THE FIRST YEAR OF LIFE

NCPNN
NATIONAL COLLABORATIVE PERINATAL NEONATAL NETWORK
RESEAU NATIONAL POUR LA COLLABORATION PERINATALE NEONATALE

A STUDY ON MORBIDITY AND MORTALITY AMONG NEWBORN BABIES, INFANTS AND UNDER FIVE YEAR OLD CHILDREN IN GREATER BEIRUT - LEBANON

THE FIRST YEAR OF LIFE

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PREFACE

Created in 1998, the National Collaborative Perinatal Neonatal (NCPNN) is a voluntary collaborative network of professionals from different health care institutions in Lebanon and from different disciplines including pediatrics, obstetrics, family medicine, nursing, epidemiology and public health. The primary objective of the NCPNN is to improve the health of pregnant women and their newborns through high quality scientific research. At the core of its research activities, the NCPNN maintains an integrated maternal and perinatal neonatal database covering all deliveries at the participating institutions.

The NCPNN has pioneered a unique system/model in Lebanon and the region. With over 88% of the deliveries in Lebanon occurring in hospitals, hospital-based networks are effective and insure a good coverage of the population of pregnant women. In developing countries with a low level of expenditure on health and health research, the input of the private sector (academic institutions, non-governmental agencies and private hospitals) is crucial. Inter- and intra-organizational arrangements, as well as partnership and collaboration among professionals can provide such settings with a productive, reliable and sustainable model/system where epidemiological evidence is gathered, the health priorities of the population under study are set and effective interventions are designed. In addition, networks are a solid infrastructure that enhance monitoring trends over time, conducting multicenter randomized controlled research trials and efficiently practicing continuous quality improvement. International experience has proven that building up regional networks among academic, research and health care institutions allows an accurate and continuous assessment of the population health status and is an efficient approach to respond to growing constraints.

So far, the NCPNN database carries information on over 40,000 newborns and their mothers admitted to twelve major hospitals in Greater Beirut and other regions of Lebanon. The network has achieved a good coverage of the population of pregnant women and their newborns in the capital Beirut and its suburbs where 35% of the Lebanese population resides. The NCPNN is currently multiplying its efforts in its expansion to the more underprivileged rural areas of Lebanon where maternal and child health problems are of greater magnitude.

With collaboration and networking, and through its database, the NCPNN has established an infrastructure for epidemiological research, intervention programs and multicenter multidisciplinary projects aiming at improving quality of care. Among these scientific based initiatives, the “Study on Morbidity and Mortality among Newborn Babies, Infants and under five Year Old Children” was undertaken in 2001 in collaboration with the World Health Organization. More than 100 pediatricians/investigators and a multidisciplinary team of researchers were involved in the study. The project is unique to the region since it is the first prospective cohort study that targets several newborn outcomes among 1320 babies followed in their first year of life. The major findings of the first phase of this study are represented in this monograph. A great effort was placed by everyone involved in the analysis, write up and editing of this monograph to ensure the accuracy of the data reported. We hope that this data will stimulate enough interest and highlight potential interventional research areas for future collaborative efforts.

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List of Abbrevations

AAP	American Academy of Pediatrics
BCG	Bacille Calmette-Guerin
CDC	Centers for Disease Control
DTP	Diphtheria, Tetanus and Pertussis
DTaP	Acellular Diphteria, Tetanus and Pertussis
FUP study	Follow-Up study: the "Study on Morbidity and Mortality among Newborn Babies, Infants and Under Five Year Old Children in Greater Beirut"
HIB	Haemophilus Influenza B
IMR	Infant Mortality Rate
IPV	Inactivated Polio Vaccine
MMR	Measles - Mumps – Rubella
NCPNN	National Collaborative Perinatal Neonatal Network
OR, 95% CI	Odds Ratio, 95% Confidence Interval
OPV	Oral Polio Vaccine
UNICEF	United Nations Children's Fund
URTI	Upper Respiratory Tract Infection
VAPP	Vaccine-Associated Paralytic Poliomyelitis
WHO	World Health Organization

THE NATIONAL COLLABORATIVE PERINATAL NEONATAL NETWORK (NCPNN)

"Bettering the attribute of medical care in virtue of healthy mothers and newborn infants through a coordinated program of research and scholarship".

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Finally we would like to acknowledge the nurses in every setting, the research assistants who collected, entered and analyzed the data, whose commitment to data quality ensured the scientific outcome of this study.

1. INTRODUCTION TO THE FOLLOW-UP STUDY

1.1. BACKGROUND
1.2. OBJECTIVES

1.1. BACKGROUND

The impact of prenatal care on the newborn can be significantly large. In the Eastern Mediterranean region perinatal conditions rank second among the leading causes of death, as they account for 8.8% of all deaths (Global Burden of Disease, 2000). In 2001, the global Infant Mortality Rate (IMR) was 56 per 1,000 live births, with considerably higher rates among the less developed (62 per 1,000) versus the more developed (5 per 1,000) countries (UNDP, 2003). Approximately two-thirds of infant deaths occur during the first 28 days of life, neonatal period, and one-third during the post-neonatal period (Trends, 1997). The reasons behind the high neonatal mortality and morbidity rates in developing countries are mostly attributed to the poor health and nutritional status of their mothers. These factors may not only cause death of the infants but may result in long-term disability as well. The patterns of morbidity and mortality, their causes and consequences remain unknown in several developing countries.

In Lebanon, after almost two decades of civil war, these patterns are indeed unknown. Like most developing countries, Lebanon lacks high quality routine statistics that provide a consistent and continuous system of assessment. Poverty, the lack of health care infrastructure and the limited resources are enormous barriers. Statistics and vital health data are mostly based on models or ad-hoc surveys with few follow-up interventions. Efforts to decrease infant and child deaths, and/or long-term morbidity, cannot succeed without appropriately designed prospective studies that can measure "true" prevalence and incidence rates. Such data and rates are necessary for the advancement of the health of the population at large. UNICEF emphasized in "The State of the World's Children, 1998", the importance of supporting research and motivated researchers to improve programs and determine the effectiveness of feasible interventions. Active and careful research needs to be done to set targets and consequent policies for the future.

The Five Year FUP study is the first cohort study of its kind in Lebanon. A group of identified newborns are followed prospectively during the most critical first year of life. It provides valuable results on various health and socio-economic parameters pertaining to the infant population of Greater Beirut.

1.2. OBJECTIVES

The overall objective of the FUP study by NCPNN is to identify the causes of morbidity and mortality during the first year of life. The specific objectives are to:

1. *Measure the impact of early postpartum discharge of newborns*
2. *Describe morbidity patterns during the first year of life*
3. *Assess breastfeeding practices*
4. *Evaluate the vaccination patterns during the first year of life*

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2. METHODOLOGY

2.1. STUDY DESIGN AND POPULATION
2.2. RECRUITMENT
2.3. STUDY INSTRUMENTS
2.4. FOLLOW-UP
2.5. INFANT DEATH
2.6. DATA MANAGEMENT
2.7. LOSS TO FOLLOW-UP

2.1. Study design and population

An identified close birth cohort of 1,320 healthy infants born between August 1st 2001and February 28th 2002 was followed during its first year of life. Infants were recruited through the clinics and dispensaries of 117 pediatricians located in the Greater Beirut area and serving communities of different socioeconomic status. Other included health care settings were the Military Hospital, Dar el Hawraa and Hariri health care centers in Beirut. The following were the inclusion criteria for the study:

. Date of birth during the period extending from Aug. 2001 to Feb. 28th 2002
. Lebanese nationality
. Single gestation
. Birthweight > 2,200 grams
. Gestational age > 35 weeks
. Absence of any major congenital anomalies at birth
. Admission status:
  . Normal Nursery
  . Intensive Care: Born and taken care of in the same hospital, had length of hospital stay < 5 days and was discharged alive
. Family informed consent
. Pediatrician (part of the Follow-up study)
. Age at first visit is 0-2 month.

2.2. Recruitment

Recruitment of newborn infants was carried out through NCPNN hospitals and/or participating pediatrician clinics.

Hospital recruitment: Research assistants were specifically trained to collect data for the Follow-Up study at the nine NCPNN member hospitals in Beirut. A baseline information questionnaire -the recruitment form- containing basic data on the newborn infant and his/her mother at delivery was filled in one of the three languages (English, French or Arabic) for all newborn admissions (normal or intensive care nurseries) to NCPNN-participating centers. This step was carried out simultaneously with the data collection done for the NCPNN Database Project. The research assistants after verifying the inclusion criteria provided the mother with an overview of the study objectives and the steps involved. If she agrees to join the study, she would be given a booklet introducing the study and including the first questionnaire, the mother was asked to bring the booklet with her on her first visit to the pediatrician.

Pediatrician recruitment: In case the baby was not born in one of the NCPNN hospitals, recruitment was done directly through the clinics of the participating pediatricians. The participating pediatricians were oriented to the objective and design of the study, and they were asked to enroll babies that are seen in their clinics, during the first period visit at 0-2 months, if they meet the above mentioned inclusion criteria. When eligible babies were identified, their parents were introduced to the study and a baby was included only after family approval was granted. Then a recruitment questionnaire was filled for each enrolled baby.

2.3. Study Instruments

A total of seven questionnaires were completed for each newborn. These were:

The Recruitment Form: It contains basic information about the newborn infant and his/her mother at delivery as well as contact information. It is filled either by the pediatrician at the first visit, at birth in the NCPNN hospitals or by the research assistants through telephone contact.

The Five Follow-up Questionnaires (0-2, 3-4, 5-7, 8-10 & 11-13 months). The five questionnaires included similar parameters, but were formulated differently depending on what is expected within each age group. Included items were:

. Size (weight, height, head circumference)
. Vaccinations
. Emergency Room visits

. Non-routine pediatrician visits
. Hospital re-admissions
. Infectious diseases
. Other diseases and congenital abnormalities
. Injuries
. Breast-feeding and formula-feeding
. Solid foods
. Vitamins & minerals
. Development
. Dental health
. Sleep position
. Caregivers

Parental follow-up: Detailed information on parental characteristics was obtained by research assistants through follow-up phone calls, six months after the date of birth of the infant. These included parental socio-demographic as well as maternal lifestyle and obstetric characteristics.

2.4. FOLLOW-UP

Pediatricians filled for each enrolled baby a total of five questionnaires during each routine visit at 0-2, 3-4, 5-7, 8-10 and 11-13 months of age. A sticker was attached to the infant's medical record containing icons indicating each of the five FUP questionnaires. The questionnaires were sequentially provided to the pediatrician as separate sheets. Each time a FUP questionnaire was filled by the pediatrician, the corresponding icon was checked as a reminder.

The filled questionnaires were kept in a special box provided to each participating pediatrician. Two research assistants who were assigned to the Follow-up study came at regular time intervals (every two to three weeks) to assist the pediatricians in filling data, collect the filled questionnaires and replace them with other forms that were prepared in advance. The next FUP questionnaires were inserted into the medical chart of the infant to facilitate the identification of a FUP case among the patients. The research assistants were also responsible for filling sections of the questionnaires (e.g. administrative data, vaccination data).

2.5. INFANT DEATH

In case an enrolled infant died during the follow-up period, the participating pediatrician filled the infant death abstraction form, specifying the age at death and cause(s) of death. This was important to determine the IMR in our study population.

