NEONATAL SURVIVAL IN ADDIS ABABA

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ABSTRACT

Neonatal mortality is estimated to be high in many developing countries but, very few studies were conducted in this area. To illucidate the magnitude of neonatal mortality and identify its determinants, a descriptive cross sectional study on a cohort of newborns was carried out in Addis Ababa health institutions between November 8 to January 19 1994.

A total of 1334 newborns participated in the study. Baseline information on the risk behavior of the mother and child characteristics were recorded just after delivery. Then follow up interview were carried out by visiting each neonate at home on the 7th and 28th day. In this study the prevalence of neonatal mortality was found to be 71.9 per 1000 live birth with early and late neonatal mortality of 50.9 and 20.9 live birth respectively. Low birth weight babies, premature babies and babies born from mothers who were not family planning users were found to be at higher risk of neonatal death using both bi-variate and multi-variate analysis.

The study concluded neonatal mortality is very high and strengthening of neonatal care facilities and further study to determine the prevalence rate of neonatal mortality among home deliveries are recommended.

ADDIS ABABA UNIVERSITY

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INTRODUCTION

Developing countries are known to carry a heavy burden of diseases and death. This is seen mainly in vulnerable groups such as children and women in the reproductive phase of life; in these groups inadequate nutrition, physiologic demands and lack of resistance make the effects of diseases more serious. The hostile physical environment in the developing world also manifests itself in a high infant and child mortality, and a low life expectancy. These two indices taken together give an indication of the health of a community(1). Social and economic developments in the Western world were accompanied by a steady decline in childhood morbidity from nutritional and infective disorders(2).

In Ethiopia, perinatal and neonatal mortality rates are undoubtedly very high. Causes of perinatal and neonatal deaths can be classified as nutrition- related and disease- related, but it should be remembered that as with infant mortality in general, there is an interaction between nutrition and disease(3).

In Addis Ababa the increase in population coupled with the poor economic standard of the country has led to a significant deteroration in the quality of life of the city people and is believed to have a negative influence on child survival.

Neonatal deaths are those that occur in the first four weeks of life. Perinatal, neonatal and infant mortality rates are the most important vital statistics used to assess maternal and child health care programs. They are indicators of the quality of antenatal care, medical services and general health services to the mothers and children(4,5).

Neonatal and infant mortality rate also reflect the socioeconomic status of the community. The accuracy of these official statistics about these indices in most developing countries has been questioned and thus cast doubt on the appropriateness of their use for evaluation and resource allocation in developing countries. Published official statistics usually present a biased image of public health and in almost every case underestimate the health problem(6). For instance, levels of neonatal mortality are believed to be high in developing countries; but lack of reliable data has resulted in underestimation of the problem. Very few developing countries have reliable data from community based studies or vital registration records(7).

Neonatal death reflects the inadequacy of paediatric care. It is however, largely influenced by the propertion of low birth weight infants. Ethiopia has high incidence of low birth weight deliveries, which is estimated to be one of the highest in the world(8,9,10).

Priority health problems of the community in most developing countries are generally preventable and affect mostly children and women. Such problems include childhood communicable diseases and widespread malnutrition which have their root causes in poverty, illiteracy and inequity (11). Hence, neonatal morbidity and mortality in developing countries will be largely uninfluenced by technological advances in the field of neonatal paediatrics until nutrition and other basic health requirements are fulfilled, and basic obstetric services extend to the majority of the population(12).

Some important neonatal problems, which exist especially in developing countries like Ethiopia, are low birth weight, birth asphyxia and trauma, infections such as syphilis,malaria and neonatal tetanus and social problems like motherless babies and harmful customs, beliefs and taboos(13,14,15).

Useful approaches to prevent neonatal morbidity and mortality include placing greater emphasis on identifying and reducing risks before pregnancy, increasing access to the use of early and regular high quality prenatal care for all pregnant women and enriching the content of perinatal care of both high and low risk women (16).

Although neonatal mortality rates are estimated to be high in many developing countries very few studies were conducted in this area (17). To allocate limited resources appropriately and to evaluate the effects of cause- specific interventions, it is very important to know the magnitude and the major causes of neonatal mortality. It was with these intentions that this study was conducted.

LITERATURE REVIEW

Maternal and perinatal morbidity and mortality are common worldwide problems. Globally 500,000 pregnancy related deaths are believed to occur annually. 95% of these deaths occur in developing countries where 85% of all births take place (18).

Magnitude of the problem in developing countries

Neonatal morbidity and mortality is much worse in developing countries than in the developed World. In order to have a general overview of the problem, examples of some developing countries are discussed.

Neonatal death is largely influenced by the proportion of low birth weight infants. Low birth weight which is usually defined as a birth weight below 2,500 grams is probably the best indicator of fetal malnutrition and is one of the most important determinants of neonatal mortality. 13% of children born in Ethiopia are under weight at birth. Average birth weight in Ethiopia are 10% lower than those of babies born in most industrialized countries(19).

