FACTORS ASSOCIATED WITH STILLBIRTH AT BANADIR HOSPITAL, SOMALIA: A CASE CONTROL STUDY

Good study and well designed and implemented

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DECLARATION

This dissertation is my original work compiled with the guidance of my supervisors, and that to the best of my knowledge has not been submitted for degree in any other university or published elsewhere. Where reference was made from other sources, published or otherwise, that source has been duly cited.

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DEDICATION

This dissertation is especially dedicated to my beloved wife Dr. Zeynab for her moral support throughout the project she encouraged me to pursue my dreams and finish my dissertation.

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I also dedicate this dissertation to my family and friends especially my best friend Abdisamad for their love, encouragement and support during the course of my studies.

I similarly dedicate this work to Eng.Daudhe is my inspiration to pursue my studies. This is for him as well.

LIST OF ABBREVIATIONS AND ACRONYMS

ANC   –   Antenatal Care

ERC   –   Ethics and Research Committee

IUFD   –   Intrauterine Fatal Death

KNH   –   Kenyatta National Hospital

MDG   –   Millennium Development Goal

SB   –   Stillbirth

SBR   –   Stillbirth Rate

SDG   –   Sustainable Development Goal

UNICEF   –   United Nations Children's Fund

UON   –   University of Nairobi

WHO   –   World Health Organization

DEFINITION OF TERMS

Stillbirth: is a baby born dead at 28 weeks of gestation or more

Stillbirth rate: number of stillbirths per 1000 total births.

Preterm birth: birth before 37 completed weeks of gestation.

Term birth: birth after 37 completed weeks of gestation and up to 42 weeks.

Post-term: birth after 42 completed weeks of gestation.

Antenatal care: This is the care a pregnant woman receives from the onset of pregnancy till Onset of labor.

Intra-partum/intranatal care: This is the care woman receives while in labor, during delivery and immediate postpartum period i.e. first one hour after delivery.

Postnatal care: This is the care a woman receives during the puerperium approximately 6 weeks or 42 days following delivery.

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ABSTRACT

Background: Worldwide in 2015, for every 1000 total births, 18.4 babies were stillborn, mostly in low-income countries.this is way above the world health assembly (WHA) endorsed target of 12 or fewer in all countries by 2030. Absent from the Millennium Development Goals and still missing in the Sustainable Development Goals, stillbirths remain a neglected issue, invisible in policies and programs, underfinanced and in urgent need of attention. Efforts to lesser this figure may be disadvantaged by an inadequate understanding of the factors associated with stillbirth.

Objective:the study was piloted in Banadir Hospital apublic teaching hospital in Somalia to determine factors associated with stillbirth during study period (January 2016 to December 2016)..

Methodology: Hospital-based case-control study conducted atBanadir Hospital. All women who delivered in the study setting during study period (Jan 2016 to Dec 2016)were randomly selected and included as cases and as controls. The information about risk factors was obtained from medical records through the help of a predesigned proforma. Statistical analysis was done using SPSS version 23. Categorical variables were analyzed using frequencies and percentage. Stillbirth was measured as a dependent variable in the analysis and risk factors as independent variables then evaluated through estimating of chi square, Odds Ratio and 95% Confidence interval. Statistical significance grounded on a p-value cutoff 0.05.

Results: During the study period 114 women who had stillbirths at the hospital were enrolled as cases where 114 who had live births were recognized as controls.It was found that there is association between the following factors and stillbirth: advanced Mother's ageOR 5.7 (95% CI 1.5-21.8), high parity OR2.7 (95% CI1.2-6.1), previous stillbirth OR4.3 (95% CI1.9-9.9), lack of antenatal careOR2.5 (95% CI1.4-4.3), prolonged laborOR5.3 (95% CI2.1-13.5) and congenital anomaliesOR 8.5 (95% CI 1.0-69.3).

Conclusion: High parity, unemployment,previous stillbirth,lack of antenatal care, prolonged laborand congenital anomalieshad strong association with stillbirth. These are modifiable

factors, byenhancing the availabilityand accessibility of the following services (education, specialized ANC, proper and early intervention of emergencies) which can be targeted to ensure a successful pregnancy outcome.

Key words: Stillbirths, factors, Banadir, Somalia**.**

1.0   INTRODUCTION AND LITERATURE REVIEW

1.1   Introduction:

WHO definition stillbirth: a baby born with no signs of live at 28 weeks of gestation or more, with a birth weight of ≥1000 g, or a body length of ≥35 cm,[1]however UK usually defines stillbirth as a death at 24 weeks or more, as other high-income nations use a cut-off 22 weeks. In this project, the definition used is the WHO definition for international comparisons. Still birth is a common adverse outcome of pregnancy, associated with many risk factors like, previous stillbirth, diabetes, prematurity, infection, birth injury, eclamptic disorders. Now many societies, and the worldwide program, stillbirths are not accounted for in spite of the fact that each stillbirth is a heartbreak for mothers and all families.[2]

The Lancet Series on elimination of preventable stillbirths shows that worldwide in 2015, 2.6 million babies were stillborn, of which 50% of the stillbirths occurred before a woman experienced labor.[3,4] The majority of stillbirths(98%) take place in low- and middle-income countries, and more than half of these occur in rural sub-Saharan Africa.[2] Although certain developed countries report a stillbirth rate of 3 per 1000 births, a 10-fold increase is reported in several settings in sub-Saharan Africa and South East Asia with noted stillbirth rates of 30 per 1000 births and above.[5,6]

Despite the overlap between the causes of and effective interventions for stillbirths and neonatal deaths,[2] the former has largely been missing from the policy agenda as a public health issue until recently with the Every Newborn Action Plan.[7] However, a review identified only 3% of research publications on stillbirths from countries that account for nearly 90% of the stillbirth burden, highlighting that the research gap in stillbirths is greater than the 10/90 gap for worldwide health research.[1] Furthermore, there is a research gap in the understanding of conditions and contexts within which stillbirths occur, and much of the available research focuses on improved in trapartum care.[7,8]

In Somalia, WHO (2007) found that neonatal mortality is estimated at 41-49/1,000 live births. Most early neonatal mortality is linked to conditions of pregnancy and birth, as well as congenital malformations.[9] Causes of newborn deaths linked to conditions of care in Somalia are low birth weight and prematurity, birth asphyxia, birth injuries, septicemia and neonatal tetanus,[10] but exact prevalence figures do not exist. Intrauterine death or stillbirth is a common complication of pregnancy. There are no reliable registrations of perinatal deaths, as reporting of stillbirths and preterm births outside of facilities does not take place. However, WHO estimates that perinatal mortality rate in Somalia was 81 per 1,000 total births in 2006.[11] A recent study by Blenco we, *et al*.[4] gave estimates for stillbirth rates as 35.5/1000 births. WHO (2015) added that the Horn of Africa is a low income area in a zone that has the maximum number of stillbirths globally today. Therefore stillbirth is a public health and developmental problem.

Despite calls for action to improve stillbirth outcomes, the strategies for delivering such interventions in health systems and in communities remain unclear. A detailed study of the causes of stillbirths in Somalia with a view to identifying possible interventions within the available resources is essential. However, for numerous cases of stillbirths the factors of death is currently not established.[6] Risk factors of death is often not documented precisely or not detailed at all. In Somalia, matters have been worsened by chronic war and conflict over almost two decades, lack of a functional central government, and poor access to quality reproductive health services. Despite increases in knowledge of effective measures and what works in reproductive health, progress in maternal health towards SDG 5 is not on track. Therefore, the present study is conducted to assess the extent of stillbirths and to study various maternal, fetal factors influencing occurrence of stillbirths in a teaching hospital in Mogadishu.

