

**Stillbirths from Year 2067 BS to 2076 BS in Western  
Regional Hospital, Pokhara, Nepal:  
A Descriptive Study**

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## ABSTRACT

**Objective:** A stillbirth is the birth of a baby born with no signs of life at or after 22 weeks gestation, but often using 28 weeks or more in less developed health systems. The aim of this study was to assess the rate of stillbirth from the year 2067 BS to 2076 BS (Nepali calendar) at a tertiary care hospital in Pokhara, Nepal and describe stillbirth by selected background characteristics.

**Methodology:** This is a Retrospective Descriptive Study on SB trend during a decade. The details for birth were only available for SB thus restricting risk analysis, but the total number of deliveries including live births were also collected. The trend of SB rate was calculated and analysed by year and month during the past decade of Nepali calendar. The SB rate was described by cross tabulation with sociodemographic and obstetric determinants.

**Results:** There were total 1204 mothers who got a stillbirth among which 1167 were singleton pregnancies and 37 were twin pregnancies. The rate of stillbirth in Western Regional Hospital has increased by more than 2% in year 2076 BS (13.8%; 95% CI 11-16) from year 2067 BS (11.4%; 95% CI 9-13) with some fluctuations within the decade. The stillbirth rate was also described analysed by some background characteristics of mothers, child, and proportion of low birthweight by different variables including gestational age, sex of the baby, season, ethnicity, and maternal age.

**Conclusion:** In our study, we found that the SB rate varied by year and season and increased during the past decade. These variations may also reflect the external factors.

**Key words:** Stillbirth; Stillbirth Trend; Descriptive Retrospective Study

## **ABBREVIATION**

ANC:	Antenatal care
AGA:	Appropriate for Gestational Age
BD:	Breech Delivery
CS:	Cesaren Delivery
GDI:	Gestational diabetes Insipidus
IUFD:	Intra Uterine Fetal Death
IUGR:	Intrauterine Growth Restriction
LAMA:	Left Against Advice
LGA:	Large for Gestational Age
LMP:	Last Menstrual Period
LSCS:	Lower Cesarean section
NDHS:	Nepal Demographic and Health survey
NHRC:	Nepal Health and Research Council
PAHS:	Pokhara Academy of Health and Sciences
REC:	Regional Committee for Medical and Health Research Ethics
SB:	Stillbirth
SGA:	Small for Gestational Age
VD:	Vacuum Delivery
WHO:	World Health Organization
WHR:	Western Regional Hospital

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# CHAPTER ONE

## INTRODUCTION

### 1.1 BACKGROUND

*“It has been four weeks of my loss and I am here for follow up. What should I tell you? How hard did I beg to have my girl in my arms?..... I do not have anything to say, because I did not see her. Yes, she was a girl. She was taken away before I was fully conscious. She looked like me, said my husband, but wish I could see her. The loss of my girl changed everything. There is not a single day I don’t cry. People in the village started bitching about me saying it was my fault, so I also blame myself for not caring enough. I feel shameful to tell people.”*

- anonymous

#### **1.1.1 STILLBIRTH**

There are multiple definitions stillbirth in use which will provide significantly different frequency and epidemiological causes.

In 1908, the Vital Statistics section of the American Public health Association concluded that being registered as stillborn should require the absence of “any evidence of life” which was further elaborated in 1913 to include any “action of heart, breathing, movement of voluntary muscle.” These concepts remain in today’s fetal death definition of the WHO in the International Classification of Disease (1).

WHO and ICD state, stillbirths are fetal deaths that occur in the perinatal period, “beginning at 22 completed weeks (154 days) of gestation (the time when birth weight is usually 500 grams) and ending seven completed days after birth” Perinatal mortality is a term used for both stillbirths and neonatal deaths during first week. However, in most low and middle-income countries a fetal death before 28 weeks of gestation cannot survive and is regarded as abortion. The definition recommended by WHO for international comparison is a baby born with no signs of life at or after 28 weeks’ gestation (2, 3).

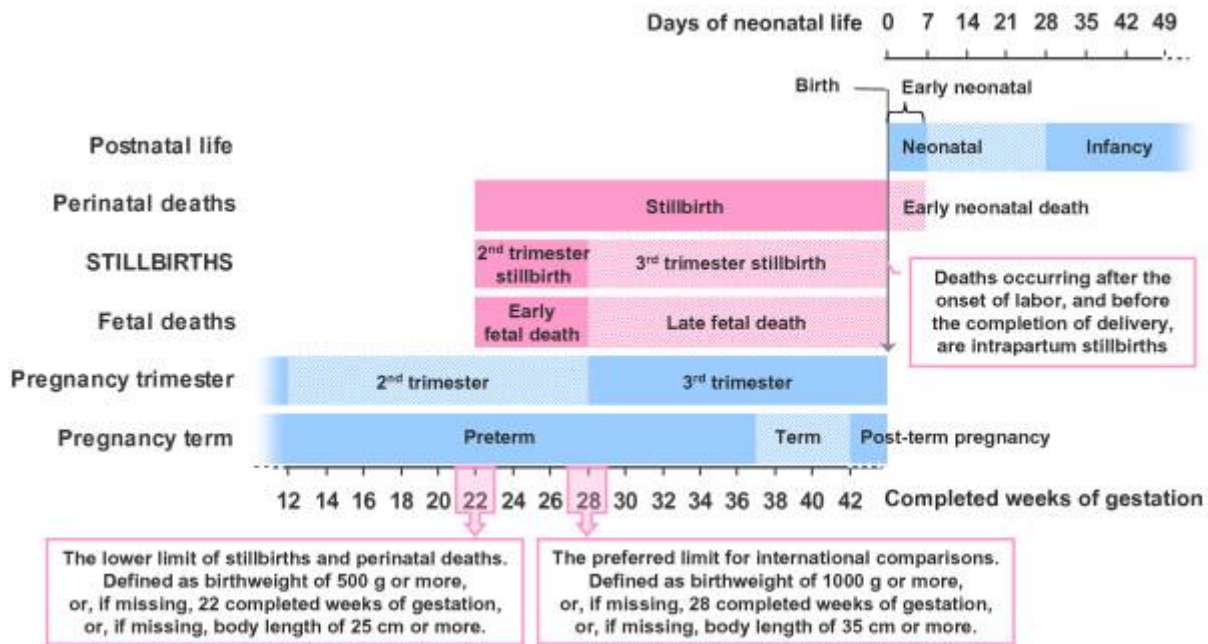


Figure 1: Definition of stillbirths in relation to timing in pregnancy and to other concepts of perinatal mortality.

Nepal Demographic Health Survey (NDHS) also defines stillbirths as fetal deaths in pregnancies lasting 7 months or more (28 weeks' of gestation or more) (4).

There are many causes of stillbirth, and a common categorization is shown here below (5).

### Causes of stillbirth

1. Childbirth complication
  - It includes the health problems occurring in pregnant women or in the developing fetus before labour begins.
2. Post-term complication
  - It refers to a pregnancy that has extended beyond 42 weeks of gestation.
3. Maternal infections in pregnancy
  - Infections such as malaria, syphilis and HIV.
4. Maternal disorders
  - The disorders include hypertension, obesity and diabetes.
5. Fetal growth restriction

- It is also known as Intrauterine Growth Restriction (IUGR) which refers to condition in which an unborn baby is smaller than it should be because it is not growing at a normal rate inside the womb.

#### 6. Congenital abnormalities

- Congenital abnormalities occur during intrauterine life and can be identified prenatally, at birth or later in life. It is also known as birth defects.

### **Risk factors for stillbirth**

Some known factors associated with lifestyle that may pose a risk for stillbirth are overweight, obesity or weight gain in pregnancy, smoking, caffeine consumption, alcohol consumption, environmental pollution, parental age, social disparities, race and ethnicity, interval between pregnancies and previous obstetric history (6).

The timing for delivery is important and should be done by health professional to prevent stillbirth. Advanced Maternal Age is also one major factor for high risk of stillbirth (7, 8).

#### **1.1.2 INTRA UTERINE FETAL DEATH (IUFD)**

Stillbirth is also known as Intrauterine Fetal Death (IUFD) (or demise). An IUFD is usually defined as a death that occurs in utero or during delivery after the completion of 20<sup>th</sup> week of pregnancy or the death of a fetus that weight 500gm or more in utero or during delivery (9).

With decreasing gestational age, IUFD becomes more common; 80% of all stillbirths occur before term, and more than half occur before 28 weeks (9).

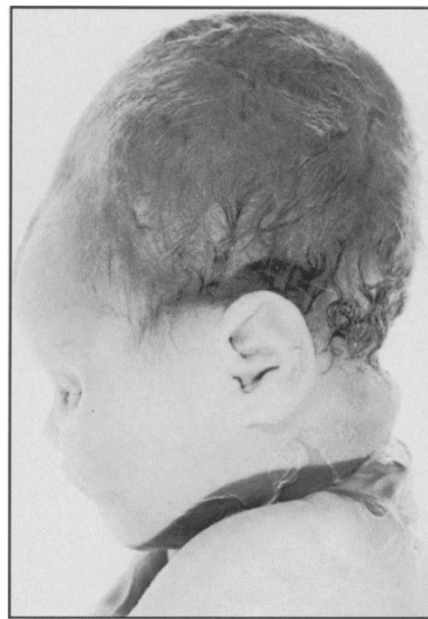
#### **1.1.3 MACERATION**

Maceration is the term used to describe analytical changes which occur when the fetus remains in utero after its demise (Strachan 1992). Most of these deaths, will have occurred in antepartum and most, but not all antepartum deaths will have signs of maceration (10).

It is clear, in most cases, the pathologist would be unable to ascertain the primary cause of death based on his analysis. However, a little attention, along with reliable methods and data collection, useful information about fetal growth and development and identification of unsuspected malformations will be forthcoming (10).



*Figure 2: Skin slipping (early sign of maceration)*



*Figure 3: Macerated Stillbirth (moulding of head)*

### **Changes of maceration**

The pathologist is often asked to decide when death occurred as a condition of the request for a cause of death. Although the changes in maceration occur in a predictable order, an exact timeline for these events is impossible to provide since they are influenced by gestation and accelerated in the presence of fetal hydrops and infection (10).



Therefore, skin slipping is the earliest sign of maceration. Corrugation or loss of epidermis exposes a red shiny dermal surface, especially over bony prominences, as a result of oblique pressure separating the epidermis from the dermis. Furthermore, skin changes in the postmature fetus can be delayed. Despite this uncertainty, it is sometimes possible to affirm or refute maternal or obstetric findings about the time of fetal death (10).