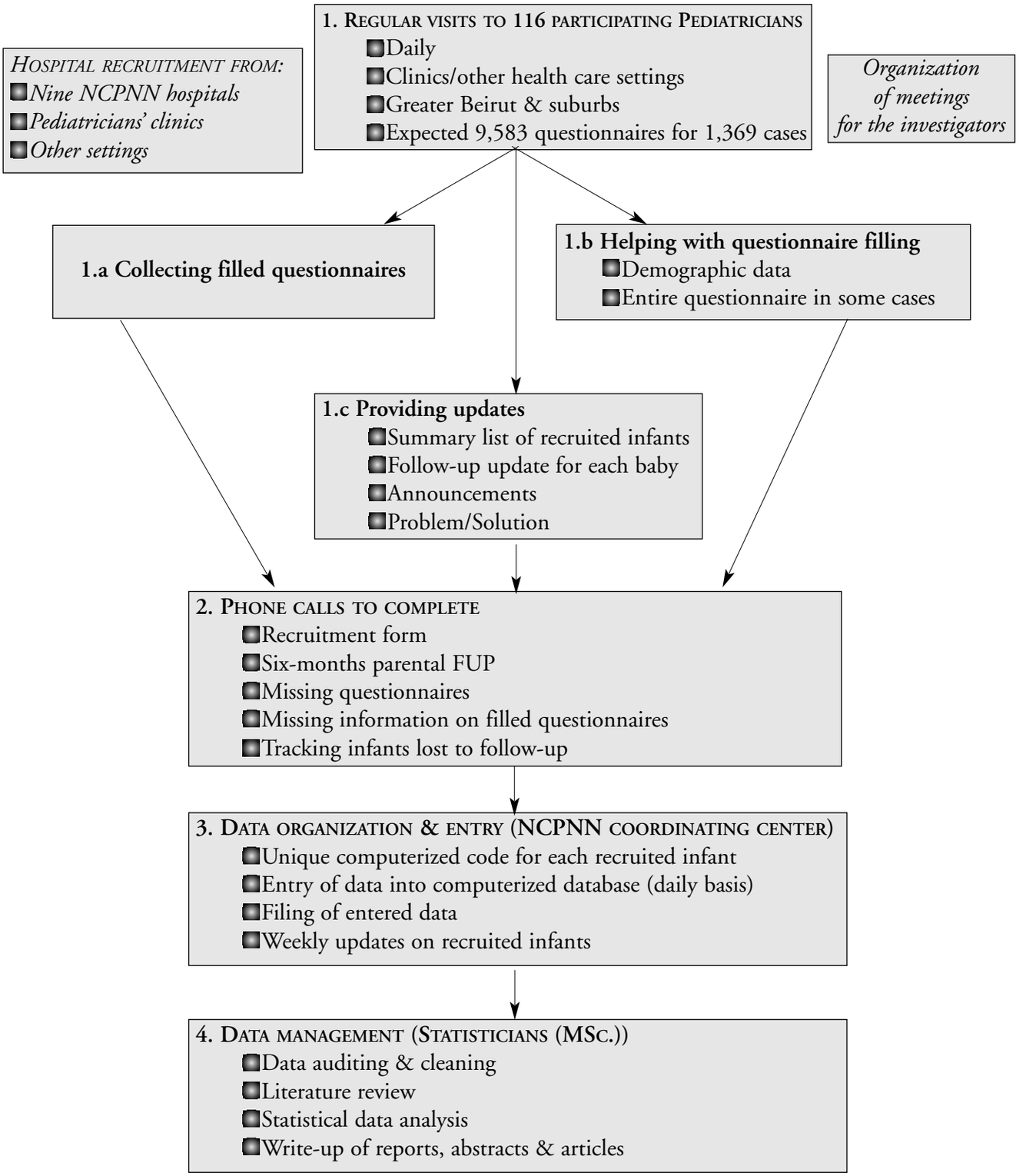
2.6. DATA MANAGEMENT

With seven questionnaires to be filled for each baby, a total of 7,714 questionnaires were collected and entered into the computerized database. Four research assistants were responsible for collecting, organizing, entering, auditing and cleaning the data. The flowchart (Figure 1) summarizes their responsibilities and scope of activities.

2.7. LOSS TO FOLLOW-UP

In case an enrolled baby was lost to the pediatrician that enrolled him, the research assistants would track the baby to other participating or non-participating pediatricians. If the baby was not traced, the research assistants obtained the needed information from parents through follow-up phone calls. A baby was considered lost to follow up if he/she could not be traced through a pediatrician or by telephone.

FIGURE 1: FLOWCHART OF ACTIVITIES PERFORMED BY RESEARCH ASSISTANTS



3. RESULTS

3.1. DESCRIPTIVE STATISTICS
3.2. IMPACT OF EARLY POST-PARTUM DISCHARGE OF NEWBORNS
3.3. MORBIDITY PATTERNS DURING THE FIRST YEAR OF LIFE
3.4. BREASTFEEDING PRACTICES
3.5. VACCINATION PATTERNS DURING THE FIRST YEAR OF LIFE

3.1 Descriptive statistics

3.1.1. Study Sample

A total of 1,320 infants were recruited through the joint efforts of the 117 participating pediatricians. Data collection, entry and auditing for the close cohort of babies were completed by the end of June 2003. The substantial number of questionnaires entered (7 different forms for each infant) as well as the fact that 117 different pediatricians were filling the information, entailed an extensive data cleaning process that took more than one month to be completed. Since many babies missed their one year visit and returned to their pediatrician few months later, the 11-13 months interval was extended to read 11-15 months. Table A.1 summarizes the total number of questionnaires collected at each age interval. The 1-2 months FUP was completed for the 1,320 newborns, while the 3-4 months, 5-7 months 8-10 months and 11-15 months FUP questionnaires were completed for 1,171 (88.7%), 1,127 (85.4%), 932 (70.5%) and 1,059 (80.3%) newborns. Recruitment forms were filled for 1,117 (84.6%) infants and a Parental Follow Up questionnaire was completed for 988 (74.8%) infants at six months of age through phone calls to their mothers.

The majority of newborns, 1,075 (81.4%), were treated at private clinics while the remaining were treated in health centers (Table A.2). More than half of the deliveries (55.6%) occurred in hospitals that were members of the NCPNN versus 44.4% of newborns delivered in other hospitals (Table A.3). The vast majority of recruited newborns resided in Mount Lebanon (67.3%), while 28.5% were from Beirut and only 4.3% were from the other three Mohafazat (districts) (Table A.4).

3.1.2. Parental Socio-Demographic Variables

Table A.5 shows the distribution of parents according to educational level. There was great similarity in education level of mothers and fathers. Those who completed university and/or had graduate education were 51.2% and 51.9% among mothers and fathers respectively. More than half of mothers (62.5%) were not working at six months after delivery. Among those working, the majority (93.3%) were employed in the private sector (Table A.6). On the other hand, 99.3% of fathers were working and mostly as full timers (98.0%). The majority (87.5%) were employed in the private sector as compared to only 12.5% employed in the public sector (Table A.7).

Most of the recruited babies were from lower class families, since 51.4% of their families earned an income less than $1000 US (Table A.8).

3.1.3. Maternal Characteristics

The majority of mothers (61.6%) were in the age group 25-34 years. Only 2.4% were aged less than 20 years, while 18.4% were aged 35 years or more (Table A.9). Almost half of the mothers were primiparous (49.0%) while 29.9% were mothers of one child (Table A.10). Around 37% of primiparous mothers were aged above 30. Parental consanguinity was high, since 12.7% reported that they were consanguineous. Of these 54.8% were of first degree consanguinity (Table A.11).

Maternal complications were not documented in approximately one third of the medical records (36%). Among the completed medical records, the reported complications were: bleeding (2.8%), maternal infection (2.5%), meconium staining of amniotic fluid (2.5%), hypertensive disorders (2.1%) diabetes mellitus (1.5%), and fetal distress (1.1%) (Table A.12). Part of the information collected on postpartum complications revealed that 17.4% of the mothers suffered from anemia, 6.6% had an infection and 2.1% experienced bleeding (Table A.13).

The mode of delivery was not recorded in 217 (16.4%) of the cases. Among the remaining 1103, 29.9% were delivered by C-section and 70.1% vaginally (Table A.14). More specifically, 134 (31%) of the 432 primiparous mothers had a Cesarean delivery. Around 44% of vaginal deliveries received epidural and 30.2% received local anesthesia. Among the 249 cesarean deliveries that had information on anesthesia, 46.5% received general anesthesia, 32.5% had spinal anesthesia and 21.3% had epidural (Table A.15).

3.1.4. Newborn Characteristics

The vast majority (84.2%) of newborns had a gestational age of 38-40 weeks (Table A.16). Males were 52.2% of the newborns as compared to 47.8% of females (Table A.17).

The mean weight of the 1,097 recorded weights was 3,298 gm ± 448 gm. The distribution by weight is shown in table A.19; 43.3% of the recruited infants weighed 3000-3499 grams and 27.2% had a birth weight range of 3500-3999 grams. More than half (60.8%) of newborns were 50-54cm in length and 54.6% had a head circumference of 35-39cm at birth followed by a circumference of <35cm (45.0%) (Table A.18). Around 60% versus 96% of newborns had an Apgar score of 9-10 at one minute and at 5 minutes respectively (Table A.19). Only 3.2% of the babies were admitted to the intensive care unit (Table A.20). Almost all of the newborns (99.4%) did not suffer from any congenital anomalies at birth since the cohort studied included healthy newborns only. (Table A.21).

In terms of length of hospital stay, 6.4% newborns stayed for less than 24 hours. In general, 26.2% of newborns tended to stay for an interval of 48-72 hours, followed by 72-96 hours (23.9%), and ≥96 hours (23.6%) (Table A.22). Over 86% of the latter were Cesarean deliveries. The mean length of stay was 48 hours for vaginal deliveries and 95 hours for Cesarean deliveries (Table A.23).

3.1.5. Sleep patterns, care giving and use of car seats

Although side sleep (72.4%) and back sleep (36.7%) were the most common forms of sleeping positions at 1-2 months of age, 93 (7%) of the newborns were sleeping on their stomach. At 3-4 months, less newborns were reported to side sleep (68.1%) whereas an increasing percentage of babies slept on their back (48.2%). At 5-7months, the proportion of babies who slept on their side remained fairly stable (67.5%) and the percentage of those who slept on their back increased even more (58.7%) (Table A.24). Across all age intervals (from 1-15 months), the mother was the main caregiver for her infant. A few of the respondents (12.2% at 1-2; 13.6% at 3-4 and 5-7; 11.2% at 8-10 and 11-15 months of age) reported that others (including grand-parents and family members) were also involved in looking after their baby (Table A.25). Car seat use was another indicator looked at to assess child safety measures. At 8-10 months, 76.1% reported car seat use for their child versus 70.6% at 11-15 months (Table A.26).

3.1.6. Infant mortality

Because of our select population of healthy infants at baseline, only two deaths were reported during the 15 month of FUP. One case was a female who died at 7 weeks of age and the main cause of death was bronchiolitis. The second case is a male who died at age 3 months and the main cause of death was Sudden Infant Death Syndrome (SIDS).

TABLE A.1. DISTRIBUTION OF RECRUITED INFANTS BY MONTH OF BIRTH FOR THE COMPLETE STUDY PERIOD
NCPNN-Follow Up Project- (August 2001-February 2003)

MONTH OF BIRTH	1-2 MONTHS FUP	3-4 MONTHS FUP		5-7 MONTHS FUP		8-10 MONTHS FUP		11-15 MONTHS FUP	
	No.	**No.**	**%**	**No.**	**%**	**No.**	**%**	**No.**	**%**
August 2001	254	237	93.3	219	86.2	181	71.3	200	78.7
September 2001	280	254	90.7	242	86.4	198	70.7	225	80.4
October 2001	274	239	87.2	234	85.4	184	67.2	222	81.0
November 2001	221	192	86.9	189	85.5	158	71.5	174	79.1
December 2001	154	136	88.3	131	85.1	111	72.1	131	85.1
January 2002	104	89	85.6	88	84.6	80	76.9	85	81.7
February 2002	31	22	71.0	23	74.2	18	58.1	21	67.7
March 2002	2	2	100.0	1	50.0	2	100.0	1	50.0
Total	**1,320**	**1,171**	**88.7**	**1,127**	**85.4**	**932**	**70.5**	**1,059**	**80.3**

TABLE A.2. DISTRIBUTION OF NEWBORNS BY TYPE OF HEALTH CARE FACILITY

NCPNN-Follow Up Project- (August 2001-February 2003)

	No.	%
Private clinics	1075	81.4
Dispensaries	245	18.6
Total	**1,320**	**100**

TABLE A.3. DISTRIBUTION OF NEWBORNS BY HOSPITAL OF DELIVERY

NCPNN-Follow Up Project- (August 2001-February 2003)

Hospital of delivery	No.	%
Network member hospitals	713	55.6
Other hospitals	570	44.4
Total	**1,283**	**100.0**

TABLE A.4. DISTRIBUTION OF RECRUITED SAMPLE BY MOHAFAZAT

NCPNN-Follow Up Project- (August 2001-February 2003)

	No.	%
Beirut	291	28.5
Mount Lebanon	686	67.3
Bekaa	4	0.4
North	20	2.0
South	19	1.9
Total	**1,020**	**100.0**

TABLE A.5. PARENTAL EDUCATION

NCPNN-Follow Up Project- (August 2001-February 2003)

Mother's education	**No.**	**%**
Illiterate/Read & write	4	0.4
Primary	35	3.5
Intermediate	148	15.0
Secondary	160	16.2
Technical	135	13.7
University	504	51.2
Total	**986**	**100.0**

Father's education	**No.**	**%**
Illiterate/Read & write	7	0.7
Primary	44	4.5
Intermediate	146	14.9
Secondary	153	15.6
Technical	122	12.4
University	510	51.9
Total	**982**	**100.0**

TABLE A.6. MOTHER'S OCCUPATION AFTER 6 MONTH OF DELIVERY

NCPNN-Follow Up Project- (August 2001-February 2003)

Mother's work status*	No.	%
Working	370	37.5
Not Working	616	62.5
Total	**986**	**100.0**

