MoHSW UNICEF

SURVEY ON

MORTALITY IN CHILDREN UNDER FIVE:

CAUSES AND INFLUENCING FACTORS

Final report

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English translation edited by Jasper Ip

ULAANBAATAR, MONGOLIA
2000

<u>Name of the survey</u>: ***Causes and factors influencing mortality in children under five***

<u>Duration of the survey</u>: December 1999 – June 2000

<u>Survey coordinators</u>: D. Malchinkhuu, Professor, PhD
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<u>Justification of the survey</u>: During the last decade, the government of Mongolia has developed and implemented a series of policies and actions to protect maternal and child health. As a result, the IMR (infant mortality rate) and U5MR (under-5 mortality rate) have been constantly decreasing and have reached a level that is similar to levels in countries with medium IMR and U5MR. (Fig.1, 2)

Despite this progress, over 2,660 children under 5 years of age still die in a single year. There has not been a single nationwide survey or scientific study conducted to determine the causes as well as the biological, medical, and social factors influencing children's mortality. The need for this kind of study is the reason for doing this survey in Mongolia.

<u>The purpose of the survey</u>: In order to study all mortality cases of children under 1 and children under 5 from 1996 to 1998 in the country, and in order to prepare a technical basis of reviewing and reformulating national policies related to the reduction of childhood mortality, the following objectives were established for the survey:

1. To develop a questionnaire, forms, and methodology using health statistics, records and reports at national, aimag, and soum levels.
2. To determine causes of mortality in children under 5 by their age groups.
3. To conduct a comparative review of mortality in children under 5 by seasons.
4. To determine biological, medical, and social factors influencing mortality of children under 5.
5. To determine the role of implementation of public health projects like ARI, CDD, HIV/AIDS, breastfeeding, and others on the reduction of mortality in children under 5.
6. To prepare a technical basis for the improvement of preventive and curative services addressing the leading causes of mortality in children under 5.
7. To consolidate findings of the survey and to prepare a technical basis for formulation of national policies aimed at further reduction of childhood mortality.

Fig 1.

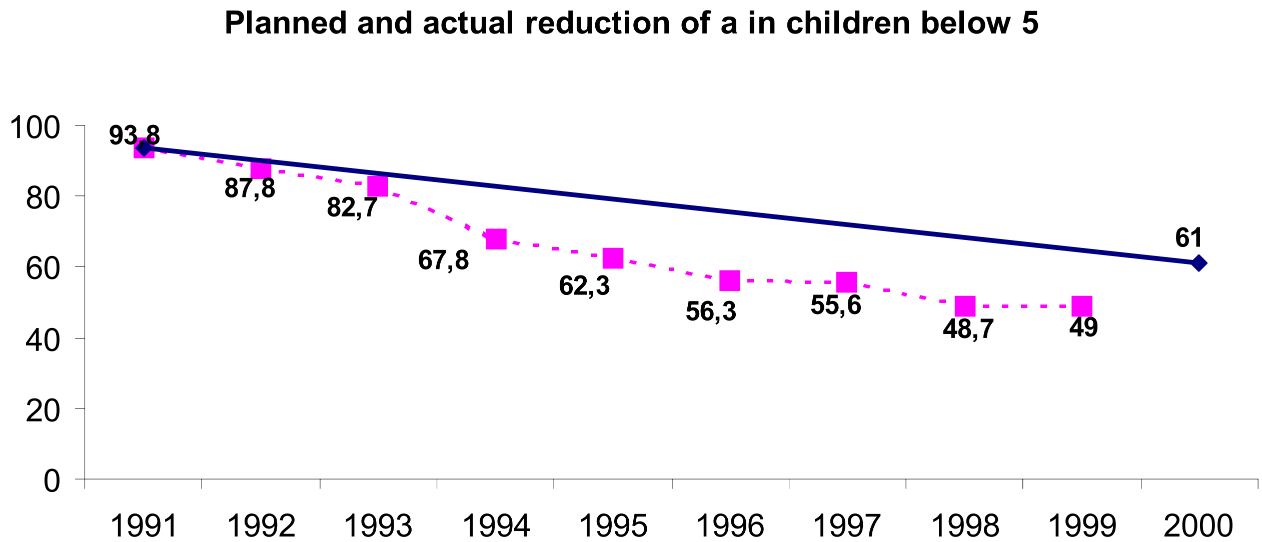
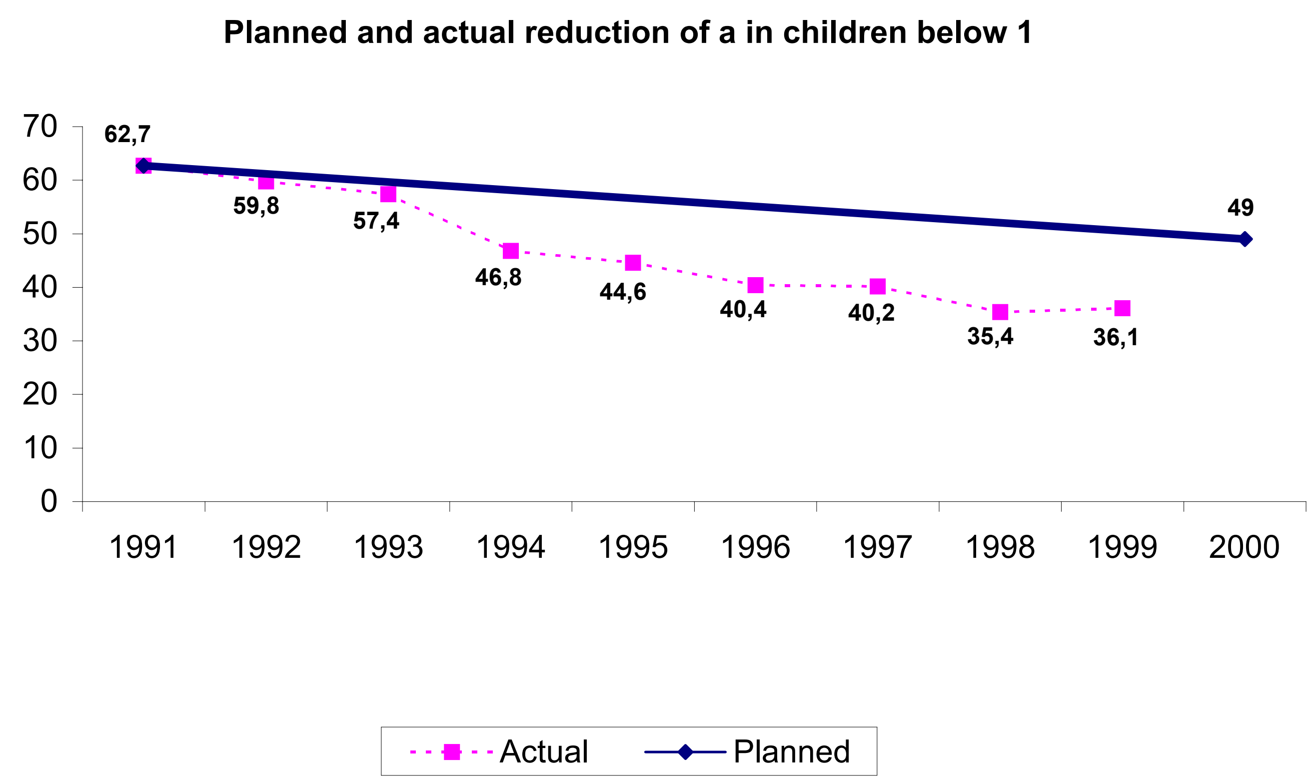

Planned and actual reduction of a in children below 5
100
80
60
40
20
0
93,8
87,8
82,7
67,8
62,3
56,3
55,6
48,7
49
61
1991
1992
1993
1994
1995
1996
1997
1998
1999
2000

Fig 2.


Planned and actual reduction of a in children below 1
70
60
50
40
30
20
10
0
62,7
59,8
57,4
46,8
44,6
40,4
40,2
35,4
36,1
49
1991
1992
1993
1994
1995
1996
1997
1998
1999
2000
Actual
Planned

Specificity of the survey

This is the first nationwide survey focusing on under-5 mortality causes in Mongolia. The same methodology was used to study materials from 1996 to 1998. By defining major causes and factors of under-5 mortality, the government will have a scientific basis for policy-making in the future.

Outcomes of the survey

This survey has determined biological, medical, and social factors influencing under-5 mortality by age groups, thus enabling the development and implementation of multilateral policies for certain age groups.

Methodology and sample size

Out of all under-5 mortality cases in Mongolia from 1996 to 1998, 1,821 records were selected using the formula $n=z^2p(1-p)d^2$ (S.□.Lvanga, Ch.□.Teea, 1989). Sample records were randomly selected from all records according to their dates of hospitalisation at aimag and soum levels (the sample covers 32.5% of all hospital mortality cases). Information from samples was recorded in questionnaires (table 1). Eighteen surveyors and seven supervisors were specially trained for data collection using this survey. The data was analysed with the EPI-info computer program. In addition, all chief pediatricians from 21 aimags and Ulaanbaatar city have completed seven questionnaires using their health statistics records from 1996, 1997, and 1998, and these results were compared with results from the actual survey.

Table 1

Selection of sample records for the under-5 mortality survey

(Data from 3 years were used)

Aimag	Under-1 mortality					1-5 mortality					
	0-1 years old				Number of sample records (%)	1-5 years old				Number of sample records (%)	Total
	1996	1997	1998	Total		1996	1997	1998	Total		
BU	108	7	99	214	94 (33.3)	53	49	48	150	50 (33.3)	144
BKh	143	115	68	326	104 (31.9)	44	37	32	113	40 (35.4)	144
Do	88	91	63	242	85 (35.1)	42	33	14	89	25 (28)	110
DG	51	33	33	117	57 (48.7)	18	15	13	46	23 (50)	80
Za	91	83	97	271	92 (33.9)	29	25	19	73	30 (41.1)	122
Or	35	55	61	151	64 (42.4)	15	23	23	61	26 (42.6)	90
Su	79	59	42	180	71 (39.4)	13	13	11	37	19 (51.3)	90
Da	133	110	86	329	105 (31.9)	44	52	42	138	45 (31)	150
Kho	122	88	113	323	104 (32.2)	57	42	54	153	45 (29.4)	149
Khu	97	108	95	300	98 (32.7)	16	48	40	104	40 (38.5)	138
Khe	73	73	51	197	75 (38)	36	25	15	76	30 (39.5)	105
UB city	526	524	466	1,516	376 (24.8)	186	122	157	465	127(27.3)	503
Total	1,546	1,346	1,274	4,166	1,325 (31.8)	553	484	468	1,505	500(33.2)	1,825

Stages of the survey:

□. Preparation

1. Health statistics, reports, and registration records from national, aimag, city, district, and soum levels were used for determining the sample size, designing survey forms, and defining the survey methodology.

B. The survey

2. The survey started in December 3, 1999. Chief paediatricians from all aimags and districts filled in seven questionnaires. Surveyors recorded data from 1,821 hospital records from 11 aimags by completing survey forms.
3. Nine supervisors checked the survey materials by comparing them with the original data and supervised the work of surveyors.
4. Survey forms were checked again and prepared for data analysis when they were collected.

C. Data analysis

5. The data analysis was done by specialists from the Health Management, Information, and Education Center in Mongolia.

Part I. Studying under 5 mortality using health statistics data

For the surveyed period of 1996-1998, women of reproductive age averaged 25.6% of the total population, and children aged 0-16 averaged 38.1% of the total population. Infants aged 0-1 year comprise 2.2% of the population, and 10.7% are children aged 1-4 (refer to the table 2, annexes 1, 2, 3).

Within the surveyed period of 3 years, out of 149,090 live births, 7,601 died before reaching 5 years of age (Table 2). Some changes in health indicators related to infant mortality and under-5 mortality statistics show that (Table 3) the number of live births in 1997 had decreased by 3.6% (2,018) as compared with the number from the previous year, but in 1998, the same indicator had increased by 2.9%, suggesting a future trend of an increasing number of live births.

The child mortality rate has decreased by 2.96% in 1997 and by 9.1% in 1998. The number of infant mortality cases per 1,000 live births has decreased every year of the survey period by 0.9 cases in 1997 and then by 4.2 cases in 1998, and the average for the three years is 36.3 cases; the number of mortality cases in children aged 1-4 per 1,000 live births has decreased by 1.8 cases in 1997 and by 6.3 cases in 1998, and the average for the three years is 51 cases. Hospital deaths occurring within the first 24 hours of hospitalisation have increased since 1996 from 25.1% to 25.3%, but the average is 24.6% due to a notable decrease in 1997; thus, 1 out of 4 children died in a hospital. The rate of hospital deaths occurring within the first 24 hours is highest in Gobi-Sumber, Dornogobi, Khovd, Sukhbaatar, Dornod, and Bayan-Ulgii aimags (Table 3).

Home deaths have increased steadily each year by 1.1% starting from 20.7% in 1996 up to 22.9% in 1998. This statistic suggests that 1 out of 5 children under 5 years of age has died at home without receiving medical assistance and service. The rate for deaths at home is highest in Bayan-Ulgii, Zavkhan, Gobi-Altai, Dundgobi, Tuv, and Bayankhongor aimags.

Table 2

Some population statistics and under 5 mortality (total for 3 years)

No.	Aimag	Population	Women at Reproductive Age	Children Under 16	Infants 0-12 Months	Children 1-5 years	Live Births	Children's mortality cases			
								Total	Hospital	Within 24 hrs	Home
1	Ar	97,003	25,380	39,934	2,813	11,693	7,344	254	218	37	36 (14.2)
2	BU	85,792	21,505	35,414	2,130	11,501	7,391	432	191	58	241 (55.8)
3	BKh	88,759	21,196	34,204	2,112	9,753	6,732	439	296	58	143 (32.6)
4	Bu	63,024	16,189	24,397	2,295	6,278	3,686	139	105	24	34 (24.5)
5	GA	69,901	20,199	27,443	1,491	7,918	4,917	278	174	28	104 (37.4)
6	GS	12,152	3,603	4,783	132	1,295	820	29	28	15	1 (3.4)
7	Da	88,083	22,887	33,960	1,408	8,602	4,113	286	224	66	62 (21.7)
8	DG	49,058	12,825	18,741	1,014	5,090	3,048	162	140	59	22 (13.6)
9	Do	74,902	18,566	30,589	1,517	8,183	4,899	332	275	85	57 (17.1)
10	Du	53,617	12,991	20,764	1,254	4,627	3,628	165	108	30	57 (34.5)
11	Za	101,414	26,477	39,926	2,128	11,116	6,693	344	202	47	142 (41.3)
12	Or	63,884	15,240	25,373	1,241	5,396	4,029	212	176	44	36 (17)
13	Uv	112,788	29,660	46,712	2,982	13,635	8,563	449	348	55	101 (22.5)
14	Um	44,700	10,436	19,147	1,136	5,634	3,429	119	104	16	15 (12.6)
15	Su	55,929	10,486	24,979	1,229	5,005	4,029	185	161	50	24 (13)
16	Se	96,033	23,500	39,477	1,746	10,732	5,430	250	233	42	17 (6.8)
17	Tu	104,112	25,334	40,467	2,011	10,713	4,917	196	131	33	65 (33.2)
18	Uv	97,681	24,038	42,092	2,710	11,405	8,069	467	412	62	55 (11.8)
19	Kho	90,798	22,463	35,335	2,132	11,119	7,702	475	321	108	154 (32.9)
20	Khu	122,533	29,298	47,658	2,236	10,945	8,004	375	286	50	89 (23.7)
21	Khe	71,377	15,379	25,504	1,336	5,801	4,677	207	146	36	61 (29.5)
22	UB city	621,232	163,352	193,588	12,465	48,082	36,970	1,806	1,668	477	138 (8.3)
Total		2,231,703	570,958	850,494	49,491	240,590	149,090	7,601	5,947	1,482	1,654 (21.8)

Table 2 (continued)