If it is the only change, it is more likely to have a death at least 6 hours before but the interval may be more than 12 hours (10).

#### **1.1.4 GESTATIONAL AGE**

The period between conception and birth is known as gestation. The baby develops and grows within the mother's womb during this period. It is the common term used to describe how far along the pregnancy is. Gestational age is a measurement of the age of a pregnancy that is calculated from the start of the woman's LMP or the equivalent gestational age as determined by a more precise method if one is available (11).

A normal full-term pregnancy ranges from 38 to 42 weeks of gestation. Infants born before this are considered premature; infants born after 42 weeks are considered postmature (11).

Gestational age can provide a view on how well the baby is growing in the womb before birth. If the baby's gestational age matches the calendar age after birth, the baby is said to be appropriate for gestational age (AGA). AGA babies have lower rates of problems and death than babies that are small or large for their gestational age. The birthweight of full-term infants that are born AGA will most often be between 2500 grams and 4000 grams. Infants weighing less than 2500gm are considered small for gestational age (SGA) while infants weighing more than 4000gm are considered as large for gestational age (LGA) (11).

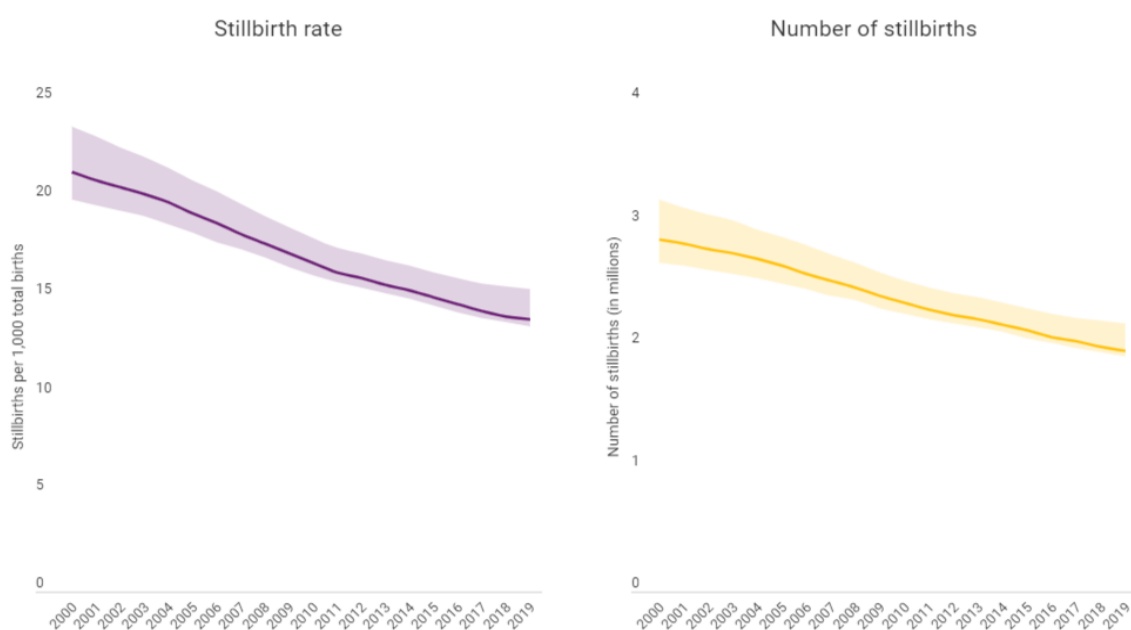
#### **1.1.5 STILLBIRTH RATES**

According to first ever joint stillbirth estimates done by UNICEF, the WHO, the World Bank Group and the Population Division of the United Nations Department of Economic and Social Affairs on 8<sup>th</sup> October 2020, claims that every year almost 2 million babies are stillborn among which 84% occur in low- and lower-medium-income countries. More than 40% of stillbirths occur during labour caused due to poor quality of care during pregnancy. It is a loss that could be prevented if women had access to a qualified health professional during childbirth and pregnancy. Therefore, regardless of several

advancements in health service to avoid or find the treatment for the cause of child mortality, progress in reducing the stillbirth rate has been slow (12).

Between 2000 and 2019, the annual rate of stillbirth reduction was just 2.3%, compared to 2.9% for neonatal death and 4.3% for death among children aged 1-59 months. The joint reports also shows that stillbirth was a challenge for high-income countries as well. In 2019, there have been more stillbirths than neonatal mortality in 39 high-income countries, and 15 countries had more stillbirths than infant mortality. Socio-economic status, mother education and ethnicity have been related to a higher incidence of stillbirth in both low- and high-income countries (13).

Global stillbirth rate and number of stillbirths (2000–2019)

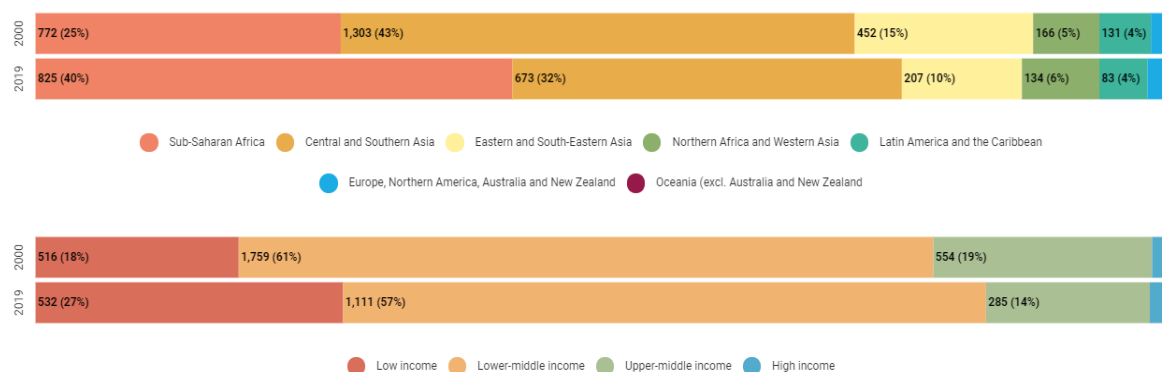


**Note:** The solid line represents the median and the shaded area represents the 90 per cent uncertainty around the median value.

**Source:** United Nations Inter-agency Group for Child Mortality Estimation (UN IGME) 2020.

Figure 4: Global stillbirth rate and number of stillbirths from 2000-2019

Number (in thousands) and global share of stillbirths, by SDG region and national income group (2000 and 2019)



Note: The first number cited for each region or income group refers to the number of stillbirths (in thousands); the second (in parentheses) is the share of stillbirths by region or income group.  
 Source: United Nations Inter-agency Group for Child Mortality Estimation (UN IGME) 2020.

Figure 5: Number in thousands and global share of stillbirths, by SDG region and national income group from 2000-2019

Similarly, there were approximately 141 million births in 2015 out of which, WHO mentioned there were 2.6 million worldwide stillbirths in 2015, with more than 7178 deaths every day. Many of such deaths have occurred in developing countries. In low and middle-income nations, 98 percent occurred. About half of all intrapartum-period stillbirths occur, which indicates the greatest risk duration. The estimated proportion of intrapartum stillbirth ranges from 10% in developed regions to 59% in south Asia (5, 14).

75% of those stillbirths occur in south Asia and sub-Saharan Africa and 60% of them are from the rural families of the community. From 2010 to 2016, the mean stillbirth rate for India were 25.3 per thousand births and 56.9 per thousand births in Pakistan. The number stillbirth in China is in 2015 had remained high ranked in the top fifth of the world even though the rate had reduced by 4 to 6 % in past 15 years (5, 15, 16).

The Every Newborn Action plan (ENAP) target national stillbirth rate of 12 or fewer stillbirths per 1000 births by 2030. A study including 195 countries estimated stillbirth rates and trend from 2000 to 2015 illustrated the increase of stillbirths at a local level. The approximate global stillbirth rate in 2015 was 18.4 per 1000 births, decreased from 24.7 in 2000. In 2015, an estimated 2.6 million babies were stillborn, giving a 19% decline in numbers since 2000 with the slowest progress in sub-Saharan Africa. 98% of all stillbirths occur in low-income and middle-income countries; 77% in south Asia and sub-Saharan Africa. The progress in reducing burden of stillbirths worldwide remains slow and insufficient to meet the national targets including ENAP (17).

A Case Study of the Navrongo War Memorial Hospital in Northern Ghana analysed the trends and the associated risk factors of stillbirths in a district hospital located in an impoverished and remote region of Ghana. The retrospective data from 2003 to 2013 showed that the stillbirth rate remained relatively large, despite a slight decrease in stillbirth rates over the study period, the findings. This study also indicates stillbirths are linked to primiparous women and preterm births with low birth weight and the efforts to reduce stillbirths should include the abolition of outdated cultural traditions (18).

A recent study stated Ethiopia as one of the countries with the highest rate of stillbirth despite of the efforts to reduce it. The rate of stillbirth declined from 13.3 per 1000 births in 2005 to 9.2 per 1000 births in 2016 among the women of reproductive age. The increase in women's urban place of residence, an increase in caesarean delivery and health facility delivery significantly contributed the decrease in stillbirth rate over time (19).

Despite the high incidence of stillbirth in most South Asian countries, there is a paucity of synthesized data on the factors that cause stillbirth. A systematic review stated the pooled rate of stillbirth from the studies in Bangladesh, India, Nepal and Pakistan was 25.15 per 1000 births. The common factors associated with stillbirth in countries of South Asia were pregnancy complications, maternal health conditions, fetal complications, lack of antenatal care, and socio-economic status (20).

#### **1.1.6 MATERNAL AND NEWBORN HEALTH CARE OF NEPAL**

In Nepal, Marriage is the signal for the beginning of exposure to most women's risk of pregnancy and is thus an effective predictor of fertility, whether or not the beginning of marriage coincides with the initiation of sexual activity, and hence the start of exposure to the possibility of pregnancy. It is a significant social and demographic indicator and represents the stage in person's life when childbearing is acceptable first in most societies (21, 22).

Nepal is promoting safe motherhood through initiatives such as providing free delivery care and transportation incentive schemes to women delivering in a health facility. In 2009, Nepal initiated a National Free Delivery Policy known as Aama Program to tackle the financial obstacles women face in accessing health facilities for delivery. A cash incentive scheme, the Safe Delivery Incentive Scheme, was initiated in 2005. It provides cash payments to women who deliver in government and selected private health facilities and incentive payments for health workers who undertake deliveries. The Ministry of Health has also implemented a birth preparedness package that outlines actions mothers and household members should take to prepare for the birth. The major aim of this package is to reduce delays in accessing delivery care services. In 2016, Nepal's government endorsed the

country's Every New-born Action Plan, which sets out a vision for the country "*in which there are no preventable deaths of new-borns or stillbirths, where every pregnancy is wanted, every birth celebrated and women, babies and children survive, thrive and reach their full potential.*" (21, 22).

