



COLLEGE OF NATURAL AND COMPUTATIONAL SCIENCES

DEPARTMENT OF STATISTICS

DETERMINANT OF POSTNATAL CARE UTILIZATION AMONG MOTHERS LIVING IN  
WOLKITE TOWN

A SENIOR RESEARCH PAPER SUMMITTED TO DEPARTMENT OF STATISTICS IN  
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## ABSTRACT

Postnatal period (PNP), also called the puerperium, is defined as the period starting immediately after the delivery of placenta and membranes up to the next six weeks (42 days). Despite postnatal care services has a significant role in improving maternal and new-born health services are underutilized in most developing countries including Ethiopia. The aim of this study is to assess postnatal care services utilization and associated factors among reproductive age women who gave live birth in 2011 E.C in Wolkite town, Southern Ethiopia. Mothers and their newborns are vulnerable to illnesses and a death during the postnatal period. The uptake of this service is low in Wolkite town. This study would be conducted by using primary data collected by direct interview. The response variable is the status of mothers who uses postnatal care. Child's characteristics and mother's characteristics would be employed as the explanatory variables. In order to analyze the collected data descriptive and inferential statistics would be employed. The finding of this study revealed that out of the total women included in the study 22.5% of them were not getting postnatal checkup on services and 77.5% of them were getting postnatal checkup services. The chi-Square test result showed that residence, education, and delivery place has a significant association with postnatal care utilization service at 5% level of significance. The logistic regression result revealed that the log odds of Women using postnatal care utilization service has significantly related with place of residence, place of delivery and wealth index. Based on the findings of this study, the following recommendations are put forward to bring about postnatal care service. Knowledge and skills on PNC care services among mother. The government should seek ways to empower women economically by producing income generating schemes and increasing postnatal care opportunities.

**Keywords:** Postnatal care utilization primary data, Binary logistic regression.

## **ACRONYMY**

CSA: Central statistical agency

EDHS: Ethiopian Demographic and health survey.

HSTP: Health sector transformation plan.

MCH: Maternal and children health

PNC: Postnatal care

PNP: Postnatal period

SNNPE: South nation nationality and people of Ethiopia

WHO: World health organization

WKU: Wolkite University

# CHAPTER ONE

## INTRODUCTION

### 1.1 Background of the Study

Postnatal period (PNP), also called the puerperium, is defined as the period starting immediately after the delivery of placenta and membranes up to the next six weeks (42 days) Worldwide, pregnancy-related complications are the main cause of death and disability among reproductive-age women. In 2015, about 300,000 women died from causes related to pregnancy and childbirth. Ninety-nine percent of the deaths occurred in developing countries. The majority of the maternal deaths (66%) were in sub-Saharan Africa (WHO et al. 2015, Black 2016). Ethiopia is the second-most populous African country, with one of the world's highest maternal mortality ratios (WHO, UNICEF2015b).

Compared to antenatal care and skilled attendance at birth, postnatal care has been neglected in safe motherhood programs (Wang *et al.*, 2011). This is an area of concern because more than 60% of maternal deaths occurred during the postpartum period and about 45% of postpartum maternal deaths occur within 1 day of delivery. the Information on health practices that are crucial to maternal and child health survival. This includes advice on the care of new born, exclusive breastfeeding practices and use of family planning. Mothers could also be treated for health conditions like postpartum hemorrhage, infection/genital tract sepsis and pre-eclampsia or eclampsia that may be picked up within the postnatal period while babies who have jaundice or thrush can also be treated. A study of 30 countries using DHS data found out that seven out of ten mothers who delivered outside a health institution did not receive postnatal care (Noureddine, 2006).

### 1.2. Statement of the problem

The postnatal period defined as here as the first six weeks after birth is critical to health and survival of a mother and her new born. The most vulnerable time for both is during the hours and days after birth lack of care in this time period may result in death or disability as well as missed opportunity to promote healthy behavior, effecting women newborn, and children. The

utilization of postnatal care services is very important to save women and children live (WHO, 2006) even though globally maternal mortality due to pregnancy and child birth was reduced by 50% from 1990 to 2010, three hundred and fifty-eight thousand (358,000) women still die from pregnancy related problems every year, worldwide. Most of these deaths occur within 48 hours after birth. Also, each year 7.6 million children fewer than five ages die the level of postnatal care coverage and it is also extremely low in wolkite town. According to (EDHS,2011) the coverage of postnatal care of mother in wolkite town was around 47.6% this means that women around 52.4% did not receives postnatal checkup. So this indicate to the existence of low postnatal care of mothers live in wolkite town and most women do not take much care during pregnancy period.

### **Research question**

- ❖ What are the main determinants of postnatal care of utilization?
- ❖ What are the factors that help the women to access the postnatal care Services?
- ❖ What are relationship between postnatal care and determinant factors?

## **1.3 Objective of the Study**

### **1.3.1. General Objective**

The objective of this study was to identify factor that affect postnatal care utilization among mothers living in Wolkite town.

### **1.3.2. Specific Objectives**

1. To identify socio-demographic factors that influence PNC utilization among women living in wolkite town at community based level
2. To identify the factors that help the women to access the postnatal care Service.
- 3.To show relationship between postnatal care and determinant factors.

