Deanship of Graduate Studies
Al-Quds University

Determinants and Risk Factors of Neonatal Mortality in Gaza Governorates in the Year 2008.

Imad Ismael Mahmood El Awoor

M.P.H Thesis

Jerusalem – Palestine

1430/2009

Determinants and Risk Factors of Neonatal Mortality in Gaza Governorates in the Year, 2008

Prepared By:

Imad Ismael Mahmood El Awoor

MB, BS: Bangladesh Medical College Bangladesh

Supervisor: Dr. Yehia Abed, M.D.Dr.P.H

Associate Professor of Epidemiology

A thesis Submitted in Partial Fulfillment of Requirement for the Degree of Master of Public Health

School of Public Health-Al-Quds University

1430/2009

Deanship of Graduate Studies
School of Public Health
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Thesis Approval

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Prepared By: Imad Ismael El Awoor
Registration No: 20714182

Supervised By: Dr. Yehia Abed, MD, Dr.P.H
Associated Professor of Epidemiology

Master thesis submitted and accepted, date:

The names and signatures of the examining committee members are as follows:

1- Head of Committee:	Dr. Yehia Abed	Signature
2- Internal Examiner :	Dr. Bassam Abu Hamad	Signature
3- External Examiner:	Dr. Mohamed El Maqadma	Signature

Jerusalem-Palestine
1431/2010

Dedication

I dedicate this work to

Those whom I will always love:

My father who planted the seeds of loving learning inside me

My mother who never stops encouraging me for continuing learning

My precious wife and my lovely kids, Rana, Haya, Ismaeel, and Abdel Rahman for their tolerance, patience and support in all avenues of my life

Declaration

I certify that this thesis submitted for the degree of Master is the result of my own research, except where otherwise acknowledged, and that this study (or any part of the same) has not been submitted for a higher degree to any other university or institution.

Signed:

Imad I. M. El Awoor

Date:

Acknowledgment

I would like to thank God and express extreme sense of thanks and obedience for keeping in the right track to successfully finish my work.

I should express my deep gratitude and thanks to my direct supervisor, Dr Yehia Abed who offered me guidance, support, and safety.

From that, I should extend my deep appreciation and respect to Dr, Majdi Ashour, who was always behind me guiding and supporting and spent with me a lot of time on the expense of his own life.

I then, should appreciate and acknowledge Dr Bassam Abu Hamad who voluntarily guided and helped a lot.

Then, I should explicit my deep feelings and gratitude to UNICEF who ever funded this research and never gave up support and guidance, through their respected partner, Union Work Health Committees (UWHC) who sponsored and assured their confidence in me.

Not to forget to convey all acknowledgment to the staff of AlQuds University who assisted me and facilitating a lot of missions concerning my research.

I should again acknowledge the efforts and the guidance of the field health program of UNRWA, headed by, Dr Maqdmah and assisted by Dr Amnah Shurbasi

In addition, my deep feelings and gratitude should be extended to all participants of this study who responded and showed a high degree of cooperation and coordination and all people helped in data collection.

Another sort of feeling should go beyond that to the members of my family from mother to sisters to all brothers and down to my wife and kids for their kind help, patience, and support. Lastly but not finally, I am indebted to many people and it is not always possible to acknowledge and thank every one all at one time.

Abstract

Universally, neonatal mortality accounts for almost 40 % of under-five child mortality. The overall aim of the study was to determine the major risk factors contributing to neonatal mortality in the Gaza Strip, in order to provide scientific evidence for future preventive strategies to promote child and maternal health.

The study was carried out in all Gaza Governorates at the house hold level. A case control design was adopted and interviewed questionnaire was completed by 715 eligible mothers. Of the respondents, 220 were cases who unfortunately experienced neonatal deaths and 495 controls with corresponding a live baby matched by sex, locality and nearest one week of birth date. Response rate was 95%. Cross tabulation, odds ratio, and multilevel bivariate logistic regression was done to explore the risk factors associated with neonatal mortality.

The odds of neonatal mortality was higher among low birth weight babies than of the normal weight group (P=0.001, OR= 9.08) and premature babies than the full term ones (P=0.01, OR=2.83). In addition, the odds of neonatal mortality was also higher among neonates whose mother had a history of prolonged labor (P=0.01, OR=0.52), or caesarean section delivery (P=0.03) and/or previous history of neonatal death (OR=5.64, P=0.002). In addition, the study clarified that, consanguineous marriage was a predictor for neonatal mortality (P= 0.04, OR= 1.20). Also, the influence of domestic violence against mother during pregnancy on neonatal mortality was prominent more among cases than controls (P= 0.02, OR= 1.58).

Unconsciousness status of the newborn after delivery, and previous history of neonatal death were found to be strong risk factors for the neonatal mortality, while adherence to colostrums feeding, type of vaccine given to the new born early initiation of breast feeding and breast feeding exclusivity were found to be protective factors for the neonatal mortality.

The study concluded that, public health interventions at all levels, community awareness, with the help of all stakeholders including MOH, UNRWA, UNICEF and other NGO's and improvement of secondary and tertiary care could help in reducing neonatal mortality.

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Operational Definition

Neonate: A new born from after birth till 28 days after delivery (WHO, 2005).

Infant: A new born in the first year of life (WHO, 2005).

Neonatal period: The period from after delivery until 28 days (WHO, 2005).

Early neonatal period: One component of the neonatal period from the time after birth until seventh day.

Late neonatal period: The period following the seventh day after birth until the 28th day.

Neonatal Mortality: Death of the new born in the neonatal period, from after birth till 28 days later (WHO, 2006).

Infant mortality: The death of an infant in the first year of life (WHO, 2006).

Neonatal mortality rate: Number of neonatal deaths per 1000 live birth in a given year (WHO, 2006).

Infant Mortality Rate: Number of infant deaths per 1000 live birth (WHO, 2006).

The perinatal period: The period that commences at 28 completed weeks of gestation and ends seven days after birth.

Live birth: refers to "the complete expulsion or extraction from its mother of a product of conception irrespective of the duration of the pregnancy, which, after such separation, breathes or shows any other evidence of life"- e.g. beating of the heart, pulsation of the umbilical cord or definite movement of voluntary muscles - whether or not the umbilical cord has been cut or the placenta is attached. Each product of such a birth considered live born (WHO, 2005).

Stillbirth: is "death prior to the complete expulsion or extraction from its mother of a product of conception, irrespective of the duration of pregnancy; the death is indicated by the fact that after such separation the fetus does not breathe or show any other evidence of life, such as beating of the heart, pulsation of the umbilical cord or definite movement of voluntary muscles" (WHO, 2000).

List of abbreviations

CBR	Crude Birth Rate
CDC	Center for disease Control and Prevention
CDR	Crude Death Rate
CMR	Child Mortality Rate
DHS	Demographic Health Survey
EMR	Eastern Mediterranean Region
Epi-info	Epidemiological Information Statistical Program
ESCWA	Economic and Social Commission for Western Asia
FAO	Food Agriculture Organization
GDP	Gross Domestic Product
IMR	Infant Mortality Rate
LBW	Low Birth Weight
MDG	Millennium Development Goals
MOH	Ministry of Health
NMR	Neonatal Mortality
NMRR	Neonatal Mortality Rate
OPT	Occupied Palestinian Territories
PCBS	Palestinian Central Bureau of Statistics
PNM	Perinatal Mortality
PNMR	Prinatal Mortality Rate
SPSS	Statistical Package for Social Science
TFR	Total Fertility Rate
UNRWA	United Nations Relief and Work Agency
UNWFP	United Nation World Food Program
WHO	World Health Organization

Chapter I

Introduction

1.1 Background of the Study

All newborns have a basic right to enjoy the highest standard of health according to the Convention on the Rights of the Child (Convention on the Rights of the Child, 1989). Yet, a recent review of child mortality (CMR) has revealed that the proportion of under-five child deaths occurring in the first month of life has been increasing (Black, et al., 2003).

Despite accounting for almost 40 per cent of all under-five child deaths and more than half of infant deaths, neonatal mortality (NMR) is not explicitly a target of the Millennium Development Goals (MDGs), rather it is included within the infant mortality (IMR) (**United Nations, 2001**). However if the MDG target of a two-thirds reduction in child mortality by 2015 is to be achieved then (NMR) must be addressed.

Of 130 million babies born annually, more than 4 million die in the neonatal period **(WHO, 2005-a)** and 99 per cent of these deaths occur in developing countries (**Lawn, et al., 2005).** During the last 30 years, the reduction in neonatal mortality rates (NMRR) has been slower, compared to both under-five and child mortality rates after the first month of life **(Hobcraft and Donald, 2002).**

It was documented that, 4 million babies are stillborn every year. Another 4 million newborns die before they reach the first month of life **(WHO, 1999).** As with maternal deaths, 99 percent of newborn deaths occur in developing countries. While there have been significant declines in infant and child mortality in the developing world in recent decades, there has been little progress in reducing the death rate for mothers and newborns **(Moss, et al., 2002).** To sustain previous health gains and meet the United Nations (MDG), policymakers need to place much greater emphasis on proven, cost-effective measures to save maternal and newborn lives.

To a considerable extent, the well-being of a newborn depends on the health of the mother. In developing countries, a mother's death in childbirth means almost certain death for her newly born child. When mothers are malnourished, sick, or receive inadequate prenatal and delivery care, their babies face a higher risk of disease and premature death. The rate of neonatal death is thus high in regions where the risk of maternal death is high. Recent estimates show that in Africa, for example, a woman's risk of dying from maternal causes over her lifetime is one in 19; and one of every five African women risks losing a newborn

during her lifetime **(WHO, 2001).** Neonatal and maternal deaths place a significant burden on health systems as well as on women and families. A recent report revealed the extent of loss of healthy life from newborn deaths; for example, it represents more than 8 percent of the total disease burden in sub-Saharan Africa and nearly 14 percent in South Asia **(Hyder, et al., 2000).**

The world has witnessed a considerable decline in infant (IMR) and (CMR) during the past decades, and the Occupied Palestinian Territories (OPT), including the Gaza Strip, are no exceptions. Currently, the general level of (NMR), (IMR), and (CMR) in the OPT is quite low (less than 40 per 1000 live birth) compared to other developing countries, but high compared to Israel and to some other Arab countries; however, a stagnation in this historical decline in IMR was observed in the last two decades in the OPT **(Pedersen, 2001).**

The current emerging pattern of (IMR) in the Gaza Strip is characterized by its predominance during the early days of infancy that is neonatal period. Infant mortality is considered as a sensitive measure of the overall health of a population, although its precise interpretation has been discussed **(Wise, 2003).** This parameter is thought to reflect an interaction of economic, social, and environmental factors likely to influence the health status of the entire population **(Reidpath and Allotey, 2003).**

1.2 Research Problem

Little is known through analytical epidemiologic research about risk factors associated with infant deaths, and (NMR) in Gaza Strip; however, one can assume that factors associated with infant deaths and survival in Gaza Strip are not different from those identified in the global context. According to different researchers, factors that may associate with (NMR) may fall into five categories: fertility behavior; nutritional status, breastfeeding, and infant feeding; the utilization of health services by mothers and for children; environmental health conditions; and socioeconomic status **(Rutstein, 2000).** Other researchers have demonstrated that accessibility to health service delivery is important determinant of neonatal mortality; in addition, the efficiency and effectiveness of the health care system is very crucial. The researcher will try to determine whether these factors are associated with neonatal mortality in the Gaza Strip.

About two thirds of infant deaths in the Gaza Strip occur in the neonatal period and only the other one third in the post-neonatal period; more than 62% of neonatal deaths occurs in the

early neonatal period (the first week of infants life), and about 38% in the late neonatal period **(Ministry of health, 2005).**

1.3 Justification of the Problem

Reported official vital statistics show that (IMR) in the Gaza Strip has declined substantially from 86 in 1970 to 69.3, 43, and 33.4 infant deaths per 1000 live births in 1975, 1980, and 1985 respectively (**Marianne and Geir, 1993).** However, this impressive decline has arrested in the mid 1980s and consequently influenced (NMR) **(Pedersen, 2001).** The overall trend in (IMR) and (NMRR) over the last two decades shows stabilization at a rate of around 30 infant deaths per 1000 live births in the decade preceding the establishment of Palestinian Authority, and a fluctuation around 25 deaths per 1000 births in the last decade

The arrest of the substantial decline in the (CMR) and (IMR) in the Gaza Strip observed through vital official statistics is confirmed through 4 Demographic and Health Surveys (DHS) conducted by the Palestinian Central Bureau of Statistics (PCBS) in the last years after the establishment of Palestinian Authority **(Annex 7).**

Of importance in terms of its impact on health status, the changing levels of income and education. Since 1967, Israeli policies toward Gaza Strip have been shaped by encouraging Gaza dependence on externally generated income sources, including the reorientation of the labor force away from agriculture and industry to labor-intensive work in Israel **(Roy, 1995, 2001).** Because of this policy, thousands (48,000 -70,000) of Gazan laborers worked in Israel and this led to a rise in the level of individual and family incomes. At the same time, educational levels also rose. This actually happened after eruption of the first uprising (Intifada) in 1987, the period followed the establishment of Palestinian Authority in 1994 and the eruption of the second (Intifada) in September 2000 **(Roy, 1995, 2001).**

In addition to the economic factor, other factors may have their impacts on the emerged character of (NMR) in the Gaza Strip. At the level of health services delivery, it suggested that the deterioration of quality of maternity services, with over-saturation of deliveries, have led to early discharge of mothers with their newborns in the post-partum period. This is in fact, affected the survival of newborn infants. Many of the implemented programs have focused on post-neonatal issues while neonatal issues were less likely tackled **(Rutstein, 2000).**

1.4 Aim of the Study

The overall aim of the study is to determine the major risk factors for neonatal mortality in Gaza strip, providing required scientific and statistical evidence to guide and improve both child and maternal health.

1.5 Objectives of the Study

General Objective

To explore risk factors and determinants influencing neonatal mortality in the Palestinian context.

Specific Objectives

- To determine the main factors of newborn deaths in Gaza Governorates, in the year 2008,
- To compare with newborn infants who survived in Gaza governorates, and their associated risk factors with related causal factors; in, 2008,
- To estimate the determinants of neonatal deaths in the Palestinian context, and to identify risk factors for neonatal mortality, in Gaza Governorates, in the year 2008,
- To recommend suggestions for possible interventions that could improve the neonatal survival in Gaza Governorates and their similar circumstances,

1.6 Research Questions

1- What are the main characteristics of (NMR) in Gaza strip?

2- Is there any relationship between (NMR) and low birth weight?

3- Is there any relationship between (NMR) and prematurity?

4- Is there any relationship between congenital anomalies and (NMR)?

5- Is there any relationship between newborn infections and (NMR)?

6- Is there any relationship between breast-feeding and (NMR)?

7- Is there any relationship between maternal related diseases and (NMR)?

8- Is there any relationship between delivery complications like prolonged labour and (NMR)?

9- Is there any relationship between fertility behavior (child spacing) and (NMR)?

10- Is there any relationship between nutritional status of mother and (NMR)?

11- Do socioeconomic and demographic conditions like education of the mother, family income, and residence (access to care), and consanguinity associate with (NMR)?

1.7 Context of the Study

The researcher will present some information or findings relevant to the study. In fact, the (NMR) in Gaza may be influenced by demographic, socioeconomic and even the political

situation. The study was conducted at the community level (household level). The researcher tried to put these contexts in relation to the subject of interest.

1.7.1 Demographic Context

Gaza strip is a small narrow band of land located in the south of Palestine, constituting the coastal zone of the Palestinian territory along the Mediterranean Sea, between Israel and Egypt **(National health plan, 1994).** According to the Census held by the Palestinian Central Bureau of Statistics (PCBS) in 2007, the total population of Gaza Strip is 1,416,543, from them,1,048,125 are registered refugees **(Department of Relief and Social services, 2007)** and with 50.7% male and 49.3 female. The Gaza people constitute 37.6% of the total population living in the Occupied Palestinian Territory (OPT). The total number of Gaza's families is 219,220 families with average family size of 6.5 people **(PCBS, 2007).** The age structure in Gaza strip is not different from that of other developing countries, that is young population, wherever, 48.3 % of the population in Gaza aged between 0 to 14 years old with 3.8 % decline compared to 1997 population census. Gaza Strip consists of five governorates (North Gaza, Gaza, Deir El Balah, KhanYounis, and Rafah). Gaza is the largest governorate in terms of population, which has around half a million inhabitants (**PCBS, 2007**). Other demographic data and estimate as the following :(**Population Reference Bureau, 2008).**

Crude Birth Rate (CBR) was 37 per 1000 live birth while Crude Death Rate (CDR) is four per 1000 live birth. (IMR) was 25 per 1000 live birth and the Rate of Natural Increase was 3.3%. The Total Fertility Rate (TFR) was 4.6 births per woman while Life expectancy at birth was 72 years in male and 73 years in female and the Population per square kilometer was 690.

1.7.2 Socioeconomic Context

In 1999, the OPT had a per capita Gross Domestic Product (GDP) of about 1600 US$ and was categorized, by the World Bank, as one of a lower-middle income economy. However, since the year 2000, per capita income has decreased by more than 35 %, and more than 47 % of the Palestinians are now living below the official poverty line, of two US$ per person per day. Thirty seven percent of the population has been hit by unemployment (**World Bank, 2004**), reflecting the collapse of the Palestinian economy that was primarily due to restrictions on movement of people and goods imposed by Israel. The dependency ratio is quite high (106%), moreover, the median age at the first marriage is 18 years (**PCBS, 2007**).

1.7.3 Child Health Context of the Study

Child and maternal health are important components of present and future population health in the occupied Palestinian territory, where roughly 40% of the population are women of

reproductive age and children younger than 5 years (**PCBS, 2007**). Children are entitled to the highest attainable standard of health. The researcher believes that in order to reach this standard, child health must be viewed in a holistic, comprehensive manner, which includes all aspects of child well-being. Child development is multidimensional including physical, cognitive, emotional and social dimensions and child well being exists when a child is able to realize his or her potential and the way opposite. Child health reflects more than physical well being, it also necessarily includes mental and social health.

In order to understand the children's situation in Palestine, one must examine a number of important factors influencing a Palestinian child's life, including: the socio-economic situation, the effects of the Intifada, child health indicators, impact of the Intifada on health, psychological health, and the educational situation in Palestine. Although the economic situation had worsened since the second Intifada (popular uprising against occupation) in 2000, (**World Bank, 2008),** living conditions worsened after the elections in January, 2006, which gave the political party Hamas control of the Palestinian Legislative Council and brought about a bad political and economic relationship with several countries in the international community (**Stanforth, 2007**). Poverty in the occupied Palestinian territory has risen sharply, and more than a third of the population is classified as food insecure (**FAO and UNWFP, 2007)**. The Israeli imposing of different checkpoints mainly in the west bank, add extra burden on the child and maternal health care and mainly perinatal and child health care emergencies **(Murray and Pearson, 2006).**

Child health care is one important component of the primary health care setting where it provides varieties of services such as immunization, growth monitoring, prophylactic service, and curative service. Child health care extends even to provide health care to the schoolchildren including vaccination, examination of the new entrants, and audiovisual screening program. The three major indicators that reflect the health situation of children in Palestine are vaccination, nutrition, and congenital anomalies:

1.7.3.1 Vaccination:

According to the annual health report of United Nations for Work and Relief Agency **(UNWRA, 2007**), immunization coverage was optimal for infants less than 12 months of age for all vaccine preventable diseases. It was recorded that 100% coverage was achieved in Gaza Strip. The report added that, child health coverage rate was 95.3% as well (**UNWRA, 2007**). This figure in fact, reflects the strict adherence of people to immunization in the first year of life, but the situation is different in the second and third year of life. It was observed

that the percentage of regular attendance for children 1< 2 years was 63% in 2007, where this percentage went down to reach 39% for children 2< 3 years in Gaza strip in the same year **(UNWRA, 2007).** According to ministry of health report, 2005, most of the vaccines demonstrated good coverage. For example, the coverage rate for Bacillus Calmet Guirene (BCG), Diphtheria, Pertusis, and Tetanus (DPT), Oral Polio Vaccine (OPV), Hepatitis "B" vaccine (HBV), Inactivated Polio Vaccine (IPV), Measles vaccine, Measles, Mumps, Rubella (MMR) was 100%, 99.3%, 99.8%, 100%, 97.1%, 98%, and 91.9% respectively **(MOH, 2005).**

1.7.3.2 Nutrition

Nutrition status of the children can be reflected in three important components, these are stunting, wasting, and underweight according to WHO and United States Center for Disease Control and Prevention (CDC). Data showing that stunting, low height for age which is an indicator for chronic malnutrition and a risk factor for poor cognitive development is markedly increasing in both Gaza strip and West bank, whereas it increased from 8.2% in 1996 to 13.2% in 2006 in Gaza strip, but it rose from 6.7% to 7.9% in West Bank respectively (**PCBS, 2007).** The prevalence of underweight remained unchanged in 2000, 2004, and 2006 according to national surveys. It was recorded that underweight was 1.4% in 2000, 2.8% in 2004, and 1.4% in 2006. Wasting indicates the acute stage of malnutrition and it is being affected by the humanitarian aids and military closure. This component should be monitored in vulnerable population like those living in direct poverty or affected by disasters or closures.

Data from **UNWRA, 2007**, indicates that 54.7% of registered refugee children less than 3 years are suffering from iron deficiency anemia, while the MOH, showed that 72.2% of fewer than 3 years children are suffering from anemia (**MOH, 2005).**

In Gaza, as a part of the OPT, under nutrition is of important concern in a situation of, frequent births, short births spacing, rising poverty, worsening in the quantity and quality of food (**World Bank, 2008).**

1.7.3.3 Congenital Abnormalities

Congenital abnormalities can be considered as one of the leading causes of neonatal mortality. It is estimated that 2.5% of the investigated live births suffered from congenital anomalies (**MOH, 2005**), and it constitutes 26.7% of the neonatal mortality (**UNWRA, 2007**). One can predict that these cases will increase because of the increase in the number of isolated areas, thus increasing consanguineous marriage. Therefore, screening and prevention activities will become more crucial (**Center of Arab Genomic Studies, 2004**).

To sum up and clarify some obstacles facing the implementation of a good child health service delivery, The Economic and Social Commission for Western Asia **(ESCWA)**, in its press release, in **2004**, explained that, the absence of national policy, which embraces the child health, no coordination between different health care providers, not including all children in national insurance schemes could be some of the problems facing this implementation. In addition, children with special needs are particularly left out of national insurance schemes. There is a lack in the diversity of treatment available in the Palestinian territories as a whole, 'Quick-fix' solutions are often implemented that do not give due consideration to the relevant social and environmental context or a rights-based approach to healthcare development. The report added that child health information systems are inadequate and require redesigning and updating, there are disparities in the number of healthcare facilities among geographic regions, the sector suffers from weak follow-up and referral systems among all healthcare agents, nutritional surveillance systems following up on trends in malnutrition and food security are weak, efforts at caregiver education to combat chronic malnutrition are insufficient, and there is a lack of food fortification strategies to combat anemia. (**United Nations Information Services, 2004)**

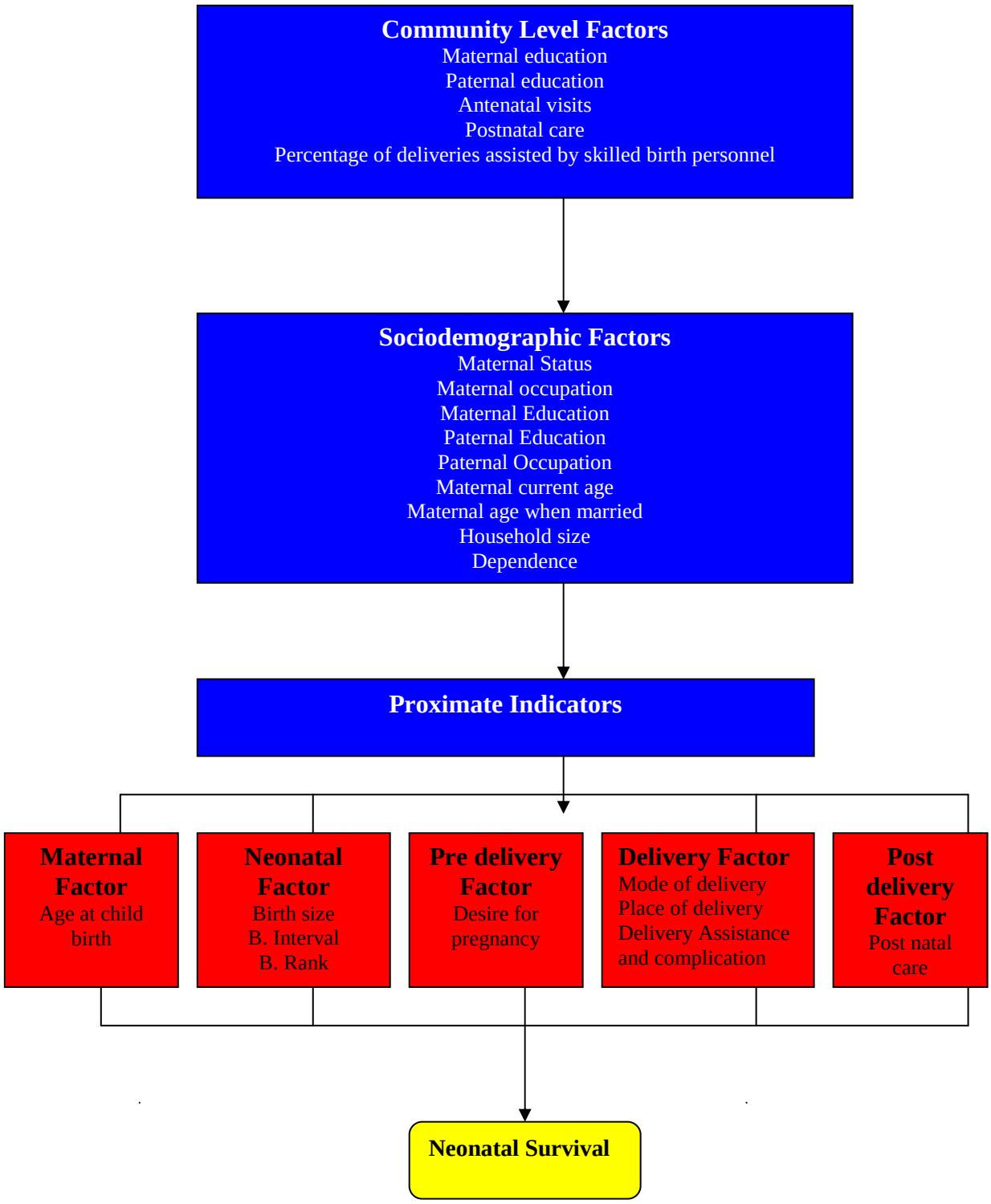
Chapter II

Conceptual Framework and Literature Review

Conceptual framework is one model that that represent a less formal attempt to organize phenomena, conceptualize the study, and stimulate research and extension of knowledge. Therefore, accumulate a body of evidence and could constitute a basis for prediction. The conceptual framework of a research is particularly needed when the study of interest is unknown and the researcher has to explore it. In the current study, the researcher adopted the conceptual framework of previous study conducted in **Indonesia, 2001,** removing or adding some points relevant to the location of the study.

The idea behind this was a trial to draw and conceptualize the predicting determinant and factors, which contribute to the NMR. In fact, and to the best of the knowledge of the researcher, most of the workers in the field of clinical practice focus on the direct and medical causes of neonatal mortality rather on the other perspective of the subject.

However, this conceptual framework will shed light on all the factors that may influence the (NMR) in the Palestinian context. It could be imaginable that, the factors that play role in determining the (NMR) are similar to the factors in different developing countries, but still, the Palestinian community has got its own circumstances which different from other communities. As illustrated in the framework, there is interrelationship between, community level factors, socio demographic and economical factors with the proximate indicators of neonatal deaths. However, the hierarchy starts from the community, whereas, the level of education of the parents, living status, household size and ,expenditure, frequency of antenatal visits, delivery assistants by skilled attendant, and post natal care utilization of service, all together are influencing (NMR). Education level among the family accompanied by the family expenditure may determine the age of marriage or age of pregnancy. In addition, the more educated the mother, the more the frequency of antenatal and postnatal care utilization of services. However, the good living status of the family accompanied by reasonable, number of household and less dependence will certainly enhance the mentality and intellectual of the mother for better care during antenatal, natal, and post natal period. The community and socio demographic factors are interconnected with the proximate factors of the framework. Furthermore, the degree to which a mother is adhered to good antenatal care and adequate nutrition during pregnancy, and adherence to skilled birth attendant, the more prediction that a good pregnancy outcome will emerge.


Community Level Factors
Maternal education
Paternal education
Antenatal visits
Postnatal care
Percentage of deliveries assisted by skilled birth personnel
Sociodemographic Factors
Maternal Status
Maternal occupation
Maternal Education
Paternal Education
Paternal Occupation
Maternal current age
Maternal age when married
Household size
Dependence
Proximate Indicators
Maternal Factor
Age at child birth
Neonatal Factor
Birth size
B. Interval
B. Rank
Pre delivery Factor
Desire for pregnancy
Delivery Factor
Mode of delivery
Place of delivery
Delivery Assistance and complication
Post delivery Factor
Post natal care
Neonatal Survival

However, the proximate indicators of neonatal mortality can even influence each other. For example, the more age at child birth, the more probability of adverse outcome of pregnancy and delivery complications.

Yet, to understand the hierarchy in a good way, it is essential to have a previous knowledge about the factors and to understand the temporal sequence of it. Moreover, the researcher tried to control for confounders in order to explore the factors that are directly and independently related to the neonatal mortality.

When studying the socio demographic factors in one model, meanwhile the maternal factors in either pregnancy, delivery or postnatal period and finally the neonatal factors, the researcher concluded some factors from each group separately. The resulting factors can be sequenced in one model to reach the final risk factors, which influence the study in an independent way.

However, the sequence of events that yield a good or bad outcome of pregnancy, starts from the social, economical, demographic environment of the mother, extending to the antenatal period, and ends in the postnatal phase. Within these atmospheres, many intervening factors may be yielded which have been appeared to have a negative or positive impact on the neonatal health.