1.2   Literature Review

McClure & Goldenberg conducted research on stillbirth in developing countries, they established that almost half of the deliveries in these settings occur at home and under-reporting of stillbirths was a significant problem.[12] They noted that classification systems have been adapted for developing countries; however, there is not a standard international system, nor is there agreement about stillbirth definitions making comparisons of cause of stillbirth over time or between sites problematic. From available data, prolonged and obstructed labor, and various infections all without adequate treatment, appeared to account for the majority of stillbirths in developing countries. McClure & Goldenberg add that despite the large number of stillbirths worldwide, the topic of stillbirths in developing countries has received very little research, programmatic or policy attention. They concluded that better access to appropriate obstetric care, especially during labor, should reduce developing country stillbirth rates dramatically.[12]

A recent study by Osman, *et al.*[13]determined the experiences of Muslim Somali mothers who hadencountered with stillbirth. They engaged qualitative interviews with ten Somali women for one to six months after they had experienced a stillbirth. Data was analyzed by using Giorgi's method of phenomenological description. The four descriptive features appeared were: ''a feeling of unfriendliness''; ''altered steadiness in life''; ''immediate pain when the picture of the dead baby turns into the memory''; and ''a wave of depression eases''. Osman, *et al.* concluded that information can be useful when health care providers communicate the experiences of stillbirth to women of Muslim faith who have experienced an intrauterine fatal death (IUFD) resulting in a stillbirth.[13]

Kudzo carried out a research project in Hohoe Municipality, Ghana, with the purpose of finding the influencing factors associated with stillbirth through planned questionnaires.[14] The model was established on 250 birth documents of mothers who delivered from 1[st]January 2011 to 30th June 2011.They found that predictors of stillbirth were obstetric problem, place of residence, alcohol intake, and self-medication.

Study by Avachat, *et al.*[15]conducted a retrospective study to assess the extent of stillbirths in a teaching hospital located in rural area of India, as well as study various causative and

contributing factors for stillbirths.All the case records of the deliveries occurred in the study setting during study period (April 2009 to March 2010) was evaluated with the help of a predesigned proforma. A total of 3,458 deliveries occurred, of them 141 were stillbirths. Significant association was observed between gestational age and stillbirth. Maternal factors were responsible for majority of stillbirths (53.19%) while 34% stillbirths were idiopathic. Avachat, *et al.* concluded that improvement in availing essential obstetric care can reduce the magnitude of stillbirths.[15]

Aminu, *et al.*carried out a systematic review of many studies reporting risk factors associated with stillbirth in low- and middle-income countries (2000–2013).[16]An aggregate of 142 studies with 2.1% from low-income settings were examined; most of the reports onthe stillbirthstaking place at health facility level. In their studies, definition of stillbirth was different where 10.6% of studies (principally upper middle-income countries) used a cut-off point of ≥22 weeks of gestation whereas 32.4% (predominantly lower income countries) used ≥28 weeks of gestation. The factors described to be associated with stillbirth comprised poverty, lack of education, maternal age (>35 or <20 years) parity (1, ≥5), lack of antenatal contacts, prematurity, low birthweight, and also previous stillbirths. The maximum and repeatedly reported factors of stillbirth were maternal factors (8–50%) including syphilis, malaria, diabetes, and positive HIV status with low CD4 count. Their review also revealed that a high percentage of stillbirths persisted uncategorized (3.8–57.4%). Aminu, *et al.* concluded that there is need for capacity-building in perinatal death audit, strong guidelines andappropriate classification system to assign factors of death must be developed. In addition, more and better data are needed immediately.[16]

Study by Dandona, *et al.* identified factors associated with stillbirth in the Indian state of Bihar using verbal autopsy for deaths including stillbirths that occurred from January 2011 to March 2014.[17]The annualized stillbirth incidence was 21.2 per 1,000 births, with it being higher in the rural areas. Significant differences were seen in delivery-related variables and associated maternal conditions based on the place of delivery and type of stillbirth. Obstetrics complications and excessive bleeding during delivery contributed to nearly 30% of the cases as a possible risk factor for stillbirth, highlighting the need for better skilled care during delivery.Dandona, *et al.* concluded that their study provided detailed insight into investigating the possible risk factors for stillbirths, as well as insight into the ground-level changes that are needed within the health

system to design and implement effective preventive and intervention policies to reduce the burden of stillbirths.[17]

Maaløe*et al* recently reported ageneral facilitybased stillbirth rate was 59 per 1000 total births in a Tanzanian case control study and noted significant (up to 25%) underreporting in hospitals registers.[18] The study reported that in the hospital setting significant determinants of intra-hospital stillbirth were: oxytocin augmentation; caesarean section rate; and severe hypertensive disorders. When we compared to controls, stillbirths were regarded by time consuming admissions during labour. Nevertheless, insufficientcare was prevalent in both cases and controls and had caused potential risks for the whole population.

In India Neogi*et al* demonstrated the risk factors of still birth using population grounded case control study.[19] Apart from confirming the well-established risk factors for stillbirths including previous stillbirths, preterm birth and labour complications, Neogi and colleagues showed that sex selection drugs increased the risk of still births. There was a two to threefold (OR 2.6, 1.5-4.5) increase in stillbirths for mothers using these drugs, with a number needed to harm of 5, and an attributable risk percent of 0.6 (95% CI 0.32 to 0.77).

A large Nepalese case-control study conducted by Ashish *et al*.[20]in tertiary care showed that the risk of in trapartum stillbirth had significantly increased with: fetal risk factors for example, small for gestational age or preterm birth; maternal demographic factors including low maternal education; and obstetric factors like an tepartum hemorrhage; and complication during labor. A separate case-control study by Ashish*et al*. confirmed these risk factors also predicted stillbirths in the Nepalese setting.[21] The factors that were independently associated with stillbirths in this study were: lack of ANC attendance (AOR 4.2, 3.2-5.4); obstetrical complications including APH (AOR 3.7, 2.4-5.7) and hypertensive disorders (AOR 2.1, 1.5-3.1); previous stillbirths (AOR 2.6, 1.6-4.4) and small weight for gestational age (AOR 1.5, 1.2-2.0).

These findings were confirmed by Ghimire*et al* in an analysis of Nepalese Demographic &Health Survey (NDHS) figures during 2001-2011.[22] In this study stillbirths were significantly associated with low levels of maternal education (aRR 1.72, 95% CI 1.10, 2.69) for no formal education and aRR 1.81, 95% CI 1.11, 2.97 for basic level of education).

Gardosi, *et al.* assessed the main risk factors associated with stillbirth in a multiethnic English maternity population.[23] The study design was a cohort of 92,218 normally formed singletons including 389 stillbirths from 24 weeks of gestation, delivered during 2009-11. Multivariable analysis recognized a significant risk of stillbirth for parity, ethnicity, obesity, smoking, pre-existing diabetes, and history of mental health complications, antepartum haemorrhage, and fetal growth restriction. In total, 195 of the 389 stillbirths in their cohort had fetal growth restriction, but in 160 (82%) it had not been detected antenatally.Gardosi, *et al.* concluded that most normally formed singleton stillbirths are potentially avoidable with the single largest risk factor is unrecognized fetal growth restriction, and preventive strategies need to focus on improving antenatal detection.[23]

2.0   CONCEPTUAL FRAMEWORK

Causes of Stillbirth

Although certain events are likely to cause stillbirth, identification of the cause at this period of life is complex, and even with placental pathological examinations and autopsies about the cause cannot be identified in half of stillbirths.[24] The proportion of stillbirth that is unexplained varies, based, in part, on the classification system used, the amount of information available to determine cause, and the biases of the person conducting the review.[24]

Multiple factors may act directly on the fetus or indirectly on the mother. Especially in many developing country settings, and particularly those with a high proportion of home deliveries, why the fetus died will often be unknown, and the percentage of stillbirths without a clearly defined cause will be even higher.[25]

Estimates suggest that infection contributes to nearly half of the stillbirths in developing countries.[26]Infection may lead to stillbirth through several pathways.Many other infections have been associated with stillbirth, but their impact in developing countries is unknown.

