lived in town (YRLTOWN)

Valid Responses	Frequency	Percent (%)	Valid %	Cumulative %
a. < 5 years	1	4.8	4.8	4.8
b. 5-10 years	3	14.3	14.3	19.0
c. >10 years	17	81.0	81.0	100.0
Total	21	100.0	100.0	

Table 2: Years attending birth

Valid Responses	Frequency	Percent (%)	Valid %	Cumulative %
b. 1-5 years	2	9.5	9.5	9.5
c. 6-10 years	2	9.5	9.5	19.0
d. > 10 years	17	81.0	81.0	100.0
Total	21	100.0	100.0	

Table 3: Level of education (LOFEDU)

Valid Responses	Frequency	Percent (%)	Valid %	Cumulative %
a. No formal education	16	76.2	76.2	76.2
b. <8th grade	1	4.8	4.8	81.0
c. 9th to 12th grade	1	4.8	4.8	85.7
d. Some coll./tech. training < 2yrs	2	9.5	9.5	95.2
e. 2yrs degree/dip.	1	4.8	4.8	100.0
Total	21	100.0	100.0	

Table 4: Children (CHLDRN)

Valid Responses	Frequency	Percent (%)	Valid %	Cumulative %
Yes	20	95.2	95.2	95.2
No	1	4.8	4.8	100.0
Total	21	100.0	100.0	

Table 5: Number of children (NOFCHLDRN)

Valid Responses	Frequency	Percent (%)	Valid %	Cumulative %
f. More than 5	20	95.2	95.2	95.2
g. N/A	1	4.8	4.8	100.0
Total	21	100.0	100.0	

Table 6: Pregnancy outcome (PREGOUTCOME)

Valid Responses	Frequency	Percent (%)	Valid %	Cumulative %
b. miscarriage	12	57.1	57.1	57.1
c. Both	3	14.3	14.3	71.4
d. Neither	5	23.8	23.8	95.2
e. N/A	1	4.8	4.8	100.0
Total	21	100.0	100.0	

Table 7: Number of births assisted (NBRTHASST)

Valid Responses	Frequency	Percent (%)	Valid %	Cumulative %
a. <5	1	4.8	4.8	4.8
b. 5-10	1	4.8	4.8	9.5
c. >10	19	90.5	90.5	100.0
Total	21	100.0	100.0	

Table 8: Number of referrals (NOREFERRAL)

Valid Responses	Frequency	Percent (%)	Valid %	Cumulative %
a. None	6	28.6	28.6	28.6
b. 1-5	11	52.4	52.4	81.0
c. 6-10	2	9.5	9.5	90.5
>10	2	9.5	9.5	100.0
Total	21	100.0	100.0	

Table 9: Referral signs (REFSIGNS)

Valid Responses	Frequency	Percent (%)	Valid %	Cumulative %
j. a, b, & d	1	4.8	4.8	4.8
k. d, b, & c	3	14.3	14.3	19.0
l. a, b, c, & d	1	4.8	4.8	23.8
m. b, c, e, & f	1	4.8	4.8	28.6
n. b, e, & f	1	4.8	4.8	33.3
o. b & c	3	14.3	14.3	47.6
p. a & b	1	4.8	4.8	52.4
r. do not know any signs	2	9.5	9.5	61.9
c. Prolonged labor	3	14.3	14.3	76.2
g. a, b, & c	3	14.3	14.3	90.5
h. c, d, & f	1	4.8	4.8	95.2
i. a, b, d, & e	1	4.8	4.8	100.0
Total	21	100.0	100.0	

Table 10: Referral decision

Valid Responses	Frequency	Percent (%)	Valid %	Cumulative %
a. The mother herself	1	4.8	4.8	4.8
b. Her husband	8	38.1	38.1	42.9
e. You/ other prof.	12	57.1	57.1	100.0
Total	21	100.0	100.0	

Table 11: Number of mothers died (NOFMDEID)

Valid Responses	Frequency	Percent (%)	Valid %	Cumulative %
a. None	15	71.4	71.4	71.4
b. 1-5	4	19.0	19.0	90.5
c. 6-10	2	9.5	9.5	100.0
Total	21	100.0	100.0	