Literature Review

Over 130 million babies are born every year, and more than 10 million infants die before their fifth birthday (**WHO, 2005-a**), almost 8 million before their first. Neonatal mortality rates (NMRR) vary from five in developed countries to 34 per 1,000 live births in the less developed regions of the world.

(http://www.savethechildren.org/publications/newborns_report.pdf). According to the World Health Report, (IMR) declined by about 25% in developing countries during 1983-1995, whereas during the same period (NMRR) fell by no more than 10% **(WHO, 1998).**

Although there has been a remarkable worldwide decline in (CMR) in the last quarter of the 20th century, this reduction in death rate has occurred mainly among older children, mostly due to the effects of immunization and infectious disease-control programs. To achieve further reductions in (IMR) and (CMR), a substantial reduction in neonatal death is of major public-health importance (**Black, Morris, and Bryce, 2003**). In preparing (CMR)-reduction strategies, it is important for countries to estimate the magnitude of perinatal and neonatal mortality and to come across updated knowledge on the cause of death in neonates, which is needed, from a country perspective, both for policy-making and for monitoring and evaluating the existing health programs. Many policymakers and health professionals are unaware that more than 10 000 newborn babies die every day, mostly from preventable causes. The (MDG) for child survival (MDG-4)—to reduce (CMR) by two-thirds between 1990 and 2015—will not be met without substantial reductions in (NMR). (**Lawn, Cousens, and Zupan 2005).** Low-cost interventions could reduce NMR by up to70 percent if provided universally (**Darmstadt et al., 2005).**

Although these interventions are inexpensive and feasible, their coverage rates are extremely low in the highest mortality settings. Overcoming health-system constraints to provide such interventions at scale is possible and practical examples of how countries can do

(Knippenberg et al., 2005). Many countries have set under-five and maternal mortality reduction as their key development goal, as suggested by international conferences such as the World Summit for Children in 1990, the United Nations Millennium Declaration (**United Nations, 2001**) and the United Nations Special Session on Children in 2002. However, national indicators of the health of mothers and newborn infants are often not readily available, especially in countries that lack vital registration systems. The reliability

of (NMR) estimates depends on accuracy and completeness of reporting and recording of births and deaths. Underreporting and misclassification are common, especially for deaths occurring early on in life (**WHO, 2007**).

2.1 Definitions

Infant mortality defined as the death of an infant in the first year of life. The infant mortality rate in a specific geographic area reflects social and political conditions, in addition to health care delivery and medical outcomes in that area. Infant mortality rates (IMR) divided into two periods, neonatal and postnatal.

Neonatal mortality (NMR) is death occurring in the first month of life and is typically associated with events surrounding the neonatal period and the infant's delivery. The highest risk for infant death is in the neonatal period (**Lawn, 2005**). World health organization has defined (NMR) as "number of deaths during the first 28 completed days of life per 1,000 live births in a given year or period." Neonatal deaths subdivided into early neonatal deaths, occurring during the first seven days of life, and late neonatal deaths, occurring after the seventh day but before the 28 completed days of life. Age at death during the first day of life (day zero) should be recorded in units of completed minutes or hours of life. For the second (day 1), third (day 2) and through 27 completed days of life, age at death should be recorded in days (**International Classification of Diseases, 2007**).

The American Medical Dictionary has defined it as "the ratio of the number of deaths in the first 28 days of life to the number of live births occurring in the same population during the same period of time".

Other scientists defined it as "the number of children dying under 28 days of age divided by the number of live births that year". The neonatal period starts at birth and ends 28 completed days after birth. Early (NMR) refers to a death of a live-born baby within the first seven days of life, while late neonatal mortality covers the time after 7 days until before 28 days. The sum of these two represents the (NMR). Some definitions of the perinatal mortality (PNM) include only the early (NMR). Neonatal mortality is affected by the quality of in-hospital care for the neonate. Neonatal mortality and post neonatal mortality (covering the remaining 11 months of the first year of life) are reflected in the Infant Mortality Rate. The legal requirements for registration of fetal deaths and live births vary between and even within countries. World Health Organization recommends that, if possible, all fetuses and infants weighing at least 500 g at birth, whether alive or dead, should be included in the statistics. The inclusion in national statistics of fetuses and

infants weighing between 500 g and 1000 g is recommended both because of its own value and because it improves the coverage of reporting at 1000 g and over. For international comparison, 1000 g and/or 28 weeks gestation is recommended (**WHO, 2005-b**).

Perinatal mortality (PNM), also perinatal death, refers to the death of a fetus or neonate and is the basis to calculate the perinatal mortality rate (PNMR). Variations in the precise definition of the (PNM) exist specifically concerning the issue of inclusion or exclusion of early fetal and late neonatal fatalities. Thus the WHO ‘s definition "Deaths occurring during late pregnancy (At 22 completed weeks gestation and over), during childbirth and up to seven completed days of life" is not universally accepted. The perinatal mortality is the sum of the fetal mortality and the neonatal mortality (**Wikepedia, 2009**).

Perinatal Mortality Rate (PNMR) defined as annual number of stillbirths and early neonatal deaths (deaths in the first week of life) per 1,000 total births (includes stillbirths). Stillbirths are defined here as gestational age of 28 or more weeks. Unknown gestational age is excluded in both numerator and denominator. The probability that a fetus considered viable will be stillborn or will die before the end of the first week of life reflects standards of obstetric and pediatric care, as well as the effectiveness of public health initiatives **(Canadian Vital Statistics Database, 2000).** .

Perinatal Mortality Rate (PNMR) refers to the number of perinatal deaths per 1,000 total births. It is usually reported on an annual basis. It is a major marker to assess the quality of health care delivery. Comparisons between different rates may be hampered by varying definitions, registration bias, and differences in the underlying risks of the populations. Perinatal Mortality Rates vary widely and may be below 10 for certain developed countries and more than 10 times higher in developing countries (**National Center for Health Statistics, 2003**). The WHO has not published contemporary data.

For the last 50 years, the term (PNM) has been used to include deaths that might somehow be attributed to obstetric causes, such as stillbirths and neonatal deaths in the first week of life. This approach does not raise the question whether babies above a certain weight or gestational age (and thus showing some potential for survival) showed any signs of life at birth or not. The perinatal mortality indicator plays an important role in providing the information needed to improve the health status of pregnant women, new mothers, and newborns. That information allows decision-makers to identify problems, track geographical trends and disparities, and assess changes in public health policy and practice.

Live birth refers to:

> *"the complete expulsion or extraction from its mother of a product of conception, irrespective of the duration of the pregnancy, which, after such separation, breathes or shows any other evidence of life"- e.g. beating of the heart, pulsation of the umbilical cord or definite movement of voluntary muscles - whether or not the umbilical cord has been cut or the placenta is attached. Each product of such a birth considered live born"* ***(WHO, 2005-a, Health status Statistics).***

Stillbirth or fetal death is:

> *"death prior to the complete expulsion or extraction from its mother of a product of conception, irrespective of the duration of pregnancy; the death is indicated by the fact that after such separation the fetus does not breathe or show any other evidence of life, such as beating of the heart, pulsation of the umbilical cord or definite movement of voluntary muscles"* ***(WHO, 2006, Page No:32).***

2.2 Magnitude of the Problem

Until the mid to late 1990s, estimates of the number of child deaths occurring during the neonatal period (the first month of life) were drawn from rough historical data rather than from specific surveys. For newborn deaths, more estimates that are rigorous emerged in 1995 and 2000, as data from reliable household surveys became available. Analysis of these data made it evident that previous estimates had seriously understated the scale of the problem **(http://www.who.int/reproductive-health/docs/neonatal_perinatal_mortality/index.html).** Although the global (NMRR) has decreased slightly since 1980, neonatal deaths have become proportionally much more significant because the reduction of neonatal mortality has been slower than that of under-five mortality. Between 1980 and 2000, deaths in the first month of life declined by a quarter, while deaths between one month and five years declined by a third. The latest evidence is that 4 million babies die each year in their first month of life, and up to half of these die in their first 24 hours – a child is about 500 times more likely to die in the first day of life than at one month of age. Neonatal mortality accounts for almost 40 per cent of all under-five deaths and for nearly 60 per cent of infant (under-one year) deaths (**Ritchie Centre for Baby Health Research, 2003)** The largest absolute number of newborn deaths occurs in South Asia – India contributes a quarter of the world total – but the highest national rates of (NMR) occur in sub-Saharan Africa. A common factor in these deaths is the health of the mother – each year more than 500,000 women die in childbirth or from complications during pregnancy, and babies whose mothers have died during childbirth have a much greater chance of dying in their first year than those whose mothers remain alive. Even these figures understate the large scale of the

problems that affect child health during the neonatal period (**Hyder,** 2003). For example, more than a million children who survive birth asphyxia each year go on to suffer such problems as cerebral palsy, learning difficulties and other disabilities. For every newborn baby who dies, another 20 suffer birth injury, complications arising from preterm birth or other neonatal conditions. Significant improvements in the early neonatal period will depend on essential interventions for mothers and babies before, during and immediately after birth.

The Lancet Neonatal Survival Series, published in **2005**, estimated that 3 million of the 4 million deaths could be prevented each year if high coverage (90 per cent) is achieved for a package of proven, cost-effective interventions that are delivered through outreach, families and communities, and facility-based clinical care across a continuum of neonatal care (antenatal, intrapartum and postpartum). While increasing skilled care is essential, the Neonatal Survival Series underlines the importance of interim solutions that can save almost 40 per cent of newborn lives in community settings. Actions required to save newborns include setting evidence based, results-oriented plans at the national level with specific strategies to reach the poorest, greater funding, agreed targets for (NMR) reduction, and promotion of greater harmonization and accountability on the part of stakeholders at the international level (**State of the world's children, 2008**).

The neonatal mortality rate for Latin America and the Caribbean is 15 per 1000, showing a narrow range of 14 (South America) to 19 (the Caribbean) per 1000 live births. Oceania's (NMR), at 26 per 1000, falls between those of Asia and Latin America, mainly because of high mortality in Melanesia. The highest number of neonatal deaths occurs in Asia, which is where most children are born. As mortality is very high in the South-central Asia sub region, over 40% of global neonatal deaths take place here, representing a challenge. Most deaths in the neonatal period occur in the first few days after birth. This applies to all regions of the world. Early neonatal deaths have obstetric origins similar to those leading to stillbirth **(United Nations Department of Economic and Social Affairs, 2002).** The global averages also hide important regional differences. The slowing down of progress started in the 1980s in the WHO African and Western Pacific Regions, and during the 1990s in the Eastern Mediterranean Region (EMR). The African Region started out at the highest levels; saw the smallest reductions (around 5% by decade between 1980 and 2000) and the most marked slowing down. In contrast, progress continued or accelerated in the

WHO region of the Americas, and the South-East Asia and European Regions. The result is that the differences between regions are growing. (**Deonis, 2003).** The rate of (NMRR) is fluctuating around 40 per 1000 live birth in the (EMR). Twenty-eight deaths per 1000 live births occur in the early neonatal period. Despite the rate of (NMR) mentioned above, still there are some variations between different nations. For instance, in Afghanistan, (NMRR) is 60 per 1000 live birth, of which, 45 deaths occurs in early neonatal period, while it is 22 and 17 in Iran respectively (**World Population Reference Bureau, 2006)**.

In Pakistan, neonatal mortality rate (NMRR) is 57 per 1000 live birth of which 38 deaths occur in the early neonatal period, while in Lebanon, 20 and 16, respectively. In Egypt, (NMRR) is 21 and 16, but in Jordan, it is 17 and 15, respectively. Looking at the figure of other countries, (NMRR) in Oman is six per 1000 live birth of which five deaths occur in the early neonatal period, meanwhile, it is only four deaths per 1000 live birth in Israel, of which three die in the early neonatal period (**World Population Reference Bureau, 2006**). In the Palestinian context, NMRR was 11.2 per 1000 live birth in whole Palestine in (2005) while it was 14.1 per 1000 live births in Gaza Strip according to ministry of health reports (**MOH, 2005**). In its annual report (2007), United Nations for Work and Relief Agency (UNWRA) estimated that (NMRR) was 17.1 deaths per 1000 live birth in Gaza strip, while it was 9.3 deaths per 1000 live birth in the West Bank (**UNWRA, 2007).**

Neonatal deaths and stillbirths in developed countries are falling. This is the result of changing patterns in reproductive health, socioeconomic progress and the quality of obstetric and neonatal facilities (**Chamberlain, 1991**). The rate of this decrease is the same for most developed countries, although where rates were high from the start, they have remained high. No good historical data on (NMR) and stillbirth rates are available for developing countries. Vital registration systems usually do not record and report stillbirths. The first global estimates of neonatal mortality, dating from 1983 (**Weekly Epidemiological Record, 1989**) were derived using historical data and are generally considered to give only a rough indication of the magnitude of the problem. Estimates that are more serious became available for 1995 and for 2000. These are based on national demographic surveys as well as on statistical models. The new estimates show that the burden of newborn mortality is considerably higher than many people realize.

2.3 Sources of Neonatal Mortality Data

Vital and Mortality Statistics

Reliable vital registration is available for only about one third of the world's population. For vital registration data to be considered reliable, WHO requires at least 85% reporting of both completeness and coverage of mortality (**WHO, 2005-b**) which is slightly different from the United Nations definition of 90% or more completeness of adult and infant mortality (**United Nations Department of Economic and Social Affairs, 2002)**. Assessments of reliability of national statistics are not available for all countries.

Survey Data

The reliability of mortality estimates calculated from prospective and retrospective birth or pregnancy histories collected in community studies depends on the completeness with which births and deaths reported. Underreporting of infant deaths is usually greater for deaths that occur very early in infancy (**Curtis, 1995).** In some cultures and societies, a pregnancy loss may never be reported (**Blanc and Grey, 2000**). Completeness and accuracy of recall, including age at death, may deteriorate with time, as in all surveys, and related to the skill and cultural sensitivity of the person carrying out the interview.

Hospital Data

Hospital studies are not an appropriate source of data for calculating mortality incidence unless all babies are born in a health facility.

2.4 Causes of Neonatal Mortality Globally

In general, neonatal deaths are the consequence of events usually associated with poor maternal health and non-availability of care during delivery or immediately after birth. Death usually originates from a cause that triggers a sequence of morbidities that ultimately precipitates death. It is, therefore, important from an epidemiological point of view to distinguish the originating causes from the direct causes, to apply interventions to remove the originating causes, thereby preventing the direct cause from operating. According to ICD-10 (**WHO, 2007**), an originating cause is defined as "the disease or injury which precipitated a train of morbid events leading directly to death."

Lawn, in (2005) described the causes of (NMR) worldwide, and he concluded that the primary direct causes of neonatal death worldwide were preterm birth (28 percent), severe infections (26 percent), and asphyxia (23 percent). Low birth weight (LBW) and maternal

complications in labor contribute significantly to (NMR). In addition, there is a direct proportional interrelationship between poverty and increased neonatal death. (NMRR) are 19 to 44 percent higher among the poorest families (**Lawn, 2005**).

In its report, the newborn health, the WHO stated that, the major medical causes of (NMR) are neonatal infections (33 per cent) i.e. neonatal tetanus, sepsis, meningitis, diarrhoea and pneumonia; birth asphyxia and trauma (28 per cent); pre-term birth and/or (LBW) (24 per cent); congenital anomalies (10 per cent); and other causes (5 per cent). Birth asphyxia, trauma, preterm and low birth weight are major contributors to morbidity in survivors (**WHO, 2003**). The report added that, deaths in newborns during the first week of life are due to conditions originating in pregnancy or during childbirth and are a result of inadequate or inappropriate care during pregnancy, childbirth, or the first critical hours after birth. After the first week, deaths are mostly due to infections acquired after birth, either at health facilities or at home in previously healthy babies. Most neonatal deaths whether during the period immediately after birth or later can be avoided with low-cost interventions that do not require sophisticated technology and can be implemented at all levels of the health system.

2.5 Determinants and Risk Factors

Risk is the probability that an event will occur. In epidemiology, it is most often used to express the probability that a particular outcome will occur following a particular exposure. A risk factor (a term only in use since the 1960s) is defined as: "an aspect of personal behavior or lifestyle, an environmental exposure, or an inborn or inherited characteristic which on the basis of epidemiological evidence is known to be associated with health-related condition(s) considered important to prevent". That is a broad and rather loose definition that leaves unanswered the issues of causal role, strength of association, and modifiability. The definition then goes on to list the several different meanings that have been ascribed to the term risk factor (Last**, 2001**).

Risk marker, an attribute or exposure that is associated with increased probability of disease, but is not necessarily a causal factor. Determinant is "an attribute or exposure that increases the probability of occurrence of disease or other specified outcome". Modifiable risk factor: "a determinant that can be modified by intervention, thereby reducing the probability of disease" (Last**, 2001**).

2.5.1 Socio-demographic Factors

It is doubtless that, different socioeconomic determinants significantly affect (NMR). The association between low socioeconomic level and mortality has been noted in several international studies (**Townsend and Davidson, 1982**). Women's literacy and level of education has repeatedly shown influence on the chances of infant and child survival (**Caldwell and Donald, 1982**). The inverse relationship between socio-economic factors of the parents and (IMR) and (CMR) is well established by several studies [Muhuri (1995); Forste (1994); Hobcraft, et al. (1984); Caldwell (1979); and Sathar (1985, 1987)] and it holds true irrespective of the overall level of mortality in the national populations (**The Pakistan Development Review, 2002)**. A matched population-based case-control study conducted in India by **Kabir, (2003)** has concluded that, lower caste, higher maternal age (>30 yrs), and father's lower educational level was strongly associated with (NMR) after controlling confounders by logistic regression. Unlikely, a surveillance nested case control study conducted in Brazil, (1991) explored that no significant associations were observed with socioeconomic status.

A similar conclusion was available at a study conducted in United Kingdom, (2004) that demonstrated that there was no direct evidence of an effect of social deprivation on the outcomes of interest. A study conducted in Malawi, (1995) reached to the conclusion that the most favorable conditions for child survival were: no preceding child; a preceding birth interval of 19 months or longer; maternal education of 9 or more years; and paternal employment in non-manual work.

The (IMR) in Nicaragua rapidly declined from 120 per 1000 live births in 1966 to 64 per 1000 live births in 1986. This decline in mortality rates was attributed to improved availability of health care services, better education facilities, especially for women and food supplementation programs. Infants living in a poor household had higher susceptibility to die than infants from a non-poor household did. Maternal education played a protective role only in poor households (**Pena, Wall, and Persson, 2000**).

A similar study conducted to assess trends in fertility and infant mortality rates in Leon, Nicaragua, observed that the decline in (IMR) was due to health interventions, specially targeted to poorer groups of women and their infants (**Pena, et al., 1999**).

2.5.2 Biomedical Factors

A study conducted by Rohina, (2003), concluded that there are two proximate determinants for (NMR), one is social, and the other is biomedical determinant. She added that, apart from the direct medical reasons, socioeconomic factors like, household factors, socioeconomic status of the family, social class, educational status of parents, occupation, etc, determine (NMR). Maternal factors like marital status, place of delivery; perinatal and Neonatal factors e.g., sex of the baby contribute towards (NMR). The biomedical determinants of (NMR) are those medical factors that determine the outcome of the pregnancy. They include maternal factors like age, parity, antenatal care, bad obstetric history, and pregnancy related complications. Perinatal and Neonatal factors like birth weight, gestational age, infection, and congenital malformations also constitute biomedical determinants (**Rohina, 2003).**

2.5.2.1 Maternal factors

To the knowledge of many researchers and literature, it is well known that maternal factors play great role in contributing to (NMR). Maternal factors start from the socio-demographic and economical perspective to pre delivery status, antenatal care, extend to factors of delivery, and finally to the period following it that is post natal care and utilization of health services.

Regarding the demographic and social effects of mother on (NMR), it was concluded that maternal schooling, higher maternal age (>30 yrs), marital status, and maternal education of 9 or more years; and paternal employment in non-manual work (**Madise and Diamond, 1995; Rohina and Kabir, 2003).**

A prospective population-based cohort study in urban Pakistan, has explored that, the obstetric factors associated with neonatal death were preterm labor (34%), intrapartum asphyxia (21%), ante partum hemorrhage (9%), infection (4%), congenital abnormality (4%) and intrauterine growth retardation (2%). No obstetric cause was found in 19% of cases (**Jehan et al., 2008**).

Crucial to mention that the relationship of parity with (NMR) was well presented and documented in (The Matlab study, Bangladesh). The relationship between high parity and infant mortality is one of the most promising associations that have been studied. It was not causal, as had long been assumed, but rather that women who experienced high levels of infant death attributed to higher parities. Almost half of women with seven or more births

had experienced the death of an infant, and 34% of them had two or more infant deaths (**Child Health Research Project Special Report, 2006**).

In studying the evolution of factors associated with (NMR) for 20 years, a study conducted in Rawanda, 2000 has explored that the presence of unfavorable conditions such as short interpregnancy period still affecting the neonatal mortality (**Beck, 2009**).

Shea Rutstein, in analysis of the Demographic Health Surveys from 18 countries, reported that the risk of (PNM) was highest in women with short and very long intervals between pregnancies. Women with less than 15 months between pregnancies, or more than 39 months, had a 43% greater chance of experiencing a perinatal death than women who spaced their pregnancies between 16 and 38 months (**Rutstein,and Roja,2003**). Women who waited 15–26 months between pregnancies had only an 11% risk of losing their child. Further, the risk of a perinatal death was highest in women with no previous children, and in women in the extremes of their reproductive years (<18 and >35–years of age). Education also affected (PNMR) —women with secondary or higher education had fewer fetal deaths than women with no formal education or one limited only to primary school. The risk of (NMR) was significantly higher in women with less than a 24-month birth interval, and women with no previous children. Again, the risk of (NMR) was highest in women at the extremes of their reproductive years. Boys had a 26% higher risk of dying than girls, and either sex of child was 22% more likely to die in the first month of life if his or her mother received no prenatal care. Importantly, antenatal tetanus vaccinations reduced the chance of neonatal death by almost 50%.

As concluded from the study conducted in Nigeria, 2006, the major determinants of neonatal deaths were teenage pregnancy, prematurity, (LBW), poverty and lack of skilled attendance at delivery. Addressing the basic determinants of (NMR) will improve newborn survival and health and this will significantly reduce mortality among under five children in developing countries (**Onayade, Sule, and Elusiyan, 2006**).

Out of the study conducted in Brazil, (2003) it was concluded that the more antenatal care visits, the less contribution to (NMR). The greater number of prenatal consultations was the protective factor for neonatal death, indicating the importance of care in this period of pregnancy outcome: a more frequent monitoring and strict pregnancy can identify early and prevent harmful situations for the newborn **(Machado, and Hill, 2003).**

Unlikely, there was no association either between the socio demographic factors or with pregnancy factors like marital status of the mother, maternal body weight in another case control study conducted in Brazil, (1991).

Similarly, another study conducted in India, (1998) came to the results of no association between (NMR) and parity and age of the mother but there was strong association between (NMR) and illiteracy, those who are living in rural slum area, those who did not complete antenatal care maternal complications during pregnancy particularly pre eclampsia and ante partum hemorrhage **(Chatterrjee, Das, Bhattacharya, and Rama, 1998).** However, **Hadar et al., (2005)**, came to the findings that , lower educational level, maternal age > 35 and high parity were found to be independent risk factors for an unplanned out of hospital delivery which contribute to neonatal mortality. In another study conducted by Kalter et al., (2001) in both Gaza Strip and West Bank, risk factors for perinatal death as assessed by multivariable logistic regression included preterm delivery, ante partum hemorrhage, any severe pregnancy complication, term delivery in a government hospital and having a labor and delivery complication, more than one delivery complication, mother's age >35 years and prim parity in a full-term pregnancy (**Kalter et al., 2001**).

Maternal supplementation with iron and folic acid was found to have effect on (PNM) and early (NMR) as was explained by a study conducted in china, (2006). The study showed a reduction in the risk of early (NMR) among infants born to women randomized to receive either iron-folic acid or multiple micronutrients compared with folic acid. The magnitude of the reduction (54%) was significant for the iron-folic acid group.

Little is known about the relationship of consanguineous marriage and (NMR). However, higher rates of neonatal and post-neonatal deaths, and deaths of children younger than 5 years were observed in consanguineous couples (**University School of Medicine of Monastir, 2007**). The inter pregnancy interval can have a relationship with (NMR) as was reported by a study conducted in Scotland in (1992). The study explored that women whose subsequent inter pregnancy interval was less than six months were more likely than other women to have had a first birth complicated by intrauterine growth restriction, extremely preterm birth, moderately preterm birth, or perinatal death **(Gordon, Jill, and Richard, 1992).**

Age of the mother at pregnancy was yet another determinant of (PNM) and (NMR). Children born to mothers at either a very young or very old reproductive age group were found less likely to survive. Teenage mothers are often biologically, economically, and socially ill prepared for child bearing. A short birth interval too is a health risk. Children born to mothers with a short inter pregnancy interval are at a greater risk of dying, in both rural and urban areas **(Galway, Wolff and Strugus, 1987).**

Research done on the effect of the place of delivery on neonatal mortality in Brazil concluded that children who were not born in a hospital had 1.9 times increased risk of neonatal death. Mothers who delivered at home were of low socio economic status and a lower education level (**Almeida et al., 1999**). The study of Campbell et al showed similar results in England and Wales **(Campbell et al, 1986**).

In spite of all studies conducted to explore the risk factors for (NMR), one can deduct that there is a similarity between different settings worldwide, and the factors affecting each other. These are for example, women's status in society, their nutritional status at the time of conception, early childbearing, too many closely spaced pregnancies and harmful practices, such as inadequate cord care, letting the baby stay wet and cold, discarding colostrums, and feeding. It is clear from the previous studies that, causes and determinants of neonatal deaths and stillbirths differ from those causing and contributing to post neonatal and child deaths. Neonatal deaths and stillbirths come from poor maternal health, inadequate care during pregnancy, inappropriate management of complications during pregnancy and delivery, poor hygiene during delivery and the first critical hours after birth, and lack of newborn care.

2.5.2.2 Prematurity and low Birth Weight

Data on the worldwide prevalence of (LBW) (birth weight of <2500 grams) are limited. Estimates based on UNICEF and WHO data for 1995-1999 indicate that 20.4 million (LBW) infants were born each year (**Save the Children, 2001**). WHO estimates that (LBW) affects 17 percent of neonates in developing countries and 6 percent in developed countries (**Save the Children, 2001**). An infant may be (LBW) because of either intrauterine growth restriction (IUGR) or preterm delivery (<37 weeks). Where (LBW) rates are highest, the proportion of (LBW) due to (IUGR) is also highest (**WHO, 1995**). Intrauterine growth restriction increases the risk of fetal and (IMR), can negatively affect health and development during infancy and childhood, and may increase the risk of developing certain chronic diseases during adulthood.

It is noteworthy to mention that there was debate on whether preterm labor (Prematurity) or (LBW) attributes to neonatal mortality in different literature. Low birth weight has long debated as one of the causes of neonatal deaths. It is associated with the death of many newborn infants, but not considered a direct cause. (**WHO, 2005b**) However, to the knowledge of some researchers, the main culprit is preterm birth and the complications coming from it, rather than low birth weight per se. This idea is contrary to a study

conducted by Pan American Health Organization, in (1988), which mentioned that low weight at birth related or not to prematurity could be referred to as one of the main risk factors for neonatal deaths.

Victora, Barros, and Vaughan in their longitudinal study, (1989) concluded that the risk for death for newborn infants with low weight at birth is 28- to 36-fold higher (**Victora , Barros, and Vaughan, 1989)** in comparison to that of newborn infants with birth weight greater than 2,500g.

Apart from this finding, it was also observed that pre-term (LBW) infants were five times as likely to die as term (LBW) infants (**Yasmin et al., 2001**)

In Bangladesh, it has been observed that low birth weight (<2500 grams) approximately doubles the (NMR) in peri urban settings. In the study, very (LBW) (<2000 grams) formed only 7% of the LBW babies, but contributed towards 30% of the mortality. Other factors have also been associated to greater risk for neonatal death, such as low vitality at birth (indicator of hypoxia) (**Dors, 1998**), maternal age younger than 15 years (**Accioly, 1993**) and multiple gestations **(Coutinho, 1996**).

Waldron, (1987) in his study concluded that there is no difference between developing and developed country regarding low birth weight as a risk factor for (NMR). He also ascertained that (LBW) (<2.5 kgs or 5.5 pounds) at birth, experience higher mortality from all causes (**Waldron, 1987**).

2.5.2.3 Congenital Malformation

Around 1% of infants have a major congenital anomaly. These anomalies are more common in developing than in developed countries, especially those caused by diseases such as syphilis, or by nutrient deficiency, which leads to neural tube defects and cretinism.

Genetic and congenital disorders are responsible for a considerable proportion of perinatal and neonatal mortality in many countries in the Region. Congenital malformations are now recognized as the leading cause of infant mortality in the United Arab Emirates (UAE) (**United Arab Emirates, Ministry of Health, 1992**) and the second leading cause in Bahrain, Kuwait, Oman and Qatar (**Qatar, Ministry of Public Health, 1993**). Reports from Saudi Arabia indicate that about 25%-35% of perinatal deaths in two hospitals were attributed to congenital malformations (**Annuals of Saudi medicine, 1990**).

On the other hand, world health organization in its annual report of estimate of mortality of neonate, explained that babies die after birth because they are malformed, are born very

prematurely, suffer from obstetric complications before or during birth, have difficulty adapting to extra uterine life, or because of harmful practices after birth that lead to infections. (**WHO, 2006).**

2.5.2.4 Infections

Limited epidemiological research indicates that the principal direct causes of neonatal death are infectious diseases, birth asphyxia, birth injuries, and the sequel of preterm birth and birth defects. During the early neonatal period (0-7 days), the major causes of death are asphyxia, infection, complications of prematurity, and birth defects; infections cause most late neonatal deaths (8-28 days) (**Lawn et al., 2001**). Infections are the major cause of mortality and morbidity in infants under 3 months of age in developing countries. More than 20 percent of children born in developing countries acquire an infection during the neonatal period, leading to an estimated 30 to 40 percent of all neonatal deaths (**Stoll, 2000**). Most of these deaths are caused by acute respiratory infections, bacterial sepsis and/or meningitis, neonatal tetanus, and diarrhea). Maternal infections, including sexually transmitted diseases (STDs) such as HIV and syphilis, can be transmitted to the fetus or newborn in utero, through contact during labor and delivery, and in some cases, through breastfeeding.