## **1.4. Significance of the study**

In developing countries like Ethiopia, maternal and child mortality remains high. This could be averted through provision of various maternal and child health (MCH) services in an integrated manner. Among these MCH services, post natal care (PNC) is the one that could significantly

reduce both maternal and child mortality. Although PNC service is such a significant, its utilization is very low, especially in developing countries. Hence, this study will identify those factors that contribute for low utilization of PNC, particularly in Wolkite town at community based level. By doing so, it will be used as a base for the concerned authorities to plan and intervene accordingly. Moreover this study will also attempt to develop base line information for future investigators. Generally new born baby and women would be taking enough postnatal care utilization in particular time.

### **1.5. Scope of the Study.**

This study was the determinants of postnatal care services utilization of mother in Wolkite town. Hence mother or new born receive PNC within three day, subsequent visits and provides information and service for the mother especially for births spacing and family planning given vitamin A to mothers. Mother individuals who are utilize postnatal care services would be considered with the main interest of comparing mother getting postnatal checkup on services or not getting postnatal checkup services.

## CHAPTER TWO

### 2. LITERATURE REVIEW

#### 2.1 The general concept of literature review

The risks of maternal mortality and morbidity are highest at birth and in the period immediately after birth. For newborns and mothers, there is the danger of complications as neonatal sepsis or post-partum hemorrhage and a delay of even a few hours before appropriate care is delivered can be fatal or result in long-term injuries or disability to the child and the mother (Lawn et al., 2010). The utilization of postnatal care is an effective means of providing a significant intervention to improve newborn survival (Baqui et al., 2009). Women in developing countries are more likely to get this care if they go to health institutions at the time of delivery (Tura, Fantahun, Fink, Ross, and Hill 2015). Postnatal care is the best critical intervention for tackling most causes of maternal and child mortality. Postnatal care helps to detect and manage complications that may arise at the time of labor, delivery, or early after delivery. The postnatal period is the time to counsel the mother about maternal nutrition, breastfeeding, and other childcare practices. The WHO and UNICEF (2013) recommend that newborns in healthcare facilities should not be sent home within the crucial first 24 hours of life, and that postnatal visits to the health care facility should be scheduled while visit to a health facility for postnatal care as soon as possible after birth is recommended for all home births. The early detection ensures that prompt treatment is given and also facilitates interventions which infant mortality worldwide (Titaley et al. 2010).

#### 2.2 Factors that determine the Utilization of Postnatal Care

There are multiple factors that determine the utilization of postnatal care, as well as its nature, and the timing of utilization. Some of the factors encourage mothers to utilize PNC; others factors are seen by health institution from visiting a PNC. Both the positive and negative factors that have been found to be associated with utilization with postnatal care will be discussed.

**Age;** A higher level of maternal and neonatal mortality rates have been observed among mothers who deliver at high and low extremes of maternal age (Reynolds *et al.*, 2006). This implies that women who are very young or very old may have higher levels of maternal mortality rates.

**Birth Order;** is an important predictor in explaining the utilization of postnatal care services. Due to the uncertainty and the perception of risk associated with first pregnancies. in utilizing postnatal services compared to adolescent women with a first birth order (1) (Singh *et al.*, 2013).

**Education;** Research in developing countries has consistently shown that there is strong relationship between education and the utilization of postnatal care. Concluding that better educated mothers are more likely to utilize postnatal care services (Rah man *et al.*, 2011).

**Place of Residence;** A study done by Mekonnen, 2002 in Ethiopia showed that Women residing in rural areas are less likely to utilize postnatal care services than their urban counterparts. These advantages include; higher levels of knowledge, access to services and health care promotion programs that use urban-focused mass media (Singh *et al.*, 2011).

**Religion;** Commonly held beliefs and norms in form of religious practices shape the way women perceive their own health and their response to the health services available.. Religion helps in shaping beliefs, norms and values (Stephenson *et al.*, 2006). These values or beliefs that women hold may prevent women from utilizing postnatal care services

**Birth Size:** The EDHS 2011 reports that the neonatal mortality rate (NMR) for babies categorized by mothers as ‘small’ or ‘very small’ was more than twice that for babies classified as ‘average’ or ‘larger than average’. In Indonesia, Titaley (2009) found that the odd of not using postnatal care was significantly higher for smaller than average-sized infants compared to larger than average sized infants.

**Employment status :**A reason for this could be because majority of mothers who are into agricultural services reside in the rural areas and may only seek modern postnatal care services after they have exhausted resources and expertise in their communities ( Sal way (2006), that women’s employment does not translate directly into greater use of maternal healthcare in Nepal.

## CHAPTER THREE

### 3. METHODOLOGIES

#### 3.1. Description of Study Area

The study was conducted in Wolkite town. It was found in south western Ethiopia and is the administration center of Gurage zone for the SNNPE region. Its Elevation points between 1910 and 1935 meter above sea level. It is found between Jimma, and Addis Ababa. That it has 158km far from Addis Ababa.

#### 3.2. Study Population

This study was planning to conduct on the assessment of postnatal care utilization of mother in Wolkite town.

##### 3.2.1 The target population

The target populations of this study were conducted on the mothers who use PNC utilization in Wolkite Town whose age is (15-44) years.