A survey done in two hospitals in Addis Ababa in 1965, indicate, early neonatal deaths accounted for only a quarter of perinatal deaths and most of these deaths took place in the first 72 hours of life. The early neonatal death found in this survey was 29.7 per live births (10).

In Africa, in general, though reliable data supported by research are not available, it is estimated that most deaths occur at home. In Kenya, for example, it is estimated that neonatal mortality rates are between 35 -100 per 1000(20). A follow up study was conducted in six community health centers to determine the risk factors which influence neonatal survival in central

Sudan estimated neonatal mortality rate to range between 20 and 36 per 1000 live birth. The major cause of death was tetanus neonatorum which accounted 29% of for all neonatal deaths(21).

In Brazil,which is the largest country in Latin America, has a persistently high infant mortality rate around 70 per 1000 live births in the period 1980-1985. More than half the infant deaths in Brazil occur during the neonatal period, and over 70% of neonatal deaths occur in the early neonatal period during the first week of life(22).

In Central America, as in most regions of the developing world, infant mortality rates are several times higher and have declined less rapidly than mortality among 1 to 4 year old children. Infectious diseases including diarrhea, acute respiratory infection and vaccine preventable diseases have been documented to be the principal causes of mortality among under 1 children. In Guatemala the 1987 National Maternal Child Health Survey found neonatal mortality to comprise almost half of all infant mortality during the period 1977 to 1987(23).

Perinatal and neonatal mortality rates are also high in India. Hospital based estimates show that the figure goes between 57 to 106 per 1000 births. In southern India a population surveillance study has reported perinatal mortality rates of 68.8 per 1000 in rural and 62.8 in urban areas(24).

In Ethiopia, a study was conducted to analyze the outcome of deliveries in Jimma hospital between the years 1985 and 1989. There was a total of 4251 deliveries, of which 769 were abnormal. There was a total of 371 perinatal deaths. The perinatal morbidity and mortality rates were 53.5 and 95.9 per 1000 live births respectively(25).

Determinants of neonatal mortality

Several risk factors for neonatal mortality and morbidity have been identified. Demographic characteristics of the mother play the vital role in the outcome of pregnancy and survival and status of the child. The major determinants are discussed in brief.

The age of the mother at the time of pregnancy has a significant effect on the outcome of pregnancy. Teenage pregnancy carries a number of risks to both mother and baby which include the risk of maternal complications from pregnancy and delivery, low birth weight, increased neonatal mortality and infant mortality. Poor nutrition and immature maternal reproductive development could be among the factors that adversely affect the outcome of pregnancy to very young mothers while the maternal depletion syndrome and weakness of the maternal reproductive tissue may contribute to the higher risk of births defects to older ones. The effect of maternal age on attitude toward breast feeding is also an essential factor in the mechanism through which maternal age influences child survival(26,27,29,31).

Marital status of the mother is an important factor in the survival of the baby. Babies born of single mothers usually have higher morbidity and mortality rates compared to the married mothers who are in union. Single mothers were observed to be less likely to feed adequate and balanced diet both themselves and their babies as well as to attend prenatal cares on time; consequently, babies born to them were under weight at birth(30). In addition to the declining socio-economic status, widowhood and divorces are associated with substantial stress, which are believed to considerably affect infant health (26,30).

The educational status of the mother, particularly female literacy, is one of the most basic characteristics of the mother associated with the outcome of pregnancy and survival of the baby. The lower the standard of education of the mother, the lower the chances of survival for the baby. Maternal education is suggested as a way of reducing infant mortality. It provides the mother with the necessary skill for child care. Educated mothers are well aware of the nutritional and health needs of newborns babies with optimal spacing convenient to get more time for child care which in turn improve the chances of survival of babies. Education through its impact on income permits the mother to provide the necessary pre and postnatal care of the baby (26,31).

Low social class (poverty) is a potent factor in neonatal and infant mortality because it is accompanied by such other circumstances as less education, substandard housing, poor diet, illiteracy and less access to health care(26,29,31,32).

Family size, adequate birth spacing, and avoiding pregnancy at the extremes of the reproductive span are important factors in reproductive outcome. Family size affects the demand for family resources (food, housing, maternal care and attention, and health care opportunities within the family). Birth spacing has also significant impact on infant mortality. The competition for maternal and family resources among closely spaced children Known to affect the health of younger and older siblings(33).

In addition to the above demographic factors, other studies showed that chat chewing, cigarette smoking, diseases during pregnancy, lack of antenatal care and intrapartum complication result in high neonatal mortality rate.

Absence of antenatal care during pregnancy and complications during labour were shown to be associated with increased risks of

neonatal death (34).