Pneumonia and other acute respiratory infections (ARIs) account for up to a quarter (**Pan American Health Organization, 1999**) or perhaps more of all under 5 (CMR), but it is difficult to determine the incidence of neonatal (ARI) in developing countries because many sick neonates are not referred for medical care. The risk of death due to (ARI) is highest in young neonates and decreases with age.

Most (ARI) deaths are due to pneumonia, which annually kills more than 3 million children under the age of 5 in developing countries **(Garenne et al., 1992**). Like sepsis, neonatal pneumonia may have an early onset if acquired from the maternal genital tract or a late onset due to infection from the hospital or home environment. Bacterial pneumonia is the most common; streptococcus pneumoniae is the most frequent cause. Low birth weight is associated with higher mortality **(Misra et al., 1991**). The risk of pneumonia increases in infants who are of (LBW) and/or malnourished, and in those who are not breastfed (**Victora et al., 1999**). In preterm neonates of low birth weight, respiratory distress syndrome, due to surfactant deficiency, is a major risk for early death. Information on the prevalence of this disorder in developing countries is especially difficult to obtain because most infants of very low birth weight (those weighing less than 1500 grams, who are at greatest risk) die soon

after birth. In these cases, causes of death other than prematurity are poorly recognized (**Mlay and Manji, 2000).**

2.5.2.5 Birth Asphyxia

Birth asphyxia is defined by the World Health Organization as "the failure to initiate and sustain breathing at birth."(**http://www.who.int/reproductivehealth/publications.html**).

It is worthy to say that, birth asphyxia is one of the major causes of neonatal mortality. Most of the studies have concluded that it is one of the top priorities associated with neonatal mortality. This was clear in a study conducted in Egypt, 2000 in which the researcher clarified that birth asphyxia constituted 28% of neonatal death. In another prospective population based cohort study in urban Pakistan study, the same finding was available which illustrated that birth asphyxia was the second rank cause of neonatal mortality following immaturity related causes (**Jehan et al., 2003**). In another study in India, it was found that birth asphyxia contributes to 31% of neonatal deaths (**Kaushik et al., 1995).** Similarly, birth asphyxia contributed to 30% of neonatal mortality in community based cohort study conducted in Nepal (**Ann et al., 2008**).

2.5.2.6 Birth Injury

Birth injury is a nonspecific term that includes potentially preventable and unavoidable injuries—mechanical or hypoxic-ischemic—suffered by the neonate during labor and delivery. Specific injuries include intracranial hemorrhage; blunt trauma to the liver, spleen, or other internal organs; injury to the spinal cord or peripheral nerves (the most devastating is cord transaction; the most common is brachial plexus injury); and fractures to the clavicles or extremities.

Although WHO has estimated that birth injuries is responsible for 11 percent of neonatal deaths worldwide (**WHO, 1996**), the incidence of specific injuries in most developing countries is unknown. Birth injuries can result in transient neonatal problems, long-term morbidity, and death. Predisposing factors include macrosomia, cephalopelvic disproportion, dystocia, prolonged or obstructed labor, breech presentation, and prematurity. Although injury may occur despite skilled care at delivery, some injuries result from inadequate medical knowledge or lower care during labor and delivery and are therefore potentially preventable. A specific diagnosis is preferable to the use of the nonspecific term "birth injury," especially when considering prevention strategies.

2.5.2.7 Hypothermia

Hypothermia, defined as a body temperature below 36.5°C, is frequent in newborns, especially those of low birth weight. Several studies have shown that without adequate care, many newborns will experience hypothermia, reaching core temperatures lower than 32°C (**Ellis et al., 1996**). Neonatal hypothermia has been reported to increase the risk of infection, coagulation abnormalities, acidosis, complications of preterm birth, and death (**Dragovich et al., 1997**). Dragovitch et al. (1997) evaluated the knowledge and practices of health professionals on thermal control of newborns in seven countries: Brazil, India, Indonesia, Kazakhstan, Mozambique, Nepal, and Zimbabwe. They found that thermal control practices were frequently lacking in the following areas: ensuring a warm environment at the time of delivery, initiation of breastfeeding and contact with the mother, bathing, checking the baby's temperature, thermal protection of low-birth-weight neonates, and care during transport. The study also demonstrated that health professionals involved in newborn care underestimate the impact of hypothermia on neonatal morbidity and mortality. A survey of health professionals involved in newborn care in an Indian hospital revealed similarly weak knowledge of hypothermia diagnosis and care; for example, fewer than one-fifth of the respondents knew the correct method of measuring the body temperature of a newborn (**Choudhary et al., 2000**).

2.5.2.8 Neonatal Jaundice/Hyperbilirubinemia

Since most births occur at home in developing countries, the magnitude of this problem is unknown. Although a relatively rare cause of death in neonates, untreated extreme bilirubinemia can cause devastating neurologic injury, long-term disability or death. The major risk of untreated hyperbilirubinemia is bilirubin encephalopathy or kernicterus (**Dennery et al., 2001**). However, Rh disease remains a problem in developing countries, where most women deliver at home, blood type is unknown, and Rhogam is not available. Kernicterus or bilirubin encephalopathy results include extra pyramidal abnormalities, choreoathetosis, involuntary muscle spasms, and sensorineural deafness. In spite of the above mentioned, krnicterus remains one of the associated factors with (NMR) and morbidity.

2.5.2.9 Diarrheal Diseases

Several community-based studies suggest that diarrhea is responsible for approximately 3 percent of all neonatal deaths (**Stoll, 2000**). Diarrheal diseases tend to occur with greatest frequency among children aged 6 months to 2 years. Some factors common to developing countries—home delivery; relative segregation of newborn infants for a period of time after birth; and the high prevalence of early, exclusive breastfeeding—protect against neonatal diarrhea. Among hospitalized newborns in developing countries, nosocomial diarrhea is an important problem (**Aye et al., 1991**). However, currently diahhraoal disease is not any more among the leading causes of death in Palestine, rather it is regarded as one of the morbidity causes rather than mortality issues

2.5.2.10 Breast Feeding and Neonatal Mortality

In most developing countries, nearly all women breast feed in the first month of life, but often breast feeding is delayed beyond the first hour after birth, and exclusive breast feeding is not usually practiced. Policies and training of staff of maternity centers and hospitals can encourage early initiation of breast-feeding and exclusive breast-feeding. Midwives can support community-based efforts to support exclusive breast-feeding.

Breast-feeding plays an important role in reducing (NMR) and should be strongly emphasized by programs attempting to reduce (NMR). Breast-feeding helps prevent hypothermia and hypoglycemia in newborn babies, which are contributory causes of early neonatal deaths especially among (LBW) and premature babies. During the late neonatal period, most deaths in developing countries are due to infections such as sepsis, acute respiratory tract infection, meningitis, omphalitis and diarrhea. Feeding colostrums and breast feeding, especially exclusive breast-feeding protect against such deaths (**Sandra,and Elizabeth, 2002).**

Promotion of early initiation of breastfeeding has the potential to make a major contribution to the achievement of the child survival millennium development goal; 16% of neonatal deaths could be saved if all infants were breastfed from day 1 and 22%, if breastfeeding started within the first hour. Breastfeeding-promotion programs should emphasize early initiation as well as exclusive breastfeeding. This has particular relevance for sub-Saharan Africa, where neonatal and infant mortality rates are high but most women already exclusively or predominantly breastfeed their infants. The risk of neonatal death

was fourfold higher in children given milk-based fluids or solids in addition to breast milk in a study conducted in Ghana. There was a marked dose response of increasing risk of neonatal mortality with increasing delay in initiation of breastfeeding from 1 hour to day 7 (**Karen,et al., 2006).**

The benefits of breastfeeding for the health and wellbeing of the mother and baby are well documented. WHO recommends early (i.e. within one hour of giving birth) initiation of breastfeeding. A recent trial has shown that early initiation of breastfeeding could reduce neonatal mortality by 22%, which would contribute to the achievement of the (MDG). Globally, over one million newborn infants could be saved each year by initiating breastfeeding within the first hour of life. In developing countries alone, early initiation of breastfeeding could save as many as 1.45 million lives each year by reducing deaths mainly due to diarrhoeal disorders and lower respiratory tract infections in children (**Lauer et al., 2006**).

In many parts of the world, the rates of early initiation of breastfeeding are extremely low: 17% in Eastern Europe and Central Asian countries, and 33% in Asia-Pacific. The highest rates (about 50%) are in Latin America, the Caribbean, East and North Africa. In South Asia, 24%–26% of babies born in Bangladesh, India and Pakistan are breastfed within the first hour of birth, whereas the corresponding rate for Sri Lanka is 75% (**http://www.worldbreastfeedingtrends.org/reportcard/RC-IB.pdf)**.

The effect of these breastfeeding patterns is reflected in the (NMRR) for these countries: 40–50 per 1000 live births for Bangladesh, India and Pakistan, while in Sri Lanka the rate is as low as 11 per 1000 live births. The impact of early initiation of breastfeeding on infant mortality and its economic advantages are well known. Yet, little attention has been paid by health-care practitioners and policy-makers to this simple preventive strategy, except for annual campaigns that aim to highlight its importance, such as the World Breastfeeding Week (**http://www.worldbreastfeedingweek.net**).

2.6 Interventions to Reduce Neonatal Mortality

Many risk factors affecting the outcomes of mother, fetus, and neonate overlap. The main medical causes of death and disability among neonates (including infection, asphyxia, preterm birth, and intrauterine growth restriction) are associated with poor maternal health

and nutritional status. For example, women in developing countries who give birth to growth-restricted neonates may themselves have been growth-restricted infants and been undernourished since childhood. Chronic maternal infections, such as malaria, further increase the risk of growth restriction.

More directly, poor management of labor and delivery can cause maternal or neonatal infection, exacerbate obstetric complications such as hemorrhage, prolonged and obstructed labor, and hypertensive disease of pregnancy and increase the risk of fetal or neonatal asphyxia. A mother's death is associated with markedly reduced survival of her children, especially infants and daughters of any age (**WHO, 1998**). The important link between the health of mother and baby should be recognized with combined efforts to improve maternal, fetal, and neonatal health (**Stoll and Measham, 2001).**

Reducing (NMR) and morbidity often involves established interventions or strategies along with the means to make them effective in each setting. For many conditions, improved education and behavioral change among women, families, and health care providers would have a major impact on birth outcomes. For direct impact, emphasis must be given to the delivery of care: getting appropriate services to those who need them and doing so in a timely manner. The strategies of reducing (NMR) should be comprehensive and holistic in approach so that it will start from the period of pregnancy until the postnatal care period. This means that emphasis will be upon the antenatal care, intra natal care, care of the newborn, and the postnatal care. Not forgetting the interventions at the level of community. It came to the knowledge of the researcher that, socio demographic influence is of relationship with the (NMR), so all efforts should be driven to the improvement of the socio economic and demographic atmosphere of the newborn deliveries. It is not only to correct the medical perspective of the issue rather all determinants of health should be tackled in order to cover the comprehensive approach of the intervention.

2.6.1 Antenatal Care

Medical factors that may contribute to neonatal morbidity and mortality include several components that can be directly addressed by antenatal care: poor maternal health and nutrition, maternal infections, and lack of immunization against tetanus (**Villar et al., 2001)**. Equally, important, antenatal care can teach mothers to recognize signs during pregnancy, labor, and delivery and encourage them to plan clean and safe deliveries—

preferably with trained assistance (**Bloom et al., 1999**). Appropriate antenatal care also includes explaining the benefits of breastfeeding, childhood immunization, and personal and domestic hygiene, and teaching parents to recognize danger signs that can occur in newborns.

It is noteworthy that maternal education has a significant and far-reaching impact on antenatal care. Better formal and health education of girls leads them in later years to seek preventive services, increase food intake during pregnancy, reduce tobacco and alcohol use, understand the implications of danger signs during labor and delivery, and seek referral care for obstetric and/or newborn complications (**Ahmed et al., 2001**).

Evidence from several randomized trials indicates that similar maternal and neonatal outcomes could be obtained from antenatal care in as few as five visits (on average) by focusing on interventions known to be effective in reducing morbidity and mortality (**Villar et al., 2001**). Counseling on birth preparedness and emergency readiness, provision of folic acid, tetanus immunization, and early detection and timely management of certain diseases could be one of the fundamental benefits of antenatal care. In addition, recognition of the danger signs of complications of severe anemia, hypertension and proteinuria, asymptomatic bacteriuria, urinary tract infection, syphilis, and other sexually transmitted diseases prevalent in the local population, and concurrent conditions such as hepatitis, and tuberculosis could be very crucial when addressing antenatal care in reducing strategies.

A multimember randomized, controlled trial conducted in more than 50 clinics in Argentina, Cuba, Saudi Arabia, and Thailand concluded that women assigned to the new model of essential antenatal care that called for an average of five visits per pregnancy had similar rates of low birth weight, postpartum anemia, urinary tract infection, and several secondary outcomes to those of women entitled in a standard antenatal care program with an average of eight visits (**Villar et al., 2001**). This finding is further supported by a systematic review of seven randomized controlled trials that assessed the effectiveness of different antenatal care models in reducing adverse outcomes for mother and infant (**Carroli et al., 2001**).

2.6.2 Care during Labor, Delivery, and the Very Early Neonatal Period

Complications of pregnancy and childbirth, a leading cause of death and disability among women of reproductive age, can also cause neonatal illness and death. Every pregnancy is at risk for complications, most of which can be managed successfully if recognized and addressed in a timely manner. However, the fact that the majority of births in developing countries occur outside hospitals and other health care facilities presents special challenges **(WHO, 1999).**

One such challenge is the use of poor aseptic techniques during labor and delivery, which lead to maternal and neonatal infections. The birth attendant can play a critical role in preventing infections of the mother and newborn by observing the need for clean hands, clean perineum, clean delivery surface, clean instruments, clean cord care, and use of an appropriate clean delivery kit.

The goal is for every delivery to be assisted by a skilled birth attendant such as a midwife, physician, or nurse. When providing a clean and safe delivery, a trained birth attendant recognizes complications such as preterm birth, preterm or prolonged rupture of membranes, and prolonged or obstructed labor and can promptly refer the patient to a health facility with essential obstetric and neonatal care. Skilled interventions are key for saving neonatal and maternal lives during labor, delivery, and the very early neonatal period **(WHO, 1999).**

According to different researchers, intervention to reduce (NMR) can not be applied universally because of different situations of the regions, some of the interventions can be applied to only high income countries while can be applied to both high and low income countries. For example, prevention of mother newborn transmission of AIDS can be applied only areas in which the disease is endemic.

2.6.3 Essential Newborn Care at the Time of Birth

World Health Organization defines essential newborn care as the care of the newborn at birth, including cleaning, drying, and warming the infant; initiating exclusive breastfeeding early; and caring for the cord. Essential care of the newborn is necessary for all infants and is ideally provided by a skilled attendant, but in the absence of skilled care, alternative

cadres of workers can carry many of the tasks out at home. World Health Organization's essential care package includes resuscitation (**WHO, 2003**).

Clean care of the umbilical cord (clean blade and tie) is important in reducing the incidence of neonatal tetanus and umbilical sepsis, but evidence for topical treatment of the cord remains unclear (**Zupan and Garner, 2000**). Hand washing is important at all levels of care. Hypothermia is an important and preventable contributor to morbidity and mortality, especially in preterm babies. The so-called warm chain involves ensuring that childbirth takes place in a warmed room, drying the newborn, encouraging skin-to-skin contact between the newborn and the mother, and avoiding bathing for at least 12 hours (**Lawn, Carthy, and Ross, 2001**).

The effects of exclusive breastfeeding have been intensively studied, and the positive effect on infant mortality is unequivocal, although studies often do not specify the effect on neonatal mortality and morbidity. The World Health Organization collaborative trial found the risk of mortality in (no breastfed) neonates to be 2.5 to 7.0 times greater than for breastfed neonates (**WHO Collaborative Group, 2000**). The practice of keeping well babies close to their mothers and allowing feeding on demand increases breastfeeding rates, reducing both hypothermia and nosocomial infections.

The effect of essential newborn care has not been formally tested as a package, although exclusive breastfeeding, cleanliness, infection control measures, and hypothermia avoidance all individually reduce neonatal mortality and morbidity. Nevertheless, only 11 percent of babies in South Asia and 14 percent in Sub-Saharan Africa are exclusively breastfed to three months. The Bellagio group (Child Health and Nutrition Research Initiative) estimated a 15 percent reduction in the (NMR) through 99 percent coverage of exclusive breastfeeding and an 11 percent impact reduction through clean delivery (**Jones, et al., 2003**). Cautiously, an essential newborn care package may result in a 10 to 25 percent reduction in the (NMR), but field trials of a combined package are still required. No economic assessments were identified.

2.6.4 Family-Community Care of the Newborn

Family care of the newborn is important for all newborns. It includes promoting positive behaviors such as breastfeeding and demand for health care throughout the neonatal period

and afterward. Cleanliness (for example, cord care and hand washing), warmth provision, and exclusive breastfeeding reduce neonatal illnesses, especially infection. Implementation of this approach will depend on the setting, the coverage of facility delivery, and the availability of community workers or other channels but is feasible even in poorly developed health systems (**Knippenbergv, et al., 2005**). The role and value of the mother are central.

A cluster-randomized trial in rural Nepal, where 90 percent of women deliver at home, also used female facilitators working with women's groups. Comparing the 12 intervention villages with their paired villages showed a 30 percent reduction in the (NMRR) [mainly late (NMRs)] mediated through increased health seeking and improved home behaviors (such as doubling the rates of practices such as hand washing and use of clean delivery kits) and strengthening of the health system (**Manandhar , et al., 2004**).

A family-community package promoting good home care of the newborn—particularly cleanliness, warmth, and exclusive breastfeeding—would have an expected reduction in the (NMRR) of 10 to 40 percent, the effect might be greater if the package successfully addressed harmful local practices. The effect of early care seeking for illness will depend on the capacity of the primary and referral health care levels to manage neonatal illness. Many questions remain about how best to work with families and communities, given widely differing cultures and behaviors and the varying capacities of existing community health workers (**Darmstadt, et al., 2005**), and about the wider application of demand subsidies.

2.6.5 Newborn Resuscitation

Approximately 5 to 10 percent of newborns do not breathe spontaneously and require stimulation. About half of those have difficulty initiating breathing, requiring resuscitation (**WHO, 1998**). The major reasons for failure to breathe include preterm birth and acute intrapartum events resulting in hypoxic brain injury. A skilled birth attendant must be competent in newborn resuscitation technique.

Evidence is growing that most newborns can be successfully resuscitated without the use of oxygen (**Saugstad, 2001**), although a small proportion of infants require such advanced resuscitation techniques as endotracheal intubation, oxygen, chest compression, or drugs.

A study by **Massawe , et al., (1996)** in two teaching hospitals, one in Tanzania and the other in India, found that resuscitators using oxygen bag device could maintain a maximum of only 20 breaths per minute, one-third of the recommended rate. Low-cost (less than US$5) versions of the bag and mask are now available, and it is the recommended device for resuscitation.

If traditional birth assistants attend, say, 20 deliveries a year, they would encounter a baby requiring resuscitation an average of only once a year, so the effect would be lower, and the cost per life saved higher, compared with a facility-based midwife who does 200 or more deliveries a year. Thus, more research is required before home resuscitation by traditional birth assistants can become a widespread policy. In the meantime, it should be ensured that where skilled attendants exist, they have the skills and equipment to perform neonatal resuscitation.

2.6.6 Emergency Care for the Newborns

For many of the world's 4 million neonatal deaths, the immediate cause is a neonatal illness presenting as an emergency either soon after birth (such as complications of preterm birth and asphyxia) or later (because of neonatal tetanus or community-acquired infections). Other important but less prevalent conditions include jaundice and hemorrhagic disease of the newborn. Many serious neonatal problems present with similar signs: inability to feed, breathing difficulty, and temperature instability. All those conditions have high fatality rates, particularly neonatal tetanus (Institute of Medicine 2003) and neonatal encephalopathy and preventive interventions may be the most realistic option in those conditions. Early phototherapy for jaundice reduces both mortality and chronic disability subsequent to kernicteris and it is feasible **(WHO 2003).** Usually it focus on the clinical neonatal management of infection, which is the most prevalent illness and the most feasible .A meta-analysis of community-based trials of case management of pneumonia in Africa and Asia yielded that a reduction of 27 % of (NMRR) (**Sazawal and Black, 2003**).

A study in rural India included injectable penicillin, reported a 62 percent reduction in the (NMRR) with a home-based package for neonatal sepsis that included injectable gentamicin, although this reduction may be related to a number of simultaneously introduced interventions in addition to the gentamicine.

2.6.7 Neonatal and Maternal Immunization

Maternal and neonatal immunization is an increasingly promising strategy given the threat of antibiotic resistance. In developing countries, however, issues of vaccine cost, availability, delivery, and efficacy in the field are major barriers to the use of vaccines established as safe and effective. A variety of neonatal immunization strategies have already proven successful. For example, the bacillus Calmette-Guérin (BCG) vaccine—a live attenuated strain of Mycobacterium bovis—is widely used in developing countries where (TB) is a common and potentially fatal disease. A meta-analysis of BCG studies involving newborns and infants concluded that the vaccine was effective for up to 10 years after infant vaccination, and that it reduced the risk of infection, on average, by more than 50 percent (**Colditz et al., 1995**). Likewise, hepatitis B vaccination of newborns has been shown to be effective in preventing neonatal infections and their sequelae. Studies from both industrialized and developing countries have shown that hepatitis B vaccine administered in the immediate newborn period can significantly reduce the rate of neonatal infection and the development of a chronic hepatitis B surface antigen (HBsAg) carrier state. In 1992, WHO recommended that all countries add hepatitis B vaccine to their routine childhood immunization programs **(WHO, 2002).**

Other promising vaccines require additional research. After successful vaccination of young children against Streptococcus Pneumoniae, studies in South Africa will evaluate the safety and immunogenicity of protein conjugate pneumococcal vaccines for neonates (**Klugman, 2001**). Rotavirus vaccines are being developed to prevent severe diarrheal disease, an important cause of infant and child mortality in developing countries (**Glass et al., 1997**). Since children in developing countries experience most severe episodes of rotavirus diarrhea in the first year of life, rotavirus vaccination should be delivered early, possibly at birth. Further studies are needed on the efficacy and safety of rotavirus vaccines for neonates in developing countries (**Glass et al., 1997**).

2.7 Infant and Neonatal Mortality in the Palestinian Context

There are two sources for estimation of (IMR) and (NMRR) in the OPT. The first source is the official vital statistics reported by the Palestinian Ministry of Health (MOH), where the MOH collects and analyses the data of child and infant mortality using the official notifications of live births, stillbirths, and death certificates **(MOH, 2004**). The current

system of vital statistics is good but incomplete, whereas 98.7% of children have birth certificates before reaching their fifth birthday (**PCBS, 2007**). The second source is the various surveys, which completed in the last years. The Palestinian Central Bureau of Statistics (PCBS) has completed a series of four Demographic Health Surveys (DHS) over the last 12 years. The United Nations for Relief and Work Agency for Palestine Refugees in the Near East **(UNRWA)** has conducted a series of three surveys using the Preceding Birth Technique in order to estimate infant and child mortality rates indirectly in the five fields of its operations, including Gaza Strip and West Bank. It is worthy to notice that while the neonatal mortality rate in the Gaza Strip has increased by about 50% from 1994 to 2007, the post-neonatal mortality rate has decreased by about 50% during the same period, leaving the infant mortality at the same level (**MOH, 2005).**

2.8 The leading Causes of Neonatal Mortality in Gaza Strip

According to the 2007 data of the Ministry of Health, premature births and (LBW) were the main causes of (IMR), constituting 25.7% of (IMR) in the Palestinian Territory. The percentage is higher in Gaza Strip in comparison with the West Bank at 36.2% and 13.4%, respectively. The third highest cause of (IMR) is respiratory system infections, which causes 24.1% of infant mortality in the Palestinian Territory: 40.1% in the West Bank, and 10.3% in Gaza Strip. On the other hand, prenatal conditions constitute the main cause of mortality among fewer than five years children, causing 44.1% of fewer than five years children mortality 46.7% in the West Bank and 41.9% in Gaza Strip **(PCBS, 2007**).

The leading causes of infants' death in 2007 in the Gaza Strip were Premature and (LBW) deaths with a proportion of 28.1%, Congenital malformation (26.7%), acute respiratory infections(19.2%), ill-defined cause (6.9%), Infectious diseases, including septicemia (4.5%), others (6.3%), gastroenteritis(1.7%), and birth trauma (0.6%) **(UNWRA, 2007)**. Deaths due to (LBW) or prematurity and congenital anomalies were more likely to occur during the early neonatal period and during the late neonatal period, while deaths due to respiratory infections were equally distributed between neonatal and post neonatal period **(UNWRA, 2007).**

Reported official vital statistics show that, (IMR) in Gaza Strip has declined substantially from 86 deaths per 1000 live birth in 1970 to 69.3 in 1975, 43 in 1980, and 33.4 in 1985. (**Heiberg and Ovenson, 1993**). However, this impressive decline has arrested in the mid 1980s **(Pedersen, 2000**). The overall trend in (IMR) over the last two decades shows

stabilization at a rate of around 30 infant deaths per 1000 live births before the establishment of Palestinian Authority. It showed a fluctuation around 25 deaths per 1000 births in the last 10 years (**Annex 8**).

Chapter III

Methodology

The researcher described the proposed methodology of the study after reading many literature and assessment of its reliability and feasibility. It started with design, population and setting of the study, and ended with the instruments, data collection, data processing, and data analysis considering validity and reliability of work. The selection criteria, limitation of the study and ethical consideration were all elicited

3.1 Study Design

The proposed study design was population based matched case control study with one to two (1: 2) matching. This type of study was proposed because it explores more than one exposure for a single outcome. Morever, it is efficient in both time and costs and it requires few subjects and logistics. This type of design is quite new because most of the earlier studies were hospital based and or cross sectional surveys. Finally, the use of the random effect multilevel modeling that took into account the hierarchical structure of the data as well as the variability within the community, household and individual levels better estimate the level of association of the study factors with the outcome.

3.2 Study Population

The study population was all available official reported cases of neonatal death that died after birth and within 28 days after delivery in Gaza Strip in 2008, and another group of controls who were alive in the same period.

3.3 Setting of Study

The study was conducted at community level (household level level) in all Gaza Governorates. All cases were obtained from the vital registration office at the ministry of interior, Gaza, 2008 and matched controls were collected accordingly by birth date, gender, and location.

3.4 Sample Size

For calculation of the sample, the researcher employed the Epi-info software version 6.04 using the following parameters: prevalence of exposure to risks for live neonates, prevalence of exposure to risks for neonatal deaths, and magnitude of difference of exposure to risks between the groups of the study, in relation to variables of low birth weight, prematurity.

These parameters were based on literature review and consultation with experts in the field of study.

Based on Epi info calculation, the sample size was 894 neonates with 298 cases and 596 controls based on 2% exposure in not ill group, at confidence interval of 95% ,a power of 80% and OR= 3.49. Controls were selected and matched by age, locality and sex from the national birth registry.

3.5 Sampling

The researcher prepared the main frame for all neonatal mortality in Gaza Strip, 2008, from the national birth registry, ministry of interior. The researcher considered 298 cases that were prepared by systemic random generation of the interior ministry, the first case was also randomly generated and 596 corresponding controls. Out of this list, only 220 of the cases and 495 of the controls could be addressed. Inaccessibility of both cases and controls was decided after visiting the nominated address 3 times. In fact, replacement of inaccessible cases and controls were considered in advance, but the matching criteria could limit this issue. Concerning the exclusion of both cases and controls, this occurred due some reasons that not consistent with the inclusion criteria e.g. neonatal age more than 28 days, travel of family outside the country and others.

3.6 Research Instruments

The researcher adopted quantitative approach relying on the research tool to meet the study objectives and enhance credibility as well. The research tool was structured questionnaire, which was partly adopted from verbal autopsy questionnaire prepared by WHO, 1999 in the developing countries, and partly by some ideas, which rose up after validation by some experts in the field of research and clinical practice. The study tool when was designed, relied on literature review, experience, field observation of the researcher, and consultation of some consultants. It was arranged in a logical sequence to facilitate the interview.

All possible care was taken with respect to the anonymity and confidentiality of information in all stages of the study. The mother of each case and control who was included in the study was interviewed, about certain subjects such as birth weight of the neonate directly after delivery, socioeconomic backgrounds, maternal age, maternal schooling, maternal health status during pregnancy, parity, history of previous child death in the family, the type of marriage of the parents, birth spacing, gestational age during delivery, the type and the place of delivery, the influence of health service delivery on the outcome of birth and other

conditions related to the neonatel survival and death in the Palestinian context. The questionnaire was pre tested and considered cultural implications. The interview time was 15-20 minutes.

Validity

The verbal autopsy questionnaire was adopted partially after reviewing related literature and consulting the concerned staff work in the field of public health and neonatal health. In order to increase the content validity of the questionnaire, it was delivered to eight experts, (six of them are experts in the public health research and the two are experts in neonatal health practice) for enhancing validation and avoiding unnecessary information. The validated questionnaire was discussed with them and a significant modification was introduced into it and therefore, increasing its clarity, relevancy and simplicity.

Reliability

Selection of seven data collectors was based on the results of interview that was conducted by experienced interview board. One of them was nominated as field supervisor. The data collectors have good experience in the field of collecting data at the level of household; some of them participated in surveys that were conducted by PCBS. Others participated in surveys conducted by Beir Zeit University on gender. Most of them having Bachelor degrees and few having Diplomas of different subjects like, economics and political science, psychosocial counseling, and social studies After selecting them, a training course was conducted by the researcher for 5 days to ensure clarity and relevance of the questionnaire. All medical terms of the questionnaire and some topics were explained and even demonstrated in front of the data collectors to enable them to simplify the questionnaire in front of interviewed mother. Piloting of 5% of the sample size was conducted to test the relevancy of the instrument. The field supervisor was assigned to monitor the performance of the data collectors. Quality check was executed by the supervisor by re interviewing 5% of the mothers of the study population and it was satisfactory. The collected questionnaire was regularly revised and entered in the pre-designed database of the SPSS program.

