'' Predisposing Factors of Infant Mortality in the North West Bank in 2001''

By

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By

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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 thesis (or any part of the same) has not been submitted for a higher degree to any other university or institution.

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ABSTRACT

Predisposing Factors of Infant Mortality in the North West Bank in 2001.

This is a quantitative retrospective study that aimed at exploring predisposing factors of infant mortality in North West Bank in 2001. The data in this study was collected from 270 infant mortality reports in 2001 in the North West Bank. The study confirms strong association between infant mortality and infant gender. Males comprise 12.73/1000 of infant mortality rate, while females 10.27/1000. The study also confirms the association between low birth weight and infant mortality.

The results show that most infant mortality cases were from infants aged 29 days to one year. Home deliveries had a lower percentage of infant mortality rate 9.20/1000 than hospital deliveries with IMR 11.75/1000. 30.4% of infant mortality cases occurred during the Spring season. The results indicate an association between mother's education level and infant survival rate: the majority of infant mortality cases were for women with less than 7 years of education. On the other hand, infant mortality cases were far more frequent among working mothers with IMR 25.61/1000 versus 10.65/1000 for non-working mothers. Results show that majority of cases were in rural areas: rural families accounted for 81.5% of the 220 cases with IMR 15.69/1000. The family relationship between the parents of infants apparently has nothing to do with infant mortality. The results also show a strong association between age of mother and infant mortality: IMR is higher for women less than 24 years of age and above 35.

The study does not confirm the importance of breast-feeding to reduce IMR. However, this is to be considered cautiously due to a large missed value in the reports.

Results also do not indicate relationship between birth spacing and a reduction in infant mortality, or a relationship between IMR and antenatal care. Recommendations were suggested in order to use the results of this study for further research and policy and action towards decreasing the influence of predisposing factors to IM and IMR.

الخلاصـــة

العوامل المساعدة على وفاة الأطفال دون سن سنه في شمال الضفة الغربية في العام2001

هدفت هذه الأطروحة إلى دراسة العوامل المتعلقة بوفيات الأطفال دون سن السنة في شمال الضفة الغربية في العام 2001 حيث تم جمع المعلومات عن طريق تحليل 270 تقرير عن وفيات الأطفال في ذلك العام.

تشير النتائج إلى أن معظم وفيات الأطفال كانت في هذه الفترة لعمر 29 يوم إلى سنة واحدة، أظهرت النتائج أن نسبة وفيات ولادة المستشفى كانت11.75/1000 بينما تجد الدراسة أن هناك ارتباط وثيق بين وفيات الأطفال وموسم الوفاة حيث أن 30.4% من حالات الوفاة تحصل في موسم الربيع. تشير النتائج أيضا بوجود ارتباط بين وفيات الأطفال وارتفاع مستوى تعليم ألام حيث تبين من النتائج أن معظم وفيات الأطفال هم لأمهات بمستوى تعليم تحت 7 سنوات.

من جهة أخرى تدل النتائج إلى أن نسبة وفيات الأطفال هي 25.6/1000 وهي لأمهات عاملات.

كذلك يتضح من خلال النتائج إلى أن معظم الوفيات من الأطفال هم من سكان القرى.

بالنسبة إلى قرابة الوالدين أشارت النتائج إلى أن القرابة بين الزوجين غير مرتبطة بوفيات الأطفال. ومن ناحية أخرى تشير النتائج أن هناك علاقة قوية بين عمر المر أهووفيات الأطفال، حيث أن معظم حالات الوفاة هي لأمهات أعمارهن تتراوح بين 15—24 سنه، أما بالنسبة إلى الأمهات اللواتي تقل أعمارهن عن 17 سنة وأكثر من 40 سنة هناك تزايد الخطورة على حياة أطفالهن بالنسبة إلى إرضاع الطفل وكيفية تأثيره على وفيات الأطفال، لا تدل النتائج إلى أن الرضاعة الطبيعية مهمة جدا للتقليل من نسبة الوفيات، وهذا غير منطقي وغير متوقع نظرا إلى غياب توثيق المعلومات بينما لا تظهر النتائج علاقة بين وفيات الأطفال والفترة بين الإنجاب.

من ناحية أخرى قد فلا تدل الدراسة على وجود علاقة قوية بين نسبة وفيات الأطفال والرعاية ما قبل الولادة أو التباعد بالأحمال.

وقد حددت الدراسة مجموعة من التوصيات ذات العلاقة بالخدمات والسياسات والتي قد تساهم في خفض معدلات وفيات الأطفال وتأثيرات عوامل وفيات الأطفال.

DEDICATION

In thankfulness this thesis is dedicated to my husband

"Saleh"; to my children Haneen, Mohamed, Ahmed, Sereen,

Osama and Rabee'…with loving appreciation for their

constant support and guidance.

Rab'ha Saleh

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duration of the breast-feeding and the employment

status of the mother.

LIST OF ILLUSTRATIONS

List of abbreviations

A.R.I.: Acute Respiratory Illness

A.G.A.: Appropriate for Gestational Age

B.F.: Breast Feeding

C.A.: Congenital Anomalies

C.H.D.: Congenital Heart Disease

CO2: Carbon Di Oxide

C.S.: Caesarian Section

D.M.: Diabetes Mellitus

F.T.: Full Term

G.S.: Gaza Strip

Hb: Hemoglobin

H.C.C.: Health Care Committees

H.S.C.: Health Services Council

H.W.C.: Health Work Committees

I.M.: Infant Mortality

I.M.R.: Infant Mortality Rate

L.B.W.: Low Birth Weight

L.G.A.: Large for Gestational Age

M.C.H.: Mother Child Health

M.O.H.: Ministry Of Health

N.G.O.: Non-Governmental Organization

N.I.M.S.: National Infant Mortalité Surveillance

N.N.D.: Neo Nate Death

O.R.T.: Oral Rehydrational Therapy

P.C.B.S.: Palestinian Central Bureau of Statistics

P.H.C.: Primary Health Care

S.G.A.: Small for Gestational Age

S.I.D.S.: Sudden Infant Death Syndrome

U.N.: United Nations

U.N.R.W.A.: United Nation's Relief and Work Agency

U.P.M.R.C.: Union of Palestinian Medical Relief Committees

USA: United States of America

V.L.B.W.: Very Low Birth Weight

WB: West Bank

WBGS: West Bank and Gaza Strip

W.H.O.: World Health Organization

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CHAPTER ONE

INTRODUCTION

The infant mortality rate (IMR) among children up to the age of one is generally expressed as the number of such deaths per 1000 live births in a specific geographical area over a given time period. Infant mortality is divided into two categories: neonatal deaths (occurring during the first 27 days after birth) and infant deaths (occurring at ages 28 days to one year). Infant mortality is considered an important indicator of the general level of health for a given population, and it is also viewed as an essential and accurate indicator of a community's socioeconomic well-being.

Towards the end of the 19th century, infant mortality throughout the world was higher than it is today. It was common for 20% or more of all infants in many populations to die before they reached their first birthday. By 1930, the number of infant deaths had declined dramatically in many countries, as the causes of infection and death were better understood. It is clear that the world's poorer countries have made dramatic progress in lowering infant mortality in the 20th century due in large part to public health programs. In 1993, infant mortality rate worldwide was 69/1000 (69 deaths for every 1000 live births). The U.N reported an average infant mortality rate of world industrialized nations of 12/1000. The infant mortality rate in Palestine has declined over the past two decades, from150/1000 prior 1967 to about 22/1000 in 1996, 22.7/1000 in 2000, and 22.9/1000 in 2001. As a comparison, the IMR's of neighboring countries in 2000 were as follows: Lebanon 28/1000, Jordan 28/1000, Egypt 27.8/1000, Iran 26/1000, and Syria 24/1000 (PCBS, 2001).

A cluster of interrelated factors are associated with infant mortality, including: poverty, inadequate prenatal care, rate of teenage pregnancies, mother's use of drugs, alcohol, and tobacco and others. Studying these factors is important because individuals and families should be understood in the broadest context of their environment to identify the factors associated with infant death. The overall goal of this study is to better understand infant mortality with the aim of eventually enhancing the health and well-being of women and infants by improving community resources and services of delivery system available to them.

1.1. Significance of the Study

Infant mortality is studied to monitor changes in the health status of infants and mothers, and the quality of services they receive. Diagnosis and management of most conditions for infants require a comprehensive approach; it is extremely important to emphasize that the interaction between physical, social, and environmental factors determine the health of mothers and their infants. Infant mortality studies may be used to highlight the standard of health care in Palestine. This study provides information useful in future planning and policy formulation in Palestine.

This study was conducted because:

* Very little has been published related to factors on Infant Mortality in Palestine in general and in the North West Bank in specific (Tulkarem, Qalqaelia, Salfit, Nablus, and Jenin).

* Infant Mortality is one of the most important indicators of health in any country. Therefore, it can be an important base to work from to improve and develop the quality and the quantity of health services in Palestine.

* This study may have implications for policy- and decision-making in health-planning in Palestine in an effort to minimize the influence of factors leading to infant mortality.

* This study invariably sheds light on the importance of overall socioeconomic well being and quality of the health services and staff as they influence infant mortality.

1.2. Statement of the Problem

Worldwide, 8 million infant deaths occur each year. Around two thirds of these deaths occur during the first week of life due to inadequate or inappropriate care during or after pregnancy. In the West Bank, IMR is more difficult to determine since between 25% and 30% of all births still take place at home (Palestinian Central Bureau of statistics, 2000), The MOH (2001), however, states that only 7.9% of all deliveries take place at home. The MOH report indicated about 94.8% of births taking place in health institutions (82.3% taking place in hospitals and 17.7% outside of hospitals) and 5.2% at home.

PCBS (2000), indicates that there are factors associated with increasing infant mortality such as mother's education, and mother's age and that infant mortality rate declined from 150/1000 prior 1967 to 30/1000 in the 1970's, 20-25/1000 in the 1980's, 20/1000 in the 1990's, and finally 22.7/1000 in 2000. IMR in the Gaza Strip declined from 150/1000 prior 1967 to 70-80/1000 in the 1970's, 30-40/1000 in 1980, 25-30/1000 between 1990 and 1995, 22/1000 in 1996, and finally 22.9/1000 in 2001.

According to the Palestinian MOH Annual Report (2001), among all infant deaths in 2001, early neonatal deaths constituted 37.4%, late neonate deaths constituted 20.2%, and post-neonate deaths constituted 42.4%. The results from the Gaza Strip (G.S) showed early neonatal deaths at about 39%: 9.7/1000 in 1995. The rate increased to

45.8% in 2001 with a rate of 10.5/1000. In late neonatal deaths, the rate was 18.5% (4.2/1000) in 2001, up from 14.4% (3.1/1000) in 1995.

1.3. Purpose of the Study

The purpose of the study is to retrospectively examine the relationship between demographic, socio-economic, and familial factors as they affected infant mortality in the North West Bank in 2001.

This research attempts to provide a basis for further studies to make use of the provided information to improve and develop the quality and quantity of women and infant health services in the area, through identification of social, economic cultural and health factors associated with infant mortality, and propose the consideration of these factors into health plans.

1.4. Objectives of the study

General goal

The purpose of this study is to detect and analyze factors affecting infant mortality, in North West Bank.

Specific objectives

* To identify the risk factors related to infant mortality in the studied area.

* To identify the relationship between socio-demographic factors such as age of mother, parity, and infant mortality.

* To highlight the relationship between birth weight, birth order, spacing, breast-feeding, rural versus urban settings, season of death, and gender of the infant and infant mortality.

* To highlight the relationship between prenatal care and infant mortality.

* To highlight the relationship between IM and qualification of birth attendants.

*   To highlight relationship between IM and twins, Caesarian Section, and parental relationship.

*   To provide recommendations based on the result of this study that can help to reduce infant mortality.

1.5. Research Questions

This research attempts to answer the following questions:

1. What are the risk factors leading to increased infant mortality in North WB?

2. What are infant related factors leading to infant mortality in North WB?

3. How do socio-economic factors affect infant mortality in North WB?

4. What is the effect of familial factors on infant mortality in North WB?

1.6. Assumptions

The research was based on the assumption, that there is an association between infant mortality and factors related to infants' socio-economic and family situation.

1.7. Limitations

The researcher was faced with the following limitations:

1. Political situation: The political situation in Palestine (military occupation) and movement restrictions made mobility from one area to another impossible. This is one of the major reasons why the study focused only on the North West Bank instead of the entire West Bank.

2. Since the study sample is drawn from the North West Bank alone, generalization cannot be made for the entire West Bank or all of Palestine.

3. Another limitation is the use of information drawn from reports only, which may mean that some information that could be considered to influence infant

mortality has not been checked since the researcher was constrained by the information available through the reports only.

4. Not all-infant mortality is reported to the Ministry of Health since some deliveries occur at home. This means that there may exist non-reported infant deaths with unknown predisposing factors.

5. Quality of the death certificate report is questionable in terms of required information and the quality of documentation. Whilst reviewing reports, the researcher found several missing information with substandard documentation.

1.8. Time Frame

The following timeframe was followed for completion of this study:

June– September 2003: - Planning for the research (proposal writing)

- Literature review and conceptual framework

- Methodology

October – November: - Data collection.

December-January2004: - Data analyses and report-writing.

1.9. Definitions of Variables

These definitions are taken from Shoptes and Smith (1980), Reeder (1992), and Hay, Levin (1997).

Pre-term: Less than 37 completed weeks of gestation (258 days).

Full term: 38 weeks to 42 completed weeks of gestation (259 – 293) days.

Low birth weight: Less than 2500gm (WHO).

Very low birth weight: Less than 1500gm (WHO).

Perinatal period: The period from 28 weeks gestation to 7 days post natal age.

Early neonatal period: Up to 7 days.

Late neonatal period: 8-28 days afterbirth.

Neonatal period: The first 28 days of life birth of infant.

Infancy: First years of life.

Perinatal mortality: Number of stillbirths and early (up to 7 days) neonatal deaths per 1000 live births.

Infant mortality rate: Number of deaths in the first 365 days per 1000 live births.

Teen birth: Refers to birth by mothers less than 20 years old.