Another important factor of stillbirth in developing countries is prolonged labor, which may result from cephalo-pelvic disproportion due to contracted pelvis or weak uterine contractions. Preeclampsia/eclampsia is also another important cause of stillbirth, which occurs in about 6% of pregnancies world-wide.[12]

Risk Factors of Stillbirth

Risk factors are characteristics associated with, but not obviously causal for stillbirth, such as advanced maternal age. The most common risk factors for stillbirths in developing countries include the lack of a skilled attendant at delivery, low socioeconomic status and poor nutrition, prior stillbirths, and advanced maternal age.[12]

Women who lack skilled care at delivery and who do not have access to emergency obstetrical care are among those at greater risk for stillbirth.[27]

In most geographic areas, in addition to access to obstetrical care at delivery, various other socio-demographic factors, including rural residence, low socioeconomic status, lack of education, lack of a partner, and poor nutrition have been associated with increased stillbirth rates.[28]In addition, advanced maternal age is a stillbirth risk factor in all areas of the world.

2.1   Schematic Conceptual Framework

Figure 1: Schematic Conceptual Framework
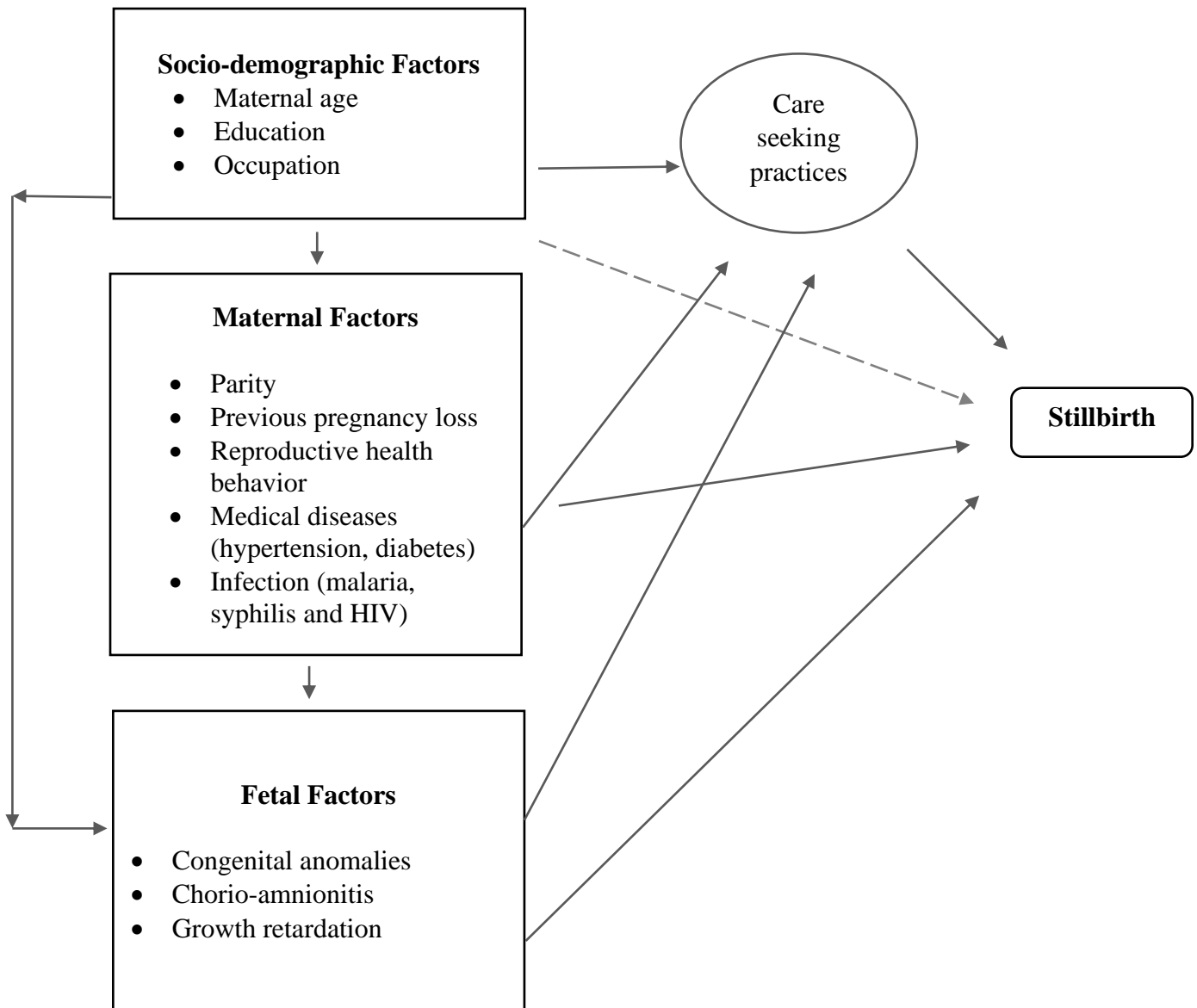
3.0   JUSTIFICATION

Every stillbirth is a disaster and a potential life injury. It represents a devastating pregnancy outcome and there is a need for increased efforts to identify the causes and to implement preventive measures.[6,29] Despite efforts to identify the factors contributing to fetal death, a substantial portion of fetal deaths are still classified as unexplained intrauterine fetal demise.[30] This proportion of unexplained deaths has remained fairly constant over the decades.[30] These deaths are therefore difficult to prevent because the determinants have not been adequately identified. Even in cases in which a cause of death can be determined, the lack of uniformity in data collection and classification of factors of fetal death have made comparisons and accurate reporting difficult. In addition, knowledge of the relative importance of the different factors of stillbirth and neonatal deaths in developing countries is still lacking.

Stillbirths represent a devastating pregnancy outcome and there is a need for increased efforts to identify the factors and to implement preventive measures. Knowledge of the relative importance of the different factors of stillbirth in Somalia is still lacking. A detailed study of the factors of stillbirths in Banadir Hospital, Mogadishu with a view to identifying possible interventions within the available resources is essential. Therefore, the study conducted to determine socio-demographic, maternal, fetal factors influencing occurrence of stillbirths in apublic teaching hospital.

4.0   RESEARCH QUESTION

- What are the socio-demographic, maternal and fetal risk factors for stillbirths among women delivered in Banadir Hospital, Somalia, in the year 2016

5.0　　OBJECTIVES

5.1　　Broad Objective

To determine the factors associated with stillbirth at Banadir Hospital, Somalia in the year 2016

5.2　　Specific Objectives

Among women delivered at Banadir Hospital, Somalia, between: 1st January to 31st December 2016:

1. To determine socioeconomic factors associated with stillbirth in Banadir Hospital
2. To determine maternal factors associated with stillbirth in Banadir Hospital
3. To determine fetal factors associated with stillbirth in Banadir Hospital

6.0   METHODS

6.1   Study Design

Unmatched case control study conducted in Banadir Hospital, Mogadishu, Somalia in which 114 women who had delivered stillbirths compared with 114 women who had delivered life births to determine the factors associated with still births.