Mother's sector of occupation	No.	%
Private	334	93.3
Public	24	6.7
Total	**358**	**100.0**

TABLE A.7. FATHER'S OCCUPATION

NCPNN-Follow Up Project- (August 2001-February 2003)

Father's work status*	No.	%
Working	974	99.3
Not Working	7	0.7
Total	**981**	**100.0**

Father's sector of occupation	No.	%
Private	849	87.5
Public	121	12.5
Total	**970**	**100.0**

Father's working conditions	No.	%
Full Time	952	98.0
Part-time	19	2%
Total	**971**	**100.0**

Father's employment	No.	%
Employee	599	61.8
Self employed	336	34.6
Employer	27	2.8
Combination of both	8	0.8
Total	**970**	**100.0**

*Assessed at 6 months after delivery

TABLE A.8. MONTHLY HOUSEHOLD INCOME ($)

NCPNN-Follow Up Project- (August 2001-February 2003)

	No.	%
<500	95	11.1
500-999	346	40.3
1000-1999	236	27.5
2000-2999	109	12.7
≥3000	73	8.5
Total	**859**	**100.0**

TABLE A.9. MATERNAL AGE

NCPNN-Follow Up Project- (August 2001-February 2003)

	No.	%
< 20	26	2.4
20-24	190	17.6
25-29	332	30.7
30-34	334	30.9
≥ 35	199	18.4
Total	**1081**	**100.0**
Mean (SD)	**29.4 (5.3)**	
Minimum-Maximum	**16-48**	

TABLE A.10. PARITY

NCPNN-Follow Up Project- (August 2001-February 2003)

	No.	%
0	432	49.0
1	263	29.9
2	134	15.2
3	38	4.3
≥ 4	14	1.6
Total	**881**	**100.0**
Mean (SD)	**0.8 (0.97)**	
Minimum-Maximum	**0-5**	

TABLE A.11. PARENTAL CONSANGUINITY

NCPNN-Follow Up Project- (August 2001-February 2003)

Consanguinity	No.	%
No	857	87.3
Yes	125	12.7
Total	**982**	**100.0**

Degree of consanguinity	No.	%
1st	68	54.8
2nd	21	16.9
3rd	13	10.5
More	22	17.7
Total	**124**	**100.0**

TABLE A.12. MATERNAL PREGNANCY COMPLICATIONS

NCPNN-Follow Up Project- (August 2001-February 2003)

	Total	N	%
Bleeding	849	24	2.8
Maternal infection	844	21	2.5
Meconium staining of amniotic fluid	824	21	2.5
Hypertensive disorders	854	18	2.1
Diabetes Mellitus (Gestational)	847	13	1.5
Fetal distress	839	9	1.1

TABLE A.13. MATERNAL POST PARTUM COMPLICATIONS (40 DAYS AFTER DELIVERY)
NCPNN-Follow Up Project- (August 2001-February 2003)

Infections	No.	%
No	920	93.4
Yes	65	6.6
Total	**985**	**100.0**
Bleeding	**No.**	**%**
No	964	97.9
Yes	21	2.1
Total	**985**	**100.0**
Anemia	**No.**	**%**
No	814	82.6
Yes	171	17.4
Total	**985**	**100.0**

TABLE A.14. MODE OF DELIVERY
NCPNN-Follow Up Project- (August 2001-February 2003)

	No.	%
Vaginal	773	70.1
C-section	330	29.9
Total	**1,103**	**100.0**

TABLE A.15. TYPE OF ANESTHESIA BY MODE OF DELIVERY
NCPNN-Follow Up Project- (August 2001-February 2003)

Type of anesthesia	Vaginal*		C-Section*		Total	
	No	%	No	%	No	%
None	139	24.3	-	-	139	16.9
Local	173	30.2	-	-	173	21.1
Epidural	251	43.9	53	21.3	304	37.0
Spinal	5	0.9	81	32.5	86	10.5
General	4	0.7	115	46.5	119	14.5
Total	**572**	**100.0**	**249**	**100.0**	**821**	**100.0**

* Represent valid percentages

TABLE A.16. GESTATIONAL AGE

NCPNN-Follow Up Project- (August 2001-February 2003)

	No.	%
≤37	87	8.3
38-40	886	84.2
≥41	79	7.5
Total	**1,052**	**100.0**
Mean	**39.0 (1.1)**	
Minimum-Maximum	**36.0-42.0**	

TABLE A.17. NEWBORN GENDER

NCPNN-Follow Up Project- (August 2001-February 2003)

	No.	%
Male	689	52.2
Female	631	47.8
Total	**1,320**	**100.0**

TABLE A.18. ANTHROPOMETRICAL MEASURES AT BIRTH

NCPNN-Follow Up Project- (August 2001-February 2003)

Birth weight	No.	%
<2500	30	2.7
2500-2999	216	19.7
3000-3499	476	43.4
3500-3999	298	27.2
≥4000	77	7.0
Total	**1,097**	**100.0**
Mean (SD)	**3,297.6 (447.9)**	
Minimum-Maximum	**2,220.0-5,200.0**	

Birth length	No.	%
<45	5	0.5
45-49	386	37.5
50-54	626	60.8
≥55	13	1.3
Total	**1,030**	**100.0**
Mean (SD)	**50.0 (2.0)**	
Minimum-Maximum	**40.6-62.0**	

Birth length	No.	%
<35	394	45.0
35-39	478	54.6
≥40	4	0.5
Total	**876**	**100.0**
Mean (SD)	**34.7 (1.4)**	
Minimum-Maximum	**29.0-47.0**	

TABLE A.19. APGAR SCORES AT 1 & 5 MINUTES

NCPNN-Follow Up Project- (August 2001-February 2003)

Apgar score at 1 minute	No	%
≤ 3	4	0.5
4-6	33	4.3
7-8	266	35.0
9-10	457	60.1
Total	**760**	**100.0**
Mean (SD)	**8.5 (1.1)**	
Minimum-Maximum	**2-10**	

Apgar score at 5 minutes	No	%
≤ 3	1	0.1
4-6	1	0.1
7-8	30	4.0
9-10	750	95.7
Total	**752**	**100.0**
Mean (SD)	**9.7 (0.6)**	
Minimum-Maximum	**3-10**	

TABLE A.20. NEWBORN ADMISSION STATUS

NCPNN-Follow Up Project- (August 2001-February 2003)

	No.	%
Normal	1,060	96.8
Intensive care	35	3.2
Total	**1,095**	**100.0**

TABLE A.21. CONGENITAL ANOMALIES AT BIRTH FOR THE COMPLETE STUDY GROUP

NCPNN-Follow Up Project- (August 2001-February 2003)

	No.	%
No	1,088	99.4
Yes	7	0.6
Total	**1,095**	**100.0**

TABLE A.22. NEWBORN LENGTH OF HOSPITAL STAY

NCPNN-Follow Up Project- (August 2001-February 2003)

	No.	%
<24	67	6.4
24-48	211	20.0
48-72	276	26.2
72-96	252	23.9
≥96	249	23.6
Total	**1,055**	**100.0**
Mean	**61.9 (33.1)**	
Minimum-Maximum	**0-168.0**	

TABLE A.23. NEWBORN LENGTH OF HOSPITAL STAY BY MODE OF DELIVERY

NCPNN-Follow Up Project- (August 2001-February 2003)

	Length of Hospital Stay	
	Mean (h)	**SD (h)**
Vaginal Deliveries	48.1	24
Cesarean Deliveries	94.7	28.5
Total Sample	61.9	33.2

TABLE A.24. SLEEPING POSITION AT DIFFERENT AGE INTERVALS

NCPNN-Follow Up Project- (August 2001-February 2003)

	1-2 months FUP (n=1,320)		3-4 months FUP (n=1,171)		5-7 months FUP (n=1,127)	
	No.	**%**	**No.**	**%**	**No.**	**%**
Back sleep	485	36.7	565	48.2	662	58.7
Stomach sleep	93	7.0	72	6.1	163	14.5
Side sleep	956	72.4	797	68.1	761	67.5

TABLE A.25. CARE GIVING AT DIFFERENT AGE INTERVALS

NCPNN-Follow Up Project- (August 2001-February 2003)

	1-2 months FUP (n=1,320)		3-4 months FUP (n=1,171)		5-7 months FUP (n=1,127)		8-10 months FUP (n=931)		11-15 months FUP (n=1,060)	
	No.	**%**	**No.**	**%**	**No.**	**%**	**No.**	**%**	**No.**	**%**
Mother	1,245	94.3	1,070	91.4	1,019	90.4	830	89.1	934	88.2
Father	81	6.1	94	8.0	93	8.3	91	9.8	86	8.1
Day-care center	10	0.8	50	4.3	60	5.3	56	6.0	87	8.2
Housekeeper	60	4.5	78	6.7	93	8.3	81	8.7	89	8.4
Other [a]	161	12.2	159	13.6	153	13.6	104	11.2	119	11.2

[a] Valid percent.

[a] Includes grand-parents and family members.

TABLE A.26. CAR SEAT USE AT 8-10 & 11-15 MONTHS OF AGE

NCPNN-Follow Up Project- (August 2001-February 2003)

	8-10 months FUP (n=931)		11-15 months FUP (n=1,060)	
	No.	**% [a]**	**No.**	**% [a]**
No	177	23.9	255	29.4
Yes	564	76.1	612	70.6
Total	741	100.0	867	100.0

3.2. Impact of early postpartum discharge of newborns

3.2.1. Background

Current trends in research have emphasized the role of continuity of care and the timing of newborns' discharge from the hospital after delivery. Recently, the issue of early newborn discharge has received widespread attention in the legal and medical fields and is still controversial, especially since financial considerations, related to third party payers, are directly affecting postpartum length of stay. Insurance companies were prompted to reduce their coverage facing rising health care costs (CDC, 1995). This factor contributed tremendously to the increasing numbers and predominance of early discharges, in the United States and most of the developed world (AAP, 1995). A second reason for the increasing number of early discharges was the inability to pay hospital fees by non-insured parents, rendering them unable to stay beyond the minimum period. Facing this challenge, several guidelines have been issued defining the minimum hospital stay that would ensure a safe discharge. In fact, although early hospital discharge of mothers and their newborn infants reduces health care costs substantially, the consequences it may produce remain somewhat indeterminate. The outcomes of the new trends were scrutinized and several studies were done to verify the multiple effects of early discharge, but no consensus has been reached yet as to the definition of early discharge (Liu, 1997 a & b; Johnson, 2002; Grupp-Phelan, 1999). However, most, if not all of these studies were done in Western countries and apply to their situations and standards. With well-structured follow-up programs available, the impact of early discharge is attenuated in developed countries.

In contrast, in developing countries with no adequate follow-up of babies, early discharges may result in overlooking quite a number of serious illnesses, such as neonatal jaundice, congenital anomalies, neonatal infections, feeding intolerance, etc. that possibly require re-hospitalization, rendering a non-cost effective system. The lack of an adequate health care infrastructure in Lebanon combined with a lack of follow-up programs, as well as a greater load of patients, with poor follow-up, increase the likelihood of re-hospitalization for many preventable diseases and disorders. Accordingly, it was deemed necessary to conduct a study in Lebanon in order to verify whether early discharge can actually be a health hazard or not.

The objective of this section is to assess the impact of early discharge on hospital readmission and non-routine pediatrician visits within the first 28 days of life among newborns in Greater Beirut.

3.2.2. Methodology

Two definitions of early discharge were used: (a) Any discharge from the hospital prior to 48 hours after delivery (AAP, 1995) and (b) Any discharge less than 24 hours for vaginal deliveries and less than 48 hours for Cesarean deliveries (Kotagal, 1999). The Chi-square test was used to identify the predictors of neonatal hospital readmission and non-routine pediatrician visits in the first 28 days of life, with a special focus on early discharge as one of the predictors. Odds Ratios and 95% Confidence Intervals were calculated.

3.2.3. Results

The average length of stay for vaginal and cesarean deliveries was 48 ± 24 hours and 95 ± 29 hours respectively. Analysis was done on a total of 1,046 newborns with information on readmissions and early discharge. According to the AAP definition, 26.3% were early discharged. Using the other definition (less than 24 hours for vaginal and less than 48 hours for cesarean deliveries), the rate of early discharge decreased to 7.2%. A total of 34 newborns (3.3%) were hospital readmitted and 83 (7.9%) had a non-routine visit to the pediatrician in the neonatal period. The main reasons for hospital readmission were jaundice (44%), suspected neonatal infection or sepsis (20.6%) and bronchiolitis (17.6%).