Table 12: Level of education and referral cross tabulation

	NOREFERRALS				
LOFEDU	a. None	b. 1-5	c. 6-10	d. > 10	Total
a. No formal education	5	9	1	1	16
b. <8th grade	1	0	0	0	1
c. 9th to 12th grade	0	1	0	0	1
d. Coll./tech. trnng < 2yrs	0	0	1	1	2
e. 2yrs degree/dip.	0	1	0	0	1
Total	6	11	2	2	21

Table 13: birth attendants' level of education and maternal death cross tabulation

	NOFMDEID			
LOFEDU	a. None	b. 1-5	c. 6-10	Total
a. No formal education	11	3	2	16
b. <8th grade	0	1	0	1
c. 9th to 12th grade	1	0	0	1
d. Coll./tech. trnng < 2yrs	2	0	0	2
e. 2yrs degree/dip.	1	0	0	1
Total	15	4	2	21

Key informants' frequency tables

Table 14: Year lived in town (YRLTOWN)

Valid Responses	Frequency	Percent (%)	Valid %	Cumulative %
a. < 5 years	1	16.7	16.7	16.7
c. > 10 years	5	83.3	83.3	100.0
Total	6	100.0	100.0	

Table 15: Years at the current position (YRSINCP)

Valid Responses	Frequency	Percent (%)	Valid %	Cumulative %
b. 1 - 5 years	1	16.7	16.7	16.7
c. 6 - 1 years	1	16.7	16.7	33.3
d. > 10 years	4	66.7	66.7	100.0
Total	6	100.0	100.0	

Table 16: Level of education (LOFEDU)

Valid Responses	Frequency	Percent (%)	Valid %	Cumulative %
a. No formal education	1	16.7	16.7	16.7
b. <8th grade	1	16.7	16.7	33.3
c. 9th to 12th grade				
d. Some coll./tech. trnng < 2yrs	1	16.7	16.7	50.0
e. 2yrs degree/dip.	3	50.0	50.0	100.0
	6	100.0	100.0	
Total				

Reference

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Appendices

Appendix A: IRB Approval Letter

EMORY UNIVERSITY | Institutional Review Board

November 26, 2013

Maryan Du'Alle
Principal Investigator
Public Health

RE: **Exemption of Human Subjects Research**

    IRB00069676

    Birth Attendants' Perception of Maternal mortality Rate and Associated Risk
    Factors in Abudwaq District, Galgudud Region, Central Somalia.

Dear Principal Investigator:

Thank you for submitting an application to the Emory IRB for the above-referenced
project. Based on the information you have provided, we have determined on
11/26/2013 that although it is human subjects research, it is exempt from further IRB
review and approval.

This determination is good indefinitely unless substantive revisions to the study
design (e.g., population or type of data to be obtained) occur which alter our
analysis. Please consult the Emory IRB for clarification in case of such a
change. Exempt projects do not require continuing renewal applications.

This project meets the criteria for exemption under 45 CFR 46.101(b) (2) and (b)
(3). Specifically, you will use a combination of questionnaires and in-depth
interviews directed at birth attendants to assess their perception of maternal mortality
risk factors in the Abudwaq district. The following documents were reviewed with
this submission:

- Study Protocol (11/22/2013)
- Interview Guide Somali Version
- Interview Guide
- Oral Recruitment Script Somali Version

- Oral Recruitment Script
- Questionnaire Somali Version
- Questionnaires
- Verbal Informed Consent Form
- Verbal Informed Consent Form Somali Version

Please note that the Belmont Report principles apply to this research: respect for persons, beneficence, and justice. You should use the informed consent materials reviewed by the IRB unless a waiver of consent was granted. Similarly, if HIPAA applies to this project, you should use the HIPAA patient authorization and revocation materials reviewed by the IRB unless a waiver was granted. CITI certification is required of all personnel conducting this research.

Unanticipated problems involving risk to subjects or others or violations of the HIPAA Privacy Rule must be reported promptly to the Emory IRB and the sponsoring agency (if any).

In future correspondence about this matter, please refer to the study ID shown above. Thank you.