Diseases like syphilis, malaria and anemia occurring during pregnancy put the child in a higher risk of neonatal morbidity during the neonatal period. They also increase mortality rates in early infancy (35,36).

Cigarette smoking during pregnancy is an important avoidable factor associated with low birth weight and neonatal death. Proposed physiological mechanisms for the effect of smoking on birth weight include hypoxia, which can be due to increased levels of carbon monoxide or to vasoconstrion of the umbilical arteries and direct toxicity from components of smoke such as nicotine and cyanide (37).

The effects of chat (catha edullis) on birth weight have been studied. It was found that healthy full term, singleton babies, born after uneventful pregnancies and deliveries had a significantly lower average birth weight when the mothers are chat chewers, either habitually or occasionally. Chat chewing appears to be one of the several material practices adverse to the fetus and later to the neonate. The mechanism behind the effect of chat on birth weight is not known. However one of the active substances in catha edullis, d-norpseudoephedrine, has been shown to have adverse effects upon the placental blood circulation, particularly if it is already impaired for other reasons. Chat also has an anorectic effect, which could influence the birth weight negatively because of the decreased maternal food intake (38).

OBJECTIVES

General objective

To determine the neonatal mortality rate and, its determinants among babies delivered in health institutions in Addis Ababa.

Specific Objectives

1. To determine the pervalence rate of neonatal mortality among babies delivered in health institutions in Addis Ababa.

2. To identify factors associated with neonatal mortality.

METHODS AND MATERIALS

Study design and population

The study utilized a descriptive cross-sectional design with internal comparison.

The study was conducted on a cohort of newborns delivered in the health institutions of zone 1 and zone 2 of Addis Ababa from November 8 1994 to January 19 1995. Zone1 and 2 were selected because zone 1 was the the residince area for the principal investigator and zone 2 was added to obtain adequate sample size in the limited time available for the research. Figure 2 shows the source of the study population. Recruitment into the study was done between November 8 1994 to December 22 1994 in the health institutions which exist in the two zones. Figure 4 summarizes the study design, inclusion /exclusion criteria and the selection hierarchy.

Inclusion:- Live birth, singleton babies who are residents of Addis Ababa.

Exclusion:- Stillbirth
Multiple deliveries
Residents outside Addis Ababa.

Study domain

Addis Ababa is the capital city of Ethiopia with an estimated population of 2.4 million. According to a census conducted in 1984, its population growth rate is 5.1% and the fertility rate was 3.2%(39). High migration rates from the countryside by people looking for employment opportunities and a better life has also contributed to the tremendous increase of the capital's population.

Addis Ababa has a relatively higher number of health institutions compared to the other parts of the country. There are 12 hospitals, 14 health centers, about 74 clinics and 24 health posts. Out of these health institutions 5 of the hospitals, 12 of the health centers and 5 of the clinics render delivery services. In the year 1993-94,(1986 Ethiopian calendar) it was estimated that about 50 - 60% of the mothers in Addis Ababa delivered in these health institutions,a total of 32,000 deliveries reported by the health institutions during that year(40).

Sampling size determination

Sample size : Assuming the general prevalence of neonatal mortality to be 10%, with 90% power and 95% certainty and the ratio exposed to non-exposed at 1:4 the sample size required for the study was calculated to be 1365.

Data collection and management

Baseline data and follow-up information were collected using pretested questionnaire. The questionnaire was prepared in English and later translated into Amharic and back translated into English. Midwives and high school graduates were recruited for the data collection. The midwives were responsible for completing baseline data questionnaire and the high school graduates filled in the follow up questionnaire at home on the 7th and the 28th day after birth. One research assistant, a nurse, was recruited for supervision. A 3-day theoretical and practical training was given to all of the research assistants. The questionnaire was pretested on deliveries occured during the training period in zone 1 and 2 health institutions and appropriate adjustments were made in the final draft of the questionnaire. Regular checking of data quality was conducted by the research coordinator. The principal investigator monitored the overall quality and conduct of the study. The data was entered using EPI-INFO version 5 statistical package for appropriate analysis.

Measurement

Exposure :- The exposure variables of interest which were birth weight, perinatal events, reproductive history and health behavior were obtained from base line data which was collected by the midwives immediately after birth.

Outcome :- neonatal mortality

Data analysis

Frequencies, percentage and rates were calculated for all variables. Rate ratios and multi-variate analysis were done to look into associations and control for confounding factors. The data were analyzed using EPI INFO version 5 and SAS statistical packages.

Operational definitions

ANC user _ Those mother who attend antenatal care during the last pregnancy atleast once.

FP user _ Those mother who attend family planning service, that is who use birth control method, before the last pregnancy.

Alcohol consumption _ Those mother who use to drink alchol during the last pregnancy.

Chat chewing _ Those mother who used to chew chat during the last pregnancy.