Although non-significant, bivariate analysis revealed trends of increasing hospital readmissions and non-routine pediatrician visits associated with early discharge. Using the AAP definition, early discharged patients were 1.4 times more at risk of being hospital readmitted as compared to those discharged later (95% CI: 0.7-2.8) (Table B.1). When early discharge was defined as less than 24 hours for vaginal and less than 48 hours for Cesarean deliveries, those discharged early were 1.8 times at higher risk of being hospital readmitted during the first 28 days of life (95% CI: 0.6-5.2) (Table B.1). On the other hand, with either definition, early discharged newborns were at a 1.2 higher risk of visiting their pediatrician on a non-routine visit during the first 28 days of life as compared to those discharged later. However this association did not reach statistical significance.
(Table B.1).

Significant predictors of neonatal hospital readmission were: very low and old maternal age, secondary/technical maternal education and prematurity. Male sex and lower income were the only predictors of non-routine visits to the pediatrician.

3.2.4. Discussion

Results of the present study showed no significant association between the practice of early post-partum hospital discharge of newborns and either hospital readmission or non-routine pediatrician visit within the first 28 days of life. Research in the field fails to give a definitive answer concerning the safety of early discharge. Some studies documented a relationship between early discharged infants and the likelihood of their readmission, with jaundiced infants being the more at risk (Lock, 1999; Liu, 2000; Radmacher, 2002) Our results are in concordance with the majority of the studies in the literature, whereby no association has been found (Danielson, 2000; Yanicki, 2002; Johnson, 2002). However, in addition to the methodological flaws most of these suffer from, the definition of early discharge varies across all studies, which makes comparison of results difficult. In our study, we used two commonly used definitions of early discharge and with either one, early discharge did not impact readmission of newborns and non-routine pediatrician visits.

Moreover, hospital readmission-the outcome measure most often used to assess the safety of early discharge-is an infrequent event, thus the need of very large sample sizes to detect significant differences. Also, in the present study, participants were all healthy newborns, resulting in low rates of readmissions. Further investigations with a larger sample size including all newborn admissions –both normal and sick babies- might show significant associations, especially that a trend of increasing readmission was observed with early discharge. It is worth noting at this stage that adequate follow-up programs attenuate the impact of early discharge, if any, and can create safeguards for newborns.

TABLE B.1. IMPACT OF EARLY DISCHARGE AND OTHER RISK FACTORS ON HOSPITAL READMISSION AND NON-ROUTINE PEDIATRICIAN VISITS WITHIN THE FIRST 28 DAYS OF LIFE

		Hospital Readmission		Non-routine Pediatrician Visits	
	Total	N (%)	OR (95% CI)	N (%)	OR (95% CI)
EARLY DISCHARGE (n=1,046)					
Early discharge (< 48 hours*)					
No	771	23(3.0)	1	58(7.5)	1
Yes	275	11(4.0)	1.4(0.7-2.8)	25(9.1)	1.2(0.8-2.0)
Early discharge (< 24 hours for vaginal & < 48 hours for cesarean)					
No	971	30(3.1)	1	76(7.8)	1
Yes	75	4(5.3)	1.8(0.6-5.2)	7(9.3)	1.2(0.5-2.7)
SOCIO-DEMOGRAPHIC CHARACTERSTICS					
Maternal education (N=918)					
Intermediate	170	3(1.8)	0.7(0.2-2.5)	13(7.6)	1.1(0.6-2.2)
Secondary/ Technical	275	16(5.8)	**2.4(1.1-5.1)**	24(8.7)	1.3(0.7-2.2)
University	473	12(2.5)	1	33(7.0)	1
Paternal education (N=914)					
Intermediate	180	5(2.8)	1.0(0.4-2.9)	20(11.1)	1.7(0.9-3.0)
Secondary/ Technical	254	13(5.1)	1.9(0.9-4.2)	16(6.3)	0.9(0.5-1.7)
University	480	13(2.7)	1	33(6.9)	1
Maternal employment status (N=918)					
Working	348	12(3.4)	1	24(6.9)	1
Not working	570	19(3.3)	1.0(0.5-2.0)	46(8.1)	1.2(0.7-2.0)
Paternal sector of employment (N=905)					
Private	794	24(3.0)	1	61(7.7)	1
Public	111	7(6.3)	2.2(0.9-5.1)	9(8.1)	1.0(0.5-2.2)
Health care facility (N=1,045)					
Private clinics	874	31(3.5)	2.1(0.6-6.8)	72(8.2)	1.3(0.7-2.5)
Dispensaries	171	3(1.8)	1	11(6.4)	1
Household income (N=797)					
< $1000	401	17(4.2)	3.8(0.9-16.5)	29(7.2)	1.6(0.7-3.6)
$1000-$1999	224	9(4.0)	3.6(0.8-16.7)	26(11.6)	**2.7(1.2-6.1)**
≥ $2000-$2999	172	2(1.20	1	8(4.7)	1

*AAP definition

TABLE B.1. CONT'D - IMPACT OF EARLY DISCHARGE AND OTHER RISK FACTORS ON HOSPITAL READMISSION AND NON-ROUTINE PEDIATRICIAN VISITS WITHIN THE FIRST 28 DAYS OF LIFE

		Hospital Readmission		Non-routine Pediatrician Visits	
	Total	N (%)	OR (95% CI)	N (%)	OR (95% CI)
INFANT CHARACTERISTICS					
Sex of the baby (N=1,046)					
Male	537	18(3.4)	1.1(0.5-2.1)	53(9.9)	**1.7(1.1-2.8)**
Female	509	16(3.1)	1	30(5.9)	1
Gestational age (N=1,001)					
≤ 37 weeks	83	6(7.2)	**2.6(1.0-6.4)**	9(10.8)	1.5(0.7-3.1)
38-40 weeks	918	27(2.9)	1	70(7.6)	1
Birthweight (N=1,039)					
<2500	28	2(7.1)	2.7(0.4-20.4)	1(3.6)	0.2(0.0-1.9)
2,500-2,999	210	8(3.8)	1.4(0.3-6.8)	16(7.6)	0.5(0.2-1.2)
3,000-3,499	445	16(3.6)	1.3(0.3-5.9)	35(7.9)	0.5(0.3-1.1)
3,500-3,999	283	6(2.1)	0.8(0.2-3.9)	21(7.4)	0.5(0.2-1.1)
≥ 4,000	73	2(2.7)	1	10(13.7)	1
MATERNAL CHARACTERISTICS					
Maternal age (N=1,028)					
< 25	205	15(7.3)	**4.4(2.0-9.9)**	18(8.8)	1.1(0.6-2.0)
25 – 35	631	11(1.7)	1	49(7.8)	1
> 35	192	8(4.2)	**2.5(1.0-6.2)**	14(7.3)	0.9(0.5-1.7)
Any pregnancy complication (N=815)					
No	624	18(2.9)	1	44(7.1)	1
Yes	191	10(5.2)	1.9(0.8-4.1)	15(7.9)	1.1(0.6-2.1)
Cigarette smoking during pregnancy (N=918)					
No	828	30(3.6)	1	65(7.9)	1
Yes	90	1(1.1)	0.3(0.0-2.2)	5(5.6)	0.7(0.3-1.8)
Admission status (N=1,037)					
Normal	1,009	32(3.2)	1	79(7.8)	1
Intensive care	28	2(7.1)	2.3(0.5-10.3)	4(14.3)	2.0(0.7-5.8)
Mode of delivery (N=1,046)					
Vaginal	734	21(2.9)	1	62(8.4)	1
C-section	312	13(4.2)	1.5(0.7-3.0)	21(6.7)	0.8(0.5-1.3)

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3.3. MORBIDITY PATTERNS DURING THE FIRST YEAR OF LIFE

3.3.1. Background

A major goal of the New York World Summit on Children in 1990 was to improve children's lives by ensuring that each child receives the best care and attention possible (Orne Gliemann et al. 2003). Indeed, the high prevalence of malnutrition and infectious diseases in developing countries deems such a step necessary. In Asia, Africa, and Latin America, an estimated 15-20 million individuals, mostly children die each year from these conditions and only 50-75 percent of children survive until their fifth birthday (Black et al. 1982). Under-nourishment, in turn, suppresses host resistance and increases the incidence and severity of infections, which further exacerbate the possibility of contracting other illnesses and slow down a child's physical growth. Together infections and poor nutrition impair the quality of children's lives and may result in permanent disability (Black et al. 1982; Ahmed et al. 1991). A study in rural Guatemala found out that children who had an increased frequency of diarrheal infections displayed significantly smaller growth increments. Likewise, another study in Guatemala also showed that infants with low weight gain had more illness episodes (Condon-Paoloni et al. 1977). In Egypt, diarrhea is said to be responsible for 55% of infant deaths. In a rural area near Alexandria, 40.42% had diarrhea at the end of their first year (Ahmed et al. 1991).

Apart from diarrhea, respiratory tract infections are also highly prevalent in several developing countries. In Egypt, acute respiratory infections are considered the second leading cause of death among young children. At the end of the first year, 25.61% had upper respiratory tract infections (URTI) in a rural area near Alexandria. In rural Bangladesh, URTI was the most common illness affecting infants below one year. In Britain, URTI are the commonest disease accounting for nearly a fifth of consultations in general practice (Ahmed et al. 1991). Consequently, child health research remains very essential to the identification of strategies to improve child health in developed as well as developing countries.

Assessing morbidity patterns in developing countries, where economic standards are assumingly lower than in developed countries, could be regarded as one such strategy to reduce overall infant mortality and improve child health. In fact, in the Alexandria study, low socioeconomic status heightened morbidity risk even further (Ahmed et al. 1991).

Moreover, in a review paper that described the magnitude of infant morbidity in developing countries, Orne-Gliemann (2003) noted that priorities of professionals in the field of child health did not always match children's health needs. For example, although malnutrition was quoted by 78% of respondents as a priority health need, it was considered as a main area of neglect in the field of child health research. Accordingly an important aspect of the FUP study is to assess morbidity patterns of healthy infants in Greater Beirut during their first year of life.

The objectives of this section of the monograph are to:

1) Examine prevalence of feeding problems, injuries and hospital readmissions.

2) Determine overall infection rate in the first year of life and the prevalent types of infections.

3) Assess antibiotic use during the first year of life.

3.3.2. Methodology

Patterns of morbidities during the first year of life were assessed using six different outcomes: (1) readmissions and pediatrician visits; (2) congenital malformations and other diseases; (3) injuries; (4) feeding problems; (5) infections; and (6) antibiotic use.

The first outcome, readmissions, included hospital readmissions, emergency room visits and non-routine pediatrician visits. The outcome of congenital malformations and other diseases was composed of 8 groups: hyperbilirubinemia, seizures, congenital heart disease, hip dysplasia, hypospadias, undescended testicles, hernia and others. As for injuries, it was categorized into 5 main subgroups: falls, burns, poisoning, motor vehicle accidents and others. Feeding problems, however, consisted of diarrhea, constipation, gastroe-

sophageal reflux, dehydration, colic and other problems. Infections were classified into upper respiratory tract infections, otitis, bronchiolitis, pneumonia, meningitis, gastrointestinal infections, urinary infections, skin infection, oral thrush and other types of infections. Antibiotic use was assessed as a dichotomous variable (yes/no). Out of those who received antibiotics, the type of antibiotics was further determined as either oral or parental.

The unit of analysis is the individual babies. According to this unit of analysis, the prevalence rates of the above six outcomes were assessed at each of the five intervals of the questionnaires, as well as at the end of the first year of life (up to the age of 15 months).

3.3.3. Results

The cumulative hospital readmission rate during the first year of life was 15%, being highest at the age of 1-2 months. The pediatrician non-routine visits, however, were more frequent with a rate of 47.2% (Table C.1). Congenital malformations were not common in this infant cohort; since the inclusion criteria of the study were initially limited to healthy babies (Table C.2). Tables C.3 & C.4 present prevalence and severity of injuries. The cumulative rate of injuries at the end of the first year of life was 10.3%, while the rate of hospitalized injuries was 1.9% only. Falls were the most common form of injury.

The overall prevalence of feeding problems at 1 year was relatively high (58.0%). While diarrhea cases increased with an increase in infant's age, constipation, gastroesophageal reflux, dehydration and colic decreased with age. At the end of the first year of life, colic was the most prevalent feeding problem (34.0%), followed by gastroesophageal reflux (19.9%) and diarrhea (15.6%). (Table C.5)

Among all morbidity outcomes, the overall infection rate till the age of 15 months was the highest. Of the entire cohort, 71.8% have had at least one infection episode during their first year of life. URTI were the most common type of infections (49.9%). High prevalence of otitis and bronchiolitis was also noted (26.5% and 20.1% respectively). URTI and otitis increased with age whereas bronchiolitis decreased after 7 months of age. (Table C.6, Figure 2).

The rate of antibiotic use during the first year was 42.2%. Similar to infections, a constant increasing trend was experienced over the months. Although oral antibiotics are not recommended at the first months of life, 4.3% of the infants received oral antibiotics at the age of 1-2 months (Table C.7).