Sincerely,

Leslie J. Garrett
Research Protocol Analyst
This letter has been digitally signed

 CC: Du'Alle   Maryan   Public Health

Study Title:

Birth attendants' perception of maternal mortality risk factors in Abudwak District, Galgudud Region, Central Somalia: A mix method Study.

Principal Investigator: Ms. Maryan Du'Alle

Introduction and Study Overview

Thank you for your interest in our maternal mortality risk factors research study. We would like to tell you everything you need to think about before you decide whether or not to join the study. It is entirely your choice. If you decide to take part, you can change your mind later on and withdraw from the research study.

1) The purpose of this study is to understand local birth attendants' perception about maternal mortality risk factors for Abudwaq town and the surrounding villages.
2) The whole study will take approximately 6-8 weeks to complete, but we only need one time interview from each respondent.
3) If you join, you will be asked to participate in an individual face-to-face interview. The interview will last between 45 minutes to an hour and it will be audio taped with your permission. We will be gathering data about your personal and professional background as it relates to your position. In addition we would like to get your honest opinion about the maternal mortality risk factors for your village and the district.
4) The interview will not put your life at risk in anyway. We are not testing anything physically on you and we will not give you any medication or any other chemicals. We will not gather any identifiable personal information. Few of the questions are sensitive in nature, as they are personal and maybe a painful memory (e.g. losing a child). There could be a minimal discomfort from answering these questions. However, you do not have answer the questions if you feel uncomfortable or they are too painful.
5) You will not benefit from this research directly; however, we hope to contribute to better strategies and action plans that will improve the maternal mortality rate of your village, district and beyond. We hope to identify maternal mortality risk factors that can be improved, so mothers and their babies from this district can have a better birth outcome.

6) Your privacy is very important to us. We will not collect any personal or health information.
7) You may revoke your authorization at any time by calling the Principal Investigator, Maryan Du'Alle, or by writing to the address listed on the information sheet that we will send to you.

Contact Information

If you have questions about this study, your part in it, your rights as a research participant, or if you have questions, concerns or complaints about the research you may contact the following:
Maryan Du'Alle, Principal Investigator: 614 – 582-1793 (will have international number when I get to Somalia) or by email m.a.du'alle@emory.edu
Emory Institutional Review Board: 404-712-0720 or toll-free at 877-503-9797 or by email at irb@emory.edu

Consent

Do you understand or have any questions about anything I just said?

Do you agree to all of the above and to take part in the study?

Participant agrees to participate: Yes   No

If Yes:

_____   _____

Name of Participant

_____   _____

Signature of Person Conducting Informed Consent Discussion   Date   Time

Appendix C: Emory University Oral Consent and HIPAA Authorization Script/Information Sheet for a Research Study

Ciwaanka Baritaanka:

Fikirka ay ka Qabaan Umul raacashada Umulisoonyinka ka adeega Magala Abudwaq ee Gobolka Galgudud Somaliyada Dhexe iyo Tuulooyin ka u dhowdhow.

Hogaamiyaha Baaritaanka: Marwo. Maryan Du'alle

Hor u dhac iyo sharaxada baritaanka

Waad ku mahadsan tahay in aad xiisaynaysid baritaankan ku saabsan umul raacshada haweenka. Waxaan jecelnahay in aan kuu sheegno xogta aad u bahan tahay in aad ku miisaantid go'aankaaga ah in aad ka qayb qaadatid baritaankan iyo in kale. Iqtiyaar buuxa baad u leedahay in aad ka qayb qaadatid baaritankan iyo in kale. Hadii aad go'aansato in aad ka qayb qaadato baaritankan, markaad doonto ayaa is bedelikartaa ood ka hari kartaa baritanka.

1. Muhiimada baritaankan waan in aan fahamno wax ay umulisooyinku ka aaminsanyihiin sababaha keena ama saa'idiya umul raacashada dumarka ku nool Abudwaq iyo tuulooyinka u dhowdhow.

2. Baritanka oo dhan wax uu qadanayaa 6-8 todobaad, lakiin hal waraysi kaliya Ayaan uga baahanahay qof kasta oo baritanka ka qayb qadanaya.