Cigarette smoking _ Those mother who smoked cigarette during the last pregnancy.

Ethical considerations

This study had no harm to anyone and there was no obligation to participate in the study. Informed consent was obtained from all study participants. All information was kept confidentially by the principal investigator. Referal was arranged for those neonate who were reported sick during home visits.

RESULTS

A total of 1606 deliveries took place during the enrolment period, November 8 1994 to December 22 1994. Out of these 180 (11%) were from other areas (outside Addis Ababa), 38 were still birth, two were triple deliveries (6 babies) and 25 were twin deliveries (50 babies), and the remaining were 1334 singleton live births, who are residents of Addis Ababa. Hence, the analysis was focused on the later, 1334 singleton live births.

Table 1 summarizes the distribution of maternal characteristics of the study population. 785 (58.9%) of the mothers were in the age group 20-29. 214 (16%) of the mothers were illiterate and from those mothers who were literate, 37.6%, 39.5% and 6.9% had primary, secondary and college education respectively. 591(44.3%) of the families reported an income below 250 birr per month, which are grouped as low income and the rest 55.7% reported income above 250 birr per month. 1160 (87%) of the mothers were married living in union at the time of the study and the rest 174 (13%) were never married,widowed and divorced. The majority (87.4%) of the mothers had at least ANC consultation during this last pregnancy and 42.1% of mothers were FP service users before this last pregnancy.

Table 2 summarizes distribution of risk factors for neonatal survival among the mothers. In this series 21 (1.6%) smoked cigarette, 93 (6.9%) chewed chat and 217 (16.2%) drank alcohol during their last pregnancy, for which they are entered into this study.

As shown in table 3 there were 693 (51.9%) male and 641 (48.1%) female newborns. 122 (9.1%) were low birth weight and 17.8% (237) were premature babies. 42.3% (564) of the babies were single child of their family.

Table 1: Socio-demogrphic characteristics of the mothers in Addis Ababa, 1994.

	Number	Percent
Maternal age		
15-19	136	10.2
20-24	385	28.9
25-29	400	30.0
30-34	248	18.6
>35	165	12.3
Total	1334	100.0
Education		
Illiterate	214	16.0
Grade 1-8	501	37.6
Grade 9-12	527	39.5
Grade >12	92	6.9
Total	1334	100.0
Income		
1-100	298	22.3
101-250	293	22.0
251-600	477	35.8
>600	266	19.9
Total	1334	100.0
Marital status		
Married	1160	87.0
Single parent	174	13.0
Total	1334	100.0
ANC user		
Yes	1166	87.4
No	168	12.6
Total	1334	100.0
FP user		
Yes	561	42.1
No	773	57.9
Total	1334	100.0

Table 2: Maternal risk behaviours Addis Ababa, 1994.

Risk factors	Number	Percent
Cigarette smoking		
Yes	21	1.6
No	1313	98.4
Total	1334	100.0
Chat chewing		
Yes	93	6.9
No	1241	93.1
Total	1334	100.0
Alcohol consumption		
Yes	217	16.2
No	1117	83.7
Total	1334	100.0

Table 3: Selected demographic characteristics of the neonate in Addis Ababa, 1994.

Characteristics		Number	Percent
Sex			
	Male	693	51.9
	Female	641	48.1
	Total	1334	100.0
Gestational age			
	28-37 weeks	237	17.8
	>37	1097	82.2
	Total	1334	100.0
Birth weight			
	<2500	122	9.1
	≥2500	1212	90.9
	Total	1334	100.0
Birth order			
	0-1	564	42.3
	2-4	542	40.6
	>4	228	17.1
	Total	1334	100.0

On the 7th day home visit, of 1334 live singleton babies. 61 were lost to follow-up and 68 neonate were reported dead. On the 28th day 10 were lost to follow-up and 28 neonate were reported dead. Hence, neonatal mortality rate was 71.9 per 1000 live birth with early and late neonatal mortality rates of 50.9 and 20.9 per 1000, respectively.

Table 4 shows the distribution of maternal characteristics and neonatal death, and the crude and adjusted odds ratios for the risk factors included in the final logistic regression model. As shown in the table those babies born from mothers who were non user of FP methods were found to be at a higher risk of neonatal death in the multi-variate analysis. Eventhough there are no stastically significant association found between the remaining variables and neonatal death, there are some socially relevant results these are single mothers are found to be at higher risk of neonatal death than married mothers. The highest income group are at lower risk of neonatal death than the lowest income group. Highly educated mothers are at lower risk of neonatal death than illiterate mothers and those mother who are not users of ANC are at higher risk of neonatal death than users.

