ORIGINAL ARTICLE

Disease Pattern of Early Neonatal Deaths: Household Health Survey 1992

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ABSTRACT In 1992, socio-economic survey was conducted and early neonatal deaths in the sample were recorded and investigated through a verbal autopsy to identify the causes of death. Main diseases and conditions in the fetus or infants, and the main maternal conditions affecting the fetus and infant were analyzed. The prevalent diseases or conditions in fetus or infants as the main cause of early neonatal deaths were hypoxia (43%) and premature births (30%). Obstetric complications affected 36% early neonatal deaths, and maternal conditions affected 25% early neonatal deaths. Complications during pregnancy and delivery frequently cause premature births and hypoxia or asphyxia to the newborn infant. Comprehensive neonatal care should be available in all health centers, delivery homes, and hospitals. **[Paediatr Indones 1997; 37:105- 113]**

Introduction

Health development and advances in medical technology have successfully prevent the occurrence of diseases and reduce the infant mortality. The sharp decline of infant mortality rate is followed by a slow decline of prenatal mortality (still births and early neonatal deaths); as a result the proportion of neonatal deaths increases towards the total infant deaths. Efforts should be done to prevent neonatal deaths in order to reduce further infant mortality. The epidemiology of disease causing deaths varies according to the population under study. However, the pattern of physio-pathological disease causing perinatal deaths are almost the same elsewhere all the over world, as they are not much influenced by the geographical conditions. Perinatal mortality rate is associated with the standard of living and the consequent improvement in available health care facilities including modern technology.[1] The physio-pathological causes of perinatal deaths are grouped into: (1) Prenatal (antenatal) causes, mostly related to mother's health; (2) Intranatal causes, mostly depend on medical expertise and its

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availability; (3) Neonatal causes, mostly associated with newborn's health.

In developing countries, the maternal conditions are more responsible as the cause of prenatal deaths, such as toxemia, anemia and malnutrition resulting in premature labor. During the intranatal period, birth trauma and asphyxia are the frequent cause of deaths, while in the neonatal period the causes of deaths are further effected by birth trauma and asphyxia, and pulmonary or intestinal infections.[1] In 1992 the Household Health Survey conducted a mortality study, including infant mortality and neonatal mortality. The objective of the study was to investigate the pattern of diseases causing deaths as found in the survey.

Methods

In 1992, socio-economic survey was conducted and any deaths in the sampled household occurring in the last one year period were recorded and reported to the local health officer. The health officer assigned a young medical doctor to investigate and performed the verbal autopsy to identify the cause of deaths. Diagnosis of diseases were derived from the signs and symptoms as described by the caretaker of the cases. Diseases were classified according to the disease groups in the Mortality List of International Classification of Diseases (Ninth Revision), with some modifications adjusted to the limitation of diagnostic procedure and to meet the need for health planning program.[3]

Early neonatal deaths are defined as deaths occurring in the first week of life (excluding still-births). Perinatal Death Certificate was used to differentiate the causes of death: (a) Main diseases or conditions in fetus or infant; (b) Other diseases or condition in fetus or infants; (c) Main maternal disease or conditions affecting fetus or infant; (d) Other maternal diseases or conditions affecting fetus or infant; (d) Other relevant circumstances

The main diseases or conditions in the fetus or infant, and the main maternal conditions affecting the fetus and infant were analyzed according to the urban and rural areas. Verbal autopsies were done retrospectively for deaths occurring in the last 1 year period, which may cause recall bias of the respondents. Besides, laymen as respondents may have limitation to recognize certain signs and symptoms, which are frequently unperceived.

Results

In 1992 socio-economic survey, 5229 pregnant women were reported in the last one year period, among which 4574 (87.5 percent) women delivered live born babies and 201 (3.8 percent) had still births (Table 1).

However in the household health survey among live births, 95 newborns died in their early neonatal period (first week of life). Seventy-six percent early neonatal deaths were reported from the urban areas and 4% from the rural areas. According to birth order 25% deaths were first born infants, 40% second to third order and 35% of fourth order or over (Table 2).

Early neonatal death were mostly born to mothers who ever had antenatal care (96%), compared to children born in the last 1 year period prior to the socioeconomic survey 79% ever had antenatal care. Most early neonatal deaths (73%) were delivered by the assistance of traditional birth attendants or relatives compared to children born in the last 1 year period prior to the socio-economic sur- vey 56% were delivered by the same assistance.

The prevalent diseases or conditions in fetus or infant as the main cause of early neonatal deaths were hypoxia and premature births, i.e., 41 (43%) and 28 (30%) respectively. In the urban areas 61% of early neonatal deaths were caused by hypoxia and 35% caused by premature births, both proportions were higher in the urban areas than in the rural areas, respectively 38% and 28% (Table 3). However, in general the early neonatal death rate in the urban area was lower than in the rural area, so that hypoxia and premature death rates might still be higher in the rural area than those in urbans.