Children's mortality cases by age groups (months)																							
0-2				2-11				12-23				24-35				36-47				48-59			
Total	Hospital	Within 24 hrs	Home	Total	Hospital	Within 24 hrs	Home	Total	Hospital	Within 24 hrs	Home	Total	Hospital	Within 24 hrs	Home	Total	Hospital	Within 24 hrs	Home	Total	Hospital	Within 24 hrs	Home
53	46	12	7	128	112	12	16	39	33	5	6	19	15	4	4	7	7	2	0	8	5	2	3
59	30	13	29	140	69	25	71	83	35	13	48	81	37	7	44	48	14	0	34	21	6	0	15
149	134	14	15	177	105	24	72	55	32	10	23	28	12	5	16	16	7	2	9	14	6	3	8
50	48	13	2	42	28	5	14	30	24	4	6	8	3	1	5	4	1	0	3	5	1	1	4
58	36	13	22	139	94	12	45	46	25	3	21	15	10	0	5	12	5	0	7	8	4	0	4
9	9	7	0	13	13	7	0	5	4	1	1	1	1	0	0	1	1	0	0				
77	71	37	6	106	72	11	34	63	53	11	10	18	13	3	5	14	9	3	5	8	6	1	2
68	65	39	3	53	47	10	6	20	16	6	4	8	4	1	4	8	4	1	4	5	4	2	1
100	92	26	8	136	106	31	30	43	38	9	5	26	18	10	8	10	8	3	2	17	13	6	4
54	41	6	13	61	33	10	28	13	9	3	4	21	13	5	8	12	10	6	2	4	2	1	2
94	69	18	25	177	100	17	77	29	14	3	15	16	7	3	9	17	7	4	10	11	5	2	6
89	86	25	3	65	50	7	15	35	27	6	8	11	9	5	2	3	2	1	1	9	2	0	7
128	115	24	13	210	164	20	44	58	34	6	24	27	15	1	12	15	12	1	3	1	8	3	3
27	23	4	4	57	51	10	6	15	14	2	1	10	8	0	2	7	6	0	1	3	3	0	1
63	60	29	3	85	67	13	18	21	21	4	0	7	6	2	1	6	4	1	2	3	3	1	0
66	63	10	3	98	92	17	6	55	50	11	5	15	13	4	2	7	6	0	1	9	9	0	0
39	30	7	9	84	58	17	26	23	15	3	8	20	13	5	7	17	8	1	9	13	7	0	6
76	75	4	1	253	244	29	9	95	73	18	22	29	17	6	12	9	2	3	7	5	1	2	4
171	112	46	59	152	111	33	41	72	48	13	24	35	22	6	13	21	12	4	9	24	16	6	8
84	70	16	14	188	138	24	50	50	38	5	12	26	20	5	6	13	8	1	5	14	12	1	2
48	42	1	6	94	61	18	33	36	24	11	12	20	12	4	8	4	3	1	1	5	4	1	1
686	668	251	18	709	645	120	64	252	227	47	25	82	70	32	12	46	36	16	10	31	22	11	9
2,248 (29.6)	1,985	615	263	3,167 (41.7)	2460	472	707	1,138 (15)	854	194	284	523 (6.9)	338	109	185	297 (3.9)	172	55	125	228 (3)	138	41	90

Table 2, annex 1

Some population statistics and under 5 mortality in 1996

No.	Aimag	Population	Women at reproductive age	Children Under 16	Infants 0-12 months	Children 1-5 years	Live births	Children's mortality cases			
								Total	Hospital	Within 24 hrs	Home
1	Ar	98,346	26,465	40,337	2,628	11,119	2,448	90	82	13	8
2	BU	81,452	20,159	34,420	1,815	10,695	2,527	161	77	22	84
3	BKh	87,476	20,360	29,641	2,077	8,845	2,220	187	130	26	57
4	Bu	61,160	15,581	23,376	2,332	7,425	1,317	34	25	4	9
5	GA	69,012	23,852	27,426	1,280	8,379	1,647	74	48	7	26
6	GS	12,084	2,986	4,987	166	1,379	286	13	13	7	
7	Da	87,368	23,400	35,100	1,400	8,600	1,345	108	84	30	24
8	DG	48,468	13,255	18,780	1,071	4,987	1,082	69	63	29	6
9	Do	76,417	18,305	31,975	1,589	9,042	1,724	129	106	35	23
10	Du	53,011	12,082	21,448	1,318	4,768	1,247	76	55	16	2
11	Za	101,923	25,520	41,588	2,230	10,419	2,244	120	68	11	125
12	Or	61,495	15,467	23,144	1,138	5,312	1,355	50	37	5	13
13	Uv	110,145	29,459	46,506	2,912	13,896	2,852	181	143	27	38
14	Um	44,306	10,350	19,051	1,109	6,212	1,205	38	31	5	7
15	Su	56,534	10,473	29,900	1,181	5,107	1,405	77	68	18	9
16	Se	94,815	23,320	38,955	1,736	10,850	1,833	87	82	11	5
17	Tu	104,238	25,353	40,643	2,010	8,659	1,723	65	43	11	22
18	Uv	99,624	26,116	43,637	2,866	11,754	2,893	177	157	21	20
19	Kho	90,200	23,405	37,247	2,191	11,924	2,758	179	118	40	61
20	Khu	121,300	28,992	45,637	2,323	10,930	2,637	97	83	11	14
21	Khe	71,212	15,372	25,678	993	6,560	1,542	76	58	16	18
22	UB city	616,747	160,396	205,024	10,282	66,194	12,281	577	541	172	36
Total		2,148,987	570,668	864,510	46,584	291,659	48,351	2,665	2,112	547	553

Table 2, annex 1 (continued)

Children's mortality cases by age groups (months)																							
0-2				2-11				12-23				24-35				36-47				48-59			
Total	Hospital	Within 24 hrs	Home	Total	Hospital	Within 24 hrs	Home	Total	Hospital	Within 24 hrs	Home	Total	Hospital	Within 24 hrs	Home	Total	Hospital	Within 24 hrs	Home	Total	Hospital	Within 24 hrs	Home
21	20	6	1	42	40	4	2	14	13	1	1	8	6	1	2	1	1			4	2	1	2
23	13	4	10	54	29	8	25	31	15	6	16	30	18	4	12	17	2		15	6			6
62	55	5	7	81	53	12	28	21	14	4	7	10	2	2	8	6	3	1	3	7	3	2	4
5	4		1	16	10	2	6	8	8	1		3	1		2	1	1			1	1	1	
18	8	4	10	36	28	3	8	8	6		2	6	3		3	4	2		2	2	1		1
7	7	5		4	4	1		2	2	1													
33	30	13	3	36	22	7	14	22	19	8	3	9	7	1	2	2	1		1	6	5	1	1
30	29	19	1	20	20	4		8	8	2		5	3	1	2	3	1	1	4	3	2	2	1
33	30	5	3	50	39	14	11	19	18	5	1	13	8	4	5	4	4	3		10	7	4	3
22	18	1	4	26	17	7	9	18	12	4	6	1	1	1		7	6	3	1	2	1		1
33	21	4	12	58	32	3	26	13	6		7	7	4	1	3	6	3	2	3	3	2	1	1
16	16	1		22	16	3	6	9	4	1	5					2	1		1	1			1
57	53	14	4	79	62	7	17	27	15	4	12	9	7	1	2	3	2		1	6	4	1	2
10	9		1	18	16	4	2	3	3	1		4	2		2	2	1		1	1			1
27	26	12	1	37	31	4	6	9	9	2		2	1		1	2	1		1				
23	22	2	1	37	34	5	3	18	17	2	1	6	6	2		2	2			1	1		
13	10	2	3	23	14	5	29	11	7	2	4	6	4	1	2	6	5	1	1	6	3		3
32	32	1	0	101	98	6	3	29	16	9	13	10	9	3	1	3	1	1	2	2	1	1	1
79	50	23	29	43	34	9	9	22	13	4	9	15	9	1	6	12	7	2	5	8	5	1	3
26	26	6		43	30	3	13	14	14	1		6	6	1		2	1		1	6	6		
18	17		1	28	18	4	10	21	16	9	5	8	6	2	2					1	1	1	
225	219	87	6	216	205	45	11	81	72	16	9	25	21	12	4	19	14	9	5	11	10	3	1
813	715	214	98	1,070	852	160	218	408	307	83	101	183	124	38	59	104	59	23	45	87	55	19	32

Table 2, annex 2

Some population statistics and under 5 mortality in 1997

□	Aimag	Population	Women at reproductive age	Children under 16	Infants 0-12 months	Children 1-5 years	Live births	Children's mortality cases			
								Total	Hospital	Within 24 hrs	Home
1	Ar	95,910	26,662	39,192	2,979	11,868	2,412	93	79	16	14
2	BU	85,292	21,472	35,316	2,170	11,591	2,370	124	57	18	67
3	BKh	87,476	21,361	36,477	2,023	10,295	2,175	152	101	18	51
4	Bu	63,798	16,767	24,477	2,267	5,618	1,167	49	38	8	11
5	GA	70,249	18,542	27,765	1,586	7,653	1,618	117	74	12	43
6	GS	12,224	4,646	4,764	103	1,285	272	11	10	5	1
7	Da	87,767	22,298	34,190	1,418	8,159	1,364	89	71	19	18
8	DG	49,065	12,806	18,771	984	5,228	984	45	35	13	10
9	Do	74,475	18,762	30,113	1,440	8,108	1,557	126	101	27	25
10	Du	53,655	12,489	19,454	1,246	4,230	1,196	46	27	7	19
11	Za	101,413	24,895	40,305	1,992	12,321	2,152	108	62	13	46
12	Or	63,541	14,485	26,418	1,441	5,638	1,230	78	71	20	7
13	Uv	113,408	29,680	46,811	2,873	13,391	2,884	136	103	18	33
14	Um	44,685	10,376	19,153	1,161	5,304	1,191	44		5	4
15	Su	55,731	10,401	22,714	1,253	5,083	1,275	61	51	21	10
16	Se	95,507	23,029	39,707	1,694	10,065	1,766	90	81	17	9
17	Tu	104,592	25,009	40,815	1,895	10,982	1,611	71	52	12	19
18	Uv	98,685	23,878	41,891	2,767	12,086	2,416	102	141	24	21
19	Kho	91,339	21,472	32,131	2,205	10,121	2,495	129	35	32	44
20	Khu	122,700	29,925	47,826	2,215	11,244	2,665	155	113	21	42
21	Khe	72,650	17,634	26,868	1,591	5,204	1,545	75	47	10	28
22	UB city	614,181	158,899	188,077	13,208	40,244	12,208	625	584	149	41
Total		2,258,343	565,488	843,235	50,516	215,718	48,553	2,586	2,023	475	563

Table 2, annex 2 (continued)

Children's mortality cases by age groups (months)																							
0-2				2-11				12-23				24-35				36-47				48-59			
Total	Hospital	Within 24 hrs	Home	Total	Hospital	Within 24 hrs	Home	Total	Hospital	Within 24 hrs	Home	Total	Hospital	Within 24 hrs	Home	Total	Hospital	Within 24 hrs	Home	Total	Hospital	Within 24 hrs	Home
19	15	5	4	49	41	5	8	12	12	2		5	4	1	1	5	5	2		3	2	1	1
16	8	4	8	36	19	9	17	23	9	4	14	28	5	1	18	13	7		6	8	4		4
54	47	4	7	61	35	8	26	16	10	3	6	11	10	1	6	6	3	1	3	4	1	1	3
20	19	6	1	13	9	1	4	11	9	1	2	2	1		1	1			1	2			2
23	17	5	6	58	41	5	17	19	7	2	12	7	5		2	6	2		4	4	2		2
1	1	1		5	5	4		3	2		1	1	1			1	1						
24	22	12	2	31	24	3	7	22	18	2	4	6	4	1	2	6	3	1	3				
12	11	5	1	22	16	6	6	6	4	2	2	1	1			2	1		1	2	2		
36	32	10	4	55	42	7	13	19	15	3	4	8	6	5	2	2	1		1	6	5	2	1
19	15	2	4	15	4	2	11	8	6	1	2	1	1	1		2	1	1	1	1			1
31	24	3	7	52	27	5	25	12	5	1	7	6	2	2	4	3	2	1	1	4	2	1	2
34	33	11	1	21	18	3	3	14	13	2	1	8	6	4	2	1	1						
40	35	5	5	62	47	9	15	17	9	2	8	8	4		4	6	5	1	1	3	3	1	
10	8	2	2	22	20	3	2	6	6			2	2			3	3			1	1		
22	20	11	2	26	18	6	8	8	8	2		3	3	2		1	1			1	1		
21	20	3	1	35	32	6	3	21	18	7	3	5	4	1	1	3	2		1	5	5		
13	11	4	2	33	26	7	7	7	5		2	6	4	1	2	8	2		6	4	4		
27	27	2	0	83	80	14	3	35	31	6	4	11	2	1	9	4	1	1	3	2	0	0	2
43	27	11	16	45	31	10	14	16	11	6	5	11	7	3	4	5	3	1	2	9	6	1	3
29	23	5	6	83	62	12	21	21	15	2	6	12	7	1	5	7	5	1	2	3	1		2
16	14	0	2	40	22	8	18	8	4	1	4	8	4	1	4	1	1			2	2		
232	226	64	6	256	237	45	19	76	72	19	4	35	29	10	6	13	10	4	3	13	10	7	3
742	655	175	87	1,103	856	178	247	380	289	68	91	185	112	36	73	99	60	14	39	77	51	14	26

Table 2, annex 3

Some population statistics and under 5 mortality in 1998

□	Aimag	Population	Women at reproductive age	Children under 16	Infants 0-12 months	Children 1-5 years	Live births	Children's mortality cases			
								Total	Hospital	Within 24 hrs	Home
1	Ar	96,756	23,014	40,275	2,832	11,693	2,484	71	57	8	14
2	BU	90,693	22,885	36,506	2,405	12,217	2,494	147	57	18	90
3	BKh	91,318	21,867	36,496	2,237	10,120	2,337	100	65	14	35
4	Bu	64,094	16,218	25,339	2,275	5,792	1,202	56	42	12	14
5	GA	70,442	18,123	27,140	1,606	7,723	1,652	87	52	9	35
6	GS	12,148	3,176	4,597	119	1,220	262	5	5	3	
7	Da	89,114	22,962	32,592	1,407	9,048	1,404	89	69	17	20
8	DG	49,642	12,414	18,673	987	5,053	982	48	42	17	6
9	Do	73,813	18,632	29,679	1,522	7,401	1,618	77	68	23	9
10	Du	54,186	14,402	21,391	1,196	4,884	1,185	43	25	7	18
11	Za	100,905	29,016	37,885	2,162	10,607	2,297	116	72	23	44
12	Or	66,616	15,767	26,557	1,146	5,238	1,444	84	68	18	16
13	Uv	113,887	29,842	46,821	3,163	13,619	2,827	132	102	10	30
14	Um	45,108	10,581	19,237	1,138	5,380	1,033	37	33	6	4
15	Su	55,523	10,525	22,322	1,253	4,825	1,349	47	42	11	5
16	Se	97,771	24,149	3,977	1,806	11,280	1,831	73	70	14	3
17	Tu	103,537	25,641	39,942	2,128	12,497	1,583	60	36	10	24
18	Uv	94,734	22,120	40,748	2,498	10,377	2,760	128	114	17	14
19	Kho	90,855	22,513	36,626	2,001	11,312	2,449	167	118	36	49
20	Khu	123,600	28,978	49,511	2,161	10,660	2,702	123	90	20	33
21	Khe	70,269	13,131	23,966	1,425	5,640	1,590	56	41	10	15
22	UB city	632,767	170,762	187,664	13,906	37,808	12,481	604	543	156	61
Total		2,287,778	576,718	843,738	51,373	214,394	49,966	2,350	1,811	459	539

Table 2, annex 3 (continued)

Children's mortality cases by age groups (months)																							
0-2				2-11				12-23				24-35				36-47				48-59			
Total	Hospital	Within 24 hrs	Home	Total	Hospital	Within 24 hrs	Home	Total	Hospital	Within 24 hrs	Home	Total	Hospital	Within 24 hrs	Home	Total	Hospital	Within 24 hrs	Home	Total	Hospital	Within 24 hrs	Home
13	11	1	2	37	31	3	6	13	8	2	5	6	5	2	1	1	1			1	1		
20	9	5	11	50	21	8	29	29	11	3	18	23	9	2	14	18	5		13	7	2		5
33	32	5	1	35	17	4	18	18	8	3	10	7	5	2	2	4	1	0	3	3	2	0	1
25	25	7		13	9	2	4	11	7	2	4	3	1	1	2	2			2	2			2
17	11	4	6	45	25	4	20	19	12	1	7	2	2			2	1		1	2	1		1
1	1	1		4	4	2																	
20	19	12	1	39	26	1	13	19	16	1	3	3	2	1	1	6	5	2	1	2	1		1
26	25	15	1	11	11			6	4	2	2	2			2	3	2	0	1				
31	30	11	1	31	25	10	6	5	5	1		5	4	1	1	4	3	0	1	1	1		
13	8	3	5	20	12	1	8	4	2	1	2	2	1		1	3	2	2		1			1
30	24	11	6	67	41	9	26	4	3	2	1	3	1		2	8	2	1	6	4	1		3
39	37	13	2	22	16	1	6	12	10	3	2	3	3	1						8	2		6
31	27	5	4	69	55	4	14	14	10		4	10	4		6	6	5	0	1	2	1	1	1
7	6	2	1	17	15	3	2	6	5	1	1	4	4			2	2			1	1		
14	14	6		22	18	3	4	4	4			2	2			3	2	1	1	2	2	1	
22	21	5	1	26	26	6		16	15	2	1	4	3	1	1	2	2			3	3		
13	9	1	4	28	18	5	10	5	3	1	2	8	5	3	3	3	1		2	3			3
17	16	1	1	69	66	9	3	31	26	3	5	8	6	2	2	2	0	0	2	1	0	0	1
49	35	12	14	64	46	14	18	34	24	3	10	9	6	2	3	4	2	1	2	7	5	4	2
29	21	5	8	62	46	9	16	15	9	2	6	8	7	3	1	4	2	0	2	5	5	1	
14	11	1	3	26	21	6	5	7	4	1	3	4	2	1	2	3	2	1	1	2	1		1
229	223	100	6	237	203	30	34	95	83	12	12	22	20	10	2	14	12	3	2	7	2	1	5
693	615	226	78	994	752	134	242	367	269	46	98	138	92	32	46	94	52	11	42	64	31	8	33