Table 5 summarizes effect of maternal risk factors on neonatal death. In this study using the final logistic regression model no stastically significant association found between cigarette smoking, chat chewing and alcohol consumption and neonatal mortality. Among the child characteristics studied gestational age and birth weight had both clinically and statically significant effect on neonatal survival. The odds of neonatal death among term and normal birth weight babies were lower than the pre-term and low birth weight babies. Odds ratio 0.33(0.19,0.59) and 0.06(0.04,0.12), respectively(table 6).

Table 7 shows distribution of type of reported illness before death. Of the 96 deaths 51 (53.1%), 43(44.8%) and 20(20.8%) were attributed to shortness of breath, vomiting and fever respectively. Other symptoms include diarrhoea, cough, skin rash, eye disease and failure to suck.

Table 4: Neonatal mortality and related maternal characteristics in Addis Ababa, 1994.

		Death		
			Crude	Adjusted
	Popn.	Number(%)	OR 95%CI	OR 95%CI
Maternal age				
15-19	125	9 (7.2)	1.00	1.00
20-24	362	29 (8.0)	1.13(0.54,2.38)	1.18(0.48,2.95)
25-29	382	21 (5.5)	0.76(0.34,1.70)	1.12(0.41,3.07)
30-34	236	22 (9.3)	2.11(0.72,6.20)	2.11(0.72,6.20)
35+	158	15 (9.5)	1.37(0.58,3.23)	1.60(0.47,5.50)
Marital status				
Married	1104	70 (6.3)	1.00	1.00
Others	159	26 (16.4)	2.92(1.80,4.74)	1.30(0.61,2.80)
Income				
0-100	279	37 (13.2)	1.00	1.00
101-250	277	25 (10.5)	0.65(0.38,1.11)	0.99(0.49,1.99)
251-600	453	22 (4.9)	0.33(0.19,0.57)	0.57(0.27,1,19)
601+	254	12 (4.7)	0.32(0.17,0.64)	0.48(0.18,1.27)
Maternal education				
Illiterate	202	24 (11.9)	1.00	1.00
1-8	476	33 (6.9)	0.56(0.32,0.97)	0.80(0.40,1.59)
9-12	499	35 (7.0)	0.56(0.32,0.97)	0.85(0.40,1.79)
12+	86	4 (4.7)	0.36(0.12,1.07)	0.62(0.15,2.58)
ANC during last pregnancy				
used	1105	70 (6.3)	1.00	1.00
Not used	158	26 (16.5)	2.90(1.78,4.69)	1.66(0.87,3.17)
FP service				
Non-user	736	66 (9.0)	1.00	1.00
user	527	30 (5.7)	0.61(0.39,0.96)	0.50(0.29,0.87)

Table 5: Neonatal mortality and related maternal risk behaviour in Addis Ababa, 1994.

Risk Factors	Popn.	Death Number (%)	Crude OR95%CI	Adjusted OR95%CI
Cigarette smoking				
Yes	19	6 (31.5)	5.92(1.95,17.20)	1.22(0.33,4.39)
No	1244	90 (7.2)	1.00	1.00
Chat chewing				
Yes	85	15 (17.6)	2.90(1.52,5.48)	0.87(0.39,1.95)
No	1178	81 (7.4)	1.00	1.00
Alcohol consumption				
Yes	209	21 (10.0)	1.46(0.05,2.49)	0.81(0.80,1.49)
No	1054	75 (7.1)	1.00	1.00

Table 6: Demographic characteristics and neonatal mortality in Addis Ababa, 1994.

		Death	
		Crude	Adjusted
	Popn.No.(%)	OR 95%CI	OR 95%CI
Sex			
Male	656 51(7.8)	1.00	1.00
Female	607 45(7.4)	0.95(0.63,1.45)	0.74(0.46,1.22)
Gestational age			
28-37	223 35(15.6)	1.00	1.00
>37	1040 61(5.9)	0.34(0.22,0.52)	0.33(0.19,0.59)
Birth weight			
<2500	112 49(43.8)	1.00	1.00
≥2500	1151 47(4.1)	0.06(0.03,0.09)	0.06(0.04,0.12)
Birth order			
0-1	527 42(8.0)	1.00	1.00
2-4	514 39(7.9)	0.95(0.60,1.50)	0.54(0.81,2.88)
5+	222 15(6.8)	0.84(0.46,1.55)	0.71(0.28,1.82)

Table 7: Symptoms of ill health before the death of the neonate in Addis Ababa, 1994. N0= 96

Type of illness	Freq	Percent
1. Shortness of breath	51	53.1
2. Vomiting	43	44.8
3. Fever	20	20.8
4. Cough	11	11.5
5. Diarrhoea	11	11.5
6. Others	23	23.9

* Percentage did not add-up to 100 because of multiple symptoms report.

DISCUSSION

In this study the pervalence rate of neonatal mortality was found to be 71.9 per 1000 live birth with early and late neonatal mortality rates of 50.9 and 20.9 per 1000 live birth, respectively.