#### 3.3 .Variable of Study

**Dependent Variable:** The dependent variable in this study is use of postnatal care services utilization of mother, which is dichotomized and categorized as.

$$Y_i = \begin{cases} 0 = & \text{if mother getting postnatal checkup services} \\ 1 = & \text{if mother not getting postnatal checkup services} \end{cases}$$

**Independent Variables:** The variables these are assumed to have influence postnatal care utilization of mother. These are:-

- Age(15-19,20-24,25-29,30-34,35-39,40-44,)
- Education level(illiterate, primary, secondary, tertiary)
- Place of Residence(urban, rural)
- Employment status(employed, unemployed)

- Religion(protestant, Muslim and Orthodox)
- Birth size (small, average and large)
- Wealth index(poor. medium and rich)

### **3.4 Source of data**

The source of data for this study was the primary source data. The data were gathering by direct interview (by questionnaires).

### **3.5 Method of data collection**

To achieve the specific objective we were collect primary data from Wolkite health center. This data were obtained by preparing well organized questionnaire. After preparation of the questionnaire, we were distributing questionnaires to respondent Wolkite town health center. The data was collect using standardized structure questionnaires with open and closed ended type of question which is prepare by English .the data collection is carried out by self-administrator.

### **3.6 Sampling Technique**

In this study to determine the sample size of respondents from whole population size we use simple random sampling techniques. Simple random sampling is the most basic probability sampling techniques in which every individuals unit (member) of the population has equal probability of being included in sample .SRS insure that each unit gets an equal chance of being included in the sample. In other words SRS is probabilities sampling techniques where every possible sample has an equal probability of being drawn.SRS can be employed only of a complete list of all population elements already exist or can be readily constructed.

### **3.7 Sample size determination**

Determining sample was very important issue for the precision of the survey. The data of our study is obtained by applying sample survey techniques .Since it is difficult to include all population, so we take the sample from the total population of mother is most important to represent the whole population (to generalize all population with the sample in order to make over all conclusion).because determine the size is the key step on over all statistical process. An appropriate sample size is means of getting enough postnatal care service. The decision is

important because taking too large sample implies waste of resource while too small sample reduce use fullness of result here target population of study would be a mothers who live in wolkite town whose age is 15-44 years. In wolkite town there are 920 of mother were uses *postnatal care utilization* (wolkite town health center, 2011). From this total population we would take sample by using simple random sampling methods.

### **Pilot survey studies**

A pilot study is generally a full scale dress rehearsal of study. A major purpose of pilot study is to check whether the organization and arrangement of survey actually work satisfactory. Since the purpose of the pilot survey is to identify weakness and problem with survey materials, procedures and arrangements, the mothers of wolkite town closely involved pilot study to observe all stages under field condition.

### **Steps to done in plot survey**

We prepare one questions instead of formulate pilot survey and distribute to 20 mothers.

1. Do you have getting postnatal checkup from services? A. yes B. no

TABLE RESULT OF PILOT SURVEY

YES	12
NO	8

The pilot survey is done by distributing questionnaire to 20 mothers and 12 of them are YES by the service of PNC, while 8 of them have NO.

This includes: -

- Level of precision required.
- Margin of error (relative or absolute).
- Level of variability of the study

If  $n_0/N$  the sampling fraction is very small say less than 5% we may consider  $n_0$  satisfactory approximation the required sample size  $n$ . If  $n_0/N > 5\%$  we follow  $n = n_0 / (1 + n_0/N)$  otherwise  $n_0 =$  If  $n_0 / N < 5\%$  we taken  $n = n_0$ .

Where  $z$  –is the accuracy level of significance usually taken as 1.96 with 95% cl.

$$n = \frac{no}{1 + \frac{no}{N}}$$

As we have seen the above table, 20 study survey one sample size 20 and the total population (N) is 920

Where,

N = total population=920

Z - Standard normal with a specified level of significance = 5% Confidence level

P = proportion of mother who will use PN service = 0.6

d= margin of error which would be occurred when we estimate.

It assumed to be (8.17%) Because to minimize our sample size.

n-is number of sample size for the study.

q =1-P proportion of mother who will not use PN service=0.4

p=12/20=0.6,q=1-p=1-0.6=0.4

= (1.96)<sup>2</sup>(0.6) (0.4)/(0.0817)<sup>2</sup>=138, since finite population correction will be

So,n/N=138/920=0.15>0.05 we adjust by the following

n=n/ (1+n/N) =138/ (1+138/920) =120Then we take <sub>n=120</sub>

### **3.8. Method of data analysis**

There are two methods of data analysis for this study, such as Descriptive and inferential statistics.

#### **3.8.1 Descriptive statistics**

Descriptive statistics utilizes numerical and graphical methods to look for patterns in a data set to summarize the information revel in a data set and to present the information a convenient form.

The purpose of descriptive statistics is to provide an over view information.

### 3.8.2 Inferential statistics

Inferential statistic is statistical methods deals with making inference or conclusion about population based on data obtained from limited number of observation that is from the population. Inferential statistics consists of estimation and hypothesis testing we would be used the most appropriate methods such as Chi square-test and Logistic regression for our study.

### 3.8.3. Chi-square test

Chi-square test is a test used to determine whether there is a relationship or association between the dependent variable and the independent or explanatory variables. It would be used to test what scientists call the null hypothesis which states that there is no significance difference between the expected and observed result.

So that the test is performed as follows.

State the Hypothesis testing:

Step 1.  $H_0$ : there is no significant association between dependent and independent variables.

$H_1$ : Not  $H_0$ .

Step 2. Determine  $\alpha$ -level of significance

Step 3. Test statistic.

$$x_{cal}^2 = \sum_{i=1}^r \sum_{j=1}^c \frac{(O_{ij} - E_{ij})^2}{E_{ij}}$$

The degree of freedom associated with contingency table possessing r-rows and c-columns= $(r-1)(c-1)$ .