3.3.4. Discussion

In general, infectious diseases, mainly upper respiratory tract infections, otitis and bronchiolitis, were among the most prevalent types of morbidities during the first year of life. Feeding problems were the second most prevalent form of morbidity with a considerable number of colic, gastroesophageal reflux, and diarrhea cases.

The readmission rate of 15% within one year of discharge is higher compared to that reported in a Canadian study where 10% were readmitted within one year (Yanicki et al. 2002). However, when looking at 1-2months post-discharge, newborns in this study were being readmitted at a rate of 5.8%, which according to some of the studies falls within the U.S and Canadian standards. Sword et al (2001) revealed that the rate of newborn readmission ranged from 2.4% to 6.7% during 1st month of life. On the other hand, several other studies demonstrated readmission rates of 3.5% and 2.6% within one month of discharge in Canada and the U.S. respectively, which are evidently lower than the study rate.

In what relates to injuries, the overall cumulative rate at year one was 10.3%. McCormick, Shapiro & Starfield (1981), reported the prevalence of injuries that sought medical care was 8.6% for the first year of life. Our results, however, reveal that only 2% of the 1320 babies were hospitalized due to an injury. In accordance with Korkmaz et al. (2002), falls were the leading cause of injury in this cohort.

With regards to feeding problems, 15% of newborns suffered from diarrhea during their first year of

life, a rate which is low compared to other developing countries. In a rural area near Alexandria, for instance, 40.42% had diarrhea at the end of their first year (Ahmed et al. 1991). However, one should attend to the geographical and economical differences between Lebanon and Egypt to be able to understand such a difference in rates. The hot climate and harsh economic conditions dominant in Egypt may be partly responsible for the high prevalence of diarrhea. Besides, the concept of diarrhea may be used differently in the literature to convey different meanings. For the purpose of this study, diarrhea encompassed feeding problems only regardless of other forms that might be concurrent with or result from infections.

In terms of infections, 49.9% of newborns contracted upper respiratory tract infections within one year, almost double the rate of those infected in Egypt (25.61%) as was shown by Ahmed et al., 1991. On the other hand, prevalence of otitis in this study was considerably lower (26.5%) than that depicted in the literature. To illustrate further, a survey in Greenland examined the onset of otitis in 591 children. It revealed that 40% of all children had acute otitis media during their first year of life, with those aged 7 and 12 months being at a highest risk (Homoe et al. 1999).

As for bronchiolitis, study findings show that 20.1% of newborns had the infection at the end of their first year. In contrast, Sung et al. (1992) study in Hong Kong reported that acute bronchiolitis accounted for only 6.6% of total admissions, 2.1% of which were newborns aged 0-24 months.

With respect to the pattern of antibiotic use, findings of this study revealed that by the end of the first year of life 42.2% of the cohort had received at least one antibiotic. This result is comparable with those reported by Thrane et al. (2003) study in Denmark. In the latter study, the cumulative incidence of antibiotic prescription at the end of the first year was 45.6% among the study cohort. Another study conducted in the United States (1996), however, reported much higher rates of antibiotic use than those mentioned above. Almost 70% of the targeted children had received a minimum of one antibiotic during the first six months of life only (Thrane et al. 2001).

In conclusion, this study can be considered a contributing initiative to health professionals, epidemiologists, policy makers, and other concerned actors through highlighting the prevalence and patterns of major morbidities among healthy newborns in their first year of life. However, further analysis of the data is needed to be able to identify risk factors and characteristics of at-risk target groups in an attempt to reduce overall morbidity in Lebanon.

TABLE C.1: READMISSIONS AND PEDIATRICIAN VISITS PATTERNS

	1-2 months FUP (n=1,320)		3-4 months FUP (n=1,171)		5-7 months FUP (n=1,127)		8-10 months FUP (n=932)		11-15 months FUP (n=1,059)		Cumulative[a] up to 15 months FUP (n=1,320)	
	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%
Hospital readmission												
No	1,243	94.2	1,114	95.1	1,082	96.0	905	97.1	1,008	95.2	1,122	85.0
Yes	77	5.8	57	4.9	45	4.0	27	2.9	51	4.8	198	**15.0**
Emergency room admission												
No	1,267	96.0	1,135	96.9	1,089	96.6	906	97.2	1,029	97.2	1,163	88.1
Yes	53	4.0	36	3.1	38	3.4	26	2.8	30	2.8	157	**11.9**
Non-routine visit to pediatrician												
No	1,153	87.3	961	82.1	878	77.7	674	72.3	802	75.8	697	52.8
Yes	167	12.7	210	17.9	249	22.3	258	27.7	257	24.3	623	**47.2**

[a] Numbers indicate babies who have had at least one episode of the outcome

TABLE C.2: PATTERNS AND PREVALENCE OF HYPERBILIRUBINEMIA, CONGENITAL MALFORMATIONS AND OTHER DISEASES

	1-2 months FUP (n=1,320)		3-4 months FUP (n=1,171)		5-7 months FUP (n=1,127)		8-10 months FUP (n=932)		11-15 months FUP (n=1,059)		Cumulative[c] up to 15 months FUP (n=1,320)	
	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%
Hyperbilirubinemia	81	6.1	2	0.2	-	-	-	-	-	-	82	6.2
Seizures	3	0.2	-	-	1	0.1	1	0.1	1	0.1	6	0.5
Congenital heart disease	13	1.0	9	0.7	10	0.9	6	0.6	4	0.4	20	1.5
Hip dysplasia	8	0.6	4	0.3	4	0.4	5	0.5	1	0.1	19	1.4
Hypospadias	2	0.2	2	0.2	1	0.1	1	0.1	-	-	4	0.3
Undescended testicles	5	0.4	-	-	2	0.2	1	0.1	2	0.2	7	0.5
Hernia	9	0.7	5	0.4	8	0.7	4	0.4	6	0.6	23	1.7
Other [a]	29	2.2	36	3.1	25	2.2	26	2.8	27	2.6	101	7.7
Total [b]	141	**10.7**	58	**5.0**	50	**4.4**	43	**4.6**	40	**3.8**	227	**17.2**

[a] Includes asthma, Ichlyosis, pyloric stenosis, orthopedic pathology, hydrocete, hishprung, anemia, thyroid, ovarian cyst, anal fistula and hip dislocation.

[b] Values do not add up to the total due to the possibility of babies having more than one condition

[c] Numbers indicate babies who have had at least one episode of the outcome

TABLE C.3: PATTERNS AND PREVALENCE OF INJURIES

	1-2 months FUP (n=1,320)		3-4 months FUP (n=1,171)		5-7 months FUP (n=1,127)		8-10 months FUP (n=932)		11-15 months FUP (n=1,059)		Cumulative[b] up to 15 months FUP (n=1,320)	
	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%
Falls	2	0.2	4	0.3	17	1.5	22	2.4	48	4.5	100	7.6
Burns	1	0.1	-	-	1	0.1	4	0.4	10	0.9	15	1.1
Poisoning	-	-	-	-	-	-	-	-	1	0.1	1	0.1
Motor vehicle accidents	-	-	1	0.1	-	-	-	-	-	-	1	0.1
Others [a]	11	0.9	-	-	2	0.2	3	0.3	5	0.5	22	1.7
Total	14	**1.1**	5	**0.4**	20	**1.8**	29	**3.1**	64	**6.0**	136	**10.3**

[a] Includes erb's palsy, clavicular fracture, dermatological pathology and post partum trauma

[b] Numbers indicate babies who have had at least one episode of the outcome

TABLE C.4: PATTERN OF INJURIES THAT LED TO HOSPITALIZATION

	1-2 months FUP (n=1,320)		3-4 months FUP (n=1,171)		5-7 months FUP (n=1,127)		8-10 months FUP (n=932)		11-15 months FUP (n=1,059)		Cumulative[b] up to 15 months FUP (n=1,320)	
	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%
Falls	-	-	-	-	4	0.4	6	0.6	5	0.5	15	1.1
Burns	-	-	-	-	-	-	1	0.1	2	0.2	3	0.2
Poisoning	-	-	-	-	-	-	-	-	1	0.1	1	0.1
Motor vehicle accidents	-	-	-	-	-	-	-	-	-	-	-	-
Others [a]	4	0.3	-	-	-	-	2	0.2	2	0.2	8	0.6
Total	4	**0.3**	-	-	4	**0.4**	8	**1.0**	10	**0.9**	25	**1.9**

[a] Includes erb's palsy, clavicular fracture.

[b] Numbers indicate babies who have had at least one episode of the outcome

TABLE C.5: PATTERNS AND PREVALENCE OF FEEDING PROBLEMS

	1-2 months FUP (n=1,320)		3-4 months FUP (n=1,171)		5-7 months FUP (n=1,127)		8-10 months FUP (n=932)		11-15 months FUP (n=1,059)		Cumulative[c] up to 15 months FUP (n=1,320)	
	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%
Diarrhea	35	2.7	33	2.8	64	5.7	56	6.0	57	5.4	206	15.6
Constipation	71	5.4	43	3.7	29	2.6	21	2.3	20	1.9	157	11.9
GE Reflux	134	10.2	120	10.3	85	7.6	34	3.7	23	2.2	263	19.9
Dehydration	3	0.2	1	0.1	-	-	1	0.1	1	0.1	6	0.5
Colic	396	30.0	111	9.5	27	2.4	3	0.3	4	0.4	449	34.0
Other [a]	9	0.7	5	0.4	8	0.7	5	0.5	8	0.8	31	2.3
Total [b]	555	**42.1**	282	**24.1**	193	**17.1**	109	**11.7**	109	**10.3**	765	**58.0**

[a] Includes protein milk allergy and poor weight gain. [b] Values do not add up to the total due to the possibility of babies having more than one feeding problem

[c] Numbers indicate babies who have had at least one episode of the outcome

TABLE C.6: PATTERNS AND PREVALENCE OF INFECTIONS

	1-2 months FUP (n=1,320)		3-4 months FUP (n=1,171)		5-7 months FUP (n=1,127)		8-10 months FUP (n=932)		11-15 months FUP (n=1,059)		Cumulative[c] up to 15 months FUP (n=1,320)	
	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%
URTI	150	11.4	203	17.3	196	17.4	175	18.8	218	20.6	659	49.9
Otitis	21	1.6	69	5.9	96	8.5	117	12.6	161	15.2	350	26.5
Bronchiolitis	27	2.0	76	6.5	118	10.5	54	5.8	66	6.2	265	20.1
Pneumonia	8	0.6	12	1.0	3	0.3	3	0.3	5	0.5	29	2.2
Meningitis	1	0.1	1	0.1	-	-	-	-	-	-	2	0.2
Gastrointestinal	9	0.7	23	2.0	35	3.1	45	4.8	56	5.3	148	11.2
Urinary	4	0.3	2	0.2	7	0.6	6	0.6	6	0.6	20	2.1
Skin infection	8	0.6	1	0.1	3	0.3	4	0.4	4	0.4	22	1.7
Oral thrush	15	1.1	7	0.6	3	0.3	3	0.3	4	0.4	31	2.3
Other [a]	12	0.9	8	0.7	26	2.3	19	2.0	33	3.1	97	7.4
Total [b]	238	**18.0**	358	**30.6**	440	**39.0**	375	**40.2**	484	**45.7**	948	**71.8**

[a] Includes Fungal infections, dyspnea, chicken pox, roseola and mump. [b] Values do not add up to the total due to the possibility of babies having more than one infection

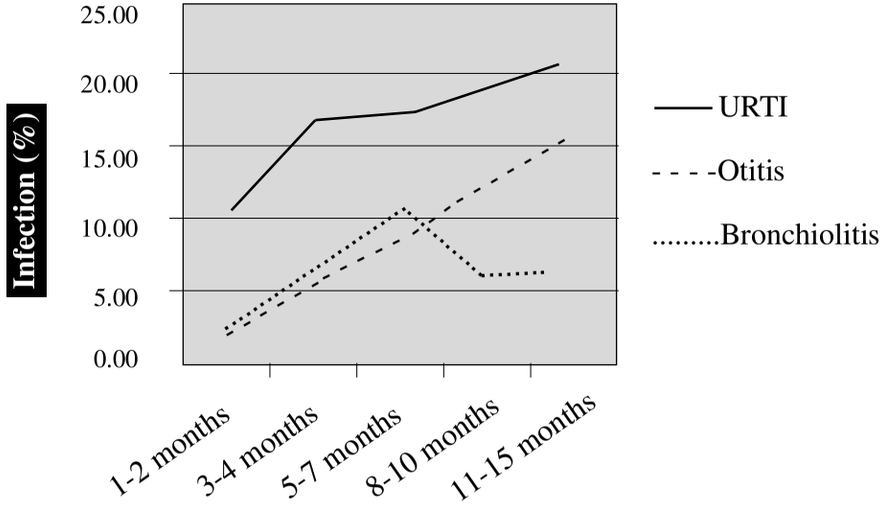
[c] Numbers indicate babies who have had at least one episode of the outcome