**Table 2, annex **

Summary of annexes 1, 2, 3 of Table 2

		Rates / Year	1996	1997	1998	Total/Average for 3 yrs
1		Population	2,148,987	2,258,343	2,287,778	2,231,703
2		Women at reproductive age	570,668	565,488	576,718	570,958
3		Children below 16	864,510	843,235	843,738	850,494
4		Infants 0-12 months	46,584	50,516	51,373	49,491
5		Children 1-5 years	291,659	215,718	214,394	240,590
6		Live births	50,571	48,553	49,966	149,090
7		Total mortality cases for children	2,665	2,586	2,350	7,601
		Out of which: At hospital	2,112	2,023	1,811	5,947
		Within 24 hrs	537	475	459	1,482 (24.9)
		At home	553	563	539	1,654 (21.8)
8	Children's mortality cases by age groups (months)	0-2 months, total	813	742	693	2,248 (29.6)
		At hospital	715	655	615	1,985
		Within 24 hrs	214	175	226	615 (45.5)
		At home	98	87	78	263 (15.9)
		2-11 months, total	1,070	1,103	994	3,167 (41.7)
		At hospital	852	856	752	2,460
		Within 24 hrs	160	178	134	472 (31.8)
		At home	218	247	242	707 (42.7)
		12-23 months, total	408	380	367	1,138 (15.0)
		At hospital	307	289	269	854
		Within 24 hrs	83	68	46	194 (13.1)
		At home	101	91	98	284 (17.2)
		24-35 months, total	183	185	138	523 (6.9)
		At hospital	124	112	92	338
		Within 24 hrs	38	36	32	109 (7.3)
		At home	59	73	46	185 (11.2)
		36-47 months, total	104	99	94	297 (3.9)
		At hospital	59	60	52	172
		Within 24 hrs	23	14	11	55 (3.7)
		At home	45	39	42	125 (7.6)
		48-59 months, total	87	77	64	228 (3.0)
		At hospital	55	51	31	138
		Within 24 hrs	19	14	8	38 (2.7)
		At home	32	26	33	90 (5.4)

Table 3

Comparison by years of some indices for under-1 and under-5 mortality

Aimag	Live births				Mortality cases				Infant mortality (per 1,000 live births)				Under-5 mortality (per 1,000 live births)				Hospital deaths within 24hrs (percentage)				Home deaths (percentage)			
	1996	1997	1998	Total	1996	1997	1998	Total	1996	1997	1998	Average for 3 yrs	1996	1997	1998	Average for 3 yrs	1996	1997	1998	Average for 3 yrs	1996	1997	1998	Average for 3 yrs
Ar	2,448	2,412	2,484	7,344	90	93	71	254	25.7	28.2	20.1	24.6	36.8	38.5	28.6	34.6	15.8	20.2	14.0	17.0	8.9	15.0	19.7	14.2
BU	2,527	2,370	2,494	7,391	161	124	147	430	30.5	21.9	28.1	26.8	63.7	52.3	58.9	58.4	28.6	31.5	31.6	30.4	52.2	52.3	61.2	55.8
BKh	2,220	2,175	2,337	6,732	187	152	100	439	64.4	52.9	29.1	48.4	84.2	69.9	42.8	65.2	20.0	17.8	21.5	19.6	30.5	33.5	35.0	32.6
Bu	1,317	1,167	1,202	3,686	34	49	56	139	15.9	28.3	31.6	25.0	25.8	42.0	46.6	37.7	16.0	21.0	28.6	22.9	26.5	22.4	25.0	24.5
GA	1,647	1,618	1,652	4,917	74	117	87	278	32.8	50.1	37.5	40.1	44.9	72.3	52.7	56.5	17.6	16.2	17.3	16.1	35.1	36.7	40.2	37.4
GS	286	272	262	820	13	11	5	29	38.5	22.0	19.1	26.8	45.4	40.4	19.1	35.4	53.8	50.0	60.0	53.6	0	9.1	0	3.4
Da	1,345	1,364	1,404	4,113	108	89	89	286	51.3	41.5	42.0	44.5	80.3	65.2	63.4	69.5	35.7	26.8	24.6	29.5	22.2	20.2	22.5	21.7
DG	1,082	984	982	3,048	69	45	48	162	46.2	36.6	37.7	39.7	63.8	45.7	48.9	53.1	46.0	37.1	40.5	42.1	8.7	22.2	12.5	13.6
Do	1,724	1,557	1,618	4,899	129	126	77	332	48.1	58.4	38.3	48.2	74.8	80.9	47.6	67.8	33.0	26.7	33.8	30.9	17.8	19.8	11.7	17.2
Du	1,247	1,196	1,185	3,628	76	46	43	165	38.5	28.4	27.8	31.7	60.9	38.5	36.3	45.5	29.1	25.9	28.0	21.8	27.6	41.3	41.9	34.5
Za	2,244	2,152	2,297	6,693	120	108	116	344	40.5	38.6	42.2	40.5	53.5	50.1	50.5	51.4	16.2	21.0	31.9	23.2	43.3	42.6	37.9	41.3
Or	1,355	1,230	1,444	4,029	50	78	84	212	28.0	43.9	42.2	38.2	36.9	63.4	58.2	52.6	13.5	28.2	26.5	25.0	26.0	9.0	19.0	17.0
Uv	2,852	2,884	2,827	8,563	181	136	132	449	47.7	35.4	35.4	39.5	63.5	47.1	46.7	52.4	18.9	17.6	9.8	15.8	21.0	24.3	22.7	22.8
Um	1,205	1,191	1,033	3,429	38	44	37	119	23.2	26.9	23.2	24.5	31.5	36.9	35.8	34.7	16.1	12.5	18.2	15.4	18.4	9.1	10.8	12.6
Su	1,405	1,275	1,349	4,029	77	61	47	185	45.5	37.6	26.7	36.7	54.8	47.8	34.8	45.9	26.5	41.2	26.2	31.0	11.7	16.4	10.6	13.0
Se	1,833	1,766	1,831	5,430	87	90	73	250	32.7	31.7	26.2	30.2	47.5	51.0	39.9	46.0	13.4	21.0	20.0	18.0	5.7	10.0	4.1	6.8
Tu	1,723	1,611	1,583	4,917	65	71	60	196	20.9	28.5	25.9	25.0	37.7	44.1	37.9	39.9	25.6	23.1	27.8	25.2	33.8	26.8	40.0	33.2
Uv	2,893	2,416	2,760	8,069	177	162	128	467	46.0	45.5	31.2	40.8	61.2	67.0	46.4	48.8	13.4	17.0	14.9	15.0	11.3	13.0	10.9	11.8
Kho	2,758	2,495	2,449	7,702	179	129	107	475	44.2	35.3	46.1	41.9	64.9	51.7	68.2	61.7	33.9	37.6	30.5	33.6	34.1	34.1	29.3	32.4
Khu	2,637	2,665	2,702	8,004	97	155	123	375	26.1	42.0	33.7	34.0	36.8	58.2	45.5	46.8	13.2	18.6	22.2	18.2	14.4	27.1	26.8	23.7
Khe	1,542	1,545	1,590	4,677	76	75	56	207	29.8	36.2	25.2	30.4	49.3	48.5	35.2	44.2	27.6	21.3	24.4	24.6	23.7	37.3	26.8	23.2
UB	12,281	12,208	12,481	36,970	577	625	604	1806	35.9	40.0	37.3	37.7	47.0	51.2	48.4	48.8	31.8	25.5	28.7	28.6	6.2	6.5	10.1	7.6
Total	50,571	48,553	49,966	149,090	2,665	2,586	2,350	7,601	38.9	38.0	33.8	36.3	55.1	53.3	47.0	51.0	25.1	23.5	25.3	24.6	20.7	21.8	22.9	21.8

The fact that 21.8% of all children died before their fifth birthday (1,654 children) died at home without any adequate medical assistance is the most alarming finding of this survey (Table 4). 67.2% of all home deaths occurred in the following eight aimags: Bayan-Ulgii (14.6%), Khovd (9.3%), Bayankhongor (6.1%), Zavkhan (8.6%), Ulaanbaatar (8.3%), Gobi-Altai (6.3%), Uvurkhangai (6.1%), and Khuvsgul (5.4%) (Table 5). On the contrary, in Gobi-Sumber (0.06%), Umnugobi (0.9%), Selenge (1.0%), Dornogobi (1.3%), and Sukhbaatar (1,4%) aimags, very few children die at home. The percentage of all under-5 home deaths at the local level are 55.8% in Bayan-Ulgii, 41.3% in Zavkhan, 37.4% in Gobi-Altai, 34.5% in Dundgobi, 33.2% in Tuv, 32.6% in Bayankhongor, and 32.4% in Khovd. In other words, in Bayan-Ulgii aimag 1 out of 2 under-5 deaths occurred at home without any medical assistance; in the other aforementioned aimags, this ratio is approximately 1 out of 3. On the contrary, home deaths occur relatively less frequently in Gobi-Sumber (3.4%), Selenge (6.8%), and Ulaanbaatar city (7.6%); these statistics show health services are more accessible in these areas for children aged 0-5. At the national level, 1 out of 5 (21,8%) children under 5 years of age who died did not receive medical assistance.

Comparing home deaths by age group reveals that the number of deaths for children aged 2-11 months (42.7%) is greater than the number of deaths for children aged 12-23 months (17.2%) or for children aged 0-2 months (15.9%). Home deaths from these three age groups account for 75.8% of all home deaths. The remaining percentage of home deaths is distributed among the following age groups: 11.2% for 2-3 years, 7,6% for 3-4 years, 5.4% for 4-5 years (Table 6). Note the trend that as age increases, the percentage of home deaths decreases; this trend may be attributed to the idea that children become more adapted to their environment with age, and the decreased proportion of home deaths may not be related to the quality of medical assistance. (□□□□□□□ □□□□□□□□□□□□ □□□□□□□□ □□)

Of all under-5 mortality, home deaths represent 25% of deaths to children aged 0-2 months, 35.4% of deaths to children aged 24-35 months, 42.1% of deaths to children aged 36-47 months, and 39.5% of deaths to children aged 48-59 months. The proportion of home deaths may be greater among older children due to increased trauma and infectious diseases.

The percentages of the causes of home deaths are 67.8% for diseases, 18.7% for trauma (5.2% of which is due to suffocation by the mother's breast at night), 5.2% for sudden death, 4.7% for congenital diseases and anomalies, 1.3% for intoxication and poisoning, and 0.4% for conditions related to living as street children. Starvation was responsible for the deaths of 32 children (1.9%) (Figure 3).

29.7% of home deaths result from a lack of knowledge and responsibility of parents regarding children's health. The lack of transportation and the long distance to health facilities account for 26.6% of home deaths. 3.8% of home deaths are due to the fault of medical personnel, and 0.8% of home deaths are due to problems within the organization of health facilities. In order to decrease the number of home deaths, knowledge of parents about danger signs and home care needs to be increased. In addition, changes should be targeted at improving accessibility to health facilities, enhancing the performance of ambulance services for children, and further developing the professional skills and knowledge of health workers.

Figure 3

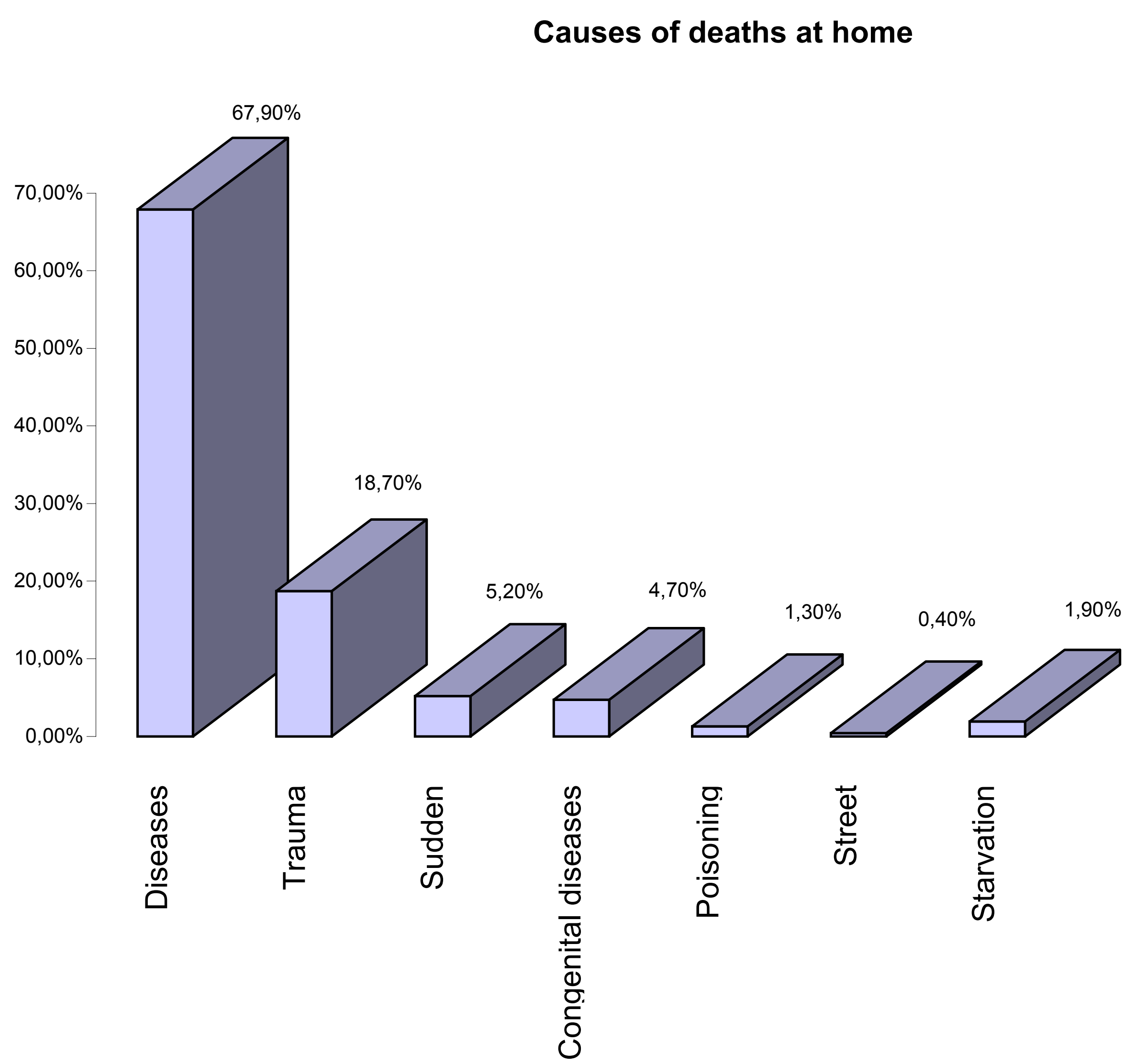

Causes of deaths at home
67,90%
18,70%
5,20%
4,70%
1,30%
0,40%
1,90%
70,00%
60,00%
50,00%
40,00%
30,00%
20,00%
10,00%
0,00%
Diseases
Trauma
Sudden
Congenital diseases
Poisoning
Street
Starvation

Table 4

Comparison by years home deaths of children 0-5

□	Aimag	Total deaths				Home deaths by age groups (months)																								Home deaths			
						0-2 months				2-11 months				12-23 months				24-35 months				36-47 months				48-59 months							
		96	97	98	∑	96	97	98	∑	96	97	98	∑	96	97	98	∑	96	97	98	∑	96	97	98	∑	96	97	98	∑	96	97	98	∑
1	Ar	90	93	71	254	1	4	2	7	2	8	6	16	1	-	5	6	2	1	2	4	-	-	-	-	2	1	-	3	8	14	14	3
2	BU	161	124	147	432	10	8	11	29	25	17	29	71	16	14	18	48	12	18	14	44	15	6	13	34	6	4	5	15	84	67	90	24
3	BKh	187	152	100	439	7	7	1	15	28	26	18	72	7	6	10	23	8	6	2	16	3	3	3	9	4	3	1	8	57	51	35	14
4	Bu	34	49	56	139	1	1	-	2	6	4	4	14	-	2	4	6	2	1	2	5	-	1	2	3	-	2	2	4	9	11	14	3
5	GA	74	117	87	218	10	6	6	22	8	17	20	45	2	12	7	21	3	2	-	5	2	4	1	7	1	2	1	4	26	43	35	10
6	GS	13	11	5	29	-	-	-	-	-	-	-	-	-	1	-	1	-	-	-	-	-	-	-	-	-	-	-	-	-	1	-	
7	Da	108	89	89	286	3	2	1	6	14	7	13	34	3	4	3	10	2	2	1	5	1	3	1	5	1	-	1	2	24	18	20	6
8	DG	69	45	48	162	1	1	1	3	-	6	-	6	-	2	2	4	2	-	2	4	2	1	1	4	1	-	-	1	6	10	6	22
9	Do	129	126	77	332	3	4	1	8	11	13	6	30	1	4	-	5	5	2	1	8	-	1	1	2	3	1	-	4	23	25	9	57
10	Du	76	46	43	165	4	4	5	13	9	11	8	28	6	2	2	4	-	-	1	1	1	1	1	3	3	1	-	4	21	19	18	57
11	Za	120	108	116	344	12	7	6	25	26	25	26	77	7	7	1	15	3	4	2	9	3	1	6	10	1	2	3	6	52	46	44	142
12	Or	50	78	84	212	-	1	2	3	6	3	6	15	5	1	2	8	-	2	-	2	1	-	-	1	1	-	6	7	13	7	16	36
13	Uv	181	136	132	449	4	5	4	13	17	15	14	46	12	8	4	24	2	4	6	12	1	1	1	3	2	-	1	3	38	33	30	101
14	Um	38	44	37	119	1	2	1	4	2	2	2	6	-	-	1	1	2	-	-	2	1	-	-	1	1	-	-	1	7	4	4	15
15	Su	77	61	47	185	1	2	-	3	6	8	4	18	-	-	-	-	1	-	-	1	1	-	1	2	-	-	-	-	9	10	5	24
16	Se	87	90	73	250	1	1	1	3	3	3	-	6	1	3	1	5	-	1	1	2	-	1	-	1	-	-	-	-	5	9	3	17
17	Tu	65	71	60	196	3	2	4	9	9	7	10	26	4	2	2	8	2	2	3	7	1	6	2	9	3	-	3	6	22	19	24	65
18	Uv	177	162	128	467	-	-	1	1	3	3	3	9	13	4	5	22	1	9	2	12	2	3	2	7	1	2	1	4	20	21	14	55
19	Kho	179	129	167	475	29	16	14	59	9	14	18	41	9	5	10	24	6	4	3	13	5	2	2	9	3	3	2	8	61	44	49	154
20	Khu	97	155	123	375	-	6	8	14	13	21	16	50	-	6	6	12	-	5	1	6	1	2	2	5	-	2	-	2	14	42	33	89
21	Khe	76	75	56	207	1	2	3	6	10	18	5	33	5	4	3	12	2	4	2	8	-	-	1	1	-	-	1	1	18	28	15	61
22	UB	577	625	604	1,806	6	6	6	18	11	19	34	64	9	4	12	25	4	6	2	12	5	3	2	10	1	3	5	9	36	41	61	138
Total		2,615	2,586	2,350	7,601	98	87	78	**263**	218	247	242	**707**	101	91	98	**284**	59	73	46	**185**	45	39	42	**125**	32	26	33	**90**	553	563	539	**1,654**