To rationalize selection of the study design:

First of all stillbirth is rare

Second: case control enables to study multiple risk factors.

6.2   Study Site and Setting

Figure 2: Map of Somalia showing Mogadishu
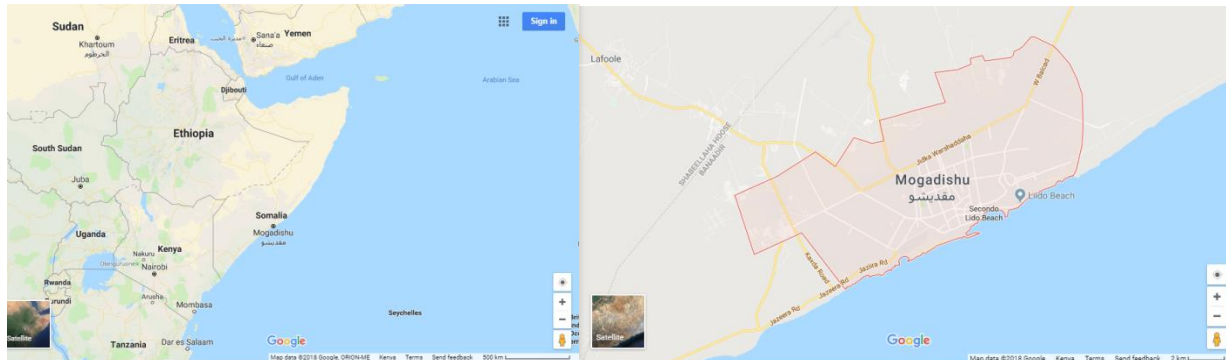
Somalia is the easternmost nation in the Horn of Africa, Its capital Mogadishu.

According to a recent United Nations Population Fund report, Somalia's population stands at 12.3 million people with 45.6% of its people <15 years of age. It is a youthful population, with a growth rate of 2.8%, which is among the highest in the world. On average, every woman bears 6.6 children and each household in Somalia has a mean of 5.9 persons.

Figure 3: Banadir hospital image

Banadir Hospital, also known as national referral hospital in Somalia, has since its establishment been the center of health care delivery in Mogadishu, Somalia.

Banadir Hospital is a public teaching hospital located in the Wadajir district of Mogadishu in Somalia, Built in 1977 as part of a Chinese development project.

It contains of four sections: Obstetrics & Gynecology section, Pediatric section, a surgical section, and general medicine section with a bed capacity of 700. The hospital also offers voluntary counseling and testing (VCT) for human immunodeficiency virus (HIV), prevention of mother-to-child transmission (PMTCT), and the expanded program on immunization (EPI) services.

This site is suitable for the study because no remarkable researches done over the past 2decades, also stillbirth rate is higher compared to neighboring countries in the continent which has the highest rate in the world.

6.3   Study Population

The study population comprised mothers who delivered in Banadir Hospital during study period (January 2016 to December 2016).

6.3.1 Inclusion Criteria

Cases – **women who delivered** stillbirths(≥28wks) at Banadir Hospital from: 1st January 2016 – to- 31st December 2016.

Control – **women who delivered** live births (≥28wks) in the same setting during the same period.

6.3.2 Exclusion Criteria

Women not delivered in Banadir Hospital at same period

Women conceived (not sure of LMP/breast feeding)

6.4 Sample Size and Sampling Procedure

6.4.1 Sample Size

This sample size was calculated usingKelsey's formula for case control studies:

$$n = (\frac{r+1}{r})\frac{(\bar{p})(1-\bar{p})(Z_\beta + Z_{\alpha/2})^2}{(p_1 - p_2)^2}$$

The following assumptions were used in determining sample size:

Z_β= 0.84 representing power of 80%

$Z_{\alpha/2}$ = 1.96 representing 95% level of confidence

r=1 representing ratio of cases to controls

P1 = proportion of cases with risk factor (an tepartum hemorrhage) is13.2% based on case control study in Nepal by Ashish et al

P2 = proportion of control with risk factor in the control group is 2.8%based on case control study in Nepal by Ashish et al

$\bar{p}$ = average of p_1 and p_2 estimated at 0.08% using $p_1 = 13.2\%$ and $p_2 = 2.8\%$

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$$n = (\frac{1+1}{1}) \frac{(0.08)(1-0.08)(0.84+1.96)^2}{(0.132-0.028)^2} = 107 \text{ per group}$$

Therefore, n = 107 (107 cases and 107 controls=214)

Due to retrospective nature of the study the sample size was increased by 7%. The ultimate sample size is 114 cases and 114 controls which gives 228.

6.4.2   Sampling Procedure

As fig. 4 shows Stratified random sampling used to select cases and controls. All the deliveries conducted from 1st January 2016 to 31st December 2016 stratified into stillbirths and live births. A simple random sample of cases obtained among the still births and a second simple random sample among the live births. Computer generated random numbers used to implement the random sampling using cases retrieved and controls retrieved as well sampling frame.
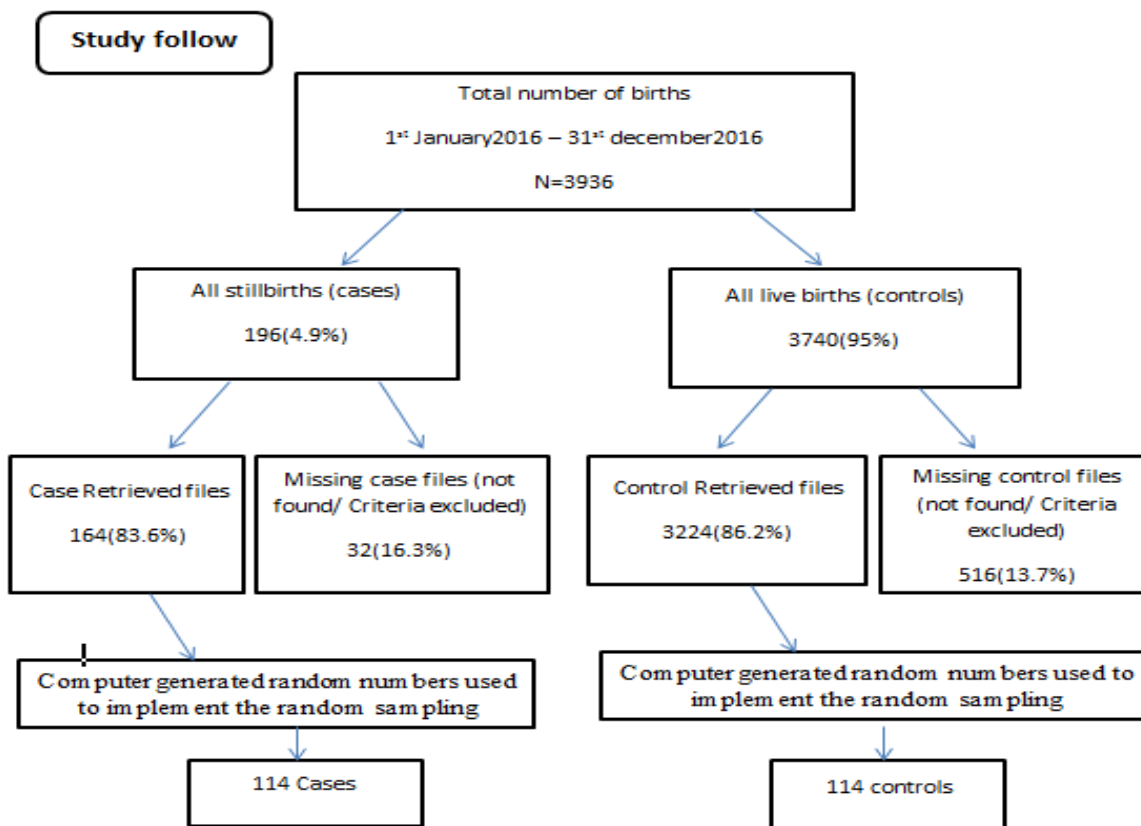
Fig. 4 Study follow chart