TABLE C.7: PATTERNS AND PREVALENCE OF ANTIBIOTIC USE

	1-2 months FUP (n=1,320)		3-4 months FUP (n=1,171)		5-7 months FUP (n=1,127)		8-10 months FUP (n=932)		11-15 months FUP (n=1,059)		Cumulative[a] up to 15 months FUP (n=1,320)	
	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%
Antibiotic use												
No	1251	94.8	1032	88.1	927	82.3	743	79.7	816	77.1	763	57.8
Yes	69	5.2	139	11.9	200	17.7	189	20.3	243	22.9	557	42.2
Antibiotic type												
No	57	4.3	123	10.5	197	17.5	184	19.7	232	21.9	533	40.4
Yes	15	1.1	21	1.8	7	0.6	10	1.1	13	1.2	59	4.5

[a] Numbers indicate babies who have had at least one episode of the outcome

FIGURE 2: PATTERNS OF THE THREE MOST PREVALENT TYPES OF INFECTIONS DURING THE FIRST YEAR OF LIFE



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3.4. BREASTFEEDING PRACTICES

3.4.1. Background

Breastfeeding is internationally considered as the ideal method of feeding for infants (AAP, 1997). The World Health Organization (WHO) and the American Academy of Pediatrics (AAP) recommend that infants are exclusively breastfed for the first 4 or 6 months of life. Exclusive breastfeeding, as defined by WHO, is "no other food or drink, not even water, except breast milk for at least 4 and if possible 6 months of life, but allows the infant to receive drops and syrups (vitamins, minerals and medicines)" (WHO, 2003). After the suggested period, mothers can gradually introduce liquids and solids to complement breastfeeding (WHO, 2003). AAP advises mothers to continue breastfeeding for at least 1 year (Madden et al. 2003) while WHO emphasizes the importance of stretching the duration to the first two years of life (Hörnell et al. 1999; AAP, 1997).

It is a well established fact that breastfeeding has priceless advantages for the growth and development of the baby, the health of the mother and the well being of the society (AAP, 1997). Despite these essential benefits, breastfeeding rates are low in various regions of the world. According to the WHO global databank on breastfeeding, only 35% of infants in 94 countries are exclusively breastfed under the age of 4 months (WHO, 2003). To improve such rates, a number of researches around the world have invested in determining the predictors for successful breastfeeding practices. Such studies are essential in determining target groups and modifiable risk factors for effective intervention programs. As detected by Haque et al. 2002, Gross et al. 1998, Hillenbrand et al. 2002 and Haider et al. 2000 interventions, mainly counseling and educational programs, improves the prevalence of breastfeeding.

In 1990 and after the declaration of WHO and UNICEF on the "Protection, Promotion and Support of breastfeeding", international attention on breastfeeding has further increased. The declaration urged governments to set national policies and targets for breastfeeding (Aarts et al. 2000). In accordance to this declaration, Lebanon established a national committee on breastfeeding and issued, although not yet effective, the Decree 118/83 on banning the low cost substitutes of breast milk (Ministry of Foreign Affairs and Lebanese Emigrants, 2001). However, data on the prevalence of breastfeeding remain still scarce.

Therefore, the objectives of this section of the mono graph are to:

1) Assess the prevalence of breastfeeding at 1, 4 and 12 months of infant's age

2) Determine the predictors of breastfeeding at one and four months of age.

3.4.2. Methodology

The prevalence of breastfeeding status was assessed through two different definitions: (1) Full breastfeeding whereby the infant receives breast milk only without receiving any non-human milk; (2) Any breastfeeding whereby the infant receives breast milk regardless of whether supplemented with non-human milk or not. No considerations about the intake of solid foods were made in both definitions. As for the determination of breastfeeding predictors, the definition of full breastfeeding was only used. It was measured at two age intervals: (1) at 1 month and (2) at 4 months of age.

Various variables that serve as potential predictors for breastfeeding were analyzed. The analyzed variables were related to: (1) Socio-demographic variables; (2) Infant characteristics variables; (3) Maternal characteristics variables; and (4) Delivery related variables. Two sets of bivariate analyses were performed at 1 and 4 months of age. For continuous data, t-tests with p-value <0.05 were used, while cross tabulations and odds ratios with 95% confidence intervals were conducted for categorical data.

3.4.3. Results

The rate of infants receiving any type of breastfeeding at the end of their first month of life was 85.9%, whereas the rate of infants receiving human

milk only was 56.3%. Although any breastfeeding rate at 1 month was relatively high (85.9%), it decreased to 63.2% at 4 months. The full breastfeeding rate at 4 months was very low (24.7%) as compared to any breastfeeding rate. At 1 year of life, the intake of human milk was minimal (Table D.1).

Table D.1. Prevalence of breastfeeding at one month, four months and one year of age

	1 month		4 months		1 year	
	n*/N§	%	n*/N§	%	n*/N§	%
Full breastfeeding	600/1065	56.3	303/1227	24.7	78/1155	6.8
Any breastfeeding	1023/1191	85.9	635/1004	63.2	190/1015	18.7

* Number of breastfed babies according to each category and definition.
§ Overall sample size of each category excluding the missing cases.
The total sample size used in all analysis was 1297

Table D.2 presents the bivariate results for the socio-demographic characteristics as predictors of full breastfeeding at 1 month. Although women aged 25 years or younger tended to breastfeed more than older women, nulliparous women were less likely to breastfeed their children. Maternal education, paternal education and household income were found to have a negative dose response relationship with full breastfeeding rates. Mothers having intermediate education or below were 2.4 more likely to breastfeed their infants than mothers with graduate university degrees. Similarly, full breastfeeding rates were 2.7 times higher for families earning $500 a month or below compared to families earning $2,000 or more. Moreover, Muslim and non-working mothers breastfed their children by 2.4 and 2.0 respectively more than Christian and working mothers.

Based on Table D.3, no significance was evident in the variables related to infant characteristics. As for delivery related variables, mode of delivery and length of hospital stay were both significantly associated with breastfeeding. The odds of breastfeeding among vaginal deliveries were 1.5 more than that of Cesarean section. In addition, women discharged before 48 hours of delivery were 2.7 more likely to breastfeed than women staying for longer time.

Bivariate analyses for the potential predictors of full breastfeeding at 4 months are summarized in Table D.4 & D.5. All significant variables at 1 month remained significant at 4 months. The association between breastfeeding status and variables related to socio-demographic status, however, were more pronounced at 4 months. On the contrary, variables related to medical factors were of greater association at 1 month of age.

3.4.4. Discussion

The prevalence of any breastfeeding at 1 and 4 months in this study was found to be 85.9% and 63.2% respectively. Although the rate is lower than the rates reported by Scandinavian countries (Lande et al. 2003; Hörnell et al. 1999), it is higher than the results by Dubois & Girard (2003) study in Quebec, Canada. Any breastfeeding rates in the latter study were 71.8% and 40.5% at 1 and 4 months respectively. At 1 year of life, the any breastfeeding rates of this study were assessed to be 18.7%. This rate is much lower than those reported in Sudan in 1987 (65.0%) (Salih et al. 1993) and in Eastern Yemen in 1978 (Musaiger, 1992).

As for the predictors of breastfeeding, evidence in the literature provide consistent results of a positive association between breastfeeding duration and maternal age (Scott & Binns, 1999; Lande et al.,

2003; Dulon, Kersting & Schach, 2001; Dubois & Girard, 2003; Hörnell et al. 1999; Pande, Unwin & Håheim, 1997; Musaiger, 1992). The results of this study, however, are not in agreement with the literature. The odds of full breastfeeding in this study increased with a decrease in maternal age at both age intervals. Results of Dulon, Kersting & Schach (2001) study in Germany were similar to this study.

In accordance with Lande et al. (1998), a positive dose response relationship between parity and breastfeeding rates were present at both age intervals. Previous experiences of breastfeeding provide more knowledge and self confidence for multiparous mothers. Breastfeeding rates were also more common in vaginal deliveries. Similarly, Arab women in Israel (1988) who have had a Cesarean delivery were less likely to breastfeed than women delivering normally (Heldenberg, Tenenbaum & Weizer, 1993). The impact of caesarian delivery on breastfeeding has been found to be a risk factor for premature breastfeeding termination in six studies while the findings of ten other studies were unable to find such an association (Leung, Lam. & Ho, 2002).

Maternal education, family income, and place of residence were all significantly associated with breastfeeding. In developed countries, high maternal education, urban residence, and high income are positively associated with longer durations of breastfeeding, but they serve as risk factors for early breastfeeding termination in developing countries (Shirima, Gebre-Medhin & Greiner, 2001; Pande, Unwin & Håheim, 1997). In accordance with the developing countries literature, the trend of breastfeeding at 1 and 4 months of age was highest among the less educated, low income families and residents of Beirut suburbs.

Religion was a significant predictor of breastfeeding at 1 and 4 months of age. Muslim mothers breastfed more than two-folds the Christian women at 1 month while it increased to more than three-folds at 4 months. This result can be explained by Islam's encouragement of breastfeeding (Sharief, Margolis & Twonsend, 2001; Bågenholm, Kristiansson & Nasher, 1987). It is stated in the Holy Quran "a mother shall breastfeed her child for two years" (Shahraban et al. 1991). As for the infant's sex as a predictor of breastfeeding, results varied among countries. In Scandinavian countries, girls were found to be breastfed for longer durations than boys (Lande et al. 2003; Pande, Unwin & Håheim, 1997) whereas this trend is inverted in some Arab countries like Yemen (Musaiger, 1992) and Jordan (Akin et al. 1986). In this study, no significant associations were present, neither at 1 month nor at 4 months.

Finally, the odds of breastfeeding increased among early discharged women. Although a number of studies suggest the absence of an association (Madden et al. 2003; Gunn et al. 2000; Janson & Rydberg, 1998; Quinn, Koepsell & Haller, 1997; Kvist, Persson & Lingman, 1996; Winterburn & Fraser, 2000; Britton, Britton & Gronwaldt, 1999), Bussolati et al. (2000) and Margolis & Schwartz (2000) reported results similar to this study. This can be attributed to the absence of rooming in systems in the hospitals, unsupportive practices of healthcare staff, and the unmonitored promotion of formula milk by sale representatives (El-Mougi, Mostafa, Osman & Ahmed, 1981).

In conclusion, although breastfeeding rates are high at one month of age, it dropped at 4 months especially for full breastfeeding. Interventions targeting mothers, health professionals and hospital systems are highly needed. According to the results of the study, mothers of high socio-economic status, nulliparous, and who have had Caesarean deliveries can greatly benefit from counseling and educational programs on breastfeeding. Working mothers should as well receive supporting breastfeeding facilities in their work setting. Moreover, continuous training of professionals on proper support and promotion of breastfeeding is necessary. There exists, as well, a need for baby friendly hospitals in Lebanon that implement rooming in systems. Finally, further analysis at the multivariate level can provide more insight to the current results. Other studies on breastfeeding aiming to use WHO definition, assessing breastfeeding status before discharge, and investigating about mother's knowledge, attitude and perception on breastfeeding is warranted.