Where r – it is no of row                      c –it is no of column

$E_{ij}$ = the expected frequency corresponding to i, j<sup>th</sup> and  $O_{ij}$ = Observed frequency.

Step4: Finding the critical value,  $x_{(r-1)(c-1)}^2$

Step5: Decision rule

We reject  $H_0$  if  $x_{cal}^2$  greater than  $x_{tab}^2$  or the p-value less than level of significance,  $\alpha$  otherwise we do not reject  $H_0$ .

Step6. Conclusion based on the decisions

$$X_{tab}^2 = X^2(c-1)(r-1) \text{ of}$$

If  $x_{cal}^2 < x_{tab}^2$  do not reject  $H_0$ .

Where  $x_{cal}^2$  is a random variable where sampling distribution is approximated very closely by the chi-square distribution with degree of freedom  $(c-1)$   $(r-1)$ .

#### 3.8.4. Assumption of chi-square test

- All individual observations should be independent.
- The sample must be randomly selected from the population.
- It is always positively skewed.

#### 3.8.5. The Logistic Regression

Regression analysis is binomially distributed data of the form  $y_i = B(n, p_i)$  for  $i=1, 2, \dots, m$ .

Where the number of Bernoulli trial  $n_i$  is known and the probability of success  $p_i$  are unknown.

This explanatory variable can be through of a  $k$ -dimensional vector and the model then takes the form (an introduction to Categorical data analysis)

$$P_i = E(y_i/n_i/x_i)$$

The logistic natural logs of the odds, of the unknown binomial probability are modeled as linear function of the  $x_i$ .

$$\text{Logit}(p_i) = \ln(p_i/1-p_i) = \beta_0 + \beta_1 x_1 + \dots + \beta_k x_k.$$

Assumptions of logistic regression

- ✳ The dependent or outcome variable is dichotomous.
- ✳ The outcomes are independent and naturally exclusive.
- ✳ Requires large sample to be accurate.

#### 3.8.6 Binary logistic regression

Binary logistic regression is used when the outcome variable is found to be dichotomous as yes/no, life/death, presence/absence, low/ high etc. we will define such response variable as  $y$ , and denote the event  $y=1$  when the subject has the characteristic of interest of interest and  $y=0$  when the subject does not have that characteristic. For binary response  $Y$  and a covariate  $X$ , let  $p(x)$  denote the “success” probability which is in this study the probability satisfied with quality

of life. Then the simplest logistic regression model which assumes a linear relationship between logit Y and X is defined as

AgrestA. (1997)

$$\text{Logit}[Y] = \log\left[\frac{P(X)}{1-P(X)}\right] = \alpha + \beta x$$

Where p(x) is the probability of the outcome of interest or “event” such as satisfied with quality of life,  $\alpha$  is y intercept,  $\beta$  is the regression coefficient.

Taking the antilog of equation 3.3 on both sides, one drives an equation to predict the probability of the occurrence of the outcome of interest as follows:

$$P(x) = \text{probability}(Y=\text{outcome of interest}/X= x, \text{ a specific value of } X) = \frac{\exp(\alpha + \beta x)}{1 + \exp(\alpha + \beta x)}$$

The term on the right side of this equation is called logistic function and hence the model is called logistic regression model.

In particular this is equivalent to  $P(Y=1/x) = \frac{\exp(\alpha + \beta x)}{1 + \exp(\alpha + \beta x)}$ , and

$$P(Y=0/x) = 1 - \left[ \frac{\exp(\alpha + \beta x)}{1 + \exp(\alpha + \beta x)} \right] = \frac{1}{1 + \exp(\alpha + \beta x)}$$

The results of the logistic analysis are in the form of odds ratio. The definition of the odds of an event is given by,  $\text{odds} = \frac{p(\text{event})}{1-p(\text{event})}$ . If an event occurs with success probability p, then the odds in favor of the probability of success are

$$\text{Odds} = \frac{P(X)}{1-P(X)} = \frac{\frac{\exp(\alpha + \beta x)}{1 + \exp(\alpha + \beta x)}}{\frac{1}{1 + \exp(\alpha + \beta x)}} = \exp(\alpha + \beta x)$$

### 3.8.7. Parameter Estimation and Testing

Parameters that are needed to be estimated by using the maximum likelihood estimation (ML) method, which is preferred over the weighted least squares approach Haber man (1978) and Schlesslman (1982).

### 3.8.8 Maximum Likelihood Estimation

The ML method is design to maximize the likelihood of reproducing the data given the parameters i.e.The procedure for obtaining maximum likelihood estimated is as follows. Let Y be the random binary response variable whose value is either zero or one. The probability

$$P(Y=1/x_1...x_k) \text{ is given by } P(Y=1/x_1...x_k) = \frac{\exp(\beta_0 + \sum_{j=1}^k \beta_j X_j)}{1 + \exp(\beta_0 + \sum_{j=1}^k \beta_j X_j)}, \text{ (Douglas. Montgomery, 2006)}$$

