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Verbal autopsy for new born deaths aged under 4 weeks in Baharak district – Badakhshan province- Afghanistan

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In partial fulfillment of the requirements

For the award of the degree of

MASTER OF PUBLIC HEALTH

BY

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Certificate

Certified that the dissertation **Verbal autopsy for newborn deaths aged under 4 weeks in Baharak district of Badakhshan province- Afghanistan** is a record of the research work undertaken by **Mohammad Eshaq Kamal**, in partial fulfilment of the requirements for the award of the degree of Master of Public Health under my guidance and supervision.

Signature of site-supervisor/co-guide

Dr. Sayed Faqir Faqiri/ Regional Program Manager

Supervisor

Date:

Declaration

I hereby declare that this dissertation **Verbal autopsy for newborn deaths aged under 4 weeks in Baharak district of Badakhshan province- Afghanistan** is the bonafide record of my original field research. It has not been submitted to any other university or institution for the award of any degree or diploma. Information derived from the published or unpublished work of others has been duly acknowledged in the text.

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Abstract

The proximate causes of deaths were (33%) birth asphyxia, (29%) pneumonia, (21%) prematurity, and (15%) diarrhea. 62% of newborns died within first seven days of life and 56% female and 44 % were male. 65% of newborns died at homes and 35% of newborns died at hospital. 68% of births were non-institutional delivery where 32% of births were institutional deliveries.

Background

Afghanistan has a high newborn mortality in the region and one of the highest in the world. However, according to the latest survey (Afghanistan Mortality Survey) published in 2010 by the Ministry of Public Health of Afghanistan, Infant Mortality is 77 deaths per 1000 births. The survey also showed that deliveries attended by skilled birth attendants reached to 34%; while 66% of births still happening at homes without a skilled birth attendant.

For review of newborn deaths (death of a child aged under four weeks) which are occurring inside health facilities, different methods are already adopted and newborn death are reviewed by multi- disciplinary team (including head of health facility, female doctor or midwife, clinical practitioners).

The team determines the lessons that can be derived from the management of the case and recommends how procedures could be improved to benefit future patients. It is uncommon, however, to involve health care managers, primary health care providers and community representatives on these multi-disciplinary teams. In addition, since only a small proportion of neonatal deaths occur in health facilities, especially hospitals, many deaths and their underlying causes are not reviewed by the teams.

In addition to the fact that newborn mortality reviews are infrequent outside health facilities, the pattern of causes of newborn deaths at home and the pattern evident in facilities is quite different. While low standards of health care at health facilities are often a primary cause of newborn death, newborn deaths in the community result from substandard health care but also from a failure of the community to recognize the severity of the problem, to delays in seeking health care and to the lack of transport.

Health care related to pregnancy, childbirth and the “often neglected” post-partum period involves different levels and type of service. All need to be addressed through specific interventions to reduce mortality. Information and services in the community, at first level facilities and at the referral level need to be strengthened and linked to address the causes of neonatal mortality. For example, community perspectives of motherhood, which are embedded in traditions and reflected in specific behavioral norms, need to be clearly understood. Improving the community’s capacity to manage complications and to respond to emergencies have to be addressed simultaneously with efforts to improve the quality of facility-based health services to ensure that referrals are timely and contribute to reducing newborn mortality in poor, rural areas.

Cost-effective and proven interventions exist to address high rates of neonatal mortality. Unfortunately, the benefit of such interventions has yet to be realized fully in low resource environments because the interventions are limited in coverage and quality. At the same time, there is a need to develop, implement, monitor, and assess better interventions and to fashion combinations of interventions for delivery through locally-designed delivery strategies. Since the knowledge base for designing, implementing and

sustaining effective delivery strategies to reduce newborn mortality is scattered, identifying and assessing these strategies is equally imperative.

The proposed approach, i.e., the local area/district-level newborn mortality review, is new and innovative. It calls on all stakeholders—from the community, the health profession and area administration/decision makers—to review newborn deaths and to recommend and take actions to reduce newborn mortality. Documenting and disseminating the outcomes of this approach will inform safe motherhood and childhood programs in the areas and elsewhere and reduce newborn deaths.

Method

A cross-sectional descriptive study of the causes of contributing factors in newborn mortality in Baharak district of Badakhshan province of Afghanistan is done. The community/area based newborn deaths review concept through verbal autopsy applied and relevant data collected in the area of project.

Based on Catchment Area Annual Census (CAAC 2015) survey (HMIS database), all newborn deaths of aforementioned district are included in the study. (37) Cases of newborn deaths occurred during the period of January 2015 to December 2015 (HMIS database) are available for community/area based newborn death review. The standard verbal autopsy tool adopted from WHO used with sections to assess causes of death as well as contributing factors at household, community and health facility level that may have contributed to the deaths. The verbal autopsy consists of interviewing people who are knowledgeable about the events leading to the death such as family members, neighbours, traditional birth attendants and professional health care providers.

Results

The proximate causes of deaths were (33%) birth asphyxia, (29%) pneumonia, (21%) prematurity, and (15%) diarrhea. 62% of newborns died within first seven days of life and 56% female and 44 % were male. 65% of newborns died at homes and 35% of newborns died at hospital. 68% of births were non-institutional delivery where 32% of births were institutional deliveries.

Conclusion

Analysis and result of verbal autopsies demonstrates that the major causes of neonatal deaths are birth asphyxia and infections. The timing of deaths suggests that neonatal interventions should be aimed at the first week of life. There is a comparative advantage between institutional deliveries and non-institutional deliveries to prevent neonatal death.

Acknowledgements

I, the author of this paper acknowledge the efforts of Dr. Massuma Neghat, Ms. Aryan and Ms. Nasira midwives of Baharak district hospital, Mahbobullah, community health supervisor of Baharak district hospital and individuals who contributed successfully to the implementation of this study. I would like to express my sincere thanks to my professors at Jodhpur School of Public Health (JSPH), Maulana Azad University, Dr. LatikaNath Sinha, Dr.Nitin Joshi, and Dr. PramilaVivek for their technical instructions, support and assistance on how to conduct a research. Also I appreciate the efforts of Dr. Sayed Faqir Faqiri, is my co-facilitator for this research who supported me throughout the process of my research design, implementation and completion.