3. Hadii aad ku soo biirto baritanka waxaa lagaa codsandoonaa in aad ka qayb qadatid waraysi kaligaa ah ood oo u kula yeelan doono hogaamiyaha baaritaanka. Waraysigu wuxuu qadanayaa in ta u dhexaysa 45 daqiiqo iyo 1 saac, waana la duubayaa hadii aad ogalaatid. Waxaan aruurin doonaa xog ku saabsan qibrada noleed iyo tan farsamo ee u leedahay shaqdaada. Waxaan kale oon doonaynaa in aan ogaano wax aad ka aamin santahay sababaha keena ama kordiya umula raacashada dumarka magaladaada iyo gobalkaba.

4. Waraysigu sinaba naftaada qadar u ma galinayo. Waxba kuguma tijaabinayno, daawana ku ma siinayno. Ma qadayno xogta shaqsiyaad ee qofka lagu garan karo. Su'alaha qaarkood waa kuwu murugo abuuri kara, maxayeelay waxay ku xasuusin karaan dhacdooyin murugo leh sid (ilmo dhintay). Jawaabta su'aalahan wel yar bay keeni karaan, laakiin in aad ka jawaabto mahan su'alahaas hadii aadan ku qanac sanayn ama ay ku murugo galiyaan.

5. Si toos ah ugama faa'iidaysid baritaankaan, lakiin waxaan rajaynaynaa in aan kordhino qaab wax looga qabanayo sidi hoos loogu dhigi lahaa umul raacashas dumarka tuuladaada, gobolka, iyo ka kor. Waxaan rajaynayaa in aan soo saarano waxyaabo sababa ama kordhiya umul raacashada oo wax laga badeli karo si hooyinka iyo caruurta gobalkani loo bedbaadiyo waqtiga dhalmada.

6. Waa muhiim in aan ilaalino xogtaada qaaska ah, sidaas darted ma aruurin doono xogtaada qaaska aha iyo taada caafimaad midna.

7. Marka aad doonto baa ka noqon kataa ogolaan shahaaga. So wac hogaamiyaha baaritanka, Maryan Du'Alle ama warqad ugu diri cinwaanka ku qoran warqadii laguu soo diry.

Xogta xiriirka

Hadii aad wax su'aal ah baritanka ka qabtid, sida qaybta aad ka qaadanasid, xuquuqdaada, ama su'aalo kale, walac, ama aad wax ka tabanayso baritanka waxaad la soo xiriiri kartaa: Maryan Du'Alle, Hogamiyaha Baritanka: 614-582-1793 (nambar Somalia ah baan qaadan doonaa markaan Somalia tago) ama email m.a.du'alle@emory.edu. waxaa kale ood la xiriiri kartaa Jamacada Emory Institutional Review Board: 404-712-0720 ama 877-503-9797 ama email irb@emory.edu

Yaalid

Ma fahamtay mis wax su'aal ah baad ka qabtaa waxa aan hada iri?

Ma ogoshahay qodobada kor ku xusan oo dhan iyo in aad ka qayb qadato baritankan?

Ka qayb qaatuhu wuxu ogoladay in uu ka qayb qaato: Haa   Maya

Hadii Haa:

_____
Magaca Ka qayb qataha

_____

Saxiixa qofka fulinaya wada hadalka ogaysiinta iyo ogolaanshaha   Tariikhda   Waqtiga

Appendix D: Oral recruitment script.

Hello,

My name is Maryan Du'Alle, I am a Masters of Public Health student at Emory University Rollins School of Public Health in Atlanta GA, United States of America. I am here to conduct a research about birth attendants' perception on maternal mortality risk factors. I would like to interview birth attendants, and government and health officials. My goal is to understand the maternal mortality rate and risk factors that mother of this district face through the respondents' perspective. I believe you can greatly contribute to our understanding of this matter. Would you like to participate in this study? We would need approximately 45 minutes to an hour of your time for a face-to-face interview.