The parameter of the above equation cannot be estimated directly; rather we can apply the maximum likelihood estimation technique. To apply the technique, each observation can be considered as Bernoulli trial and by assumption that each  $Y_j$  is independent, the joint distribution of the observed values can be written as  $p(Y_1=y_1, Y_2=y_2...Y_n=y_n)$

$$= p(Y_1=y_1) p(Y_2=y_2)...p(Y_n=y_n)$$

The probability of the  $i^{\text{th}}$  observation given  $(x_1...x_n)$  is given by

$$P(Y_i=y_i/x_{1i},...x_{ki}) = P_i^{y_i} (1-p_i)^{1-y_i}, \text{ where } i=1, 2,...,n \text{ and } n \text{ is the number of case in the data.}$$

The likely hood function for  $(\beta_0, \beta_1, \beta_2... \beta_k)$  given  $(y_1...y_n)$  can be expressed as

$$L(\alpha, \beta_1, \dots, \beta_k / y_1, \dots, y_n) = \prod_{i=1}^n P_i^{y_i} (1 - p_i)^{1-y_i} \text{ This is equal to 1}$$

$$= \sum_{i=1}^n y_i \log \left[ \frac{\exp(\alpha \beta_0 + \sum_{j=1}^k \beta_j X_{ij})}{1 + \exp(\beta_0 + \sum_{j=1}^k \beta_j X_{ij})} \right] + \sum_{j=1}^n (1 - y_i) \log \left( \frac{1}{1 + \exp(\beta_0 + \beta_j X_{ij})} \right)$$

The estimates of the unknown parameters of the above equation are obtained by maximizing the equation with respect to each of the parameters. However, the equation does not have an analytical solution. The estimate can be found by maximizing the equation using iterative techniques such as newton-rapson method, Iterative techniques are programmed for model analysis in packages like SPSS,

### 3.9 Model Diagnostic Test.

Measures of goodness of fit test are statistical tools used to explore the extent to which the fitted response obtained from the postulated model compares with the observed data (Alan Agresti, 1997). The summary measures of goodness of fit test statistics that will be used in this study were the Hosmer- Lemshow test.

### 3.9.1 Goodness of fit of the model

The goodness of fit or calibration of a model measures how well the model describes the response variable..

To check the fit data whether fit the model or not should be checked by Wald test, Likelihood ratio test, and Hosmer-Lemeshow test.

### 3.9.2 Likelihood Ratio Test

The likely hood ratio test uses the ratio of the maximized value of the likely hood function for the simple model ( $L_0$ ).

The likely hood ratio test statistics equal:

$$G^2 = -2 \log [L_0/L_1] = -2[\log (L_0) - \log (L_1)]$$

This log transformation of the likely hood function yields chi-squared statistics.

Logit [ $\theta(x)$ ] =  $\log [(x)/(1-\theta(x))]$  =  $\alpha + \beta_1 x_1 + \beta_2 x_2 + \dots + \beta_i x_i$  or we can write as follows :

$$Z = \beta_0 + \beta_1 x_1 + \beta_2 x_2 + \dots + \beta_i x_i$$

Where  $z = \text{logit} [\theta(x)]$ ,  $\alpha = \text{intercept}$  and  $\beta_1, \beta_2, \beta_3$  & soon are called the regression coefficients' of  $x_1, x_2, x_3$  respectively. The intercept is the value of  $z$ , when the value of all independent variable is zero (i.e., the value of  $z$  in some with no risk factor). Each of the regression coefficients describes the sizes of the contributions of that risk factor.

### 3.9.3. Wald Test

A Wald test is used to test the statistical significance of each coefficient in the model. The test statistic is a chi-square statistic with a desirable outcome of non-significance, indicating that the

model prediction does not significantly differ from the observed. The hypothesis to be tested is:  
 $H_0: \beta = \beta_0$  vs.  $H_A: \beta \neq \beta_0$  at  $\alpha$  level of significance.

$w = \left(\frac{\hat{\beta}_i}{SE(\hat{\beta}_i)}\right)^2 \approx \chi^2(1)$  However, several authors have identified problems with the use of Wald statistic. Menard (1995) warns that for large coefficients, the standard error is inflated, lowering the Wald statistic (chi-square) value. The likelihood ratio test is more reliable for small sample sizes than the Wald test (Agresti, 1997).

### 3.9.4 Hosmer-Lemeshow test

The final measure of model fit is the Hosmer-Lemeshow goodness-of-fit statistic, which measures the correspondence between the actual and predicted values of the dependent variable. The Hosmer-Lemeshow test is a commonly used to test for assessing the goodness of fit of a model and allows for any number of explanatory variables, which may be continuous or categorical. The test is similar to a  $\chi^2$  goodness of fit test and has the advantage of partitioning the observations into groups of approximately equal size, and therefore, there are less likely to be groups with very low observed and expected frequencies. In this case, better model fit is indicated by a smaller difference in the observed and predicted classification.

Hosmer-Lemeshow goodness of fit  $\hat{c}$  is

$$\hat{c} = \sum_{i=1}^k \frac{(o_k - n_k \pi_k)^2}{n_k \pi_k (1 - \pi_k)}$$

Where:-

$n_k$ - is number of observation in to  $k^{\text{th}}$  group and

$o_k$  – observed number of events in the  $k^{\text{th}}$  group.

$H_0$ : The model is good to fit the data.

$H_1$ : The model is not good to fit the data.

If the Hosmer-Lemeshow test statistic is greater than 0.05, we will not reject the null hypothesis that there is no difference between observed and model predicted values.