Abortion: Intentional termination of pregnancy at a time before birth.

Adolescence: The period of life beginning when the secondary sex characteristics begin to develop and the capacity for reproduction is reached, and ending with adulthood.

Anemia: A blood condition in which there is deficiency of hemoglobin red blood cells per total volume of blood.

Antenatal: Occurring or formed before birth**.**

Premature: Born before organ system has matured to the point of physiological functioning, less than 37 weeks.

Parity: The condition of a woman with respect to her having born children.

Post maturity: Over development, as of a post mature infant who progressed beyond full term.

Prime gravida: A women who is pregnant for the first time.

Term baby: One occurring between 38-42 weeks gestation (WHO); an infant born at 40 weeks and weighing less than 2500gr (which is below the 10th percentile for weight) would be mature but underweight (LBW). This case is called intrauterine growth retardation.

Hypoglycemia: Defined as a blood glucose level of 20-25mg/dl in an infant with a low birth weight and 30-35mg/dl in an infant weighing more than 2500g during the first three days of life.

Prone position: Lying face downward

Supine position: Lying on back with face upward.

Diarrhea: Frequent discharge of loose faecal matter from the bowels.

1.10. Summary

Infant mortality rate is considered as an indicator of general level of the health of the community and its well being. Studying and analyzing predisposing factors of infant mortality, will help in planning for health in a way that minimizes those factors. Infant mortality in Palestine is still high and deserves attention. This study is one attempt at shading further light on this issue in Palestine.

CHAPTER TWO

Study Setting

2.1. Introduction

 The purpose of this chapter is to provide a brief description of the geography and demography of Palestine with a specific emphasis on the study area: Nablus, Tulkarem, Jenin, Qalqilya, and Salfit. It also describes the health providers in Palestine particularly in the study area.

2.2. Geographic background and demographic indicators in Palestine

According to the Palestinian Central Bureau of Statistics (2000), and the Ministry of Health Annual Report (2001), Palestine covers 6,162 square km comprising two geographically separated areas: the West Bank, and the Gaza strip. The West Bank comprises 5,800 square km west of the Jordan River. It is divided into three geographical regions: the north, center, south, and Jerico, Salfit, and Tubas area. The North includes: Nablus, Jenin, Tulkarem, and Qalqilya. The center includes Ramallah and Jerusalem. The south includes Bethlehem and Alkhalil, and finally there is the Jericho, Salfit and Tubas area.

About 60% of the Palestinian population lives in 400 villages and rural refugee camps. The remaining population lives in urban refugee camps and cities. The Gaza Strip is a narrow piece of land lying on the coast of the Mediterranean Sea. It comprises of 360 square kilometers. Gaza's population is concentrated in cities, small villages, and eight refugee camps that contain two thirds of the population. Part of the refugee population has been moved from camps to other areas.

The population of Palestine is 3,298,951 (MOH, Palestine annual report, 2001. The West Bank's population is 2,102,360, while Gaza's population is 1,196,591. The

population of east Jerusalem is 367,003. The refugee's population in the Gaza Strip and the West Bank is 1,483,394 of the total WBGS population (United Nation's Relief and Work Agency's (2001) report). 865,242 (58.3%) are residents of Gaza and the remaining 618,152 (41.7%) are residents of the W.B. Most refugees live in difficult conditions, in over-crowded houses with bad sanitation. These conditions have a negative impact on general health and especially on the health of pregnant mothers and their children. The population density in the G.S is 3,278 inhabitants per one square km, while in the West Bank there are 362 inhabitants per one square km.

2.3. The Northern area of Palestine

8.1% of the Palestinian population lives in the Northernmost area of the West Bank called Jenin, which covers 583km^2. 4.5% of the Palestinian population lives in the Tulkarem region of the West Bank, which covers 246km^2. 8.9% of the Palestinian population lives in the Nablus region of the West Bank, which covers 605km^2. 2.5% of the Palestinian population lives in Qalquilya region of the West Bank, which covers 166km^2. Finally, 1.2% of the Palestinian population lives in the Salfit region of the West Bank, which covers 204km^2.

Table 2.1. Distribution of registered Palestinian refugees in the North West Bank 2001

Tulkarm Camp	15,661
Norshams Camp	7,994
Jenin Camp	13,755
Asker Camp	13,297
Balata Camp	20,002
Beitelma Camp	6,033

Source: MOH- population and demography, Health Status in Palestine (2001).

2.4. Palestinian Health Care System

There are 4 different health service providers in Palestine: the government, UNRWA, NGOs, and the private sector who provide primary, secondary and some tertiary health services.

2.4.1. Primary health care (PHC): Primary health care is the basic level of care providing preventive, curative and rehabilitive services to reach maximum health well being.

These services are provided by: non-governmental organizations, the Ministry of Health Centers, UNRWA Centers, and private doctors.

PHC- Primary Health Centers in Palestine: According to (MOH,2001), the total number of PHC Centers in Palestine is 609: 101 centers in Gaza Strip and 508 on the West Bank. 373 centers (61.2% of the centers) offer MCH. 51 centers (8.4%) are part of UNRWA, and NGOS have 185 centers (30.4%). In the West Bank the person to center ratio is between 3000 and 5000 to 1 in Jericho, and between 1,500 and 3000 to 1 in Alkalil. The average ratio of person per center is 5,417. The ratio in Jerusalem is about 9,000 to 1.

In Gaza, the population – center ratio ranges between 10,000 and 17,000 to 1. The average is 11,874 persons per center. Of the PHC centers in G.S, MCH operate 44 PHC centers, 32 of them providing immunization and child health care. Nine centers work three 24 hours emergency shifts, and 8 centers work two such shifts.

There are 69 specialized clinics, 16 family planning clinics, 22 dental and oral clinics. Approximately 21 centers have laboratories, and 10 centers have x-ray units.

UNRWA – Primary Health Centers

There are 17 UNRWA PHC centers in the Gaza Strip and 34 in the West Bank, totaling 51 centers in Palestine. The ratio of refugees in Palestine per center is 28,000, the ratio of people per center in Gaza is 49,000, where the same ratio in the West Bank is 17,400. UNRWA offers health services free of charge and vaccination services and antenatal and postnatal care are also offered by their centers.

Non-governmental Organizations

Non-governmental Organizations proliferated in the 1970's; there are 40 health centers in Gaza Strip, and 145 centers in West Bank. Four main health NGO's operate in the occupied territories: the Health Services Council, the Union of Health Work Committees, the Health Care Committees, and the Union of Palestinian Medical Relief Committees. Safe Motherhood Programs have been designed to reduce mortality resulting from pregnancy and childbirth complications in antenatal care, delivery care, and post-natal care.

Antenatal care is provided for pregnant women in 208 clinics in MOH and 68 clinics in UNRWA. According to the Palestinian Annual Report 2001, the number of visits per pregnant women is 2.6 in MOH and 6.7 in UNRWA. A program for high-risk mothers is implemental in 28 referral governmental clinics, and 17 UNRWA clinics.

There is a post-natal care program in the Palestine Red Crescent Society giving care to mothers during pregnancy and post-birth. The program takes care of children up to 3 years old, including home visits.

2.4.2. Secondary health care services

Table 2.2. Hospitals statistics in Palestine

	2003
# of hospitals	72
# of government hospitals	22
# of NGOs and private hospitals	50
# of beds	5000
Bed per population	1.4
Bed occupancy / government.	55.2

Source: Union of Health Work Committees, 2004

Table 2.2 indicates that 72 hospitals operate in the West Bank and Gaza Strip offering a variety of secondary health service with the largest percentage being of government hospitals. There are 10 hospitals in the Northern districts of the West Bank.

2.4.3. Births in North WB in 2001

The MOH report indicates that there were 23419 live births in North West Bank in 2001 as indicated in table 2.3.

Table 2.3. Live births in North West Bank in 2001

Area	Male	Female	Total
Jenin	3793	3802	7595
Tulkarem	2041	1891	3932
Qalquelia	1270	1236	2506
Salfit	845	775	1620
Nablus	3987	3779	7766
Total	*11936*	*11483*	*23419*

CHAPTER THREE

Review of relevant Literature

This chapter will cover relevant theoretical and empirical literature on predisposing factors to infant mortality.

It is worth mentioning that local – Palestinian literature on the subject is extremely limited, and the researcher was unable to find studies concerning the subject in Palestine, expert for statistics from PCBS and the MOH.

The literature review is arranged by the leading causes of IM and risk factors. The chapter concludes with a conceptual framework based on the reviewed literature.

3.1. Leading Causes of Infant Mortality

There are several leading causes to IM including:

3.1.1. Prematurity and Low Birth-weight

Prematurity and low birth-weight are the main causes of infant mortality during the first 4 weeks of life. Low birth weight is the chief cause of death: one third of these deaths are due to intracranial and spinal injury at birth (Reeder, Sharon, Leonide, 1992).

Other low birth-weight infants may be undersized for the length of their gestation, either delivered before or at term. These infants are called small for gestational age, but they are physically mature. In the past, all newborns weighing 2500gm or less were termed premature and those weighing more than 2500gm were designated full term, due WHO defines a term baby as one who is delivered by (38-42 weeks).

3.1.2. Physical Problems

Any neonate may be a victim of asphyxia during the labor and delivery, or immediately after birth. SGA infants are particularly vulnerable. The process of asphyxia may be

caused by reduced or lack of umbilical circulation, or due to inadequate placenta exchange as in a bruptio placenta.

Premature infants account for the majority of high risk infants. A premature infant often experiences a variety of physiological handicaps: the inability to coordinate sucking, swallowing and breathing, a decreased ability to maintain body temperature, pulmonary immaturity, immature control of respiration leading to apnea and Brady cardiac increase, susceptibility to infection, and immaturity of the metabolic process, which may lead to hypoglycemia or hypocalcemia.

In a study by Butler and Alberman (1978), 468 infants aged 259 days or more, weighing less than 2500gm were identified. It was found that delivery of low birth weight infants was significantly correlated with weight gain during pregnancy, maternal height, maternal smoking, parity, maternal employment, low social class, and a previous infant of low birth weight.

The Palestinian Central Bureau Statistics (2000) indicated that infant mortality from pre-maturity and low birth-weight constituted about 20-30% of Infant Mortality in Palestine.

3.1.3. Sudden Infant Death Syndrome (SIDS)

According to the Palestinian Annual Report (2001), SIDS comprised 9.9% of infant deaths in the West Bank and 14.1% in the Gaza Strip. 20% of all cases of sudden death can be explained by autopsy findings (Sharon, Leonid, 1992).

The frequency of SIDS cases in the United States is 1-2 per 1000 infants. The number of deaths peaks at the age of 2 months, and most deaths occur in infants from few weeks to 6 months old. There is an increase in death during the peak of respiratory virus season, when most cases occur between midnight and 8am with a 3-2 male-female ratio.

Other risk factors in SIDS include: low birth-weight, teenage or drug addictive mothers, family history of SIDS, and multiple births. SIDS has even been seen to be associated with sleeping position. Several studies from different countries present evidence that the risk of SIDS is significantly higher when infants are placed in their bed to sleep in prone position (Ponsby, Bwyer and Cochrane, 2002). A survey reported in the Journal of the American Medical Association (JAMA) in 1992, indicated that the incidence of SIDS in infants being placed in the prone position was found to be about 70%. When placed in the supine position it decreased to 24%. In 2002, Siegfried, Nyska, Edear, Joevegg, and Patterson reported that Sudden Infant Death syndrome is the most common cause of post neonatal infant mortality in the developed world, with a peak age of incidence between 2 and 6 months.

3.1.4. Diarrhea and Gastroenteritis

Acute infectious diarrhea is a worldwide public health problem especially in developing countries. It remains a major cause of infant mortality despite therapeutic progress. Mortality due to diarrhea in industrial countries is much lower and generally stable.

Viruses are the common cause of acute gastroenteritis in developing and developed countries. In the United States, Rotavirus predominantly affects infants aged 3 to 15 months, and peak incidents occur during the winter months. The virus is transmitted via the fecal – oral route and survives for hours on hands, and for days on environmental fomites (Katyal, Rang, Singh, 2000).

The World Health Organization (WHO) estimated that diarrhea episodes in infants result in 3.3 million infant deaths per year, making diarrhea diseases major contributors to infant mortality in the developing world (Katyal, 2000).

In developing countries, it has been estimated that more than 870,000 children die from Rotavirus infection every year (Katial, 2000). Studies showed that Rotavirus accounts for nearly 25% of hospital admissions in India, (Brooretal. 1985).

In a study conducted in Latin America by Petran, Onis, Lauer, Villor (2001), found that exclusive breast-feeding resulted in 55% reduction of deaths from diarrheal diseases, and acute respiratory infection throughout infancy. Among infants aged 0-3 months, 66% of deaths from these causes were preventable by exclusive breast-feeding. Within infant aged 4 -11 months, 32% of such deaths were preventable by breast-feeding. Over all 13.9% of infant deaths from all causes are preventable by breast-feeding.

A study conducted in Bangladesh by Mitra, Rahman, Fuchs (2002), on cohorts of 496 children aged less than 5 years of age who were admitted to intensive care between 1992 and 1994, indicated that females experienced a two-fold higher risk of death compered with males.

Several indices of severe infections were identified more frequently among females than males; in addition, females with severe infections were less frequently brought to the hospital than males with severe infections.

Oral Rehydration Therapy (ORT) was introduced in 1979 with the aim of controlling diarrheas disease. Case studies in Brazil, Egypt, Mexico, and the Philippines confirm an increase in the use of ORT, which leads to marked reduction in mortality (Victoria, Bryce, Monasch, 2000).

3.1.5. Congenital Malformation

Major Congenital Malformations are seen in 1.5% of live births and account for 22% of perinatal deaths, 18% of stillbirths, and 27% of neonatal deaths (William, Hay and Jessier 1997). According to the MOH Annual Report (2001), congenital malformation

accounted for 22.4% of neonatal deaths in Palestine with 17% in the West Bank and 25.1% in the Gaza Strip. Mortality due to congenital malformation varies in different parts of the world and there has been a significant fall in the last half century from 500 to 160 incidents per million due to improvement in treatment. Congenital heart disease occurs at a rate of about 7/1000, and at birth cardio-vascular malformation accounts for approximately 1.2/1000 deaths during infancy.