Somali

Asalama calaykum,

Magacaygu waa Maryan Du'Alle, waxaan ahay ardayad ka diyaarinaysa shahaada heerka sare, kuna taqasusaysa Caafimaadka Guud (Public Health) jamacada Emory University Rollins School of Public Health ee ku taala gobolka Atlanta GA, ee Wadanka Maraykanka. Waxaan halkaan u imid in aan baaritan ka sameeyo aragtida umulisooyinku ee sababaha keena ama kordhiya umul raacashada. Waxan doonayaa in aan waraysto umulisooyinka, mamulka magalada, iyo madaxda caafimaadka. Yoolkaygu waa in aan fahamo sababaha u keena ama kordhiya umul raaca hooyooyinka gobalkaan anigoo ku cabiraya aragtida dadka ka qayb qadanaya baritankan.Waxaan aamin sanahay in aad si wayn uga qayb qadan kartid fahamkayaga ku aadan arintaan. Ma doonaysaa in aad ka qayb qaadato baritankan? Waxaan kaaga baahanahay qiyaas ahaan 45 daqiiqo ilaa iyo 1 saac oo waqtigaaga ka mid ah ood uga qayb qadatid waraysi is hor fadhi ah.

Appendix E: Questionnaires

Questionnaire for birth Attendants

1. How long have you lived in town/village (name)?
   a. < 5 years
   b. 5 – 10 years
   c. >10 years
2. How long have you been a birth attendant?
   a. < a year
   b. 1-5 years
   c. 6 – 10 years
   d. > 10 years

3. What level of formal education do you have
   a. < 8th grade
   b. 9th to 12th grade
   c. Some college/technical training < 2 years
   d. 2 year degree/diploma
   e. 4 years degree/diploma
   f. Graduate degree/diploma
4. Do you have any children?
   Yes/No

If yes,

5. How many children do you have?
   a. 1
   b. 2
   c. 3
   d. 4
   e. 5
   f. More than 5

6. Have you or your wife ever had any of the following?
   a. Miscarriage
   b. Stillbirth
   c. Both
   d. Neither
7. How many births have you assisted in 2013?
   a. < 5
   b. 5 – 10
   c. > 10
8. How many mothers have you referred to a higher level (hospital) during labor in 2013?
9. What conditions or signs did the women you referred exhibited?
10. Who makes the decision to refer the mother (s)?

a. The mother herself
b. Her husband
c. Mother
d. Mother in-law
e. You
f. Other relative

11. How many of the mothers you assisted in 2013 have died during the delivery or within 42 days after delivery?

Questionnaires for government and health officials

1. How long have you lived in town/village (name)?
   a. < 5 years
   b. $5 - 10$
   c. >10
2. How long have you been in your current position?
   a. $<$ a year
   b. 1-5 years
   c. $6 - 10$ years
   d. > 10 years
3. What level of formal education do you have
   a. $< 8^{th}$ grade
   b. 9th to 12th grade
   c. Some college/technical training < 2 years
   d. 2 year degree/diploma
   e. 4 years degree/diploma
   f. Graduate degree/diploma

Appendix F: Interview guide
Birth attendants

Tell me about how you became a birth attendant and what changed if anything about the process throughout the years.

- Has the respondent always wanted to become a birth attendant and planned for it?
- Was it unplanned opportunity?
- Was it forced/necessity situation?
- What changed during this time about the child birth processes in this town/village and why
    - did the numbers of child birth at home decreased or increased and why
    - did number of health care facilities increased/decreased
    - have the birth attendants received new training
        - what kind of training
        - who provided the training
        - how did it effected the birth outcome

In your opinion how is the maternal mortality status of town/village(X) and the Abudwaq district as a whole.

- What do birth attendants think about the maternal death rates in the area
    - High, low, okay…
    - Are birth attendants aware of Somali's high maternal mortality rate
    - Are birth attendants stressed about the situation

Based on your personal and professional experiences, explain in detail the factors you think increase woman's chance of dying during childbirth and or in the following 42 days.

- What factors are mentioned
- What priority were the factors mentioned
- Is there a difference between the factors mentioned by
    - Mothers and non-mothers
    - Attendants who had miscarriage, stillbirth or both and others
    - Attendants with no education or low education attainment and attendants with technical training or college degree/diploma

In your opinion what is the most important factor (s) that need to be improved in order to improve the maternal mortality rate for town/village (name) and the district. What are your suggestions of how to improve the most important factor(s)?

- What factor(s) is/are selected as most important

Key informants (Government, health official, and community leaders)

In your opinion how is the maternal mortality status of town/village(X) and the Abudwaq district as a whole.