Obstetric complications affected 36% early neonatal deaths. These proportions of early neonatal deaths affected by obstetric complications in both urban and rural areas did not show any difference (Table 4). Maternal conditions affected 25% of early neonatal deaths, and the proportions tended to be higher in the urban areas (30%) than in the rural areas (24%).

Among early neonatal deaths 39% were not affected by any maternal conditions or obstetric complications. The proportion of early neonatal deaths without any effect of maternal conditions or obstetric complications was higher in the rural areas (40%) than in the rural areas (35%).

Table 1. Pregnancy outcomes (Socio-Economic Survey, 1992)

Pregnancy Outcomes	Urban area		Rural area		Both area	
	Number	Percent	Number	Percent	Number	Percent
Live births	1826	87.7	2748	87.3	4574	87.5
Still births	69	3.3	132	4.2	201	3.8
Abortions	186	8.9	268	8.5	454	8.7
Total	2081	100	3148	100.0	5229	100

Table 2. Early neonatal death by background characteristics (Household Health Survey 1992)

Background characteristics	Household Health Survey 1992		Socio-economic Survey 1992	
	n	Percent	n	Percent
Area				
• Rural	72	75.8		
• Urban	23	24.2		
Birth Order				
• 1st	21	24.7		
• 2nd to 3 rd	34	40.0		
• 4th or over	30	35.3		
Birth Interval				
• Less than 24 months	33	44.6		
• 24-35 months	11	14.9		
• More than 35 months	30	40.5		
Antenatal Care				
• None	4	4.2	1073	20.7
• 1-3 visits	45	47.4	1763	34.0
• 4 or more visits	46	48.4	2354	45.4
Delivery Assistant				
• Traditional or relatives	69	73.4	2909	55.6
• Doctor or midwife	25	26.6	2320	44.4

Among early neonatal deaths caused by hypoxia, 21% were affected by obstetric complications, and in 16% they were without any maternal conditions or obstetric complications, and 12% affected by prolonged labor. See Table 5. Among early neonatal deaths due to premature births, 11% were affected by maternal conditions (hypertension, malaria, malnutrition), 8% by obstetric complications (premature rupture of membrane, placenta and hemorrhage), and 11% were not affected by any maternal conditions or obstetric complications (Table 5).

Table 3. Main diseases or conditions of early neonatal deaths (Household Health Survey 1992)

Disease or conditions	ICD-9 code	Urban areas		Rural areas		Both areas	
		n	%	n	%	n	%
Congenital malformation	740-759			4	5.6	4	4.3
Premature	764, 765	8	34.8	20	27.8	28	29.5
Post mature	766			2	2.8	2	2.1
Birth trauma	767			3	4.2	3	3.2
Hypoxia	768, 769	14	60.9	27	37.5	41	43.2
Tetanus neonatorum	771.3			5	6.9	5	5.3
Other infectious disease	771	1	4.3	3	4.2	4	4.2
Hemolytic disease	773			1	1.4	1	1.1
Ill-defined	779			7	9.7	7	7.4
TOTAL		23	100	72	100.0	95	100.0

Discussion

Mothers with early neonatal deaths are more likely to have ante-natal care than the overall pregnant women, however they are more likely to deliver assisted by non-medical delivery assistance. These situation are possibly due to the lack of accessible of safe delivery assistance.

Comparing the disease pattern causing neonatal deaths, it is necessary to consider the different method in disease classification. In this study perinatal causes of deaths are differentiated into (1) disease or conditions in fetus or infant and (2) maternal disease or conditions affecting fetus or infant, as recommended in the International Classification of Diseases, while hospital records and other perinatal studies are more frequently based only on diseases or conditions in fetus or infants.[6-11]

Based on diseases or conditions in fetus or infant, hypoxia and prematurity are the most prevalent cause of neonatal deaths. Various studies reported 50% neonatal deaths are caused by hypoxia, and prematurity are the second prevalent cause of deaths.[6-11] In this study 43% neonatal deaths are due to hypoxia, however considering the maternal disease or conditions affecting fetus or infant, hypoxia frequently occurs as a result of complication of pregnancy and delivery, i.e. abnormal uterine contraction, prolonged labor, and hypertension (preeclampsia and eclampsia).