A study of babies born live with heart malformations reported that up to one third would die from cardiac causes within the first month of life, and 60% before the end of the first year (William, Hay and Jessier, 1997). In another study 15% to 20% of infants recognized to have heart disease died within the first year of life (Pexider, 1990). Up to 40% of infants with Down's syndrome have cardiac abnormalities with artrio-ventricular septal defects being the most prevalent. Even with modern surgery, 15-20% of live-born children in which defects are recognized during infancy can die in the first year of the life, usually in the early weeks or months.

A study conducted in Finland by Varasmaki, Gissler, Ritvanen, and Haartikainen (1995) on 954 single pregnancies between 1991-1995, showed that 63% were males, and that death among births until one year of age was higher in diabetic than in non-diabetic mothers.

3.1.6. Respiratory Disease

It is well kown that in devloping countries the two leading causes of infant mortality are ARI and diarrheal diseases. In Palestine 16.4% (WB 20.6% vs. GS 14.1%) of infant deaths are caused by pneumonia.

Respiratory Failure

It accounts for approximately 50% of deaths of children less than one year of age. A study conducted in Indonesia by Sutanto, Gessner, DjlantiI, Steinhoff, Murphy, Nelson, Widjaya, and Arjoso (2002), indicated that in the 50 rural villages in Iceland and Indonesia, the total number of child at risk during the study period was 17,015. 64% of deaths were due to ARI occurring outside the hospital setting; the incidence of pneumonia was higher among younger and rural children

According Rasmus, Pio and Enarson, (2000), acute ARI (mostly pneumonia) is one of the leading causes of death in young children in developing countries; it accounts for 28% of childhood mortality. Research in the last 15 years has contributed to improving the effectiveness of the case management strategy to reduce mortality from pneumonia in children in developing countries. Technological initiatives succeeded in making appropriate diagnostic and therapeutic devices available. Orientation of effective communication between health workers and families about home care of children with ARI and current international research initiatives are looking into measures for improving the referral of severe pneumonia and effective management of severe pneumonia.

A study conducted in Guinea by Lehmann, Heywood in (1996) on a cohort of 1711 children born in Tari to learn how low birth weight affects pneumonia, showed that infant mortality is negatively related to birth weight; mortality was very high among children with birth weight less than or equal to 2 kilograms, and was lowest in the 3.1 to 3.5 kilogram birth-weight. Pneumonia mortality declined with increasing birth weight in the 1-5 month age group, but in the 6-11 month old group the risk of pneumonia was the

same among children with birth- weights of less than 3.5 kilograms as those with birth-weights of less than or equal to 2.5 kilograms.

3.2. Risk Factors

There are several risk factors related to reproductive outcomes. Some of these factors such as age of mother may be beyond control, but others such as behavioral risk factors are mutable. Fifty babies die every six minutes; 4 million infants are stillborn while 4 million never reach one month of age (London Health Center, 2001). Social risk factors include age of mother, parity, socio-economic and socio- demographic factors. These factors determine the incidence of low birth weight and lowered health status and obstetric complications during pregnancy.

The following is a general discussion identifying risk factors of infant mortality. El Amin etal reported the result of a survey conducted from May to August 2002 at Omdurman Maternity Hospital in Sudan in which they found that perinatal mortality rate was 8.2%. A high proportion of both perinatal and neonatal deaths involved relatively large infants (more than 34 weeks) gestation, and they concluded that these deaths were potentially preventable by improved perinatal care.

A study conducted in Colombia, Peru, Costa Rica, and Panama in (1982) showed variables related to mother's environment, socioeconomic status and biological factors (pregnancy history mother's age at birth of the child and order of birth) as related to infant mortality.

A study from Jordan in (1985) by El-Atom showed significant association between infant mortality and socioeconomic and environmental factors including mother's

education housing quality, water and electricity supply, and availability of soap for hand washing and sewage system.

In 1994, Hammerman, reported the analysis of 397,083 live births between 1985-1988 in Israel. The infant mortality rate averaged 11.1/1000, 4.0% of which was associated with perinatal asphyxias.

A cluster of inter-related environment factors were found to be associated with infant mortality in the United States. These factors include poverty, inadequate prenatal care, high rate of teenage pregnancies, and usage of drugs, alcohol, and tobacco during pregnancy. Prenatal care affects infant health through birth weight; low birth weight is responsible for 75% of neonatal death, and 60% of postnatal deaths

3.2.1. Factors Related to the Infant

3.2.1.1. Weight of Infant at Birth

The size of an infant at birth is influenced by many factors. Some infants are classically "pre-mature", that is, born before their organ system has matured, some of them delivered before or at term. An infant born after completing 37 weeks of gestation and weighing less than 2,500 grams (below 10th percentile for weight or length), is considered to have growth retardation.

Preterm infants are infants who are delivered before 37 weeks. Preterm infants have special health problems. They face a variety of physiological handicaps, notably the inability to suck, swallow, and breathe in a coordinated fashion, which is not in place until 34 to 36 weeks of gestation, decreased ability to maintain body temperature, pulmonary insufficiency due to surfactant deficiency, and structural immaturity are

indicative of preterm infants born less than 26 weeks of gestation. These infants suffer an increased susceptibility to infection, as well as an immaturity of the renal function and immaturity of the metabolic process, leading to hypoglycemia, and hypocalcemia.

During the first 4 weeks of life, early gestational age and low birth weight are the chief causes of death. One third of these deaths are due to intracranial and spinal injury at birth

Lang (1992) in his study in Germany between 1983-1986 showed that mortality rate was 20 times higher in low birth weight infants versus mature ones. Additionally, in all live born children.

Another risks of increasing rate of premature birth were: multiparty, higher birth order, maternal age below 19 and over 30 years and mothers working in trade factories. Both neonatal and post neonatal mortality rates increased with declining birth weight. The strength of association between birth weight and risk of death was stronger for neonatal than for post neonatal mortality. Infants born to teen mothers had higher rates of both neonatal and post neonatal mortality.

Sholtes, and Smith (2000) with information taken from the infant mortality records, from all 50 states in the USA between 1960 and 1980 focused on both neonatal and post natal mortality rates. The results showed that infant mortality increased with declining birth-weight. The researcher added that there is a strong association between birth-weight and risk of death, which was stronger for neonatal than postnatal mortality.

The PCBS (2000) indicates that infant mortality rises steeply for infants with birth-weights below 2500 grams and only slightly for infants with birth-weights above 4000

grams. A study in Gaza Strip in 1997 showed that infant mortality due to prematurity and low birth-weight accounted for 20 to 30% of total infant mortality between 1991 and 2000.

3.2.1.2. Sex of the Child

According to the report of the National Center for Health Statistics in the USA (2000), IMR is higher for male infants than for female infants. In Palestine, no major difference is reported between males and females. In a study in Japan (2001), infant morality rate was analyzed among single, twin, and triplet births during the period of 1995 to 1998. Using Japanese vital statistics, the results showed that IMR was higher in males than in females for both singles and twins, but not for triplets.

A study in Jordan by the Department of Family and Community Medicine at the University of Jordan in Amman between November 1995 and October 1996, included a random sample of 200,000 persons living in 100 clusters in all geographical areas of Jordan. In this sample, of 6,028 infants, 129 deaths were identified as resulting from gender specific factors, yielding a gender specific death rate of 22.6/1000 for male infants and 20.1/1000 for female infants.

In the Yemen Demographic Maternal and Child Health Survey (1998), the infant mortality was higher for boys (98/1000) than for girls (80/1000).

In a study conducted in the Qatif area in Saudi Arabia by Hussein (1994), using information obtained from the birth and death certificates of 3039 live births, results indicated male IMR of 20.78/1000 and a female IMR of 21.35/1000.

Another study conducted by Wahab, Winrinvist, Stenlund, and Wilpop (2001) in Indonesia, on 1948 infants born between January 1995 to December 1996, showed that

IMR was higher in male infants and that males had higher mortality if born after more than two siblings.

3.2.1.3. Age of infant at death

Two third of infant deaths occur during the first 28 days of life (the neonatal period). The most frequent causes of death during this period are birth defects (24%), low birth-weight or preterm (21%), and respiratory distress syndrome (7%). The remaining third of infant deaths occur during the post neonatal period between the 29th day of life and the first year birthday. The most common cause of death during this period is Sudden Infant Death Syndrom. The Hussein (1994) study showed that 70% of deaths occurred in the neonatal period and about 75% of the deaths were preventable. The author of the study added that major causes of IMR were premature delivery in 25 (39.1%), infections in 16 (25%), and birth defect in 12 (18.8%), SIDS in 4 (6.3%) and difficult delivery in 3 (4.7%). The researcher also stated that neonatal mortality rate was 14.8/1000, and postnatal mortality was 6.35/1000.

The National Infant Mortality Surveillance (NIMS) project studied US data from 1960 to 1980. The NIMS conference held in May 1986 in Atlanta, Georgia, and the Public Health Report (1987) found that: Both neonatal and post neonatal mortality rates increased with declining birth weight, although there was a stronger association between birth-weight and death of neonate than between birth weight and death postnatal. The risk of neonatal death was lowest (1.4/1000) for infants with birth weights of 3500 to 3999 grams.

Infants born to teen mothers had a higher rate of both neonatal and postnatal mortality compared of mothers aged 20 years or older. The increased risk of infant mortality is neonatal but not postnatal when birth-weight is over 1500 grams (VLBW).

According to a study in India by Taneja and Vaidya (1997), nearly 25 million children are born in India every year, of whom approximately 2.7 million die before reaching the age of five. 46% of these deaths are in infants, and 29.3% occurred in the neonatal period. The major causes of death are preventable, such as Tetanus, Diarrhea, Measles, and fever. A USA study by McCarthy, Sachs, Layde, Burton, Terry and Rocha (1986) showed that twins had a neonatal IMR six times higher than singletons. This is probably due to low birth-weight.

In Palestine, the average percentage of early neonate's deaths is 41.3%, while the percentages of late neonate and post-neonate were 18.2% and 40.5%, respectively (PCBS, 2000). In the Gaza Strip in 1995, about 39% (9.7/1000) of total infant deaths occurred during the first week of life (i.e. early neonatal). This figure rose to 53.7% in 2000, an elevation attributed to infant and birth related causes. This result poses a serious problem which needs urgent intervention. Mortality at this age can be prevented as it may be related to environmental causes and infection. Suggestions for alternative or improved health programmes in Palestine can help.

3.2.1.4. Place of delivery

The safe motherhood program, launched in 1987, has emphasized the importance of access to emergency obstetric care in order to manage the common causes of obstetric death: obstructed labor, hemorrhaging, eclampsia, and infection. A study conducted by Cord, Pesmhumer, Arole, and Rarole (2001) on 2905 pregnancies in 25 villages in India

indicated that there were 2861 deliveries after 24 weeks, of which 14.4% took place at home. Perinatal mortality rate was 36/1000 due in part to stillbirth. 64% of perinatal deaths were infants delivered at home. Out of 103 perinatal deaths, 66 were home delivery. The researchers add that two thirds of perinatal deaths were home deliveries from obstetric causes or due to low birth weight, or respiratory infection.

In Palestine, about 77.5% of births took place in hospitals, while 22.5% occurred outside of hospitals. Government hospitals accounted for the largest percentages of total deliveries, up to 50 or 60% in the Gaza Strip, and about 36.5% in the West Bank. Home deliveries account for 5.7% in Palestine, 2.1% in G.S, and 8.2% in West Bank (MOH 2001).

In a study conducted in Egypt by Serour, Younis, Hefnawi, and Nawar (1981) showed that there were 6990 deliveries during 21 months, with 580 hospital perinatal deaths. According to this study certain high risk factors were associated with perinatal mortality that include biosocial and biomedical factors: maternal education, marital status, maternal age, parity, family size, antenatal care, mother's weight and sex of the baby.

Others tried to explain how IM is affected by the person who helps in delivery.

According to the USA Center for Health Statistics (1998), infant mortality risks for all babies delivered by certified nurse mid-wives in the USA showed excellent birth outcome for these midwife attended deliveries. It also showed that the risk of experiencing an infant death was 19 percent lower for births attended by physicians.

Ibrahim, Omer, Amin, Bakier, and Rustwan (1992) analyzed 6275 deliveries over a period of 3 years. Results showed 150 still births and 167 neonatal deaths. Yet when an intervention program to upgrade the skills of the village midwives started in the middle of the second year there was a 25% reduction in rate of still births and neonatal deaths.

3.2.1.5. Season of death

Some studies tried to explain the relationship between infant mortality and the season. Lerer, Butchart, and TerreBlanche (1995) studied police death certificates of 70 caregivers whose infants died between June 1991 and January 1992. The results showed that the majority of the infant deaths (42.9%) were due to respiratory infections, with diarrheal diseases having the second highest frequency (24.3%). This finding is consistent with the fact that 50% of deaths occurred in the Summer months of June, July and August, and 43% of infants died before 4 months of age.

The Department of Epidemiology at the Johns Hopkins University School of Hygiene and Public Heath, studied the seasonal occurrence of infant deaths. It revealed a peaking of deaths during May and August, influenced by gastroenteritis as a cause of death, which is particularly prevalent during the summer months.

3.2.2. Socioeconomic Factors

3.2.2.1. Mother's education

Several studies have suggested that child mortality in developing countries is associated more closely with maternal education. In Africa, a child born to an uneducated mother faces a 20% chance of dying before the age of 5 years; whereas the risk for a child whose mother has received at least five years of education drops to 12%.

PBCS (2000) indicated that IMR decreases with the increased education of mothers. The mortality rate among infants born to mothers with 9-10 years of schooling is almost twice that of infants born to mothers with 16 or more years of education. However, not all studies showed a negative association between IM and mother education. A study in 1992 in Peru by the Department of Pediatrics of the University Children's Hospital showed that late fetal and early neonatal mortality were particularly high where mothers

were found to have more years of education. This can be attributed to the fact that educated mothers may be generaly employed, leading to less time with infants, and the early introduction of formula milk which may lead to medical problems.