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6.5   Data Variables

Data Variables

Dependent Variable:

Still Birth

Independent Variables:

Risk Factors

Socio-demographic Factors

-Maternal age

-Education

-Occupation

-parity

Maternal factors

- Obstetric factors (Previous pregnancy loss, Antenatal attendance)

-Medicaldiseases(pregnancy induced hypertension, gestational diabetes)

- Infection (malaria)

Fetal Factors

-Congenital anomalies   -Chorio-amnionitis   -Growth retardation

6.6   Research Instruments

A pre-designed questionnaire used to collect data from medical records of selected cases and controls. (See Appendix 1) The tool contained informationsocio-demographic factors, maternal factors and fetal risk factors that are routinely documented in medical record.

6.7   Case Definition

The WHO defines stillbirth as a "fetal death late in pregnancy" and allows each country to define the gestational age at which a fetal death is considered a stillbirth for reporting purposes; in Somalia, death of a fetus weighing 1,000 g or more than 28 weeks of gestation is defined as stillbirth.[31]

Factor of death assignment was made in accordance with a modified version of the classification system proposed by Baird et al. and Pattinson et al. who adapted the system for use in developing country settings allowing for the identification of the following primary obstetrics factors of death: Spontaneous preterm labor (< 37 weeks), infections, antepartum hemorrhage, intrauterine growth restriction, hypertension, fetal abnormality, trauma and intrapartum asphyxia, maternal disease, other unexplained intrauterine death and multiple pregnancy.[32]

6.8   Data Collection

Ethical clearance was obtained from institutional ethical committee, this record-based case control study conducted. Data collection conducted within approximately three-month period. The maternity register containing all deliveries during one -year study period assessed to find out the number of stillbirths. Two data sources -individual client medical records and the maternity register- used during the study because these sources contain complementary information that are particularly useful in retrospective studies in which missing data is a common concern. The investigators reviewed the medical records of the selected sample and abstract data on the risk factors for stillbirths with the help of a predesigned proforma (see appendix 7.1). On completing the review of individual medical records the maternal register inspected to establish if any relevant additional information are available from this source.

6.9   Study Personnel

Assistants trained to assist in the research; a records officer (Qualification - Certificate in Health Records) to assist in the retrieval and records management. All filled proforma checked by the principal investigator for completeness.

6.10   Data Analysis Methods

Collected data coded and entered into a Microsoft excel spreadsheet. Statistical analysis done using: Statistical program for social sciences (SPSS) program version 23.

Descriptive analysis of the cases and controls conducted separately using socio-demographic data. The distribution of all numeric (continuous) variables inspected to determine normality. For categorical variables e.g. education level and occupation frequencies and percentage of mothers with each level of the categorical variables calculated. Factors of stillbirth identified through comparison of mean between cases and controls for numeric data using the percentages of cases and control with different levels of each socio-demographic, maternal and fetal risk factor compared using chi square. Stillbirth status considered as dependent variable for the analysis and effect of risk factors on stillbirth evaluated through estimating adjusted odds ratio with 95% confidence intervals. Statistical significance based on a P-value cutoff of 0.05.

6.11   Ethical Considerations

Ethical approval obtained from KNH/UON Ethics and Research Committee. Ethical approval also obtained from Banadir Ethics and Research Committee, Mogadishu, Somalia.

Patient identity and details retained unspecified at all periods through the use of coded proforma with matching codes over the patient's document. The information of the questionnaire was only available to the statistician and primary investigator who upheld concealment and adhered to data safeguard standards.

Data was stored only in a computer with a password to facilitate confidentiality.

This study aimed to yield results which add and contribute towards evidence-based practice for the risk factors associated with stillbirth. The results can be published and serve as a basis for future studies in this area. After publication, the digital records of the data will be deleted to ensure confidentiality is maintained.

The primary investigator has no conflict of interest.

6.12 Strengths Limitations of the Study

Study strengths

The first study on factors associated with stillbirth in Banadir hospital

Assessed the hospital deliveries

Study limitations

This is a case control study that usually demonstrates association between various factors and stillbirth, but it cannot determine a causal relation.

Although this study was a hospital based, the background characteristics of mothers with stillbirths might be varied at population level

7.0 RESULTS

During the study period between January and December 2016 a total of 228 files (114cases, 114controls) were identified as eligible for this analysis (Fig.4).The results are as follows: Socio-demographic factors, maternal factors and fetal factors for stillbirth.

7.1 Socio-demographic factors

Table 1Showswomen with stillbirth were older, less educated, and unemployed more than those with live births. Advanced maternal age: cases (28.9%) compared to controls (12.4%) with OR 5.7 (95% CI1.5-21.8), and p-value of0.010.Also the table showed that26.3% of cases had secondary and above level of education compared to56.1% of controls OR0.3 (95% CI 0.1-0.6), and p-value of 0.001.Similarly the table showed63.1% of cases were unemployed compared to46.5% controls with OR 2.5 (95% CI 1.2-5.2) and p-value of 0.013.

Table 1: Socio-demographic factorsN = 114

Variable	Frequency n (%)		Total n (%)	OR (95% CI)	p-value
	Stillbirth	**Live birth**			
Age in Years	**N = 114**	**N = 114**	**N = 228**		
16-19	4 (3.5)	9 (7.9)	13 (5.7)	1	
20-25	34 (29.8)	36 (31.6)	70 (30.7)	2.1 (0.6-7.6)	0.237
26-30	16 (14.0)	33 (28.9)	49 (21.5)	1.1 (0.3-4.1)	0.897
31-35	27 (23.7)	23 (20.2)	50 (21.9)	2.6 (0.7-9.7)	0.136
>35	33 (28.9)	13 (12.4)	46 (20.2)	5.7 (1.5-21.8)	**0.010**
Marital status					
Married	105 (92.1)	108 (94.7)	213 (93.4)	1	
Divorced/Separated	4 (3.5)	4 (3.5)	8 (3.5)	1.0 (0.3-4.2)	0.969
Widowed	5 (4.4)	2 (1.8)	7 (3.1)	2.6 (0.5-13.5)	0.249
Education					
No formal education	34 (29.8)	22 (19.3)	56 (24.6)	1	
Primary	50 (43.9)	28 (24.6)	78 (34.2)	1.2 (0.6-2.3)	0.689
Secondary and above	30 (26.3)	64 (56.1)	94 (41.3)	0.3 (0.1-0.6)	**0.001**
Occupation					
Student	15 (13.2)	28 (24.6)	43 (18.9)	1	
Unemployed	72 (63.1)	53 (46.5)	122 (53.5)	2.5 (1.2-5.2)	**0.013**
Business	23 (20.2)	28 (24.6)	51 (22.4)	1.5 (0.7-3.5)	0.315
Other	4 (3.5)	5 (4.4)	9 (3.9)	1.5 (0.3-6.4)	0.588
Occupation (Spouse)					
No spouse	9 (7.9)	6 (5.3)	15 (6.6)	2.1 (0.5-8.8)	0.288
Student	7 (6.1)	10 (8.8)	17 (7.5)	1	
Unemployed	21 (18.4)	9 (7.8)	30 (13.1)	3.3 (0.9-11.5)	0.053
Business	55 (48.2)	65 (57.0)	120 (52.6)	1.2 (0.4-3.4)	0.718
Other	22 (19.3)	24 (21.1)	46 (20.2)	1.3 (0.4-4.0)	0.638

7.2 Maternal factors

Table 2Shows Obstetric complications, medical diseases and infections in women with stillbirth. Women with stillbirth had higher parity, history previous stillbirth, preterm, prolonged labour, antepartum hemorrhage, and less antenatal care attendance than those with live births.