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Contents

Introduction 8

Review of Literature 9

Methodology..... 12

Results and Discussions 14

Recommendations..... 29

References 30

Annexes:

Copy of Paper Published / consent for publication

Interview Schedule

Consent Form and Research Subject Information Sheet

Ethical Considerations

Introduction

Globally, about 4 million neonatal deaths occur every year. Direct causes of neonatal deaths are estimated to be preterm birth, severe infections, and birth asphyxia. Most of these deaths occur in developing countries. There is dearth of reliable information on causes of these deaths through routine vital registration systems. Furthermore, most deaths in these countries occur at home, thus hospital based medical certification of death is not available. This has important bearing on resource allocation and strategic planning.

Verbal Autopsy (VA) technique has been used in such situations to ascertain causes of child deaths and neonatal deaths. Diagnostic accuracy of VA depends upon the VA tool, its administration, coding and classification of deaths, and cause specific mortality fractions in a particular area. Many VA studies have been done using different tools and classification systems. Validation studies with standard WHO VA tools have shown reasonable sensitivity and specificity for childhood deaths.

Review of Literature

Most information on medical history is provided on death certificates or in vital registration systems, which may not be available in some developing countries, measuring cause-specific mortality rates are very difficult in this situation, especially where vital registration is lacking for the majority of population. Providing good analysis and estimates for cause-specific mortality is essential for understanding the overall profile and burden of disease in a population (Bickel et al 2006). The verbal autopsy has been used to estimate-cause specific mortality in a variety of methodological settings. There is limited literature on infant and child mortality in Afghanistan with most research conducted at the provincial and regional level due to security and logistic reasons. Moreover most mortality statistics and data in Afghanistan collected in the past decade for instance; Amowitz et al (2002) conducted a cross-sectional survey of 4886 Afghan women living in 7 districts in Afghanistan's Heart province, while Mayhew et al (2008) conducted a cross-sectional study in all 33 provinces in 2004, a retrospective cohort study of women of reproductive age (15-45 years) was done by Bartlett et al in 2002 in 4 districts of Kabul province, Laghman province, Kandahar province and Badakhshan province (Bartlett et al 2005). And the most recent country wide mortality survey was done in 2010 (AMS-2010).

The high rates of maternal and perinatal mortality in Afghanistan were attributed to low rates of Cesarean sections (CS) and many cases of CS were either emergencies or referrals from another health care facility (Kim et al 2012), Bartlett et al 2005 reported that only 13 % of respondents in their study had used skilled birth attendants during delivery. Diarrhea and acute respiratory infections are responsible for about 36% of childhood deaths in Afghanistan (Gessner 1994; Prasad 2006). Bartlett et al 2005 investigated the deaths among women of reproductive age through verbal autopsy interview of family members, their study showed that remoteness is a significant factor in increasing maternal mortality in Afghanistan. Other risk factors for child and maternal mortality rates in Afghanistan are: home delivery, (90%) of total births is without medical assistance (Nelson 2011) and poor sanitation and lack of access to clean water have an indirect relation to high infant mortality in Heart Province (Amowitz et al 2002).

Oyelola A. Adegboye, Danelle Kotze (Canadian studies in population 41, no. 1-2 spring/summer 2014) 165-179

The AMS (Afghanistan Mortality Survey) centres on data from VA (verbal autopsies of deaths within a household up to three years beforehand (2007-2010). Analyzed explorative summary of 1105 neonatal deaths, 997 prenatal and child, and 1831 adult deaths in the AMS-2010 data, the results from the combined data sets indicated that two-third of urban households fall in the richest quintile, while over 54% of the households have access to safe drinking water. Also only one fifth of the households have an improved toilet facility. The fertility rates are 5.2 and 4.7 children per female for rural areas and urban areas respectively. Death from pregnancy-related causes very high (higher in rural areas), with 1 in every 50 women dying of pregnancy-related causes, 2 in 5 pregnancy-related deaths occur during pregnancy, and about 20% within two months after delivery (APHI/MoPH et al 2011) among 1105 deaths in the neonatal data, about 65% deceased were reported to have had complications of pregnancy, child birth and the puerperium. Because of these complications (39%) babies are born before term due to early end of pregnancy, prematurity 40.6%, cases of low birth weight (44%) and a few cases of malformation. Thus, disease classified as complications (i.e., complications of pregnancy, child birth and the puerperium) are the most common cause of neonatal death.

Nonyane BA et al (2007) carried a social and verbal autopsy study to determine cultural-, social- and health system-related factors that were associated with the delay in formal care seeking in Sylhet district, Bangladesh. (27.5%) sought formal care first; (7.9%) sought informal care first; (17.8%) sought informal care only, and (46.8%) did not seek any type of care. There was lower cumulative incidence of seeking formal care first for preterm neonates, and those who delivered at home; and higher cumulative incidence for those who reported less than normal activity. The main barriers to seeking formal care reported, believing the neonate was going to die anyway (17.7%), and believing traditional care was more appropriate (15.8%). The majority of neonates died before formal care could be sought, but formal care was more likely to be sought than informal care. There were economic and social belief barriers to care-seeking.

Kalter HD et al (2010) VASA interviews were conducted of a random sample of 453 neonatal deaths identified by the 2010 Niger National Mortality Survey (NNMS). Causes of death were determined by expert algorithm analysis, and the prevalence of household, community and health system determinants were examined along the continuum of maternal and newborn care, the Pathway to Survival for newborn illnesses, and an extended pathway for maternal complications. The social autopsy findings were compared to available data for survivors from the same cohort collected by the NNMS and the 2012 Niger Demographic and Health Survey. Severe neonatal infection and birth asphyxia were the leading causes of early neonatal death in the community and facilities. Death in the community after delayed care seeking for severe infection predominated during the late neonatal period. The levels of nearly all demographic, antenatal and delivery care factors were in the direction of risk for the VASA study decedents. They more often resided rurally and their mothers were less educated and gave birth when younger than survivors' mothers. Their mothers also were less likely to receive quality antenatal care, skilled attendance at birth or to deliver in an institution. Nearly half suffered an obstetric complication, with more maternal infection (17.9%), antepartum hemorrhage (12.5%) and eclampsia/preeclampsia (9.5%) for all births in Niger. Their mothers also were unlikely to seek health care for their own complications (37% to 42%) as well as for the newborn's illness (30.6%).