A study in Indonesia by Mellington and Cameron (1994) on 6620 women showed that both primary education and secondary schooling for the mother significantly decrease the probability of child death. The results of this study support the theory that being educated without working outside the home can lead to good care of children.

Rajna, Mishara and Krishamoon (1998) showed that education has a direct as well as indirect effect through antenatal care, improving maternal education and reducing infant mortality rate.

In a study conducted in Ondo State in Nigeria in (1986-1987), indicated that mothers who have graduated from secondary school experience a higher rate of infant mortality than less educated mothers.

According to the Yemen Demography and Maternal and Child Heath Survey, maternal illiteracy is associated with a significantly higher risk of neonatal death – which decreases with the increase in the level of education of the mother.

3.2.2.2. Employment of Mother

There are other factors associated with infant mortality rate such as employment of mother. In a 1989 survey in Nigeria by Barkol on 2111 mothers, the relationship between infant mortality and maternal employment was examined. The result was that children of working class mothers are likely to experience higher rates of infant mortality than those of non-working mothers. No effect of the duration of breast-feeding was detectable.

In Tanzania, a study by Mbago of the Department of Statistics in 1994 using data from 1988 focusing on three regions populated by Burundi refugees found that children born to 'housewives' were associated with low levels of mortality compared to those born to employed mothers.

3.2.2.3. Rural and Urban Residence

Several studies showed that IMR increased in rural areas, mainly due to several factors such as sanitation, house conditions and medical services.

Ali (1990) discussed the relative importance of demographic and socio economic factors with respect to their role in reducing infant mortality and indicated that demographic factors have more effect on infant mortality than socioeconomic factors. However, the study suggested that there is a need to improve housing in urban areas, and sewage systems in rural areas to reduce the infant mortality rate − showing that factors causing infant mortality are present in both urban and rural areas.

According to the Indonesian Census of 1985 there was a considerable urban-rural differential in infant mortality. In general, babies born in urban areas had a lower mortality rate than those born in rural areas. Additionally, education, age at marriage, occupation and literacy have significant effects on infant mortality.

The Yemen Demography and Maternal and Child Heath Survey showed that infant mortality rates in rural areas are higher than in urban areas with the infant mortality rate being 94 deaths per 1000 live births in rural areas compared to 75 deaths per 1000 live births in urban areas. Furthermore, Amin, Ruhul, and Kamal (1989) indicated that mortality of infants and children are higher in rural area than in urban areas.

3.2.2.4. Income and poverty

Infants born into poor families are twice as likely to die compared to infants born to families above the poverty level. Studies also show that deaths due to preterm labor and low birth weight, are linked to poverty.

According to the U.S Census of the World Population, the highest ratio of infant deaths is 177 per 1000 live births found in the Western Sahara. The lowest rate is four deaths per 1000 live births found in Japan. These figures indicate that there is a direct relationship between poverty and infant mortality.

Casterline, Cokksey, and Ismail (1992) examined determinants of infant and child mortality in Egypt. The result of this research supports the theory that in early childhood, survival chances improve markedly as income increases.

Jordanian data from the 1985 Amman Follow-Up Health and Population Survey was used to examine the association between child mortality and socioeconomic and environmental conditions. The analysis and the estimates showed that the proportional effects of mother's education, housing quality, water and electricity supply, and sewage connection are highly significant - with poverty and family income being key determinants in these factors.

3.2.3. Familial Factors

3.2.3.1. Family and Reproductive history

Human reproduction is a complex process involving the union of the genetic material of both parents.

Ethnic Background: Certain genetic diseases are found within the population from specific ethnic backgrounds. For example, African Americans have an increased chance of sickle cell anemia and Mediterranean people have a greater chance of Thalasemia.

Family History: The occurrence of certain diseases such as hemophilia, Parkinson's disease, birth defects, and congenital heart disease increase with past family history of these diseases.

Reproductive History: A history of spontaneous abortion and children with birth defects or genetic diseases may indicate an increased risk for the unborn child. Medical records should be reviewed when available.

3.2.3.2. Maternal age

Findings indicate that the mortality and the morbidity are higher among infants of the older Primi and multipara mothers, and among those of very young mothers. There is also a strong correlation between socio-economic status and age of mother.

In births to parents with more education or higher family income, the mothers tend to be older. The lower the socio-economic status the greater the tendency for the mother to be younger. Pregnancy in adolescence is also linked to maternal and neonatal mortality.

The link between early childbearing and lower rate of infant survival in developing countries has serious implications. One in five women aged 20-24 years reported having had their child before their 18th birthday. In addition, babies born to women older than 40 are at a greater risk of dying in infancy than those whose mothers are in their 20's – 30's.

A cause of high infant mortality in older women is related to the likelihood that these women have several children already, so new infants are more likely to die in infancy than other babies. In addition, in developing countries many older women are in poor health condition and have poor nutrition.

Throughout the developing world, babies born to women younger than 20 years are on average one-third more likely to die than infants born to women in their 20's and 30's. (Family Planning Improves Child Survival and Health, 1998).

The 1992 Yemen Demography and Maternal and Child Health Survey indicated that higher infant mortality risk occurs among children born to very young mothers. Teenage mothers suffer an IMR of 128 per 1000 live births; while the mortality rate of children born to women aged 40-49 are 79-84 deaths per 1000 births. Results indicate that the proportion of the infant death increases steadily with the age of mother. Teenage mothers and those over 34 years of age face nearly twice the risk of IMR compared to woman between 20 and 24 years. First and multiparity pregnancies (greater than 8 previous pregnancies) carry a similar risk of IMR, compared to women who had between one and four pregnancies.

3.2.3.3. Breast-feeding

Breast-feeding is one of the most important influences on children's health worldwide and provides optimal nutrition for the normal infant during the early months of life and helps to provide protection against gastrointestinal and upper respiratory infections. Furthermore, allergic diseases are less common among infants who have been breast-fed.

The advantage of breast-feeding lies in the composition of mother's milk, which is ideal for normal growth and development. Feeding with breast milk means that microbial contamination can be avoided. Breast-fed babies derive antibodies from mothers, and another advantage is that breast milk is free, and there is no need for time-consuming preparation.

Unfortunately, breast-feeding rates remain low among several subpopulations of women, including low income, and young mothers. Absolute contra-indications to breast-feeding are rare such as the presence of tuberculosis in mothers.

Valerie (1992) on a study on 222, 989 infants concluded that bottle-feeding leads to a poor diet, poor food supplementation, and unhygienic feeding.

Huffman, Zehner and Victoria (2001), searched the Medline database about breast-feeding and infant mortality. Results indicated that breast feeding helps in prevention of hypothermia and hypoglycemia in neoborn babies. These two conditions lead to early neonatal deaths especially among low birth weight and premature babies. Breast-feeding protects against infections. A study conducted in Ghana by Ahiadeke, Gurak, and Shwager (2000), on utilizing data on the reported reason for weaning, indicated that children who are weaned in the neonatal period because of illness or weakness to suck, experience much higher risk of dying than others.

Another study was conducted in Bangladesh by Arifeen, Antelman, and Becker (2001) on birth cohort of 1677 infants who were born in Dhaka slum areas of Bangladesh. Results indicated that the duration of breastfeeding has a direct impact on infant mortality, IMR occurred in one-month old infants who were breast-feeding exclusively at a rate of 53%,and gradually declined to 5% to infants who are 6 months of age.

Moring (1998) analyzed determinants of infant mortality in various regions of Finland between the late seventeenth and early twentieth century. Results indicated that in areas where cows milk was available as substitute for breast milk, infant mortality was high. IMR was also high in areas where drinking water was contaminated.

Another study conducted in Bangladesh by (Amin, 1990) on data from 1975 to 1978 among 2000 women showed that breast feeding at various stages of the child's life is a significant predictor of infant mortality. The study showed that infants breastfeeding at birth had better probabilities of survival relative to those who are never breast fed or are given liquid supplements very early in life.

A study published by the UN Population Division found nearly 35,000 deaths out of 280,000 births among children under five (in 25 developing countries) and recommended that the family planning program achieve better spacing, and that health programs should encourage breast feeding in order to decrease IMR, and to delay the next pregnancy.

3.2.3.4. Birth Spacing and Birth order

Closely spaced babies born less than two years apart are much likely to die than those born after a longer interval. This is a serious problem in developing countries. Closely spaced births present a risk to the health of all three family members involved, especially the mother herself who does not have sufficient time to regain her strength after delivery, the previous infant often has to be weaned early, while the baby born is likely to be premature with low birth weight. Frequency of LBW is high where the birth order has short intervals and the minimum frequency of LBW is at birth order with longer intervals.

Children of a high birth order are born into conditions characterized by restricted access to parental attention and supervision (Hunshek, 1992). Such limited access to parental time may also result in less attention being paid to the health and safety of the children during the first years of their life. For example, children born later to large families have

been found to run a higher risk of experiencing accidents during early childhood.Nixon, Pearn, Golding and Kurzon analyzed Swedish statistics from 1997 and found that death from infectious disease still plays a role in Sweden. Children who were born into crowded houses were found to have a higher risk of catching life threatening infections during the first years of their lives. While having a young mother may create a biological advantage of survival for the first born over the later born, the size of the family and birth rank are more likely to be superceded as factors in IMR by economic factors, especially economic shortages in large families (Hanshek, 1992, Bergling 1980).

Data analyses by Miller, Trusselly, Pebley and Vaughan (1992) concluded that children born within 15 months of preceding births are 60% to 80% more likely than other children to die in the first two years of their lives. A 1998 study in Vietnam by Swenson, Nguyen, and Pham analyzed a sub-sample of rural children from 1990. The mortality rate was highest among first order births and births with an interval of less than 12 months.

Zenger (1993) indicated that birth spacing effects on neonatal mortality are stronger when the preceeding child has survived the neonatal period than when it has died before the neonatal period.

In Norway and Sweden, Espehaug, Daltveit, Vollset, Oyen, Ericson, and Irgens (1994) studied all live single births in Norway and Sweden between 1985 and 1988. They focused that infant mortality was 1.5 times higher in Norway than in Sweden. The largest difference belonged to young mothers with a high birth order. In second births of mothers aged less than 20 years, the observed mortality ratio of Norway to Sweden was

1:8 with the infant mortality ratio decreasing with increasing maternal age for all birth orders, and decreasing for the second births of mothers aged 35 years or more. The study supports the suggestion that later born children are a disadvantaged group within the family during up bringing and that they also tend to have a higher risk of mortality at all stages of life.

The 1992 Yemen Demographic, Maternal and Child Health Survey found that IMR decreased to 76 per 1000 for the 4 to 6 birth order, then increased for birth number 7 or higher. A similar phenomenon was observed for neonatal mortality and under five mortality. The Pakistan 1990-1991 health survey showed too that infant and child mortality is higher among first and higher births than among births of the second or third orders.

3.2.3.5. Ante-Natal Care

Safe motherhood should be designed to reduce morbidity and mortality of both mothers and infants through antenatal care to women, especially those in high-risk groups.

There needs to be delivery care to minimize delivery complications, and postnatal care of babies and mothers including breast-feeding, and immunization. Studies demonstrate that good quality prenatal care promotes good outcomes.

PCBS (2000) indicated that 95.6% of pregnant women receive antenatal care from skilled people. 27.5% of women with recent pregnancies in Palestine have been vaccinated against Tetanus Toxin. The majority of women received two to three doses. The services to high risk pregnancies only started at 1998 in Gaza Strip. In the West

Bank, the number of pregnant women who received high risk health care from the public sector increased from 11,722 in 1999 to 12,622 in 2000 (PCBS, 2000).

The MOH Annual Report (2001), states that 208 clinics provide antenatal care services to pregnant women, with an additional 68 clinics run by UNRWA. Immunization coverage among newly pregnant women is 33% in MOH, 43.8% in Gaza and 25.8% in West Bank. In UNRWA, the coverage is 98.9%.

Women who receive prenatal care in the first trimester have better pregnancy outcomes than women who receive little or no prenatal care. The incidence of delivering very low birth weight (VLBW) babies weighing less than 1,500gm is 40 percent higher among women who receive late or no prenatal care compared with women entering care in the first trimester.

The Yemen 1992 survey showed that 78 out of 1000 infant deaths were died born to mothers who received no medical maternal care during pregnancy. This rate dropped to 61 deaths per 1000 for infants born to mothers who received antenatal care.

The Qatif area study indicated that IMR was 21.06 per 1000. 70.3% of the 45 deaths that occurred were in the neo natal period. About 75% of these deaths were preventable since the major cause of this IMR was premature delivery (39.%) which could have been prevented by improved prenatal care.

A retrospective study that examined the situation in Haifa, Israel in 1980 concluded that there is a positive association between lack of prenatal care and Jewish infant mortality among Jewish people. Of the Jewish mothers whose infants died, 19.2% did not attend a clinic regularly for prenatal care, compared with only 6.8% in the control group.

3.2.3.6. Multiple births

Race, maternal parity and maternal age affect the incidence of dizygotic twining.

Complication of multiple births: Preterm delivery gestation length tends to be inversely related to the number of fetuses and it is prematurity that tends to increase the mortality and morbidity of twins.

Obstetric complications: Including polyhydramnios, pregnancy-induced hypertension and premature rupture of membrane are seen to affect IM.

Mortality and twin's pregnancy: Herruzo, Matinez, Biel, Roblesm, and Miranda (1992) reviewed 488 twin pregnancies. Results indicated that in the birth of neonates weighing 1000 gm or more, complications were present in 56.7% of all pregnancies. Most common was the threat of premature labor (17.4%), followed by pre-eclampsia (14.5%). Perinatal mortality was 31.8 per 1000, with 80% of neonatal deaths in twin pregnancies involving newborns weighing less than 2000 g.

Imaizumi (1994) study on perinatal mortality during the period of 1980-1991, indicated that prematurity has a relation with multiple births. The prematurity rate was 7.7/1000 for singletons, 45.6/1000 for twins, 89/1000 for triplets and 116.8/1000 for quadruples. The perinatal mortality rate was significantly higher in males than females for singleton and twins.