The high prevalence of neonatal mortality found in this study is consistent with the report that Ethiopia has an infant mortality rate among the highest in the world and there is reason to believe that many infant deaths occur with in the child's first month of life (19). There could be ,however a slight overestimation of neonatal deaths due to reference of high risk group to health institutions.

This study revealed a significantly higher risk of neonatal mortality among the low birth weight babies. This result is in consistent with other studies done in Ethiopia and other developing countries (10,18). Pre-term newborns were also found to be at higher risk of neonatal mortality using the final multi-variate analysis, similar to previous reports from other developing countries (20,27).

Though in other studies family size was an important factor in reproductive outcome and child survival, since family size affects the demand for family resources (33), no statstically significant association was found between family size and neonatal mortality in this study. This could be due to the fact that only the nucleus family is considered in the study and did not allow to observe the effect of extended family which is very common in our society.

Studies showed that the lower the standared of education of the mother, the lower the chances of survival for the the baby. Maternal education is suggested as a way of reducing infant

mortality, since it provides the mother with the necessary skill for child care(26,31). In this study although no statistically significant association was found, the difference between illiterate and highly educated mothers was remarkable, that is, babies born from highly educated mothers were at a lower risk of mortality than babies born from illiterate mothers.

Marrital status has been found to be associated with infant mortality in previous studies. Babies of single mothers were considered as high risk groups in terms of neonatal mortality compared to those babies from married mothers, the explanation being that single mothers may be less likely to feed adequate and balanced diet both for themselves and their babies as well as to attend prenatal cares on time(30,32). Eventhough no statstically significant association was found between marrital status and neonatal mortality in this study. But, it has to be noted that babies born from single mothers had a higher risk of neonatal death as compared to babies born from married mothers.

Babies born from low income families are believed to be at a higher risk of mortality than those of babies from higher income group (26,31,32). This study found no statstically significant association between income and neonatal mortality, this may be due to the information generated from the mothers about their income, most of the mothers were reluctant to tell their income. Therefore, information obtained on income should be considered carefully (41). However, a remarkable gap between the lowest and the highest income group was observed, that is, the lowest income group was at higher risk of neonatal death than the highest income group.

The association observed between maternal age and child survival in other studies was not seen in this study. This may be due to the fact that most mothers may not know or told their exact age, the reliability of reported age is a problem in most places where vital events registration is non- existence.

In this study babies born from mothers who were family planning users were found to be at a lower risk of neonatal mortality than those born from non users, which is consistent with other studies too. Unlike other studies ANC attendance showed no stastically significant association with neonatal mortality in this study. This may be due to the fact that in this study no consideration was given to the number of follow up or visits made by the mother during the life of her pregnancy. Clearly only one visit may not bring any change. Eventhough no stastically significant association was not found to be at a lower risk of neonatal death than non user.

Although Cigarette smoking, chat chewing and alcohol consumption by pregnant women were found to be associated with neonatal mortality(37,38), in this study no stastically significant association was observed between cigarette smoking, chat chewing and alcohol consumption and neonatal mortality. This may be due to the effect of cigarette, chat and alcohol depends on the dose, duration and the kind of consumption used, which are not considered in this study, and also the small number of women reported using these substances.

Stillbirths, twins and triples deliveries were excluded from the study and this exclusion may have underestimated neonatal mortality. Non-singlton babies are known to be at higher risk of dying. Losses to follow up were small, 71 (5.3%) of cohort member. When considering the complexity of doing follow-up study

in a large urban setting like Addis Ababa the loss is negligible, it could not have any significant effect on the finding of the study. However, if we take all the drop out as alive, or as dead, the prevalence of neonatal mortality range between 7.1 and 12.4.

Although the use of health institutions delivered newborns could be regarded as a weakness of this study, on the other hand, in developing countries, follow up studies like this one is very important to detect the true magnitude of the problem, particularly when a significant proportion of deaths occur outside health care facilities.

The results of the study are assumed to be valid. A relatively high sample size was used to minimize the role of chance. Bias was minimized by using a uniform inclusion criteria and achieving high follow-up rates. Reliability was maintained by prior training of supervisors and interviwers, by using pretested questionnaire, by regular supervision. Multivarate analysis was utilized for control of confounding.

Limitations of the study

- The missing of home deliveries limit generalizability of the findings.

- The short and fixed period of the study limit to see the effects of the seasonal variation of birth.

CONCLUSION AND RECOMMENDATION

The study demonstrated a high prevalence of neonatal mortality, that is 71.9 per 1000 live birth with early and late neonatal mortality of 50.9 and 20.9 per 1000 respectively.

This study revealed significantly lower risk of neonatal mortality in normal birth weight and term babies, adjusted odds ratio 0.06(0.04,0.12) and 0.33(0.19,0.59) respectively. And newborns born from mothers who were not users of FP service prior to the last pregnancy were at higher risk of neonatal mortality.