Mrisho M et al (2007): reported cause of death and care-seeking prior to death in neonates based on interviews with relatives using a Verbal Autopsy questionnaire. Neonatal deaths identified between 2004 and 2007 through a large household survey in 2007 in five rural districts of southern Tanzania. the most common causes were prematurity (33%), birth asphyxia (22%) and infections (10%). Amongst the deaths, 41% (90/219) were on the first day and a further 20% (43/219) on day 2 and 3. The majority of births was at home and attended by unskilled assistants.

Nqa NT et al (2010): Neonatal mortality rate within the study area was 16/1000 (238 neonatal deaths and 14,453 live births) over the study period. Prematurity/low birth-weight (37.8%), intrapartum-related neonatal deaths (birth asphyxia, 33.2%), infections (13.0%) and congenital malformation (6.7%) were the four leading causes of death. Four cases of neonatal tetanus were found. Intrapartum-related deaths dominated in the home delivery group, whereas prematurity was the most prominent cause of death at all facility levels. Most neonatal deaths occurred within the first 24 h after delivery (58.6%).

Manandhar SR et al (2010): There were 25,982 deliveries in the 2 years from September 2006 to August 2008. Verbal autopsies were available for 601/813 stillbirths and 671/954 neonatal deaths. The perinatal mortality rate was 60 per 1000 births and the neonatal mortality rate 38 per 1000 live births. 84% of stillbirths were fresh and obstetric complications were the leading cause (67%). The three leading

causes of neonatal death were birth asphyxia (37%), severe infection (30%) and prematurity or low birth weight (15%). Most infants were delivered at home (65%), 28% by relatives. Half of women received an injection (presumably an oxytocic) during home delivery to augment labour. Description of symptoms commensurate with birth asphyxia was commoner in the group of infants who died (41%) than in the surviving group (14%).

Doqra V et al (2011): In 2011, Save the Children India launched a project for the disadvantaged population of Rajasthan, Bihar and Odisha. As a baseline activity, neonatal deaths during January-December 2012 were investigated using modified verbal autopsy tool in six sub-district-level administrative units (blocks) adopting 30-cluster sample survey approach. The study reported a total of 189 neonatal deaths of which 50% occurred at home and 39% happened on Day 1. About half of the deaths occurred in blocks from Bihar. High number of neonatal deaths belonged to households that were below poverty line (64%) and other disadvantaged classes (46%); among mothers who were illiterate (65%), <20 years of age (54%) and during their first-order births (36%). Birth asphyxia was a major cause of neonatal deaths across all blocks.

Khanal S et al (2011): The proximate causes of deaths were infections (41%), birth asphyxia (37.2%), prematurity (11.5%), and low birth weight related causes (6.9%). There was no significant statistical difference in deaths due to infection seen in non-institutional deliveries (43.5%) than institutional deliveries (34.6%). More than half of the deaths (58.5%) occurred within the first three days of life where the predominant cause of death was birth asphyxia (60.7%).

Adetola AO et al (2011): The NMR was 32.1 per 1000 live births. The leading causes of death were severe perinatal asphyxia (79.4%), low birth weight (LBW: 55.9%), and infections (41.2%). The associated risk factors were lack of antenatal care, prolonged rupture of membranes, maternal peripartur fever; prematurity and LBW.

Vergnano S et al (2011): Case-by-case agreement between InterVA and reviewing physician diagnoses for 69 cases from Malawi, 180 cases from Zimbabwe, and 385 cases from Nepal were 83%, 71%, and 74%, respectively. The proportion of stillbirths identified as fresh or macerated by the different methods of VA interpretation was similar in all three settings. Comparing across countries, the modified InterVA method found that proportions of preterm births and deaths due to infection were higher in Zimbabwe (44%) than in Malawi (28%) or Nepal (20%).

Turnbull E et al (2011): Among 1679 households, information was collected on 148 deaths: 34% stillbirths, 26% neonatal and 40% early childhood deaths. Leading identifiable causes of stillbirth were intrauterine infection (26%) and birth asphyxia (18%). Of 32 neonatal deaths, 38 (84%) occurred within the first week of life, primarily because of infections (37%) and prematurity (34%). The majority of early childhood deaths were caused by suspected bacterial infections (82%). HIV prevalence was significantly higher in mothers who reported an early childhood death (44%) than mothers who did not (17%). Factors significantly associated with mortality were lower socio-economic status, inadequate water or sanitation facilities, home delivery and absence of a trained delivery attendant.

Bapat U et al (2012): Of 105 stillbirths, 65 were fresh (62%) and obstetric complications dominated the cause classification. Of 116 neonatal deaths, 87 were early and the major causes were intrapartum-related (28%), prematurity (23%), and severe infection (22%). Bereavement was associated with socioeconomic quintile, previous stillbirth, and number of antenatal care visits. We identified 201 individual delays in

121/187 birth narratives (65%). Overall, delays in receiving care after arrival at a health facility dominated and were mostly the result of referral from one institution to another. Most delays in seeking care were attributed to a failure to recognize symptoms of complications or their severity.

Engmann C et al (2012): There were 252 perinatal deaths (118 END; 134 SB) studied from pooled data. Almost half (45%) of the END occurred on postnatal day one, (19%) occurred on the second day and (16%) the third day. Major early neonatal COD were infections (49%), birth asphyxia (26%), prematurity (17%) and congenital malformations (3%). Major causes of SB were infection (37%), prolonged labor (11%), antepartum hemorrhage (10%), preterm delivery (7%), cord complications (6%) and accidents (5%).

Koffi AK et al (2013): The data come from the 2013 Verbal and Social Autopsy (VASA) study that collected data in order to describe the biological causes and the social determinants of deaths of children under 5 years of age in Balaka and Salima districts of Malawi. A total of 320 neonatal deaths were confirmed from the VASA survey. While one antenatal care (ANC) visit was high at 94%, the recommended four ANC visits was much lower at 41% and just 17% of the mothers had their urines tested during the pregnancy. 173 (54%) mothers of the deceased newborns had at least one labor/delivery complication that began at home. The caregivers of 65% (n = 75) of the 180 newborns that were born at home or born and left a health facility alive perceived them to be severely ill at the onset of their illness, yet only 44% (n = 80) attempted and 36% (n = 65) could reach the first health provider after an average of 91 minutes travel time. Distance, lack of transport and cost emerged as the most important constraints to formal care-seeking during delivery and during the newborn fatal illness.