Great grand multiparous cases (23.7%) compared to controls (11.4%) with OR 2.7 (95% CI 1.2-6.1) and p-value of 0.016.

Previous history of still births or early neonatal death was (24.6%) ofcases compared to(7.0%) of controls,OR-4.3 (1.9-9.9) and P-value of <0.001.

Preterm were (50.0%) of cases compared to (42.1%) of controls, OR-1.4 (0.8-2.3) and P-value of 0.232.

Lack of antenatal care Attendance were (71.9%) of cases compared to(50.9%) ofcontrols, OR-2.5 (95% CI- 1.4-4.3) and P-value of 0.001.

Number of times Attended antenatal care: The ANC attendance of only 2times were (46.9%) of cases compared to (8.9%) of controls, p-value of <0.001, while ANC attendance of 4times had (9.4%) of cases compared to (37.5%) of controls.

Prolonged labor were (22.8%) of cases compared to (5.3%) of controls, OR 5.3 (95% CI 2.1-13.5) and p-value of <0.001.

An tepartum hemorrhage were (8.8%) of cases compared to (2.6%) of controls, OR 3.6 (95% CI 0.9-13.3) with a p-value of 0.046.

Number of babies delivered: Twin delivery were(4.4 %) of cases compared to (0.9) of controls, OR 5.2(95% CI 0.6-45.1).

Pregnancy induced hypertension were (10.5 %) of cases compared to (7.0%)controls, OR 1.6 (95% CI 0.6-3.9).

Gestational diabetes: cases were equal to controls (0.9%)each. Malaria cases 6 (5.3 %) compared to no controls.

Table 2: Maternal factors *N = 114*

Variable	Frequency n (%)		Total n (%)	OR (95% CI)	p-value
	Stillbirth N = 114	**Live birth** N = 114	N = 228		
Parity					
≤1	30 (26.3)	39 (34.2)	69 (30.3)	1	
2-4	33 (28.9)	43 (37.7)	76 (33.3)	0.9 (0.5-1.9)	0.994
5-6	24 (21.1)	19 (16.7)	43 (18.9)	1.6 (0.7-3.5)	0.204
≥7	27 (23.7)	13 (11.4)	40 (17.5	2.7 (1.2-6.1)	**0.016**
Previous history of still births					
Yes	28 (24.6)	8 (7.0)	36 (15.8)	4.3 (1.9-9.9)	**<0.001**
No	86 (75.4)	106 (93.0)	192 (84.2)	1	
Gestational age					
Preterm	57 (50.0)	48 (42.1)	105 (46.1)	1.4 (0.8-2.3)	**0.232**
Term	57 (50.0)	66 (57.9)	123 (53.9)	1	
Prolonged labor					
Yes	26 (22.8)	6 (5.3)	32 (14.0)	5.3 (2.1-13.5)	**<0.001**
No	88 (77.2)	108 (94.7)	196 (86.0)	1	
APH(pp/abp)					
Yes	10(8.8)	3 (2.6)	13 (5.7)	3.6 (0.9-13.3)	**0.046**
No	104(91.2)	111(97.4)	215(94.3)	1	
Number of babies delivered					
Twin	5 (4.4)	1 (0.9)	6 (2.6)	5.2 (0.6-45.1)	0.213
Singleton	109 (95.6)	113 (99.1)	222 (97.4)	1	
ANCAttendance					
Yes	32 (28.1)	56 (49.1)	88 (38.6)	1.0	
No	82 (71.9)	58 (50.9)	140 (61.4)	2.5 (1.4-4.3)	**0.001**
Number of ANC attendance	**N = 32**	**N = 56**	**N = 88**		
1	4 (12.5)	0 (0.0)	4 (4.5)	-	N/A
2	15 (46.9)	5 (8.9)	20 (22.7)	15.0 (2.0 – 74.3)	**<0.001**
3	7 (21.9)	12 (21.4)	19 (21.6)	2.9 (0.6 – 13.8)	0.269
4	3 (9.4)	21 (37.5)	24 (27.3)	0.7 (0.1 – 4.0)	1.000
5	3 (9.4)	15 (26.8)	18 (20.5)	1	
6	0 (0.0)	3 (5.4)	3 (3.4)	-	N/A
	N = 114	**N = 114**	**N = 228**		
PIH					
Yes	12 (10.5)	8 (7.0)	20 (8.8)	1.6 (0.6-3.9)	0.483
No	102(89.5)	106(93)	208(91.2)	1	
GDM					
Yes	1 (0.9)	1 (0.9)	2 (0.9)	1.0 (0.1-16.2)	1.000
No	113(99.1)	113(99.1)	226(99.1)	1	
Malaria					
Yes	6 (5.3)	0 (0.0)	6 (2.6)	-	N/A
No	108(94.7)	114(100)	222(97.4)	1	

Figure5showsRupture of uterus: the case population had more Rupture of uterus than the control populations.

Rupture of uterus cases are2 (1.8 %) compared to lack of controls.