Another study in Japan between 1995 and1998 about the effect of order of multiple births and the birth weight on the IMR, showed that proportions of neonatal deaths among total infant deaths was about one half for singletons, and ¾ for both twins and triplets. The IMR for babies weighing 1500gm or less were 2.4 per 1000 for singletons, 5.9 per 1000 for babies weighing 1500gms or less.

3.2.3.7. Parity

Multiparty is also associated with less successful outcomes. Parity relates to categories that have specific social significance, because it contributes to a general picture of poor reproductive outcomes for both mother and infant. Aziz (1980) evaluated maternity performance during the period of 1975-1979 in 3 major hospitals in Khartoum. Looking at 8858 women who delivered in those hospitals, results indicated that 3130 of them had 5 or more children. Obstetric complications and fetal outcomes were investigated. When parity was considered high rate of ante-natal complications, such as Anemia, anti partum hemorrhage, and postpartum hemorrhage were found.

The stillbirth rate and neonatal mortality were higher for grand multi women. Results concluded that multiple births lead to more complications which lead to an elevation in infant mortality.

George (1973) studied 2287 families, and indicated that in families with 5 or more births, 51% of children died, while the death rate for children in families with three or fewer births was 38%. Another study conducted by Khalifa (1989) using individual birth history data from the Sudan Fertility Survey 1979, indicated that rural women, with no education, and those married to uneducated husbands showed rapid parity and an elevation in IMR.

3.3. Conceptual framework

The conceptual framework for this research is based on the integrated relationship between Infant Mortality and physical, social and environmental factors including:

* Factors related to the infant.

* Socio economic factors

* Familial factors.

The above components have been utilized as a guiding principal for data collection, assessing predisposing factors in infant mortality in North West Bank in 2001.

Figure 1- CONCEPTUAL FRAMEWORK

Factors related to infant mortality		
Factors related to the infant	**socioeconomic factors**	**Familial factors**
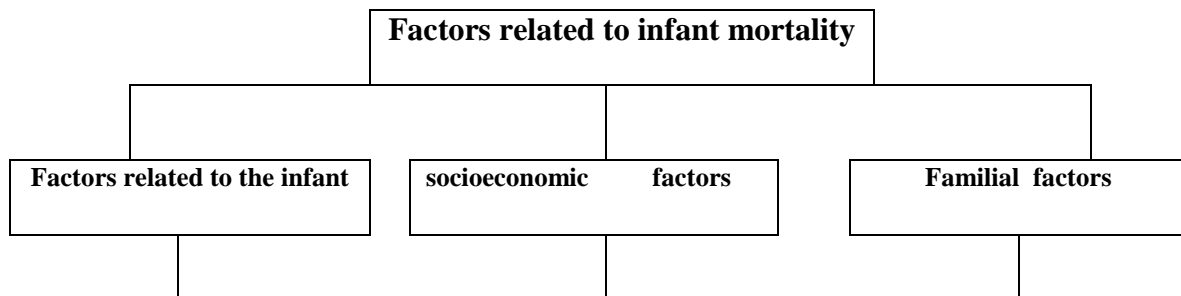
Weight of infant at birth	Mothers education	Close relationship
More than 2500gm, 1500-2500 gm	less than 4 years, 4-6 years	first degree, second degree
Less than 1500gm	7-12 years, more than 12 years	no familial relation
Sex of the child	Employment of mother	Maternal age
Male	employed	less than 17 years, 12-24 years
Female	unemployed	25-32 years, 33-40 years
		more than 40 years
Age of infant at death	Rural and urban	Breast feeding
From birth – 7 days, 8-28 days		less than month, 1-4 months
29 days to one year		more than 4 month
Place of delivery	Income and poverty	Birth spacing
Home		less than 11 months, 12-24 months
hospital		more than 24 months
Season of death		birth order
Spring, Summer, Autumn, Winter		six and less, more than 6
		Ante-natal care
		No care, first 3 months
		4-6 months, 6-9 months
		Multiple births
		Single, twin, multiple
		Parity
		6 and less, more than 6

CHAPTER FOUR

Methodology

4.1. Introduction

This chapter covers the research design, the study sample, the instrument used for data collection and data collection and analysis methods, definitions and limitations faced throughout the study.

4.2. Research Design

A quantitative retrospective descriptive survey design was used to study reports of infant mortality in North West Bank, using a death report format of the Ministry of Health in Palestine.

4.3. Population and sample

The investigator utilized all (270) infant mortality reports of the Ministry of Health from the year 2001 in the North West Bank including: Nablus, Jenin, Tulkarm, Qalqilia, and Salfit. The targeted population was all deaths (death certificates) for the year 2001 in the North West Bank. No random selection of certificates has taken place and thus the sample was the same as the population.

4.4. Data Collection Instrument and Data Collection

Quantitative data was collected by reviewing all reports of infant mortality in 2001, with specific emphasis on the following information available from the infants death report. (Appendix 3)

First: Information related to the infant

- Weight at birth.

- Sex

- Age of infant at death

- Place of delivery

- Seasonal of death.

Second: Information related to socio economic factors:

- Level of mother's education

- Mother's employment

- Factors related to life in rural or urban areas

- Income and poverty.

Third: Information related to familial factors:

- Relationship of the parents

- The maternal age

- Breast-feeding practices

- The birth spacing and birth order

- Antenatal care

- Multiple births

- Parity.

It is note worthy to mention that the researcher obtained all information from the infant death reports and no interviews were conducted with the mothers. The report format is a standard one used in Palestine and in this study is considered as the data collection instrument.

The researcher collected all the data by reviewing the infant death reports at the Ministry of Health. Data was analyzed using SPSS and presented as frequencies and percentages.

4.5. Ethical considerations

A formal letter seeking consent to conduct the study was sent to the Ministry of Health to facilitate co-operation of the Health Directorate in the North West Bank (Appendix 1 and 2). The researcher herself checked the information from the infant mortality reports, in order to maintain confidentiality and consistency in dealing with the reports.

4.6. Basic definitions and variables considered

1. Birth weight:

Operational definition: Weight less than 2500 gm, < 2500 gm (LBW).

Conceptual definition: Weight of infant in grams at birth.

2. Age of infant at death:

Operational definition: The period between date of delivery till date of death, early neonate < 7 days, neonatal 8-27 days, post neonatal infancy 28 days to one year.

Conceptual definition: Age at death in months.

3. Mother education:

Conceptual definition: Illiterate applies to any person unable to read or write in any language and who never received a certificate from any formal education system.

Operational definition: Mother education in years.

4. Employment of mother:

Operational definition: Work done outside the home.

5. Age of mother:

Conceptual definition: The age of the mother refers to the date when the mother was born (in days, months and years).

Operational definition: Age of mother in years.

6. Birth order:

Conceptual definition: Total number of previous pregnancies.

7. Interval between this pregnancy and the previous pregnancy:

Conceptual definition: The period between birth dates.

Operational definition: Interval between the previous pregnancy and pregnancy of the death infant, in months.

8. Close relationship of parents:

Conceptual definition: The relationship between the parents.

Operational definition: First degree, second degree, third degree.

9. Breast-feeding:

Conceptual definition: Feeding of the infant on breast milk alone.

10. Antenatal care:

Operational definition: Antenatal care, in the first, second and third trimesters.

Conceptual definition: visiting MCH centers to receive care when pregnant.

4.7. Data Analysis

The data were analyzed by using computer program SPSS.

4.8. Summary

This chapter explained how the research was carried out, indicated the desigen, the population, the sample and the setting, described the instrument that was used and identified data collection procedure and data analysis methods.

CHAPTER FIVE

Results

The chapter covers data presentation − results with a focus on factors related to the infant and socio-economic factors related to infant mortality as delineated in the conceptual framework covered in chapter 3.

Table 5.1 indicates that of 266 completed reports of infant deaths, the Nablus area had the highest number of 122 cases (45.2%). This was followed by Jenin with 102 cases (37.4%), then Tulkarm with 32 cases (11.9%). Qalqilia and Salfit had the lowest percentage of infant deaths with 11 cases (4.1%). It is worthy to note that missed information will be seen in each table. This is because such information was overlooked by those who were filling the report and the information was not in the report and thus unavailable to the researcher. This is a rather serious flaw in the documentation process.

<u>Table 5.1. Distribution of study population by district</u>

District	Live Birth	Frequency	Percent	IMR
Jenin	7595	101	37.4	13.29
Nablus	7766	122	45.2	15.7
Tulkarm	3932	32	11.9	8.13
Qalqilia and Salfeit	4126	11	4.1	2.66
Total	23419	266	98.5	11.53
Missed		4	1.5%	
Total		270	100%	

When related to table 2.3 in chapter two we notice the reported birth of 23419 infants in the Northern District and reported infant mortality of 270 making the infant mortality rate as follows (270x1000) / 23419 = 11.53. That is 11.53 per 1000 live births.

5.1. Death Factors related to the infant:

5.1.1. Weight of infant at birth

Table 5.2 shows that of 262 infants, 136 (50.4%) weighed more than 2500 gm's and 126 infants or 46.7% had a birth weight below 1500 gm's.

MOH annual report indicates that of the total 23419 live births, 22201 (94.8%) weighed more than 2500grms. Consequently, IMR calculations are as follows:

For more than 2500grms = (136 / 22201) x 1000 = 6.1/1000

For less than 2500grms = (126 / 1218) x 1000 = 103.4/1000

Table 5.2. Distribution of study population by weight of infant

Weight of infant	Frequency	Percent	Live Births	IMR
more than 2500(gram)	136	50.4	22201	6.125
Less than 2500(gram)	126	46.7	1218	103.4
Total	262	97.0	23419	
Missed	8	3.0		
Total	270	100.0		

5.1.2. Sex of the child

Table 5.3 shows that out of 270 infants, 152 were male (56.3%) and 118 infants were female (43.7%). Male IMR is 12.73/1000 while it is 10.27 for females.

Table5.3. Distribution of study population by sex of the infant

Gender	frequency	percent	Live Births	IMR
Male	152	56.3	11936	12.73
Female	118	43.7	11483	10.27
Total	270	100.0	23419	

5.1.3. Age of infant at death

Table 5.4 shows that out of 270, 87 infants (32.2%) died at the age between 29 days and one year. 74 infants (27.4%) died between birth and the age of seven days, and 61 infants (22.6%) died at an age between eight and 28 days.

Table 5.4. Distribution of study population by age of infant at death

Age of infant at death	frequency	percent	IMR
From birth – 7 days	74	27.4	3.15
8 – 28 days	61	22.6	2.60
29 days to year	87	32.2	3.71
Total	222	82.2	
Missed	48	17.8	
Total	270	100.0	

When related to table 5.4 IMR in the three periods is as follows:

- Early neonatal period (birth → 7 days) (74 / 23419) x 1000 = 3.15/1000.

- Neonatal (61 / 23419) x 1000 = 2.60/1000.

- Post neonatal (87 / 23419) x 1000 = 3.71/1000.

These figures are to be considered cautiously since data was missing from 48 cases which is substantial number of the total 270 cases.

5.1.4. Place of delivery

Table 5.5 shows that out of 270 infants, 246 (91.1%) were delivered in hospitals while home deliveries accounted for 23 cases (8.5%). Data from the MOH for the same year indicates the birth in North West Bank of 20921 infants in hospitals that is 89.3% of the total 23419 live births. Out of hospital births totaled 2498 (10.7%) IMR calculations related to total number of births as reported by the Ministry of Health are as follows:

IMR-Hospitals (246 / 20921) x 1000 = 11.75/1000

IMR-Outside (23 / 2498) x 1000 = 9.20/1000

Table 5.5. Distribution of study population by place of delivery

Place of delivery	frequency	percent	Live Births	IMR
Hospital	246	91.1	20921	11.75
Home	23	8.5	2498	9.20
Total	269	99.6		
Missed	1	0 .4		
Total	270	100.0	23419	

5.1.5. Season of death

Table 5.6 indicates that most infant mortality occurs in Spring (98 cases or 36.3%), followed by Winter with 65 infants (24.1%). In Summer and autumn, 52 infants (19.3% each).

Table 5.6. Distribution of study population by season of death

Season of death	frequency	percent
Spring	98	36.3
Summer	52	19.3
Autumn	52	19.3
Winter	65	24.1
Total	267	98.9
Missed	3	1.1
Total	270	100.0

5.2. Socio Economic factors

5.2.1. Mothers' education

Table 5.7 shows that women who were educated for less than four years had 15 infant deaths (5.6%). 35 infant deaths (13%) were attributed to mothers with more than 12 years of education; and 55 infant deaths (20.4%) were attributed to mothers with between four and six years of education. The majority of infant deaths occurred to mothers with an education level of between seven and 12 years.

Table 5.7. Distribution of study population by mother's education

Mothers education	frequency	percent	Live Births	IMR
less than 7 years	70	26	2669	26.2
7 – 12 years	148	54.8		
more than 12 years	35	13.0	15550	9.51
Total	253	93.7	4777	7.32
Missed	17	6.3		
Total	270	100.0	23419	

The MOH report indicate that of the 23419 live births mothers educated up until 7 years constituted 11.4%, 7-12 years constituted 66.4% and more than 12 years (20.4%). IMR calculations would be as follows:

- − Less than 7 years [70 / 2669mothers (11.4%)] x 1000 = 26.2/1000

- − 7-12 years [148 / 15550mothers (66.4%)] x 1000 = 9.5/1000

- − more than 12 years [35 / 4777mothers (20.4%)] x 1000 = 7.32/1000

5.2.2. Employment of mother

Table 5.8 indicates that the majority of infant mortality cases (242 or 89.6%) occurred with mothers who were not working, while 18 cases occurred to working women (6.7%). 10 cases (3.7%) are unreported.