On the basis of the above findings of the study, the following recommendations were made.

1. Further study to determine the prevalence rate of neonatal mortality among home deliveries and in a rural setup is highly recommended.
2. Establishing or strengthening of neonatal care is very essential.
3. Finally strengthening of health education to mothers to have prenatal care and also to attend FP services is also recommendable.

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Appendix

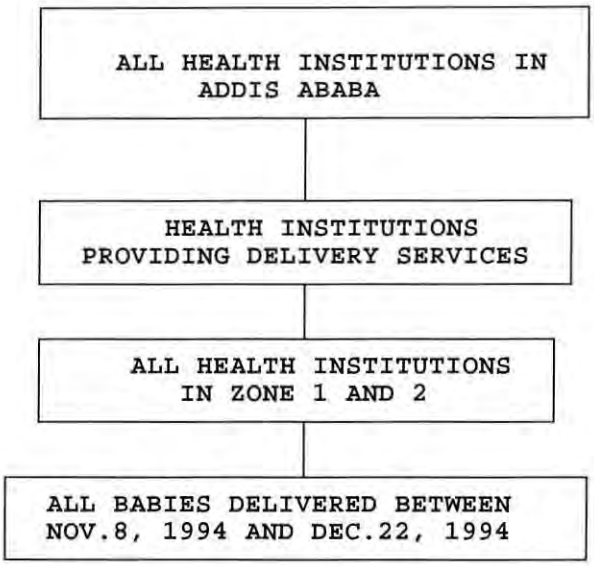

Figure 2. Study health institutions

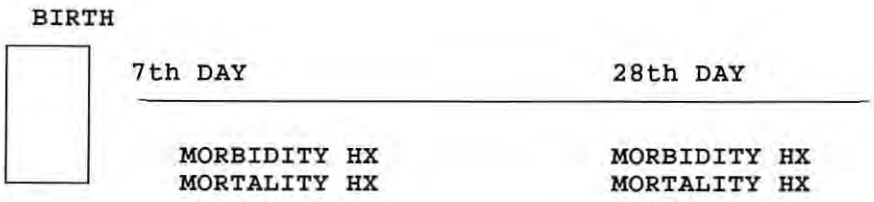

FIGURE 3. Follow up and data collection schedule

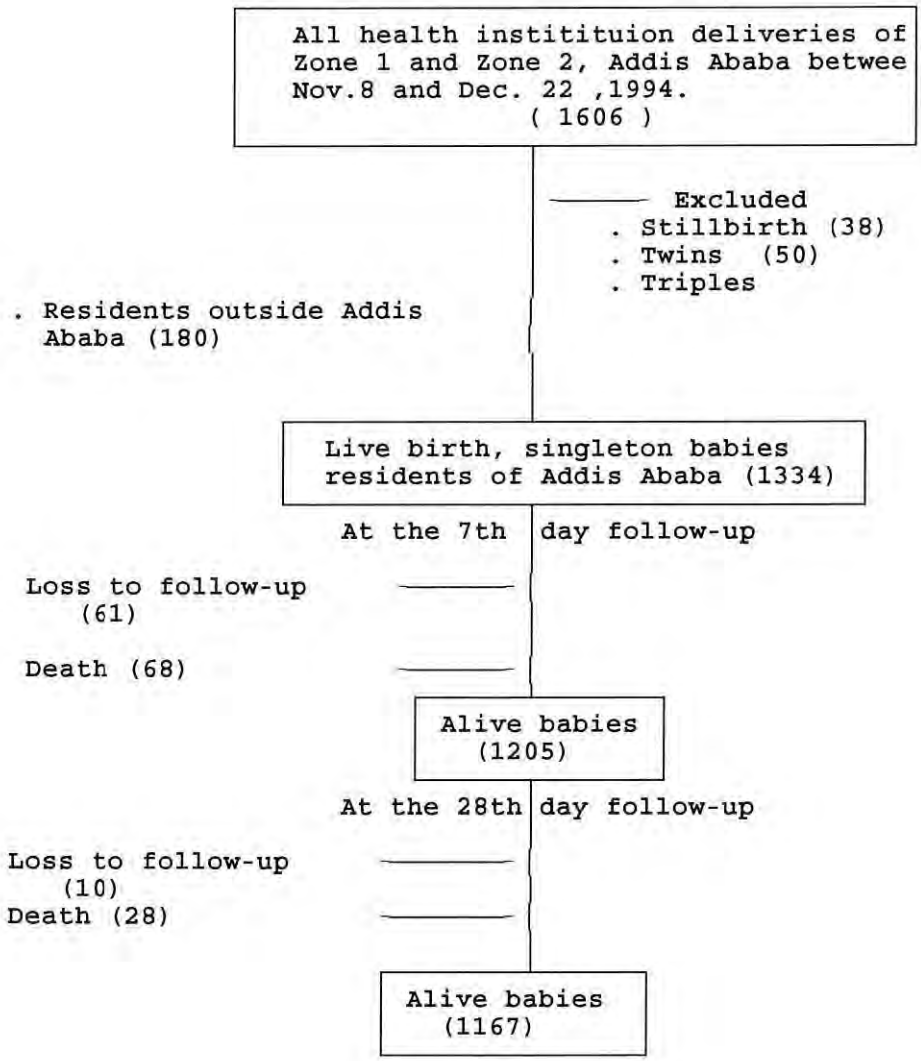

FIGURE 4 STUDY DESIGN AND SELECTION HIERARCHY ADDIS ABABA 1994.

Appendix

NEONATAL SURVIVAL STUDY IN ADDIS ABABA
BASELINE QUESTIONNAIRE

Date____/___/____

SECTION ONE: PARENTAL INFORMATION

1. Mother's full name _____
2. Address: Higher_____ Kebele_____ House #_____
3. Mother's age_____
3.1 Marrital status 1) Married 2)Single
4. Education of mother:
   4.1. Can read newsletter or letter: 1.Yes 2.No
   4.2. Last grade completed_____
5. Education of father
   5.1. Can read newsletter: 1.Yes 2.No
   5.2. Last grade completed_____
6. Average monthly income in birr_____
7. Is there latrine for the family use? 1.Yes 2.No
8. Source of drinking water: 1.Pipe 2.Others, specify____

SECTION TWO: OBSTETRIC HISTORY

9.Total number of pregnancies (including abortion and still birth)_____
10.Number of abortion_____
11.Total number of deliveries_____
12.The age gap between this and the previous child:_____ years and ____ months.

13.Which of the following did you (the mother) take during pregnancy?

1.Chat 2.Cigarettes 3.Alchol
4.Traditional drug 5. Others(specify)_____

14.Did you (the mother) attended ANC? 1.Yes 2.No

15.Were you immunized for tetanus during (or before) the last pregnancy? 1.Yes 2.No If yes how many times?_____

Check immunization card: 1=one dose 2=2 doses 3=3 or more

16.Were you using family planning methods before this pregnancy?
1.No 2.Yes, what method?_____

SECTION THREE: CHILD INFORMATION

17.Gestational age:_____ weeks

18.Sex: 1.Male 2.Female

19.Weight: _____ grams 19.1 Placental weight ___grams

20.Height:_____ cms

21.Delivery time: 1.During working hours _____