There was minimal increase in institutional deliveries from 1996 to 2001. The proportion doubled to 18% in 2006 and doubled again to 35% in 2011. Between 2011 and 2016, there was remarkably 35-57% percentage point increase in the proportion of institutional deliveries. Assistance from a skilled birth attendant during delivery is considered a key factor in reducing maternal and neonatal mortality. In Nepal, 58% of deliveries are conducted by a skilled provider. The proportion of births assisted by skilled birth attendants increased from 36% in 2011 to 58% in 2016. In 2011 nurses and nurse midwives assisted slightly more births than doctors; however, in 2016, doctors were the major provider during delivery (21, 22).

#### **1.1.7 STILLBIRTH RATES IN NEPAL**

A pregnancy that does not end in a live birth is a stillbirth or miscarriage or an abortion. Most pregnancies (81%) resulted in a live birth. Less than one tenth (9%) of pregnancies were aborted and a similar proportion resulted in miscarriages; a very small proportion ended in stillbirth (1%). The percentage of pregnancies ending in abortion is higher in urban than in rural areas. The proportion of pregnancies ending in miscarriage (14%) and stillbirth (3%) was higher among women age 35-49 than among younger women (21, 22).

According to NDHS 2011 and 2016, perinatal deaths comprise stillbirths (pregnancy losses occurring after 7 months of gestation and early neonatal deaths (deaths of live births within the first 7 days of life). As shown in figure 4, which is the table from NDHS report 2011, the rate of stillbirths is 53 SB divided by 5444 per thousand i.e 9.7 per 1000 pregnancies. Similarly, we can note the increase in number of stillbirths to 78 divided by 5086 per thousand, i.e 15 per 1000 pregnancies in 2016 from the same updated report of NDHS (21, 22).

In Province 4, which is the study area, the use of ANC services from skilled providers was 87.3%. among which 43.4% and 43.8% were doctor and nurses/auxiliary nurses midwives respectively as the major service providers. 68.3% of births in 2016 were delivered in health facilities. 57.3% took place in government facilities whereas 30.3% were home deliveries. The most reported reasons from women who did not deliver their most recent birth at health facility was not necessary to deliver in health facility (47.7%) followed by facility being too far or not having transportation (26.2%). Province 4 has the highest proportion of pregnancies ending in abortion (21, 22).

A study of “Factors Associated with Stillbirth Among Pregnant Women in Nepal” states stillbirths as a major problem among the women with higher maternal age, minimum or no education and living in certain had to reach geographical regions. Among 8918 ever pregnant women aged 15-49 years, 488 had experienced at least 1 stillbirth during their lifetime. The limitations of this study was the chance of response bias, recall bias and social desirability bias due to the vulnerability of the participants (23).

A verbal autopsy study on “causes of stillbirths and neonatal deaths in Dhanusa districts, Nepal, suggested that the quality of care provided during pregnancy and delivery remains suboptimal as the rates of stillbirth and neonatal death is high at present (24).

Socio-economic predictors of stillbirth in Nepal were studied through 2001-2011 found that low level of education, ecological zones and open defecation were strong predictors of stillbirth. Among 18,386 pregnancies of at least 28 weeks gestation, 335 stillbirths were reported. Access to antenatal care services and skilled birth attendants for women in the mountainous and hilly ecological zones of Nepal is needed to further reduce stillbirth and improved services should also focus on women with low levels of education. Weaknesses of this study were recall bias and misclassification bias because the data was based upon the self-reporting from mothers (25).

**Table 8.4 Perinatal mortality**

Number of stillbirths and early neonatal deaths, and the perinatal mortality rate for the five-year period preceding the survey, by background characteristics, Nepal 2011

Background characteristic	Number of stillbirths <sup>1</sup>	Number of early neonatal deaths <sup>2</sup>	Perinatal mortality rate <sup>3</sup>	Number of pregnancies of 7+ months' duration
<b>Mother's age at birth</b>				
<20	10	43	48	1,111
20-29	27	89	35	3,355
30-39	13	15	33	863
40-49	3	2	35	116
<b>Previous pregnancy interval in months<sup>4</sup></b>				
First pregnancy	19	57	44	1,732
<15	5	10	52	293
15-26	8	36	40	1,101
27-38	9	25	38	884
39+	12	20	23	1,434
<b>Residence</b>				
Urban	4	11	29	507
Rural	49	137	38	4,938
<b>Ecological zone</b>				
Mountain	9	13	50	437
Hill	23	57	37	2,154
Terai	20	79	35	2,854
<b>Development region</b>				
Eastern	16	33	38	1,286
Central	4	58	36	1,721
Western	10	26	36	1,017
Mid-western	14	18	40	807
Far-western	9	14	37	614
<b>Mother's education</b>				
No education	25	79	40	2,575
Primary	16	26	38	1,095
Some secondary	10	40	34	1,478
SLC and above	2	4	20	297
<b>Wealth quintile</b>				
Lowest	20	32	37	1,410
Second	11	35	39	1,194
Middle	12	41	46	1,145
Fourth	5	31	38	943
Highest	5	10	19	753
<b>Total</b>	<b>53</b>	<b>149</b>	<b>37</b>	<b>5,444</b>

Figure 6: NDHS report 2011

**Table 8.4 Perinatal mortality**

Number of stillbirths and early neonatal deaths, and the perinatal mortality rate for the 5-year period preceding the survey, by background characteristics, Nepal DHS 2016

1.2

Background characteristic	Number of stillbirths <sup>1</sup>	Number of early neonatal deaths <sup>2</sup>	Perinatal mortality rate <sup>3</sup>	Number of pregnancies of 7+ months' duration
<b>Mother's age at birth</b>				
<20	19	34	47	1,129
20-29	37	35	22	3,244
30-39	21	11	49	659
40-49	1	0	20	54
<b>Previous pregnancy interval in months<sup>4</sup></b>				
First pregnancy	32	32	35	1,801
<15	12	20	42	761
15-26	17	11	37	772
27-38	5	5	16	606
39+	12	12	21	1,145
<b>Residence</b>				
Urban	41	32	27	2,739
Rural	37	48	36	2,347
<b>Ecological zone</b>				
Mountain	3	10	36	360
Hill	28	26	28	1,914
Terai	47	44	32	2,812
<b>Development region</b>				
Eastern	23	23	40	1,156
Central	28	22	27	1,859
Western	14	11	26	934
Mid-western	8	14	32	700
Far-western	5	10	34	437
<b>Province</b>				
Province 1	13	14	32	823
Province 2	26	22	35	1,379
Province 3	13	9	28	813
Province 4	5	3	20	391
Province 5	13	13	28	905
Province 6	5	9	40	338
Province 7	5	10	34	437
<b>Mother's education</b>				
No education	33	31	37	1,740
Primary	15	23	37	1,026
Some secondary	12	18	25	1,235
SLC and above	18	8	24	1,084
<b>Wealth quintile</b>				
Lowest	16	23	36	1,088
Second	18	24	39	1,081
Middle	19	14	29	1,131
Fourth	16	14	29	1,036
Highest	10	4	19	750
<b>Total</b>	<b>78</b>	<b>80</b>	<b>31</b>	<b>5,086</b>

## STATEMENT OF THE PROBLEM

Worldwide, there are between three and four million stillbirths each year, 98% of these deaths occur in the developing world. Many of these deaths could be potentially preventable if women had access to



a skilled birth attendant and emergencies services such as having access to c-section and antibiotics. Stillbirths are universally undercounted, especially at lower ages of gestation.

In Nepal, stillbirth is a devastating event not only for the baby, but also for the mother and father, the wider family, the health service and community. There is increasing evidence that many deaths are potentially preventable, and stillbirth rates are starting to be recognized as an important indicator of the quality of care. However, stillbirth can happen in any family. Having a risk factor for stillbirth doesn't mean for sure that you will have stillbirth. But knowing about and reducing the risk factors may help prevent stillbirth from happening.

Province no.4 has a diverse population living in versatile geography from hills to mountain ranges. Western Regional Hospital is situated at the heart of this province where it is feasible for most of the citizens not only from urban but also from rural areas to seek the health care facilities. Despite of its accessibility and fact of WRH being Nepal's second largest government hospital, the availability of health care services and its acceptance from the public is a topic of interest. Therefore, along with all health care services, maternal and child health care is one of the important services provided by WRH. The trend of still birth in past decade can be indicator of good work but also can be the alarm for a need to change the way for providing health services. Life-style modification, geographical and seasonal diversity are the major risk factors that increase the challenges for pregnant mothers in this province.

Hence, our research questions are, what the trend is if stillbirths in this health facility, and what the stillbirth rates by various background factors are. Based on this we will discuss factors potentially influencing stillbirth rates.

## **CHAPTER TWO**

### **OBJECTIVES**

#### **2.1 General Objective**

- To describe the stillbirths from year 2067 BS to 2076 BS in Western Regional Hospital, Pokhara, Nepal

#### **2.2 Specific Objectives**

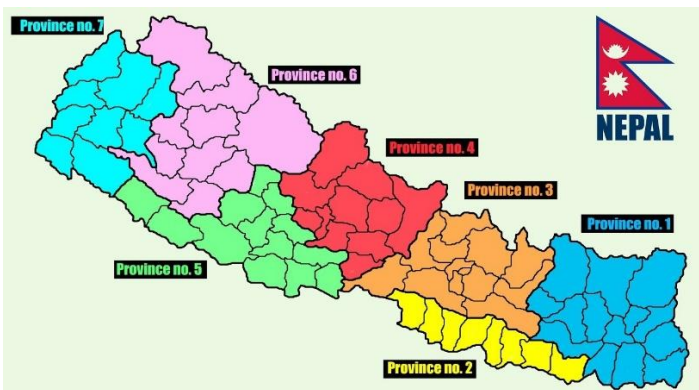
- To determine the rate of still birth by year and month from year 2067 BS to 2076 BS in Western Regional Hospital, Pokhara, Nepal
- To describe stillbirth rates by background characteristics.