## CHAPTER FOUR

### 4. RESULT AND DISCUSSION

The aim of this chapter is to analyze determinate of postnatal care services utilization of mother in wolkite town. The data used in this study for the analysis were obtained by face to face interview. The response variables considered in this study is the status of using postnatal care utilization and it has binary outcomes and categorized as (0=postnatal care used, 1=not used postnatal care). Which are indicators of postnatal care services utilization of mother in wolkite town. Descriptive and binary logistic regression analyses were used to measure the factor of postnatal care services utilization of mother. The descriptive part provides percentages of postnatal care services utilization of mothers with independent variable. The binary logistic regression analysis was to identify the postnatal care services and to predict the odds of postnatal care services in wolkite. The data were analyzed by using the SPSS.

**Table 4.1 Results of Descriptive Analysis**

Variable	Category	frequency	Percent	PNC		d.f	sign	Chi-square
				Not used	used			
Age in 5-year group	15-19	42	35	10(8.3%)	32(26.7%)	5	0.425	4.922
	20-24	39	32.5	12(10%)	27(22.5%)			
	25-29	25	20.8	3(2.5%)	22(18.3%)			
	30-34	6	5	1(0.8%)	5(4.2%)			
	35-39	5	4.2	0(.0%)	5(4.2%)			
	40-44	3	2.5	1(0.8%)	2(1.7%)			
Place of residence	Urban	90	75	14(11.7%)	76(63.3%)	1	0.002	9.956
	rural	30	25	13(10.8%)	17(14.2%)			
Educational level	Illiterate	32	26.7	11(9.2%)	21(17.5%)	3	0.029	3.712
	Primary	45	37.5	9(7.5%)	36(30%)			
	Secondary	30	25	5(4.2%)	25(20.8%)			
	higher	13	10.8	2(1.7%)	11(9.2%)			

Religion	Orthodox	39	32.5	8(6.7%)	31(25.8%)	2	0.516	1.322
	Protestant	47	39.2	9(7.5%)	38(31.7%)			
	Muslim	34	28.3	10(8.3%)	24(20%)			
Employment status	employed	60	50	12(10%)	48(40%)	1	0.512	0.430
	unemployed	60	50	15(12.5%)	45(37.5%)			
Wealth index	Poor	45	37.5	11(9.2%)	34(28.3%)	2	0.587	1.066
	Middle	59	49.2	14(11.7%)	45(37.5%)			
	rich	16	13.3	2(1.7%)	14(11.7%)			
Birth Size of child	Large	43	35.8	10(8.3%)	33(27.5%)	2	0.073	5.221
	Average	64	53.4	11(9.2%)	53(44.2%)			
	small	13	10.8	6(5%)	7(5.8%)			
Place of delivery	home	46	38.3	18(15%)	28(23.3%)	2	0.001	11.831
	health	74	61.7	9(7.5%)	65(54.2%)			
	institution							
Marital status	Married	49	40.8	11(9.2%)	38(31.7%)	3	0.818	0.932
	divorced	40	33.3	10(8.3%)	30(25%)			
	Unmarried	20	16.7	3(2.5%)	17(14.2%)			
	widowed	11	9.2	3(2.5%)	8(6.7%)			

From Table 4.1 at 5% level of significance we conclude that place of residence, education, and delivery place have significant association with PNC. The highest proportion of women who uses postnatal care service was observed in the age group 15-19 (26.7%). The women in the age group (20-24) had the second highest proportion of women who uses postnatal care services, was 22.5% and the lowest proportion of women who uses postnatal care service was observed in the age group 40-44 (1.7%).

The proportion of women who use postnatal care service was (63.3)% in urban areas where as (14.2)% of women was in rural area. Similarly, the proportion of postnatal care service was also different based on the education level of women. The result showed that out of (26.7)% of women who was no education were uses postnatal care service was (17.5)%. The proportion of

women who uses this service in the primary and secondary school is 30% and 20.8% respectively.

Table 4.1 also shows that the proportion of marital status is varied. The highest proportion of women who uses postnatal care service was observed in the married (31.7%). Similarly the lowest percentage of women who uses postnatal care service was observed in the widowed (6.7%) According to employment status, 50% of the respondents were Unemployed and 50% of them were employed. The highest proportion of women based on wealth index that uses postnatal care service was observed in the middle 49.2%, whereas the lowest percentage of women who uses postnatal care service was observed in rich1 3.3%. also in the case of birth size the highest percentage of women who uses postnatal care service was (44.2)% in average and similarly the lowest is small birth size (5.8%).similarly the proportion of women who uses postnatal care service was (23.3)% in home delivery and (54.2)% was in the health institution. Based on religion (31.7)% of protestant was the highest percentage of women who uses this service, whereas the smallest percentage (20%) of women who uses this service was Muslim.

**Table 4.2 Model Summary**

-2Log likelihood	Cox & Snell R Square	Nagelkerke R Square
89.827	.272	.415

**Interpretation:**

Table 4.2 of model summary, we revealed that the -2 log likelihood statistic ( $D_{fitted}$ ) is 89.827.this statistic measures how the model predicts the decisions. Although from iteration history (beginning block) we can see that the -2 log likelihood for the constant only model ( $D_{null}$ ) is 129.96. The smaller statistic is better the model. Adding the predictor variables reduced the -2 log likelihood statistics by  $129.96-89.827=38.133$ (the value of chi-square in omnibus test of model coefficients (D)).since  $D_{fitted}= 89.827$  is smaller than  $D_{null}= 129.96$  this implies that there is at least one predictor in the model or set of predictors significantly improved model fit.