2.During duty hours_____

22.Type of delivery:
1.SVD (normal)____ 2.Assisted with forceps____
3.Assisted with vacuum ____ 4.Caesarean section____
5.Others (specify)_____

23.Outcome of delivery: 1.Alive_____ 2.Stillbirth

23.1 Outcome of delivery:1.Single 2.Twins 3.More_____

24.Congenital abnormality: 1.No_____ 2.Yes, specify_____

25.Trauma during delivery: 1.No_____ 2.Yes, specify____

Consent form

We would like to do follow-up on the health status of this child at your home. Would you agree to it ?

_____ Yes _____ No

If Yes, please inquire about the location of their residency place.

Location_____
_____

Telephone:_____ _____ Home _____ Neighbour
_____

FOLLOWUP QUESTIONNAIRES ON THE THE 7TH AND 28TH DAY

Date_____/_____/_____

1. Mother's full name_____
2. Address: Higher_____ Kebele_____ House #_____
3. Is the child alive: 1. Yes 2. No /if not alive move to question number 8.
4. Has he been sick in the last seven days?
   1. Yes 2. No
5. If yes which of the following?
   1. Cough ____ 2. Shortness of breath____
   3.Diarrhea____4. vomiting_____ 5. fever_____
   6. Others, specify____
6. What were the measures taken for the above sickeness?
   1. none 2. traditional medicine
   3. health instititution 4. Others, specify_____
7. Has he had physical problems? 1. Yes 2. No
8. If the child is not alive, What was the age of his death? _____ days.
9. What symptoms did he have at or shortly before the death?
   1. cough 2.Shortness of breath 3. fever
   4.diarrhea
   5. vomiting 6. others, specify_____

DECLARATION

I, the undersigned, declare that this thesis is my original work and has not been presented for a degree in this or any other university and that all sources of materials used for this thesis have been duly acknowledged.

Name _____

Signature_____

Place_____

Date of submission_____

This thesis has been submitted for examination with our approval as University Advisors.

Dr Yemane Berhane

Advisor

DECLARATION

I, the undersigned, declare that this thesis is my original work, has not been presented for a degree in any other university and that all resources of material used for this thesis have been fully acknowledged.

Name : Yodit S/Mariam

Signature: Yodit

Place : Addis Ababa, Ethiopia

Date of Submission : May, 1995