- What do government and health officials think about the maternal death rates in the area

    o High, low, okay…

    o Are these officials aware of Somali's high maternal mortality rate

    o Are they stressed about the situation

Based on your personal and professional experiences, explain in detail the factors you think increase woman's chance of dying during childbirth and or in the following 42 days.

- What factors are mentioned

- What priority were the factors mentioned

- Is there a difference between the factors mentioned by

    o Government and health officials

    o Officials with no or low education attainment and officials with technical training or college degree/diploma

In your opinion what is the most important factor (s) that need to be improved in order to improve maternal mortality for town/village (name) and the district. What are your suggestions of how to improve the most important factor(s)?

- What factor(s) is/are selected as most important

Appendix G: Questionnaire translation

Su'aalo

Su'aalaha umulisooyinka

1. Meeqa sanaad ku nooshahay magalada/tuulada (magaca)?

       a. in ka yar 5 sano

       b. 5 – 10 sano

       c. 10 sano & wax kabadan

2. Meeqa sanaad umuliso ahayd?

       a. In ka yar hal sano

       b. 1-5 sano

       c. 6 – 10 sano

       d. In kabadan 10 sano

3. Waxa barashada caadiga ah heerkeebaad ka gaartay

       a. Dugsi dhexe
       b. Ilaa dugsiga Sare
       c. Heer Jaamacad/dugsi farsamo in kayar 2 sano
       d. Shahaado 2 sano ah
       e. shahaado Jamacadeed oo 4 sano ah
       f. Shahaado Jamacad the Sare

 4. Ilmo Ma leedahay?

       Haa/Maya

Hadii aad ilmo leedahay ?

5. Meeqa ilmood baad leedahay?

   a.   1
   b.   2
   c.   3
   d.   4
   e.   5
   f.   5 ka badan

6. Adiga ama xaaskaagu ma la kulmay wax yaabahan?

   a.   Ilmo mayd ku dhashay
   b.   Dilan

c. Labadaba

d. midna

7. Meeqa ilmood baad dhalintooda ka qayb qaadatay sanadkii 2013?

a. < 5

b. 5-10

c. > 10

8. Meeqa hooyoyin baad u gudbisay cafimaad sare (Hisbitalka) sanad kii 2013?

9. Calaamado noocee ah bay lahaayeen dumarka/hooyoyinka aad gudbisay.

10. Yaa gaar go'anka ah in haweenayda loo gudbiyo goobaha caafimadka sare

a) Hooyada nafteeda

b) Ninkeeda

c) Hooyadeed

d) Sodohdeed

e) Adiga

f) Ama qof kale

11. Hooyooyinkii aad ka dhalisay meeqa dhimatay markay dhalayeen ama 42 cisho ee dhalmada ka danbaysay?

Su'aalaha madaxda dowlada iyo caafimaadka

1. Meeqa sanaad ku nooshahay magalada/tuulada (magaca)?

a. < 5 sano

b. 5 – 10 sano

c. >10 sano

2. Meeqa sanaad shaqadaan ka shaqaynaysay?

a. < sanad

b. 1-5 sano

c. 6 – 10 sano

d. > 10 sano

3. Waxa barashada caadiga ah heerkeebad ka gaartay

a. < fasalka sideedaad

b. fasalka sagaalaad ilaa labo iyo tobnaad

c. heer jaamacadeed/farsamo < 2 sano

d. Shahaado 2 sano ah

e. shahaado 4 sano ah

f. Sahaado Jamacad the Sare

Appendix H: Interview guide translation

Hagaha waraysiga

Umulisooyinka

Iiga waran sida aad umulisada ku noqotay, iyo hadii wax iska badeleen sida umuliso loo nodqo sanadadii lasoo dhaafay.

- Umulisadu ma qorshaynaysay inay umuliso noqoto oo ma u diyaargarowday?
- Ma shaqo aan lagu talogalin bay ahayd?
- Ma qasab bay ahayd/xaalad laga fursan waayey?
- Maxaa is ka badelay xaalada dhalmada ee magaladan/tuuladan intii ay umulisadani ka shaqynaysay? Sabab?
    - o Tirada caruurta guryaha ku dhashay ma hoosbay u dhacday mise way saa'iday maxaana sababay
    - o Tirada xarumaha cafimaadka ma saa'iday mise hoos by u dhaceen
    - o Umulisooyinku tababar cusub may qaateen
        - ▪ Muxuu ahaa tababarku
        - ▪ Yaa bixiyey tababarkan
        - ▪ Siday u saamaysay dhalmada

Sidee baad u aragtaa xalada umul raaca ee magaalada/tuulada (X) iyo dhamaan degmada Abudwaq.