Ma Y et al (2014): Among 470 completed investigations; a cause of death was assigned to 423 cases (90%). Overall, pneumonia (34.5%), preterm birth complications (16.5%), diarrhea (10.4%), birth asphyxia (10.3%), and congenital abnormalities (8.5%) were the main causes, with 56.6% of deaths occurring in the neonatal period. Deaths were attributable predominantly to prematurity or birth asphyxia in the early neonatal period, whereas infection accounted for more than 60% and 80% of deaths in the late and post neonatal periods, respectively. Calculated infant mortality was 21.9 in 1000 live births.

Fotrill E et al (2015): Analysis included 3772 neonatal deaths and 3256 stillbirths. Between 63% and 82% of neonatal deaths occurred in the first week of life, and males were more likely to die than females. Prematurity, birth asphyxia and infections accounted for most neonatal deaths, but important sub national and regional differences were observed. More than one-third of deaths in urban India were attributed to asphyxia, making it the leading cause of death in this setting.

Methodology

A cross-sectional descriptive study of the causes of contributing factors in newborn mortality in Baharak district of Badakhshan province of Afghanistan is done. The community/area based newborn deaths review concept through verbal autopsy applied and relevant data collected in the area of project.

Based on Catchment Area Annual Census (CAAC 2015) survey (HMIS database), all newborn deaths of aforementioned district are included in the study. (37) Cases of newborn deaths occurred during the period of January 2015 to December 2015 (HMIS database) are available for community/area based newborn death review. The standard verbal autopsy tool adopted from WHO used with sections to assess causes of death as well as contributing factors at household, community and health facility level that may

have contributed to the deaths. The verbal autopsy consists of interviewing people who are knowledgeable about the events leading to the death such as family members, neighbours, traditional birth attendants and professional health care providers.

Goal:

To determine causes of neonatal deaths, collect information on history of pregnancy, delivery, the condition of baby soon after birth and the mother's health and contextual factors.

Objectives

- a) To find the various causes of neonatal deaths in Baharak district of Badakhshan province by verbal autopsy method
- b) To recommend changes in the neonatal health services to reduce neonatal death.

Research questions

To reveal underlying causes of newborn deaths in Baharak district of Badakhshan province the international standard verbal autopsy questionnaire introduced by WHO (death of a child aged under four weeks) is used as data collection tool in this study.

Study design

The study implemented in Baharak district of Badakhshan province of Afghanistan located at $(37.0054)^0$ latitude and $(70.90572)^0$ longitude. Baharak district is located about 40 km south-east of Fayzabad center of the province. The capital is the city of Baharak and the district is home to approximately $(65360)^1$ residents consisting of 75 villages. The district is also called Baharistan. Total area of Baharak is $328KM^2$. In the entire district a district hospital is functional serving for its own population as well as neighboring districts. There are 9 Health Posts located in the catchment area of Baharak DH. Baharak district is one populated district among 28 districts of Badakhshan province;

The neonatal mortality verbal autopsy approach is done in Baharak district of Badakhshan province. All newborn deaths that occurred within Baharak district during the year of 2015 obtained from CAAC 2015 (Catchment Area Annual Census). The CAAC is a data collection strategy or census introduced by MoPH through which community health workers (CHWs) who are in the structure of CBHC (community based health care) of MoPH conduct this census for their catchment area on annual bases. The data from this census is interned in health management information system (HMIS) database and submit to MoPH. The number of newborn deaths reported 37 cases for Baharak district (source HMIS database of MoPH) and verbal autopsy interview conducted for all newborn deaths with their parents and seblings. The list of households where newborn death occurred is available in Baharak district hospital in the section of community health supervisor. The inclusion criteria were conducting of interview with family members of deceased newborn and exclusion criteria were:

- a) Those care givers of the deceased newborns who are not willing to give consent for the study.

b) Those caregivers of the deceased newborns who have been displaced and left the district by any reason were not included in this study.

Sampling technique:

The data comes from CAAC 2015 (HMIS database/MoPH) through which total number of newborn deaths reported to be 37 cases from January 2015 to December 2015 and in this study all 37 newborn deaths that occurred in Baharak district included. The list of households where newborn death occurred is available in Baharak district hospital in the section of community health supervisor.

Data collection procedure:

The data collectors, themselves (Dr. Massuma, Midwives and community supervisor of Baharak DH) conducted the interview with care givers of dropout children by applying predesigned and pretested questions in a form of record, while obtaining of informed consent from respondents were in place. The study subjects are fully informed about the purpose of the study and full privacy and confidentiality assured and the collected data is used solely for the sake of research. Data collectors were trained on appropriate applying of verbal autopsy questionnaire, a simulation session was conducted to improve skills of data collectors about interview and filling of the questionnaire. List and addresses of all households where there were newborn deaths prepared by community health supervisor of Baharak district hospital based on CAAC report. The survey started on 10th February 2017 and ended on 7th April 2017. It took around two months and completed.

Data analysis:

Each variable of the verbal autopsy questionnaire were analyzed by using excel software. Frequency of each variable was counted and shown in percentage, and interpretation of the information was done in consultation with a skillful pediatrician of Faizabad provincial hospital.

Ethical consideration

The purposes of this survey communicated with Badakhshan provincial public health directorate (PPHD) who is the representative and an agency of ministry of public health in the province and a written Permission of provincial public health directorate of Badakhshan province obtained on the conduction of this study. Moreover informed consent of respondents was in place.

Limitations of the study

A long recall period is likely to impair a respondent's ability to recollect and report relevant information. Siblings of three deceased newborns rejected to be interviewed.

Results and Discussions

Results

This chapter presents the findings of the verbal autopsy study in detail. The tables and graphs derived from the data collected from mothers and other respondents who lived with deceased in the period leading to his/her death. The primary study population was consisted of 37 newborn deaths that were reported by community health workers through Catchment Area Annual Census (CAAC) activity. The interviewers

conducted interviews with 34 cases successfully in first visit while 3 cases rejected to attended interview. So the study population decreased from 37 to 34. Informed consent was obtained for each individual interview and confidentially highly ensured.