3.7 Data Collection

It is worth mentioning that, a training course was conducted for seven data collectors for a period of 5 days. All vague points were well explained by the researcher.

Before starting data collection, all questionnaires forms were prepared, organized, and numbered with serials to ensure the availability of all forms and to identify the subjects' completion of the study sample without errors. Comments of the data collector and fieldwork supervisor were added to the questionnaire for further evaluation and clarifications. Both cases and controls were identified with the help of registers in the Ministry of Interior, and UNRWA clinics. The researcher adopted the case definition of (WHO) criteria for neonatal death and this reliance was strictly adhered. Some data were crossed checked with the family certificates to prevent recall bias.

3.8 Response Rate

In such closed communities like Gaza strip, the response rate is expected to be high. The current study showed such high response rate (95%), among respondents of the study population. This high percentage could be related to the fact, people in Gaza are under continuous tense conditions, they like to debrief or elaborate some thing, and they wait for sympathy from others. Around 78 cases and 101 were excluded either due to inaccessibility, or due to conditions not applied to the inclusion criteria e.g. neonatal age more than 28 days, travel of family outside the country, controls are not purely matched. Some of the respondents were not available because many people changed or lost their addresses particularly after the Israeli war against Gaza, December 2008.

3.9 Eligibility Criteria

Inclusion Criteria

Singleton newborn infant who died in the neonatal period that is from after birth to 28 days in this period in 2008. Neonatal deaths were defined as those that occurred during the neonatal period commencing at birth and ending at 28 days completed after birth. Two controls were matched for each case, based upon sex and locality, and nearest one week of childbirth.

Exclusion Criteria

Twins were excluded. In fact, the researcher excluded twins based on assumption that it will affect the results of the study (Twins are known to be either preterm, low birth weight). In addition, stillbirth, infants born after 28 days, and neonates whose parents traveled from Gaza were excluded.

3.10 Data Management (Statistical Analysis)

The collected data was entered and analyzed by using statistical package for social Science (SPSS version 11.5), carrying out data analysis as follows:

Over viewing the data of cases and controls, excluding the unnecessary information, coding, designing data entry model, defining variables, coding variables, data cleaning, frequency, cross tabulation, statistical significance, and other tests. Data analysis was divided into multi-stages including:

- A descriptive analysis of the characteristics pertaining to neonates included in the study such as frequency and cross tabulation.

- A bi-variate analyses for identifying risk factors associated with neonatal mortality, using logistic regression. Risk was assessed according to odds ratio, adjusted or not to 95% Confidence Interval (CI) and for P significant, P = 0.05, Odds-ratio = (1) was considered as that of less risk for neonatal death for the reference category of each independent variable. A variable was treated as a confounder when it is significantly associated ($p \leq 0.05$) with both the outcome and variables within its own level or in higher levels. The results of analyzed data will be reported in a final report, which will be submitted to an internationally recognized peer reviewed public health journal for a possible publication.

3.11 Pilot Study

A pilot study was performed on a small sample (5% of cases and controls) to test recruitment, response rate, validity, reliability, and suitability of questionnaire as well as ambiguity, before long expensive research study starts, so that, remodeling and reframing may take place. No major changes were added to the original questionnaire.

3.12 Ethical Consideration

An official letter of approval to conduct the research was obtained from Helsinki committee-Gaza strip (Ethical committee). Written consent form was obtained from each participant in the study. Every participant was receiving explanatory letter about the research purpose and sponsorship to know that participation is optional. Permission for recoding the interviews was considered. All ethical concepts were considered: respect for people and respect for the truth.

3.13 Limitation of the Study

Limitation of the study was mainly recall bias. Changing addresses and difficulty of defining them could be another limitation of the study. The researcher tried to replace the inaccessible respondents but this was faced by the matching criteria.

3.14 Budget

United Nations for Children Fund (UNICEF) funded the study through the sponsorship of Union Health Work Committees, Gaza, (UHWC). A number of data collectors were trained in order to collect data timely and effectively for further processing and analysis. All materials and non-material resources were offered to conduct the research.

Chapter IV

Results and Discussion

The study showed obvious variation in demographic factors, socio economic status, obstetrical/gynecological history, maternal care and nutrition, neonatal related characteristics between the two groups.

The present study contributes to an understanding of the risk factors and determinants of neonatal mortality in Gaza Governorates. Most of the studies conducted earlier tackled the risk factors of infant mortality or child mortality in general, but this study has the peculiarity of exploring those risk factors affecting the neonatal period, which constitutes more than half of the causes of infant mortality (**Department of pediatrics, Australia**). It is worth reminding the reader that the presented information are being based on 220 cases (Neonatal deaths) and 495 controls (corresponding live child) whose mothers were interviewed at the house hold level in all Gaza Governorates, thus studying neonatal death in such a setting surrounded by various cultural and traditional beliefs is a complex task.

However, using the interviewed questionnaire helped to see the issues from a different angle and facilitate better understanding of newborn health. As it is a case control study, sometimes it was not possible to generate enough information to make a concrete conclusion urge to design a cohort study in future. In comparison to the prospective design of other studies, this study could bring up data in consistence with the purpose of its contents; moreover the other designs lacking the some important determinant recorded, as data was not collected primarily, but this study overcome that constraint by collecting data within the purpose of the study itself. Yet, the study was as other case control studies rendered to recall bias. The researcher believes that this study has important insights for both research and health program planning.

4.1Characteristics of Study Population

The study was carried out in the five geographicall Governorates of the Gaza Strip. The majority of participants were from Gaza governorate (38.9%) followed by North Gaza (19.7%), Rafah (16.4%), Khan Younis (15.1%) and Midzone (9.9%). Of those, 52.9% were male, and 47.1% were female. Of the cases, 54.5% were male, while 45.5% were female and of the controls, 52.1% were male and 47.9% were female. The study demonstrated that 38.2% of cases and 39.2% of controls were from Gaza, 22.3% and

18.6% from North Gaza, 13.6% and 17.6% from Rafah, 14.5% and 15.4% from Khan Younis, 11.4% and 9.3% from Midzone
respectively.

The present study showed slightly higher number of male than that of female (Male 378, female 337) among the study population, of which 120 was male and 100 was female cases, while controls were 258 male and 237 female **(Table 1**).

This diversity of results is one of the difficulties that render it difficult to establish satisfactory answers and guidelines. It could be explained by the fact that there was a matching process between cases and controls by sex, and thus, they will be similar in this character on influencing the neonatal deaths.

4.1.1 Mother Current Age

The mean maternal current age of all study participants was 27.9 years [standard deviation (SD) 6.3 yrs]. For cases, the mean age was 28 years (SD 6.45); while for controls, it was 27.87 years (SD 6.29). The majority of mothers were aged 15-35 years (85.4% of cases and 87.9% of controls); the minority were aged 36-49 yrs (14.5% of cases, 11.9% of controls).

The mean current age of the mothers of the two groups was almost similar and there were no statistical significant differences between the two groups. This may reflect the Palestinian culture of getting girls married in younger ages.

4.1.2 Mother's Age at Marriage

Regarding the age of the mother at marriage, the study demonstrated that, the mean age at marriage of the study population was 19.48 years. For cases' mothers it was 19.53 (SD 3.55), and for controls' mothers it was 19.46 (SD 3.73) **(Figure1).** I addition, 42.7% of cases' mothers age was less than 18 years, while 46.9% of controls' mothers were in the same age group. It was evident out of the study that, 45.9% of cases' mothers and 42 % of controls' mothers fall in the group of 18- 23 years of age**.** In addition, the study could demonstrate slight differences in the mother's age at marriage between the two groups (Mean age at marriage for cases' mothers 19.53, for controls' 19.46) but this slight difference could not reach any statistical significance (P=0.834). This finding was similar to the findings in a case control study conducted in Bangladesh, 2003 that concluded that there was no association between the age of mother and the neonatal mortality (**Mercer, et al., 2006**).

Table (1): Socio-demographic and Economical Characteristics of the Responding Mothers of Singleton Births in Gaza Governorates, 2008

Variable		Case		Control		
		No	%	No	%	P value
1.Sex						
	Male	120	54.5%	258	52.1%	
	Female	100	45.5%	237	47.9%	
2- Locality.						
	North Gaza	49	22.3%	92	18.6%	
	Gaza	84	38.2%	194	39.2%	
	Midzon	25	11.4%	46	9.31%	
	Khan younis	32	14.5%	76	15.4%	
	Rafah	30	13.6%	87	17.6%	
3-Mother education						**0.179**
	<6 yrs.	16	7.3%	25	5.1%	
	6-12yrs	160	72.70%	344	69.5%	
	>12yrs	44	20%	126	25.5%	
4. Mother's Ag						**0.431**
	15-25	97	44.1%	202	40.8%	
	26-35	91	41.4%	233	47.1%	
	36-49	32	14.5%	59	11.9%	
5- Type of family						**0.88**
	Nuclear	92	41.8%	210	42.4%	
	Extended	128	58.2%	285	57.6%	
6.Consanguinity						**0.043**
	Cousin (close relation)	80	36.4%	154	31.2%	
	Far away from family (Not close)	42	19.1%	71	14.4%	
	Not relative	98	44.5%	269	54.5%	
7.Residenc						
	Outside camp	171	77.7%	407	82.2%	
	In camp	49	22.3%	88	17.8%	
8.House hold size						**0.085**
	2-3	57	25.9%	93	18.8%	
	4-6	100	45.5%	237	47.9%	
	>6	63	28.6%	165	33.3%	
9.Family income in Nis	**<450**	75	34.1%	137	27.8%	
	450-1200	68	30.9%	158	32. %	
	>1200	77	35%	198	40.2%	**0.208**

This, in fact, expresses the Palestinian culture and attitude towards early marriage (before 18 yrs), though WHO considered the age below 18 yrs as child, this means that almost half of the mothers of the study got married at child age which may hinder the interventions of reproductive health education and intervention program for improving child and maternal health.

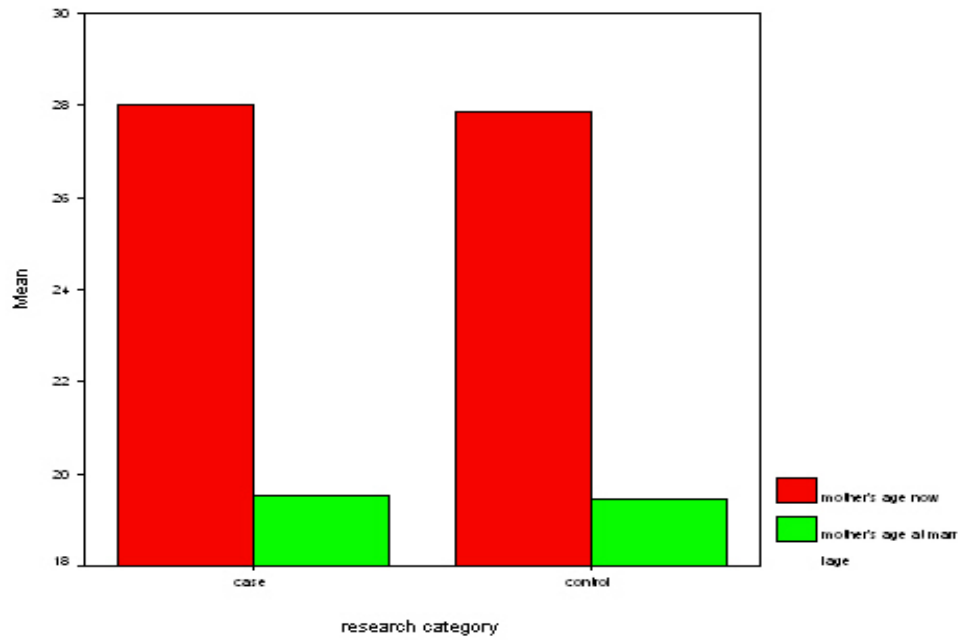


Figure1: **Study Population by Current Mother Age and Age at Marriage Gaza Governorates, 2008**

4.1.3 Mother's Occupation

Regarding the working status of the mother, the majority of the mothers are house wife (95% of cases' and 92.3% of controls' mothers) , and there was slight difference between both groups in respect to the nature of work (0.9% of cases' and 2% of controls' are professional, 4.1% of cases' and 5.7% of controls' are non professional). This difference did not reach statistical significance (P=0.375).

However, this percentage of working mothers is familiar with the report of MOH, 2005, which mentioned that around 95.6% of the mothers are homemaker and it is only 2%, are employees and 1.4% are teachers. This may reflect another Palestinian attitude towards the willing not to work mothers.

4.1.4 Maternal Schooling

Concerning the educational level among the mothers of the study participants, the study demonstrated that, the mean of education of the study mothers was 11.48 yrs (SD=2.92). For the cases, it was 11.24 yrs (SD= 3.00), and for the controls it was 11.59 (SD=2.88). Most of the mothers have finished 6-12 yrs of education (72.7% of cases, 69.5% of controls), while 20% of cases' and 25.5% of controls' have completed more than 12 yrs of education till the time of the study. The mothers who could not complete 6 yrs of education were 7.3% of cases and 5.1% of controls.

Concerning the maternal schooling, the proportion of mothers of cases who could not complete their primary education is higher than those of controls' are, while the percentage of mothers who completed 6-12 yrs of education is higher in cases than in controls **(Table 1)**. On the other hand, the percentage of mothers who completed their secondary education and proceeded to the university education is higher in controls' mothers than in cases'. This difference between the two groups could not reach statistical significance (P=0.179).

This finding was almost similar to the MOH annual report in which, 74.8% of mothers reached to the level of secondary school **(MOH, 2005).**

However, this finding contradict the findings of many international studies which concluded that mother's education is one of the important predictors of neonatal mortality (**Christiana, et al., 2001; Mercer et al., 2006**).

Yet, it may be attributed to the fact that most of Palestinian women are literate as was mentioned earlier. However, the accessibility and opportunity for maternal schooling is quite good enough in Gaza Governorates. It could be that, the difference between both mother of cases and mother of controls could not associate with the neonatal mortality because maternal education became universally implemented, so the impact of maternal education could not be elicited.

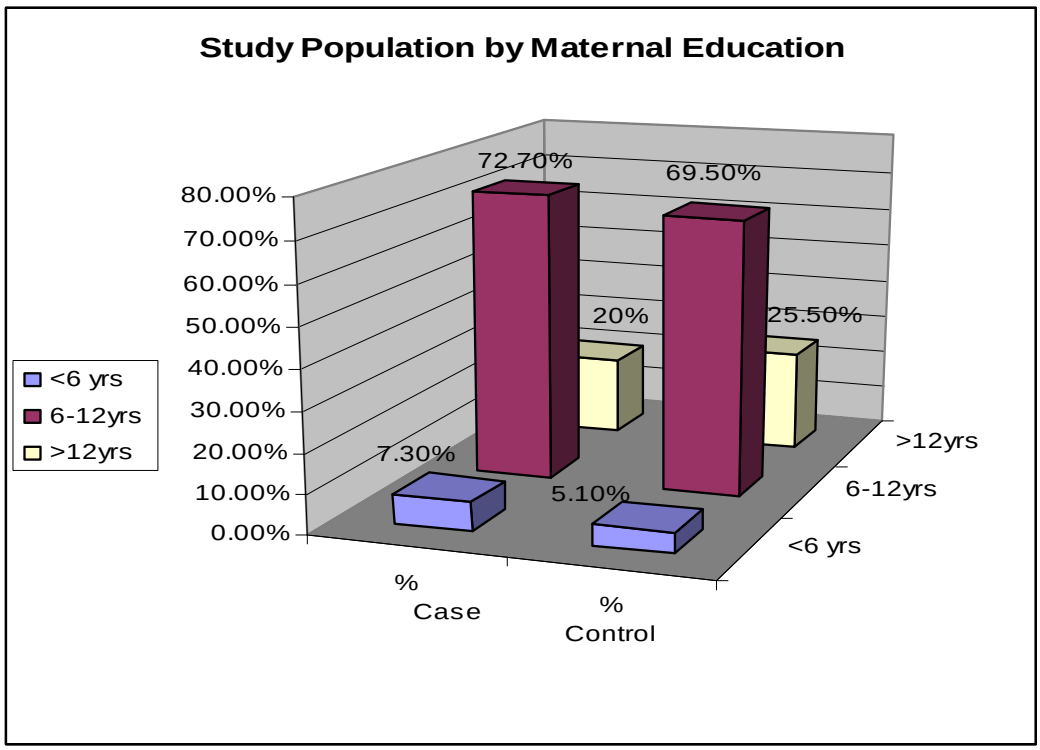


Figure 2: Study Population by Mother Education, Gaza Governorates, 2008

4.1.5 Paternal Factors (Figure 3)

Concerning the fathers of the study population, the current study has demonstrated that, the mean current age of the whole fathers of both groups was 32.63 years. For cases, it was 32.32 yrs (SD= 8.12) and for controls it was 32.77 (SD= 6.95). Most of them have completed more than 6 yrs education in their life (52.3% of cases' fathers, and 57% of controls' fathers complete 6-12 yrs education). In the same time, 32.3% of cases' fathers and 31.7% of controls' have completed more than 12 yrs education in their life. In addition, the working status of the fathers revealed that, 37.7% of cases' fathers and 31% of controls' fathers are without any work (Unemployed), while most of the working fathers are not professional (50.9% of cases' fathers and 54.3% of controls').

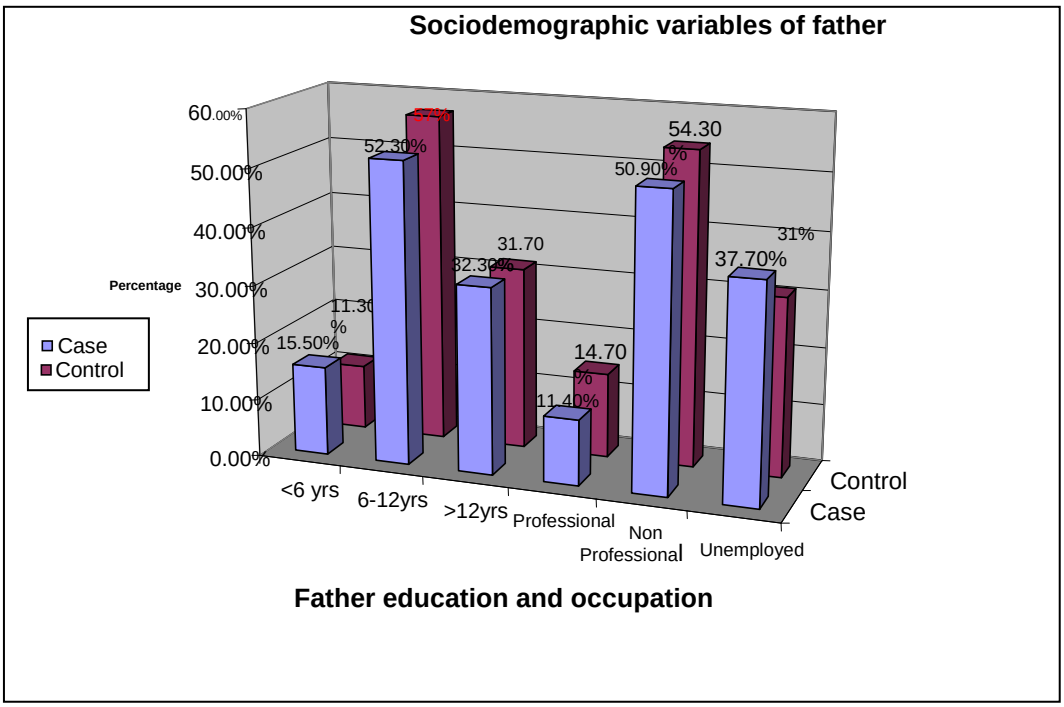


Figure3: Study Population by Paternal Education and Occupation, Gaza Governorates, 2008

4.1.6 Residence, Dependence, Type of Family and House Hold Size of the Mother

The study showed that 80.8% of the study participants live outside camp in city, town, or living project, while 19.2% live in camps. For cases, 77.7%, and for controls 82.2% live outside camp, while 22.3% and 17.8% live inside camps respectively. It also showed that no wide difference between cases and controls in living the type of family, whereas, 41.8% of cases live in nuclear type of family while 58.2% live in extended type. In the same time, for controls, 42.4% live in nuclear type, while 57.6% live in extended type of family.

The majority of the study participants' house holds size was between two and six (for cases, 71.4%, and for controls, 66.7%). The rest of the study participants' showed that 28.6% of cases and 33.3% of controls have more than six household sizes **(Table 1)**. This finding may be rendered to the reality that most of the Palestinian residents live almost in homogenous life style.

In addition the study explored that, mean number of dependence among the whole study population was 3.33 (SD2.03). For cases it was 2.95 (SD1.98) and for controls, 3.51 (SD2.03). Among them, the mean number of living rooms was 3.2 (SD1.24). For cases it was 3.26 (SD1.29), and for controls 3.17 (SD1.22). The study also revealed that the majority of the families of study population have TV at their homes (96.4% of cases' families, and 96.4% of controls'). Regarding the residence, the data of the study

discovered that, there was slight difference between cases and controls in living in camps, while among the same group those who live outside the camps is more than in camps. They used to live alike in nuclear and extended type of families. There was no obvious difference between the cases and controls regarding the type of family which did not reach statistical significance (P= 0.88). This finding may be rendered to the reality that most of the Palestinian residents live almost in homogenous life style.

The mean of household size was slightly higher among controls' families than cases' (Mean of household size among cases 5.3, mean among controls 5.7). There was predominance of house hold size of 2-6 among both groups in which controls were higher but this difference did not reach statistical significance (P=0.085). However, this finding was different from the results of the study conducted in Bangladesh, 2003, which explored that the more the household size, the more the probability of neonatal death. Meanwhile, it was in contradiction of the study conducted in Nicargua, which explored that infants living in a poor household had higher susceptibility to die than infants from a non-poor household did (**Pena, et al., 2000**).

The mean number of dependence was 3.33 (SD 2.03) among the whole families of the both groups, while it was 2.95 for cases' and 3.51 for controls' which reached strong statistical significance (P=0.001). However, there were some differences between the cases and the controls concerning the number of dependence, whereas 21.4% of cases' and 29.8% of controls' have dependence more than four people. This difference similarly reached statistical significance (P=0.05). Needless to say that, this finding reflects the burden of dependence on the Palestinian families which already suffer from high dependence ratio (I.07 in Gaza strip, and 0.9 in the West Bank) **(MOH, 2005).**

Yet, this interesting finding will drive and attract attention of all planners and policy makers to put insight and forwarding their efforts towards improving the living status of the families and to increase awareness of the community in order to reduce this burden, and thus reducing neonatal mortality in the Palestinian context.

When entered in the logistic regression model initially **(Table 6),** the dependence factor emerged in association with neonatal mortality among the sociodemographic factors for the difference of groups, the cases and the controls (P= 0.000, OR= 1.16). However, it lost its statistical significance when combined with other significant factors in the final model.

4.1.7 The Consanguinity

Concerning the consanguinity, the study clarified that, 32.7% of the study participants were close relation marriage (cousin), while 15.8% was not close relation (Far away from the family). For cases, it was 36.4%, and for controls, it was 31.2% for the first type of relationship respectively, while it was 19.1% for cases, and 14.4% for controls for the second type relationship respectively **(Table 1).**

Regarding the consanguinity, the study explored that, both first and second type relationship frequency was higher in cases group than in controls, while the non relative relationship was higher in controls families than in cases' which reached a statistical significance (P=0.043). When the researcher entered it into logistic regression **(Table 6)** with other sociodemographic factors, it emerged as associated risk factor (OR = 1.23, CI= 1.03- 1.47).

The subject of consanguineous marriage became a source of major scientific and public interest in the United Kingdom (UK) and the United States of America (USA) from the mid-19th century onwards. Much of this interest centered on the claimed deleterious outcomes of consanguinity, although there were also scientists and clinicians who denied any adverse effects and instead argued that inbreeding offered major biological advantages. A large majority of studies have indicated that early mortality is increased in the progeny of consanguineous unions when compared with children born to unrelated parents. However, most of these studies failed to control for the potential effects of socio demographic variables **(Christofer, 1995)**. Crucial to say that, this important finding was consistent with few international studies like the one in Pakistan **(Christofer, 1995)** which reached the conclusion that the difference in perinatal and neonatal deaths between the two groups of study resulted mainly from the higher incidence of congenital and metabolic abnormality among Asians due to consanguineous marriage, and another one from (**University School of Medicine of Monastir, 2007**), which demonstrated that higher rates of neonatal and post-neonatal deaths, and deaths of children younger than 5 years were observed in consanguineous couples.

However, as little is known about the relationship of consanguineous marriage and neonatal mortality, this issue needs further research studies to explore more factors related to it and to control the socio demographic factors. As a result, all efforts should be directed to greater emphasis on and acceptance of genetic counseling and antenatal diagnosis in parallel with increasing awareness and changing attitudes of the community to avoid close consanguineous marriage.

4.1.8 Family Income (Figure 4)

In relation to the economical aspect of the study, the family income mean of the whole study population was 1231.29Nis, with (SD1184.79). For cases, it was 1119.19Nis (SD 1105.96), and for controls it was 1281.32 (SD1216.07). The family income was distributed in almost the same manner among both cases and controls, whereas, 34.1% of cases and 27.8% of controls earn less than 450Nis per month. In the same time, 35% of cases and 40.2% of controls have an income of more than 1200Nis per month **(Table1)**. The mean income of cases' families was less than the controls' (Mean income in cases, 1119.19, Mean income in controls 1281.32). This difference did not reach statistical significance (P=0.09). The percentage of families of more than 1200 income is higher than of controls that of cases but this did not reach any statistical significance (P=0.208). Other imminent of the family were not searched except for TV.

This finding was different of many studies that estimated that family expenditure has association with neonatal mortality (**Mercer, et al., 2006**).

In fact, this difference may be attributed to the fact that, the researcher was not able to adjust the indicator of family income and specify it. Furthermore, a sort of bias would have been introduced by the interviewed mother when was asked about the family income by the data collector due to the sensitivity of such a subject in the Palestinian context.

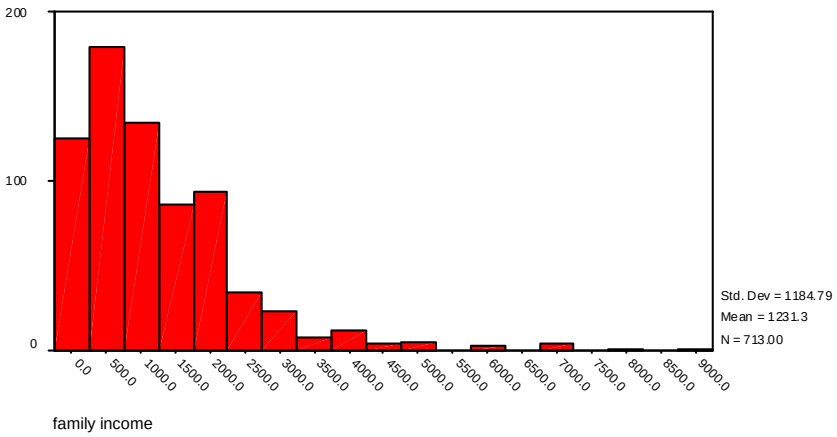


Figure 4: **Study Population by Family Income, Gaza Governorates, 2008**

4.1.9 Age of Mother at First Pregnancy

The present study explored that the mean age of mother of all participants was 20.29 yrs at the first pregnancy (SD 3.516, CI=20.03-20.54). For cases, the mean age of the mother when first pregnant was 20.31(SD 3.63), and for controls it was 20.27 yrs (SD 3.46). The age

group of this variable did not demonstrate wide difference between cases and controls. For cases, the proportion of age less than 18 yrs was 35.5%, while it was 36.4% for controls **(Table 2**). The most prominent age group at first pregnancy was from 18-24 yrs, wherein it constitutes 52.7% of cases and 52.3% of controls. The least age group of first pregnancy was from25-40 yrs whereas; it was 11.8% for cases and 11.3% for controls. The current study explored that there was slight difference between the mean age of the cases' mothers and the controls' at first pregnancy (20.31 versus 20.27), but this difference could not reach statistical significance (P=0.904). The most prominent age group was higher in cases' mothers than in controls', moreover the less than 18 yrs group was lower in the cases' than in controls' (35.5% versus 36.4%). This difference between the groups did not reach statistical significance (P=0.964).

4.1.10 Birth interval, Parity, Mode and Place of Delivery and Birth attendant

The mean birth interval was 31.12 months for all participants of study population (SD 19.9, CI=29.4 - 32.7). For cases, it was 29.02 months and for controls, 32.09months. More than half the cases had a history of birth interval less than 24 months (55.2% of cases, 43.6% of controls). The birth interval of 24-32 months constitutes 17.7% of cases and 21.7% of controls while 27.1% of cases and 34.7% of controls had a history of birth interval more than 32months **(Table2).** The mean birth interval in cases was lower than in controls, but this difference did not reach statistical significance (P=0.087). In the same time, the birth interval of more than 32 months was higher in controls than in cases (34.1% versus 27.1%), and this difference was statistically significant (P=0.03). In fact, this finding came in accordance with many international studies previously mentioned in literature. Shorter the birth interval, more the chance of neonatal death. Such a topic is quite common in developing countries, and it could be illustrated by the fact that people get early marriage, therefore the concept of birth spacing is far away from minds. Furthermore, the culture in the Palestinian context of preferring boys to girls may oblige women for repeated pregnancies and short birth interval.