Table 5

Deaths at home and within first 24 hours at hospital, by aimags and cities

□	Aimag	Total deaths, children 0-5	Home deaths			Hospital deaths	Within 24 hours		
			Cases	↓	↔		Cases	□	↔
1	Ar	254	36	2.2	14.2	218	37	2.5	17.0
2	BU	432	241	**14.6**	**55.8**	191	58	3.9	30.4
3	BKh	439	143	**8.6**	**32.6**	296	58	3.9	19.6
4	Bu	139	34	2.1	24.5	105	24	1.6	22.9
5	GA	278	104	**6.3**	**37.4**	174	28	1.9	16.1
6	GS	29	1	0.06	3.4	28	15	1.0	53.6
7	Da	286	62	3.7	21.7	224	66	4.4	29.5
8	DG	162	22	1.3	13.6	140	59	4.0	42.1
9	Do	332	57	3.4	17.2	275	85	5.7	30.9
10	Du	165	57	3.4	34.5	108	30	2.0	27.8
11	Za	344	142	**8.6**	**41.3**	202	47	3.2	23.3
12	Or	212	36	2.2	17.0	176	44	3.0	25.0
13	Uv	449	101	**6.1**	**22.5**	348	55	3.7	15.8
14	Um	119	15	0.9	12.6	104	16	1.1	15.4
15	Su	185	24	1.4	13.0	161	50	3.4	31.1
16	Se	250	17	1.0	6.8	233	42	2.8	18.0
17	Tu	196	65	3.9	33.2	131	33	2.2	25.2
18	Uv	467	55	3.3	11.8	912	62	4.2	15.0
19	Kho	475	154	**9.3**	**32.4**	321	108	7.3	33.6
20	Khu	375	89	**5.4**	**23.7**	286	52	3.5	18.2
21	Khe	207	61	3.7	29.5	146	36	2.4	24.7
22	UB	1,806	138	**8.3**	**7.6**	1,668	477	32.2	28.6
Total		7,601	1,654	100	21.8	5,947	1,482	100	24.9

Table 6

Distribution of home deaths by age groups

	Age groups (months)	Total cases of deaths	Cases of home deaths	Percentage among total cases of home deaths	Percentage among total cases of deaths
1	0-2	2,248	263	15.9	11.7
2	2-11	3,167	707	12.7	22.3
3	12-23	1,138	284	17.2	25.0
4	24-35	523	185	11.2	35.4
5	36-47	297	125	7.6	42.1
6	48-59	228	90	5.4	39.5
Total		1,821	1,654	100.0	21.8

Figure 4

Home deaths and age groups

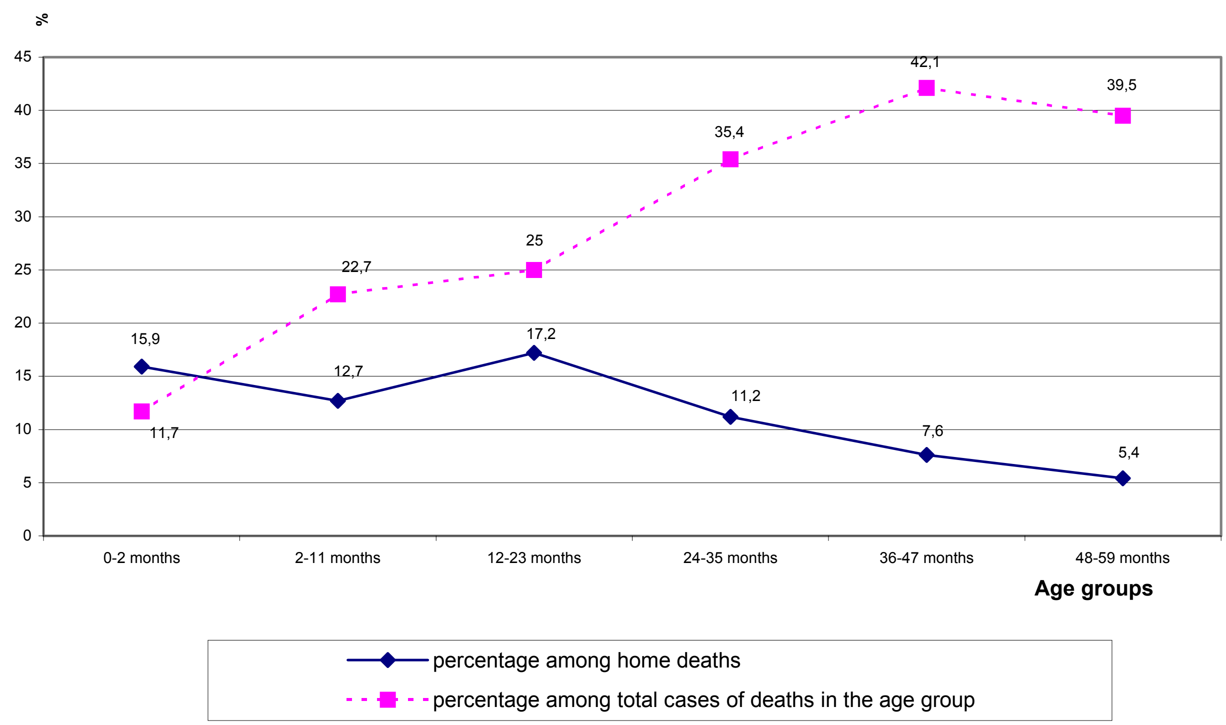


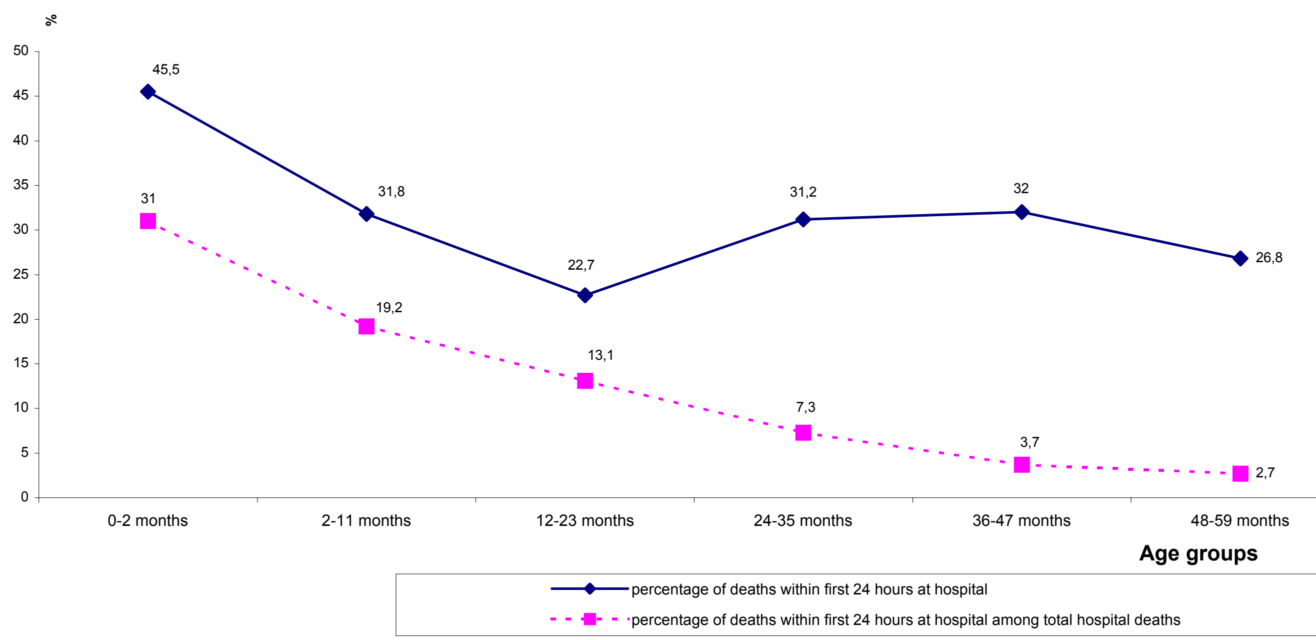
Table 7

Correlation of hospital deaths within first 24 hours and age groups

	Age groups (months)	Total cases of children died at hospital	Total cases of children died at hospital within first 24 hours	Percentage among hospital deaths within first 24 hours	Percentage among total cases of hospital death in the age group
1	0-2	1,985	615	45.5	31.0
2	2-11	2,460	472	31.8	19.2
3	12-23	854	194	13.1	22.7
4	24-35	338	109	7.3	31.2
5	36-47	172	55	3.7	32.0
6	48-59	138	37	2.7	26.8
Total		5,947	1,482	100.0	24.9

Figure 5

Deaths within first 24 hours at hospital and age groups



Both Table 5 and Table 7 address the proportion of hospital deaths that occur within the first 24 hours of hospitalization. At the national level, 24.9% (1,482) of 5,947 hospital deaths of children under 5 years of age have occurred within the first 24 hours of hospitalization. This index is highest in Gobi-Sumber, Dornogobi, Dornod, Bayan-Ulgii, Sukhbaatar, and Khovd aimags; 1/3 of all hospital deaths occur in these six aimags. In Ulaanbaatar city, 32.2% of hospital deaths occur within the first 24 hours; this statistic indicates that primary health care at the level of family doctors is not functioning effectively. In Uvurkhangai, Umnugobi, Uvs, Selenge, Gobi-Altai, Arkhangai, and Khuvsgul aimags, the index for death in a hospital within 24 hours ranges from 15.0-18.2%. In these aimags, late referrals occur less frequently, and emergency services are in a better state.

The distribution of hospital deaths within the first 24 hours among different age groups is listed in Table 7. The percentage of children who died within 24 hours in a hospital is 41.5% for the 0-2 months age group, 31.8% for the 2-11 months age group, 13.1% for the 12-23 months age group, 7.3% for the 24-35 months age group, 3,7% for the 36-47 months age group, and 2.6% for the 48-59 months age group. The percentages are higher for younger age groups because diseases complicate faster and more severely with younger children.

The percentage of total hospital deaths is 31.0% for children aged 0-2 months, 19.2% for children aged 2-11 months, 22.7% for children aged 12-23 months, 32.2% for children aged 24-35 months, 32.0% for children aged 36-47 months, and 26.8% for children aged 48-59 months. These statistics suggest that sicknesses of children under 2 months of age are very severe and progress quickly, and healthcare for children 2-11 months is relatively good (Enkhjin, this is not a fair conclusion since the sample sizes for these age groups are not comparable); however, healthcare for children aged 1-5 years gets worse again.

Another factor influencing under-5 mortality is premature birth. Morbidity of prematurely born babies is 6.8 times greater than morbidity of babies carried to full term, and the mortality rate is 46.8 times higher for premature babies (□. □unkhzol et al. 1995). Out of 151,110 deliveries during the three-year survey period, 149,090 (98.7%) were live births, and 2,020 (1.3%) were stillbirths (Table 8). The percentages of stillbirths in Bayan-Ulgii (2.6%), Khovd (2.3%), Dornod (1.9%), and Zavkhan (1.6%) aimags are relatively higher than the national average (1.3%), while the percentages are lowest in Selenge (0.8%), Umnugobi (0.7%), and Orkhon (0.8%) aimags. A total of 1,237 (61.2%) stillbirths were mature babies; these stillbirths may have resulted from poor monitoring during pregnancy and unsatisfactory healthcare services. Out of 149,090 live births, 96.4% (143,714) were mature, and 3.6% (5,379) were premature babies. In Zavkhan, Khuvsgul, Uvurkhangai, Orkhon, and Dornod aimags, the percentage of premature births is higher than the national average (Table 8).

Table 9 compares mortality of children aged 0-5 years by each month of the year with the national annual average (6,858 deaths) of the survey period. Under-5 mortality during the months from January to April is highest, totalling 41.4% (9.5%, 10.1%, 11.4%, 10.4%, respectively), while during the months of July and from October to December, under-5 mortality is lowest, totalling 26.7% (6.4%, 7.0%, 6.4%, 6.9%, respectively) for these four months. The remaining months of May, June, August, and September comprise 31.7% (8.6%, 7.5%, 7.2%, 8,4%, respectively) of the annual mortality. This trend of high and low mortality coincides with the peak seasons of ARI and diarrheal diseases. Because of the unique geography and weather conditions of each aimag, the months of high mortality vary among aimags.

For example, diarrhea is responsible for high mortality during the month of May in Arkhangai, Bayan-Ulgii, Bayankhongor, Bulgan, Zavkhan, Uvurkhangai, Khuvsgul, and Sukhbaatar, during the month of June in Arkhangai, Bayankhongor, Khovd, and Ulaanbaatar, during the month of July in Sukhbaatar, during the month of August in Bayan-Ulgii, Dornod, Sukhbaatar, and Selenge, and during the month of September in Darkhan-Uul, Dornogobi, Orkhon, Selenge, and Khentii. December has the highest mortality in Umnugobi, Bulgan, and Tuv aimags (Enkhjin, is it necessary to list all these aimags?).

In all aimags except Dornogobi and Selenge, the leading cause of child mortality is ARI and pneumonia. In all aimags except Dornogobi, Selenge, Sukhbaatar and Khentii, the second most common cause of child mortality is neonatal conditions. In all aimags except Zavkhan, Selenge, and Khentii, the third leading cause is diarrhea. In Dornogobi, neonatal conditions are the leading cause, pneumonia is second, and diarrhea is third. In Selenge aimag, diarrheal diseases are the leading cause, ARI is second, and neonatal conditions is third. In many aimags, meningococcal infections and trauma were the fourth and fifth most common causes of child mortality.

In all aimags except Selenge and Darkhan the leading cause of mortality for children aged 1-4 is pneumonia, and the second most common cause is diarrhea (except in Bayankhongor and Dundgobi aimags. In Selenge, Darkhan, and Dornogobi, the leading cause is diarrhea, and the second most common cause is ARI and pneumonia. In Bayankhongor and Dundgobi aimags, the second leading cause is cerebral and neurological diseases; the third, fourth, and fifth most common causes are trauma, meningoencephalitis, and infectious diseases, respectively. In Selenge and Dornod aimags, the fifth leading cause is kahexia.

The aforementioned information suggests that the five leading causes of mortality in children under 1 year of age is pneumonia, perinatal (neonatal) conditions, diarrheal diseases, infectious diseases, and trauma. For children 1-4 years of age, the top four causes are pneumonia, diarrheal diseases, infectious diseases, and trauma.

In Ulaanbaatar city, the five major causes of under-1 mortality are pneumonia (21.8%), perinatal (neonatal) conditions (21.7%), diarrheal diseases (18.7%), meningitis (6.5%), and anomalies (defects) in development. The five leading causes for children 1-4 years of age in Ulaanbaatar city are pneumonia (41.1%), diarrheal diseases (37.7%), meningitis (14.2%), cardiac diseases (2.6%), and anomalies (defects) in development (2.8%).