Table 5.8. Distribution of study population by employment of mother

Employment of mother	frequency	percent	Live Births	IMR
Employed	18	6.7	702	25.6
Unemployed	242	89.6	22717	10.65
Total	260	96.3		
Missed	10	3.7		
Total	270	100.0		

The MOH annual report indicated that 3% of all mothers who gave birth in North West Bank in 2001 were employed. That is of the 23419 births, 702 (3%) were to employed mothers and 22717 (97%) were to non employed mothers. Consequently IMR calculations would be as follows:

- IMR mothers employed (18/702) x 1000 = 25.6/1000

- IMR unemployed mothers (242/22717) x 1000 = 10.7/1000

5.3. Rural and urban distribution

Table 5.9 indicates that the rural areas account for the majority of infant mortality cases (220 or 81.5%), with IMR of 15.65/1000 while urban areas account for 50 cases (18.5%) with IMR of 10.16/1000.

Table 5.9. Distribution of study population by location of residence

Location of residence	frequency	percent	IMR
City	50	18.5	10.16
Village	220	81.5	15.65
Total	270	100.0	

5.4. Familial factors

5.4.1. Relationship of parent's

Table 5.10 indicates that 93 cases (34.4%) of infant mortality occurred where the parents of the infant had a first degree relationship. Parents who are related by second degree accounted for 47 cases (17.4%). Infant deaths to parents who had no family relationship totaled 96 cases (35.6%).

Table 5.10. Distribution of study population with consideration to the familial relationship between parents

Relationship between parents	frequency	percent
First Degree	93	34.4
Second Degree	47	17.4
No familial relation	96	35.6
Total	236	87.4
Missed	34	12.6
Total	270	100.0

5.4.2. Mother's age

Table 5.11 shows that the majority of infant deaths occurred to mothers between 15 and 24 years of age (140 cases or 51.8%) with IMR of 19.3/1000. 30.7% cases occurred to mothers between 25 and 34 years of age with IMR of 7.73/1000 followed by 13.7%

cases to mothers between 35 and 44 years of age with IMR 15.6/1000. Mothers older than 40 years of age suffered four cases of infant death or 1.5%. Ten reports did not indicate the age of the mother.

Table 5.11. Distribution of study population by mother's age

Mother's age	frequency	percent	Live Births	IMR
15-24 years	140	51.8	7236	19.3
25 – 34 years	83	30.7	10725	7.73
35 – 44 years	37	13.7	2365	15.6
Total	260	96.3		
Missed	10	3.7		
Total	270	100.0		

5.4.3. Breast feeding

Table 5.12 shows that 54 infant deaths occurred in infants who were breastfed for less than one month (20%). Another 54 cases occurred in infants breast fed between one and four months (20%), and 43 cases (15.9%) occurred in infants aged above four months.

Table 5.12. Distribution of study population by breast-feeding

Duration of breastfeeding	frequency	percent	Live Births	IMR
Less than 4 months	108	40.0	18219	5.92
more than 4 months	43	15.9	5200	8.26
Total	151	55.9		
Missed	119	44.1		
Total	270	100.0		

The MOH report indicated that 77.8% or 18219 infants are exclusively breast fed for 4 months while 22.2% (5199) are breast fed for more than 4 months. IMR calculations using statistics in this study would be as follows:

- Breast fed 4 months (108/18214) x 1000 = 5.92/1000

- Breast fed more than 4 months (43/5200) x 1000 = 8.2/1000

It is worthy to note that there were 119 missing values related to breast feeding on the studied infant death reports. Thus, the above IMR figures must be cautiously considered.

5.4.4. Birth spacing

Table 5.13 shows that 51 infants (18.9%) died in cases where birth spacing was less than 11 months. 102 infants (37.8%) died in cases where births had been spaced between 12 and 24 months and 46 infants (17.0%) died in cases where the previous birth had occurred over 24 months before.

Table 5.13. Distribution of study population by birth spacing

Birth spacing	frequency	percent
less 11 months	51	18.9
12 – 24 months	102	37.8
more than 24 months	46	17.0
Total	199	73.7
Missed	71	26.3
Total	270	100.0

5.4.5. Birth order

Table 5.14 shows that 121 (44.8%) cases of infant mortality occurred in infants born as the sixth child or earlier. Infants who were seventh born (or over seventh) have a higher mortality rate of 127 (47.0%). 22 cases did not report the infant's birth order.

Table 5.14 Distribution of study population by birth order

Birth order	frequency	percent
6 and less	121	44.8
More 6	127	47.0
Total	248	91.9
Missed	22	8.1
Total	270	100.0

5.4.6. Ante-natal care

Table 5.15 shows that majority of infant mortality cases occurred where the mother had antenatal care (61.1%) with infant mortality rate of 16.98/1000. 80 cases of infant mortality occared where the mother had no antenatal care with IMR of 5.83/1000.

- (80/13702) x 1000 = 5.83/1000

- (165/9718) x 1000 = 16.98/1000

Table 5.15. Distribution of study population by antenatal care

Antenatal care	frequency	percent	Live birth	IMR
no care	80	29.6	13702	5.83
With care	165	61.1	9718	16.98
Total	245	90.7		
Missed	25	9.3		
Total	270	100.0		

5.4.7. Type of pregnancy

Table 5.16 indicates that 233 cases of infant mortality (86.3%) occurred in instances of single pregnancy, whereas 24 cases (8.9%) occurred with twin births, and eight cases (3%) occurred in multiple pregnancies.

Table 5.16. Distribution of study population by type of pregnancy

Type of pregnancy	frequency	percent	Live Births	IMR
single	233	86.3	22928	10.16
twin & multiple	29	10.8	491	59
Total	262	97.0		
Missed	8	3.0		
Total	270	100.0		

MOH indicates the 2.1% of all live births in 2001 are twins or multiple. Relating to the 23419 births in North West Bank, the twins total 491 (2.1% of 23419) while the singletons total 22928 (97.9%). Consequently, IMR calculations would be as follows:

- Twins and more (29/491) x 1000 = 59/1000
- Singletons (233/22928) x 1000 = 10.16/1000

5.4.8. Parity

Table 5.1 indicates that out of 235 cases, 175 cases (64.8%) occurred to mothers who had six children and less, and 60 cases of mortality occurred to mothers who had over six children.

Table 5.17. Distribution of study population by parity

Number of pregnancies	frequency	percent
6 and less	175	64.8
More than 6	60	22.2
Total	235	87.0
Missed	35	13.0
Total	270	100.0

5.5. Reason for death

Cardio-respiratory problems caused the majority of deaths – 180 cases (66.7%). 42 cases (15.6%) were caused by septic shock. 19 cases (7.0%) occurred as a result of premature birth. 16 cases (5.9%) occurred as a result of respiratory arrest and 10 cases (3.7%) occurred as a result of respiratory distress syndrome. These were the reasons indicated in the reports and transferred to table 5.18 as indicated by physician filling the report under the heading reason of death.

Table 5.18. Distribution of study population by reason of death

Reason of death	frequency	percent
RDS	10	3.7
Cardio respiratory	180	66.7
Septic shock	42	15.6
Premature	19	7.0
Respiratory arrest	16	5.9
Total	267	98.9
Missed	3	1.1
Total	270	100.0

It is worth mentioning that the reason of death as indicated in the roports is not clearly reflective of the root reason and categories as currently indicated are interrelated and do not reflect the actual causes.

5.6. Cross tabulation

The following section provides cross tabulation of certain variables to enrich the analysis and specifically address the significance or non significance of relationships between mother education and birth order, breast feeding, age of mother at infant birth, care during pregnancy, relationship between parents and birth weight. Additionally, age of mother and rank order of infant and breast feeding and mothers employment: cross tabulation based on mothers education is important since literature has extensively focused on the significance of mothers education and pregnancy and its outcomes.

5.6.1. Birth order and mother's education

Results in table 5.19 show no significant relationship between the birth order of infants and the level of education of the mother, (computed chi-square (6.83), it is less than critical value (12.59)).

Table 5.19. Distribution of study population considering relationship between birth order and mother's education

Rank order of kids		Level of education of the mother				total
		Less 4 years	4 - 6 years	7 – 12 years	More than 12 years	
the first	count	3	16	45	14	78
	% within rank order of child	3.8%	20.5%	57.5%	17.9%	100.0%
	% within mother education	30.0%	35.6%	32.6%	41.2%	34.4%
	% of total	13.%	7.0%	19.8%	6.2%	34.4%
2 – 6	count	4	21	79	14	118
	% within rank order of child	3.4%	17.8%	66.9%	11.9%	100.0%
	%within mother education	40.0%	46.7%	57.2%	41.2%	52.0%
	% of total	1.8%	9.3%	34.8%	6.2%	52.0%
More than 6	Count	3	8	14	6	31
	% within rank order of child	9.7%	25.8%	45.2%	19.4%	100.0%
	%within mother education	30.0%	17.8%	10.1%	17.6%	13.7%
	%of total	1.3%	3.5%	6.2%	2.6%	13.7%

Rank order of kids		Level of education of the mother				total
		Less 4 years	4 - 6 years	7 – 12 years	More than 12 years	
Total	Count	10	45	138	34	227
	% within rank order of child	4.4%	19.8%	60.8%	15.0%	100.0%
	% within mother education	100.0%	100.0%	100.0%	100.0%	100.0%
	% of total	4.4%	19.8%	60.8%	15.0%	100.0%

5.6.2. *Duration of breast-feeding and level of education of the mother*

The relationship between breast-feeding and the level of education of the mother is not significant (table 5.20), (computed chi-square is 4.95%, giving a critical value of 12.59).

Table 5.20. Distribution of study population considering the relationship between duration of breast-feeding and mother's education

Duration of breastfeeding		Level of education of the mother				total
		Less 4 years	4 - 6 years	7 – 12 years	Over 12 years	
less month	count	2	11	31	10	54
	% within duration of B.F	3.7%	20.4%	57.4%	18.5%	100.0%
	% within mother education	28.6%	28.2%	41.3%	37.0%	36.5%
	% of total	1.4%	7.4%	20.9%	6.8%	36.5%
1 – 4 months	count	2	19	25	8	54
	% within duration of B.F	3.7%	35.2%	46.3%	14.8%	100.0%
	% within mother education	28.6%	48.7%	33.3%	29.6%	36.5%
	% of total	1.4%	12.8%	16.9%	5.4%	36.5%
More than 4 months	Count	3	9	19	9	40
	% within duration of B.F	7.5%	22.5%	47.5%	22.5%	100.0%
	% within mother education	42.9%	23.1%	25.3%	33.3%	27.0%
	% of total	2.0%	6.1%	12.8%	6.1%	27.0%
Total	Count	7	39	75	27	148
	% within duration of B.F	4.7%	26.4%	50.7%	18.2%	100.0%
	% within mother education	100.0%	100.0%	100.0%	100.0%	100.0%
	% of total	4.7%	26.4%	50.7%	18.2%	100.0%

5.6.3. Age of mother at infant birth and mother's education

Table 5.21 shows that there is a significant relationship between the age of the mother at the time of the infant's birth and the level of the mother's education (computed chi-square is 23.7 while critical value is 21.3).

Table 5.21. Distribution of study population considering relationship between age of mother at infants birth and mother education

Age of mother at infants birth		Level of education of the mother				total
		Less 4 years	4 - 6 years	7 – 12 years	Over 12 years	
less 17 years	count	2	12	9	4	27
	%within age of mother when gave birth to infant	7.4%	44.4%	33.3%	14.8%	100.0%
	% within mother education	14.3%	22.6%	6.1%	12.1%	10.9%
	%of total	8%	4.9%	3.6%	1.6%	10.9%
17-24 years	count	5	23	67	10	105
	%within age of mother gave birth to infant	4.8%	21.9%	63.8%	9.5%	100.0%
	%within mother education	35.7%	43.4%	45.6%	30.3%	42.5%
	% of total	2.0%	9.3%	27.1%	4.0%	42.5%
25-32 years	Count	4	11	47	16	78
	%within age of mother gave birth to infant	5.1%	14.1%	60.3%	20.5%	100.0%
	%within mother education	28.6%	20.8%	32.0%	48.5%	31.6%
	%of total	1.6%	4.5%	19.0%	6.5%	31.6%
33-40 years	Count	2	5	23	3	33
	%within age of mother gave birth to infant	6.1%	15.2%	69.7%	9.1%	100.0%
	%within mother education	14.3%	9.4%	15.6%	9.1%	13.4%
	%of total	.8%	2.0%	9.3%	1.2%	13.4%
Over 40 yrs	Count	1	2	1		4
	%within age of mother gave birth to infant	25.0%	50.0%	25.0%		100.0%
	%within mother education	7.1%	3.8%	.7%		1.6%

Age of mother at infants birth		Level of education of the mother				total
		Less 4 years	4 - 6 years	7 – 12 years	Over 12 years	
	% of total	.4%	.8%	.4%		1.6%
Total	Count	14	53	147	33	247
	% within age of mother gave birth to infant	5.7%	21.5%	59.5%	13.4%	100.0%
	% within mother education	100.0%	100.0%	100.0%	100.0%	100.0%
	% of total	.5.7%	21.5%	59.5%	13.4%	100.0%

5.6.4. Care during pregnancy and mother's education

Table 5.22 shows an insignificant relationship between care during pregnancy and level of education of the mother (computed chi-square is 9.79 while the critical value is 16.92).

Table 5.22. Distribution of study population considering relationship between care during pregnancy and mothers education

Care during pregnancy		Level of education of the mother				total
		Less 4 years	4 - 6 years	7 – 12 years	More than 12 years	
no care received	Count	2	18	47	10	77
	% within care during pregnancy	2.6%	23.4%	61.0%	13.0%	100.0%
	% within mother education	15.4%	34.6%	33.8%	31.3%	32.6%
	% of total	.8%	7.6%	19.9%	4.2%	32.6%
First 3 months	count	4	18	33	9	64
	% within care during pregnancy	6.3%	28.1%	51.6%	14.1%	100.0%
	% within mother education	30.8%	34.6%	23.7%	28.1%	27.1%
	% of total	1.7%	7.6%	14.0%	3.8%	27.1%
From 4-6 months	Count	5	14	33	8	60
	% within care during pregnancy	8.3%	23.3%	55.0%	13.3%	100.0%

Care during pregnancy		Level of education of the mother				
		Less 4 years	4 - 6 years	7 – 12 years	More than 12 years	total
	%within mother education	38.5%	26.9%	23.7%	25.0%	25.4%
	%of total	2.1%	5.9%	14.0%	3.4%	25.4%
From 6 - 9 months	Count	2	2	26	5	35
	%within care during pregnancy	5.7%	5.7%	74.3%	14.3%	100.0%
	%within mother education	15.4%	3.8%	18.7%	15.6%	14.8%
	%of total	.8%	.8%	11.0%	2.1%	14.8%
Total	Count	13	52	139	32	236
	%within care during pregnancy	5.5%	22.0%	58.9%	13.6%	100.0%
	%within mother education	100.0%	100.0%	100.0%	100.0%	100.0%
	%of total	5.5%	22.0%	58.9%	13.6%	100.0%

5.6.5. Relationship between parents and mother's education

Table 5.23 shows no significant relationship between the parents' relationship and level of education of the mother (computed chi-square is 3.17 while critical value is 12.59).