Table (2): Comparison between Cases and Controls by Selected Antenatal and Obstetrical History of Responding Mothers of Study Population, Gaza Governorates, 2008

Variable		Cases			Control			
		No	**%**	**Mean**	**No**	**%**	**Mean**	**P value**
1-Age at first pregnancy in years				**20.31**			**20.27**	**0.904**
	<18	78	35.5%		180	36.4%		**0.964**
	18-24	116	52.7%		259	52.3%		
	25-40	26	11.8%		56	11.3%		
2-Parity				**4.8**			**4.38**	**0.05**
	1-3 times	88	40%		236	47.7%		**0.148**
	4-6 times	78	35.5%		159	32.1%		
	>6 times	54	24.5%		100	20.2%		
3-Birth interval in months				**29.02**			**32.09**	**0.087**
	<24	100	55.2%		171	43.6%		**0.034**
	24-32	32	17.7%		85	21.7%		
	>32	49	27.1%		136	34.7%		
4- Place of A/N care								
	Public sector and UNRWA	180	82.2%		449	91.3%		**0.001**
	NGO	14	6.4%		7	1.4%		
	Private clinics	19	8.7%		27	5.5%		
5- Starting month of iron intake								
	First to third month	85	42.1%		132	29.7%		**0.006**
	Fourth to fifth month	106	52.5%		276	62%		
	Sixth to ninth month	11	5.4%		37	8.3%		
6-Duration of folic acid intake				**3.78**			**3.48**	**0.034**
	1-3month	110	63.6%		268	67.5%		**0.008**
	4-7month	48	27.7%		118	29.7%		
	>7months	15	8.7%		11	2.8%		
7- Place of delivery								
	Health facility	215	97.7%		495	100%		**0.001**
	Home delivery	5	2.3%		0	0%		
8-Mode of delivery								
	Non C/S delivery	161	73.2%		436	88.1%		**0.000**
	C/S delivery	59	26.8%		59	11.9%		
9-Domestic violence	Yes	48	21.8%		74	15%		
	No	172	78.2%		419	85%		**0.026**

Regarding the number of pregnancy, the study demonstrated that the mean number of pregnancy among the mothers of study population was 4.52 (SD2.86, CI=4.31-4.73). For cases, it was 4.8 and for controls, it was 4.38 times. Most of the mothers of the study population paid a history of 1-3 times pregnancy (40 % for cases, and 47.7% for controls). In addition, it showed that, 24.5% of mother of cases and 20.2% of mother of controls had been pregnant for more than six times.

Regarding the parity history of the mothers of both groups, the mean number of pregnancies was higher in cases' than in controls' group (4.82 versus 4.38) which reached statistical significance (P=0.05), while the frequency of mothers who had been pregnant for more than 6 times was higher in cases' than in controls' but this did not reach any statistical significance (24.5% of cases and 20.2% of controls, (P=0.14).

Parity is one of the significant factors predicting the neonatal death in most of the developing countries. However, this fact came in consistence with other studies previously mentioned in literature. The fact that, for one quarter of mothers in this study parity exceeded six is not surprising and is related to early marriage and childbearing traditions similar to those seen in neighboring countries.

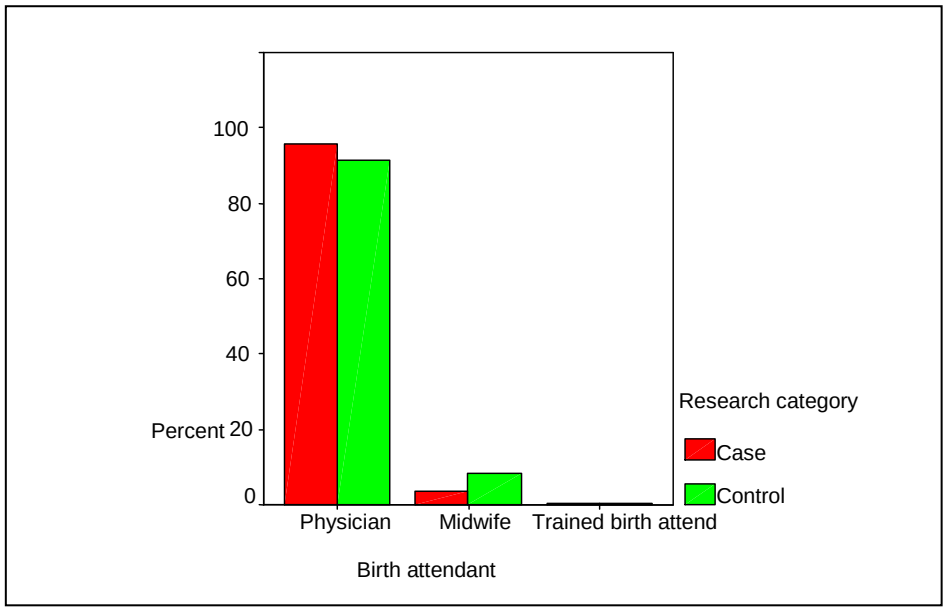
The study showed that all controls were delivered at health facility, hospital, private clinic or primary health care setting, while 2.3% of cases were delivered at home. This was strongly statistically significant (P=0.001). Of those who were delivered at health facility, 26.8% of cases delivered by cesarean section(C/S), while only 11.9% of controls were delivered by C/S. The proportion of cases who were delivered by non C/S was 73.2%, in the same time it was 88.1% for controls. It was clear that the percentage of non C/S delivery was lower in cases than in controls and this was statistically significant (P=0.000), but disappeared out of the stepwise model of logistic regression and lost its significance, when was combined with other maternal variables.

A Physician has attended the majority of the deliveries (95.9% for cases, and 91.3% for controls). In contradiction, trained birth attendant attended 0.5% of cases' deliveries and 0.4% of controls' deliveries. The proportion of physician birth attendant was higher in cases' delivery than in controls' **(Figure 5)** and this did not reach statistical significance (P=0.076). This finding supports the findings of other studies that demonstrated that, health facility delivery is a protective factor of neonatal mortality **(Christiana, et al., 2001).**

4.1.11 Domestic Violence

Regarding the exposure of mothers of the study population to domestic violence, the study explored that 21.8% of cases' mothers and 15% of controls' mothers have been exposed to domestic violence during pregnancy **(Table2)**. The proportion of domestic violence exposure in cases' mothers is quite higher than in controls which reach statistical significance (P=0.03, OR=1.58). When this factor was stratified by duration of pregnancy and with birth weight group, it was strongly statistically significant**.** The odds of neonatal death was higher in cases whose mothers was exposed to domestic violence during their pregnancy with the neonate for preterm baby more than for full term baby (P=0.002, OR= 4.35). However, it lost its significance when entered into the logistic regression model. This important finding came in accordance with a study conducted in **Bangladesh, 2002** that stated "Neonatal mortality showed a significant 1.7 – 2.2 fold increased risk in women having emotional stress and physical violence during pregnancy. Women found a strong association between neonatal death and domestic violence. "There are many husbands, fathers- and mothers-in-law who beat their wives or sons' wives while they are pregnant. A fetus might be injured at that time. Consequently, the baby may die at any time after birth. Moreover, if there is any harassment or emotional stress, how a pregnant woman can have adequate diet and rest! The fetal growth will be hampered; the baby will be low birth weight and may be affected by various diseases and complications."(**Nasreen, Ahmed and Chowdhury, 2002**).

Figure 5: Study Population by Skilled Birth Attendant, Gaza Governorates, 2008



4.1.12 Antenatal Care

The current study explored that, the majority of the mothers of both cases and controls have received antenatal care (99.5% for cases and 99.4% for controls). This slight difference between the two groups did not reach statistical significance (P=0.80).

The study-demonstrated difference between cases and controls concerning the place of antenatal care of the mothers of study population and similarities regarding the start month of pregnancy for antenatal care. However, it was clear that 82.2% of mother of cases repeatedly visited both UNRWA and public sector for A/N care, while 91.3%of controls paid the same visits (At UNRWA, 64.8% of cases and 74.8% of controls, at public sector, 17.4% of cases, and 16.5% of controls). Regarding the place of ante natal care it was evident that, the proportion of cases is lower than controls in visiting the UNRWA and public sector and this difference was strongly statistically significant (P=0.001), while it was higher in visiting the private clinic **(Table2).** For cases, 8.7% of mothers paid visits at private clinics while, 5.5% of controls' mothers did the same follow up. They have started visiting the health facilities since the first month of pregnancy (For cases, 56.2%, and for controls, 55% started A/N care from the first to second month).

However, 7.3% of cases' mothers and 6.5% of controls' mothers started A/N care after the fourth month of pregnancy. The mean number of A/N visits was higher in controls' group than in cases' (9.71 versus 8.88) which was statistically significant (P=0.002). During their visits, the study demonstrated that, 9.6% of mothers of cases paid less than four visits, while 5.3% of controls' mothers paid the same number of visits. However, 90.4% of cases' mothers paid four or more visits, wherein 94.7% of controls' mothers paid it too. Of the less than four visits, the proportion of cases' mothers was higher than the controls' which was statistically significant (P=.033, OR=1.901). This finding indicates that the more the frequency of antenatal visits, the less the chance of neonatal death. It also encourages the WHO protocol that at least four antenatal visits are required for a pregnant woman in their follow up. The risk of not attending four antenatal visits is almost twice for dying a neonate than the attending one. Of the place of antenatal care, the study supports the attendance in UNRWA clinics and Public sector (Governmental).

Yet, one of the influential predictor of neonatal death is antenatal care. Antenatal visits should be at least four to reduce the risk. This finding is consistent with the findings from other studies in Indonesia, Turkey and United States (**Asih, Tjitra, and Oesman, 1997; and UNICEF, 2003).**

The current data explored some complications **(Figure 6)** of the mothers of the study population during pregnancy, delivery or after delivery but these differences in complications did not reach statistical significance. However, 22.3% of cases' mothers and 21.4% of controls' mothers suffered from swollen legs during Pregnancy (P=0.797, OR=1.05), 14.5% and 12.9% suffered from hypertension (P=0.55, OR=1.14), 2.7% and 1.8% of diabetes mellitus (P=0.43, OR=1.50), 5% and 4% of vaginal bleeding (P=0.56, OR=1.25) respectively.

On the other hand, 3.2% of cases' mothers and 4.2%% of controls' mothers suffered from vaginal bleeding during or after delivery (P=0.50, OR=0.742). It showed that, 9.1% of mothers of cases and 5.3% of their peers of controls suffered from fever during pregnancy for more than 3 days (P=0.05, OR=1.80). In the same time, 5% of mothers of cases and 3.4% of controls' mothers suffered from fever after delivery in the puerperal period (P=0.32, OR=1.48)

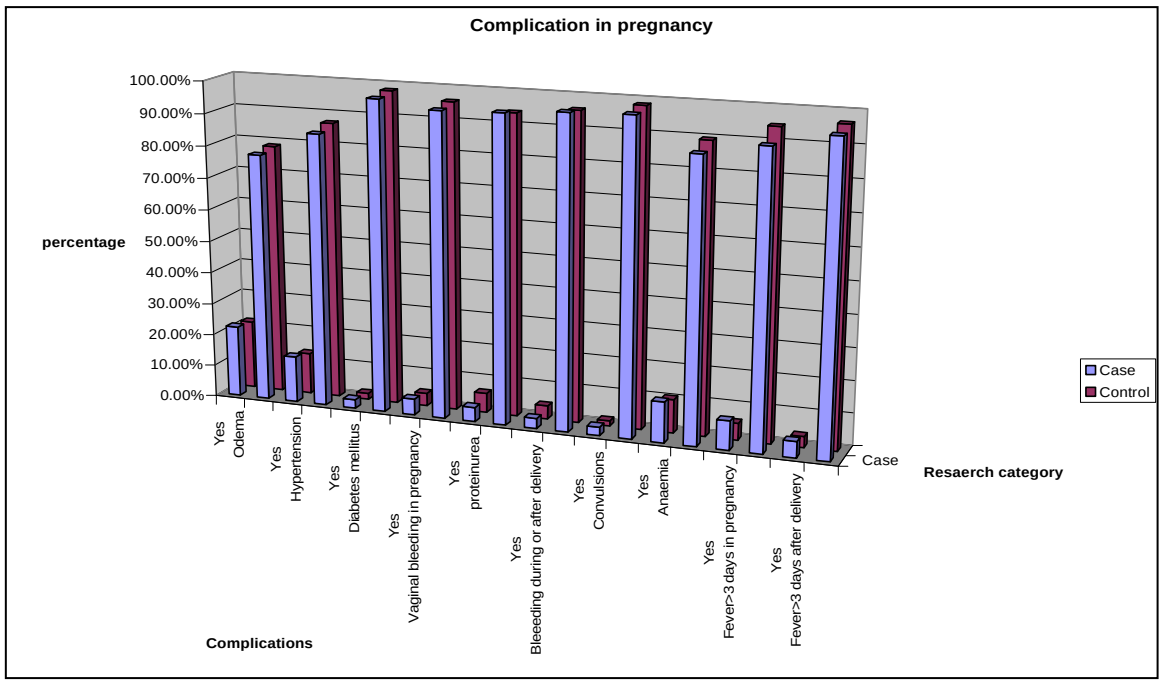


Figure 6: Study Population by Complications of Responding Mothers during and after Pregnancy, Gaza Governorates, 2008

The study revealed that 42.1% of cases' mothers, while 29.7% of controls' mothers started iron intake from the first to the third month of pregnancy. In the same time, 52.5% of cases' mothers and 62% of controls' mothers started iron intake from the fourth to fifth month of pregnancy, while 5.4% and 8.3% of them started iron intake from the sixth to the ninth

month of pregnancy **(Table 2).** For those who were taking iron during pregnancy, 80.5 % of cases' mothers and 75.5% of controls' were taking it every day and regularly.

Regarding the duration of folic acid intake in months, the study showed that, the mean duration of folic acid intake was higher in cases' mothers than in controls' (3.78 versus 3.48, P=0.03), and 63.6% of cases' mothers and 67.5% of controls' mothers have taken folic acid for 1-3 months, while 27.7% of cases' mothers and 29.7% of controls' mothers have taken the folic acid for 4-7 months. On the other hand, 8.7% of cases and 2.8% of controls have taken the folic acid for more than 7 months. It was observed that the percentage of cases' who had taken folic acid for at least 3 months was lower than that of the controls' which reached statistical significance (P=0.008).

This finding support the evidence of taking folic and iron together will reduce the risk of early neonatal mortality by 52% among infants born to women randomized to receive either iron-folic acid or multiple micronutrients compared with folic acid in a study conducted in **China, 2006 (Chinese Centre for Disease Control and Prevention, 2006).**

4.1.13 Current Pregnancy

Concerning the status of the mothers, the study revealed that 32.3% of cases' mothers and 19.8% of controls' mothers are currently pregnant, and the risk of the currently pregnant mother is almost twice the non-pregnant mother. (P=0.000, OR=1.9). For those who are not currently pregnant, 59.3% of cases mothers and 65.7% of controls' mothers do not like to become pregnant immediately (they wanted later). On the other hand, 19.3% of cases' mothers and 22.8% of controls' mothers wanted no more pregnancy rather than this neonate. This difference between the two groups could reach statistical significance (P=0.014)

This finding reflects that most of the mothers are willing to postpone their pregnancy as a sort of feeling that, this may alleviate some burden of the implications of newborn delivery and thus taking some rest.

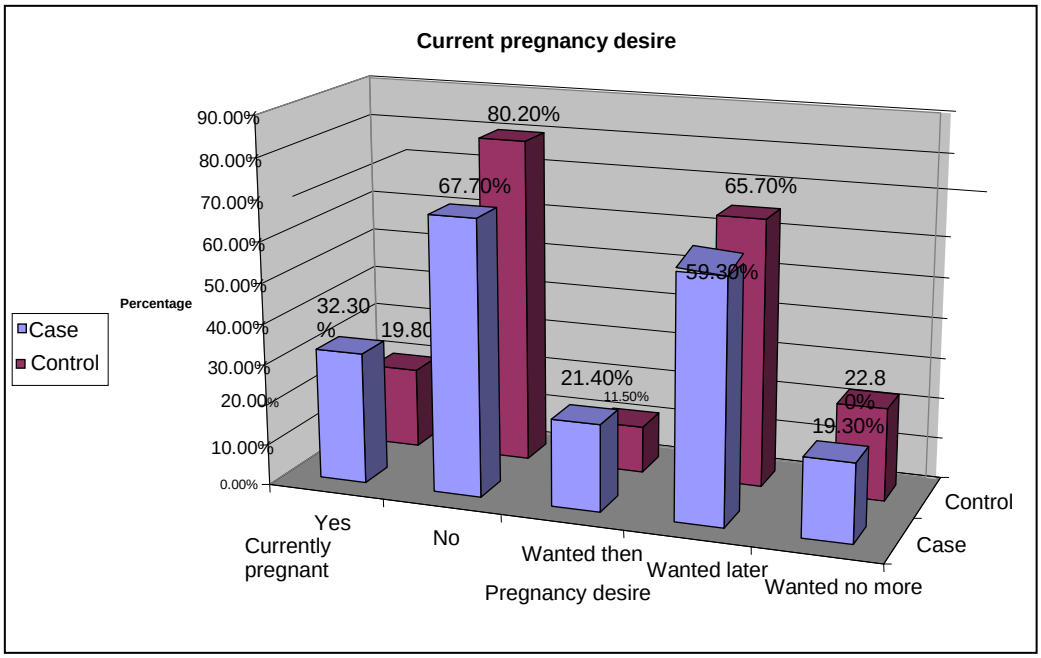


Figure 7: Study Population by Current and Desire for Pregnancy, Gaza Governorates, 2008

4.1.14 Duration of Pregnancy

The study explored that the mean duration of pregnancy with the whole study population was 8.78 months (SD0.617). For cases, the mean duration of pregnancy was 8.40 [SD0.925, CI 8.28- 8.53], but for controls, it was 8.95 [SD =0.27, CI= 8.93- 8.98]. It was clear that there was slight difference between the mean duration of pregnancy between the two groups, whereas it was in cases' lower than that of controls' and this will reflect the gestational age of the neonate of the study which was strongly statistically significant (P=0.001, OR= 13.04). Among those, 35.5% of cases and 4% of controls were premature and did not complete 9 months gestation (6- 8 months gestation). In addition, 64.5% of cases and 96% of controls have completed 9-10 months

gestation during pregnancy **(Table3**). It was evident that the percentage of premature neonates is significantly higher that of the controls' (P=0.001, OR=13.04). It was evident that the proportion of premature neonates is significantly higher that of the controls'. The risk of neonate to die is 3 times for premature when compared with full term baby. When entered into the logistic

regression model it remained statistically significant (OR= 2.83, CI=1.22- 6.56, P= 0.01) **(Table7).** The study revealed also that 56.8% of pregnancy with cases and 81.6% of pregnancy with controls ended around the expected time of delivery, while 39.5% of cases and 11.1% of controls ended earlier than the expected time of delivery and 3.6% of cases

and 6.5% of controls' pregnancy has ended later than the expected date of delivery **(Table 3)**. It was clear that the percentage of cases' pregnancy which ended earlier than the expected date is higher than that of the controls' which did reach a strong statistical significance (P=0.001).

Yet, this result was similar and in consistence with many in the world as in the study conducted in Bangladesh (**Mercer, et al., 2006**). In that study, it was demonstrated that although few control mothers (1%) reported pregnancy 8 months, it was a highly significant risk factor for neonatal death after controlling for other factors: AOR, 6.7 using neighborhood controls, and 7.7 using neighborhood controls.

As a result, all efforts should be directed towards avoiding preterm delivery through adherence to antenatal care service and encouraging mother to practice healthy practices and nutritional support during pregnancy. Concerning the nature of gestation, the study explored that 95% of pregnancy with cases and 94.9% of controls' occurred due to normal process and without intervention of any medication, while 3.6% of cases, and 3.8% of controls' occurred due to the help of medication. In vitro fertilization (IVF) gestation was the route cause o1.4% of cases and 1.2% of controls. The slight difference between the two group did not reach statistical significance (P=0.978).

Table (3): Comparison between Cases and Controls by Selected Antenatal and Obstetrical History of Responding Mothers in Gaza Governorates, 2008

Variable	Case		Control		
	No	%	No	%	P value
1-Duration of Pregnancy					
6-8 months	78	35.5%	20	4%	**0.001**
9-10 months	142	64.5%	475	96%	
2-Gestation Nature					
Normally	209	95%	470	94.9%	**0.978**
Normally with medication	8	3.6%	19	3.8%	
IVF	3	1.4%	6	1.2%	
3-Labor Duration					
<12 hours	191	86.8%	459	92.7%	**0.011**
>12hours(Prolonged labor)	29	13.2%	36	7.3%	

4.1.15 Delivery Conditions

Regarding the conditions around the delivery process, the study has demonstrated that, 86.8% of cases' labor lasted for a period of less than 12 hours, while 92.7% of controls' have lasted the same period **(Table3).** On the other hand, 13.2% of the mothers of cases and 7.3% of controls' mothers have suffered from prolonged labor (>12 hours). Of prolonged labor, the percentage of cases' mothers who suffered, is significantly higher than the controls' (P=0.011, OR=0.517).

Crucial to say that, complications of delivery that may yield to prolonged or obstructed labor, has association with neonatal mortality and considered one of the risk factors. However, this finding of the study came in accordance with other findings of other studies. In addition, the results of the study in **Indonesia, 2006** indicated that neonates born to women experiencing complications such as vaginal bleeding, fever or convulsions during childbirth had remarkably higher odds of dying compared to those born to women without any complications. A study in **Bangladesh** revealed that infants born to women without severe delivery complications had better survival than those born to women with ecclampsia, intra-partum hemorrhage, or even prolonged labor (**Mercer, 2006**).

4.1.16 Mother's Nutrition during Pregnancy

The current study revealed that there was variation in taking different types of food among mothers of the study population during pregnancy. However, 25.5% of cases' mothers and 24.2% of controls' have consumed more food than before pregnancy in general, while 49.5% of cases' and 48.9% of controls' have consumed similar amount of food as before, and 22.7% of cases' and 24.8% of controls' have taken less amount of food than earlier. Regarding the type of food, 57.3% of cases' mothers and 57.5% of controls' have consumed the same amount of rice as before pregnancy, while 18.6% of both cases and controls' have taken more rice than before **(Table 4).**

However, 60% of mothers of cases and 58% of controls' have eaten pulses similar to the period preceding pregnancy , while 19.5% of cases' and 20.8% of controls' increased their amount of pulses during pregnancy. Regarding meat intake, it was observed that 47.3% of cases' and 44.4% of controls' have consumed the same amount of meat, while 31.8% and 30.7% have increased the amount of taking meat as compared to the non pregnant period. With the regard to fish intake, it was revealed that 43.2% of cases' and 43.6% of controls' have consumed similar amount of fish compared to non pregnant status, while33.6% and 30.7% have taken more amount than before respectively.

Table (4): Nutritional Status, Smoking, and Breast Feeding Status of Responding Mothers of Singleton Births of Study Population in Gaza Governorates, 2008

Variable		Case		Control		
		No	%	No	%	P value
1-Eating Food in General in Pregnancy						
	More	56	25.5%	120	24.2%	**0.93**
	Equal	109	49.5%	242	48.9%	
	Less	50	22.7%	123	24.8%	
2-Type of food						
2.1 Rice	More	41	18.6%	92	18.6%	**0.763**
	Equal	126	57.3%	284	57.5%	
	Less	48	21.8%	112	22.7%	
2.2 Meat	More	70	31.8%	152	30.7%	**0.667**
	Equal	104	47.3%	220	44.4%	
	Less	42	19.1%	109	22%	
2.3 Vegetables	More	70	31.8%	155	31.3%	**0.547**
	Equal	128	58.2%	297	60%	
	Less	19	8.6%	41	8.3%	
3.Breast Feeding	Yes	66	30%	483	97.6%	**0.000**
	No	154	70%	12	2.4%	
4.Time Breast feed	Immediately	56	70%	463	95.1%	**0.000**
	Within 24 hours	14	17.5%	13	2.7%	
	After 24 hours	10	12.5%	11	2.3%	
5.Mother's Smoking	Yes	4	1.8%	8	1.6%	**0.846**
	No	216	98.2%	487	98.4%	

Regarding vegetables, 58.2% of cases' and 60% of controls' have consumed similar amounts of vegetables compared to the non pregnant period, while 31.8% and 31.3% have taken more amount respectively.

Regarding milk drinking, 33.6% of cases' and 34.1% of controls' have drunk the same amount of milk compared to the preceding period, while 30.9% and 28.3% have taken more amounts respectively. The study could explore that, 46.8% of cases' mothers and 44.4% of controls' had a rest more in pregnancy than non pregnant state, while 8.6% and 9.5% had less rest than before respectively.

4.1.17 Breast Feeding and Smoking Habit

Concerning the breast-feeding approach, the study demonstrated that only 30 % of cases were breast fed, while 97.6% of controls were breast fed too. It was observed that the

percentage of controls' who were breast-fed is higher and highly significant than the cases' group (P=0.000, OR=0.011). Of those who were breast fed, 70% of cases and 95.1% of controls were breast fed within one hour of delivery. In the same time, 17.5% of cases and 2.7% of controls were breast fed within 24 hours of delivery. On the other hand, 12.5% of cases and 2.3% of controls were fed after the first 24 hours. There was a clear difference in timing of breast feeding so that the percentage of feeding within the first hour is higher in controls than in cases, which reach statistical significance (P=0.000). Of those who were breast fed, 30% of cases' and 97% of controls were firstly fed with the colostrums, which was related and highly significant particularly for the first hour breast feeding group and within 24 hours feeding group. This, in fact assures the importance of early initiation of breast.

This finding was in agreement with a study conducted in **Ghana**, which explored that the risk of neonatal death was fourfold higher in children given milk-based fluids or solids in addition to breast milk. However, most of the newborn are usually breast fed, but the problem is in delaying breast-feeding to the period after the first critical hour. Yet, this issue should be tackled very carefully to increase awareness of the community mothers in order to urge them for early initiation of breast-feeding. It is worth mentioning that, breast-feeding is highly associated with neonatal mortality in the Palestinian context. However, breast-feeding lost its significance when entered in the model of logistic regression but colostrums feeding remained statistically significant up to the final model **(Table 7 and 9).**

In relation to smoking, the study explored that 49.5% of cases and 45.5% of controls have got some one smoking at home, while 1.8% of cases' mothers and 1.6% of controls' were smokers. This difference between the two groups in smoking status of the mother did not reach any statistical significance (P=0.846, OR=1.12).

This result of the present study was not consistent with the cohort study conducted by getting data from Swedish Medical Birth Register, 1983-2000 in which smoking cessation reduced the risk of infant death. The smoking-related risk of neonatal mortality appears to be mediated by smoking effects on gestational age **(Johansson,et al., 2009).**

4.1.18 Immunization, and History of Neonatal Death (Table 5)

The present study explored that, 16.8% of cases and 99.6% of controls were immunized. It was well presented that the proportion of controls who were immunized is far higher than of the cases and this did reach strong statistical significance (P=0.001, OR=0.001). Of those who were immunized, it was observed that, it is only 31.6% of cases and 91.2% of controls were given the all regimen of vaccines in the first month of life, while 60.5% of

cases and 3.5% of controls were vaccinated by Bacillus Calmet Guerin(BCG) vaccine only. In addition, neither Salk vaccine nor

HBV were delivered as a single vaccine to any case of the study, while Salk alone or HBV alone was given to 0.2% of controls. It was clear that the frequency of taking all the required vaccines in the first month of life is higher among controls than among cases which reached strong statistical significance (P=0.001, OR= 0.02). This result could be attributed to the fact that cases did not have the chance to be vaccinated because most of them die early in the first week or they are at hospitals.

In fact, this finding is very crucial to address. It is well known that immunization program is one of the most effective programs in the Palestinian context in terms of availability, coverage rate and effectiveness. However, according to reports from UNRWA, the immunization coverage may reach 99.5% for vaccines among the refugees population (UNRWA, 2007), which may reflect the adherence and attitude of community to get vaccination done.

The study has demonstrated that 40% of cases and 13.5% of controls has a history of neonatal death rather than the cases included in the target population. This indicated that the history of family neonatal death is more prominent among cases than controls group which was highly statistically significant (P=0.001, OR=4.25). However, this factor kept its statistical significance when entered in logistic regression along with other neonatal factors **(Table 8 and 9).**

The risk of neonatal death is almost seven times in families who have history of neonatal death than who don not have, which was strongly statistically significant.

In addition, the history of neonatal death in the family could be considered as a strong predictor of neonatal death as was explored by using logistic regression. This fact came in agreement of other studies previously mentioned in literature.

Regarding the birth history of the study population, the study could explore that, 10% of cases and 2% of controls have suffered from birth injuries on their bodies, while 84.5% and 97.8% did not have any of such history during birth respectively. In addition, 5.5% of cases' mothers and 0.2% of controls' don not remember or do not know about this injury. Of those who were injured during birth, 43.5% of cases' injuries were on the head, 43.5% on the body (trunk), 4.3% on the arms and or hands, and 8.7% on the feet and or legs. On the other hand, none of the injuries of controls' was on arms and or hands, while it was on body, head and feet and or legs (70%, 20%, and 10% respectively).

Table (5): Comparison between Cases and Controls in Selected Neonatal Variables in Gaza Governorates, 2008

		Case		Control		
		No	**%**	**No**	**%**	**P value**
1-Family history of neonatal death	Yes	88	44%	67	13.5%	**0.001**
	No	132	66%	428	86.5%	
2-Congenital malformation						**0.001**
	Yes	53	24.1.%	7	1.4%	
	No	162	73.6%	488	98.6%	
3-Birth weight	Low weight	107	48.9%	63	12.8%	**0.001**
	Normal	96	43.8%	387	78.3%	
	Big baby	16	7.3%	44	8.9%	
4.Birth Size	Smaller	91	41.4%	61	12.3%	**0.001**
	Average	112	50.9%	397	80.2%	
	Larger	17	7.7%	37	7.5%	
5-Able to breathe normally	Yes	121	55%	469	94.7%	**0.001**
	No	92	41.8%	25	5.1%	
6-History of cyanosis	Yes	66	30%	17	3.4%	**0.001**
	No	136	61.8%	476	96.2%	
7-History of fever	Yes	15	6.8%	19	3.8%	**0.001**
	No	169	76.8%	472	95.4%	
8-History of pneumonia	Yes	26	11.8%	13	2.6%	**0.001**
	No	148	67.3%	469	94.7%	

4.1.19 Congenital Malformation

With regard to the congenital malformation, it was observed that, a small proportion of controls have suffered from congenital malformation after birth (1.4%), while 24.1% of cases have suffered from such malformation **(Table 5).** It was evident that the percentage of congenital malformation is significantly higher in cases than in controls (P=0.001, OR= 22.8). Most of the congenital malformations were on the body (For cases, 52.9% and for controls, 33.3%). The other sites were on head, feet and or legs and then arms and or hands. For cases, 39.2% on head, 3.9% on feet or legs, and 3.9% on arms or hands, and for controls, 22.2%, 33.3% and 11.1% respectively. This finding is similar to many studies findings on congenital malformation (**Egypt, Iran, Pakistan, Bangladesh, Brazil, UK, and Sweden).**

This important finding could be attributed to the high rate of consanguineous marriage among the study populations. However, this topic is a place for further research and studies, and thus all efforts should be directed to plans for reducing its incidence.