# CHAPTER THREE

## METHODOLOGY

### 3.1 Study setting

Landlocked between two giant countries, China and India, lies Nepal with an area of 147,181 km<sup>2</sup> in South Asia. It is mainly located in Himalayas with some parts of Indo-Gangetic Plain with an estimated population of about 26.4 million. Nepal is 48<sup>th</sup> largest country by population and 93<sup>rd</sup> largest country by area. This study is going to be carried out in the Western Regional Hospital, Kaski, Pokhara, Nepal. Pokhara is metropolitan city of Nepal and is also the capital of Province no. 4, Gandaki zone. It is situated about 200 km west from Kathmandu, the capital city of Nepal. Pokhara is the second largest city of Nepal with area 464.2 km<sup>2</sup> and with population density of 868.074/km<sup>2</sup> (26).



Pokhara is also commonly known as tourist capital of Nepal due to numbers of caves, lakes, falls, and trekking routes to famous mountains base camps such as Annapurna, Machhapuchhre and many more. Besides that, it also has 46 public health facilities and 21 non-public health facilities. Out of which

public health facilities comprises of 2 hospitals, 2 primary health care centres, 21 health posts, 18 urbans health centres and 3 other health facilities. Whereas, non-public health facilities comprise of 14 hospitals and 7 primary health centres and health posts (26).



Western Regional Hospital (WRH) is the second biggest hospital of Nepal and biggest hospital in the Western Region with the capacity of 500 beds. It is a referral hospital covering 16 districts of the Western Region. This hospital was established in 2012 BS as a “Soldier Board Hospital” and considered as District Hospital with 15 beds in 2019 BS. Further, on 2043 BS it was upgraded as a Zonal Hospital with 150 beds, on 2061 as regional hospital with 350 beds, and finally on 2071 as Regional Hospital with 500 beds. Now it is developed as an academic centre with the name of PAHS

(Pokhara Academy of Health and Sciences) in 2072. The department of Obstetrics and Gynaecology takes care of women's reproductive and fertility issues (27, 28).

### **Nepali Calendar**

The years in Nepali calendar are indicated in "Bikram Sambat (BS)" based on Eastern Hindu Lunar Calendar. From December 15th to April 15th, Nepali dates are 56 years ahead of the Gregorian Calendar (English Calendar). The English calendar is 57 years ahead from the 16th of April to the 14th of December. The Lunar Calendar has 12 months, each of which has a minimum of 29 days and a maximum of 32 days (29).

The start of year 2067 BS is 14<sup>th</sup> April 2010 AD and the end of 2076 BS is 14<sup>th</sup> May 2019 AD (30).

### **Seasons of Nepal**

In Nepal, the English word "season" is translated as "Ritu". There are six seasons in Nepal categorized by the months of Nepali calendar (31).

#### **Spring Season (Basanta Ritu)**

This season involves the Nepali months of Chaitra and Baishak. It occurs between Mid-March and Mid-May on the English calendar. This is Nepal's windy season.

#### **Summer Season (Grishma Ritu)**

In the Nepali calendar, this season falls in the months of Jestha and Ashad. It occurs between the mid of May and the mid of July on the English calendar. This is the hottest time of year in Nepal.

#### **Rainy Season (Barsha Ritu)**

According to the Nepali calendar, this season falls in the months of Shrawan to Bhadra. It occurs between mid-July and mid-September in the English calendar. This is the rainy season, marked by extreme precipitation.

#### **Autumn Season (Sharad Ritu)**

Sharad Ritu is ruled by the Nepalese months Ashwin and Kartik. It occurs between mid-September and mid-November on the English calendar.

### Pre-Winter Season (Hemanta Ritu)

Mangsir and Poush months of the Nepali calendar fall under this season. It occurs between the mid of November and the mid of January.

### Winter Season (Shishir Ritu)

This season includes the Nepali months of Magh and Falgun. This occurs between the mid-January and mid-April on the English calendar. This is Nepal's coldest season.

## **Ethnicity of Nepal**

There are approximately 101 ethnic groups that speak 92 different languages. With a view of the traditional population layout, the distinction between caste and ethnicity becomes clearer. Nepal's official language is Nepali, which is spoken and understood by the vast majority of the country's inhabitants. Each ethnic group has its own mother language (32).

The ethnicity of Nepal is mostly based upon the geographical classification (32).

### Northern Himalayan People

Sherpas, Dolpa-pas, Lopas, Baragaonlis, and Manangays are all found in Nepal's mountainous regions. Sherpas live primarily in the east, in the Solu and Khumbu regions; Baragaonlis and Lopas live in the semi-desert areas of Upper and Lower Mustang in the rain-shadow area; Manangays live in Manang district; and Dolpa-pas live in the Dolpa district of western Nepal.

### Middle Hills and Valley People

In the middle hills and valleys, many ethnic groups reside. Magars, Tamangs, Rais, Limbus, Thamis, Sunuwars, Newars, Thakalis, Chepangs, Brahmins, Chhetris, and Thakuris, Damai, Sarki, Kami, and Sunar are some of them.

### Tarai People

Tharus, Darai, Kumhal, Rajbangsi, Bote, Majhi, and other ethnic groups make up the Tarai's largest ethnic groups. They speak Maithili and Bhojpuri, two north Indian dialects. Because of the fertile plains of the tarai, agriculture is the primary source of income for the majority of the population. However, some occupational castes exist, such as the Majhi (fisherman), Kumhal (potter), and Danuwar (cart driver).

### **3.2 Study population**

The participants are each woman who had come to hospital and had delivered the stillborn babies. They have been registered in the discharge registry book.

### **3.3 Study design**

The study is Retrospective Descriptive Study design where the past 10 years data from 2067 BS to 2076 is collected. The major outcome of the study will be the rate of stillbirths in WRH. The study also illustrates the background characteristics of stillbirth.

### **3.4 Inclusion and Exclusion criteria**

Inclusion criteria: All stillbirth deliveries recorded in the delivery discharge books within the year 2067 BS to 2076 BS are included.

### **3.5 Sample size**

Total 1204 stillbirth deliveries were registered within the year 2067 BS to 2076BS. Out of with 1167 were singletons pregnancies whereas 37 were multiple pregnancies.

Assuming the SB rate s around 1% i.e. 10/1000 births (NDHS 2011), we aimed to estimate the SB rate with 80% statistical power and 95% confidence level, and an absolute precision of 0.5. A sample of 1056 would give an absolute precision of 6/1000 with 95% confidence level for SB rates between 4 and 16 per 1000.

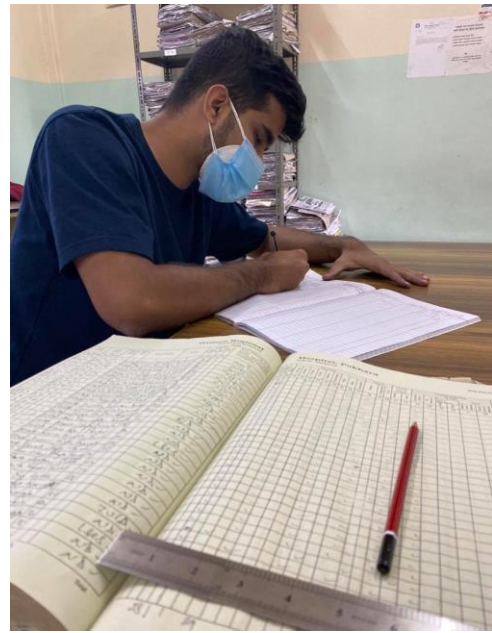
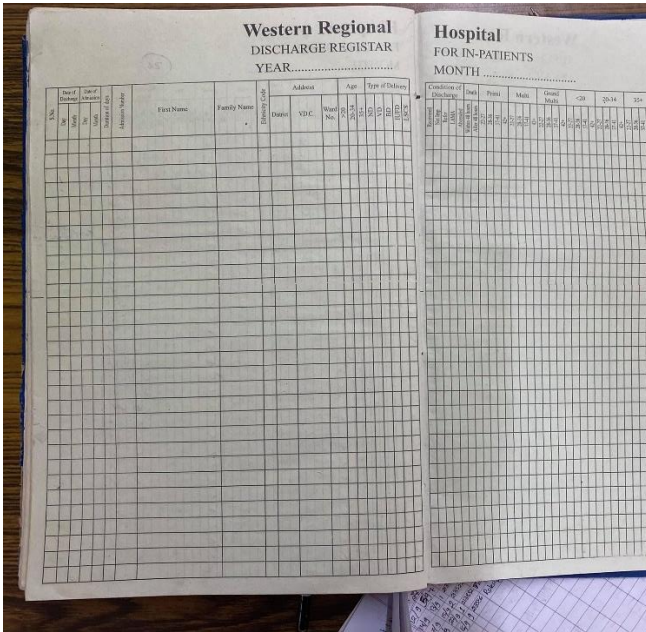
### **3.6 Data collection and entry**

The maternity discharge registry books were stored randomly in a storeroom of hospital. The registry books were searched and labelled according to the recorded years firstly by the investigators before the data collection.



The data from the routine discharge registry books in the maternity ward was copied handwritten and later entered in Epidata. The information such as admission date(dd/mm/yyyy BS), duration of stay in the hospital, ethnicity, address, maternal age(<20 years,20-34 years and 35+ years), delivery type, condition of mother while being discharged, maternal death, parity(Primiparous(0), Multiparous(1-4) and grand Multiparous(5+)), gestational age(22-27 weeks, 28-36 weeks, 37-41 weeks, 42 weeks or more weeks), birthweight (100-499g, 500-999g, 1000-1499g, 1500-2499g, 2500-3999g, 4000g and more grams) and sex of the stillborn babies were copied. In reference to admission date, month helped us allocate the variable season (spring, summer, rainy, autumn, pre-winter and winter) as per Nepali calendar in our study. Hence, no names of the participants were copied to maintain the confidentiality of the data. These information are our variables from which we further did our analysis of our research. The outcome measurement is the number of stillbirths that were recorded from the maternity discharge registry.





Overall, all the data corresponding with the stillbirth that might help in further analysis were included during the data collection.

The maternity discharge register books were routinely filled in all maternity wards by the health workers of the hospital after the deliveries to record the outcomes. Data was collected by Principal Investigator (Rachana Aryal, research student of UiB) and field assistant (Dikshant Devkota) at the hospital record department under the continuous supervision of Medical Recorder Officer, Mr. Badri Raj Ghimire and Mr. Madan Kumar Ranjitkar in the relevant time period. The collected data were finally approved by senior Medical Recorder Officer, Mr. Bhim Poudel. Double data entry was done in EpiData software for data quality assurance and to ensure the correct digitalisation of entered data.