TABLE D.2. SOCIO-DEMOGRAPHIC CHARACTERISTICS AS PREDICTORS OF FULL BREASTFEEDING AT ONE MONTH OF AGE

	Full breastfeeding at 1 month				
	Full breastfeeding		Mixed & bottle feeding		
	N	%	N	%	OR (95% CI)
SOCIO-DEMOGRAPHIC CHARACTERISTICS					
Maternal age (N=879)					
< 25	122	67.4	59	32.6	**2.1 (1.3-3.2)**
25 – 35	289	54.1	245	45.9	1.2 (0.8-1.7)
> 35	82	50.0	82	50.0	1
Parity (N=889)					
0	194	47.4	215	52.6	1
1	150	59.8	101	40.2	**1.7 (1.2-2.3)**
≥ 2	152	66.4	77	33.6	**2.2 (1.6-3.1)**
Maternal education (N=808)					
Intermediate and below	113	68.5	52	31.5	**2.4 (1.5-3.8)**
Secondary	74	63.8	42	36.2	**2.0 (1.2-3.2)**
Technical	64	55.7	51	44.3	1.4 (0.9-2.3)
University (undergraduate)	120	45.8	142	54.2	0.9 (0.6-1.4)
University (graduate)	71	47.3	79	52.7	1
Paternal education (N=805)					
Intermediate and below	113	68.1	53	31.9	**2.0 (1.3-3.1)**
Secondary	75	64.1	42	35.9	**1.7 (1.0-2.7)**
Technical	39	41.5	55	58.5	0.7 (0.4-1.1)
University (undergraduate)	118	48.6	125	51.4	0.9 (0.6-1.3)
University (graduate)	96	51.9	89	48.1	1
Maternal employment status (N=808)					
Working	134	44.4	168	55.6	1
Not working	308	60.9	198	39.1	**2.0 (1.5-2.6)**
Household income (N=700)					
< $500	55	67.1	27	32.9	**2.7 (1.5-4.7)**
$500-$999	162	59.1	112	40.9	**1.9 (1.3-2.8)**
$1000-$1999	96	49.5	98	50.5	1.3 (0.8-2.0)
≥ $2000	65	43.3	85	56.7	1
Area of residence (N=831)					
Administrative Beirut	129	54.9	106	45.1	1
Beirut suburbs	146	64.6	80	35.4	**1.5 (1.0-2.2)**
Outside greater Beirut	194	52.4	176	47.6	0.9 (0.7-1.3)
Religion (N=803)					
Muslim	278	64.5	153	35.5	**2.4 (1.8-3.1)**
Christian	162	43.5	210	56.5	1

TABLE D.3. DELIVERY RELATED CHARACTERISTICS & INFANT CHARACTERISTICS AS PREDICTORS OF FULL BREASTFEEDING AT ONE MONTH OF AGE

	Full breastfeeding at 1 month				
	Full breastfeeding		Mixed & bottle feeding		
	N	%	N	%	OR (95% CI)
DELIVERY RELATED CHARACTERISTICS					
Admission status (N=893)					
Normal	484	56.0	380	44.0	**1.2 (0.6-2.5)**
Intensive care	15	51.7	14	48.3	1
Mode of delivery (N=900)					
Vaginal	371	58.9	259	41.1	**1.50 (1.1-2.0)**
C-section	132	48.9	138	51.1	1
Early discharge (< 48 hours) (N=853)					
No	314	49.6	319	50.4	1
Yes	159	72.3	61	27.7	**2.7 (1.9-3.7)**
INFANT CHARACTERISTICS					
Sex of the baby (N=1,020)					
Male	306	57.5	226	42.5	1.1 (0.9-1.4)
Female	268	54.9	220	54.1	1

	Mean	SD	Mean	SD	p-value
Birth weight (N=908)	3,286.9	463.5	3,302.5	431.4	0.601
Gestational age (N=859)	39.0	1.2	39.1	1.1	0.169

TABLE D.4. SOCIO-DEMOGRAPHIC CHARACTERISTICS AS PREDICTORS OF FULL BREASTFEEDING AT FOUR MONTH OF AGE

	Full breastfeeding at 4 month				
	Full breastfeeding		Mixed & bottle feeding		
	N	%	N	%	OR (95% CI)
SOCIO-DEMOGRAPHIC CHARACTERISTICS					
Maternal age (N=1,028)					
< 25	70	35.0	130	65.0	**1.8 (1.2-2.9)**
25 – 35	132	20.8	502	79.2	0.9 (0.6-1.3)
> 35	44	22.7	150	77.3	1
Parity (N=1,036)					
0	84	17.4	399	82.6	1
1	74	25.0	222	75.0	**1.6 (1.1-2.3)**
≥ 2	90	35.0	167	65.0	**2.6 (1.8-3.6)**
Maternal education (N=950)					
Intermediate and below	73	42.0	101	58.0	**3.7 (2.2-6.0)**
Secondary	41	26.8	112	73.2	**1.9 (1.1-3.2)**
Technical	29	22.3	101	77.7	1.5 (0.8-2.6)
University (undergraduate)	48	15.1	269	84.9	0.9 (0.6-1.5)
University (graduate)	29	16.5	147	83.5	1
Paternal education (N=946)					
Intermediate and below	64	35.6	116	64.4	**2.9 (1.8-4.7)**
Secondary	43	28.7	107	71.3	**2.1 (1.3-3.5)**
Technical	21	17.6	98	82.4	1.1 (0.6-2.0)
University (undergraduate)	57	20.1	226	79.9	1.3 (0.8-2.1)
University (graduate)	34	15.9	180	84.1	1
Maternal employment status (N=950)					
Working	41	11.3	323	88.7	1
Not working	179	30.5	407	69.5	**3.5 (2.4-5.0)**
Household income (N=825)					
< $500	36	41.9	50	58.1	**5.4 (2.9-10.0)**
$500-$999	90	27.2	241	72.8	**2.8 (1.7-4.7)**
$1000-$1999	42	18.2	189	81.8	1.7 (0.9-2.9)
≥ $2000	21	11.9	156	88.1	1
Area of residence (N=969)					
Administrative Beirut	62	22.9	209	77.1	1
Beirut suburbs	89	33.2	179	66.8	**1.7 (1.2-2.5)**
Outside greater Beirut	87	20.2	343	79.8	0.9 (0.6-1.2)
Religion (N=944)					
Muslim	164	33.1	332	66.9	**3.5 (2.5-4.8)**
Christian	56	12.5	392	87.5	1

TABLE D.5. DELIVERY RELATED CHARACTERISTICS & INFANT CHARACTERISTICS AS PREDICTORS OF FULL BREASTFEEDING AT FOUR MONTH OF AGE

	Full breastfeeding at 4 month				
	Full breastfeeding		Mixed & bottle feeding		
	N	%	N	%	OR (95% CI)
DELIVERY RELATED CHARACTERISTICS					
Admission status (N=1,041)					
Normal	249	24.7	759	75.3	**1.5 (0.6-2.5)**
Intensive care	6	18.2	27	81.8	1
Mode of delivery (N=1,049)					
Vaginal	190	26.0	542	74.0	**1.4 (1.0-1.9)**
C-section	64	20.2	253	79.8	1
Early discharge (< 48 hours) (N=995)					
No	141	19.0	601	81.0	1
Yes	96	37.9	157	62.1	**2.6 (1.9-3.6)**
INFANT CHARACTERISTICS					
Sex of the baby (N=1,174)					
Male	155	25.3	457	74.7	1.1 (0.9-1.5)
Female	131	23.3	431	76.7	1
	Mean	SD	Mean	SD	p-value
Birth weight (N=1,058)	3,285.9	458.7	3,310.2	419.5	0.450
Gestational age (N=1,000)	39.0	1.1	39.2	1.1	0.138

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3.5. Vaccination patterns during the first year of life

3.5.1. Background

Access to vaccination has varied between developing and industrialized countries. On average, it is estimated that a child in a developing country is ten times more likely to die from a vaccine-preventable disease than a child from an industrialized one. In some countries, up to 70% of children do not receive the full set of vaccines; the lowest coverage being in Sub-Saharan Africa (WHO, 2001). In Lebanon, 2.6% of the mothers reported that their children were never vaccinated according to The National Survey on The State of Lebanese Children (UNICEF, 2000). Inequality in access is even apparent between rural and urban areas within countries (WHO, 2001).

The controversy between the Centers for Disease Control (CDC) and the World Health Organization (WHO) recommendations regarding the use of inactivated polio vaccine (IPV) or oral polio vaccine (OPV) is a compelling factor that prompts pediatricians and other concerned players to assess the extent of their usage and evaluate their effectiveness accordingly. As of January 1st, 2000, CDC recommended the exclusive use of IPV for routine childhood polio vaccination in the United States to eliminate the risk for Vaccine-Associated Paralytic Poliomyelitis (VAPP). All children should receive four doses of IPV at ages 2, 4, and 6-18 months, and 4-6 yrs. OPV should be used only in countries where polio is endemic (MMWR, 2000). In contrast, WHO reaffirmed its position that "OPV alone is the basis for the global eradication of polio and that the addition of IPV is neither necessary nor recommended for this purpose." (WHO, 1995)

Pertussis constitutes another burden on newborns, particularly within their first year of life. Indeed, the global burden of pertussis is approximately 45 million cases and 409,000 deaths per year, with the highest incidence rates and risks of deaths and complications occurring in the developing world (WHO, 1999). Developed countries are sometimes no less likely to report Pertussis cases. During 1997-2000 in the United States, among 29,048 persons with Pertussis, 8,390 (29%) were less than one year. The average annual incidence rates were highest among infants aged less than one year (MMWR, 2002). Cellular pertussis (DTP) versus acellular petussis (DTaP) vaccines raised equal debatable concerns. Because of its high reactogenicity, Japan abandoned the use of DTP vaccine in 1970 (Shah et al. 2003). From 1997 to 1999, Australia followed Japan's lead (Torvaldsen et al. 2002). In contrast, for some developing countries the main obstacles against the use of DTaP are its high price and concern about its duration of protection. WHO endorses the use of DTaP vaccines of documented quality in cases where DTP vaccines are not widely accepted (WHO weekly epidemiological record, 1999). Likewise, based on published reports that indicate the effectiveness of DTaP vaccine when administered to 2, 4, and 6 months aged infants, the Food and Drug Administration has licensed three DTaP vaccines for use among children aged 6 weeks to 6 years (MMWR, 1997).

Regarding BCG vaccination, WHO recommends a single dose administered during infancy as a public health measure in developing countries with a higher prevalence of tubercular infection (1% and upper) (Kosecik et al. 2002). In India, where TB is highly prevalent, BCG should be given to all newborns within two weeks of birth as part of the National Immunization Program along with a zero doze of OPV (Kaur et al. 1999). Yet, vaccine schedules vary widely among countries. According to the Expanded Program on Immunization (EPI) classification of the WHO Eastern Mediterranean region, BCG is used in all but 3 countries (Cyprus, Jordan and Lebanon). Most countries/areas give BCG vaccine at birth, 2 countries (Bahrain and Tunisia) schedule additional doses at school age and Kuwait uses 1 dose at the age of $3^{1/2}$-4 years (Wkly Epidemiol Rec., 1996).

The main objectives of this section are to:

1) Assess neonatal vaccination patterns during the first year of life

2) Assess the prevalence of IPV versus OPV vaccines

3) Assess the prevalence of DTaP versus DTP vaccinations

4) Assess BCG vaccination patterns.

3.3.2. Methodology

Vaccination prevalence was assessed at different age intervals: 1-2months, 3-4 months, 5-7 months, 8-10 months, and 11-15 months. The main vaccines looked at were: Hepatitis B, Polio, DTP, Hib, BCG, Measles, MMR, and Varicella. Bivariate analysis was done to determine the predictors of BCG vaccine. Odds ratios and 95% confidence intervals were calculated for BCG vaccine accordingly.

3.3.3. Results

Table E.1 represents vaccination patterns cumulative for each age interval. By the end of the first year of life, there was almost a complete coverage for the three doses of polio, DTP, and Hib. Although high coverage rate was experienced in the first two doses of hepatitis B vaccination (97.3%, 96.5% respectively), it noticeably decreased for the third dose (87.7%). Since measles, MMR and varicella vaccinations are first introduced starting 9 months of age; the coverage rate was as low as 52.5%, 32.1% and 17.3% respectively. As for BCG, almost 19% of the cohort received it. It is worth noting that by the age of one year, 18 babies (1.7%) have missed any of the three shots of polio and DTP.

Table E.2 shows that the vast majority of the children received the cellular type of DTP. Although not as high as cellular DTP, the injectible form of polio was administered to a substantial number of children (>65.5%).

Table E.2. Cumulative patterns of IPV and cellular DTP administration up to 11-15 months of age

Vaccination coverage up to 15 months FUP		
	No.	%[a]
Injectible Polio (N=831)		
I	574	69.1
II	567	68.2
III	544	65.5
Cellular DTP (N=945)		
I	887	93.9
II	888	94.0
III	897	94.9

[a] Represents valid percentage

In general, BCG vaccination was more prevalent in low socioeconomic communities. A negative association, for example, was evident with maternal and paternal education. Fathers with primary education were three times more likely to vaccinate their children with BCG than fathers who have attained a university graduate degree. The monthly house income was also found to have a negative dose response relationship with BCG administration. As the income increased, an apparent decrease in BCG coverage took place. The parental working status was, as well, a significant predictor of BCG vaccination. Non-working mothers and fathers working in the public sector had higher rates of BCG coverage than their counterparts. Moreover, families that resort to dispensaries for medical care tend to vaccinate their children with BCG 2.6 times more than those who can afford to utilize private clinics. As for maternal age, an increasing trend of BCG use, although not significant all throughout the age groups, was experienced with younger age. Finally, residing in the Southern suburbs of Beirut, an economically disadvantaged community, increased the likelihood of BCG vaccination by 2.5 times than those residing outside Greater Beirut area (Table E.3).

3.3.4. Discussion

By the end of the first year of life, almost all newborns received the three doses of polio, DTP, and Hib vaccines recommended at each age interval. It follows that mothers are highly aware about the debilitating health consequences that may arise if they do not abide by the pediatrician's regulations. In contrast, vaccination for the third dose of Hepatitis B was not as prevalent as for the first two doses. As for the measles, varicella, and MMR, the patterns of vaccinations are clearly understandable given that they can be given at different age intervals and the practice varies among pediatricians.