4.1.20 Birth Weight, Birth Rank

The mean birth weight of the whole study population was 2948.13 [SD759.53, CI 2892.29-3003.98]. For cases, the mean birth weight was 2492.02 (SD 920.39), and for controls it was 3150.34 (SD570.25). The mean birth weight of controls was strongly significant and higher than of the cases (P=0.001). Almost half of the cases weight was low birth weight (48.9% 0f cases and 12.8% 0f controls). In addition, 43.8% of cases and 78.3% of controls were normal birth weight(2500 gm-3999gm) and 7.3% and 8.9% were big baby (equal or more than 4000 gm) respectively. It was significant to say that the percentage of low birth weight was higher in cases than in controls and the percentage of normal birth weight was higher in controls than in cases that reach a strong statistical significance. (P=0.001, OR= 9.00). This finding support the findings of other studies that explored that low weight at birth related or not to prematurity could be referred to as one of the main risk factors for neonatal deaths **(Pan American Health Organization, 1994).** It is noteworthy to mention that there was debate on whether preterm labor (Prematurity) or low birth weight attributes to neonatal mortality in different literature. Low birth weight has long debated as one of the causes of neonatal deaths. It is associated with the death of many newborn infants, but not considered a direct cause (**WHO, 2005-a**).

The study explored that 50.9% of cases' size and 80.2% of controls' were about the average size according to the statement of the mothers, while 29.5% of cases and 10.3% of controls' were smaller than usual, and 11.8% and 2% were very small respectively. The proportion of cases with smaller size is higher than that of the controls which was strongly statistically significant (P=0.001).

Regarding the birth rank **(Figure 8)** of the study population, it was found that there were slight differences between cases and controls, where 55.5% of cases were ranked from first child to third, while 52.9% of controls were with the same rank. The rest of both cases ranked more than third that ranged from fourth to fourteenth. This factor was weakly associated with (NMR) and the difference did not reach statistical significance (P= 0.5, OR= 1.1).

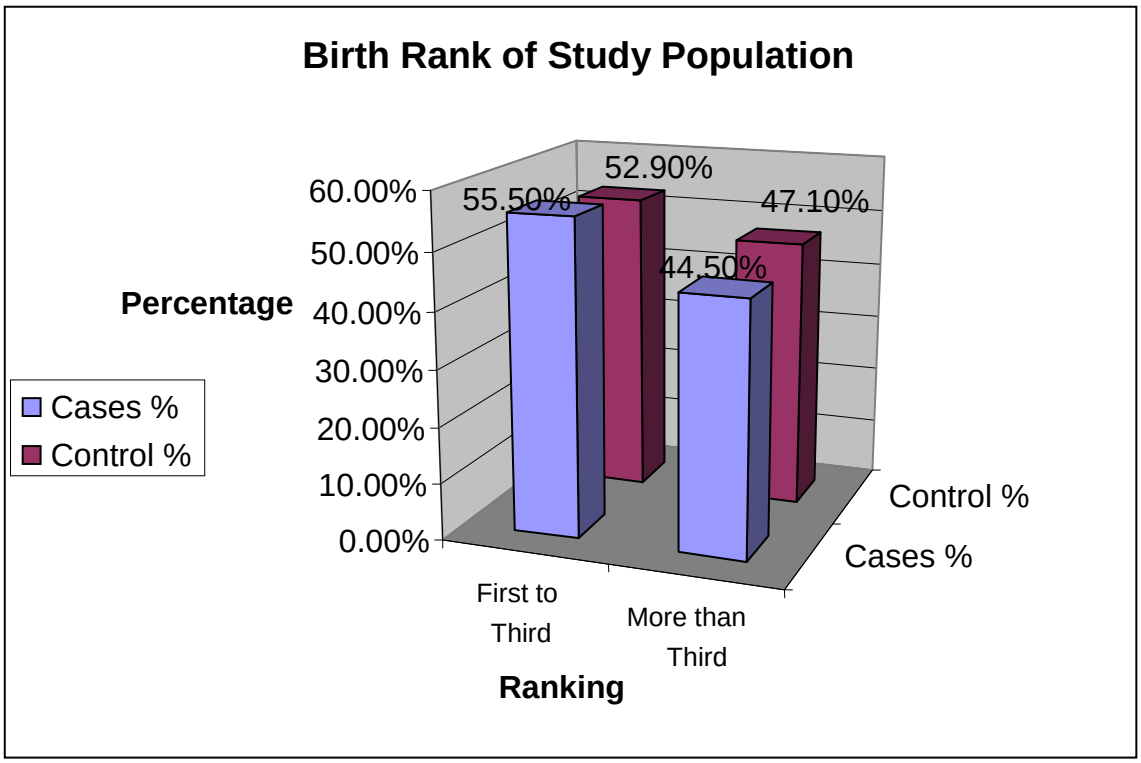


Figure 8: Study Population by Birth Rank of the neonate among other children of family

4.1.21 Breathing, Suckling, Crying and Neonatal Illness

Out of the study, 55% of the cases could breathe normally immediately after birth, 23.7% could suckle in a normal way, and 69.1% were able to cry immediately after birth, while for controls, 94.7% , 94.7% and 91.1% respectively, could do the same milestones immediately after birth. It was well inferred that the percentage of controls who were able to do the previous milestones after delivery is much higher than those of cases which was highly statistical significant (P=0.001 for all relationships). In addition, for cases, 30% experienced cyanosis, 6.8% convulsion, 14.1% unconsciousness, 7.3% bulging fontanel, 7.3% severe jaundice, 1.4% redness or drainage from the umbilical cord, and 1.4% rash or papules containing pus, but for controls 3.4%, 0.8%, 1%, 1.2%, 4.6%, 2% and 1.4%, respectively. Moreover, 6.8% of cases and 4.6% of controls have suffered from fever, which lasted from 1- 3 days or more than 3 days (73.3% of cases and 47.1% of controls, from 1- 3 days fever) while 26.7 % of cases and 52.9% of controls got fever > 3 days. It was well observed that the cases suffered from some neonatal danger signs more than the controls and this difference was with strong statistical significance (P=0.001 in all relationships).

The study added that, 2.7% of cases and 4% of controls have suffered from diarrhea while 4.5% of cases and 6.7% of controls have a history of cough in the early days of life. Difficult breathing

was the early presentation of 44.1% of cases and 5.9% of controls with 19.5% of cases and 2.2% of controls had fast breathing after labor. The study explored that, 11.8% of cases and 2.6% of controls have suffered from Pneumonia. Furthermore, 21.8% of cases and 7.5% of controls have received antibiotics in the first month of life **(Table 5).** It was worth mentioning to say that the frequency of respiratory illnesses was higher in cases than in controls and the frequency of bacterial infections was similarly higher in controls. This difference between the two groups was strongly statistically significant (P=0.001 in all relations). The risk of newborn of having difficult breathing after birth will increase the probability of neonatal death to six times over the one who don not suffer from it.

This finding came in accordance with many international studies which mentioned that neonatal infections top prioritized by ARI (Acute respiratory Infections) was one of the causal factors of neonatal mortality **(Campbell, et al., 2000, and Chowdhury, et al., 2005).**

It is prudent to mention that, the ability of the baby to suckle in a normal way, and unconsciousness status after delivery in the current study and thus their consequences could be considered as strong predictor and risk factor for neonatal death. Yet, care of the newborn immediately after delivery is very critical and all programmers, planners and decision makers should tackle this highlighted area. It was well observed that the cases suffered from some neonatal danger signs (convulsion, fever, and cyanosis) more than the controls and this difference was with strong statistical significance.

Table (6): Logistic Regression of Socio demographic Variables among Study Population

Socio demographic	Odds Ratio	95% Confidence Interval			P value
Dependence	1.16	1.07	-	1.27	0.001
Consanguineous marriage	1.23	1.03	-	1.47	0.02

The above-illustrated table summarizes the sociodemographic factors that were statistically significant (SS) with the differences between cases and controls. As shown, dependence entered in step 1, it remained statistically significant. When consanguinity entered the

model in step 2, the dependence remained (SS). It means that, among the sociodemographic factors, these two variables are the most important in predicting neonatal deaths among the groups of study population.

Table (7): Logistic Regression of Maternal Factors in Pregnancy, Delivery and Post Natal Care, Gaza Governorates, 2008

Maternal factors in pregnancy, delivery and post natal care	Odds Ratio	95% Confidence Interval			P value
Colostrum feeding	0.07	0.02	-	0.22	0.001
Duration of pregnancy	2.83	1.22	-	6.56	0.01

As shown in table, colostrums feeding and duration of pregnancy appeared to be one of the strong risk factors that determine neonatal deaths in Gaza Governorates. These two variables remained strongly statistically significant after entering all the other possible maternal factors.

Table (8): Logistic Regression of Neonatal Variables, Gaza Governorates, 2008

Neonatal variables	Odds Ratio	95% Confidence Interval			P value
Family history of neonatal death	4.53	1.61	-	12.75	0.004
Birth weight of the neonate	1.001	1.001	-	1.002	0.02
suckling in a normal way	0.18	0.06	-	0.53	0.002
Unconsciousness	36.70	6.56	-	205.09	0.000

Table showed the neonatal factors that remained statistically significant among all the other significant factors when all entered the logistic regression model. However, strength of association was clear with, unconsciousness factor and family history of neonatal deaths

Table (9): Logistic Regression of Combined Variables, Gaza Governorates, 2008

Variables	Odds Ratio	95% Confidence Interval			P value
Colostrum feeding	0.05	0.01	-	0.20	0.000
Family history of neonatal death	7.49	2.65	-	21.13	0.000
Unconsciousness	39.55	7.89	-	198.30	0.000

The above-mentioned table, showed the final model of logistic regression when the researcher combined all the remaining significant variables together. Yet, among all, the strength of association was higher for the unconsciousness factor, and the lowest was for colostrums feeding. The most important independent factors determining the neonatal deaths in Gaza strip could be those factors mentioned above.

Table (10): Logistic Regression Model for the Study Population, Gaza Governorates, 2008

Socio demographic variables				**Maternal factors in pregnancy, delivery and post natal care**			**Neonatal factors**			**Combined Variables**		
Socio demographic	**Odds Ratio**	**95% Confidence Interval**	**P value**	**Odds Ratio**	**95% Confidence Interval**	**P value**	**Odds Ratio**	**95% Confidence Interval**	**P value**	**Odds Ratio**	**95% Confidence Interval**	**P value**
Dependence	1.16	1.07 - 1.27	0.000									
Consanguineous marriage	1.23	1.03 - 1.47	0.000									
Maternal factors in pregnancy, delivery and post natal care												
Colostrums feeding	0.07	0.02 – 0.22	0.000							**0.05**	**0.01 – 0.20**	**0.000**
Duration of pregnancy	2.83	1.22 – 6.56	0.01									
Neonatal variables												
Family history of neonatal death	4.53	1.61 – 12.75	0.004							**7.49**	**2.65– 21.13**	**0.000**
Birth weight of the neonate	1.001	1.001 - 1.002	0.018									
suckling in a normal way	0.18	0.06 – 0.53	0.002									
Unconsciousness	36.70	6.56 – 205.09	0.000							**39.55**	**7.8 – 198.30**	**0.000**

4.2 Controlling Confounders among the Study Population

The current study is regarded one of the studies in which many confounders could affect the reliability of results e.g. socio demographic factors. In the same time, the researcher attempted to display and demonstrates the impact of socio demographic context on the results of the study. In addition, the researcher hypothesize that the socio demographic factors are being considered important determinant of neonatal mortality, though most of the research focus on the medical and neonatal factors. However, bivariate logistic

regression was performed using logistic regression, and the researcher divided the variables into groups (socio demographic, maternal, and neonatal), then combined the associated factors from each group in one model to reach the final factors that predicts the future of neonatal mortality.

From the socio demographic factors, consanguinity, and the number of dependence were considered as risk factors. In addition and for the maternal factors duration of pregnancy was a risk factor. For the neonatal factors, vaccine type, and colostrum breast-feeding, suckling ability of newborn, unconsciousness state after delivery, family history of neonatal deaths, and birth weight. These findings are consistent with most of international and regional studies (**Galway, Wolff and Strugus, 1987; Yasmin et al., 2001; Lawn et al., 2001 and Oana, et al., 2000).**

When combined with in one model, the final risk factors were the followings: colostrums feeding (OR=0.05, CI= 0.01 – 0.2, P= 0.000), history of neonatal death among the family (OR=7.49, P=0.000, CI= 2.65 -21.13), and unconsciousness status after delivery (OR=39.55, P=0.000, CI= 7.89 -198.30). These findings support the decision to establish and expand neonatal care services that are accessible and capable of providing specialized care to the sick newborn. Cost-effective and life-saving interventions that target the preterm infant, such as "kangaroo care'', (skin-to-skin care) are a part of the neonatal Protocol. (**http://www.kangaroomothercare.com/research.htm**).

The researcher believes that, these factors reflect the utilization of health services mainly during the postnatal period. From another scope, all causes of losing the baby consciousness state after delivery should be avoided and must be top prioritized when addressing the newborn health.

Chapter V

Conclusion and Recommendations

The current study was designed to explore the risk factors determining the neonatal mortality in Gaza Governorates and thus, contributing to the improvement and intervention to improve both maternal and child health in the Palestinian context.

The researcher adopted a case control design at the level of household by interviewing the mothers of 220 cases and 415 controls matched by sex, locality and nearest one week of birth. In general, the analysis revealed that the availability and use of perinatal health care services were associated with reduced odds of neonatal deaths. Mothers with a higher frequency of antenatal visits and the individual utilization of postnatal care services were significantly associated with reduced odds of neonatal deaths. The majority of participants were from Gaza city, and male cases were slightly higher than female cases. The sex of the neonate did not influence the death of the cases, which was explained by the fact that a matching was done regarding sex of the neonate. The mean maternal current age of all study participants was 27.9 years. Regarding the age of the mother at marriage, the study demonstrated that, almost half of the mothers of cases and controls in parallel, fall in the age less than 18 yrs old, which reflect the Palestinian culture for early marriage but this could not influence the association with neonatal mortality. The majority of the mothers of the study population was homemaker, literate and completed from 6-12 yrs of education, which is consistent with the local reports of MOH. However, maternal schooling emerged without association with chance of neonatal death. This still reflect the concept of additional Information, Education and Communication activities that are needed to raise community awareness about the significance of neonatal services.

When entered in the logistic regression model, dependence and consanguinity emerged as predictors of neonatal mortality among the sociodemographic variables. This means that efforts should be directed to reduce the burden of dependence, because the Palestinian territories are suffering from high dependence ratio. Furthermore, the subject of consanguineous marriage should be elicited and handled in a scientific way. The acceptance of genetic counseling and antenatal diagnosis in parallel with increasing awareness and changing attitudes of the community to avoid close consanguineous marriage should be one of the priorities.

Regarding maternal factors of pregnancy, delivery and postnatal care, the researcher concluded that number of antenatal visits should be at least four to protect women form neonatal death, which is in consistence with WHO recommendation. The risk of not attending four antenatal visits is almost twice for dying a neonate than the attending one. A more frequent monitoring and strict pregnancy can identify complications early and prevent harmful situations for the newborn. However, UNRWA as a place of antenatal care was the most prominent place to influence the neonatal mortality, meanwhile, for those who visited UNRWA more than 4 times, the chance of neonatal death was less than those who visited it less than 4 times (P= 0.005)

The health facility delivery and the mode of delivery was one of the protective factors for neonatal death (P= 0.001, OR= 0.637). The study explored that the non C/S delivery frequency is higher among controls' than cases', which means by any means that the mother of cases were more susceptible to complications of pregnancy or delivery more than those of controls'.

During antenatal follow up, the starting month of taking iron emerged as strong risk factor. When this factor was stratified by the month of antenatal visits, it emerged in association with the early visits (P=0.008) and when introduced along other maternal factors to the logistic regression model, it lost significance. The researcher concluded that iron intake should be taken as early as possible in the first trimester to reduce the incidence of maternal anemia that leads to neonatal mortality and morbidity.

Furthermore, the study explored that the current pregnancy at the time of interview was strongly associated with neonatal mortality. The study revealed that the risk of neonatal death for the currently pregnant mother is almost twice the non-pregnant mother (P=0.000, OR=1.9). The proportion of mothers who want no more pregnancies are higher in controls than in cases and this association with neonatal death was strongly significant when stratified with the current pregnancy status (P=0.02). This may reflect the importance of birth spacing, and the willing of mothers to postpone future pregnancies. As a common practice among the Palestinian women, the study concluded that almost half of the mother of cases and controls had a history of birth interval less than 24 months, and the percentage of birth interval more than 32 months is higher in controls' than in cases'. When stratified by the parity group, the birth interval association was statistically significant with 1 - 3 times pregnancy group, but this association was lost when entered into the logistic regression model. This indicates the importance of conducting population-based programmes about the importance of spacing between pregnancies. In the

Palestinian religious culture, commitment to breastfeeding children up to 2 years could be helpful in this context. However, the parity of more than six was considered as a risk factor for neonatal death mainly for the group of age more than 23 yrs among the mothers of study population (P= 0.02).

In addition, it was observed that taking folic acid from 1-3 months could be protective factor for reducing neonatal mortality (P= 0.008) but it lost its significance when entered in logistic regression model.

The duration of labour (to judge prolonged labour) emerged as strong risk factor of neonatal mortality, so appropriate antenatal care can play a role by educating women and their families to recognize delivery complications that lead to prolonged labor and require referral to health care services to achieve a better health outcome for both mothers and infants **(Table5).** Preterm labor or prematurity emerged as a strong predictor for neonatal death when entered in the logistic regression model (P=0.01, OR= 2.83), However, this factor remains one of the important risk factors, interestingly, both in normal weight group and low birth weight group (P= 0.001 for both relations). As an indicator of health care service utilization after delivery, postnatal care services received by the neonates showed a significant protective effect. This result demonstrated an important role of postnatal care services in reducing neonatal mortality in Gaza Governorates. The breast-feeding approach was a very strong risk factor for neonatal death (lost its statistical significant in the model of logistic regression). The researcher supports the early initiation approach of breast-feeding. It was observed out of the study that breast-feeding within the first hour of childbirth was strongly statistically significant between the both groups (P=0.000). Feeding with colostrums was significant among the groups of early initiation of breast-feeding and it seems protective factor, which remained until the final step of logistic regression. Yet, most of the programs should focus on early initiation and colostrums feeding among the mothers of community.

As a strong risk factor, immunization did not remain significant when entered the model of logistic regression. These results suggest the need for public health interventions directed at improving the awareness of mothers and family members about the importance of postnatal care checks and to further increase the utilization of these services. Quality, accessibility, and availability of the services should be enhanced to ensure optimal results for neonatal health.

The history of neonatal death in the family could be considered as a strong predictor of neonatal death as was explored by using logistic regression the final model **(Table 9).**

Congenital malformation appeared as important risk factor for neonatal mortality and the difference between cases and controls were statistically significant. However, when stratified by consanguineous marriage, it was observed that it was statistical significance in all groups of marriage but the highest frequency was in cousin marriage (Close relationship marriage) (P=0.000 in all groups).

It was significant to say that the percentage of low birth weight was higher in cases than in controls and the percentage of normal birth weight was higher in controls than in cases which reach a strong statistical significance (P=0.000).
Similarly, Birth weight appeared as a risk factor in the first levels of analysis (P=0.01, OR= 1.001). However, when entered to the final model of logistic regression, it lost its significance. However, it is worth mentioning that, the low birth weight influence the neonatal mortality in full term group and no significance was in the preterm group.

The neonatal illness and care around the neonatal period could be influential on neonatal mortality. Yet, the suckling after birth and unconsciousness state of newborn which reflect the seriousness of any illness of the neonate in general, cyanosis, passage of fresh visible blood in the stool, difficult breathing, in drawing of the chest, and pneumonia were all, predicting risk factors when entered in the model of logistic regression, but it is only, unconsciousness, and suckling ability which remained statistically significant up to the final model and did not lose its significance, other variables lost statistical significance. In other words, the researcher can conclude that unconsciousness, its consequences and causes can be considered as independent risk factor for neonatal mortality.

The study explored an interesting finding concerning the domestic violence in pregnancy. It was demonstrated that, neonatal mortality showed a significant 1.5 fold increased risk in women having domestic violence during pregnancy (P=0.03, OR=1.58). However, the researcher concluded that domestic violence against mothers during pregnancy was a strong risk factor for neonatal mortality when stratified by duration of pregnancy (P=0.002, OR=4.351), birth weight (P=0.001, OR= 4.5) and mode of delivery (P= 0.02, OR= 0.34).

To sum up conclusion, the researcher summarizes that, community level data examined in this analysis demonstrated that individual, household and community level variables had a

significant impact on neonatal mortality. These findings point to the need for comprehensive prevention strategies to further reduce neonatal mortality in Palestine.

At the community level, the quality of the health infrastructure as well as the availability of adequate neonatal facilities will have significant impact in reducing neonatal mortality. At the household and individual levels, health promotion strategies to increase awareness of the importance of timely and appropriate ante natal, postnatal care service utilization, the benefits of immunization, adherence to early initiation of breast- feeding with colostrums feeding, birth spacing and preventing violence against women, and involvement of men and in-laws in the process are needed given their protective effect on neonatal mortality. Interventions to prevent low birth weight would also contribute to further reductions of neonatal mortality in Palestine.

Recommendations

Based on the results of the current study, the following recommendations are as follows:

Recommendations for the Health Service Delivery

- More than half the cases had a history of birth interval less than 24 months as it was explored out of the study that was considered as a risk factor for neonatal death. This result indicates the importance of conducting population-based programmes about the importance of spacing between pregnancies. Further more, the risk of not attending four antenatal visits is almost twice for dying a neonate than the attending one. Yet, at least four A/N visits are recommended for a pregnant mother.
- Out of the study results, it was demonstrated that parity , preterm labor, early rupture of membrane, prolonged labor, mode and place of delivery were considered as risk factors for neonatal mortality during pregnancy and delivery, so assessment of the antenatal care offered and factors that enhance utilization of antenatal services, such as offering the service free of charge, health promotion, use of information, education, and communication materials, targeted at the household and community levels, on birth preparedness, recognition of danger signs for mother and newborn, safe deliveries and postpartum care.
- The present study showed that, utilization of health services in the postnatal period is very determinant of the neonatal mortality. So all efforts, programs, and stakeholders such as MOH, UNRWA, UNICEF and other NGO's should rest on such highly critical area. The increased emphasis on immediate drying, warming, and immediate and exclusive breastfeeding for the newborn, use clear approach for all complicated deliveries in which a neonatologist and obstetrician are present at the time of delivery, improved clinical practices related to assessment and resuscitation of the neonate and the use of APGAR scores to assess the condition of the newborn, and strict immunization rules and protocols particularly as earlier as possible are recommended.

- The study concluded that, low birth weight and congenital malformation were considered as risk factors for (NMR), therefore, family planning with counseling can reduce the risk of congenital malformations by preventing high-risk pregnancies. Furthermore, surveillance of low birth weight is recommended. Low birth weight is a risk factor for neonatal death whose prevention is complex and that is related to general

improvement of the quality of life of the population. We do suggest, however, that it is fundamental to adopt more direct measures at healthcare services and inside communities that will ensure adequate care of the mother and the baby. These measures should include the prenatal, natal and neonatal (especially early neonatal) periods.

- The study could add the result of relationship of consanguinity and domestic violence with the neonatal mortality. Both are culturally sensitive issues and rarely tackled by different researchers. However, early detection of complications during pregnancy and neonatal period, the acceptance of genetic counseling and A/N diagnosis, prevention of violence programs targeting men and in-Law's are recommended.
- Implementation of special infection control activities in order to reduce cause of sepsis and frequency of nosocomial infections.
- Continued and sustainable emphasis on further neonatal reduction with coordination of all programmers, such as MOH, UNRWA, UNICEF and other NGO's
- Early recognition of high-risk pregnancies and newborns coupled with an efficient reliable referral system is the mainstay of a program that could significantly lower neonatal mortality rates. The success of such a program will certainly rest on improved hospital care for the high-risk patients.

Recommendations for Policy Makers

- Almost half of the mothers of the study got married at child age (< 18 yrs) which may hinder the interventions of reproductive health education and intervention program for improving child and maternal health. Yet, early marriage should be avoided which needs more efforts and programs to work on changing attitudes and in built culture through, health education and health promotion.
- The study demonstrated that, number of dependence (< 15 yrs and or >65 yrs) was associated with the neonatal death between the two groups (Cases and Controls). Yet, this interesting finding should drive and attract attention of all planners , policy makers and decision makers to put insight and forwarding their efforts towards improving the living status of the families and to increase awareness of the community in order to reduce this burden, and thus reducing neonatal mortality in the Palestinian context.
- The concept of preconception care should be highlighted and implemented with the available resources and good intention of all stakeholders.

Recommendations for Further Research Studies

- The effect of sociodemographic determinant on neonatal mortality independently could be an area of future research.
- The researcher, for further research studies, advises to conduct more studies on the relationship of domestic violence and consanguinity, with neonatal mortality, which is a very culturally sensitive issue.

Chapter VI

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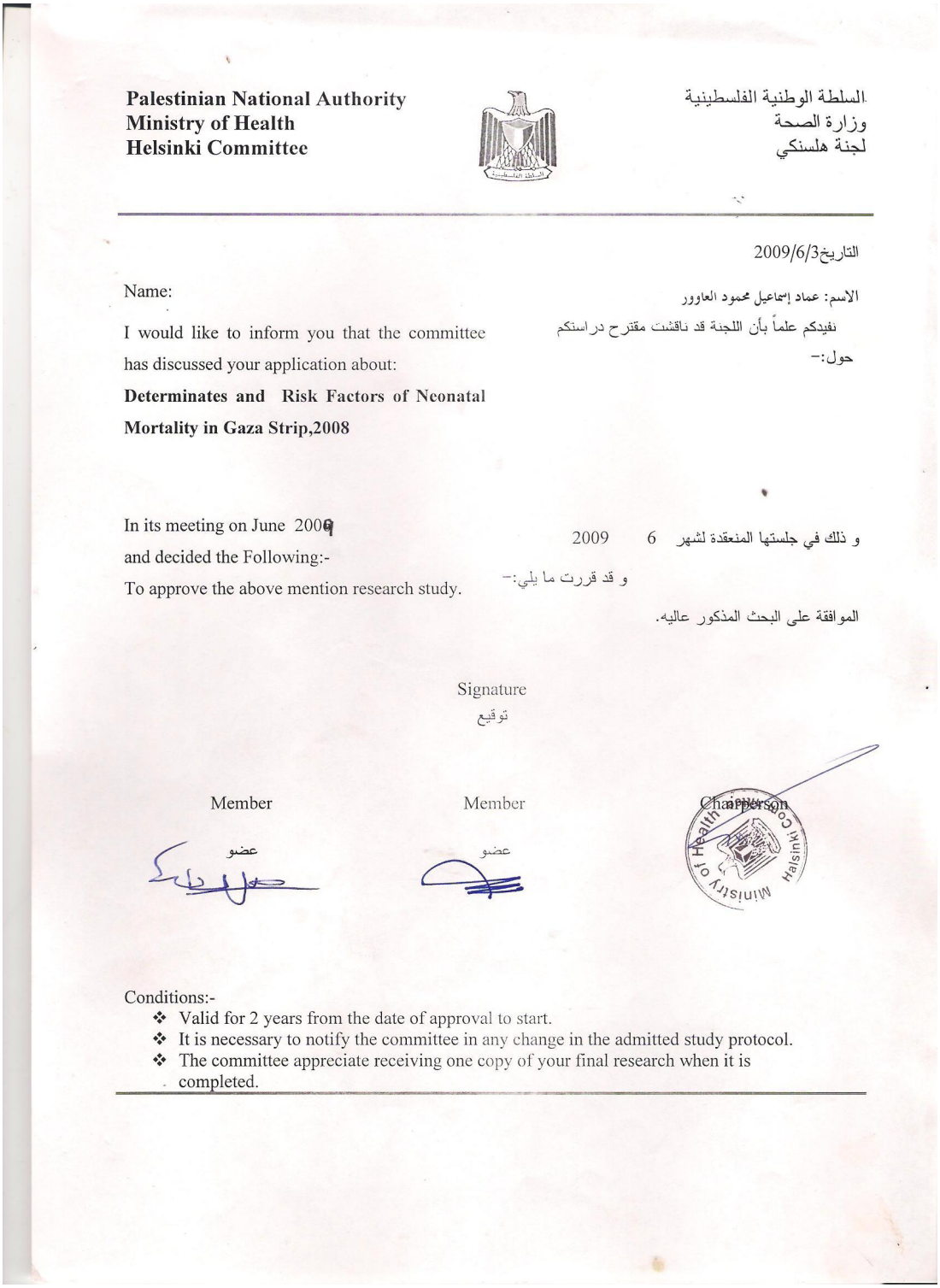
Annexes

Annex 1: Approval Letter from Helsinki Committee, Ministry of Health, Palestine



Palestinian National Authority
Ministry of Health
Helsinki Committee

السلطة الوطنية الفلسطينية
وزارة الصحة
لجنة هلسنكي

التاريخ2009/6/3

Name:

الاسم: عماد إسماعيل محمود العاورر

I would like to inform you that the committee has discussed your application about:

نفيدكم علماً بأن اللجنة قد ناقشت مقترح دراستكم حول:-

Determinates and Risk Factors of Neonatal Mortality in Gaza Strip,2008

In its meeting on June 2009

و ذلك في جلستها المنعقدة لشهر 6 2009

and decided the Following:-

To approve the above mention research study.

و قد قررت ما يلي:-

الموافقة على البحث المذكور عاليه.