Table 8

Comparison of premature born and stillborn babies by aimags and cities

Aimags	Total births				Live births				Still births				Total for 3 years			
	Year			Total for 3 years	Mature		Premature		Mature		Premature		Live births		Still births	
	1996	1997	1998		□	%	□	%	□	%	□	%	□	%	□	%
Ar	2,480	2,453	2,518	7,451	7,284	99.2	60	0.8	55	51.4	52	48.6	7,344	98.6	107	1.4
BU	2,579	2,428	2,580	7,587	7,367	99.7	24	0.3	196	100.0	-	-	7,391	97.4	196	2.6
BKh	2,249	2,209	2,367	6,825	6,658	99.9	74	0.1	44	47.3	49	52.7	6,732	98.7	93	1.4
Bu	1,335	1,174	1,218	3,727	3,620	98.2	66	1.8	28	68.3	13	31.7	3,686	98.9	41	1.1
GA	1,670	1,631	1,669	4,970	4,750	96.6	167	3.4	22	41.5	31	58.5	4,917	98.9	53	1.1
GS	289	279	264	832	799	97.4	21	2.6	6	50.0	6	50.0	820	98.6	12	1.4
Da	1,360	1,385	1,424	4,169	3,933	95.6	180	4.4	34	60.7	22	39.3	4,113	98.7	56	1.3
DG	1,099	992	996	3,087	2,915	95.6	133	4.4	26	66.7	13	33.3	3,048	98.7	39	1.3
Do	1,758	1,593	1,645	4,996	4,662	95.2	237	4.8	48	49.5	49	50.5	4,899	98.1	97	1.9
Du	1,261	1,205	1,203	3,669	3,459	95.3	169	4.7	23	56.1	18	43.9	3,628	98.9	41	1.1
Za	2,274	2,192	2,339	6,805	6,243	93.3	450	6.7	59	52.7	53	47.3	6,693	98.4	112	1.6
Or	1,363	1,239	1,458	4,060	3,828	95.0	201	5.0	13	41.9	18	58.1	4,029	99.2	31	0.8
Uv	2,897	2,916	2,865	8,678	8,090	94.5	473	5.5	69	60.0	46	40.0	8,563	98.7	115	1.3
Um	1,211	1,203	1,041	3,455	3,377	98.5	52	1.5	18	69.2	8	30.8	3,429	99.3	26	0.7
Su	1,427	1,299	1,367	4,093	3,955	98.2	74	1.8	41	64.1	23	33.9	4,029	98.4	64	1.6
Se	1,842	1,780	1,850	5,472	5,316	97.9	114	2.1	30	71.4	12	28.6	5,430	99.2	42	0.8
Tu	1,753	1,634	1,601	4,988	4,812	97.6	105	2.1	31	43.7	40	56.3	4,917	98.6	71	1.4
Uv	2,929	2,444	2,797	8,170	7,773	96.3	296	3.7	65	64.3	36	35.7	8,069	98.8	101	1.2

Kho	2,820	2,559	2,504	7,883	7,512	97.5	190	2.5	97	53.6	84	46.4	7,702	97.7	181	2.3
Khu	2,672	2,696	2,728	8,096	7,556	94.4	448	5.6	62	67.4	30	31.6	8,004	98.9	92	1.1
Khe	1,552	1,569	1,603	4,724	4,532	96.9	145	3.1	29	61.7	18	38.3	4,677	99.0	47	1.0
UB city	12,403	12,333	12,637	37,373	35,273	95.4	1697	4.6	241	59.8	162	40.2	36,970	98.9	403	1.1
Total	51,223	49,213	50,674	151,110	143,714	96.4	5,376	3.6	1,237	61.2	783	38.8	14,9090	98.7	2,020	1.3

Table 9

Mortality of children 0-5 in months of the year by aimags and cities

Months / Aimags	1		2		3		4		5		6		7		8		9		10		11		12		Total
	□	%	□	%	□	%	□	%	□	%	□	%	□	%	□	%	□	%	□	%	□	%	□	%	□
Ar	21	9.7	31	12.2	36	14.2	38	15.0	30	11.85	26	10.3	15	5.9	5	2.0	9	3.55	6	2.4	15	5.9	21	8.3	253
BU	14	5.6	16	11.1	22	15.3	11	7.6	16	11.1	13	9.0	7	4.9	18	12.5	8	5.55	8	5.55	4	2.8	7	4.9	144
BKh	22	9.62	38	9.7	63	16.1	48	12.3	41	10.5	38	9.7	19	4.8	19	4.8	23	5.9	14	3.6	32	8.2	34	8.7	391
Bu	13	11.5	11	8.15	19	14.0	18	13.33	14	10.4	12	8.9	8	5.92	7	5.2	11	8.1	6	4.44	3	2.22	13	9.62	135
GA	20	24.13	25	14.36	18	10.34	17	9.8	13	7.5	14	8.0	9	5.2	8	4.6	12	6.7	9	5.2	15	8.62	14	8.0	174
GS	7	7.14	1	3.45	6	20.69	2	6.9	2	6.9	-	-	3	10.34	2	6.9	1	3.45	3	10.34	1	3.45	1	3.45	29
Da	16	9.26	16	7.14	24	10.71	28	12.5	14	6.25	9	4.0	18	8.0	9	8.5	28	12.5	29	12.94	13	5.8	10	4.46	224
DG	15	11.74	27	16.66	12	7.4	21	12.96	12	7.4	14	8.64	7	4.32	9	5.55	7	4.32	17	10.49	11	6.8	10	6.17	162
Do	39	6.29	23	6.92	18	5.42	31	9.37	29	8.73	19	5.72	26	7.83	34	10.24	44	13.25	24	7.23	22	6.62	23	6.92	332
Du	10	9.59	16	10.06	31	19.49	25	15.72	11	6.91	12	7.54	8	5.03	11	6.91	13	8.17	4	2.51	11	6.91	7	4.4	159
Za	33	8.92	46	13.37	40	11.62	37	10.75	36	1046	25	7.26	17	4.94	20	5.81	15	4.36	23	6.68	23	6.68	29	8.43	344
Or	19	9.8	22	10.32	25	11.73	12	5.63	11	5.16	16	7.51	18	8.45	13	6.1	22	10.32	14	6.57	20	9.39	21	9.86	213
Uv	44	15.38	71	15.81	80	17.81	57	12.7	49	10.91	22	4.9	18	4.0	22	4.9	20	4.45	28	6.23	12	2.67	26	5.8	449
Um	16	3.78	16	15.38	19	18.26	-	-	-	-	-	-	2	1.92	7	6.73	9	8.65	9	8.65	16	15.38	10	9.61	104
Su	7	12.0	20	10.81	20	10.81	19	10.27	26	14.05	7	3.78	17	9.19	18	9.73	13	7.02	15	8.1	14	7.56	9	4.86	185
Se	28	7.14	19	8.15	22	9.42	18	7.72	16	6.86	10	4.3	23	9.87	22	9.42	32	13.73	13	5.58	21	9.0	9	3.86	233
Tu	14	7.06	20	10.2	21	10.71	23	11.83	8	4.08	9	4.6	8	4.08	12	6.12	21	10.71	18	9.18	15	7.65	27	13.77	196
Uv	33	9.05	45	9.64	59	12.63	48	10.28	40	8.56	39	8.35	27	5.78	45	9.63	32	6.85	32	6.85	21	4.5	46	9.85	467
Kho	43	9.7	43	9.05	39	8.21	46	9.68	34	7.16	43	9.05	35	7.37	35	7.37	44	9.26	40	8.42	36	7.58	37	7.79	475
Khu	38	10.13	37	9.87	51	13.6	50	13.33	44	11.73	30	8.0	19	5.07	17	4.53	14	3.73	23	6.13	29	7.73	23	6.13	375
Khe	17	11.64	14	9.6	14	9.6	9	6.16	13	8.9	11	7.53	9	6.16	7	4.8	13	8.9	15	10.27	15	10.27	9	6.16	146
UB	182	10.91	137	8.21	145	8.69	157	9.41	134	8.03	145	8.69	127	7.61	145	8.69	185	11.1	131	7.85	92	5.51	88	5.27	1,668
Total	651	9.5	694	10.1	784	11.4	715	10.4	593	8.6	514	7.5	440	6.4	495	7.2	576	8.4	481	7.0	441	6.4	474	6.9	6,858

Part II. Hospital records study of under-5 mortality causes and the factors influencing them

From 5,947 hospital records from 1996 to 1998, 1,821 records were sampled, using the variable random selection method, to establish the leading causes of child mortality. Of all the surveyed children, 752 (41.3%) had died due to respiratory diseases, and pneumonia accounted for 75.7% of these deaths. Pneumonia is also responsible for 31.2% of all deaths. 68.9% of the children died before one year of age, while 31.1% of deaths occurred between the ages of 1 to 4 years. Out of 569 children who died from pneumonia, 401 (30.4%) were infants, and 168 (29.5%) were 1-4 years of age. (Table 2.1, 2.2, 2.3, 2.4, 2.5, 2.6)

The second major cause of under-5 mortality is diarrheal disease (with 352 cases of diarrhea without blood in stools and 13 cases with blood in stools). Of the 352 children who died from diarrhea without blood in stools, 63.3% were infants, and 36.7% were 1-4 years of age (Table 2.1, 2.2, 2.3). Diarrheal diseases is the third leading cause of under-1 mortality (16.9%) and is ranked second in 1-4 mortality (28.8%). Of all children who died from diarrheal diseases, 88% (310) were under 2 years of age.

The third leading cause of under-5 mortality (14.9%) and the second leading cause of under-1 mortality (20.1%) are four types of perinatal (neonatal) conditions (Table 2.1, 2.2, 2.3). Among the four illnesses in this group, asphyxia and anomalies (defects) in development are the major components. In the 1-4 years age group, the third leading cause of mortality is a combination of six infectious diseases (10.4%). Cerebral and neurological diseases (5 to 7 types of diseases) rank fifth for under-5 (12.4%), under-1 (15.4%) and 1-4 (4.6%) mortality.

Table 2.1

Causes of under-5 mortality

No.	Causes	Kinds of the cause	Total cases	Percent	Per 1,000 live births	Rating
1	Respiratory diseases	5	752	41.3	413	I
2	Diarrheal diseases	1	352	19.3	193	II
3	Neonatal conditions	4	271	14.9	149	III
4	Cerebral, neurological diseases	7	226	12.4	124	IV
5	Infectious diseases	8	105	5.8	58	V
6	Surgical conditions, trauma	11	46	2.5	25	VI
7	Cardiac diseases	2	36	2.0	20	VII
8	Diseases of blood	2	15	0.8	8	IX
9	Other	7	18	1.0	10	VIII
Total		47	1,821	100	1,000	

The fifth leading cause of under-5 (5.8%) and under-1 (4.0%) mortality is infectious disease (8 types), and 50.5% of deaths from infectious disease afflict children under 1 year of age. The most alarming of these findings is the occurrence of 8 cases (15.1%) of congenital syphilis and 3 cases (5.4%) of tuberculosis.

The sixth most common cause of under-5 (2.5%) and under-1 (1.7%) mortality is surgical diseases and trauma. For the 1-4 years age group, surgical diseases and trauma is ranked fifth (41.6%); 25% of these deaths are caused by skin burns.

Seven types of diseases comprise the group specified as 'other' (18 cases; 1%). Six out of these seven types afflict children under 1 year of age (33.3%).

Out of 36 (2%) cases of cardiac diseases, 20 (55.6%) occurred in children under 1; 91.7% of all cardiac diseases were congenital defects.

A total of 15 (0.7%) cases of blood disease were recorded; 66.6% of these cases occurred in children under 1. Four (26.7%) of these cases were leucosis.

ARI and diarrheal diseases were responsible for 60.6% (1,104) of all child mortality.

The data collected suggests that there are some differences in the causes of mortality between the under-1 age group versus the under-5 and 1-4 years age groups.

Table 2.2

Major causes of infant mortality

No.	Causes	Kinds of the cause	Cases	Percentage	Percentage among infant deaths	Percentage among under 5 deaths	Rating
1	Respiratory diseases	4	517	68.7	39.1	28.4	I
2	Neonatal conditions	4	266	98.15	20.1	14.6	II
3	Diarrheal diseases*	1	223	63.3	16.9	12.2	III
4	Cerebral, neurological diseases	6	203	89.8	15.4	11.1	IV
5	Infectious diseases	7	53	50.5	4.0	2.9	V
6	Surgical conditions, trauma	8	23	50.0	1.7	1.3	VI
7	Cardiac diseases	2	20	55.5	1.5	1.1	VII
8	Diseases of blood	2	10	66.7	0.8	0.5	VIII
9	Other	4	6	33.3	0.45	0.3	IX
Total		38	1321	72.5	100.0	72.5	

* Salmonella and cholera not included.

Table 2.3

Major causes of 1-4 mortality

No.	Causes	Kinds of the cause	Cases	Percentage	Percentage among 1-4 deaths	Percentage among under-5 deaths	Rating
1	Respiratory diseases	5	235	31.3	47.0	12.9	I
2	Neonatal conditions	1	129	36.7	28.8	7.1	II
3	Diarrheal diseases*	6	52	49.5	10.4	2.9	III
4	Cerebral, neurological diseases	5	23	10.2	4.6	1.3	IV- V
5	Infectious diseases	9	23	50.0	4.6	1.3	IV-V
6	Surgical conditions, trauma	2	16	44.4	3.2	0.9	VI
7	Cardiac diseases	7	12	66.7	2.4	0.6	VII
8	Diseases of blood	3	5	33.3	1.0	0.3	VIII-IX
9	Other	2	5	1.85	1.0	0.3	VIII-IX
Total		40	500	27.5	100.0	27.5	

Table 2.4

Major causes of under-5 mortality

No.	Name of the disease	Cases	Percentage among major causes	Percentage among under 5 deaths
1	Pneumonia	569	44.1	31.2
2	Diarrhea	352	27.3	19.3
3	Anomalies	143	11.1	7.8
4	Perinatal encephalopathy	118	9.1	6.5
5	Asphyxia, aspiration	108	8.4	5.9
Total		1290	100.0	69

By nozological names of diseases (?), the five leading causes of under-5 mortality are pneumonia 569 (44.1%), diarrheal diseases (27.3%), anomalies of growth and development (11.1%), perinatal encephalopathy (9.1%), and asphyxia and aspiration (8.4%); these diseases are responsible for 1,290 deaths (69%) in children under 5 years of age (Table 2.4).

The five leading causes of 968 infant mortality are pneumonia (30.4%), diarrheal diseases (16.9%), anomalies of growth and development (9.7%), perinatal encephalopathy (8.2%), and asphyxia and aspiration (8.1%); these five illnesses cause 53.1% of all under-5 mortality and 73.3% of all infant mortality (Table 2.5).

Table 2.5

Major causes of infant mortality

No.	Name of the disease	Cases	Percentage among infant deaths	Percentage among under 5 deaths	Percentage among major causes
1	Pneumonia	401	30.4	22.0	41.4
2	Diarrhea	223	16.9	12.2	23
3	Anomalies	128 (19)	9.7	7.0	13.3
4	Perinatal encephalopathy	109	8.2	6.0	11.3
5	Hypoxia, suffocation	107	8.1	5.9	11.0
Total		968	73.3	53.1	100

Table 2.17

Distribution of major causes of mortality for infants

Disease group	Number of cases	Percentage of age group	Percentage of infant mortality	Percentage of under-5 mortality
1. Respiratory diseases	76	16.4	5.7	4.2
1.1 ARI 1.2 Tracheitis 1.3 Pneumonia	3 4 69	0.6 0.9 14.9	0.2 0.3 5.2	0.16 0.2 3.8
2. Diarrheal diseases	6	1.3	0.4	0.3
3. Infant diseases	258	55.7	19.5	14.2
3.1 Asphyxia 3.2 Congenital anomalies 3.3 Sepsis 3.4 Leucosis 3.5 Hemolytic disease 3.6 Daun disease 3.7 Malnutrition 3.8 Cardiac anomalies 3.9 Hematoma	106 95 36 1 6 2 1 10 1	22.9 20.55 7.8 0.2 1.3 0.4 0.2 2.0 0.2	8.0 7.2 2.7 0.08 0.45 0.15 0.08 0.8 0.08	5.8 5.2 2.0 0.05 0.3 0.1 0.05 0.5 0.05
4. Infectious diseases congenital syphilis	7	1.5	0.5	0.4
5. Neurological diseases	114	24.6	8.6	6.3
5.1 Perinatal encephalopathy	77	16.65	5.8	4.2
5.2 Birth cerebral trauma	14	3.0	1.1	0.8

5.3 Insult	23	5.0	1.7	1.3
6. Surgical diseases	2	0.4	0.15	0.1
6.1 Peritonitis 6.2 Intestinal obstruction	1 1	0.2 0.2	0.08 0.08	0.05 0.05
Total	463	99.9	35.1	25.4

The disease groups that were the leading causes of mortality for children aged 1-2 months were respiratory diseases, neurological diseases, infant diseases, diarrhea diseases, and surgical diseases (52.1%, 23.9%, 10.3%, 9.4%, 4.3%, respectively), of which the first three groups accounted for 86.3%.

Table 2.18

Distribution of major causes of mortality for children aged 1 - 2 months

Disease group	Number of cases	Percentage of age group	Percentage of infant mortality	Percentage of under-5 mortality
1. Respiratory diseases	61	52.1	4.6	3.3
1.1 ARI 1.2 Tracheitis 1.3 Pneumonia	16 3 42	13.7 2.6 35.9	1.2 0.2 3.2	0.9 0.16 2.3
2. Diarrheal diseases	11	9.4	0.8	0.6
3. Infant diseases	12	10.3	0.9	0.7
3.1 Congenital anomaly 3.2 Sepsis 3.3 Blood diseases 3.4 Cardiac anomaly 3.5 Malnutrition	3 5 2 1 1	2.6 4.3 1.7 0.8 0.8	0.2 0.4 0.15 0.08 0.08	0.16 0.3 0.1 0.05 0.05
4.0 Neurological diseases	28	23.9	2.1	1.5
4.1 Insult 4.2 Encephalopathy 4.3 Bacterial meningitis	17 9 2	14.5 7.7 1.7	1.3 0.7 0.15	0.9 0.5 0.1
5.0 Surgical diseases	5	4.3	0.4	0.3
5.1 Osteomyelitis 5.2 Abscess	1 4	0.8 3.4	0.08 0.3	0.05 0.2
Total (14 types)	117	100.0	8.9	3.3

Among the causes of mortality in the age group of 1-2 months, pneumonia was the most common cause (35.9%, 3.2%, 2.3%) (Enkhjin, these three statistics need to be defined somewhere in the text, not just in the table; otherwise, only one statistic should be used instead of three), followed in decreasing order by insult (23.9%, 2.1%, 1.5%), ARI (13.7%, 1.2%, 0.9%), encephalopathic remnants (7.7%, 0.7%, 0.5%), and sepsis (4.3%, 0.4%, 0.3%). These five causes represented 85.5% of the total mortality in this age group. Causes of mortality for children aged 1-2 months accounted for 8.9% of the total causes of mortality of children in the age group of up to 1 year and represented 3.3% of children in the age group of up to 5 years.