Particularly, in terms of polio vaccination, results of the present study deviated more towards the CDC recommendations where a substantial number received IPV instead of OPV vaccine, although WHO recommends the exclusive use of OPV. Likewise, the Lebanese Ministry of Public Health is much more inclined towards the use of OPV as both types have their advantages and disadvantages. For instance, although IPV has been administered to a substantial number of newborns in our study, the literature shows that unlike OPV, IPV confers very little immunity to the intestinal tract. It is also expensive to purchase as opposed to OPV, and requires trained personnel to administer it. IPV also reduces the risk of VAPP. On the other hand, the risk of paralytic polio with OPV is 1/1 million vaccinated infants (Melnick et al, 1992).

Although according to the Expanded Program on Immunization (EPI) classification of the WHO Eastern Mediterranean region, Lebanon did not use BCG vaccine in 1996, still 19% of the cohort in our study was vaccinated for it. The study rate was even higher for the Beirut suburban areas where economic standards are lower as

compared to administrative Beirut and other areas of Greater Beirut. This might be an indicator that TB cases have been diagnosed and confirmed, thus creating a need to reintroduce the vaccine. The reverse can also hold true, where TB cases are under-reported, or if they are, may not be reported accurately. According to the head of Pulmonary Tuberculosis Center, the current policy is not to administer BCG vaccine, as the incidence of TB is low (10/100,000). Besides, from 2001 till 2003, there has been a decline in TB cases (500-427-380 cases respectively). The current policy, in turn, raises other questions. If the regulation is not to use BCG vaccine, then who is offering it and based on what criteria is it being administered? Similarly, given that BCG vaccination is highly prevalent in the Southern Beirut suburbs, it is perfectly understandable to see that those who sought medical care at a dispensary in our study were more likely to vaccinate their children for BCG, as medical consultation at a dispensary is cheaper than at a private clinic.

Unlike the common use of the DTaP vaccine in developed countries, as in Japan and Australia (Shah et al., 2003; Torvaldsen et al., 2002) , the majority of children received DTP at the time the study was conducted (August 2001-February 2003). One probable reason for its higher prevalence may be due to its cheaper price. However, it is worthy to investigate further whether current trends in DTP vaccination are still stable.

In conclusion, further research into the policies relating to newborn vaccination in Lebanon is needed to see whether they are properly implemented or not. Furthermore, pediatricians and concerned health sectors should encourage and promote standardized vaccination practices at the national level.

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TABLE E.1. CUMULATIVE PATTERNS OF VACCINATIONS[a]

	1-2 months FUP		3-4 months FUP		5-7 months FUP		8-10 months FUP		11-15 months FUP	
	No.	%[c]	No.	%[c]	No.	%[c]	No.	%[c]	No.	%[c]
Hepatitis B										
I[b]	890	67.5	842	72.5	1,028	91.9	896	96.6	1,023	97.3
II	549	41.7	761	66.6	862	77.6	878	95.1	1,012	96.5
III	-	-	26	2.3	443	40.2	614	66.9	918	87.7
Polio										
I	419	31.8	1,099	97.2	1,105	99.5	922	99.9	1,046	99.7
II	-	-	876	78.9	1,082	98.0	920	99.8	1,044	99.5
III	-	-	55	5.0	970	88.4	902	98.0	1,031	98.4
DTP										
I	422	32.1	1,102	97.4	1.105	99.5	922	99.9	1,046	99.7
II	-	-	853	76.8	1,079	97.9	920	99.8	1,044	99.5
III	-	-	52	4.7	966	88.0	902	97.9	1,039	99.1
Hib										
I	378	28.7	1,020	90.3	1,073	96.8	911	98.7	1,035	98.8
II	-	-	784	70.3	1,028	93.1	898	97.3	1,025	97.8
III	-	-	51	4.5	849	77.1	862	93.5	1,000	95.7
BCG	142	10.8	149	12.8	167	15.0	137	14.8	196	18.9
Measles	-	-	-	-	-	-	417	45.9	545	52.5
MMR	-	-	-	-	-	-	-	-	333	32.1
Varicella	-	-	-	-	-	-	-	-	179	17.3

a Cumulative vaccinations since date of birth.

b Roman numerals indicate the first, second and third doses of each vaccine.

c Valid percent.

TABLE E.3. SOCIOECONOMIC PREDICTORS OF BCG VACCINES AT ONE YEAR OF AGE.

		BCG vaccine			
	Total	N	%	OR	(95% CI)
Health care facility (N=1,037)					
Private clinics	874	141	16.1	1	
Dispensaries	163	55	33.7	**2.6**	**(1.8-3.8)**
Area of residence (N=866)					
Administrative Beirut	248	42	16.9	1.2	(0.8-1.8)
Beirut suburbs	227	67	29.5	**2.5**	**(1.6-3.7)**
Outside Greater Beirut	391	57	14.6	1	
Maternal age (N=925)					
< 20	23	7	30.4	2.4	(0.9-6.3)
20-24	150	40	26.7	**2.0**	**(1.2-3.4)**
25-29	274	47	17.2	1.1	(0.7-1.9)
30-34	291	51	17.5	1.1	(0.7-1.9)
≥ 35	187	29	15.5	1	
Maternal Education (N=881)					
Primary	30	8	26.7	**2.7**	**(1.1-7.0)**
Intermediate	129	39	30.2	**3.3**	**(1.8-6.0)**
Secondary	135	34	25.2	**2.5**	**(1.4-4.7)**
Technical	123	15	12.2	1.0	(0.5-2.2)
University (undergraduate)	302	35	11.6	1.0	(0.5-1.8)
University (graduate)	162	19	11.7	1	
Paternal Education (N=879)					
Primary	44	11	25.0	**3.0**	**(1.3-6.9)**
Intermediate	119	34	28.6	**3.6**	**(2.0-6.7)**
Secondary	134	24	17.9	**2.0**	**(1.0-3.7)**
Technical	107	22	20.6	**2.3**	**(1.2-4.5)**
University (undergraduate)	274	39	14.2	1.5	(0.8-2.7)
University (graduate)	201	20	10.0	1	
Mother's current work status (N=881)					
Working	338	36	10.7	1	
Not working	543	114	21.0	**2.2**	**(1.5-3.3)**
Father's sector of employment (N=866)					
Private	758	115	15.2	1	
Public	108	31	28.7	**2.3**	**(1.4-3.6)**
Monthly household income (N=764)					
< $500	79	26	32.9	**16.4**	**(3.7-72.4)**
$500-$999	298	65	21.8	**9.3**	**(2.2-39.2)**
$1000-$1999	217	30	13.8	**5.4**	**(1.3-23.1)**
$2000-$2999	101	8	7.9	2.9	(0.6-14.0)
≥ $3000	69	2	2.9	1	

* As defined by AAP

4. CONCLUSIONS & RECOMMENDATIONS

To date few, if any, cohort studies were conducted in Lebanon and the region to assess morbidities and outcomes in healthy infants less than one year of age. Most Studies reviewed from the literature invariably included either at risk, sick newborns, or primary school children. The follow up study by the NCPNN can be regarded as pioneering in being the first cohort study that involves a considerably large number of newborns (1,320) selected from the Greater Beirut area, Lebanon. It also encompasses more than one outcome measure and assesses their incidence rates. Examples of studied outcomes included: vaccination and breastfeeding practices, morbidities, impact of early discharge, and others. The collaborative nature of this study, embodied in the form of a network of research team members, pediatricians, and trained personnel, has facilitated the progress of the study throughout its different phases. Particularly, the collaboration of 117 pediatricians as well as trained personnel with varying level of expertise, and the exemplary coordination of efforts on behalf of the research team, makes this study even more valuable and unique. The network team members were very cautious about data collection in an attempt to reduce potential biases. For instance, to reduce the possibility of having misclassification bias, specifically recall bias, several outcomes were assessed at different time intervals during the newborn's first year of life. Another positive aspect relates to the low rate of loss-to-follow up that was ensured through relying on multiple sources of follow up, thus reducing the potential for selection bias. Newborns that changed their pediatrician were kept track of. Phone calls facilitated the follow up process as well. Besides, the comprehensive nature of this study will allow us to look at the net effect of certain factors on specific outcomes thus accounting for confounding bias in future studies. It is worth noting that the cohort was chosen from healthy newborns delivered in the greater Beirut area. Therefore, the data in this monograph should be carefully interpreted.

Apart from its comprehensiveness, the study bared a social impact on participating mothers. It helped strengthen social interactions and establish a trusting relationship between parents and pediatricians. The study also helped increase awareness and knowledge among mothers about certain health issues relating to maternal postpartum care (CBC, Pap smear….).

Despite the above strengths, the study had some limitations: Five questionnaires had to be filled at different age intervals (1-2, 3-4, 5-7, 8-10, and 11-15 months) and not all items were completed giving rise to missing data. The number of the questionnaires could have been reduced to three targeted at newborns of 1month, 6 months, and 1 year without affecting the quality of the data obtained. Some pediatricians probably did not have the time to go over every item in detail and fill it appropriately due to their busy schedule. In addition, questionnaires were very condensed with information, hindering the ability to obtain complete and sometimes accurate responses. The large number of participating pediatricians raises questions regarding uniformity or standardization when filling the different questionnaire items.

The results derived from this study carry several implications for further analysis, research, and interventions. An interesting finding relates to the considerable percentage of women who are delivering at an older age (35 years and above), which may have potential repercussions on the fetus. Consanguineous marriages (12.7%) represent another issue worth investigating further, because of the health risks that such marriages may incur. In addition these marriages would be expected to be higher had the sample been recruited from Lebanon as a whole. Therefore, further research is warranted to assess the prevalence of consanguineous marriages in Lebanon and the characteristics of those involved in such marriages. The high rate of antibiotic use among newborns is another compelling factor for further research into the reasons behind such a high use and the extent of accompanying antibiotic resistance. There is also a need to standardize vaccination practices. In terms of the impact of early discharge on hospital readmission, this study

found that increased hospital readmissions were associated with early discharge (although they were not statistically significant). As such, further studies of a larger sample size involving both sick and healthy newborns are needed to examine the nature of this relationship even further. The inclusion of sick newborns in future studies will also enable us to identify those at risk of developing or contracting morbidities, which minimizes the incidence of morbidities and makes us better able to assess their prevalence.

Taken from a public health perspective, findings of this study suggest that mothers require awareness and education on some aspects of infant care. For instance, it was found out that 7% of the infants slept on their stomach, although this sleeping position is not recommended for newborns. Thus, health professionals should alert the mother to the hazards associated with the stomach sleeping position (e.g. as in chocking, suffocation…) and provide her with appropriate guidelines for newborn care. With respect to breastfeeding, results showed that only 6.8% were full breastfeeding at one year. Such low rate should be an incentive for pediatricians and all concerned sectors (WHO, Ministry of Health, family planning associations, hospitals…) to promote awareness to the importance of breastfeeding and encourage mothers to abide by the WHO recommendations for breastfeeding. The medical staff, including nurses, residents, and others should be equally aware of the importance of breastfeeding and help institutionalize its practice in hospitals. Incorporating its value into the educational curriculum of the medical staff could be an attempt to raise awareness about breastfeeding importance among the medical sector itself. Likewise, Mothers who are early discharged should be well informed about the importance of following up on their newborn's health, as there are some diseases (e.g. hyperbilirubinemia, cardiac lesions) that may not show any symptoms in the first day or two.

Study findings have helped highlight the direction for future interventions that could focus on different health care issues such as the elevated rate of C-section in an attempt to understand the predictors of such a high rate. In what relates to breastfeeding, future interventions should focus on integrating breastfeeding facilities at the workplace for employed mothers. Moreover, establishing baby-friendly hospitals that favor breastfeeding can help install the practice among newly-delivered mothers. With regards to early discharge, pediatricians as well as others involved in the medical sector should ensure a proper follow-up of early discharged infants. The lack of car seat use among 24% of the mothers for their newborns raises concerns as to their child's safety and should motivate pediatricians to discuss child safety measures, particularly with newly-delivered mothers. At the policy level, just as seat belt use became mandatory in Lebanon in recent years, similar policies should be issued regarding car seat use to ensure that all baby passengers are safe.

In conclusion, the wealth of data gathered during this study on the first year of life necessitates further in depth analysis. It also undermines the necessity to continue the follow up study of the same cohort over the first five years. Children grow up in a complex environment and accordingly it is necessary to define the determinants of Lebanese children's health in the first five years, a most critical period of life.

4. Conclusion and recommendations

"Bettering the attribute of medical care in virtue of healthy mothers and newborn infants through a coordinated program of research and scholarship".

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