### 3.7 Data analysis

The data was first analysed as singleton and multiple pregnancies for single delivery and twin delivery respectively. This information of SB was based on the mothers' information while the analysis of SB with variables related to baby's information was done excluding the gestational age 22-27 weeks.

The stillbirth rate was calculated by SB per 1000 births. Further analysis was done by cross-tabulation. The trend of still birth is calculated in per 1000 births, where total deliveries were the denominator.

Cross tabulation was done with SB rate by year, and SB rate by maternal age group, sex of the baby, and proportion of LBW. Twins were analysed separately.

SPSS was used for analysis.

### **3.8 Ethical consideration**

The ethical approval from Regional Committee for Medical and Health Research Ethics (REC) in Western Norway was sought. Similarly, ethical approval from Nepal Health and Research Council (NHRC), Nepal was taken. Then, the ethical approval from Institutional Review Committee, Pokhara, Nepal was handed. Lastly, hospital permit from Western Regional Hospital was provided from hospital director, Dr. Arjun Acharya before conducting research.

Informed consent from the participants themselves were not requested as the data was collected from registers and copied handwritten before entering in the computer through use of Epidata software; and there will be no contact with the participants on personal basis. Hence, while collecting the data we overlooked and did not copy any names of the participants in the register for maintaining the confidentiality. The hospital registration number were recorded to ensure correct copy for each data collected and this number was later deleted in the database before analysis.

## CHAPTER FOUR

### RESULTS

The birth register of WRH had 1204 mothers who got stillbirths from year 2067 BS to 2076 BS as per Nepali calendar. Out of these, there were 37 twin pregnancies, and 1167 were singleton pregnancies. Among the twin pregnancies, 12 mothers had only one still born baby while 25 remaining mothers had both stillborn babies. Summing up all, the total number of stillbirth babies were 1229. In the following table twin has been described as multiple pregnancies. Table 1 illustrates the distribution of singleton and multiple pregnancies.

*Table 1: Distribution of singletons and multiple pregnancies among mothers who got stillborn baby at Western Regional Hospital, Nepal, 2067-2076 BS.*

<b>Pregnancies</b>	<b>Mothers N (%)</b>	<b>Stillbirth n (%)</b>
Singleton pregnancy	1167 (96.9)	1167 (95.0)
Multiple pregnancy	37 (3.1)	12+50 (5.0)
Total	1204 (100)	1229 (100)

#### 4.1 TREND OF PREGNANCIES WITH A STILLBIRTH

##### 4.1.1 ETHNICITY OF THE MOTHERS

Ethnicity of the mothers is shown in Table 5. Among singleton pregnancies, the highest number of participants were Dalit with 24.6% and Newar with least percentage of 4.4%. All other castes with 7.9% did not fall under the categorization of ethnicity fell under others. Similarly, there are more mothers from Dalit ethnicity There were also 7 missing information of participants' ethnicity.

Table 2: Ethnicity of mothers with singleton and multiple pregnancies who got a stillborn baby at Western Regional Hospital, Nepal, 2067-2076 BS

Ethnicity	Singletons		Multiple	
	N	%	N	%
Brahmin	273	23.4	7	18.9
Chhetri	169	14.5	6	16.2
Newar	51	4.4	3	8.1
Rai/Limbu/Magar/Tamang	221	18.9	5	13.5
Madhesi	67	5.7	3	8.1
Dalit	287	24.6	10	27
Others	92	7.9	3	8.1
Missing	7	0.6	-	-
Total	1167	100	37	100

#### 4.1.2 SEASONAL DISTRIBUTION

Seasonal distribution of the deliveries is shown in Table 6. The study shows the similar distribution of stillbirth among singletons in terms of Summer, Rainy and Pre-Winter with around more than 17%. Hence, the highest and lowest percentage can be noted in Autumn (18.5%) and Spring (13.2%) respectively with 5.6% difference. In contrast among multiple pregnancies, we can see the highest distribution in Autumn with 35.1% and least in Pre-winter with 5.4%. The distribution in Spring is 18.9%, in Winter is 16.2%, in Rainy is 13.5% and in Summer is 10.8%.

Table 3: Seasonal distribution among mothers with singleton and multiple pregnancies who got a stillborn baby at Western Regional Hospital, Nepal, 2067-2076 BS.

Season	Total deliveries	Total days	Singletons		Multiple	
			N	%	N	%
Spring	13299	61	154	13.2	7	18.9
Summer	14539	62 or 63	202	17.3	4	10.8
Rainy	16684	62 or 63	208	17.8	5	13.5
Autumn	16372	61	216	18.5	13	35.1
Pre-Winter	15845	59	204	17.5	2	5.4
Winter	14401	59	183	15.7	6	16.2
Total	91140	364	1167	100	37	100

#### 4.1.3 MATERNAL AGE

Maternal age distribution of the deliveries is shown in Table 7. Women aged under age 20 represented 12.5% of singleton and 24.3% of multiple pregnancies; women from age 20-34 had 80.4% of singleton pregnancies and 73% of multiple pregnancies. There were very few multiple pregnancies among 35 years and more.

Table 4: Maternal age of mothers with singleton and multiple pregnancies who got a stillborn baby at Western Regional Hospital, Nepal, 2067-2076 BS.

Maternal age	Singletons		Multiple	
	N	%	N	%
<20	146	12.5	9	24.3
20-34	938	80.4	27	72.9
35+	82	7.0	1	2.7
Missing	1	0.1	-	-
Total	1167	100	37	100

#### 4.1.4 TYPE OF DELIVERY

Categorization of deliveries was done by midwife and recorded in the register, see Table 8. Out of 1167 stillbirths, among singleton pregnancies, 55.1% were Intra uterine fetal death, 28.4% were Normal delivered, 9.4% were Caesarean Section and 5.5% were Breech delivered. There were 18 stillbirths who were vacuum delivered. In the same way, in multiple pregnancies the highest

distribution of delivery type was Intra uterine fetal death followed by Normal delivery and Caesarean Section with 32.4%, 29.7% and 24.3% respectively. There were also 3 and 2 of each Breech and Vacuum delivery.

*Table 5: Type of delivery among mothers with singleton and multiple pregnancies who got a stillborn baby at Western Regional Hospital, Nepal, 2067-2076 BS.*

Type of delivery	Singletons		Multiple	
	N	%	N	%
Normal delivery	332	28.4	11	29.7
Vacuum delivery	18	1.5	2	5.4
Breech delivery	64	5.5	3	8.1
Intra uterine fetal death	643	55.1	12	32.4
Cesarean Section	110	9.4	9	24.3
Total	1167	100	37	100

#### 4.1.5 MATERNAL DISCHARGE CONDITION

The condition of the mother at discharge from the hospital is shown in Table 9. After the stillbirth, the 99.2% of mothers were discharged recovered, while 6 were not improved, and the information of 2 participants were missing. One of the participants left the hospital without informing any health workers of the hospital. Out of 37 multiple pregnancies of the stillbirths, 36 of them were recovered while one was missing.

*Table 6: Maternal discharge condition among mothers with singleton and multiple pregnancies who got a stillborn baby at Western regional Hospital, Nepal, 2067-2076 BS.*

Condition of discharge	Singletons		Multiple	
	N	%	N	%
Recovered	1158	99.2	36	97.3
Not imp	6	0.5	-	-
Left against advice (LAMA)	1	0.1	-	-
Missing information	2	0.2	1	2.7
Total	1167	100	37	100

#### 4.1.6 MATERNAL DEATH

Maternal deaths associated with the delivery was recorded by midwives and is shown in Table 10. There was total 7 maternal deaths along the stillbirth of the baby. Out of which, 4 of them died within 48 hours of the delivery and 3 died after 48 hours of the delivery among singleton pregnancies. While one died after 48 hours of delivery and one was missing among multiple pregnancy.

Table 7: Maternal death mothers with singleton and multiple pregnancies who got a stillborn baby at Western Regional Hospital, Nepal, 2067-2076 BS.

Maternal death	Singletons		Multiple	
	N	%	N	%
Within 48 hours	4	0.3	-	-
After 48 hours	2	0.2	1	2.7
Alive at discharge	1159	99.3	35	94.6
Missing	2	0.2	1	2.7
Total	1167	100	37	100

#### 4.1.7 PARITY OF MOTHERS

The parity of the mothers who got SB babies is shown in Table 11. Among them, 47% and 42% of the participants had multiparous (1-4 previous pregnancies) and primiparous pregnancies, respectively. Around 11% also had a grand multiparous (five or more former pregnancies). There was one participant with missing parity information. Perhaps among multiples, 18 of them were primiparous, 15 of them were multiparous and 4 of them were grand multiparous.

Table 8: Parity of mothers with singleton and multiple pregnancies who got a stillborn baby at Western Regional Hospital, Nepal 2067-2076 BS.

Parity	Singletons		Multiple	
	N	%	N	%
Primiparous (0)	490	42	18	48.6
Multiparous (1-4)	549	47	15	40.5
Grand multiparous (5+)	127	10.9	4	10.8
Missing	1	0.1	-	-
Total	1167	100	37	100

## 4.2 BACKGROUND CHARACTERISTICS OF STILLBIRTH

The background characteristics of the 1229 stillborn babies (see Table 1) are analysed with the proportion of low birthweight by different variables including the gestational age of 28-36 weeks, 37-41 weeks and 42 and more weeks. The death of foetus under 27 weeks of gestational age are usually regarded as spontaneous abortion rather than stillbirth.

### 4.2.1 GESTATIONAL AGE

Table 12 shows that 59.7% of singleton stillbirths were between 37-41 weeks and 37.8% were between 28-36 weeks of gestational. Few of them were 42 weeks or of more among singleton. Similarly, among multiple pregnancies, highest gestational age distribution can be seen between 37-41 weeks with 64.3% and the lowest can be noted among 42 weeks or more. The preterm stillbirths which are below 36 weeks up to 28 weeks are around 37.8%.

*Table 9: Gestational age among mothers with singleton and multiple pregnancies who got stillborn baby at Western Regional Hospital, Nepal, 2067-2076 BS.*

Gestational age	Singletons		Multiple	
	N	%	N	%
28-36	393	37.8	9	32.1
37-41	621	59.7	18	64.3
42+	26	2.5	1	3.6
Total	1040	100	28	100

### 4.2.2 BIRTH WEIGHT CATEGORY

The birthweight of the babies from the deliveries is shown in Table 13, and was only recorded in the categories listed, not as exact weight. There were 38.1% of stillborn babies whose birth weight was between 2500 to 3999 grams which is the majority among singletons. The weight between 1500 to 2499 grams is the largest group among babies from multiple pregnancies with 46.4%, while same range of birthweight has 30.3% among singletons. This is a reflection of the generally smaller size of twins than singletons. Similarly, only 17 stillborn babies had birthweight with or more than 4000 grams. There were no stillborn babies with birthweight range between 100-499, 4000+ and no missing stillborn babies' weight among multiples.