Basic information about respondents

Table 1.1

Relationship to the deceased	Frequency	Percentage
Father	4	12%
Mother	27	79%
Sibling	3	9%
other relative	0	0%
no relation	0	0%
Total	34	100%

Majority of the respondents were mothers of the deceased (79%) fathers (12%) and siblings (9%).

Table 1.2

Respondent lived with the deceased in the period leading to his/her death	Frequency	Percentage
Yes	34	100%
No	0	0%
Total	34	100%

All respondents (100%) lived with the deceased in the period leading to newborns death.

Information on the deceased and date/place of death

Table 2.1

deceased male or female	Frequency	Percentage
Female	18	53%
Male	16	47%
Total	34	100%

Of all deceased 53% were females and 47% were males, where the ratio of female and male were 1.13:1.

Table 2.2

Age categories in days	Frequency	Percentage
1--6	21	62%
7--14	7	21%
15--23	6	18%

Total	34	100%
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Majority of newborns (62%) died in the first week of life, (21%) died in second week and 18% died in third week of life.

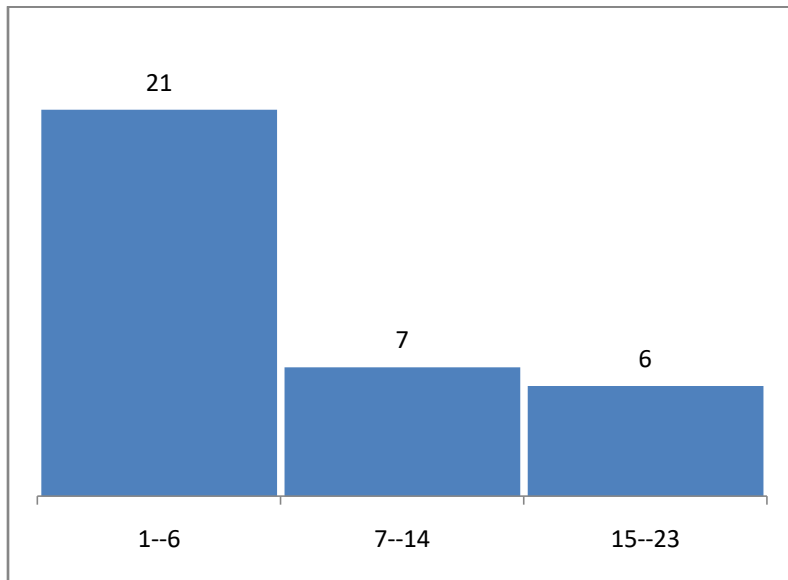


Table 2.3

Place of death	Frequency	Percentage
Hospital	12	35%
Home	22	65%
Total	34	100%

65% of deaths occurred at home and 35% of deaths occurred at hospital.

Pregnancy history

Table 3.1

Number of births including still births the mother had before this baby	Frequency	Percentage
No birth before this	6	18%
only one birth before this	4	12%
more than one birth before this	24	70%
Total	34	100%

82% of mothers were Multi parous, and 18% was nulliparous.

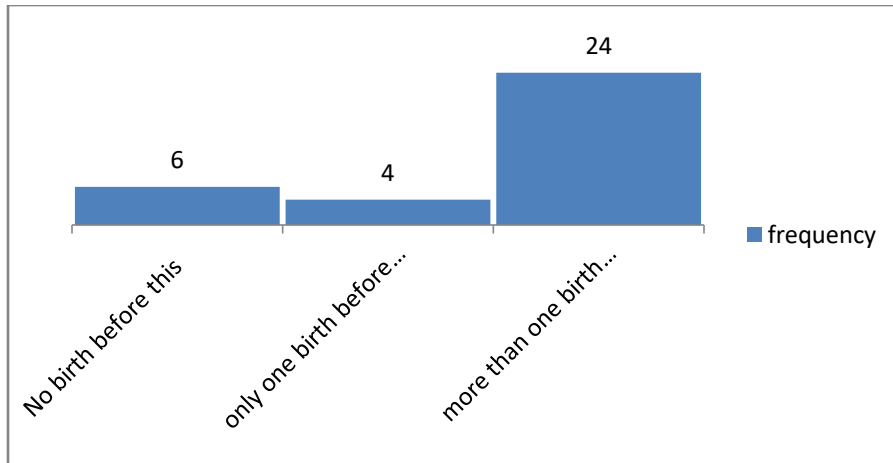
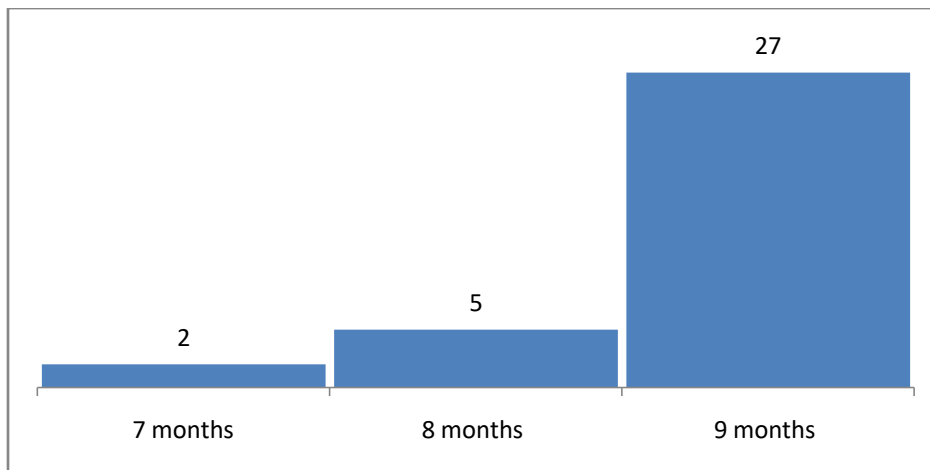


Table 3.2

Length of pregnancy when the baby was born	Frequency	Percentage
7 months	2	6%
8 months	5	15%
9 months	27	79%
Total	34	100%

79% was term pregnancies, while 15% ended in month 8th and 6% in 7th.