- Sidee bay umulisooyinku u arkaan tirada umul raaca soonaha
    - o Mid sare, hoos, ama caadi…
    - o Umulisooyinku ma la socdaan in ay umul raacashadu Somalia aad ugu badan tahay
    - o Umulisooyinku xaalada ma ka welwelsan yihiin

Adigoo adeegsanaya qibradaada nololeed iyo taada shaqo fadlan si faahfaahsan u sharax sababaha aad u malaynayso in ay kordhiyaan in ay haweenku isku dhintaan waqtiga foosha ama ay umul raacaan 42 bari ee dhalmada ka danbaysa.

- Sababahee baa la sheegay
- Sidee bay sababuhu la sheegay u kala horeeyeen
- Ma wax farqi ah baa u dhexeeyey sababaha ay xuseen
    - o Hooyooyinka iyo kuwaan hooyooyinka ahayn
    - o Umulisooyinka, ilmo kadilmeen, dhinteen, labadaba iyo kuwu kale
    - o Umulisooyinka aan aqoonta lahayn ama aqoontoodu hoosayso iyo umulisooyinka haysta farsamo ama shahaado heer jamacad

Aragtidaada sababteebaa ugu muhiimsan oo u baahan in wax laga badelo si hoos loogu dhigo umul raacashada magaalada/tuulada ama degmada. Sideebaad oran lahayd wax halooga badelo sababaha muhuumka aha.

- Sababeheebaa loo xushay in ay yihiin kuwa sababaha ugu muhiimsan

Madaxda Dowlada iyo Caafimaadka

Sidee baad u aragtaa xalada umul raacashada ee magaalada/tuulada (X) iyo dhamaan degmada Abudwaq.

- Sidee bay madaxda dowladu iyo caafimaadku u arkaan tirada umul raacashada soonaha
  - Mid sare, hoos, ama caadi…
  - Madaxdu ma la socdaan in ay umul raacashada Somalia aad u sarayso
  - Madaxdu xaalada ma ka welwelsan yihiin

Adigoo adeegsanaya qibradaada nololeed iyo taada shaqo fadlan si faahfaahsan u sharax sababaha aad u malaynayso in ay kordhiyaan in ay hooyadu isku dhimato waqtiga foosha ama ay umul raacdaan 42 bari ee dhalmada ka danbaysa.

- Sababahee baa la xusay
- Sidee bay sababaha la xusay u kala horeeyeen
- Ma wax farqi ah baa u dhexeeya sababaha ay xuseen maxada dowladu iyo kuwa caafimaadku

Aragtidaada sababteebaa ugu muhiimsan oo u baahan in wax laga badelo si hoos loogu dhigo umul raacashada magaalada/tuulada ama degmada. Sideebaad oran lahayd wax halooga badelo sababaha muhuumka aha.

- Sababeheebaa loo xushay in ay yihiin kuwa sababaha ugu muhiimsan

Appendix I: Translation authentication letter

Somali Community Access Network
700 Morse Road Suite 101 Columbus Ohio 43214

Tel. (614) 439-3034
Fax (614) 448-4395
info@SomaliCAN.org
www.SomaliCAN.org

December 12, 2013

To Whom It May Concern:

This is to confirm that we have conducted an independent assessment of the Somali translation of the following survey instruments for Maryan Du'alle:

1. Interview Guide
2. Oral Recruitment Script
3. Questionnaires
4. Verbal Consent of HIPAA

We found that the documents were accurately and validly translated and the complete meaning of each item is conveyed in the target language. We certify that there are no translation problems that will have an impact on the results of the proposed study.

Should you have any questions, please contact me at (614)439-3034 or by e-mail at Jibril@SomaliCAN.org.

Sincerely,

Jibril Mohamed
Executive Director

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