Causes of mortality for children aged 2-5 months differed from the previous two age groups in that respiratory diseases, diarrheal diseases, and neurological diseases were the three disease groups that were leading causes, followed by infectious diseases as the fifth most prevalent disease group. The specific diseases of pneumonia, diarrhea, ARI, tracheitis, and encephalopathy were the five leading causes of mortality of children aged 2-5 months (83.3%) (Table 2.19).

Table 2.19

Distribution of major causes of mortality for children aged 2 - 5 months

Disease group	Number of cases	Percentage of age group	Percentage of infant mortality	Percentage of under-5 mortality
1. Respiratory diseases	198	57.4	15.0	10.9
1.1 ARI	24	7.0	1.8	1.3
1.2 Tracheitis	20	5.8	1.5	1.1
1.3 Laringotracheobronchitis	4	1.2	0.3	0.2
1.4 Pneumonia	150	43.8	11.5	8.2
2.0 Diarrheal diseases	78	22.6	5.9	4.3
3.0 Infectious diseases	11	3.2	0.8	0.6
3.1 Acute hepatitis	1	0.3	0.08	0.05
3.2 Meningococcal infection	5	1.45	0.4	0.3
3.3 Dysentery	3	0.9	0.23	0.16
3.4 Salmonella	1	0.3	0.08	0.05
3.5 Congenital syphilis	1	0.3	0.08	0.05
4.0 Neurological diseases	32	9.3	2.4	1.8
4.1 Insult	5	1.45	0.4	0.3
4.2 Bacterial meningitis	10	2.9	0.8	0.6
4.3 Birth cerebral trauma	2	0.6	0.15	0.1
4.4 Cerebral cyst	1	0.3	0.08	0.05
4.5 Perinatal encephalopathy	14	4.1	1.1	0.8
5.0 Surgical diseases, trauma	9	2.6	0.7	0.5
5.1 Osteomyelitis	1	0.3	0.08	0.05
5.2 Abscess	3	0.9	0.23	0.16
5.3 Intestinal obstruction	1	0.3	0.08	0.05
5.4 Hernia	1	0.3	0.08	0.05
5.5 Thoracic cage and abdominal injury	1	0.3	0.08	0.05
5.6 Burn	1	0.3	0.08	0.05
5.7 Peritonitis	1	0.3	0.08	0.05
6.0 Other diseases	17	4.9	1.3	0.9
6.1 Anomalies	5	1.45	0.4	0.3
6.2 Cardiac anomaly	4	1.2	0.3	0.2
6.3 Sepsis	6	1.7	0.45	0.3
6.4 Malnutrition	1	0.3	0.08	0.05
6.5 Blood diseases	1	0.3	0.08	0.05
Total (27)	345	100.0	26.1	18.9

Of the 28 different types of diseases, 396 cases of mortality for children aged 6-11 months were caused mainly by respiratory diseases and diarrheal diseases, followed by infectious diseases and neurological diseases, respectively. The specific causes of mortality were pneumonia (35.4%, 10.6%, 7.7%), diarrhea (32.3%, 9.7%, 7,0%), ARI (5.05%, 1.5%, 1.1%), tracheitis (5.05%, 1.5%, 1.1%), and bacterial meningitis (3.8%, 1.2%, 0.8%) (Table 2.20).

Table 2.20

Distribution of major causes of mortality for children aged 6 - 11 months

Disease group	Number of cases	Percentage of age group	Percentage of infant mortality	Percentage of under-5 mortality
1. Respiratory diseases	182	46.0	13.8	10.0
1.1 ARI	20	5.05	1.5	1.1
1.2 Tracheitis	20	5.05	1.5	1.1
1.3 Laringotracheobronchitis	2	0.5	0.15	0.1
1.4 Pneumonia	140	35.4	10.6	7.7
2.0 Diarrheal diseases	128	32.3	9.7	7.0
3.0 Infectious diseases	35	8.8	2.6	1.9
3.1 Acute hepatitis	11	2.8	0.8	0.6
3.2 Meningococcal infection	14	3.5	1.1	0.8
3.3 Tuberculosis	3	0.75	0.23	0.16
3.4 Dysentery	6	1.5	0.45	0.3
3.5 Varicella	1	0.25	0.08	0.05
4.0 Neurological diseases	30	7.6	2.3	1.6
4.1 Insult	2	0.5	0.15	0.1
4.2 Bacterial meningitis	15	3.8	1.1	0.8
4.3 Scull injury	1	0.25	0.08	0.05
4.4 Birth cerebral trauma	2	0.5	0.15	0.1
4.5 Cerebral cyst	1	0.25	0.08	0.05
4.6 Perinatal encephalopathy	9	2.3	0.7	0.5
5.0 Surgical diseases, trauma	6	1.5	0.45	0.3
5.1 Peritonitis	1	0.25	0.08	0.05
5.2 Osteomyelitis	1	0.25	0.08	0.05
5.3 Abscess	1	0.25	0.08	0.05
5.4 Intestinal obstruction	2	0.5	0.15	0.1
5.5 Burn	1	0.25	0.08	0.05
6.0 Cardiac diseases	5	1.3	0.4	0.3
6.1 Myocarditis	1	0.25	0.08	0.05
6.2 Cardiac anomaly	4	1.0	0.3	0.2
7.0 Other diseases	10	2.5	0.8	0.5
7.1 Congenital anomalies	6	1.5	0.45	0.3
7.2 Sepsis	1	0.25	0.08	0.05
7.3 Kidney inflammation	1	0.25	0.08	0.05
7.4 Asphyxia	1	0.25	0.08	0.05
7.5 Allergies	1	0.25	0.08	0.05
Total (28)	396	100.0	30.0	21.7

The following tables summarize the main causes of mortality for children under the age of one year by age groups. For all children aged more than one month, pneumonia was the leading cause, and ARI was consistently the third most prevalent cause. For children aged 1-2 months, the second leading cause was insult, whereas for the age groups of 2-5 months and 6-11 months, diarrhea was the second leading cause (Table 2.21 b, c, d).

Table 2.21

Leading causes of mortality for infants

	Disease group	Number of cases	Percentage in infant mortality	Percentage of under-1 mortality	Percentage of under-5 mortality
1	Asphyxia	106	22.9	8.0	5.8
2	Congenital anomalies	95	20.5	7.2	5.2
3	Perinatal encephalopathy	77	16.6	5.8	4.2
4	Pneumonia	69	14.9	5.2	3.8
5	Sepsis	36	7.8	2.7	2.0
Total		383	82.8	29.0	21.0

Table 2.21b

Leading causes of mortality for children aged 1 - 2 months

	Disease group	Number of cases	Percentage in infant mortality	Percentage of under-1 mortality	Percentage of under-5 mortality
1	Pneumonia	42	35.9	3.2	2.3
2	Insult	17	14.9	1.3	0.9
3	ARI	16	13.7	1.2	0.9
4	Perinatal encephalopathy	9	7.7	0.7	0.5
5	Sepsis	5	4.3	0.4	0.3
Total		89	76.1	6.7	4.9

Table 2.21c

Leading causes of mortality for children age 2 - 5 months

	Disease group	Number of cases	Percentage in infant mortality	Percentage of under-1 mortality	Percentage of under-5 mortality
1	Pneumonia	150	43.8	11.5	8.2
2	Diarrhea	78	22.6	5.9	4.3
3	ARI	24	7.0	1.8	1.3
4	Tracheitis	20	5.8	1.5	1.1
5	Perinatal encephalopathy	14	4.1	1.1	0.8
Total		286	82.9	21.6	15.7

Table 2.21d

Leading causes of mortality for children age 6 - 11 months

□	Disease group	Number of cases	Percentage in infant mortality	Percentage of under-1 mortality	Percentage of under-5 mortality
1	Pneumonia	140	35.4	10.6	7.7
2	Diarrhea	128	32.3	9.7	7.0
3	ARI	20	5.05	1.5	1.1
4	Tracheitis	20	5.05	1.5	1.1
5	Meningococcal infection	14	3.5	1.1	0.8
6	Viral hepatitis	11	2.8	0.8	0.6
Total		333	84.1	25.2	18.3

The fourth leading cause of mortality for both the age groups of 2-5 months and 6-11 months was tracheitis. For children aged 2-5 months, perinatal encephalopathy was the fifth leading cause while meningococcal infection held the same rank for children aged 6-11 months (Table 2.21 c, d). The fourth and fifth leading causes of mortality for children aged 1-2 months were hypoxygenic encephalopathy and sepsis, respectively (Table 2.21 b).

The causes of mortality for children aged less than one month were different than the causes for the age groups of greater than one month. Asphyxia, congenital anomalies, and perinatal encephalopathy were the three leading causes, while pneumonia and sepsis were fourth and fifth, respectively. These five diseases accounted for 82.8% of infant mortality (Table 2.21□).

The causes of mortality for children aged 1-4 also differed from the causes for other age groups. Among the 21 types and 269 cases in the age group of 12-23 months (Table 2.22, column 5) pneumonia was the primary cause (38.3%, 20.6%, 5.7%), followed by diarrhea (32.3%, 17.4%, 4.8%), laryngitis (15.9%, 3.2%, 0.9%), tracheitis (5.2%, 2.8%, 0.8%), and viral hepatitis (4.1%, 2.2%, 0.6%). These five causes were responsible for 85.5% of all mortality causes.

For children 24-35 months of age (Table 2.22, column 6), mortality is attributed to 20 types of diseases, and 119 cases were recorded. The leading causes were pneumonia (36.1%, 8.6%, 2.4%) and diarrhea (20.2%, 4.8%, 1.3%), followed by three equally proportioned causes, which were tracheitis, laryngitis, and meningococcal infection (5.9%, 1.4%, 0.4%). These five causes represented 74% of all mortality causes in this age group.

In the group for children aged 36-47 months (Table 2.22, column 7) 24 types of diseases along with 57 cases were registered. Again, pneumonia and diarrhea were the two leading causes while laryngitis, viral hepatitis, and encephalopathy, each of the same proportion, completed the list of five major causes. These five causes accounted for 50.9% of all mortality causes in this age group. Thus, as the age of the age group increased, the number of different causes of mortality also increased, and subsequently, a smaller number of diseases were responsible for the majority of mortality.

In the 48-59 months age group (Table 2.22, column 8) 22 types of diseases and 57 cases of mortality were recorded. The two leading causes of mortality were an equal proportion of pneumonia and diarrhea (each 18.1%, 2.0%, 0.5%), followed by ARI (10.9%, 1.2% 0.3%), and laryngotracheitis and cardiac anomaly were tied as the fourth most prevalent cause (each 5.4%, 0.6%, 0.16%). These five reasons represented 57.9% of all mortality causes in this age group.

Table 2.22

Leading causes of mortality for children aged 1-4 years

	Disease (columns)	12-23 months				24-35 months				36-47 months				48-59 months				1-4 years		
		5				6				7				8						
2	Tracheitis	14	5.2	2.8	0.8	7	5.9	1.4	0.4	2	3.5	0.4	0.1	-				23	4.6	1.3
3	Pneumonia	103	38.3	20.6	5.7	43	36.1	8.6	2.4	12	21.0	2.4	0.7	10	18.1	2.0	0.5	168	33.6	9.2
23	ARI	4	1.5	0.8	0.2	2	1.7	0.4	0.1	2	3.5	0.4	0.1	6	10.9	1.2	0.3	14	2.8	0.8
9	Peritonitis	-				-				-				1	1.8	0.2	0.05	1	0.2	0.05
10	Laringotracheobronchitis	16	5.9	3.2	0.9	7	5.9	1.4	0.4	3	5.3	0.6	0.2	3	5.4	0.6	0.16	29	5.8	1.6
4	Diarrheal diseases	87	32.3	17.4	4.8	24	20.2	4.8	1.3	8	14.0	1.6	0.4	10	18.1	2.0	0.5	129	25.8	7.1
21	Salmonella	3	1.1	0.6	0.2	-				1	1.75	0.2	0.0	-				4	0.8	0.2
32	Dysentery	3	1.1	0.6	0.2	1	0.8	0.2	0.05	-			5	-				4	0.8	0.2
11	Viral hepatitis	11	4.1	2.2	0.6	2	1.7	0.4	0.1	3	5.3	0.6		2	3.6	0.4	0.1	18	3.6	1.0
14	Tuberculosis	2	0.74	0.4	0.1	4	3.4	0.8	0.2	1	1.75	0.2	0.2	2	3.6	0.4	0.1	9	1.8	0.5
15	Meningococcemia	1	0.4	0.2	0.05	7	5.9	3.2	0.4	3	5.3	0.6	0.0	2	3.6	0.4	0.1	13	2.6	0.7
28	Diphtheria	-				-				2	3.5	0.4	5	2	3.6	0.4	0.1	4	0.8	0.2
62	Congenital syphilis	-				-				-			0.2	-				-		
67	Varicella	-				-				-			0.1	-				-		
1	Perinatal encephalopathy	1	0.4	0.2	0.05	3	2.5	0.6	0.2	3	5.3	0.6	0.2	2	3.6	0.4	0.1	9	1.8	0.5
13	Insult	-				-				1	1.75	0.2	0.0	1	1.8	0.2	0.05	2	0.4	0.1
43	Bacterial meningitis	3	1.1	0.6	0.2	4	3.4	0.8	0.2	-			5	1	1.8	0.2	0.05	8	1.6	0.4
58	Birth cerebral trauma	-				2	1.7	0.4	0.1	-				-				2	0.4	0.1
72	Hydrocephalia	-				-				-				-				-		
	Peritonitis	-				1	0.8	0.2	0.05	1	1.75	0.2	0.0	-				2	0.4	0.1
12	Osteomyelitis	-				-				-			5	1	1.8	0.2	0.05	1	0.2	0.05
17	Appendicitis	-				-				2	3.5	0.4		1	1.8	0.2	0.05	3	0.6	0.2
19	Brain contusion	1	0.4	0.2	0.05	1	0.8	0.2	0.05	-			0.1	-				2	0.4	0.1
20	Burn	4	1.5	0.8	0.2	4	3.4	0.8	0.2	1	1.75	0.2		1	1.8	0.2	0.05	10	2.0	0.55
25	Thoracic cage and	-				1	0.8	0.2	0.05	2	3.5	0.4	0.0	-				3	0.6	0.2
31	abdominal injury												5							
	Posttraumatic sepsis	-				-				-			0.1	1	1.8	0.2	0.05	1	0.2	0.05
38	Blood diseases	3	1.1	0.6	0.2	-				2	3.5	0.4		-				5	1.0	0.3
45	Skull fracture	-				-				1	1.75	0.2		-				1	0.2	0.05
50	Nephroblastoma	-				-				1	1.75	0.2	0.1	-				1	0.2	0.05
55	Intestinal obstruction	-				-				-			0.0	-				-		
64	Hernia	-				1	0.8	0.2	0.05	-			5	-				1	0.2	0.05
66													0.0							
													5							
26	Glomerulonephritis	-				-				-				2	3.6	0.4	0.1	2	0.4	0.1
27	Hematoma	-				-				1	1.75	0.2	0.0	1	1.8	0.2	0.05	2	0.4	0.1
37	Malnutrition	2	0.74	0.4	0.1	-				1	1.75	0.2	5	-				3	0.6	0.2
44	Pancreatitis	-				-				-			0.0	1	1.8	0.2	0.05	1	0.2	0.05
40	Cardiac anomaly	7	2.6	1.4	0.4	2	1.7	0.4	0.1	2	3.5	0.4	5	3	5.4	0.6	0.16	14	2.8	0.8
56	Myocarditis	1	0.7	0.2	0.05	-				-				1	1.8	0.2	0.05	2	0.4	0.
57	Lymphogranulomatosis	-				-				-			0.1	1	1.8	0.2	0.05	1	0.2	0.05
63		-				2	1.7	0.4	0.1	-				-				2	0.4	0.
70	Allergies	1	0.4	0.2	0.05	-				-				-				1	0.2	0.05
16	Congenital anomalies	1	0.4	0.2	0.05	-				-				-				1	0.2	0.05
18	Sepsis	1	0.4	0.2	0.05	1	0.8	0.4	0.05	1	1.75	0.2	0.1	-				3	0.6	0.2
52	Asphyxia	-				-				1	1.75	0.2	0.1	-				1	0.2	0.05
45	Daun disease	-				-				-				-				-	-	-
Types of diseases		21			100	20		100	24				100	22			100	39		100
Number of cases		269				119			57					55				500		

Comparison of the causes of mortality for children aged 1-4 according to the four age groups revealed that pneumonia, diarrhea, and laryngotracheobronchitis were the three leading causes. Ranking fourth for children in the 12-23 and 36-47 months age groups was viral hepatitis, and in the 24-35 months age group, meningococcal infection was the fourth most prevalent cause (Table 2.23b). Meningococcal infection ranked fifth for children in the 12-23 months age group, and in the 48-59 months age group, the fifth most common cause was cardiac anomaly (Table 2.23 a, b, c, d).