21% of pregnancies ended earlier than expected date and 79% completed the expected date.

Table 3.3

Mothers' illness during pregnancy	Frequency	Percentage
High blood pressure	12	35%
Heart Disease	0	0%
Diabetes	0	0%
Epilepsy/Convulsion	0	0%
Other	0	0%
None	22	65%
Total	34	100%

35% of mother had high blood pressure during pregnancy while 65% of mothers were without illness.

Table 3.4

Mothers' illness during three last months of pregnancy	Frequency	Percentage
Vaginal bleeding	1	3%
Smelly Vaginal discharge	4	12%
Puffy face	0	0%
Headache	5	15%
Blurred vision	2	6%
Convulsion	1	3%
Febrile illness	5	15%
Severe Abdominal pain	2	6%
Pallor/shortness of breath	0	0%
None	14	41%
Total	34	100%

51% of mothers were said that they had complicated pregnancy (15% headache, 15% febrile illness, 12% smelly vaginal discharge, 6% severe abdominal pain, 6% blurred vision, 3% convulsion, 3% vaginal bleeding) and 41% without complication during three last month of pregnancy.

Table 3.5

Single or multiple births	Frequency	Percentage
Singleton	31	91%
Twin	3	9%
Triple or more	0	0%
Total	34	100%

31 (91%) of births were singleton while 3 (9%) was twins. All three cases of twins who died were the birth second order.

Delivery history

Table 4.1

Place of birth	Frequency	Percentage
Hospital	11	32%
Home	23	68%
Total	34	100%

68% neonates died at home and 32% died at hospital, though number newborn deaths are high at community compare to hospital but still hospital deaths are also high which needs to be further studied.

Table 4.2

Who assisted with delivery?	Frequency	Percentage
Doctor	0	0%
Nurse/MW	11	32%
TBA	1	3%
Relative	21	62%
Mother by herself	1	3%
Other	0	0%
DK	0	0%
Total	34	100%

62% of deliveries assisted by relatives, 32% assisted by nurse/midwives and 3% mother by herself.

Table 4.3

When did the water break?	Frequency	Percentage
Before labor started	11	32%
During labor	22	65%
Don't know	1	3%
Total	34	100%

Water break started before labour for 32% of pregnancies, 65% started during labour and 3% did not know.

Table 4.4

How many hours after the water broke the baby born?	Frequency	Percentage
Less than 24 hours	33	97%
24 hours or more	1	3%
Don't know	0	0%
Total	34	100%

In 97% of cases baby born less than 24 hours after water broke and only 3% cases baby born in more than 24 hours

Table 4.5

Was the water foul smelling?	Frequency	Percentage
Yes	4	12%
No	28	82%
don't know	2	6%
Total	34	100%

In 12% of deliveries the water was foul smelling which shows infections, 82% was no infection and 6% did not know.

Table 4.6

Was there excess bleeding on the day labour started?	Frequency	Percentage
Yes	4	12%
No	30	88%
don't know	0	0%
Total	34	100%

12% of deliveries were started with excess bleeding and 88% was with no excess bleeding.

Table 4.7

Did the mother have a fever on day labour started?	Frequency	Percentage
Yes	7	21%
No	26	76%
don't know	1	3%
Total	34	100%

21% of mothers had a fever on the day labour started, 76% did not have and 3% did not know.

Table 4.8

How long did the labour pains last?	Frequency	Percentage
Less than 12 hour	22	65%
12-23 hours	9	26%
24 hours or more	2	6%
Don't know	1	3%
Total	34	100%

32% of labours were prolonged and 65% was normal, 3% did not know.

Table 4.9

Was it a normal Vaginal Delivery?	Frequency	Percentage
Yes	32	94%
No	2	6%
don't know	0	0%
Total	34	100%
What type of Delivery was it?	Frequency	Percentage
Forceps/ Vacuum	1	50%
C- Section	1	50%
Total	2	100%

32 deliveries 94% was normal vaginal delivery and 2 (6%) was not, 1 out of 2 was assisted with forceps/vacuum and 1 out of 2 was C-section.

Table 4.10

Which part of the baby came first?	Frequency	Percentage
Head	32	94%
Bottom	1	3%
Arm/Hand	1	3%
Total	34	100%

In 94% deliveries head came first and 6% of deliveries were mal position.

Table 4.11

Did the Umbilical cord come out before the baby was born?	Frequency	Percentage
Yes	8	24%
No	25	74%
don't know	1	3%
Total	34	100%

In 8 out of 34 (24%) deliveries umbilical cord came out before the baby was born, 74% after baby was born and 3% did not know.

Condition of baby soon after birth:**Table 5.1**

At birth what was the size of the baby?	Frequency	Percentage
Smaller than normal	9	26%
Normal	23	68%
Larger than normal	1	3%
Don't know	1	3%
Total	34	100%

Out of 34 newborns 9 of them (26%) were smaller than normal, 68% said normal, 3% larger than normal and 3% did not know.

Table 5.2

Was the baby premature?	Frequency	Percentage
yes	7	21%
No	27	79%
Don't know	0	0%
Total	34	100%
How many months along was the pregnancy	Frequency	Percentage
7 months	2	29%
8 months	5	71%
Total	7	100%

7 newborns out 34 (21%) was premature and 79% was mature. 29% of premature was born in month 7th and 71% was born in month 8th.

Table 5.3

Anything applied to the umbilical cord stump after birth?	Frequency	Percentage
Yes	5	15%
No	28	82%
don't know	1	3%
Total	34	100%

In 15% something were applied to the umbilical cord stump, according to respondents the things which were applied were a piece of fabric soaked with cooking oil, and sheep's dung combined with burnt bread. 82% did not apply anything to the umbilical cord stump.

Table 5.4

What was the colour of baby at birth?	Frequency	Percentage
Normal	22	65%
Pale	7	21%
Blue	4	12%
Don't know	1	3%
Total	34	100%

The colour of newborns 11 out of 34 (33%) were pale and blue which shows birth asphyxia, 65% were normal colour and 3% were unknown.

Table 5.5

Did the baby breathe after birth even a little?	Frequency	Percentage
yes	34	100%
No	0	0
Don't know	0	0
Total	34	100%

All 34 newborns (100%) did breathe even a little after birth and therefore no still birth were reported among them.