Table 4. Maternal conditions and obstetric complications affecting early neonatal deaths (Household Health Survey , 1992)

Maternal conditions or complications	ICD-9 code	Urban areas		Rural areas		Both areas	
		n	%	n	%	n	%
Maternal conditions	760	7	30.4	17	23.6	2	25.3
• Hypertension	760.0	5	21.7	4	5.6	4	9.5
• Malaria	760.2	1	4.3	4	5.6	9	5.3
• Typhoid fever	760.2			1	1.4	5	1.1
• Malnutrition	760.4	1	4.3	4	5.6	1	5.3
• Injuries	760.5			1	1.4	5	1.1
• Other				3	4.2	1	3.2
						3	
Obstetric complications	761-763	8	34.8	26	36.1	3	35.8
• Premature rupture of	761.1			3	4.2	4	3.2
• membrane	761.7	2	8.7	4	5.6	3	6.3
• Mal presentation	762.0-762.1	1	4.3	3	4.2	6	4.2
Placenta	762.1	1	4.3	3	4.2	4	4.2
• Hemorrhage	762.4-762.5	1	4.3	2	2.8	4	3.2
• Cord	763.1, 763.7,	3	13.0	9	12.5	3	12.6
• Prolonged labor	763.9			2	2.8	1	2.1
Others						2	
						2	
Not affected by maternal		8	34.8	29	40.3	3	38.9
conditions or obstetric complications						7	
Total		23	100.0	72	100.0	9	100.0

In this study 43% of neonatal deaths are associated with hypoxia. However, considering the maternal disease or conditions affecting fetus or infant, hypoxia frequently occurs as a result of complication during pregnancy and delivery, i.e. abnormal uterine contraction, prolonged labor, and hypertension (i.e., preeclampsia or eclampsia).

Diseases causing neonatal deaths in the urban areas are slightly different than those in the rural areas. In the urban areas prematurity and hypoxia are the most

frequent causes. Maternal hypertensive disorders are slightly more prevalent in the rural areas (5.4% in the rural and 3.9% in the urban),[13] however the proportion of neonatal deaths related to maternal hypertensive disorder in the rural areas are less than those in the urban areas.

Table 5. Main causes of early neonatal deaths by maternal conditions of complications

	Premature		Hypoxia		Others		Ill-defined		Total	
	n	%	n	%	n	%	n	%	n	%
Maternal conditions	10	10.5	6	6.3	3	3.2	5	5.3	24	25.3
• Hypertension	3	3.2	4	4.2	1	1.1	1	1.1	9	9.2
• Infectious diseases	3	3.2	1	1.1	0		2	2.1	6	6.2
• Malnutrition	4	4.2			0		1	1.1	5	5.3
• Injuries									1	1.1
• Others			1	1.1	1	1.1	1	1.1	3	3.2
Obstetric complications	8	8.4	20	21.1	4	4.2	2	2.1	34	35.2
• Premature rupture of membrane	2	2.1			1	1.1			3	3.1
• Mal-presentation			6	6.3	0				6	6.3
• Placenta	3	3.2	1	1.1	0				4	4.1
• Haemorrhage	3	3.2			1	1.1			4	4.1
• Cord			1	1.1	0		2	2.1	3	3.1
• Prolonged labour			12	12.6	0				12	12.6
• Others					2	2.1			2	2.1
Without maternal conditions	10	10.5	15	15.8	12	12.6			37	38
TOTAL	28	29.5	41	43.2	19	20.0	7	7.4	95	100.0

Malaria, typhoid fever and nutritional deficiencies during pregnancy are the major diseases causing neonatal deaths. In the rural areas infectious diseases more often occur, causing nutritional deficiency and anemia, which might influence intrauterine fetal growth.

In the rural areas neonatal tetanus was reported as the cause of 5% neonatal deaths, which is relevant with the low coverage of tetanus immunization among

pregnant women in the rural areas (37%) as compared to the urban areas (56%).[12]

Infections in newborn infants are found among 4% of deaths, which might due to poor handling during delivery and non hygienic handling of the newborn infant, i.e. premature rupture of the membrane, and non-sanitary environment of delivery homes. Birth injures are found among 3% neonatal deaths, which are usual related to prolonged labor especially among the first parity, precipitated delivery, malpresentation and disproportion. These cases might need an emergency obstetric assistance and in certain cases cesarean section.

Conclusions and Recommendations

The major causes of early neonatal deaths were due to complications which occurred during pregnancy and delivery. Detection of early signs of the complications are important to prevent the adverse effects and refer the high risk cases to delivery hospitals, where emergency obstetric care facilities are available. Considering certain obstetric complications which can occur unexpectedly without any signs during antenatal care, it is necessary to suggest mothers giving births in delivery homes under the supervision of midwives; if any obstetric complications occur the midwives will be able to handle the problems, in case of emergency the midwives can provide preliminary assistance and refer them to a medical doctor in the nearest health centers or hospitals. Complications during pregnancy and delivery may cause hypoxia or asphyxia to the newborn infant, or in certain extend may affect premature births. Thus it is essential to have comprehensive neonatal care in all health centers, delivery homes and hospitals.

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