The “Cox&Snell R square” the value is .272 (27.2%) of variable in the dependent variable (postnatal care services) is explained by explanatory variables Also nagelker R square indicate that .415(41.5%) the response variable explained. Generally the model which includes the explanatory variable explains between 27.2% and 41.5% of variation in dependent variables (postnatal care services).

**Table 4.3 Hosmer and Lemshow Test**

Step	Chi-square	Df	Sing.
1	7.869	8	.446

Ho=the model is good fit

H<sub>1</sub>=the model is not a good fit

Since the p-value (.446) is greater than  $\alpha=0.05$  the statistical level of significance and it implies that fail to reject the null hypothesis (Ho). So we conclude that the model is fitted the data well.

#### 4.4 Result of binary logistic regression

Table 4.4 Estimates, standard errors, Wald, degree of freedom, p-values, estimated odds-ratio

Variable	Variable in the equation								
		B	SE	WALD	DF	p-value	EXP(B)	95%CI for exp(B)	
								Lower	Upper
Age				3.283	5	0.657			
	15-19	0.566	0.66	0.75	1	0.391	1.761	0.483	6.422
	20-24	-0.831	0.876	0.900	1	0.343	0.435	0.078	2.425
	25-29	0.947	1.562	0.367	1	0.544	2.578	0.121	55.078
	30-34	-21.03	1.599	0.000	1	0.999	0.000	0.000	

	35-39	-0.280	1.407	0.040	1	0.842	0.755	0.048	11.919
Residence	Urban	2.136	0.745	8.221	1	0.004	8.466	1.966	36.460
Religion				4.638	2	0.098			
	Orthodox	-0.894	0.777	1.324	1	0.250	0.409	0.089	1.876
	protestant	0.834	0.84	0.984	1	0.32	2.302	0.443	11.950
Marital Status				4.195	3	0.241			
	Married	0.506	0.647	0.61	1	0.435	1.658	0.466	5.900
	Divorced	-1.676	0.972	2.972	1	0.085	0.187	0.028	1.258
	Unmarried	-0.189	1.098	0.03	1	0.863	0.828	0.096	7.117
Education				0.73	3	0.866			
	Illiterate	-0.499	0.729	0.469	1	0.493	0.607	0.145	2.533
	Primary	-0.586	0.791	0.549	1	0.459	0.557	0.118	2.622
	Secondary	-0.594	1.233	0.232	1	0.630	0.552	0.049	6.190
Employment	Unemployed	0.003	0.651	0.000	1	0.996	1.003	0.280	3.590
Birth Size				1.534	2	0.464			
	small	-0.613	0.639	0.922	1	0.337	0.542	0.155	1.894
	Average	0.347	0.920	0.142	1	0.706	1.415	0.233	8.588
Place of delivery	Home	-1.436	0.658	4.763	1	0.029	0.238	0.065	0.864
Wealth of index				4.196	2	0.123			
	poor	0.025	0.636	0.002	1	0.968	1.025	0.295	3.567
	medium	-2.391	1.198	3.983	1	0.046	0.092	0.009	0.958
	Constant	-0.126	0.867	0.021	1	0.885	0.882		

From the above table 4.4 variables in equation can fit the model for logistic regression are only those which are significant, when we compare p-value with level of significant. So the fitted model are given below

**The fitted model can be written as:-**

$$\text{Logit } (\pi) = \beta_0 + \beta_1 X_1 + \beta_2 X_2 + \dots + \beta_p X_p$$

Where:  $X_1, X_2, \dots, X_p$  are the independent variables.

Table 4.4 showed that result of parameter estimations of Binary logistic regression. Out of the total predictor variables only three categories are significant.

$X_1$ =urban

$X_2$ =medium

$X_3$ =home

$\beta_1, \beta_2, \dots, \beta_p$  are coefficient of independent variable and

$\beta_0$  is constant (intercept).

$$\text{Logit } (\pi) = -.126 + 2.136X_1 + -2.391X_2 - 1.436X_3$$

Where  $\beta_0 = -.126$

### **Estimated odds ratios and 95% confidence interval for odds ratio**

Table 4.4 gives the odds ratios for each variable.

The last categories of the explanatory variables are used as reference.

The odds ratio is the ratio of the odds of an event occurring in one group to another group.

We can interpret the odds ratio of place of residence obtained in the above table using the reference category rural. Women who live in urban area were 8.466 times more likely to use postnatal care utilization than women who live in rural area controlling the other predictor variables as constant. Women whose wealth index was medium were 0.092 times less likely to use postnatal care utilization than women whose wealth index was rich controlling the other predictor variables as constant. Delivery place has also a significant relation with postnatal care utilization service. Women who delivered at home were 0.238 times less likely to use postnatal

care utilization than women who delivered at health institution controlling the other predictor variables as constant.

## **Discussion of Results**

The major objective of this study was to examine factors that affect postnatal care services in wolkite town. The study has identified several factors that have influence on utilization of postnatal care services in wolkite. The study includes place of residence, women's education, marital status, religion, and education are common predictors for this study. The result revealed that out of the total respondents included in this study 77.5% of them were used postnatal care utilization service.

This study revealed that women residing in urban areas are more likely to use postnatal care services than their rural parts. This statement is consistent with findings in Ethiopia by Mekonnen, 2002 he showed that Women residing in rural areas are less likely to utilize postnatal care services than their urban counterparts.