Table 5.6

Did the baby given assistance to breathe?	Frequency	Percentage
yes	6	18%
No	28	82%
Don't know-8	0	0%
Total	34	100%

Only 6 (18%) of newborns were assisted to breathe and 28 (82%) were not assisted or not resuscitated.

Table 5.7

Was the baby ever able to suckle or bottle-feed?	Frequency	Percentage
yes	21	62%
No	13	38%
Don't know	0	0%
Total	34	100%
How soon after birth did the baby	Frequency	Percentage

suckle or bottle-feed?		
first hour	7	33%
second hour	3	14%
3rd hour	2	10%
5th hour	2	10%
6 hour	4	19%
after six hour	3	14%
Total	21	100%

21 (62%) of newborns were able to suckle or bottle feed, while 13 (38%) were not able to suckle or bottle feed. Among who were able to suckle or bottle feed 33% started feeding within first hour, 14% second hour, 10% third hours, 10% fifth hours, 19% six hours and 14% after six hours. In summary 84% started feeding within six hours and 14% after six hours.

Table 5.8

Was the breastfeeding exclusive?	Frequency	Percentage
yes	15	71%
No	6	29%
Don't know-8	0	0%
Total	21	100%

15 out of 34 (71%) breast fed exclusively and 29% did not.

Table 5.9

Did the baby have convulsions?	Frequency	Percentage
yes	5	15%
No	29	85%
Don't know-8	0	0%
Total	34	100%
How soon after birth did the convulsions start?	Frequency	Percentage
1 day after birth	2	40%
2 days after birth	1	20%
14 and more days after birth	1	20%
17 days after birth	1	20%
Total	5	100%

5 out of 34 (15%) of newborns had convulsion and 85% did not have, 2 out of 5 (40%) of those who had convulsion started 1 day after birth and 1 out of 5 (20% started 2 days after birth, start of convulsion before day 3rd can be presumed to be sign of hypoxic- ischemic encephalopathy. 1 out of 5 (20%) started convulsion 14 days after birth and 1 out of 5 (20%) started 14 days or more after birth which may be sign of intrauterine infection.

Table 5.10

Did the child have bulging of the fontanelle?	Frequency	Percentage
yes	2	6%
No	27	79%
Don't know	5	15%

Total	34	100%
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2 out of 34 (6%) had bulging of fontanelle and 27 out of 34 (79%) did not have. Bulging of fontanelle may be sign of following disorders:

- Hydrocephalus
- Encephalitis
- Meningitis
- Shaken baby syndrome

Since infections are common so it can be due to encephalitis or meningitis.

Table 5.11

Did the baby have a fever?	Frequency	Percentage
yes	15	44%
No	19	56%
Don't know	0	0%
Total	34	100%
How many days after birth did the baby have a fever	Frequency	Percentage
less than one day	3	20%
one day	5	33%
two days	2	13%
more than four days	5	33%
Total	15	100%

15 out of 34 (44%) had a fever and 19 out of 34 (56%) did not have. Fever can be presumed to be sign of infection.

Table 5.12

Did the baby become cold to the touch?	Frequency	Percentage
Yes	4	12%
No	30	88%
Do not know	0	0%
Total	34	100%
How many days after birth did the baby become cold to touch	Frequency	Percentage
less than one day	1	25%
one day	2	50%
more than one day	1	25%
Total	4	100%

4 out of 34 (12%) became cold to touch and 88% did not. As majority of cases became cold to touch in day first, (25%) less than one day and 50% within one day so it can be presumed to be sign of hypothermia.

Table 5.13

Did the baby have a cough?	Frequency	Percentage
Yes	1	3%
No	32	94%

Do not know	1	3%
Total	34	100%

1 out of 34 (3) had a cough and 94% did not have a cough.

Table 5.14

Did the baby have fast breathing?	Frequency	Percentage
Yes	6	18%
No	26	76%
Do not know	2	6%
Total	34	100%

6 out of 34 (18%) had fast breathing, 26 out of 34 (76%) did not have.

Table 5.15

Did the baby have difficulty breathing?	Frequency	Percentage
Yes	10	29%
No	23	68%
Do not know	1	3%
Total	34	100%
How many days after birth did the baby start having difficulty in breathing?	Frequency	Percentage
one day	4	40%
two days	1	10%
three days and more	4	40%
do not know	1	10%
Total	10	100%
Did the baby have chest in drawing?	Frequency	Percentage
Yes	5	50%
No	4	40%
Do not know	1	10%
Total	10	100%
Did the baby have grunting?	Frequency	Percentage
Yes	5	50%
No	5	50%
Do not know	0	0%
Total	10	100%
Did the baby have flaring of the nostrils?	Frequency	Percentage
Yes	5	50%
No	5	50%
Do not know	0	0%
Total	10	100%

10 out of 34 (29%) had difficulty breathing, 5 out of 10 (50%) had chest in drawing and 5 out of 10 (50%) had grunting. They are considered as signs of infections leading to pneumonia.

Table 5.16

Did the baby have diarrhoea?	Frequency	Percentage
Yes	5	15%
No	29	85%
Do not know	0	0%
Total	34	100%
How many days after birth did the baby have diarrhoea?	Frequency	Percentage
one day	3	60%
two days	1	20%
more than two days	1	20%
Total	5	100%

5 out of 34 (15%) had diarrhoea and 85% did not have,

Table 5.17

Did the baby have vomiting?	Frequency	Percentage
Yes	5	15%
No	29	85%
Don't know	0	0%
Total	34	100%

5 out of 34 (15%) had vomiting. All of those who had diarrhoea were associated with vomiting.

Table 5.18

Did the baby have abdominal distension?	Frequency	Percentage
Yes	6	18%
No	27	79%
Don't know	1	3%
Total	34	100%

6 out of 34 (18%) had abdominal distension.

Table 5.19

Did the baby have redness or discharge from the umbilical cord stump	Frequency	Percentage
Yes	6	18%
No	27	79%
Don't know	1	3%
Total	34	100%

6 out of 34 (18%) had redness or discharge from the umbilical cord.