Table 10: Birth weight of stillborn baby from mothers with singleton and multiple pregnancies at Western Regional Hospital, Nepal, 2067-2076 BS.

Birth weight	Singleton		Multiple	
	N	%	N	%
100-499	10	1	-	-
500-999	89	8.6	2	7.1
1000-1499	211	20.3	6	21.4
1500-2499	315	30.3	13	46.4
2500-3999	396	38.1	7	25.0
4000+	17	1.6	-	-
Missing	2	0.2	-	-
Total	1040	100	28	100

#### 4.2.3 SEX OF BABIES

As shown in the table 14, the percent of male stillbirth among singleton babies is higher than females. In multiple pregnancies female stillborn is much higher than males. There were 4 stillborn babies whose gender were not identified during or after delivery.

Table 11: Sex of stillborn baby among mothers with singleton and multiple pregnancies at Western Regional Hospital, Nepal, 2067-2076 BS.

Sex	Singleton		Multiple	
	N	% (95% CI)	N	% (95% CI)
Male	570	54.8 (52-58)	13	46.4 (23-54)
Female	466	44.8 (42-47)	15	53.6(46-77)
Not identified	4	0.4	-	-
Total	1040	100	28	100

#### 4.2.4 RATE OF STILLBIRTH PER 1000 BIRTHS

The rate of SB by year is shown in Fig.1 and in Table 16. The trend has been calculated by total number of stillbirths per 1000 birth in the respective years from 2067 BS to 2076 BS. The rate of SB has increased from 11% in 2067 to around 14% in 2076, but with some fluctuation. We can also see the increase in rate of stillbirth from the year 2071 BS up to 2076 BS. Perhaps, it seems to drastic drop in the year 2072 BS. The spearman correlation coefficient is 0.7 and the p value is 0.02.

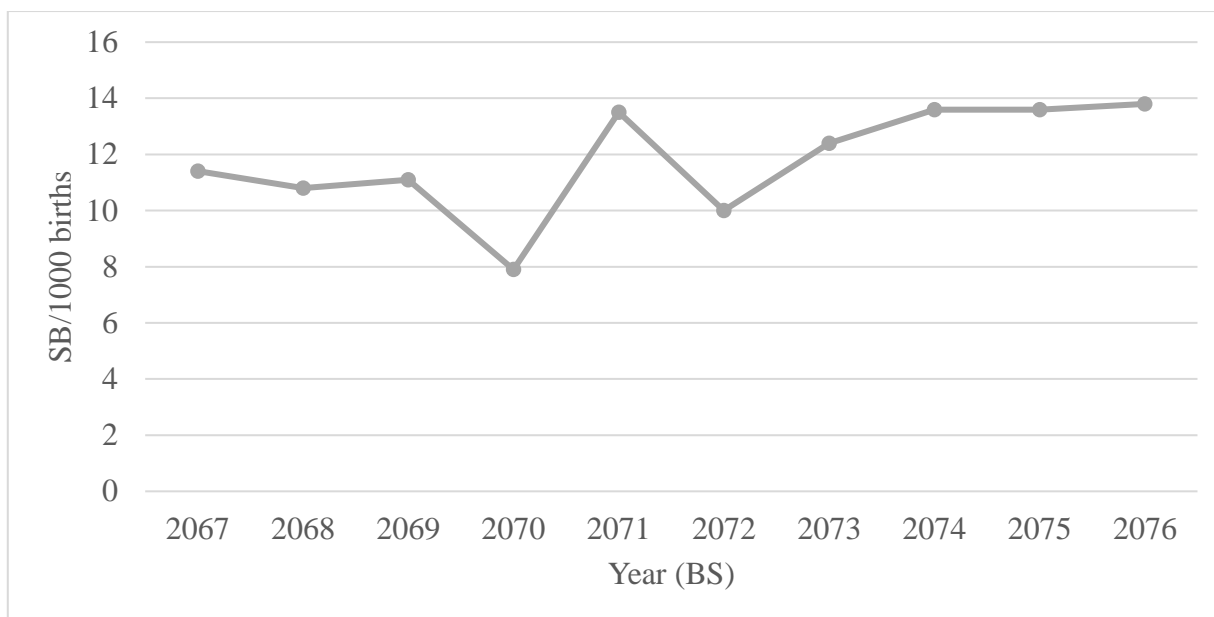


Figure 8: Trend of stillbirth per 1000 births at Western Regional Hospital, Nepal, 2067-2076 BS.

Table 12: Trend of stillbirth rates among women delivering at Western Regional Hospital, Nepal, between 2067 and 2076 BS.

Year (BS)	Total deliveries	SB/1000 births	95% CI
2067	9624	11.4	9-13
2068	9897	10.8	8-13
2069	9517	11.1	9-13
2070	8797	7.9	6-10
2071	9631	13.5	11-15
2072	9145	10	8-12
2073	9043	12.4	10-14
2074	8645	13.6	11-16
2075	8445	13.6	11-16
2076	8396	13.8	11-16

#### 4.2.6 HISTOGRAM COUNT OF BIRTHWEIGHT

The background characteristics of stillborn baby is analysed with the proportion of low birthweight by different variables including the gestational age of 28-36 weeks, 37-41 weeks and 42 and more weeks. The death of foetus under 27 weeks of gestational age are usually regarded as spontaneous abortion rather than stillbirth.

The histogram (Fig.2) and table 17 shows birthweight of stillborn babies with error bars showing 95% confidence level. The birthweight between 2500-3999 gm has the highest count with 403 (37.7%), while the birthweight 100-499 gm or more have the least count with 10 (0.9%).

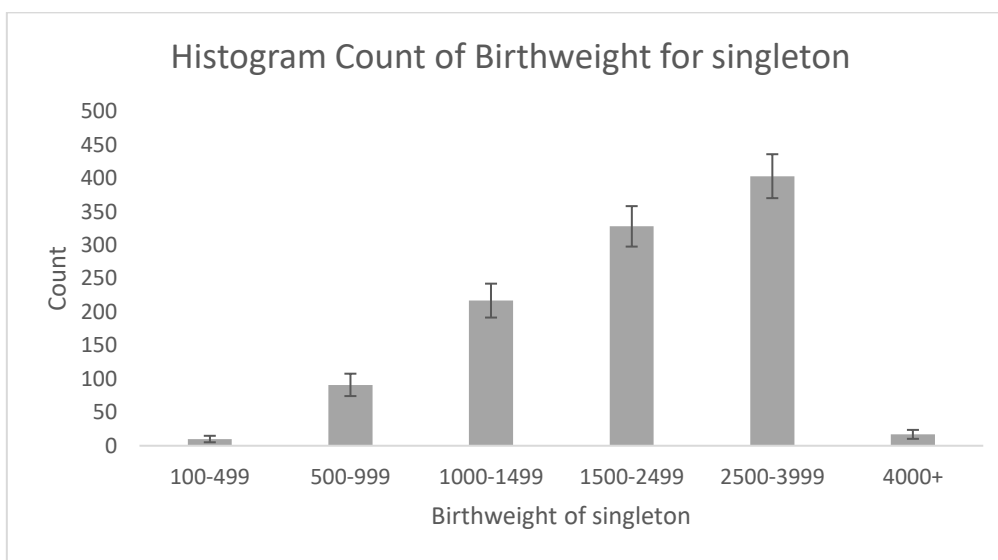


Figure 9: Error bars for Birthweight among singleton of stillborn baby at Western Regional Hospital, Nepal, 2067-2076 BS.

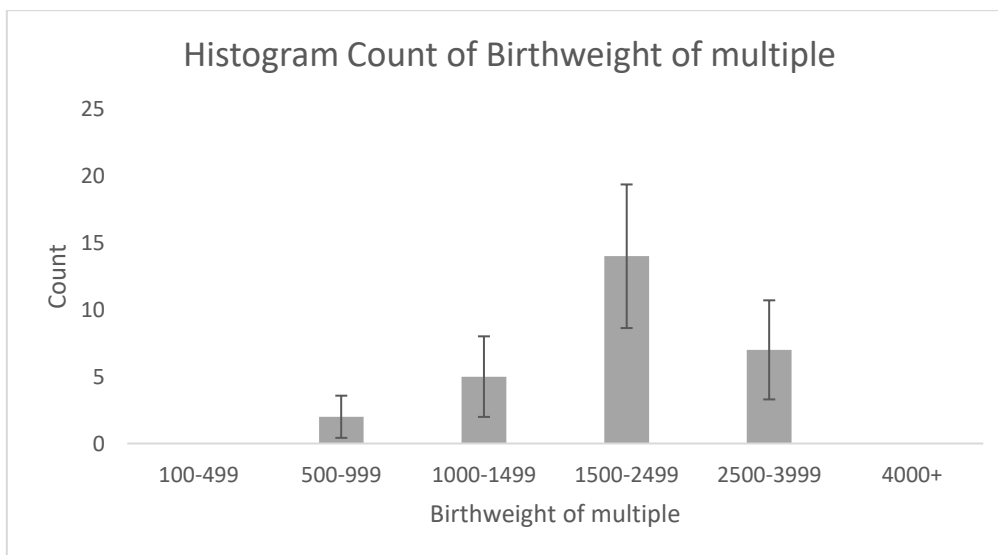


Figure 10: Error bars for Birthweight among multiple of stillborn baby at Western Regional Hospital, Nepal, 2067-2076 BS.

Table 13: Count and proportion of birthweight categories of singleton and multiple of stillbirths at Western Regional Hospital, Nepal, 2067-2076 BS.

Birthweight in gm	Count for singleton	% for singleton	Count for multiple	% for multiple
100-499	10	0.9	-	-
500-999	91	8.5	2	0.2
1000-1499	217	20.3	5	0.5
1500-2499	328	30.7	14	1.3
2500-3999	403	37.7	7	0.7
4000+	17	1.6	-	-
Total	1066	99.8	28	2.6

#### 4.2.7 PROPORTION OF LOW BIRTHWEIGHT AMONG SB BY YEAR

The proportion of LBW among SB was lower the five first years (2067 BS to 2071 BS) than the latter five years (2072 BS to 2076 BS) of the decade. The rate of SB varied in the 10 years, but there was significant correlation between proportion of LBW and year ( $p=0.004$ , coefficient 0.8).