Table 2.23

Leading causes of mortality for children aged 12-23 months

No	Disease	Number of cases	Percentage of major morbidity	Percentage of age group morbidity	Percentage of 1-4 years mortality	Percentage of under-5 mortality
1	Pneumonia	103	43.2	38.3	20.6	5.7
2	Diarrhea	87	36.5	32.3	17.4	4.8
3	Laringotracheobronchitis, bronchitis	30	12.6	11.1	6.0	1.6
4	Acute hepatitis	11	4.6	4.1	2.2	0.6
5	Cardiac anomaly	7	2.9	2.6	1.4	0.4
Total		238	100.0	88.6	47.6	13.1

Table 2.23b

Leading causes of mortality for children aged 24-35 months

No	Disease	Number of cases	Percentage of major morbidity	Percentage of age group morbidity	Percentage of 1-4 years mortality	Percentage of under-5 mortality
1	Pneumonia	43	43.0	36.1	8.6	2.4
2	Diarrhea	24	24.0	20.2	4.8	1.3
3	Laringotracheobronchitis, bronchitis	14	14.0	11.8	2.8	0.8
4	Meningococcal infection	7	7.0	5.9	1.4	0.4
5	Tuberculosis	4	4.0	3.4	0.8	0.2
5	Bacterial meningitis	4	4.0	3.4	0.8	0.2
5	Burn	4	4.0	3.4	0.8	0.2
Total		100	100.0	84.0	20.0	5.5

Table 2.23c

Leading causes of mortality for children aged 36-47 months

1	Disease	Number of cases	Percentage of major morbidity	Percentage of age group morbidity	Percentage of 1-4 years mortality	Percentage of under-5 mortality
1	Pneumonia	12	38.7	21.0	2.4	0.7
2	Diarrhea	8	25.8	14.0	1.6	0.4
3	Laringotracheobronchitis, bronchitis	5	16.1	8.8	1.0	0.3
4	Acute hepatitis	3	9.7	5.3	0.6	0.2
5	Meningococcal infection	3	9.7	5.3	0.6	0.2
Total		31	100.0	54.4	6.2	1.8

Table 2.23d

Leading causes of mortality for children aged 48-59 months

№	Disease	Number of cases	Percentage of major morbidity	Percentage of age group morbidity	Percentage of 1-4 years mortality	Percentage of under-5 mortality
1	Pneumonia	10	31.3	18.1	2.0	0.5
2	Diarrhea	10	31.3	18.1	2.0	0.5
3	ARI	6	18.7	10.9	1.2	0.3
4	Laringotracheobronchitis, bronchitis	3	9.4	5.4	0.6	0.16
5	Cardiac anomaly	3	9.4	5.4	0.6	0.16
Total			99.9	58.2	6.4	1.8

The following table compares the five main causes of mortality for children aged up to 5 years according to the children's age groups (Table 2.24). These five diseases accounted for 69.1 percent of all mortality causes for children aged up to 5 years.

Table 2.24

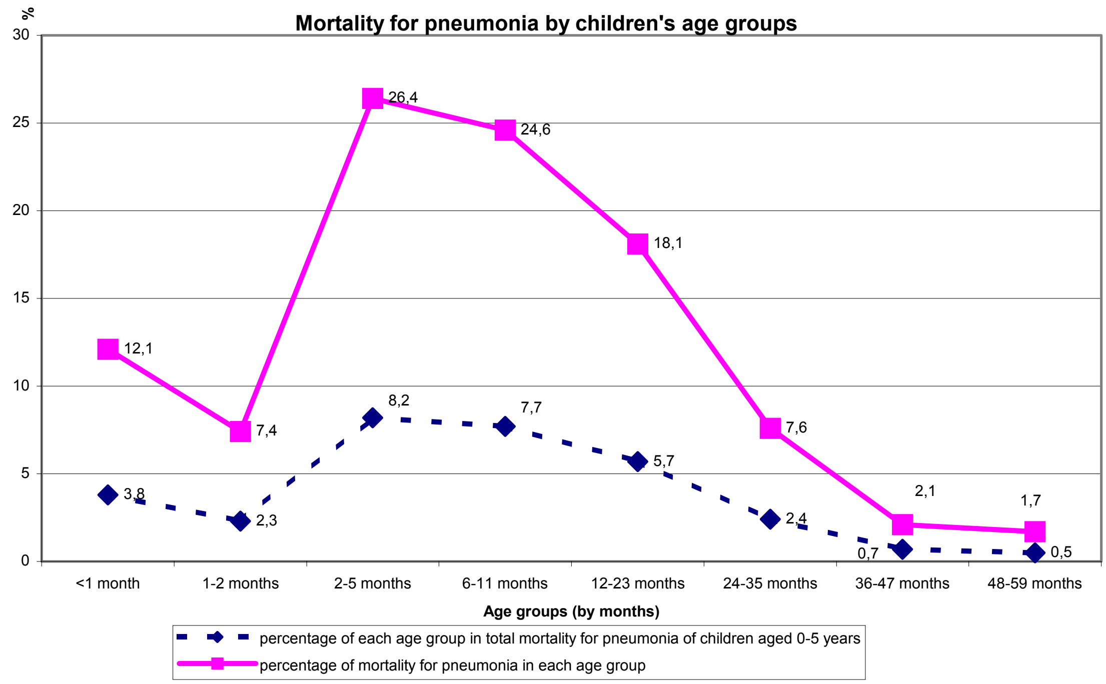
Leading causes of mortality for children aged up to 5 years

No	Disease	Child's age by month								Total
		<1	<1-2	2-5	6-11	12-23	24-35	36-47	48-59	
1	Pneumonia	69 12.1 3.8	42 7.4 2.3	150 26.4 8.2	140 24.6 7.7	103 18.1 5.7	43 7.6 2.4	12 2.1 0.7	10 1.7 0.5	569 100 31.2
2	Diarrheal diseases (enteritis, enterocolitis)	6 1.7 0.3	11 3.1 0.6	78 22.2 4.3	128 36.4 7.0	87 24.7 4.8	24 6.8 1.3	8 2.3 0.4	10 2.8 0.5	352 100 19.3
3	Perinatal encephalopathy, its remnants	77 65.2 4.2	9 7.6 0.5	14 11.9 0.8	9 7.6 0.5	1 0.8 0.05	3 2.5 0.2	3 2.5 0.2	2 1.7 0.1	110 100 6.0
4	Congenital anomaly	95 86.5 5.2	3 2.7 0.2	5 4.5 0.3	6 5.4 0.3	1 0.9 0.05	- - -	- - -	- - -	118 100 6.5
5	Asphyxia	106 97.2 5.8	- - -	- - -	1 0.9 0.05	- - -	- - -	1 0.9 0.05	1 0.9 0.05	109 100 5.98
	Total	353 **28.1** 19.4	65 5.2 3.6	247 **19.5** 13.6	284 **22.6** 15.6	192 **15.3** 10.5	70 5.6 3.8	24 1.9 1.3	23 1.8 1.26	1,258 100 69.1

According to the table, the five diseases corresponded to 85.5% of mortality in the age groups under 1 month, 2-5 months, 6-11 months, and 12-23 months (28.1%, 22.6%, 19.5%, 15.3%, respectively).

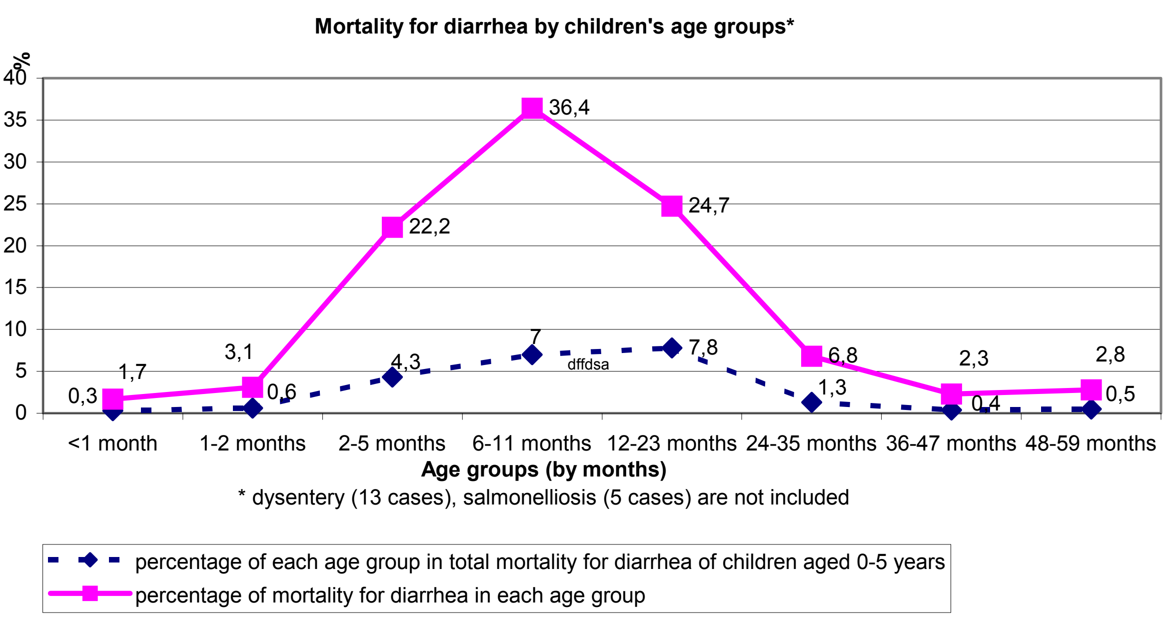
Leading the mortality causes, pneumonia represented 32.2% of all deaths, and among the different age groups, pneumonia was the highest in the 2-5 months age group but declined gradually as age increased (Fig.6). Pneumonia occurred infrequently in the infant and 1-2 months age groups.

Fig. 6



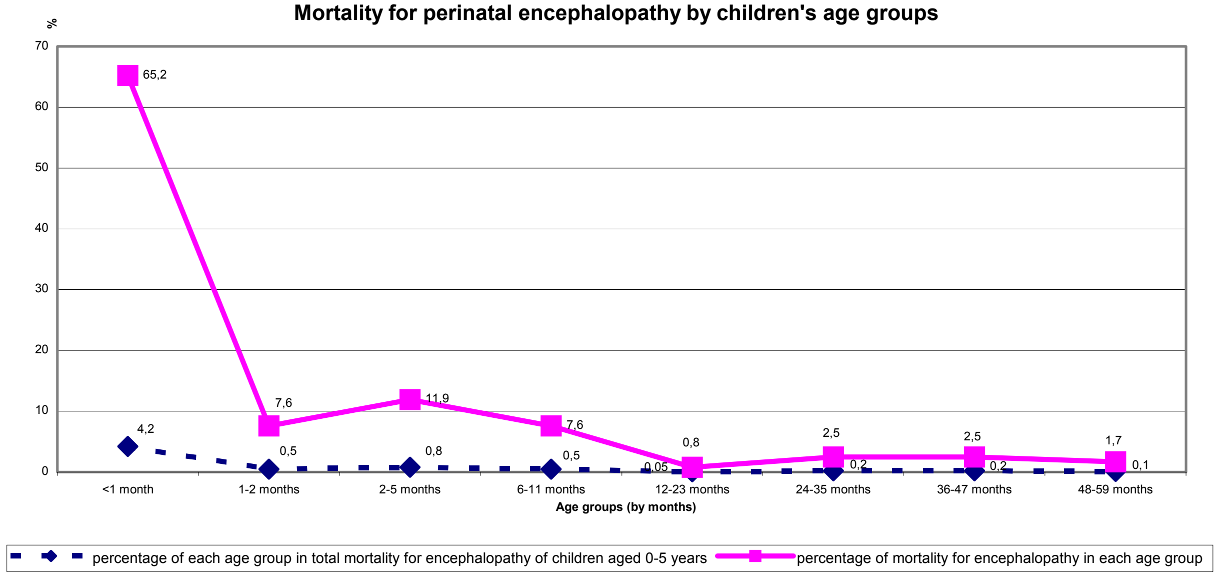
Diarrhea, the second most common cause of mortality, was responsible for 19.3% of all cases of mortality in the studied age groups. Diarrhea steadily became more prominent with age until the percentage reached a pinnacle at 6-11 months but gradually declined thereafter (Fig. 7). The percentage of diarrhea was highest in the 6-11 months age group because at this age, children begin to eat complementary foods and increase their contact with the environment by crawling and walking; moreover, children do not receive immunization against microbes that cause diarrhea.

Fig. 7



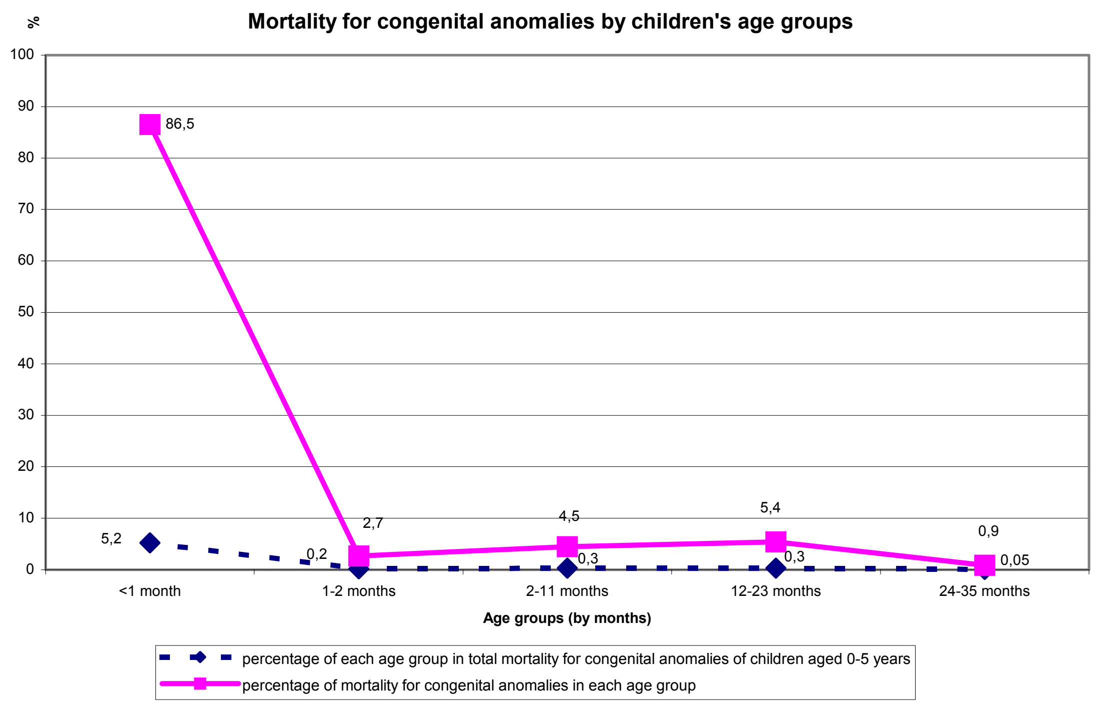
The third most common cause of child mortality was perinatal encephalopathy and its remnants, accounting for 6.5% of mortality causes. This disease caused a majority of mortality for infants (65.2%) and continued to afflict children until 1 year of age but decreased in the 1-4 age group (Fig. 7). Out of the total mortality by encephalopathy, 72.8% occurred in children under 2 months, and the remaining 27.2% were caused by its remnants.

Fig. 8



The next disease, congenital anomalies, corresponded to 6% of the causes of mortality for children under 5 years of age. Congenital anomalies occurred as a majority for infants (86.5%) because of the disease's dependence on the prognoses of anomalies. Children with unviable anomalies survived less than one year (Fig. 9).

Fig. 9



Asphyxia, the fifth most common cause of mortality, accounted for 5.98% (~6%) of mortality causes, and this disorder occurred almost exclusively to infants. A few cases were recorded for older children usually due to sudden deaths (Fig. 10).