Mothers' health and contextual factors

Table 6.1

What was the age of the mother at the time the baby died?	Frequency	Percentage
19--24	8	24%
25--30	17	50%

31--36	8	24%
42	1	3%
Total	34	100%
Did the mother receive antenatal care?	Frequency	Percentage
Yes	24	71%
No	10	29%
Don't know	0	0%
Total	34	100%

8 out of 34 (24%) age of mothers at the time the baby died were between age 19-24 years , 17 out of 34 (50%) were aged between 25- 30 years and 8 out of 34 (24%) were between 31-36 years.

24 out of 34 (71%) mothers received antenatal care and 10 out of 34 (29%) did not receive ANC.

Table 6.2

Did the mother receive tetanus toxoid (TT) vaccine?	Frequency	Percentage
Yes	25	74%
No	9	26%
Don't know	0	0%
Total	34	100%

25 out of 34 mothers (74%) received TT vaccine.

Table 6.3

How is the mother's health now?	Frequency	Percentage
HEALTHY -1	32	94%
ILL-2	2	6%
Not alive-3	0	0
Don't know 8	0	0
Total	34	100%

32 out of 34 (94%) mothers were healthy by the time of interview and 2 out of 34 (6%) were ill.

Table 6.7

Did the baby receive any treatment for the illness that led to death?	Frequency	Percentage
Yes-1	25	74%
No-2	9	26%
Don't know-8	0	0%
Total	34	100%
at which of the following places or facilities the baby received treatment during the illness that led to death:	Frequency	Percentage
Home	2	6%
Traditional healer	13	38%
Government clinic	0	0%
Government hospital	10	29%

Private clinic	0	0%
Private hospital	0	0%
Pharmacy, Drug seller	0	0%
other places	0	0%
Total	25	100%

25 out of 34 babies sought treatment for the illness that led to his/her death, 2 out of 25 (6%) received treatment for the illness that led to his/her death at home, 13 out of 25 (38%) sought treatment from traditional healers, and 10 out of 25 (29%) sought treatment from governmental hospital.

Discussions

This verbal autopsy study for deceased newborns lesser than 4 weeks provides valuable information for the Staff of Baharak district hospital, health service providers, and management staff of BPHS implementing NGO to design proper interventions to address causes of neonatal deaths at Baharak district which is a large and populated district of Badakhshan province

Since this was the first verbal autopsy study for neonatal deaths in Baharak district, therefore comparison of this findings with previous studies is not applicable, however in many other countries, similar studies have been done which can be elaborated here.

This survey revealed that the proximate causes of deaths were (33%) birth asphyxia, (29%) pneumonia, (21%) prematurity, and (15%) diarrhea.

The finding of this survey revealed that 62% of newborns died within first week of life and finding of Nega Assefa et al Neonatal mortality and causes of death in Kersa Health and Demographic Surveillance System (Kersa HDSS), Ethiopia, 2008–2013 showed (82.4 %) of the deaths was occurred in the first week of life, and findings from Edward Fottrell et al (May 13, 2015) Cause-specific neonatal mortality: analysis of 3772 neonatal deaths in Nepal, Bangladesh, Malawi and India showed Between 63% and 82% of neonatal deaths occurred in the first week of life. So, first week of life is the most important time to put remedial intervention in place to prevent neonatal deaths.

56% of newborns who died were females and 44 % were males. Findings from Edward Fottrell et al (May 13, 2015) showed that males had 20%–50% higher mortality than females.

65% of newborns died at homes and 35% of newborns died at hospital. 68% of births were non-institutional delivery where 32% of births were institutional deliveries.

Birth asphyxia were found the most common cause of neonatal deaths (33%) in Baharak district, since majority of deliveries are happening at homes where there is no skilled birth attendant and also there is no equipments and instruments to resuscitate the newborns, of course there is also no capacity to identify the neonatal asphyxia.

Nega Assefa et al Neonatal mortality and causes of death in Kersa Health and Demographic Surveillance System (Kersa HDSS), Ethiopia, 2008–2013 found out that birth asphyxia and perinatal respiratory disorder caused (28.2 %) of neonatal deaths which is similar to the finding of this survey.

Infections particularly Pneumonia (29%) was found the second common cause of neonatal death in Baharak district. It was noticed that warm chain practices to keep the babies warm from birth up to 28

days of life are poor, the place where deliveries are happened are cold and newborn babies are very prone to become cold and resultantly to develop pneumonia and other respiratory infections.

Nega Assefa et al Neonatal mortality and causes of death in Kersa Health and Demographic Surveillance System (Kersa HDSS), Ethiopia, 2008–2013 found out that bacterial sepsis of the newborn accounted for 31.2 %.

As per the finding of this survey prematurity accounted for (21%) of neonatal deaths and the finding of Nega Assefa et al Neonatal mortality and causes of death in Kersa Health and Demographic Surveillance System (Kersa HDSS), Ethiopia, 2008–2013 accounted prematurity (17.3 %) of neonatal deaths.

Diarrhea accounted for 15% of neonatal deaths which is presumed to be due to poor hygiene and sanitation practices by households.

According to this survey 65% of newborns died at home and in compare to Nega Assefa et al 2008- 2013, (94 %) of neonatal deaths occurred at home. The variance is may be due to improved health seeking behavior of people in Baharak district.

According to this survey (68%) delivered at home without skilled birth attendant and (15) care takers (44%) did not seek governmental hospital care to provide treatment for their newborn babies. (82%) deceased did not assist to breathe and did not resuscitate.

Exclusive breastfeeding needs to be strengthened by all mothers where 38% of mother did not practice exclusive breast feeding.

Around 35% newborns died at the hospital which is high and quality services within Baharak district hospital needs to be enhanced.

Some harmful habits were noticed that care takers are applying hazardous things to the umbilical cords of newborns as it was noticed that burnt bread combined with sheep's dung, and cooking oil are applied which will lead to severe infections.

Recommendations

- To enhance community awareness regarding safe mother hood, and improve health seeking behavior of people from hospital and health facilities.
- To improve knowledge and skills of care takers regarding basic new born care
- To enable community health workers to identify life threatening conditions of the newborns.
- To improve the neonatal care services in the hospital and referral system from Health post levels to the hospital.
- To educate people to reduce and finally eliminate the harmful habits and replace them with useful ones.
- Hygiene and sanitation practices to be improved at house hold levels.

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