Table 14: Proportion of Low Birthweight among stillbirths by Year at Western Regional Hospital, Nepal, 2067-2076 BS.

Year	Proportion of LBW (%)	95% CI
2067	53.3	44-63
2068	56.1	47-66
2069	55.7	46-65
2070	52.2	40-64
2071	53.5	45-62
2072	61.5	51-72
2073	69.6	61-78
2074	64.1	55-73
2075	66.7	58-75
2076	70.2	62-79

#### 4.2.8 PROPORTION OF LOW BIRTHWEIGHT BY SEX

The proportion of low birthweight in terms of sex is classified again as singletons and multiple, where table 22 shows the higher percentage of low birthweight among female stillborn babies in singletons

with 62.9% and 76.9% among male stillborn babies in multiple. The babies whose sex was not identified were too few for analysis.

Table 15: Proportion of Low Birthweight among stillbirths by Sex at Western Regional Hospital, Nepal, 2067-2076 BS.

Sex	Proportion of LBW in Singletons (%)	95% CI	Proportion of LBW in Multiple (%)	95% CI
Male	58.8	55-63	76.9	50-100
Female	62.9	59-67	73.3	48-99
Others	50	42-100	-	-

#### 4.2.9 PROPORTION OF LOW BIRTHWEIGHT BY SEASON

Table 18 illustrates the proportion of low birthweight by season, where we can see the highest in summer with 70.3% followed by rainy with 63.3%, spring with 60.4%, autumn with 59.5% and pre-winter with 55.9%. The lowest proportion of low birthweight was 54.3% in winter season. We observe that summer had significantly higher percentage of low birthweight than winter and pre-winter.

Table 16: Proportion of Low Birthweight among stillbirths by Season at western Regional Hospital, Nepal, 2067-2076 BS.

Season	Proportion of LBW (%)	95% CI
Spring	60.4	52-69
Summer	70.3	63-77
Rainy	63.3	56-70
Autumn	59.5	53-66
Pre-Winter	55.9	49-63
Winter	54.3	47-62

#### 4.2.10 PROPORTION OF LOW BIRTHWEIGHT BY ETHNICITY

LBW by ethnicity is shown in Table 19. The proportion of low birthweight by ethnicity is higher among Newar followed by Chhetri with 75.2% and 64.5% respectively. The lowest is found to be among Madhesi with almost 47%. This difference was not statistically significant.

Table 17: Proportion of Low Birthweight among stillbirths by mother's ethnicity at Western Regional Hospital, Nepal, 2067-2076 BS.

<b>Ethnicity</b>	<b>Proportion by LBW (%)</b>	<b>95% CI</b>
Brahmin	63.3	57-69
Chhetri	64.5	57-72
Newar	65.2	51-80
Rai/Limbu/Magar/Tamang	56.7	50-64
Madhesi	46.7	34-60
Dalit	60.6	55-66
Others	62.7	52-73

#### **4.2.11 PROPORTION OF LOW BIRTHWEIGHT BY GESTATIONAL AGE**

Table 20 describes the proportion of low birthweight by gestational age. Here, the highest percentage is among the preterm pregnancies that is 28-36 weeks with 85.8%. Week 37-41 has slightly higher proportion of low birthweight than 42 weeks of pregnancies by 1%.

Table 18: Proportion of Low Birthweight among stillbirths by Gestational Age at Western Regional Hospital, Nepal, 2067-2076 BS.

<b>Gestational Age</b>	<b>Proportion of LBW (%)</b>	<b>95% CI</b>
28-36	85.8	82-89
37-41	45.4	41-49
42+	44.4	24-64

#### **4.2.12 PROPORTION OF LOW BIRTHWEIGHT BY MATERNAL AGE**

As per table 21, the higher percentage of low birthweight are among the mothers' aged below 20 years with 64.8% followed by maternal age between 20-34 years with 60.7%. Around half of stillborn babies with low birthweight were from 35+ years mothers. There was no statistically significant difference in proportion low birthweight by maternal age group.

*Table 19: Proportion of Low Birthweight among stillbirths by Maternal Age at Western Regional Hospital, Nepal, 2067-2076 BS.*

<b>Maternal Age</b>	<b>Proportion of LBW (%)</b>	<b>95% CI</b>
<20	64.8	56-73
20-34	60.7	57-64
35+	52.6	41-64

## **CHAPTER FIVE**

### **DISCUSSION**

#### **5.1 MAIN FINDINGS**

This study has shown the trend in stillbirth rates during the past decade, increasing by more than 2% from 11.3% to 13.8%, but with some variation ranging between 7.9-13.8%. there were 1204 mothers who had stillbirth in Western Regional Hospital in the period 2067-2076 BS. The rate of stillbirth dropped in the year 2071 and increased in 2072 BS, seems like compensation and then back to “normal” after these two years.

#### **5.2 MOTHERS WHO GAVE STILLBIRTHS**

In this study over the past decade, we describe the mothers giving stillbirths. We found that 3.1% of the 1204 mothers had twin pregnancies where 25 mothers lost their both babies. The mothers from Dalit and Brahmin ethnic group visited the hospital for stillbirth deliveries more than other ethnicities, reflecting the main users of the hospital. Socioeconomic status and ethnicity have been considered as the key factors associated with stillbirth in rural areas of Nepal (33). As per the retrospective study at one of the eastern tertiary care hospitals, Nepal, 9% of multiple pregnancies were found among the mothers delivering in that hospital in one year (34), probably reflecting the advice from clinics for all twin pregnancies to deliver at hospital.

Stillbirths were more common during autumn season in both singleton and multiple pregnancies. In Nepal the year is divided into 6 seasons, each 2 months and least 59 to 63 days according to seasons. There are usually 61 days during autumn season in a year, the other seasons vary accordingly. Autumn season is also the festival season in Nepal. Two main festivals, Dashain and Tihar are celebrated all over the country and all public and private workplaces are closed at least for a week. The hospitals and other health institution are partially closed depending on the departments while most of the health professional take leave to celebrate with their families leading to absence and unavailability of human resource in the health institution. Potentially this could give limited staffing situation every year during autumn season, and higher risks for the babies during delivery, some of whom may die.

In our study, we see that most mothers who got an SB were between 20 and 35 years; young mothers under 20 years represented 12.5% of singletons but 24.5% of twin deliveries. This probably reflects



referral routines at the antenatal clinics, as all twin pregnancies are strongly advised to go to hospital for delivery.

In our study, “delivery methods” was routinely reported in WRH, categorised into 5 categories. Most of the stillborn babies were reported as “normally” delivered; a previous study at WRH has also revealed that most of the mothers who get SB babies are reported as “normal” deliveries (32). There is increasing rate of deliveries by CS globally including Nepal which is a subject of concern. Globally the rate of CS is near to 26% and 5% in Nepal; 3.5% in rural and 15% in urban area (35). There was higher proportion of deliveries by CS among twins than singleton pregnancies in our study, which is expected as planned deliveries. More than half of the stillborn babies were recorded as IUF/D by the midwives. All IUF/Ds are SB, but when it is recorded as IUF/D it usually shows that the midwife knew that the foetus was dead in utero before delivery started. The categories are not mutually exclusive, as there may be IUF/D/SB born as Normal, Vacuum, Breech or CS.

During all these 10 years, there were 7 maternal deaths among women who had a stillborn baby, 4 deaths were within 48 hours of delivery and 3 after 48 hours. The maternal mortality rate among these mothers who got an SB was 0.58 per 1000 women years. According to NDHS 2016 the maternal mortality rate in the general population is 0.20 per 1000 women years.(22) The maternal mortality rate of NDHS 2016 represents women all over the country, Nepal for 7 years, while our study illustrates the rate only among a selected group of pregnant women who came to deliver in Western Regional Hospital and gave birth to a still born child during the 10 years. Our study only accounts for the maternal deaths reported during pregnancy, delivery and within and/or after 48 hours of delivery, whereas the NDHS 2016 reports the maternal deaths during pregnancy, delivery and within the six weeks of delivery. In spite of this, our study had a much higher maternal mortality rate than NDHS 2016 because of the selected population. This selection bias could be due to events that took the lives of the babies, and these events may of course sometimes threaten the life of the mother also. This could be infections during pregnancy or complications during delivery. We did not calculate the maternal mortality ratio, meaning maternal deaths per 100,000 live born, which in the DHS 2016 is reported to be 239 (95% CI 134-345) per 100000 live births. The mothers who had stillborn babies were mostly multiparous followed by primiparous, reflecting the population of pregnant women in the area. A descriptive study done in WRH has also indicated most of the mothers with IUF/D cases then and from history were multiparous.(36)

### 5.3 STILLBORN BABIES

In our study of delivery records of 1204 mothers who had stillborn babies; the singletons gave 1167 SB, in addition 25 mothers got twins where both were SB (total 50) and 12 where only one of the twins was SB. In total there were 1229 SB babies.

Stillborn babies had the gestational age of 37-41 weeks in 59.7% of singletons and 64% of multiples, while those born prematurely (28-36 weeks) represented 37.8% of singletons and 32.1% of multiples. Even though the data for stillbirth of gestational week 22-27 was collected in our study, it was excluded during the analysis, as the dead foetus of this low gestational age is usually considered as spontaneous abortion, although definitions will probably change with improving health care. The Department of Obstetrics and Gynaecology at WRH has also mentioned the higher rate of premature stillbirth of the babies (33).

The premature birth of stillborn babies indicates the expected rate of low birth weight (below 2500gm). There were around 64% of stillborn babies with low birth weight in our study. The percentage of low birth weight for all the babies born in Province 4 of Nepal is 10% as per NDHS 2016 (22). This difference in LBW in all babies versus SB babies is expected, as a stillbirth occurring preterm will almost invariably lead to LBW in the outcome.

In our material among SB babies the male-to-female sex ratio was 1.2. There were only 4 babies with no gender identification. In general, the sex ratio of male to female baby is always slightly above 1, usually around 1.06 (M/F) in Nepal (37). In our study the high sex rate probably reflects a higher case fatality of boys than girls, likely on biological basis. A study including more than 30 million births, show the higher risk of stillbirth among male babies than female babies that is 1.1. (38).

The proportion of LBW among SB has increased from substantially from 53.3% in 2067 to 70.2% in 2076. We do not know why more SB are small at the end of the study period. It could be because of more foetuses surviving the first trimesters due to good treatment, and hence many foetuses that previously were spontaneously aborted may now live until 28 weeks or more, but this is only speculation.