Table 5.23.   Distribution of study population considering relationship between child's parents relationship and mother's education

Relation between parents		Level of education of the mother				
		Less 4 years	4 - 6 years	7 – 12 years	More than 12 years	total
First	count	7	14	58	12	91
	%within relation	7.7%	15.4%	63.7%	13.2%	100.0%
	% within mother education	53.8%	33.3%	41.1%	41.4%	40.4%
	%of total	3.1%	6.2%	25.8%	5.3%	40.4%
Second	count	1	10	26	7	44
	%within relation	2.3%	22.7%	59.1%	15.9%	100.0%
	%within mother education	7.7%	23.8%	18.4%	24.1%	19.6%
	% of total	.4%	4.4%	11.6%	3.1%	19.6%
No relation	Count	5	18	57	10	90
	%within relation	5.6%	20.0%	63.3%	11.1%	100.0%

Relation between parents		Less 4 years	4 - 6 years	7 – 12 years	More than 12 years	total
				Level of education of the mother		
	%within mother education	38.5%	42.9%	40.4%	34.5%	40.0%
	%of total	2.2%	8.0%	25.3%	4.4%	40.0%
Total	Count	13	42	141	29	225
	%within relation	5.8%	18.7%	62.7%	12.9%	100.0%
	%within mother education	100.0%	100.0%	100.0%	100.0%	100.0%
	%of total	5.8%	18.7%	62.7%	12.9%	100.0%

5.6.6 Birth-weight and age of mother

Table 5.24 shows a significant relationship between the birth weight and age of the mother (computed chi-square it is (20.22) and has a critical value of 15.51).

Table 5.24.   Distribution of study population considering relationship between birth weight and age of mother at infant's birth

Birth weight		Less 17 years	17-24 years	25-32 years	33-40 years	More than 40 years	Total
				Age of the mother when she gave birth to the child			
more than 2500gr	Count	7	59	51	14	2	133
	% within birth weight (gram)	5.3%	44.4%	38.3%	10..5%	1.5%	100.0%
	% within age of mother when she gave birth to infant	24.1%	54.6%	63.8%	42.4%	50.0%	52.4%
	% of total	2.8%	23.2%	20.1%	5.5%	.8%	52.4%
1500-2500(gr)	Count	15	27	19	15	2	78
	% within birth weight (gram)	19..2%	34.6%	24.4%	19.2%	2.6%	100.0%
	% within age of mother when she gave birth to infant	51.7%	25.0%	23.8%	45.5%	50.0%	30.7%

Birth weight		Age of the mother when she gave birth to the child					Total
		Less 17 years	17-24 years	25-32 years	33-40 years	More than 40 years	
	% of total	5.9%	10.6%	7.5%	5.9%	.8%	30.7%
Less than 1500(gr)	Count	7	22	10	4		43
	% within birth weight(gram)	16..3%	51.2%	23.3%	9.3%		100.0%
	% within age of mother when she gave birth to infant	24.1%	20.4%	12.5%	12.1%		16..9%
	%of total	2.8%	8.7%	3.9%	1.6%		16.9%
Total	Count	29	108	80	33	4	254
	% within birth weight (gram)	11.4%	42.5%	31.5%	13.0%	1.6%	100.0%
	% within age of mother when she gave birth to infant	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%
	% Of total	11.4%	42.5%	31.5%	13.0%	1.6%	100.0%

5.6.7. Age of mother and rank order of infant

Table 5.25 shows a significant relationship between the age of the mother and rank order of infants (computed chi-square, is 50.17 with a critical value of 15.51).

Table 5.25. Distribution of study population considering relationship between mother's age and order of infants

Rank order of infants		Age of mother					Total
		Less 17 Years	17-24 years	25-32 years	33-40 years	More than 40 years	
the first	Count	10	42	25	2		79
	% within rank order of child	12.7%	53.2%	31.6%	2.5%		100.0%
	% within age of mother when she gave birth to infant	41.7%	43.8%	31.3%	6.5%		33.6%
	% of total	4.3%	17.9%	10.6%	.9%		33.6%
2 – 6	Count	11	48	49	16	1	125
	% within rank order of child	8.8%	38.4%	39.2%	12.8%	.8%	100.0%
	% within age of mother when gave birth to infant	45.8%	50.0%	61.3%	51.6%	25.0%	53.2%
	% of total	4.7%	20.4%	20.9%	6.8%	.4%	53.2%
more than 6	Count	3	6	6	13	3	31
	% within rank order of child	9.7%	19.4%	19.4%	41.9%	9.7%	100.0%
	% within age of mother when she gave birth to infant	12.5%	6.3%	7.5%	41.9%	75.0%	13.2%
	%of total	1.3%	2.6%	2.6%	5.5%	1.3%	13.2%
Total	Count	24	96	80	31	4	235
	% within rank order of child	10.2%	40.9%	34.0%	13.2%	1.7%	100.0%
	% within age of mother when she gave birth to infant	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%
	% Of total	10.2%	40.9%	34.0%	13.2%	1.7%	100.0%

5.6.8. Duration of breast-feeding and employment of mother

Table 5.26 shows that there is no significant relationship between breast feeding and employment of mother (computed chi-square (5.15), critical value (5.99)).

Table 5.26. Distribution of study population considering the duration of the breast-feeding and the employment status of the mother

Duration of breastfeeding		Employment status of the mother		Total
		Worker	Non-worker	
under one month	count	3	51	54
	% within duration of feeding	5.6%	94.4%	100.0%
	% within mothers who work	33.3%	36.7%	36.5%
	% of total	2.0%	34.5%	36.5%
1-4 months	count	2	50	52
	%within duration of feeding	3.8%	96.2%	100.0%
	% within mothers who work	22.2%	36.0%	35.1%
	%of total	1.4%	35.1%	35.1%
More than 4 months	count	4	38	42
	%within duration of feeding	9.5%	90.5%	100.0%
	% within mothers who work	44.4%	27.3%	28.4%
	%of total	2.7%	25.7%	28.4%
Total	count	9	139	148
	%within duration of feeding	6.1%	93.9%	100.0%
	% within mothers who work	100.0%	100.0%	100.0%
	% of total	6.1%	93.9%	100.0%

This chapter presented the data gathered from 270 infant death certificates from the MOH in the year 2001 in the North districts of Palestine. It also attempted to calculate infant mortality rate as related to several variables whilst considering the total number of live births in 2001 in the North West Bank.

CHAPTER SIX

Data Analysis and Discussion

6.1 Introduction

A quantitative retrospective descriptive study was carried out in an attempt to examine the relationship between demographic, socio and familial factors and infant mortality in North West Bank in 2001. To achieve this, all infant mortality reports were examined from the year 2001 in the North West Bank: Jenin, Nablus, Tulkarm, Qalqilia, and Salfit. The reports covered 270 cases, 101 cases (37.4%) in Jenin, 122 cases (45.2%) in Nablus, 32 cases (11.9%) in Tulkarm, Qalqelia and Salfit, 11 cases (4.1%), while 4 cases were unclear, (1.5%).

6.2 Birth weight: Table 5.2 shows that of 270 infants, 136 cases (50.4%) with IMR 6.1/1000 is related to infants weighing over 2500 grams. 126 (46.9%) with IMR 103.4/1000 related to infants weighing less than 2500 grams.

This research supports the study result of Imaizumi (2001), which concluded that IMR decreased rapidly as birth weight increased. Langk (1992) also concluded that that both neonatal and post natal mortality rates increased with declining birth weights. The National Infant Surveillance Project of 1980 supported this conclusion: birth weight declines lead to an infant mortality increase.

This study also supports the information taken from the infant mortality records from 50 states in America between 1960-1980 where Smith reported a strong association between infant birth weight and IMR, as well as PCBS (2000) which reported a steep rise in IMR for infants with low birth weight.

6.3. Gender: Table 5.3 relates to gender of infants and indicates that there is an association between the gender of the infant and the infant mortality which is 12.73/1000 for males, and 10.27/1000 for females. This result supports the study of the National Center for Health Statistics (2000) in USA, which reported that infant mortality rate, is generaly higher for males than females. The results also agree with those of the Department of Family and Community Medicine at the University of Jordan (1995), which reported that IMR for males is 22.6 per thousand births and only 20.1 per thousand births for female infants. In addition, the Yemen Demographic Maternal and Child Health Survey of 1998 reported 98 deaths per thousand for male infants with 80 deaths per thousand for female infants. A similar study carried out by Wahab in the Qatif area in Saudi Arabia, pointed also to a higher IMR rate among male infants.

Results of the study also show that IMR is higher (3.71/1000) for infants aged 29 days – one year, followed by early neonate 3.15/1000 in infants aged between birth and seven days old.

6.4 Place of delivery: Table 5.5 shows that of 269 cases, 246 are hospital deliveries with IMR 11.75/1000. Only 23 cases with IMR of 9.20/1000 are home deliveries. This indicates that there are hospital and home delivery factors which may lead to infant mortality. Generally, women who give birth in hospitals may have higher pregnancy related risks. This finding does not support the study result of Pesmhumer and Arole (2001) carried out in India - which reported that 66 out of 103 perinatal deaths were home deliveries. The National Center for Health Statistics in 1998, reported that the risk of infant death was 19% lower for births attended by doctors as opposed to home delivery. At any rate, results of this study has shown that both hospital and home

deliveries are related to infant mortality but must be interpreted cautiously especially inrelation to cases of high risk which give birth in hospitals.

6.5. Season of death: The results point to an association between infant mortality and the Spring season, when the majority of infant deaths occurred (98 or 36.3%) as opposed to 52 deaths (19.3%) in Summer and Autumn. This finding does not support the research of John Hopkins University (USA) which concluded that the majority of infant deaths in Egypt were caused by gastro-enteritis during Summer. Research in 1995 in South Africa concluded that 50% of all infant deaths occur in Winter. This can only be explained by the theory that every country has a season where infant mortality rates peak.

6.6. Mother's education: Table 5.7 shows IMR decreases with increased mother education. This supports the findings of the Smith (USA) 1960-1980 study which concluded that IMR decreases when the level of education of the mother increases. The 1983 research carried out in Sierra Leone attempts to explain how education of the mother leads to a decrease in infant mortality by pointing out that high education of women leads to high immunization rates. The PBCS (2000) concurred in its findings that the mortality rate of infants born to mothers with nine and 10 years of education is almost twice as high as the IMR suffered by mothers with 16 or more years of education. Women with more than 12 years of education also fall into the low IMR percentage category and can be assumed to have a high level of knowledge about diseases affecting infants and how to prevent infant mortality.

On the other hand, a study carried out by the Department of Paediatrics in Peru in 1993, and an analysis of infant mortality carried out between 1985 and 1987 in Nigeria reported that mothers educated to a higher level had higher infant mortality rates. A

1990 demographic and health survey, also carried out in Nigeria, revealed that women with some primary education had a slightly higher risk of mortality than those mothers with no education at all. On the contrary, research carried out by Mishara in India in 1998 reported that education through antenatal care leads to a decrease in IMR. Several studies suggested that child mortality in developing countries is associated more closely with the level of education, than with any other socioeconomic factors mainly because more educated mothers have more awareness of information related to family planning and increasing access to health care services.

6.7 Employment: Of 260 reported cases as in table 5.8, 18 (6.7%) of IM cases with 25.6/1000 of all IMR occurred to working mothers, while 242 (89.6%) with 10.65/1000 cases of IMR occurred to non-working women. The results agree with research by Banlkolea (Nigeria, 1998) and Mbagomc (Tanzania, 1994) reporting that children born to "housewives" suffer a much lower level of IMR, because mothers stay at home and focus more time on caring for children and are able to breastfeed their children for much longer periods than working women.

6.8. Place of living: As shown in table 5.9 results indicate that 50 cases of IM with IMR of 10.16/1000 occured to infants in cities whereas 220 cases with IMR 15.69/1000 occurred in the villages. This finding is supported by the 1985 Indonesian census as well as research carried out by Amin and Kamal in Bangladesh (1989), which reported that IMR is higher in rural areas. This can be explained by a higher availability of health resources in urban areas, and the fact that the majority of people in developing countries live in rural areas.

6.9 Parents relationship: As shown in table 5.10, 96 cases (35.6%) of IM occured where there is no close familial relationship between the parents, while 93 (34.4%)

cases occur in cases where parents are first degree relations. Since both results are similar, it cannot be concluded that there is any special association between IMR and a close familial relationship between parents.

6.10 Age of mothers: This study supports that the age of the mother is a very important factor in IMR. As shown in table 5.11, the age category 35 and above had an IMR of 5.64/1000, 19.3/1000 for women aged 15-24 years and 7.7/1000 for women aged 25-34years. The Yemen Demography and Maternal and Child Health Survey showed that the under 20 age group has an IMR of 128 per 1000, whereas the IMR for children born to mothers aged between 40 and 49 years is 74 − 84 per 1000. The PBCS 2000 study showed that IMR is highest where mothers are under 20 years old or above 35 years of age, which support the results of this study.

6.11 Breast-feeding: The finding in this study reflect that a longer period of breastfeeding is not associated with a lower rate of IMR. This is due to a large missing value which may have affected the results (missing documentation). This finding does not support the results of research carried out by the Cambridge study (1992) which indicated that there is a significant positive correlation between breast feeding and IMR. It does not support the results of a Washington DC, USA (2001) study that bottle feeding leads to poor food supplementation and unhygienic feeding, whereas breastfeeding can protect infants from hypoglycemia, and can protect neo-born babies from hypothermia (which leads to early neonatal deaths especially in premature to low birth weight babies).