The analysis revealed that women in the richest wealth index had higher odds of giving birth in a health facility compared with the poorest women. Women who are poor may not be able to afford these costs and this may discourage them from the use of these services. Thus the utilization of postnatal care services among poor households could be due to the low priority assigned to health seeking when compared to other basic daily needs or to the lack of resources for health care expenses, whereas households with funds available could spend a proportion of their earnings on health care (Muldoon *et al.*, 2011).

## CHAPTER FIVE

### 5. CONCLUSIONS AND RECOMMENDATION

#### 5.1 Conclusion

The aim of this study was to identify that the determinant of postnatal care service in wolkite town. Since the target of PNC service is to improve the health of mothers and children, it would be essential to study the factors that can improve the performance of the service. The health of the community is largely dependent upon their living conditions and life styles.

The finding of this study revealed that out of the total respondents 27(22.5%) of them were not getting postnatal checkup] services and 93(77.5%) respondents were getting postnatal checkup services. The chi-Square test result showed that residence, education, and place of delivery have a significant association with postnatal care utilization service at 5% level of significance.

The logistic regression result revealed that the log odds of Women using postnatal care utilization service has significantly related with place of residence, place of delivery and wealth index.

#### 5.2 Recommendations

The main objective of this research was, that all society and concerned bodies must understand that Age of women, marital status of women, educational level of women, and work of women, religion and number of children of women are the main determinant factors for the use of PNC services in our study area. The government and other concerned bodies should make efforts to expand general community based education so that women can have better access to information concerning maternal health services. Further detail investigation is necessary to know what type of relation is found between the dependent and independent variables.

**Based on the findings of our study, the following recommendations were put forward.**

1. Increasing and improving the level of education will create better chances to uses this service.

2. Programs should focus on creating awareness about the disadvantages of not using PNC
3. Lack of information on PNC services was the major reason reported for not receiving PNC service.
4. The government should seek ways to empower women economically by producing income generating schemes and increasing postnatal care opportunities
5. Strategies to improve and scale up PNC service utilization among women.
6. Knowledge and skills on PNC care services among mother.

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APPENDIX

WOLKITE UNIVERSITY

COLLEGE OF NATURAL AND COMPUTATIONAL SCIENCES

DEPARTMENT OF STATISTICS

**APPENDIX 1; Questionnaire**

This questionnaire is prepared to collect data that would be used for writing our bachelor's degree as partial fulfillment of the requirement for the degree of science in statistics in the Wolkite University. The purpose of this questionnaire is to gather information about "Determinants of postnatal care utilization in wolkite town". It is believed that the information obtained from your response will have a considerable importance for the success of the study, Therefore, please be objective while you respond to each item in the questionnaire.

1, how old are you? \_

2, where is your residence? a) Urban b) rural

3, what is your marital status? a) Married b) divorced c) unmarried d) widowed

4, what is your religion? a) Orthodox b) protestant c) Muslim

5, what is your education status? a) Illiterate b) primary c) secondary d) higher

6, what is your husband's education status? a) Illiterate b) primary c) secondary d) higher

7, what is your employment status? a) Employed b) unemployed

8, where did you deliver your last baby? a) Home b) health institution

9, do you have getting postnatal checkup from health services? a) Yes b) No

10, did you have antenatal visit/s during your last pregnancy? a) Yes b) no

11, what is the size of your child at birth? a) Large b) average c) small

12, do you know the uses of contacting health care providers after child birth? A) Yes b) no

13, what is your wealth index? A) Poor b) middle c) riche

**APPENDIX 2 Dependent variable coding**

Original variable	Internal variable
yes	0
no	1

**APPENDIX 3;ContingencyTable4.4.1 for Homer and Lamshow test**

postnatal care=yes			Postnatal care=no		Total
	observed	Expected	Observed	Expected	
1	12	11.946	0	0.054	12
2	12	11.713	0	0.287	12
3	12	11.383	0	0.617	12
4	10	11.147	2	0.853	12
5	11	10.670	1	0.1.33	12
6	9	9.952	3	2.048	12
7	7	9.062	5	2.938	12
8	9	7.746	3	4.254	12
9	9	6.660	3	5.340	12
10	2	2.721	10	9.279	12

#### APPENDIX 4; Categorical Variables coding

Variables	Category	Code
Age	15-19	0
	20-24	1
	25-29	2
	30-34	3
	35-39	4
	40-44	5
Residence	Urban	0
	Rural	1
Education	Illiterate	0
	Primary	1
	Secondary	2
	Higher	3
Religion	Orthodox	0
	Protestant	1
	Muslin	2
Employment	Employed	0
	Unemployed	1
Wealth index	Poor	0
	Middle	1
	rich	2
Size of child birth	Large	0
	Average	1
	small	2

Place of delivery	Home	0
	Health institution	1
Marital status	Married	0
	Divorced	1
	Unmarried	2
	widowed	3

DECLARATION

We, the undersigned declare that this paper is our original work and has not been presented for a degree in any other university and that all sources of material used for the paper have been duly acknowledged.

Declared by:

Name \_\_\_\_\_

Signature \_\_\_\_\_

Date \_\_\_\_\_

Name \_\_\_\_\_

Signature \_\_\_\_\_

Date \_\_\_\_\_

Examiner \_\_\_\_\_

Signature \_\_\_\_\_

Date \_\_\_\_\_

Confirmed by advisor

Name \_\_\_\_\_

Signature \_\_\_\_\_

Date \_\_\_\_\_