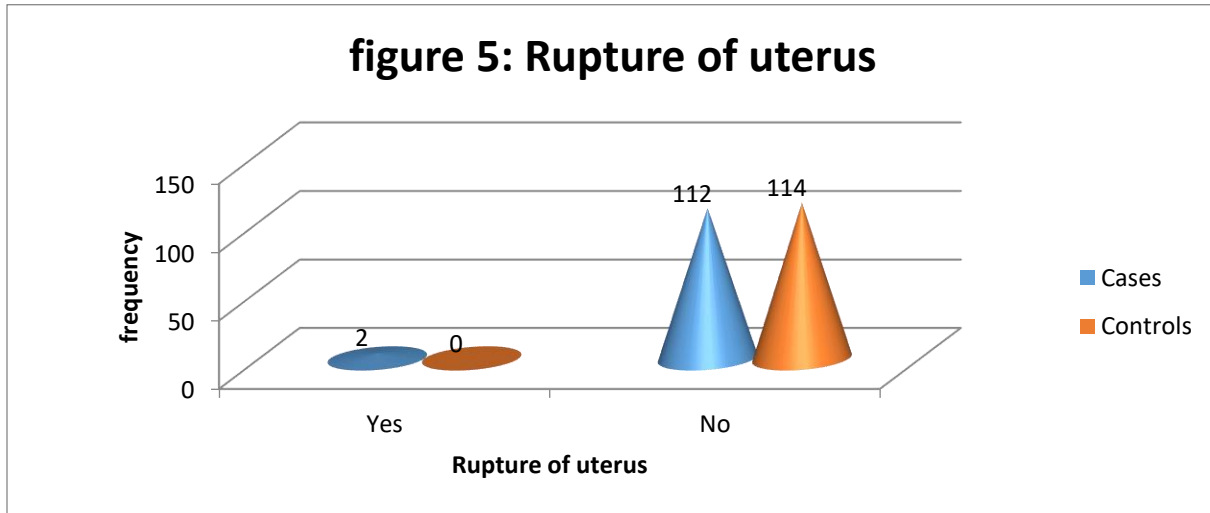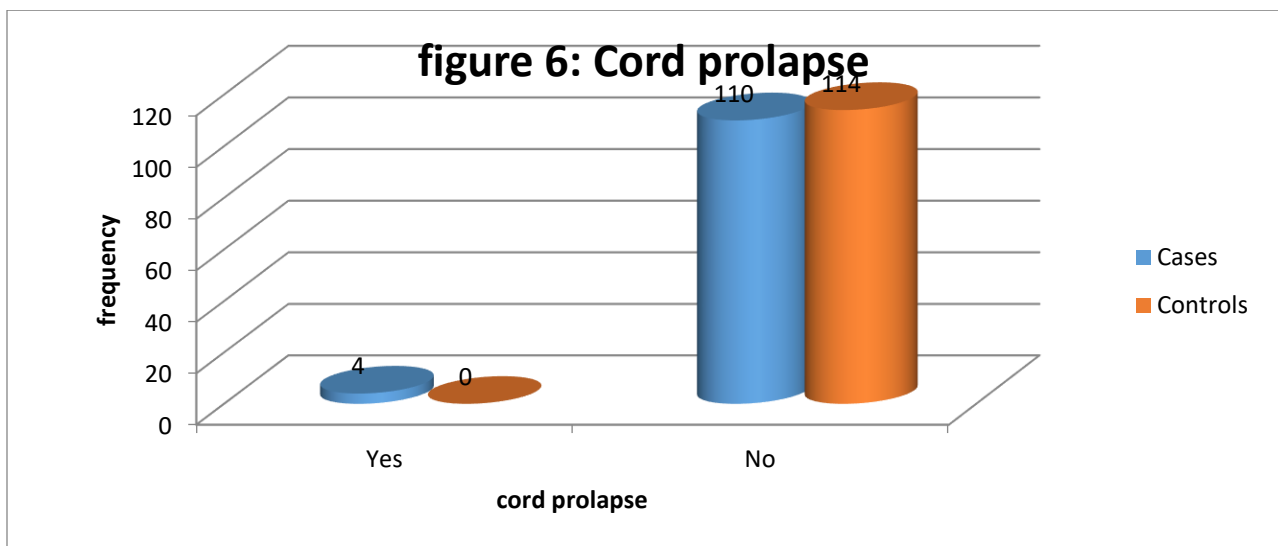**Figure 5**: Rupture of uterus

figure 5: Rupture of uterus

Figure 6showsCord prolapse: the case population had more Cord prolapse than the control populations.

Cord prolapse cases are4 (3.5 %) compared to lack of controls.

Figure 6: Cord prolapsed

figure 6: Cord prolapse

7.3 Fetal factors

Table 3Shows fetal complications (Congenital anomalies, Chorioamnionitis and Growth retardation) the case population had more Congenital anomalies, Chorioamnionitis and Growth retardation than the control populations, the risk of stillbirth with Growth retardation was 2.4 times higher in case population than in control population as the risk of stillbirth with Congenital anomalies was 8.5 times higher in case population than in control population with a p-value of 0.035.

Congenital anomalies were (7.0%) of cases compared to (0.9%)of controls, OR 8.5 (95% CI1.0-69.3) and p-value of 0.035

Low birth weight of 1000-2499grm had (28.9) of cases compared to(0.9) of controls, OR 46 (95% CI 6.2-343.5) and p-value <0.001.

Table 3: Fetal factorsN = 114

Variable	Frequency n (%)		Total n (%)	OR (95% CI)	p-value
	Stillbirth **N = 114**	**Live birth** **N = 114**	**N = 228**		
Congenital anomalies					
Yes	8 (7.0)	1 (0.9)	9 (3.9)	8.5 (1.0-69.3)	**0.035**
No	106(93.0)	113(99.1)	219(96.1)	1	
Chorio-amnionitis					
Yes	2 (1.8)	0 (0.0)	2 (0.9)	-	N/A
No	112(98.2)	114(100.0)	226(99.1)	1	
Growth retardation (IUGR)					
Yes	7 (6.1)	3 (2.6)	10 (4.4)	2.4 (0.6-9.6)	0.296
No	107(93.9)	111(97.4)	218(95.6)	1	
Birth weight					
1000-2499	33 (28.9)	1 (0.9)	34 1(14.9)	46 (6.2-343.5)	**<0.001**
2500+	81 (71.0)	113 (99.1)	194 (85.1)	1	

8.0 DISCUSSION, CONCLUSION AND RECOMMENDATIONS

8.1 Discussion

This study determined the factors associated with stillbirth among women delivered at Banadir Hospital between January 2016 and December 2016. During the study period, 114 women who had stillbirths at the hospital were regarded as cases, where 114 who had live births were categorized as controls.

An association was found between the following factors and stillbirth: advanced maternal age OR 5.7 (95% CI1.5-21.8), high parity OR 2.7 (95% CI 1.2-6.1), previous stillbirth OR 4.3 (95% CI 1.9-9.9), lack of antenatal care attendance OR 2.5 (95% CI 1.4-4.3), prolonged labor OR 5.3 (95% CI 2.1-13.5), congenital anomalies OR 8.5 (95% CI 1.0-69.3) and low Birth weight OR 46 (95% CI 6.2-343.5).

There are potential clarifications for the associations seen between selected variables of these risk factors and stillbirth. For example, women with advanced age are more likely to have age-associated congenital anomalies and placental pathologies (placental aging is faster after 35years, cells of the placenta are under more stress; less able to repair, and show signs of inflammation). Findings of this study show that majority of the women who delivered in Banadir Hospital are of low socio-demographic status as reflected by their employment status (majority were unemployed) and level of schooling (majority are primary education and below). Majority of them were aged between 20-25years. Overall, the study established that women's ANC visits are low, with most of them were either not attending or attending 1-3 times. The high unemployment rates among the women means that women depend on spouses or close relatives for financial support, a factor likely to cause less ANC visits. Thus, achieving the world health assembly (WHA) endorsed target of 12 or fewer in all countries by 2030 can be realized to a larger extent through establishment of quality ANC in public facilities since such facilities are utilized mostly by women of low socio-demographic circumstances, who are often victims of stillbirth.

Demographic and reproductive characteristic associated with stillbirth are largely preventable. However, stillbirth has continued to deteriorate in Somalia despite of all the efforts being made by the government, non-governmental organization and the community. This study finds that most of the mothers with stillbirth were at low level of education, for instance, only

(26.3%)among cases had secondary and above level of education compared to (56.1%) among controls (p value 0.001). This endorses the results from past studies [4, 5, and 6]. This finding is important since it emphasizes the role of education for the mother in obtaining and understanding the benefits of good health and being able to make appropriate decisions during pregnancy. It is important to note that despite the woman's weaker role in decision-making in African settings, education has a strong influence on stillbirth. Secondary and above level of education appears protective against stillbirth which is significant finding.

Factors significantly associated with stillbirth also included high parity. This study found that high parity was an influential predictor of stillbirth. The probableenlightenments for the association is the increased incidence of the obstetric complications in multiparous (labour dysfunction, preterm, anemia and etc.). Previous studies have shared comparable findings [4, 6].