Female babies have slightly higher percentage of low birthweight than the male babies in the singleton pregnancies. This is expected, as generally boys are slightly heavier than girls. We find the proportion of SB with LBW significantly higher in summer (70.3%) than pre-winter (55.9%) and winter (54.3%). We do not know the reason for higher proportion SB with LBW in summer. In all ethnicities around 50-60% of the SB babies were LBW.

The LBW proportion in stillborn babies was significantly higher among the preterm (28-36 weeks) babies, as would be expected from any foetus not getting enough time to reach a desirable birthweight.

The general remarks in the register given for the stillborn babies were mostly recorded “fresh” and “macerated” by midwives after delivery. The register was not consistent in this respect.

### **Strengths and limitations of the study**

This study has several strengths. It includes all stillbirths at WRH for a long period to study trends, and as it involves routine delivery discharge register it reflect the real-life situation of this population. The population use the hospital both as a primary hospital for ordinary deliveries and for referral deliveries, and thus probably reflects the background of many of the stillbirths in the area.

The study also has several limitations. As a tertiary care hospital, it is expected to have more referrals and complications than a primary care hospital. However, most of the users were local using it as primary hospitals, but we do not know the percentage of referrals to the maternity ward. The data provided did not include all pregnant women who delivered at the hospital, and thus prevented us from doing an observational study design assessing risk factors, and we had to limit our study to describing the stillbirth only. The total number of deliveries and live birth in each month were provided but were not allowed to copy all the recorded data in the maternity registry books due to the rules and restrictions of hospital and ethical review committee.

## CHAPTER SIX

### CONCLUSION AND RECOMMENDATION

We conclude that the trend of stillbirth has significantly increased in Western regional Hospital by more than 2% from 2067-2076 BS with some fluctuations. The maternal mortality rate among mothers who got SB was 0.58 maternal deaths per 1000 women per year. There seems to be a higher rate of SB in the autumn season with festivals. The birth register at WRH was good and readable and was used in this limited study to describe the stillbirths. Further studies on risk factors for stillbirths can be done by the hospital.

#### **Recommendation**

Additional initiatives should be taken to reduce the stillbirth rate.

- The reason of increased stillbirth in Autumn should be identified and implement the control measures.
- The information related to stillbirth should be clearly stated in the register by the health professionals of WRH, which would be helpful to reduce the underlying causes.
- As we had the limited data and resources for our research, more in-depth study should be done to identify the associated risk factor of stillbirth in WRH.

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# **ANNEX**



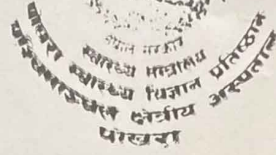


नेपाल सरकार  
स्वास्थ्य मन्त्रालय

फोन नं.-०६१-५२०४६१,  
०६१-५३३५००

## पोखरा स्वास्थ्य विज्ञान प्रतिष्ठान

पश्चिमाञ्चल क्षेत्रीय अस्पताल  
रामघाट, पोखरा



प.सं:-०७७/०७८

च.नं:-

मिति:-२०७७/०६/२२

**श्री जो जस सँग सम्बन्ध छ ।**

प्रस्तुत विषयमा युनिभर्सिटी अफ बर्गेन, नर्वे वाट मास्टर अफ ग्लोबल हेल्थ अध्ययन गर्ने शिलसिलामा “स्टील बर्थ” (Assessing Trend of Stillbirth from Year 2066 BS to 2076 BS in Western Regional Hospital, Pokhara, Nepal, विषयमा थैसिस प्रयोजनको लागि तथ्यङ्क संकलन गर्नको लागि रचना अर्यालले अनुमति माग गर्नुभएकोमा NHRC तथा IRC वाट सहमति प्रदान भएपछी अस्पताललाई Data Collection को लागि बुझाउनुपर्ने निर्धारित शुल्क बुझाए पश्चात मात्र आवश्यक तथ्यङ्क संकलन गर्न अनुमति दिन सकिने व्यहोरा जानकारीको लागि अनुरोध गरिन्छ ।

सह.प्रा.डा. अर्जुन आचार्य

निर्देशक

**निर्देशक**



Government of Nepal  
**Nepal Health Research Council (NHRC)**  
Estd. 1991

Ref. No.: 1084

14 October 2020

**Ms. Rachana Aryal**  
**Prof. Sven Gudmund Hinderaker**  
Principal Investigator  
University of Bergen, Norway

**Ref: Approval of thesis proposal**

**Dear Ms. Aryal and Prof. Hinderaker,**

This is to certify that the following protocol and related documents have been reviewed and granted approval by the Expedited Review Sub-Committee for implementation.

<b>ERB Protocol Registration No.</b>	640/2020 MT	<b>Sponsor Protocol No</b>	NA	
<b>Principal Investigator/s</b>	Ms. Rachana Aryal Prof. Sven Gudmund Hinderaker	<b>Sponsor Institution</b>	NA	
<b>Title</b>	Assessing Trend of Stillbirth from Year 2066 BS to 2076 BS in Western Regional Hospital, Pokhara, Nepal – A Cross-sectional Study			
<b>Protocol Version No</b>	NA	<b>Version Date</b>	NA	
<b>Other Documents</b>	1. Data collection tools 2. Acceptance letter from study site	<b>Risk Category</b>	Minimal risk	
<b>Expedited Review</b>	Proposal	<input checked="" type="checkbox"/>	<b>Duration of Approval</b> 14 October 2020 to 14 October 2021	<b>Frequency of continuing review</b>
	Amendment	<input type="checkbox"/>		
	Re-submitted	<input type="checkbox"/>		
	<b>Meeting Date:</b> 12 October 2020			
<b>Total budget of research</b>	NRs 5,72,250.00			
<b>Ethical review processing fee</b>	NRs 10,000.00			

R:



Government of Nepal  
**Nepal Health Research Council (NHRC)**



Ref. No.: 1094

**Investigator Responsibilities**

- Any amendments shall be approved from the ERB before implementing them
- Submit progress report every 3 months
- Submit final report after completion of protocol procedures at the study site
- Report protocol deviation / violation within 7 days
- Comply with all relevant international and NHRC guidelines
- Abide by the principles of Good Clinical Practice and ethical conduct of the research

If you have any questions, please contact the Ethical Review M & E Section at NHRC.

Thanking you,

**Dr. Pradip Gyanwali**  
Member-Secretary  
(Executive Chief)



Government of Nepal  
Ministry of Health  
**Pokhara Academy of Health Sciences**  
WESTERN REGIONAL HOSPITAL  
Institutional Review Committee  
Ramghat, Pokhara



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Ref. No: 39. 2077/078

To,  
Ms. Rachana Aryal  
Principal Investigator  
University of Bergen  
Norway

I am pleased to inform you that the Institutional Review Committee of the Pokhara Academy of Health Science (IRC-PAHS) has approved the following research project to be conducted at Western Regional Hospital of Pokhara Academy of Health Sciences.

**Project Title:** - Assessing Trend of Stillbirth from Year 2066 BS to 2076 BS in Western Regional Hospital, Pokhara, Nepal – a cross-sectional study

**Principal Researcher OR Responsible Supervisor:**

Ms. Rachana Aryal

**Other researcher(s):**

Mr. Sven Gudmund Hinderaker (University of Bergen, Norway)  
Mr. Dikshant Devkota

Projects may be renewed for up to a total of five years by submitting a request for an extension 45 days prior to the above date of expiration. A new application for research is needed if the research is to continue for more than five years.

The following conditions apply to your approval. Failure to abide by these conditions may result in suspension/termination of your project and/or disciplinary action.

**Limit of approval:** Approval is strictly limited to the research as described in the submitted ethics application.

**Amendments of project:** Any changes to the research project must have prior approval from the IRC. Upon submission of the amendment form, if the changes are found to be significant, a new full application for approval of the revised project may be required.

**Unanticipated or adverse event:** The IRC must receive a written report of any unanticipated and/or adverse events encountered during the course of the research within 14 days of the event occurring.



Government of Nepal  
Ministry of Health

# Pokhara Academy of Health Sciences

WESTERN REGIONAL HOSPITAL

Institutional Review Committee

Ramghat, Pokhara



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E-mail : irc.poahs@gmail.com

After such an event, the research must be halted until the report is reviewed by the IRC and written approval to resume is granted. Failure to do so may lead to the suspension or termination of the project.

*Monitoring and auditing:* All projects may be subject to monitoring and/or auditing at any time by the IRC or a designated third party.

*Progress report(s):* Researchers must submit to the IRC a progress report on completion of data collection and also an annual report if the project was approved for more than one year. Failure to submit a progress/annual report may lead to suspension or termination of the project.

*Final report:* Researchers must submit a final report to the IRC upon completion of the research project.

If you have any queries, please contact the IRC.

On behalf of the Institutional Review committee, I wish you well in your research.

## Member Secretary

Dr Laxman Barstola  
Member Secretary  
Institutional Review Committee (IRC)  
Pokhara Academy of Health Science  
Email: [irc.poahs@gmail.com](mailto:irc.poahs@gmail.com)  
Website: <http://pahs.gov.np/>

**Project Title:** - Assessing Trend of Stillbirth from Year 2066 BS to 2076 BS in Western Regional Hospital, Pokhara, Nepal – a cross-sectional study

**Researcher's name:**  
Ms. Rachana Aryal



Government of Nepal  
Ministry of Health & Population  
**Pokhara Academy of Health Sciences**  
**Western Regional Hospital**  
**Ramghat, Pokhara**



Ref. No.: 077/078

Date: 9<sup>th</sup> Nov. 2020

**To whom it may concern.**

I hereby certify that Miss. Rachana Aryal, currently studying Masters of Global Health in University of Bergen, Norway, has been allowed to collect the data only of **Stillbirth** from the discharge registry book of maternity ward under the continuous supervision of Badri Raj Ghimire, Medical Recorder Officer, as her part of thesis research study titled "**Assessing Trend of Stillbirth from year 2067 BS to 2076 BS, in Western Regional Hospital, Pokhara, Nepal**" for completion of her master degree. In regards of government and hospital rules, as much as data provided should remain very confidential and maintain all the ethical values as per mention while the data was handed. If not, based upon **Health Policy and Act of Nepal** the strict action against Miss Rachana Aryal and her mentioned supervisor Sven Gudmund Hinderaker will be taken for data misuse.

We wish her the best for her study and future endeavor.

Thank you

*BR Ghimire*

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**Badri Raj Ghimire**  
Medical Recorder Officer,  
Medical Record Department,  
Pokhara Academy of Health Science  
Western Regional Hospital,  
Ramghat, Pokhara