Signature
توقيع

Member
عضو

Member
عضو

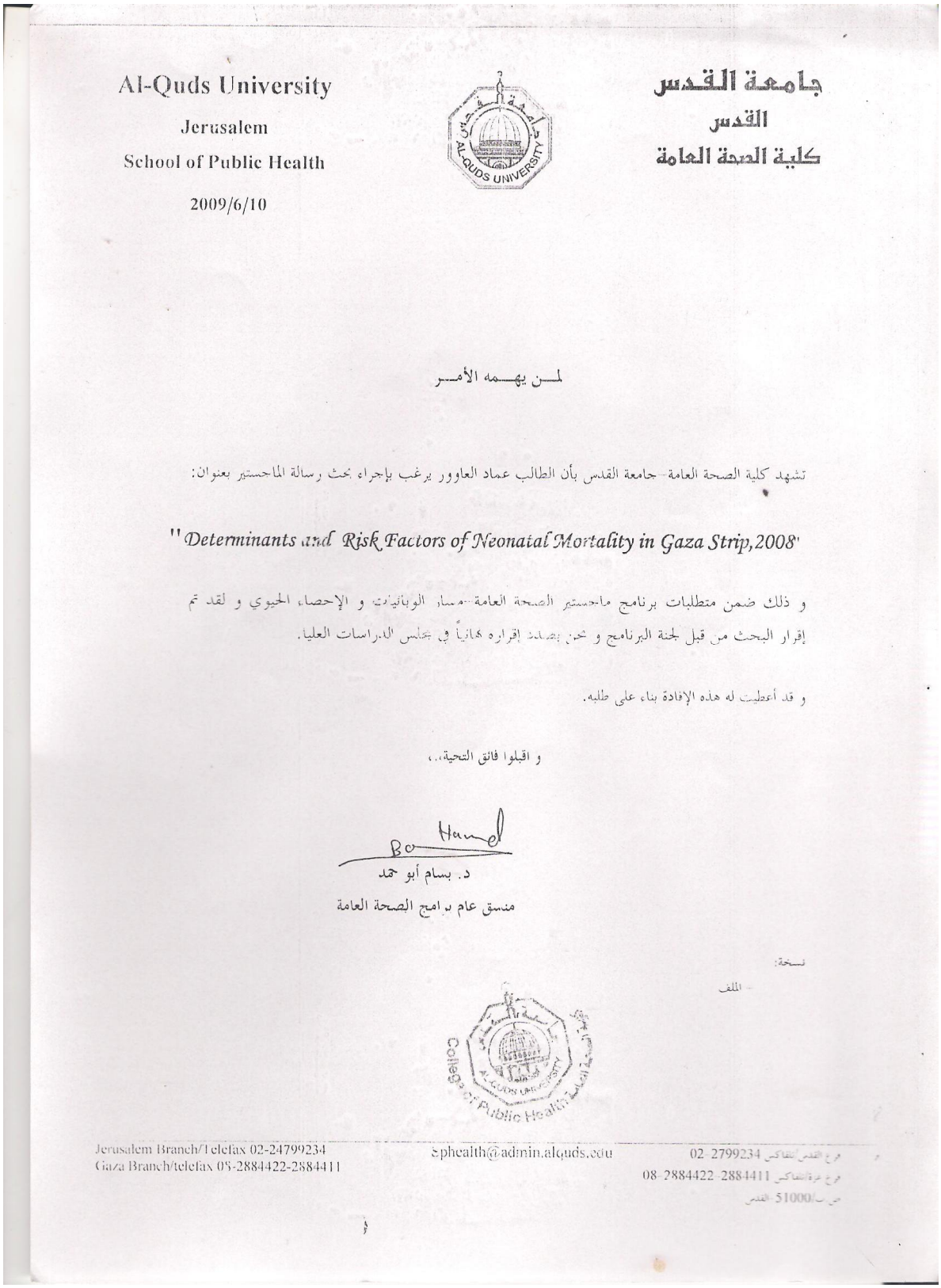
Chairperson

Ministry of Health Helsinki Committee

Conditions:-

- Valid for 2 years from the date of approval to start.
- It is necessary to notify the committee in any change in the admitted study protocol.
- The committee appreciate receiving one copy of your final research when it is completed.

Annex 2: Letter of recommendation from AlQuds University



Al-Quds University
Jerusalem
School of Public Health

2009/6/10

جامعة القدس
القدس
كلية الصحة العامة

لمن يهمه الأمر

تشهد كلية الصحة العامة- جامعة القدس بأن الطالب عماد العاوور يرغب بإجراء بحث رسالة الماجستير بعنوان:

"Determinants and Risk Factors of Neonatal Mortality in Gaza Strip,2008"

و ذلك ضمن متطلبات برنامج ماجستير الصحة العامة -مسار الوبائيات و الإحصاء الحيوي و لقد تم إقرار البحث من قبل لجنة البرنامج و نحن بصدد إقراره كلياً في مجلس الدراسات العليا.

و قد أعطيت له هذه الإفادة بناء على طلبه.

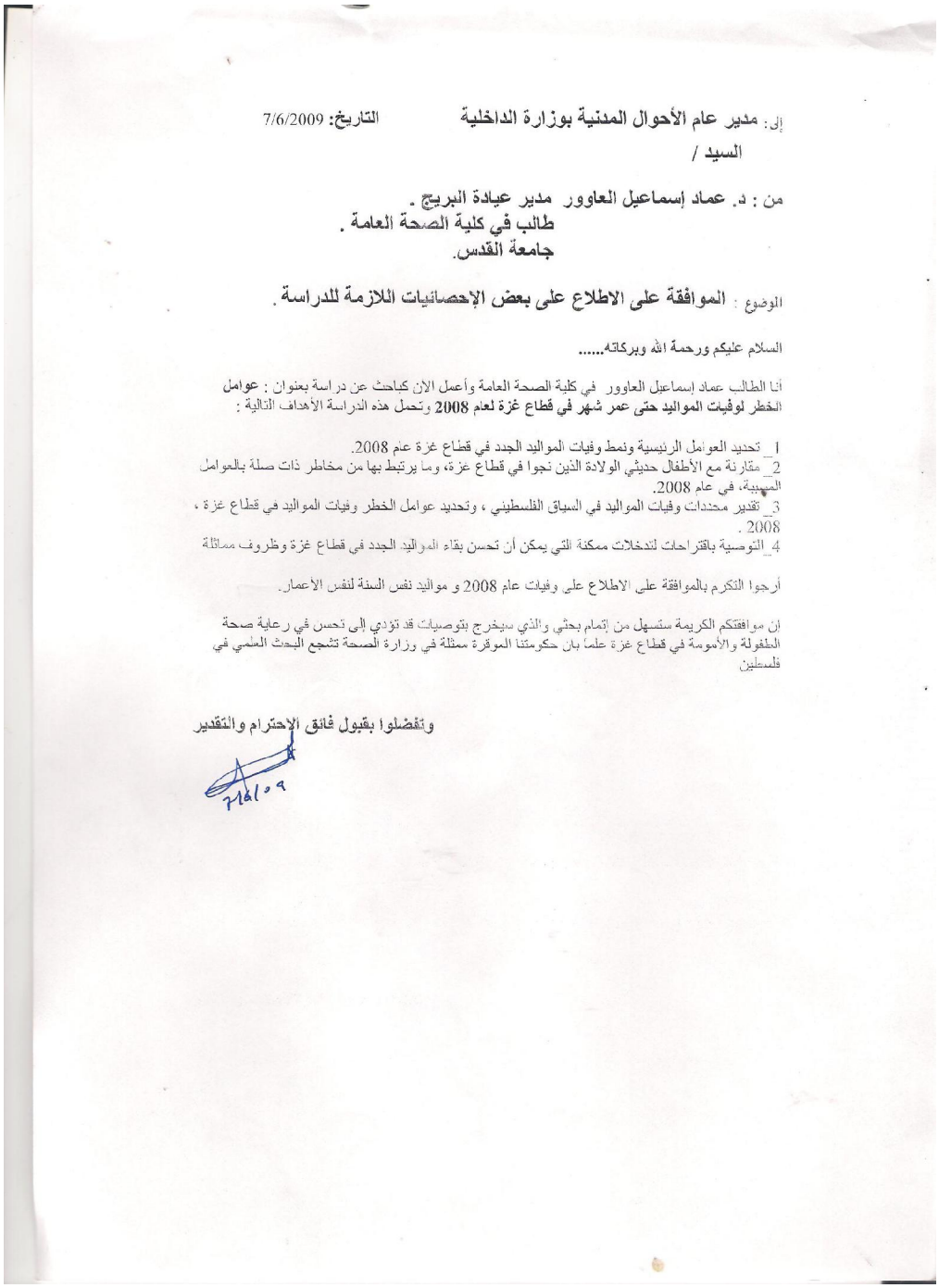
و اقبلوا فائق التحية،،

د. بسام أبو حمد
منسق عام برامج الصحة العامة

نسخة:
- الملف

Jerusalem Branch/Telefax 02-24799234
Gaza Branch/telefax 08-2884422-2884411
Sphealth@admin.alquds.edu
فرع القدس/تلفاكس 02-2799234
فرع غزة/تلفاكس 08-2884422-2884411
ص.ب/51000 القدس

Annex 3: Letter for Ministry of Interior



إلى: مدير عام الأحوال المدنية بوزارة الداخلية التاريخ: 7/6/2009

السيد /

من : د. عماد إسماعيل العاوور مدير عيادة البريج .
طالب في كلية الصحة العامة .
جامعة القدس.

الموضوع : الموافقة على الاطلاع على بعض الإحصائيات اللازمة للدراسة .

السلام عليكم ورحمة الله وبركاته.....

أنا الطالب عماد إسماعيل العاوور في كلية الصحة العامة وأعمل الآن كباحث عن دراسة بعنوان : عوامل الخطر لوفيات المواليد حتى عمر شهر في قطاع غزة لعام 2008 وتحمل هذه الدراسة الأهداف التالية :

1_ تحديد العوامل الرئيسية ونمط وفيات المواليد الجدد في قطاع غزة عام 2008.
2_ مقارنة مع الأطفال حديثي الولادة الذين نجوا في قطاع غزة، وما يرتبط بها من مخاطر ذات صلة بالعوامل المهيئة، في عام 2008.
3_ تقدير محددات وفيات المواليد في السياق الفلسطيني ، وتحديد عوامل الخطر وفيات المواليد في قطاع غزة ، 2008 .
4_ التوصية باقتراحات لتدخلات ممكنة التي يمكن أن تحسن بقاء المواليد الجدد في قطاع غزة وظروف مماثلة

أرجوا التكرم بالموافقة على الاطلاع على وفيات عام 2008 و مواليد نفس السنة لنفس الأعمار.

إن موافقتكم الكريمة ستسهل من إتمام بحثي والذي سيخرج بتوصيات قد تؤدي إلى تحسن في رعاية صحة الطفولة والأمومة في قطاع غزة علماً بان حكومتنا الموقرة ممثلة في وزارة الصحة تشجع البحث العلمي في فلسطين

وتفضلوا بقبول فائق الاحترام والتقدير

7/6/09

Annex 4: Letter for Ministry of Health, 2008

بسم الله الرحمن الرحيم

اليوم: الأربعاء. التاريخ: 2009/06/10م

عطوفة الأخ الفاضل/ د. حسن خلف حفظه الله،،،

وكيل وزارة الصحة المساعد

السلام عليكم و رحمة الله وبركاته...

الموضوع/ المساعدة في الحصول على بعض البيانات من وحدة نظم المعلومات.

نهديكم أطيب تحياتنا ونتمنى لكم وافر الصحة والعافية، بالإشارة إلى الموضوع أعلاه وفي ضوء تعزيز الدراسات البحثية التي هي من استراتيجيات وزارة الصحة في قطاع غزة، أنا الدكتور عماد العاوور أقوم بإجراء بحث بعنوان **المحددات وعوامل الخطر من وفيات المواليد في قطاع غزة 2008**، تحت إشراف الدكتور يحيى عابد، والهدف العام من البحث هو استكشاف أسباب ركود معدلات وفيات الرضع في العقود الأخيرة ودراسة العوامل المؤثرة في مخاطر الوفيات الأطفال حديثي الولادة في السياق الفلسطيني، دراسة لتقييم ومناقشة العوامل المحددة لمعدل وفيات المواليد وتقدر عوامل الخطر المرتبطة بها.

سوف أكون مقدراً جداً إذا سمحت لي أن أنال شرف الموافقة من خلالكم لأتمكن من الحصول على بعض البيانات من قسم نظم المعلومات التابع لوزارتكم الموقرة وهذا في واقع الأمر سيسهل لي الدراسة المذكورة أعلاه.

وتفضلوا بقبول فائق الاحترام والتقدير،،،

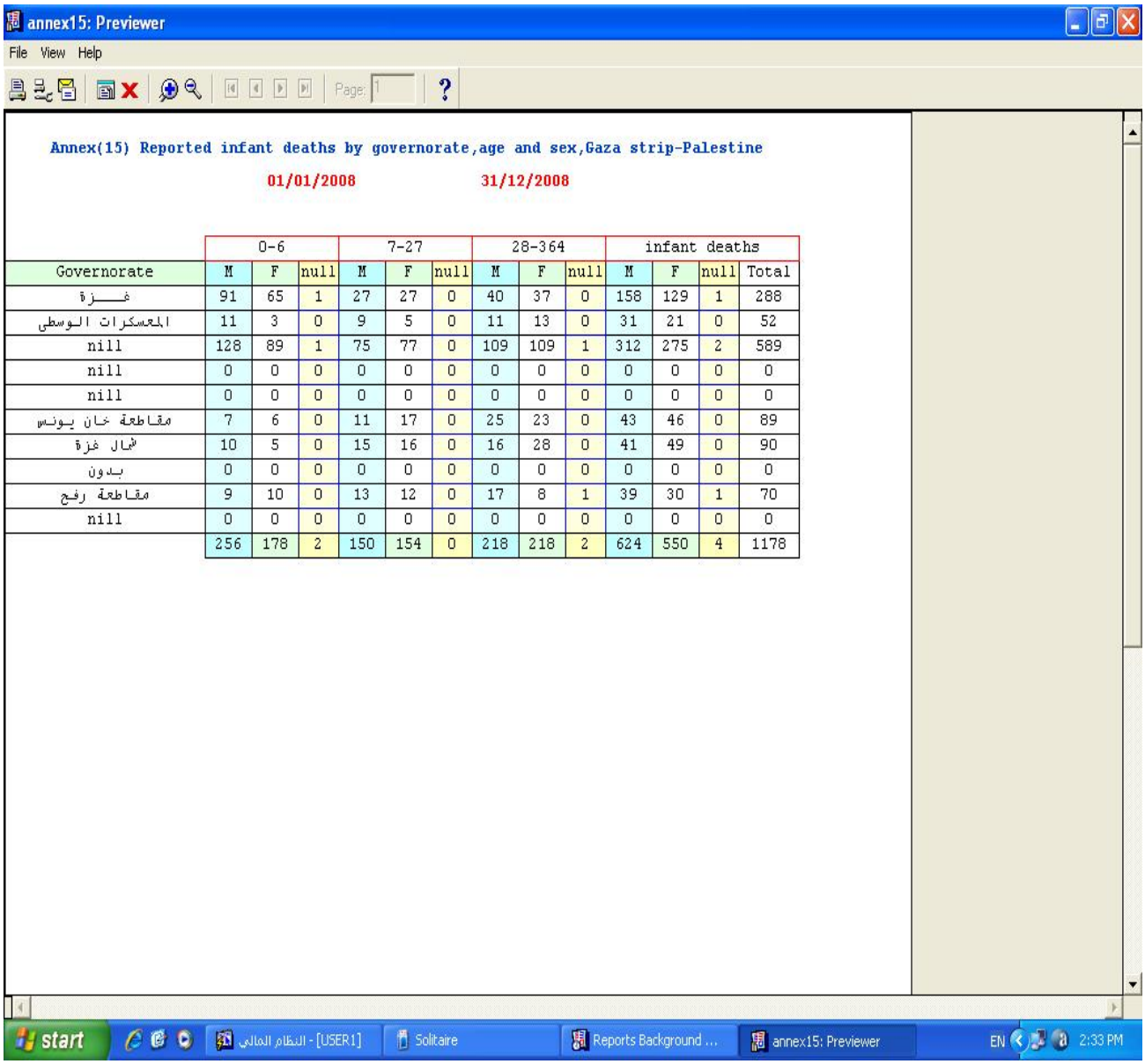
مقدم الطلب:

د. عماد العاوور

طالب في كلية الصحة

العامة جامعة القدس

Annex 5: Reported Neonatal, Infant deaths by Governorates, age and Sex, 2008

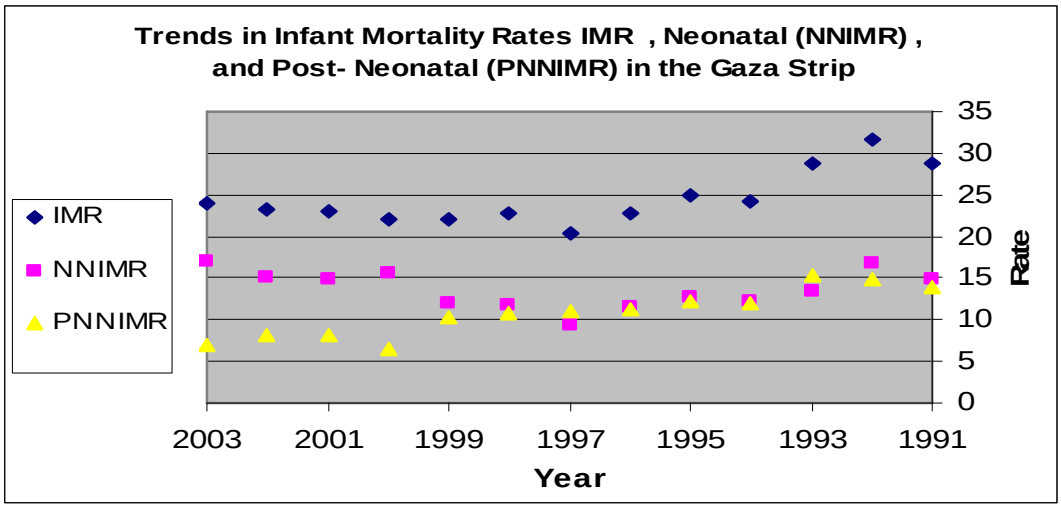


	0-6			7-27			28-364			infant deaths			
Governorate	M	F	null	M	F	null	M	F	null	M	F	null	Total
غـــــزة	91	65	1	27	27	0	40	37	0	158	129	1	288
المعسكرات الوسطى	11	3	0	9	5	0	11	13	0	31	21	0	52
nill	128	89	1	75	77	0	109	109	1	312	275	2	589
nill	0	0	0	0	0	0	0	0	0	0	0	0	0
nill	0	0	0	0	0	0	0	0	0	0	0	0	0
مقاطعة خان يونس	7	6	0	11	17	0	25	23	0	43	46	0	89
شمال غزة	10	5	0	15	16	0	16	28	0	41	49	0	90
بدون	0	0	0	0	0	0	0	0	0	0	0	0	0
مقاطعة رفح	9	10	0	13	12	0	17	8	1	39	30	1	70
nill	0	0	0	0	0	0	0	0	0	0	0	0	0
	256	178	2	150	154	0	218	218	2	624	550	4	1178

Annex (6): Logistic Regression Model for the Study Population, Gaza Governorates, 2008

Socio demographic variables				Maternal factors in pregnancy, delivery and post natal care			Neonatal factors			Combined Variables		
Socio demographic	Odds Ratio	95% Confidence Interval	P value	Odds Ratio	95% Confidence Interval	P value	Odds	95% Confidence Interval	P value	Odds Ratio	95% Confidence Interval	P value
Dependence	1.16	1.07 - 1.27	0.000									
Consanguineous marriage	1.23	1.03 - 1.47	0.000									
Maternal factors in pregnancy, delivery and post natal care												
Colostrums feeding	0.07	0.02 – 0.22	0.000							0.05	0.01 – 0.20	0.000
Duration of pregnancy	2.83	1.22 – 6.56	0.01									
Neonatal variables												
Family history of neonatal death	4.53	1.61 – 12.75	0.004							7.49	2.65– 21.13	0.000
Birth weight of the neonate	1.001	1.00 - 1.002	0.018									
suckling in a normal way	0.18	0.06 – 0.53	0.002									
Unconsciousness	36.70	6.56–205.09	0.000							39.55	7.8 – 198.30	0.000

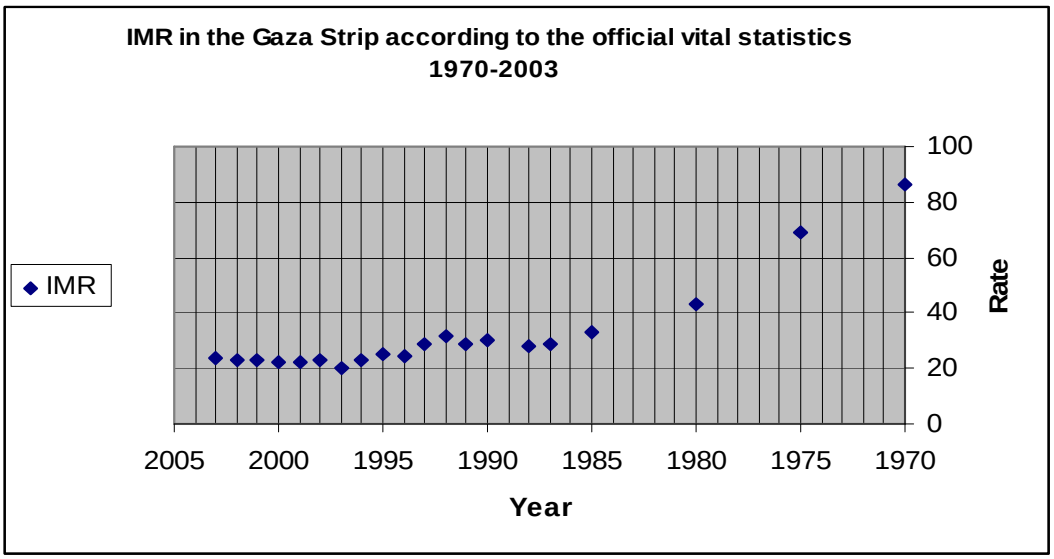
Annex 7: Neonatal and Post-neonatal Mortality Rates in the Gaza Strip – 1991-2003.



Annex 8: Child mortality rates according to four DHS.

Indicator	Gaza Strip 1996	Gaza Strip 2000	Gaza Strip 2004	Gaza Strip 2006	West Bank 1996	West Bank 2000	West Bank 2004	West Bank 2006	OPT 1996	OPT 2000	OPT 2004	OPT 2006
IMR	30	27.3	30.2	28.8	26	24.4	20.1	22.9	27	25.5	24.2	25.3
CMR (U5)	37	31.2	34.8	31.7	31	27.2	23.7	25.7	33	28.7	28.3	28.2

Annex 9



Sources of Data:

1970-1988: Marianne Heiberg and Geir Øvensen(Eds.).1993..

1990- 2003: Ministry of Health, Health Status in Palestine-Ministry of Health Annual Report 2003, July 2004

Determinants and Risk Factors of Neonatal Mortality in Gaza, 2008

Questionnaire

A Case Control Study

1-Serial Number of Neonate: ----------

2- Name of Data collector: ----------

3-Name of Neonate: ----------

4-Sex of neonate: 1- Male 2- Female

5-Research category 1-Case 2-Control

6-Date of birth: ___/___/___ dd mm yy

7-Date of death: ___/___/___ dd mm yy

8-Age of neonate at death: ---------- day

9- Age of child still alive: ---------- months

10-Governarate:1-North Gaza 2- Gaza 3- Midzone 4-KhanYounis 5- Rafah

Address in details: ----------

Tel. No. ----------

PART 1 **Socio demographic conditions**	
11-Mother's age (Now): ☐	Age (in years).....
12-Mother's age at marriage:	Age (in years).....
13-Marital status of mother: ☐	1- Currently married 2-Formerly married
14-Mother's occupation: ☐	1- Professional(Physician, lawyer, accountant, chemist,) 2- Managerial(manager, headmaster, teacher) 3- Marcher 4- Skilled worker (Chief worker, chief, grocer, printer) 5- Partly skilled(telephone worker, fruit worker) 6-Unskilled worker(cleaner) 7- Housewife
15-Mother's education in years: --	
16-Father's age in years:	
17-Father's education in years:	
18-Father's occupation: ☐	1- Professional(Physician, lawyer, accountant, chemist,) 2- Managerial(manager, headmaster, teacher) 3- Marcher 4- Skilled worker (Chief worker, chief, grocer, printer) 5- Partly skilled(telephone worker, fruit worker) 6-Unskilled worker(cleaner) 7- Unemployed

19-Residence: ☐	1- City 2-Town 3-Village 4-Construction project (Sheikh Radwan, El Amal,) 5-Refugee camp
20-Household size: …….	
21-Type of family ☐	1- Nuclear 2- Extended
22- How many of your family members either less than 15 yrs and or more than 65 yrs old? ☐	
23How many living rooms you have at your house?	
24-Do you have TV at home?	1- Yes 2- No
25-Family income: ☐	
26-Consanguinity ☐	1 Cousin 2-Form the same family, Hammoulah (Either mother or father) 3- Not relative

PART 11

Pregnancy History and Maternal Care

27- How old were you at the time of your first pregnancy? ☐	Age (in years).....
28-Please, think of the time of your previous pregnancy. When did that pregnancy end? ☐	Time the previous pregnancy ended Year Month
29- Until now, how many times have you been pregnant? ☐	Number of pregnancies...
30-Birth interval in months ?	----------
31- How many of your surviving sons and daughters are older than (Name)? ☐	Older sons..... Older daughters.....
32-Where was (Name) delivered? ☐	1-Hospital 2- private clinic3- private health center 4-home 5- others (specify)
33-What was mode of delivery? ☐	1-Spontenous vaginal delivery 2-Assisted vaginal delivery 3- cesarean section
34-Who was birth attendant? ☐	1- Physician 2- Midwife 3- Trained birth attendant
35- Did you receive any antenatal care (ANC) when you were pregnant with (Name)? ☐	1-Yes 2- No
If answer is yes, 36- Now I would like to ask you about the services you received at your antenatal care (ANC) visits during your pregnancy with (Name) in any of your antenatal care visits during this pregnancy: ☐	(i) Was your weight measured? 1-Yes 2-No (ii) Blood pressure measured. 1-Yes 2-No (iii) Urine tested. 1-Yes 2-No (iv) Blood (Hb%) tested 1-Yes 2- No (v) Were you given iron and folic acid tablets? 1- Yes 2- No (vi) Were given any other services? 1- Yes (Specify) 2- No

37- Last time, from where did you receive antenatal care (ANC) for this pregnancy? More than one option ☐	1- Public sector 2- UNRWA health center 3- NGO sector 4- Private clinic 5- Others (Specify)----------	
38-How many months were you pregnant with (Name) when you first received antenatal care (ANC) ?	First visit at ----------	
39-How many times did you receive antenatal care (ANC)?	Number of ANC visits.....	
40- If the answer is No, or you made only ☐e antenatal visit What were the reasons you did not make any antenatal visit or you made only one antenatal visits? Circle more than one answer ☐	1-Did not feel its necessity..... 2-Objection of family members. 3-None to accompany..... 4-Economic constraint..... 5-Poor quality of ANC..... 6-ANC provider at far distance 7-Others---------- (Specify)	
41- During your pregnancy with (Name), or during or after the delivery of (Name), did you have any pregnancy related complications, like: ☐		
-Swollen arms and legs (edema) ☐	1- Yes	2- No
-High blood pressure ☐	1- Yes	2- No
-Diabetes mellitus ☐	1- Yes	2- No
-Vaginal bleeding during pregnancy ☐	1- Yes	2- No
-Labor for more than 12 hours ☐	1- Yes	2- No
-Albumin in urine ☐	1- Yes	2- No
-Excessive bleeding during/after Delivery ☐	1- Yes	2- No
-Convulsion ☐	1- Yes	2- No
-Anemia ☐	1- Yes	2- No
-Fever for more than 3 days during pregnancy ☐	1- Yes	2- No
-Fever for more than 3 days after delivery ☐	1- Yes	2- No
-Others specify---------- ☐	1- Yes	2- No
42- Have you ever been exposed to any sort of domestic violence either physically psychologically? ☐	1- Yes	2- No
43-Did you receive folic acid during pregnancy with (Name)?	1- Yes	2- No
44- If yes, From which month did you start to take folic acid tablet?	1-One month before pregnancy 2-First month of pregnancy3- Second month of pregnancy	

45- How long did you take folic acid tablet?	----------months
46-Did you take iron tablets during pregnancy with (Name)? ☐	1- Yes 2- No
47 From which month of last pregnancy did you start to take iron tablet? ☐	Month.....
48- From the starting date of iron tablet in this pregnancy, did you take iron tablet everyday? ☐	1- Yes 2- No
49- Are you currently pregnant?	1- Yes 2- No
50- If answer is No, Do you have desire for pregnancy? ☐	1-Wanted then 2- Wanted later 3- Wanted no more
51- Do you know your blood group?	1- Yes 2- No
52-If Yes, What type of group it is? ☐	1-A 2- B 3-AB 4- O
53-Do you know your NAME blood group? ☐	1- Yes 2- No
54-If Yes, What type of group it is? ☐	!- A 2- B 3-AB 4- O
55--When you delivered, did any one tell you that there was mismatching of blood between yours and your(NAME)? ☐	1- Yes 2- No

PART 111
Mothers' Nutrition

56- When you were pregnant with (Name), did you eat as much food as you usually ate before the pregnancy, or did you eat more or less food than you usually ate before? ☐	1-More than before 2-Same as before. 3-Less than before 4-Don't know/not sure
57- Do you eat the following foods, as much during your pregnancy as you usually ate before the pregnancy, or do you eat more or less food than you usually ate before? ☐	

	Less	More	Same as	Never previous ate
1-Rice...				
2-Pulses				
3-Fish				
4-Meat				
5-Eggs				
6-Vegetables				
7-Milk				
8-Fruit				
9-Others				