Influences significantly associated with stillbirth comprised previous stillbirth. This study found that previous stillbirth was influential predictor of stillbirth. Previous studies have shared similar findings [4, 5]. Though mothers are grieving that loss the likely explanations for the association is possibility of presence of triggering factor which is to be screened or investigated. The experience of stillbirth leads to spend many times seeking medical advice expecting to have a live baby. This may point the need for future prospective cohort studies.

Factors significantly associated with stillbirth likewise included lack of antenatal contacts. This study found that lack of antenatal contacts was an important predictor of stillbirth. Antenatal care attendance improves pregnancy out comes while its lack leads to perinatal complications including stillbirth. The study reinforces the previous studies have shared similar findings [4, 5]

Variables significantly associated with stillbirth similarly included prolonged labour. This study found that prolonged labour was a powerful predictor of stillbirth. Possible reasons for this finding are that prolonged labour is failure to progress or slow progress of labour caused by obstructed labour (passage), fetal factor (passenger), or weak contractions (power) the feral death triggered by asphyxia, cerebral hemorrhage or placental complications. Previous studies have shared similar findings [3, 5]

Variables associated with stillbirth also included pregnancy induced hypertension. This is more related to inadequate antenatal care as well as in trapartum monitoring. Similar studies[5]

Factors significantly associated with stillbirth likewise included Congenital anomalies. This study found that Congenital anomalies as an influential predictor of stillbirth. Several different lethal malformations and heart defects lead to stillbirth. Previous studies have shared similar findings [4, 6]

Stillbirth is been ignored in the setting as it is neglected worldwide; absent from millennium development goals and missing in sustainable development goals.

Therefore we need: To discuss the problem with all medical stuff in the hospital as well as to organize national seminars. To be issue dnew guidelines by ministry of health to all hospitals about antenatal and intra-partum management to improve pregnancy outcome.

8.2 Conclusion
The factors that were significantly associated with stillbirth included: Advanced age, High parity, Lack of antenatal care attendance, preterm delivery, prolonged labor, Congenital anomalies and low birth weight. This is in line with previous studies.

8.3 Recommendations

- ✓ Need to raise general education in the community (increasing level of education specially girls, changing awareness on the importance of antenatal care and increasing the knowledge of the risk factors for adverse birth outcomes).
- ✓ Essential to have an appropriate management of maternal obstetrics and medical conditions (early intervention)
- ✓ Need to develop and strict adherence to protocols in managementof fetal conditions (screening congenital anomalies and genetic conditions)
- ✓ Crucial to have contraception to reduce high parity as it is strongly associated with stillbirth.

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10.0   APPENDICES

10.1   Appendix I: Questionnaire

1. **IP No.:** _____

2. **Study No.:** _____

3. **Date of Admission:** _____ **Time** (am\pm): _____

GENERAL CHARCTERISTICS

1. Age: _____

2. Marital Status:

Single [ ]   Married [ ]   Divorced/Separated [ ]   Widowed [ ]

3. EducationLevel Attained:

No Formal Education [ ]   Primary [ ]   Secondary [ ]   College/University [ ]

4. Occupation:

Student [ ]   Unemployed [ ]   Farmer [ ]   Pastoralist [ ]   Business [ ]

Other (specify) _____

5. If married, spouse occupation:

Student [ ]   Unemployed [ ]   Farmer [ ]   Pastoralist [ ]   Business [ ]

Other (specify) _____

6. Religion:

Muslim [ ]   Christian [ ]   Other (specify) _____

OBSTETRIC CHARCTERISTICS

 1. Parity: _____

 2. LMP: _____

 3. Gestational Age in Completed Weeks: _____ **Gestational by LMP**

4. **When was the last delivery?** _____

5. **Previous history of stillbirth or early neonatal death:**

Yes [ ]   No [ ]   If Yes, State Cause _____

6. **Site of delivery:**

Delivered at Banadir Hospital [ ]   Delivered Elsewhere [ ]

PRENATAL EVENTS

1. **Attend Antenatal Care:**

Yes [ ]   No [ ]   If Yes, No. of Times _____

2. **Gestational Age at First Attending ANC:** _____

3. **If Attended Antenatal Clinic; where?**

Booked at Banadir Hospital [ ]   Booked Elsewhere [ ]

4. **Antenatal Complication:**

Anemia [ ]   Pregnancy Induced Hypertension [ ]   Malaria [ ]   PROM [ ]

Other (specify) _____

5. **Reason for Admission:**

Labor [ ]   APH [ ]   PIH [ ]   Malaria [ ]   Other (specify) _____

6. **Onset of Labor:**

Spontaneous [ ]   Induced [ ]   Other (specify) _____

PREGNANCY OUTCOME

1. **Pregnancy Outcome:**

Alive [ ]Stillbirth [ ]   FSB [ ]   MSB [ ]   Neonatal Death [ ]

2. **Outcome:**   with congenital anomalies[ ]   without [ ]

3. **Birth Weight** (grams): _____

4. Gestational Age (in weeks): _____

5. Apgar score:

1 min_____   5 min _____   10 min_____

6. Meconium Passed:

Yes [ ]   No [ ]   If Yes, What Grade? (1, 2, 3) _____

7. Mode of Delivery:

Spontaneous Vaginal [ ]   Assisted Vaginal [ ]   Caesarean Section [ ]

8. Number of Babies Delivered:

Singleton [ ]   Twin [ ]   Triplet [ ]   Other (specify) _____

LABOR EVENT

1. Prolonged Labor:

Yes [ ]   No [ ]

2. Obstructed Labor:

Yes [ ]   No [ ]

3. Mal Presentation:

Yes [ ]   No [ ]

If Yes, (specify) OPP [ ]   Face [ ]   Brow [ ]   Shoulder [ ]   Breech [ ]

4. Cord Prolapsed:

Yes [ ]   No [ ]

Uterine Rupture:

Yes [ ]   No [ ]   Other (specify) _____

4. **Delays model**   1st Delay in decision( )   2nd Delay in reaching( ) 3rd Delay in receiving

    adequate health care( )

10.2　Appendix II: Study Time Line

Activities	NOV 2017	DEC 2017	JAN 2018	FEB 2018	MAR 2018	APR 2018	MAY 2018	JUN 2018	JUL 2018	AUG 2018	SEP 2018	OCT 2018	NOV 2018	DEC 2018
Proposal Development	▓	▓												
ERC Approval			▓	▓	▓	▓								
Data Collection						▓	▓	▓	▓					
Data Analysis										▓	▓			
Report Writing												▓	▓	
Dissemination of Findings													▓	▓

10.3   Appendix III: Budget

ITEM	QUANTITY	UNIT COST (Ksh)	TOTAL (Ksh)
Printing & Packaging			
Proposal printing	40	10	400
Photocopy of proposal	40*3	3	360
Binding of proposal	3copies	100	300
Proposal printing 2nd draft	3copies	10	1060
Photocopy of proposal 2nd draft	3copies	3	360
Binding proposal 2nd draft Ethic: UON/KNH	3copies	100	300
Total			2,780
Printing of questionnaire	3	10	30
Photocopy of questionnaire	3*228	3	2,052
Printing of result black & white	3copies	10	1,500
Printing of result color	3copies	20	3,000
Binding of Final paper	3copies	100	300
Total			6,882
Contracted Services			
Statistician	1	30,000	30,000
Research Assistants	3	10,000	30,000
Sub Total			60,000
Communication			
Emails & Phone calls	1	5000	5000
Sub Total			5000
Publication	1	50,000	50,000
Contingency 15%	1		9,000
Grand Total			74,000

10.4Appendix IV: Map of Somalia, Mogadishu

10.5 Appendix V: Location of Banadir Hospital