Ahiadeke, Guak, and Wagers (2000) found that those weaned in the neonatal period due to illness or an inability of the infant to suckle experienced a much higher risk of dying than other infants. A 1973 study carried out by the Fabella Memorial Hospital found

that 55 of 98 children (60%) who died in the first two years of their lives were not breastfed at all while 18% were weaned before death.

6.12 Birth spacing: Table 5.13 shows that most infant mortality cases (37.8%) occurred when births have been spaced between 12 and 24 months apart. 17% of IM occurred where the last birth was over 24 months prior. It also reflects a higher IM for children who rank more than six in birth order (47%) whereas before child number six have an IM of 44.8% with 8.1% of IM occurring in children of an unreported age.

The results do not support previous studies carried out by Miller, Truslly, Pebley, and Vaughan (1992), which concluded that children born within 15 months of the preceding birth are 60-80% more likely than other children to die in the first two years. A study by Swenson (1998) reported that mortality rates are higher among first order births and those births which occur at intervals of less than 12 months, and also that IM increases in women who have had many pregnancies. In addition, the Yemen Demographic Maternal and Child Health Survey pointed out that IMR decreased to 76 per 1000 among the first four to six children born in a family and then increased for birth seven and higher.

6.13 Ante natal care: Table 5.15 shows that the majority of IM cases are those where there was no antenatal care 80 cases (29.6%) and then the percent of cases decreased with more ante-natal care.

The result supports previous studies which have concluded that the intervention of antenatal care (including education, universal access to family planning services, good quality care in case of complications) leads to lower IMR. The Yemen 1992 study showed that 78 infants per 1000 died where mothers received no medical maternal care, dropping to 61 deaths per 1000 for those born to mothers who received antenatal care.

In Haifa (Israel), a retrospective study (1980) reported a positive association of lack of pre-natal care with infant mortality among Jewish people – 19.2% of infants died in cases where mothers did not attend a clinic regularly for pre-natal care compared to 6.8% for those mothers who received care. For Arab women, the percentage was 30% IMR rate where mothers did not attend a clinic for pre-natal care and 25% where they did.

6.14 Type of pregnancy: Table 5.16 shows that the highest IM happens in twins and multiple births with a calculated IMR of 59/1000, while it is 10.16/1000 in singltons. Research carried out by Heruz (1991) in Spain found a much higher danger of pre-natal mortality for twins weighing less than 2000 grams (out of 488 twins, the rate was 31.8/1000 or 80%). In Harave Hospital, Crowther, California, USA, the 1983 pre-natal mortality rate for twin pregnancy was 97/1000: 3 times higher than the rate for single pregnancies.

6.15 Parity: Table 5.17 shows an unexpected result that the majority of infant deaths 175 (64.8%) is for women who have 6 and less children, dropping to 60 deaths (22.2%) for those women who have more than 6 children. This contradicts the findings of Aziz, who studied three major hospitals in Khartoum between 1975 and 1979. Of 8858 IM cases, 3130 were those born after the fifth child – a higher rate of antenatal complication which elevated the chance of infant death. A similar result is seen in an Indian study of 2287 families with three or fewer births - 38% of these infants died, whereas the IM was 51% for infants born to families that had five or more children.

6.16 Mother education and birth order: The cross tabulation shows no significant association between the level of education of the mother and birth order. The level of education of the mother does not affect the rank order of the infant. Table 5.19

shows that women with first baby are affected by the level of education while women who have between two and six children and more than twelve years education have an inverse relationship with the number of children. Looking at families with six children, the results show no association between education and numbers of children, but an education level of more than twelve years affects the birth order of children inversely. Chi-square shows that there is no significant relation between the two variables.

6.17 Level of education of the mother and duration of breast feeding:

Table 5.20 shows no significant relation between the level of education of the mother and the duration of breast-feeding. Mothers who breastfeed their infants for more than four months seem to have lower education level. 3.7% of mothers who have less than four years of education breastfeed their babies, 20.4% who have $4 - 6$ years education breastfeed, 57.4% with $7 - 12$ years breastfeed and 18.5% of mothers who have over 12 years of education breastfeed. Women with less than four years of education seem not to know enough about breast-feeding. This might be affected by antenatal care, the nature of the family, and family planning services. Women with education of $7–12$ years have knowledge and time for breastfeeding their babies. Most of them are staying at home. Mothers with more than 12 years of education have knowledge but other factors can lead them not to breastfeed, such as working outside the home.

6.18 Mother's age when she has the baby, in comparison with the level

of education: Table 5.21 points to an important finding - that there is a strong association between the age of the mother when she has the baby and her level of education. 14.3% of mothers who give birth before they are 17 years old have less than four years education. 35.7% of mothers with less than four years education give birth when they are between 17 and 24 years old. 28.6% of mothers with less than four years

education give birth at an age between 25 – 32 years old, and 14.3% at an age of between 33 and 40 years. This shows that most women with less than four years education give birth between the ages of 17 – 24 years. Only 12.1% of mothers with over 12 years education give birth when they are younger than 17 - 48.4% of educated women give birth when they are 25-32 years old.

6.19 Level of education of the mother and ante natal care: Table 5.22 shows no correlation between the level of education of the mother and care during pregnancy. A high level of education does not mean that the mothers have a high level of care during pregnancy. This is seen by the fact that only 13.6% of women with over 12 years education have care during pregnancy, whereas 22.0% of women who have only seven to 12 years of education have antenatal care.

6.20 Parents' family relationship: Table 5.23 shows that the level of education of the mother is not related to the degree of family relationship between parents. Women who have less than four years education marry first degree relatives at a rate of 7.7%, whereas women with over 12 years education marry first degree relatives at a rate of 13.2%. Most women in the study who married first degree relatives (63.7%) were educated between seven and 12 years.

6.21 Infant birth weight and age of mother: Table 5.24 shows correlation between infant birth weights and the age of mother when she has a baby. Chi square shows a strong association between variables. Results show that 51.7% of all women under 17 years old have underweight babies dropping to 25.0% for women aged between 17 and 24 years, and 23.8% for women aged 25 to 32 years. However, this increases with age: women aged between 33 and 40 years have underweight babies at the rate of 42.4% and at a rate of 50.0% when they are older than 40 years.

6.22 Age of mother and rank order of infant: Table 5.25 shows an important finding: there is a relationship between the age of the mother when she has the baby, and the rank of birth order. Women younger than 17 years suffer IMR of 12.7% with their first babies; women aged between 17 – 24 suffer IMR of 53.2% for first babies, while there is 31.6% IMR for first babies to women aged between 25 – 32 years.

6.23 Working women and breast feeding: Table 29 shows that mostly non working women breastfeed. 93.9% of non working women breastfeed but only 6.1% of working women do.

6.24 Summary:

This chapter covered the analysis of results relating to IM factors and calculated IMR. It also presented crosstabulation of some variables. Agreement or disagreement of findings where highlighted whenever applicable with previous local and international data or research findings.

6.25 Conclusion

This research validate that there are predisposing factors of infant mortality which will guide the health care providers as well as the family members in planning interventions and to set priorities in order to reduce the mortality of infant in North West Bank area and in Palestine. The results of this research should be the beginning phase for further research and more studies on infant mortality in all Palestine. A summary of results is as follows:

6.26 Recommendations

Infant mortality predisposing factors and infant mortality rates can be interpreted as measures of the well-being of children in any country. Usually IMR reflect the levels of health and the socioeconomic status of the population it describes. This measure of

mortality is watched closely worldwide by policy makers and national health program managers. Research on IMR generates information which enables local communities to improve community health service systems.

The IMR is associated with a variety of socio-economic and community factors as well as medical health conditions, such as poverty, and the presence or absent of social support for the pregnant women. Factors such as family and medical health condition, physical and emotional stress to the mother during the pregnancy, the nutritional status of the mother and infant, quality and access to prenatal and paediatric health care, coordination of local services, delivery systems and the availability of community resources must also be taken into consideration. It is so important to begin a plan to decrease IMR, and implement educational interventions. Such a plan should target all Palestinian women of different ages, different levels of education, and different areas of employment and non-employment.

The plan should concentrate on how to publicise the risk factors and train midwives, nurses and doctors to be able to deal with infant mortality related problems – both through antenatal or postnatal care. The plan should focus on finding specialists in all MCH clinics in Palestine. The missing information in death reports need to be focused on. More studies are needed to explain the risk factors of infant mortality in different rural, urban and camp areas, in both the West Bank and Gaza Strip. Thus a more generalized infant mortality study in Palestine may be more appropriate.

Other recommendations are as follows:

- Train qualified teams for research on infant mortality and cnduct further research on IM.

- Services to families in MCH centers must be improved, especially during pregnancy.

- More post-natal care is needed.

- Midwives and traditional birth attendants need more training, and they and other birth attendents must be made aware that they should inform the MOH about all home deliveries and follow proper reporting systems.

- There is a need to improve the death certificate form to cover other relevant questions and ensure more comprehensive and accurate documentation. Additionally, a clear definition of concepts must be available for person filling out the form. For example, what is meant by antenatal care received (# of visits, duration, etc). Such clarity will enable researchers and planners to come up with more valid results and plans.

- Awareness programs on predisposing factors to infant mortality.

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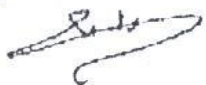
بسم الله الرحمن الرحيم

عطوفة وكيل وزارة الصحة حفظه الله:-

تحية فلسطينية وبعد:

الموضوع : استبيان حول وفيات الأطفال لعام 2001 دون السنة الأولى.

أنا الموظفة رابعة مصطفى حسين (حاملة هوية رقم): 991795170.

أعمل في مديرية صحة سلفيت وأدرس ماجستير صحة عامة بجامعة القدس المفتوحة بترشيح من وزارة الصحة، وأنني الآن أحضر للرسالة في موضوع العوامل المؤدية لوفيات الأطفال دون السنة الأولى.

أرجو التكرم والموافقة على حصولي للاستبيانات والمرفق منها نموذج والذي يتم تعبئته من قبل مديريات الصحة وذلك في المديريات التالية:

طولكرم، جنين، نابلس، قلقيلية، سلفيت، وذلك بهدف تحليل البيانات.

مرفق مع هذا الكتاب كتاب من عميد الكلية.

واقبلوا فائق الإحترام

رابعة مصطفى

2004/10/7

التاريخ:

حضرة مكتب مديرية الصحة العامة نابلس المحترم

تحية طيبة وبعد:

نعلمكم ان الطالب/ة _____ سراج عبد مصطفى ح _____ الطيبسي

هو/هي احد طلاب برنامج الماجستير في كلية الصحة العامة ويقوم/ تقوم بالتحضير لرسالة الماجستير وهو/وهي بحاجة للاطلاع على المعلومات المتوفرة لديكم والتي لها علاقة .بموضوع الرسالة:-..

وتفضلوا بقبول فائق الاحترام،،،

دكتور محمد شاهين

عميد كلية الصحة العامة

وزارة الصحة
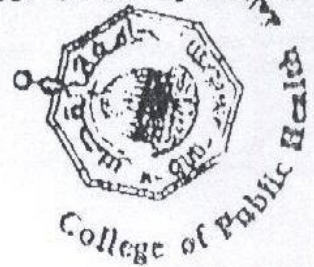
استبيان عن الطفل المتوفى
سري

معلومات عن الطفل المتوفى

ضع دائرة	الجنس	رقم الهوية	العائلة	الاب	اسم المتوفى الاول
انثى	ذكر .٣	.٢			.١

اذا مستشفى اكتب اسمه	البيت	المستشفى	مكان الولادة	تاريخ الميلاد يوم /شهر /سنة	المدينة / القرية	المنطقة
	II	I	.٦	/ / .٥	٤ب.	.٤

العمر عند الوفاة			اذا مستشفى اكتب اسمه	البيت	المستشفى	مكان الوفاة	تاريخ الوفاة يوم /أشهر /سنة	الوزن عند الولادة (غم)
ساعة	يوم	شهر	٩ب.	II	I	.٩	/ / .٨	.٧
.١٠								

أ. العوامل الاجتماعية والاقتصادية

العوامل المؤثرة (ضع دائرة ١٥، ١٦)

مهنة الاب	تعليم الاب	مهنة الام	تعليم الام
.١٤	سنة .١٣	.١٢	سنة .١١

عدد افراد الاسرة في البيت	عدد الغرف في البيت	شبكة مياه	الكهرباء
.١٨	.١٧	لا نعم .١٦	لا نعم .١٥

ب. العوامل العائلية

اجهاضات .٢٢أ	ولادات ميتة ٢٢ب.	ولادات حية ٢٢ج.	بعد فترة حمل الطفل المتوفى عمن سبقه بالاشهر .٢١	ترتيب الطفل في الولادة .٢٠	عمر الام عند ولادة الطفل المتوفى .١٩

ضع × بالمربع المناسب للاسئلة ٢٣، ٢٤، ٢٥

٢٣ نتيجة الحمل في الطفل المتوفى	٢٤. طبيعة الولادة	٢٥. صلة القرابة	مدة الرضاعة الطبيعية	الرعاية اثناء حمل الطفل المتوفى
مفرد	طبيعي	درجة اولى	.٢٦	لم تتلق رعاية ٢٧أ.
توام	قيصرية	درجة ثانية		في الثلث الاول ٢٧ب.
متعدد	غير ذلك (حدد)	لا قرابة	ساعة يوم شهر	في الثلث الثاني ٢٧ج.
				في الثلث الثالث ٢٧د.

سبب الوفاة

٢٨ السبب المباشر

(الرجاء كتابة سبب واحد فقط في السطر الواحد في (ا) ، (ب) و (ج))

(ا) _____ ناتج عن

(ب) _____ ناتج عن

(ج) _____ امراض اخرى

تحت اشراف الطبيب:

	اسم المقابل:
ملاحظات لجنة المنطقة	التوقيع:
	التاريخ