58- When you were pregnant with (NAME), did you take enough rest as you took before the pregnancy, or did you take more rest or less rest than you usually took before? ☐	1-More than before 2-Same as before. 3-Less than before
59- Did you breastfeed (Name) ☐	1- Yes 2- No
60- How long after birth of (Name), did you begin breastfeeding him/her? ☐	1-Immediately after birth within one hour 2-Within 24 hours of birth 3-After 24 hours of birth
61- Did you feed the first milk (colostrum) to (Name)? ☐	1- Yes 2- No
62- Are you still breastfeeding (Name)? ☐	1- Yes 2- No
63- Does any one live with you and share you at least one room and kitchen smoke? ☐ ☐	1- Yes 2- No
64-If yes, what type of smoking habit does he practice? ☐ ☐	!- Cigarette 2- Pipe 3- Shesha 4- Others
65-Have you ever smoke?	1- Yes 2- No
66-If yes, what type of smoking habit do you practice ☐	!- Cigarette 2- Pipe 3- Shesha 4- Others
PART 1V **Information about the Neonate** **All questions for both case and control except Q.No ,69, 70, 71, 72 for Case only**	
67- Was he/she immunized? ☐	1- Yes 2- No
68- If yes, what vaccination did he/she received? More than one answer ☐	1- BCG 2- Salk vaccine 3- Hepatitis vaccine 4- Don't know 5- All of above
69- Where did _____ die (Tick relevant box) **for case** ☐	1. Hospital 2.Other health facility 3.On route to hospital or health facility 4. Home 5. Other (specify
70-What was the length of time the child was ill before he/she died? **case** ☐	__ Hours-/days
71- Was care sought outside the home while he/she had this illness? **case** ☐	1. Yes 2. No 3. Do not know
72- (If yes, ask :) Where or from whom did you seek care? (Record all responses **case** ☐	1. Government hospital . 2. Governmental health centre or clinic 3- UNRWA H/C 4-NGO 5. Private physician 6. Pharmacy, drug seller 7. Other provider. 8. Relative, friend

73- Is there history of neonatal death in this family ?	1- Yes 2- No
74- How many months long was the pregnancy? ☐	__ __ months
75- Did this child's pregnancy end early, on time, or late? ☐	1. Early 2. On time 3. Late 4. Don't know
76- The pregnancy with the name occurred due to ----------?	1- Naturally without any medication 2- Naturally after intervention of medication 3- IVF
77- Did the waters leak before labor or during labor? ☐	1. Before 2. During 3. Waters never broke 4. Don't know
78- How much time did the labor and delivery take? (Note: labor begins when contractions are no more than 10 minutes apart.) ☐	1. Less than 12 hours 2. Twelve hours or more
79- Were there any bruises or marks of injury on _____'s body at birth? ☐	1. Yes 2. No 3. Don't know
80- If yes, where are they? ☐	1. Head 2. Body 3. Arms/hands 4. Legs/feet
81- Did he/she have any congenital malformations at birth? ☐	1. Yes 2. No 3. Don't know
82- (If yes, ask): Where were there malformations? ☐	1. Head 2. Body 3. Arms/hands 4. Legs/feet
83- Were there malformations anywhere else? ☐	
84- What was his/her weight immediately after delivery? ☐	----------gm
85- At the time of birth was _____:(Read out choices) ☐	1. Very small 2. Smaller than usual 3. About average 4. Larger than usual
86- Was _____ able to breathe after birth immediately? ☐	1. Yes 2. No 3. Don't know
87- Was _____ able to suckle (or bottle feed) in a normal way after birth? ☐	1. Yes 2. No 3. Don't know
88- Did _____ stop being able to suckle in a normal way? ☐	1. Yes 2. No 3. Don't know
89- (If yes, ask): How long did_____ stop suckling?	---------- hours or days
90- Was _____ able to cry after birth? ☐	1. Yes 2. No 3. Don't know
91- Did _____ stop being able to cry? ☐	1-Yes 2. No 3. Don't know
92- (If yes, ask): How long did _____ stop crying? ☐	
93- Did _____ have cyanosis?	1. Yes 2. No 3. Don't know

94- Did _____ have spasms or convulsions? ☐	1. Yes 3. Don't know	2. No
95- did he/she become unresponsive/unconscious? ☐	1-Yes 3. Don't know	2. No
96- Did he/she have a bulging fontanel? ☐	1-Yes 3. Don't know	2. No
97 Did he/she have yellow skin and or yellow eyes? ☐	1-Yes 3. Don't know	2. No
98- Did he/she have redness or drainage from the umbilical cord stump?	1-Yes 3. Don't know	2. No
99- Did he/she have a skin rash with papules containing pus? ☐	1-Yes 3. Don't know	2. No
100- Did he/she have a fever? ☐	1-Yes 3. Don't know	2. No
101- (If fever ask) How many days did the fever last? ☐	. . . . . __ __ days	
102- Did he/she have (loose motion of unusual nature of stool more than 3 times per day- diarrhea)?	1-Yes 3. Don't know	2. No
103- Was there visible blood in the loose or liquid stools? ☐ ☐	1-Yes 3. Don't know	2. No
104- Did _____ have a cough?	1-Yes 3. Don't know	2. No
105- (If yes, ask): For how many days did the cough last? ☐	. __ __days	
106-, Did _____ have difficult breathing?	1-Yes 3. Don't know	2. No
107- (If yes ask): For how many days did the difficult breathing last? ☐	. __ __ days	
108-, did the child have fast breathing? ☐ ☐	1-Yes 3. Don't know	2. No
109- (If yes, ask): For how many days did the fast breathing last?	. __ __ days	
110- Did he/she have in drawing of the chest? ☐	1-Yes 3. Don't know	2. No

111- Did he/she have noisy breathing? (Demonstrate each sound ☐	1 Stridor 1. Yes 2. No 3. Don't know .2 Grunting 1. Yes 2. No 3. Don't know .3 Wheezing 1. Yes 2. No 3. Don't know
112-Did _____ have pneumonia (local terms)? ☐	1-Yes 2. No 3. Don't know
113-I would now like to ask a few questions about any drugs might have received - Did _____ ☐ receive any of the following?	-Antibiotics . 1. Yes 2. No 3. Don't know -Others(specify)

Comments

1-Results of field work

1- The questionnaire was filled completely in one visit
2- The questionnaire was partially filled
3- The questionnaire was filled in more than one visit
4- The family refused to offer any information

2-Comments of data collector:

Date: ----------

3-Comments of field supervisor:

Date: ----------

4-Comments of quality controller:

Date: ----------

استبيان المحددات وعوامل الخطر من وفيات المواليد في قطاع غزة ، 2008

1. الرقم التسلسلي للاسم:	
2. اسم الباحث:	
3. اسم الطفل:	
4. الجنس:	**1.ذكر** **2. أنثى**
5. حالة الطفل:	**1. متوفى (حالة)** **2.حي (ضابطا)**
6. تاريخ الميلاد: **إذا كان الاسم حالة انتقل الى السؤال رقم (7) ثم** **واذا كان الاسم ضابط انتقل الى السؤال رقم (9)**	**___ / ___ / ___**
7. تاريخ الوفاة:	**___ / ___ / ___**
8. عمر الطفل عند الوفاة:	**..... يوما**
9. عمر الطفل الذي مازال على قيد الحياة الآن:	**..... شهرا**
10. المحافظة:	**1_شمال غزة 2_ غزة 3_ المنطقة الوسطى** **4_خان يونس 5_رفح**
11. العنوان كاملا:	
12. رقم التلفون:	
الجـــــــــــــزء الأول ***الظروف الاجتماعية والديموغرافية***	
13. عمر الأم بالأعوام الآن:	**---------- عاما**
14. عمر الأم عند الزواج بالأعوام:	**---------- عاما**
15. الحالة الاجتماعية للأم:	**1 – متزوجة حاليا 2 – متزوجة سابقا**
16. مهنة الأم:	**1–مهنية " طبيب محامي محاسب كيميائي 2– إدارايه "مدير مؤسسة ناظر مدرسه معلم 3– تاجرة 4– عامله مهاريه "مسئولة عمال مسئولة بقالة "5– " عامله مهارية جزئيا "عاملة تلفون عامله فواكه 6–عامله ليس مهارية " عامله نظافة 7– ربة بيت**
17. عدد سنوات التعليم للأم:	**---------- سنة**
18. عمر الأب بالأعوام:	**---------- عاما**
19. عدد سنوات تعليم الأب:	**---------- سنة**

20. مهنة الأب :	**-مهني " طبيب محامي محاسب كيميائي 2- إداراي"مدير مؤسسة ناظر مدرسه معلم 3- تاجر 4- عامل مهاري "مسئول عمال مسئول بقالة "5- " عامل مهاري جزئيا "عامل تلفون عامل فواكه 6-عامله ليس مهاري " عامل نظافة 7-عاطل عن العمل .**
21. الإقامة:	**1مدينة 2- شبة مدينة 3- قريه 4- مشروع اسكان 5- مخيم لآجئين**
22. عدد آفراد الآسرة:	**---------- فرد**
23. نوع الأسرة:	**1- نووية 2- ممتدة**
24. ما هو عد الأشخاص في الآسرة الدين تقل آعمارهم عن 15سنة أو تزيد أعمارهم عن 65سنة ؟	**---------- شخصا**
25. كم عدد غرف المعيشة في البيت مضاف إليها الصالون ؟	**---------- غرفة**
26. هل لديكم تلفاز في البيت ؟	**1- نعم 2- لا**
27. دخل الأسرة بالشيقل:	**---------- شيقل**
28. صلة القرابة بين الزوجين:	**1-ابن عم ، ابن عمه ، ابن خال ، ابن خاله 2- من نفس عائلة الآم أو الآب(حمولة) 3- لا يوجد صلة قرابه**
الجزء الثاني **رعاية الآم آثناء الحمل**	
29. كم كان عمرك عند أول حمل لك (بالسنوات) ؟	**---------- سنة**
30. متى انتهى الحمل السابق لهذا الاسم (الشهر والسنة)؟	**---------- شهر ---------- سنة**
31. الفترة الزمنية بالأشهر بين ولادة هذا المولود والولادة السابقة ؟	**---------- شهر**
32. كم مرة حملت بالاضافة الى الحمل بهذا الاسم ؟	**---------- مرة**
33. كم عدد الابناء والبنات الاكبر من هذاالاسم؟	**عدد الأبناء: عدد البنات:**
34. أين ولد الاسم ؟	**1- مستشفى 2-عيادة خاصة 3-المركز الصحي الخاص 4- المنزل - 5 _ آخري (حددي)**

35. كيف كانت طبيعة الولادة؟	**1- ولادة طبيعية 2-ولادة طبيعية بمساعدة الادوات 3- ولادة قيصرية**
36. من قام وأشرف على عملية الولادة؟	**1-الطبيب 2- قابلة 3-مدربة**
37. هل تلقيت أي رعاية اثناء الحمل بهذا الاسم ؟ **اذ كانت الاجابة نعم انتقلي الى السؤال (38) ثم (39)** **اذا كانت الاجابة لا: انتقلي للسؤال (40)**	**1- نعم 2- لا**
38. حددي انواع الخدمة من القائمة؟	**-قياسا وزنك؟ 1-نعم 2 - لا** **2-قياس ضغط ال 1-نعم 2- لا** **3- اختبار البول 1 -نعم 2 - لا** **4-اختبار نسبة الهيموغلوبن1 - نعم 2 - لا** **5)_ فحص سكر 1_ نعم 2_ لا** **5-إعطاء أقراص الحديد وحمض الفوليك ؟ 1 نعم 2 - لا** **6- أية خدمات أخرى؟ 1 - نعم (حددى) 2 - لا**
39. من اين تلقيت الرعاية اثناء الحمل بهذا الاسم ؟	**- القطاع العام 2-المركز الصحي التابع للانروا** **3-قطاع المنظمات غير الحكومية 4-عيادة خاصة** **5- غير ذلك حددي**
40. كم كان عدد اشهر الحمل عندما تلقيت اول رعاية اثناء الحمل بهذا الاسم ؟	**---------- شهر**
41. كم مرة حصلت على الرعاية اثناء الحمل بهذا الاسم؟	**عدد المرات:**
42. اذا كان الجواب لا او حصلت على رعاية لمرة واحدة اثناء الحمل بالاسم ما هي الاسباب التي حالت دون ذلك؟	**-لا ترى أنها ضروري** **2-اعتراض من أفراد الأسرة** **3-لا يوجد مرافق** **4- ضائقة اقتصادية** **5-ضعف جودة الرعاية أثناء الحمل** **6-بعد المسافة لمقدم الخدمة الصحية**
43. وخلال الحمل الخاص بك (اسم) ، أو أثناء أو بعد الولادة (الاسم) ، فهل عانيت من أي مضاعفات الحمل ذات الصلة مثل :	
انتفاخ في الذراعين والقدمين (الوذمة):	**1 - نعم 2 - لا**
ارتفاع ضغط الدم:	**1 - نعم 2 - لا**
مرض السكري :	**1 - نعم 2 - لا**

النزيف المهبلي أثناء الحمل:	**1 – نعم**	**2 – لا**
الزلال في البول:	**1 – نعم**	**2 – لا**
النزيف أثناء / بعد الولادة:	**1 – نعم**	**2 – لا**
تشنجات:	**1 – نعم**	**2 – لا**
فقر الدم:	**1 – نعم**	**2 – لا**
الحمى لأكثر من 3 أيام أثناء الحمل:	**1 – نعم**	**2 – لا**
الحمى لأكثر من 3 أيام بعد الولادة:	**1 – نعم**	**2 – لا**
أخرى :	**1 – نعم**	**2 – لا**
44. هل سبق لك أن تعرضت لأي نوع من العنف الأسري من قبل الزوج ، سواء بدنيا أو نفسيا؟	**1 -- نعم**	**2 -- لا**
45. هل تناولتي أقراص حامض الفوليك آثناء الحمل بالاسم ؟	**1 -- نعم**	**2 – لا** **3_لا اعرف**
46. إذا كانت الإجابة نعم من آي شهر بدئتي تناول آقراص حامض الفوليك ؟	**1– شهرا كاملا قبل الحمل**	**2– أول شهر في الحمل** **3–بعد الشهر الأول**
47. ماهي المدة التي استمريتي فيها تناول أقراص حامض الفوليك ؟	**..... شهر .**	
48. هل من عادتك أن تتناولي أقراص الحديد خلال فترة الحمل بـــــ (الاسم)؟	**1 -- نعم**	**2 -- لا**
49. من أي شهر في الحمل بدأت تناول أقراص الحديد؟	**الشهر.....**	
50. منذ أن بدأت تناول أقراص الحديد في الحمل ب (الاسم)هل تناولت أقراص الحديد كل يوم بانتظام.؟	**1 – نعم**	**2 -- لا**
51. هل أنت حامل الآن؟	**1 -- نعم**	**2 -- لا**
52. وإذا كان الجواب لا ، هل لديك الرغبة في الحمل؟	**1– ارغب مباشرة**	**2 – ارغب في وقت لاحق** **3 – لا ارغب على الإطلاق**
53. هل تعرفين ما هي فصيلة دمك ؟	**1 – نعم**	**2 – لا**
54. إذا كان الجواب بنعم ، ما هو نوع فصيلة دمك ؟	**A _1**	**B _2** **AB_3** **O–4**
55. هل تعرفين فصيلة دم المولود ؟	**1 – نعم**	**2 -- لا**
56. إذا كان الجواب بنعم ، ما هو نوع فصيلة دمه؟	**A _1**	**B _2** **AB_3** **O–4**

57. عندما وضعت المولود هل أخبرك أي احد من مقدمي الخدمة الصحية بأنه حدث عدم ملائمة بين دمك ودم المولود ؟	**1 – نعم** **2 – لا**
الجزء الثالث **تغذية الأم**	
58. عندما كنت حاملا ب (الاسم) ، هل كنت تأكلين كمية من الطعام كما كنت تأكلين قبل الحمل ، أو كنت تاكلين كمية اكثر او اقل مما تعودت عليه	**1 – اكثر مما سبق** **2 – مساوي لما سبق** **.3_ اقل مما سبق** **4 – لا أعرف / غير متأكد**
59. هل أكلت من الاطعة الموضحة اثناء حملك ب (الاسم) كما كنت تاكلين قبل الحمل أو اكثر او اقل ؟ الأرز البقوليات سمك لحمة البيض الخضروات الحليب الفاكهة أخري	**أقل ، اكثر مساوي ، لم أأكل أبدا** **أقل ، اكثر مساوي ، لم أأكل أبدا** **أقل ، اكثر مساوي ، لم أأكل أبدا** **أقل ، اكثر مساوي ، لم أأكل أبدا** **أقل ، اكثر مساوي ، لم أأكل أبدا** **أقل ، اكثر مساوي ، لم أأكل أبدا** **أقل ، اكثر مساوي ، لم أأكل أبدا** **أقل ، اكثر مساوي ، لم أأكل أبدا** **أقل ، اكثر مساوي ، لم أأكل أبدا** **أقل ، اكثر مساوي ، لم أأكل أبدا**
60. عندما كنت حاملا ب(الاسم) ، هل اخذت قسطا من الراحة كما كنت قبل الحمل او كانت الراحة اقل او اكثر مما سبق؟	**1 – اكثر مما سبق** **2 – مساوي لما سبق** **3 اقل مما سبق**
61. هل ارضعت (الاسم) رضاعة طبيعية ؟	**1 – نعم** **2 -- لا**
62. متى بدأت إرضاع (الاسم) رضاعة طبيعية له الها ؟	**1 – فور ولادته...** **2 – غضون 24 ساعة من الولادة** **3 وبعد 24 ساعة من الولادة**
63. هل أرضعت (الاسم) أولا بحليب اللبا ؟	**1 – نعم** **2 -- لا**
64. هل ما زلت على الرضاعة الطبيعية (الاسم)؟ **للضابط**	**1 – نعم** **2 -- لا**
65. هل هناك أي فرد يعيش معكم ولكم حصة واحدة على الأقل من غرفة ومطبخ يدخن ؟	**1 – نعم** **2 -- لا**

66. إذا كان الجواب نعم فما هو نوع التدخين الذي يمارسه؟	**1- السجائر 2 – غليون 3- شيشة 4 – آخرى**
67. هل تدخنين ؟	**1 -- نعم 2 – لا**
68. إذا كان الجواب نعم ، فما هو نوع التدخين الذي تمارسينه .؟	**1 – السجائر 2 – غليون 3- شيشة 4 – آخرى**
<u>الجزء الرابع</u> ***<u>معلومات عن الاسم</u>*** ***<u>كل الآسئلة للضابط والحالةماعدا الأسئلة رقم 71 -72 – 73- 74 -فهي للحالة فقط</u>***	
69. هل طعمت (الاسم)؟	**1 – نعم 2 -- لا**
70. إذا كانت الإجابة بنعم ، ما نوع التطعيم الذي تناوله؟ أكثر من إجابة واحدة	**1 –لقاح السل (ابرة الكتف) 2 – لقاح شلل الاطفال (حقنة العضل) 3 -- لقاح التهاب الكبد الوبائي 4- كل ما سبق 5 -- لا أدري**
71. اين مات (الاسم) ؟ **للحالة فقط**	**(1). مستشفى 2. مرفق صحي اخر 3. في الطريق إلى المستشفى أو المرفق الصحي 4.في المنزل 5- أخرى (حددي)**
72. ما هو طول الفترة الزمنية التي كان الطفل مريض بها قبل الوفاة؟ **للحالة فقط**	**ساعات\ أيام**
73. هل كنت تسعين لرعاية الطفل خارج المنزل، بينما كان لديه هذا المرض؟ **للحالة فقط**	**1. نعم 2. لا 3. لا أعرف**
74. إذا كانت الإجابة بنعم: اين بحثت رعاية الطفل أثناء المرض؟ **للحالة فقط**	**1. مستشفى حكومي 2. مركز صحي حكومي أو عيادة 3 –وكالة الغوث الدولية 4 مؤسسة غير الحكومية 5. الطبيب الخاص. 6- الصيدلة 7- قريب او صديق 8. أخرى**
75. هل توفى احد أطفالك ؟	**1 – نعم 2-لا**
76. كم عدد شهور حملك بهذا الاسم؟	**..... أشهر**
77. هل انتهى حمل هذا الاسم قبل الميعاد أو في الوقت المتوقع او بعد الوقت المتوقع؟	**1. في وقت مبكر. 2- حسب الميعاد المتوقع 3- متاخر عن الميعاد 4- لا اعرف**
78. هل حدث الحمل بهذا المولود كنتيجة ل.....؟	**1. حمل طبيعي بدون تعاطى عقاقير 2. حمل طبيعي بعد تعاطي عقاقير طبية 3. حمل بعد زراعة اطفال الانابيب**

79. هل نزل عليك سائل مهبلي قبل او اثناء المخاض ؟	**1. قبل المخاض 2. خلال المخاض** **3- لم ينزل سائل 4 . لا أعرف**
80. كم من الوقت استغرق المخاض والولادة؟	**1. أقل من 12 ساعة** **2. اثنتي عشرة ساعة أو أكثر**
81. هل كان هناك أي كدمات أو علامات الإصابة على جسم (الاسم) عند الولادة؟	**1 نعم 2. لا 3. لا أعرف**
82. إذا كانت الإجابة بنعم ، اين هم؟	**1. رأسه. 2 الجسم 3. الأيدي. 4.الساقين / القدمين**
83. هل كان عليه أن أي من التشوهات الخلقية عند الولادة؟	**1. نعم 2. لا 3. لا أعرف**
84. إذا كانت الإجابة بنعم ، نسأل : أين كانت هذه التشوهات؟	**1_ رأسه 2_ الجسم 3_ الأيدي** **4- الساقين / القدمين**
85. هل كانت هناك تشوهات في أي مكان آخر؟	**1 نعم 2. لا 3. لا أعرف**
86. كم كان وزن المولود بعد الولادة مباشرة؟	**---------- غرام**
87. كيف كان حجم الطفل عند الميلاد؟	**1. صغيرة جدا. 2- أصغر من المعتاد** **3-. حول المتوسط 4- أكبر من المعتاد**
88. هل كان قادرا على التنفس بعد الولادة؟	**1 نعم 2. لا 3. لا أعرف**
89. هل كان قادرا على التقاط حلمة ثدي الام (الرضاعة الطبيعية) في صورة طبيعية بعد الولادة؟	**1 نعم 2. لا 3. لا أعرف**
90. هل تو قف (االاسم) عل التقاط ثدي الام بطريقة طبيعية؟	**1 نعم 2. لا 3 . لا أعرف**
91. إذا كانت الإجابة بنعم ، كم وقتا استغرق في ذلك ؟	
92. هل كان الطفل قادر على البكاء بعد الولادة؟	**1 نعم 2. لا 3.لا أعرف**
93. وهل توقف (الاسم) عن القدرة على البكاء؟	**1 نعم 2. لا 3. لا أعرف**
94. إذا كانت الإجابة بنعم ، كم استغرق التوقف عن البكاء ؟	
95. هل عانى الطفل من ازرقاق الجلد ؟	**1.نعم 2. لا 3. لا أعرف**
96. هل عانى الطفل من تشنجات ؟	**1.نعم 2.لا 3.لا أعرف**
97. هل عانى من فقدان الوعى او عدم استجابة ؟	**1 نعم 2. لا 3. لا أعرف**
98. هل عانى الطفل من انتفاخ اليافوخ ؟	**1 – نعم 2. لا 3. لا أعرف**
99. هل عانى الطفل من اصفرار العينين أو راحة اليدين ؟	**1 نعم 2. لا 3. لا أعرف**

100. هل عانى الطفل من احمرار او افرازات من الحبل السري ؟	**1- نعم 2. لا 3. لا أعرف**
101. هل عانى الطفل من حبيبات جلدية مصطحبة بفقاعات صديدية ؟	**1نعم 2. لا 3. لا أعرف**
102. هل عانى الطفل من ارتفاع فى درجة الحرارة (الحمى) ؟	**1 – نعم 2 . لا 3. لا أعرف**
103. اذا كانت الاجابة نعم كم يوما استمرت الحمي؟	**.....يوما**
104. هل عانى الطفل من براز ذو طبيعة سائلة غير طبيعية اكثر من ثلاث مرات يوميا (اسهال)؟	**1 – نعم 2. لا 3. لا أعرف**
105. هل لاحظت وجود دم في البراز؟	**1 نعم 2. لا 3. لا أعرف**
106. هل عاتى الطفل من سعال ؟	**1 – نعم 2 . لا 3. لا أعرف**
107. إذا كان الجواب نعم كم يوما استمر هذا السعال؟	**. . . . . يوما**
108. هل عانى الطفل من صعوبة فى التنفس ؟	**1 – نعم 2. لا 3. لا أعرف**
109. إذا كان الجواب نعم فكم يوما استمر ضيق التنفس؟	**..... أيام**
110. هل عانى الطفل من سرعة فى عدد مرات التنفس ؟	**1 – نعم 2. لا 3. لا أعر ف**
111. إذا كان الجواب نعم فكم يوما استمرت سرعة التنفس ؟	**..... أيام**
112. هل عانى الطفل من انجذاب او انسحاب القفص الصدرى ؟	**1 – نعم 2. لا 3. لا أعرف**
113. هل عانى الطفل من نفس مزعج ؟	**1.نفس مزعج اثناء الشهيق 1 - نعم 2- لا 3 لا أعرف** **.2 الشخير 1 نعم 2. لا 3. لا أعرف** **.3 الصفير 1. نعم 2. لا 3 . لا أعرف**
114. هل عانى الطفل من التهاب رئوى ؟	**1 – نعم 2. لا 3. لا أعرف**
115. والآن أود أن أسأل بعض الأسئلة عن أي عقاقير تناولها الطفل ؟	**1.المضادات الحيوية.1. نعم 2. لا 3. لا أعرف** **4- اخرى (حددي)**

ملاحظات:

أولا: النتيجة النهائية للبحث الميداني.

1- تم أنهاء تعبئة بيانات الإستبيان خلال زيارة واحدة.

2- تمت تعبئة البيانات بشكل جزئي .

3- تمت تعبئة البيانات خلال أكثر من زيارة .

4- رفضت الأسرة إعطاء المعلومات.

ثانيا: ملاحظات جامعة البيانات :

التاريخ : ----/ ----/ ------

ثالثا : ملاحظات المشرف / ة الميداني / ة .

----------التاريخ : -----/ ----/ --

رابعا: ملاحظات المدقق/ ة .

----------التاريخ : -----/ ----/ --

ملخص الدراسة

محددات و عوامل الخطر لوفيات المواليد حديثي الولادة في محافظات قطـــاع غـــزة للعـــام 2008م

الهدف من الدراسة:

تمثل وفيات المواليد حديثي الولادة ما يقرب من 40 في المائة من وفيـــات الأطفـــال تحـــت ســـن الخامسة ، على الصعيد العالمي.ان الهدف العام من هذه الدراسة هو تحديد وتقدير عوامـــل الخطـــر الرئيسية لوفيات المواليد في قطاع غزة ،وتوفير ما يلزم من الأدلة العلمية والاحـــصائية علـــى حـــد سواء، مما يؤدي الي تحسين صحة الطفل والأم.

منهجية البحث:

أجريت الدراسة في جميع محافظات غزة علي مستوي المنازل. و لقد تبني الباحث تصميم الحالات و الشواهد وأجريت مقابلات مع 715 من امهات الفئة المستهدفة باستخدام استبيان تبناه الباحـــث مـــن الاستبيان الذي اقرته منظمة الصحة العالمية لاستقصاء واكتشاف عوامل الخطـــر المـــسببة لوفيـــات الاطفال و قد تم تعديل بعض الاجزاء من الاستبيان بعد استشارة عدد من الخبـــراء وذوي العلاقـــة .وقد كانت العينة تتكون من220 حالة وفاة من الأطفال حديثي الولادة ، و 495 ولادة حيـــة مقابلـــة حسب الجنس والمكان وأقرب أسبوع من تاريخ الولادة.

ولقد تبني الباحث الاساليب العلمية والاحصائية المتقدمة للوصول الـــي نتـــائج الدراســـة وكانـــت النتائجعلي النحوالتالي :

ملخص النتائج

اظهرت الدراسة فروقات واضحة بين الحالات والشواهد بالنسبة لعوامل الديمغرافية والاجتماعيـــة ، عوامل الام اثناءالحمل والعوامل المحيطة بالولادة والعوامل التي تحدد الفترة الواقعة بعد ولادة الطفل

حيث كانت هناك معدلات الوفيات اعلي في المجموعات التي كانت تعاني من زيادة نسبة الاعالة وزواج الاقارب اكثر من المجموعة المقابلة .كما اظهرت الدراسة ان نسبة الوفيات كانت اعلى في المجموعة التي عانت من نقص في وزن الطفل عند الولادة عن الحد الطبيعي والولادات المبكرة التي لم تكتمل الي العمر الصحيح من عمر الطفل في الحمل.

كما اظهرت الدراسة ان نسبة الوفيات كانت اعلى في المجموعة التي عانت الامهات فيها من ولادة متعثرة، عمليات قيسرية وحينما كان هناك وفيات سابقة في الاسرة. بينت الدراسة ان حالة فقدان الوعي للطفل المولود بعد الولادة وثبوت وفيات اطفال سابقة في الاسرة كانت تشكل عوامل خطر لوفيات الاطفال حديثي الولادة وبينما كانت الرضاعة الطبيعية المبكرة مع تغذية الطفل بحليب اللبأ، الالتزام بالتطعيمات المقررة في الشهر الاول بعد الولادة تشكل عوامل حماية ووقاية لوفيات الاطفال حدثي الولادة.

اظهرت الدراسة ايضا زواج الاقارب والعنف الاسري ضد الام اثناء الحمل ، كانت تشكل عوامل خطر لوفيات الاطفال حديثي الولادة حيث ان معدلات الوفيات كانت اكثر في الحالات من الشواهد .

توصيات الباحث:

بناء علي النتائج السابقة يوصي الباحث بأهمية بناء نظام صحي شامل تستطيع الامهات من خلاله متابعة الحمل والولادة وفترة مابعد الولادة ومتابعة الاطفال حديثي الولادة بشكل مبكر ،كما يوصي الباحث بزيادة الوعي الصحي علي مستوى المجتمع المحلي بمساعدة كل من وزارة الصحة الفلسطينية ووكالة الغوث الدولية ، اليونيسيف والمؤسسات الأهلية الأخرى من أجل تحسين الرعاية الصحية الأولية بمستوياتها المختلفة مما يؤدي إلى تقليل نسبة الوفيات لدى الأطفال حديثي الولادة .