Fig. 10

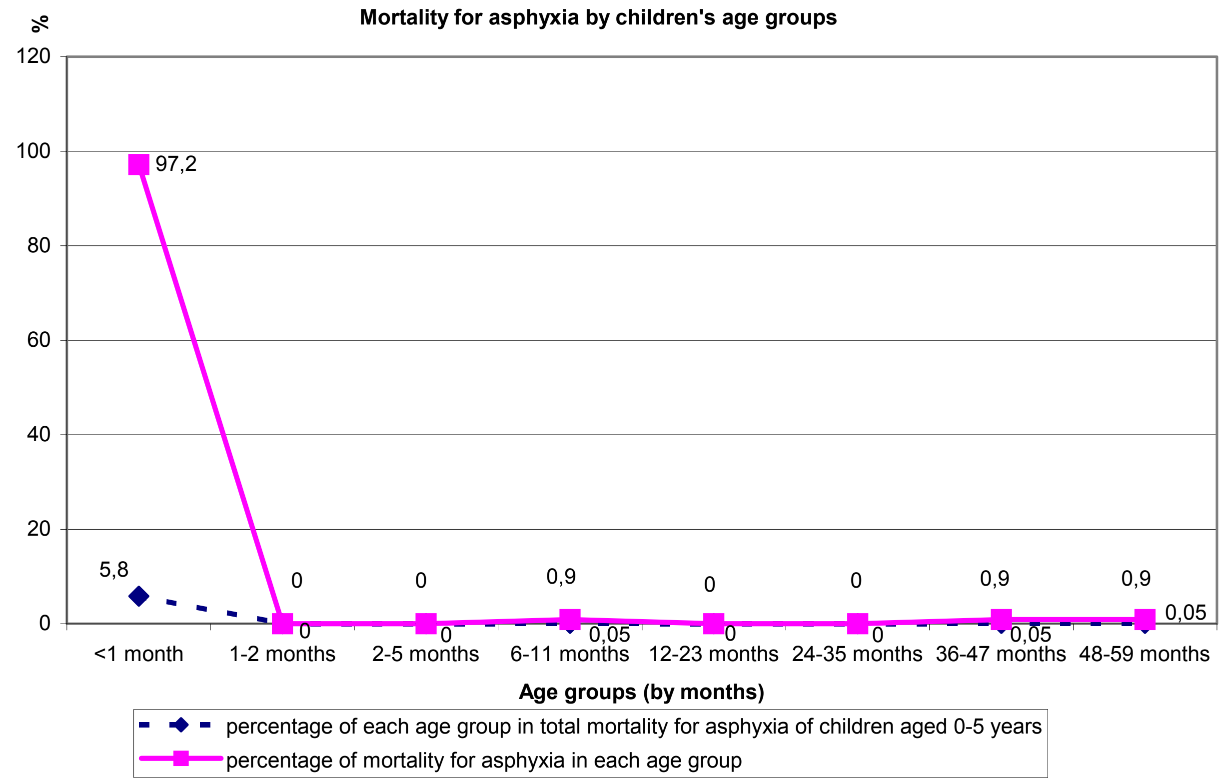


Table 2.25 summarizes the causes of mortality for children under 5 years of age by two age groups, under 1 year and between 1 to 4 years. For children under 1 year, 30.4% of mortality was by pneumonia, and pneumonia accounted for 22.0% of all mortality causes for children under 5 years. For all cases of pneumonia for children under 5 years, 70.5% of mortality causes occurred for children under 1 year.

Table 2.25 shows that 63.3% of all cases of diarrhea occurred in the age group of children under 1. Diarrhea accounted for 16.9% of all mortality causes for children under 1 year and 12.2% of children under 5 years; 63.3% of mortality causes occurred for children under 1 year for all cases of diarrhea for children under 5 years.

Perinatal encephalopathy caused 8.2% of mortality for children under 1 and 6.0% of mortality for children under 5. For children under 5, 92.4% of all cases of this disease occurred in children under 1.

For children under 1, congenital anomalies accounted for 8.2% of mortality causes, and for children under 5, this disease represented 6.0% of the causes. Nearly all cases of mortality by congenital anomalies (99.1%) occurred in children under 1.

Asphyxia caused 8.1% of mortality for children under 1 and 5.9% of mortality for children under 5. For most cases of asphyxia (98.2%), the children afflicted were under 1 year of age.

Table 2.25

Mortality by main disease categories for the children aged below 1 and 1-4 years

No.	Disease group	Age (year)		Total
		Below 1	1-4	
1	Pneumonia	401 (70.5%) 30.4 22.0	168 (29.5%) 33.6 9.2	569 31.2
2	Diarrhea	223 (63.3%) 16.9 12.2	129 (36.7%) 28.8 7.1	352 19.3
3	Perinatal encephalopathy	109 (92.4%) 8.2 6.0	9 (7.6%) 1.8 0.5	118 6.5
4	Congenital anomalies	109 (99.1%) 8.2 6.0	1 (0.9%) 0.2 0.05	110 6.0
5	Asphyxia	107 (98.2%) 8.1 5.9	2 (1.8%) 0.4 0.1	109 5.98
Total		949 (75.4%) 71.8 52.1	309 (24.6) 61.8 17.0	1,258 69.1

The distribution of occurrences of the major mortality causes by hospital is given in Table 2.26. The percentage of incidents of mortality by pneumonia was 45.9% in aimag hospitals, 37.4% in soum hospitals, 10.5% in district hospitals, and 3.9% in MCH centers. In regards to mortality by diarrhea, 43.8% occurred in aimag hospitals and 23.6% occurred in district hospitals. Mortality by perinatal encephalopathy occurred 61.9% of the time in aimag hospitals and 16.9% of the time in MCH centers. The percentage of incidents of mortality by congenital anomalies was 49.1% in aimag hospitals and 18.2% in MCH centers. For asphyxia, 51.8% of incidents of mortality were in aimag hospitals and 13% of incidents of mortality were in MCH centers.

Children under 1 month of age in Ulaanbaatar were treated at MCH centers; therefore, mortality by the top three diseases was relatively high. Thus, the causes of mortality for children under 5 years accounted for 91.6% of all deaths, and the mortality rate of the 13 diseases that are shown in Table 2.26 was high in aimag and soum hospitals at 44.3% and 26.2%, respectively, while lower in district hospitals (12.5%), MCH centers (11.7%), and other hospitals (5.1%).

The leading causes of mortality for the 739 deaths at aimag hospitals are pneumonia (35.3%), diarrhea (20.8%), perinatal encephalopathy (9.9%), asphyxia (7.6%), and congenital anomalies (7.3%).

At soum hospitals, the five major causes of the 438 deaths were pneumonia (48.6%), diarrhea (11.4%), ARI (10.3%), laryngitis/tracheitis (8.7%), and insult (4.1%).

The 212 deaths at the district hospitals were caused by diarrhea (39.1%), pneumonia (28.3%), bacterial meningitis (5.7%), meningococcal infection (5.7%), and laryngitis/tracheitis (4.2%).

The five leading causes of mortality for the 195 deaths at MCH centers were diarrhea (24.6%), pneumonia (11.3%), perinatal encephalopathy (10.3%), congenital anomalies (10.3%), and sepsis (9.2%).

The leading causes of mortality varied among the different types of hospitals. In Ulaanbaatar, diarrhea was primary cause of mortality, while pneumonia was responsible for most deaths in soum hospitals. Mortality for congenital anomalies, perinatal encephalopathy and sepsis were high in MCH centers since these facilities focus on infant health care.

Table 2.26

The main disease categories of mortality by hospitals

No.	Disease group	Number of cases	Percentage* of cases	Hospitals: District hospital	Aimag hospital	Soum hospital	MCH center	Other hospitals	
1	Pneumonia	569	31.2	60 10.5 28.3	261 45.9 35.3	213 37.4 48.6	22 3.9 11.3	13 2.3 15.3	569 100.0
2	Diarrhea	352	19.3	83 23.6 39.1	154 43.8 20.8	50 14.2 11.4	48 13.6 24.6	17 4.8 20.0	352 100.0
3	Perinatal encephalopathy	118	6.5	3 2.5 1.4	73 61.9 9.9	17 14.4 3.9	20 16.9 10.3	5 4.2 5.9	118 99.9
4	Congenital anomalies	110	6.0	7 6.4 3.3	54 49.1 7.3	11 10.0 2.5	20 18.2 10.3	18 16.2 21.2	110 99.9
5	Asphyxia	108	5.9	6 5.55 2.8	56 51.85 7.6	12 11.1 2.7	14 13.0 7.2	20 18.5 23.5	108 100.0
6	ARI	77	4.2	6 7.8 3.3	10 13.0 1.3	47 61.0 10.7	13 16.9 6.7	1 13 1.2	77 100.0
7	Sepsis	51	2.8	2 3.9 0.9	28 54.9 3.8	1 2.0 0.2	18 35.3 9.2	2 3.9 2.4	51 100.0
8	Insult	49	2.7	3 6.1 1.4	19 3.9 2.6	18 36.7 4.1	7 14.3 3.6	2 4.0 2.4	49 100.0
9	Laryngitis, tracheitis	105	5.7	9 8.6 4.2	43 40.9 5.8	38 36.2 8.7	14 13.3 7.2	1 1.0 1.2	105 100.0
10	Bacterial meningitis	35	1.9	12 34.3 5.7	11 31.3 1.5	7 20.0 1.6	2 5.7 1.0	3 8.6 3.5	35 100.0
11	Cardiac anomaly	33	1.8	3 9.1 1.4	12 36.4 1.6	5 15.1 1.1	11 33.3 5.6	2 6.1 2.4	33 100.0
12	Meningococcal infection	32	1.8	12 37.5 5.7	9 21.1 1.2	10 31.2 2.3	1 3.1 0.5		32 99.9
13	Viral acute hepatitis	30	1.6	6 20.0 3.3	9 30.0 1.2	9 30.0 2.1	5 8.6 2.6	1 1.4 1.2	30 100.0
Total		1,669	91.6	212 12.7 100	739 44.3 100.0	438 26.2 100	195 11.7 100	85 5.1 100	1,669 100.0

Note: *percentage of causes of mortality for children under 5 years

When mortality is sorted by hospitals and age (Table 2.27), 53.3% of children under 1 month of age and 42.7% of children aged 1-2 months are found to have died at aimag hospitals; only 17.0% of children under 1 month of age died at MCH centers. In regards to mortality for children aged 2-5 months, 27.7% occurred in soum hospitals while 18.9%

occurred in district hospitals. Children aged 6-11 months experienced 31.5% mortality at district hospitals and 23.2% mortality in soum hospitals. Thus, for mortality of all children under 1 year of age, 44.3% occurred in aimag hospitals and 26.9% occurred in soum hospitals.

In regards to mortality for children aged 1-4 years, 45.5% occurred in aimag hospitals while 26.0% occurred in soum hospitals. Out of all the 1,821 registered children aged 0-5 years, 829 (45.5%) cases of mortality occurred in aimag hospitals; from these cases, 70.6% were children under 1 year of age, and 29.4% were children 1-4 years of age.

Of the children who died in aimag hospitals, 20.8% were children under 1 month of age, 18.9% were 6-11 month old children, and 16.2% were aged 12-23 months. Given these statistics, healthcare needs to be improved for pregnant women and infants; this improvement can be accomplished by identifying basic diseases earlier and strengthening the quality of treatment and supervision.

The percentage of the 473 children who died in soum hospitals was 75.1% for children under 1 year, and of this percentage, 27.1% were aged 2-5 months, 23.2% were 6-11 months and 14.2% were under 1 month.

Of the 222 children who died in district hospitals, 31.5% were 6-11 months, and 18.9% were 12-23 months of age; these deaths result from the high rate of basic diseases in Ulaanbaatar city.

The percentage by age group of the 203 children who died in MCH centers was 38.9% for children under 1 month, 26.7% for 6-11 months old children, and 16.3% for 2-5 months old children.

Table 2.27

Mortality by age group and hospitals

No.	Age group	Total	Hospitals					
			District hospital	Aimag hospital	Soum hospital	MCH Center	Other	
1	Under 1 month	463	20 4.3 9.0	247 53.3 20.8	67 14.5 14.2	79 17.0 38.9	50 10.8 53.2	463 100.0 25.4
2	1-2 months	117	15 12.8 6.8	50 42.7 6.0	47 40.2 9.9	4 3.4 2.0	1 0.9 1.1	117 100.0 6.4
3	2-5 months	345	42 12.2 18.2	131 38.0 15.8	131 38.0 27.7	33 9.6 16.3	8 2.3 8.5	345 100.0 18.9
4	6-11 months	396	70 17.7 31.5	157 39.6 18.9	110 27.8 23.2	42 10.6 26.7	17 4.3 18.1	396 100.0 21.7
Under 1 year		**1,321**	**147** **11.1** **66.2**	**585** **44.3** **70.6**	**355** **26.9** **75.1**	**158** **12.0** **77.8**	**76** **5.7** **80.8**	**1,321** **100** **72.5**
5	12-23 months	269	42 15.6 18.9	134 49.8 16.2	60 22.3 12.7	24 8.9 11.8	9 3.3 9.6	269 100 14.8
6	24-35 months	119	21 17.6	58 48.7	29 24.4	6 5.1	5 4.2	119 100

			9.5	7.0	6.1	3.0	5.3	6.5
7	36-47 months	57	7 12.3 3.2	28 49.1 3.4	13 22.3 2.7	5 8.8 2.5	4 7.0 4.3	57 100 3.1
8	48-59 months	55	5 9.1 2.3	24 43.6 2.9	16 29.1 3.4	10 18.2 4.9		55 100 3.0
1-4 years		**500**	**79 15.0 33.8**	**244 48.8 29.4**	**118 23.6 24.9**	**45 9.0 22.2**	**18 3.6 19.2**	**500 100.0**
0-5 years		1,821	222 12.2	829 45.5	473 26.0	203 11.1	94 5.2	1,821 100.0

Of the 1,730 cases of hospital mortality, 575 (33.2%) deaths occurred within 24 hours, and its rate was greater than 30% for all health facilities excluding MCH centers. For example, in soum hospitals, the rate was 40.2%; this high rate indicates that parents' knowledge about seeking care is poor, and the health workers' availability to examine children is unsatisfactory, thus hospitalizing children later than at appropriate standards. In addition, reanimation and intensive therapy equipment are in bad condition, and the training of health workers is inadequate. Supplementary medical care by soum, aimag, and family (bagh) doctors is also often poor (Table 2-28).

Table 2-28

Period of hospitalization and death places

Period / Place of Death	Period of hospitalization									Total
	Within 1 hour	1-2 hours	2-6 hours	6-24 hours	Mortality within 24 hours	1-3 days	4-6 days	8-13 days	> 13 days	
District hospital	5 2.4→ 11.9↓	5 2.4 13.5	9 4.2 7.6	48 22.6 12.7	67 31.6 11.6	45 21.2 9.6	31 14.6 9.6	41 19.3 17.8	28 13.2 16.3	212 100.0 12.3
Aimag hospital	15 1.9→ 35.7↓	14 1.8 37.8	60 7.6 50.4	167 21.1 44.3	256 32.6 44.5	212 26.8 45.1	129 16.3 45.6	113 14.3 49.1	82 10.4 47.7	792 45.8
Soum hospital	11 2.3→ 26.2↓	12 2.6 32.4	39 8.3 32.8	127 27.0 33.7	189 40.2 32.9	154 32.8 32.8	63 13.4 22.3	42 8.9 18.3	22 4.7 12.8	470 27.2
MCH center	2 1.0→ 4.8	5 2.4 13.5	10 5.2 8.4	23 11.9 6.1	40 20.2 7.0	45 23.3 9.6	46 23.8 16.3	30 15.5 13.0	32 16.6 18.6	193 11.2
Other hospitals	9 14.3→ 21.4↓	1 1.6 2.7	1 1.6 0.8	12 19.0 3.2	23 36.5 4.0	14 22.2 3.0	14 22.2 4.9	4 6.3 1.7	8 12.7 4.7	63 3.6
	42 2.4↓	37 2.1	119 6.9	377 21.8	575 33.2	470 27.2	283 16.4	230 13.3	172 9.9	1,730

For the main disease categories, the percentage of mortality that occurred within 24 hours was 35.4% of 731 deaths by pneumonia, 19.3% of 347 deaths by diarrhea, 41.1% of 85 deaths by infectious diseases, 40.4% of 193 deaths by neurological diseases, 32.6% of deaths by surgical diseases and trauma, and 45.9% of deaths by infant diseases.

Table 2-29

The main cause of mortality and period of hospitalization

No.	Disease group	Period of hospitalization				Number of children died within 24 hours	Percentage of child mortality within 24 hours	Number of total registered deaths
		1 hr	1-2 hrs	2-6 hrs	6-24 hrs			
1	**Respiratory diseases**	12	15	58	174	259	35.4	731
1.1	ARI	2	2	5	29	38	55.1	69
1.2	Tracheitis	2	1	2	16	21	31.6	67
1.3	Laringotracheobronchitis	2	0	5	6	13	37.1	35
1.4	Pneumonia	6	12	46	123	187	33.4	560
2	**Diarrhea**	7	4	10	46	67	19.3	347
3	**Infectious diseases**	5	4	6	20	35	41.1	85
3.1	Dysentery	1	0	0	0	1	7.8	13
3.2	Infectious hepatitis	0	0	1	4	5	17.9	28
3.3	Meningococcal infection	2	4	5	15	26	81.2	32
3.4	Diphtheria	1	0	0	0	1	25.0	4
3.4	Congenital syphilis	1	0	0	1	2	25.0	8
4	**Neurological diseases**	2	5	16	55	78	40.4	193
4.1	Perinatal encephalopathy	1	3	9	35	48	41.7	115
4.2	Insult	1	0	4	9	14	33.3	42
4.3	Bacterial meningitis	0	1	1	4	6	17.6	34
4.4	Birth cerebral trauma	0	1	2	6	9	45.0	20
4.5	Contusion of the head	0	0	0	1	1	50.0	2
5	**Surgical diseases and trauma**	0	2	4	9	15	32.6	46
5.1	Osteomyelitis	0	0	0	1	1	25.0	4
5.2	Appendicitis	0	1	0	0	1	20.0	5
5.3	Generalized peritonitis	0	0	0	2	2	40.0	5
5.4	Burn	0	0	0	3	3	25.0	12
5.5	Abscess, phlegmon	0	0	0	2	2	25.0	8
5.6	Intestinal obstruction	0	0	2	0	2	50.0	4
5.7	Hernia	0	0	1	0	1	50.0	2
5.8	Thoracic cage and abdominal injury	0	1	1	0	2	50.0	4
5.9	Skull injury	0	0	0	0	1	50.0	2
6	**Infant diseases**	16	6	21	68	111	45.9	242
6.1	Asphyxia	9	3	6	33	51	62.2	82
6.2	Congenital anomalies	5	1	8	23	37	46.2	80
6.3	Cardiac anomaly	1	1	2	5	9	27.3	33
6.4	Sepsis	1	1	5	7	14	29.8	47
7	**Other diseases**	0	1	4	5	10	34.0	27
7.1	Glomerulonephritis	0	0	0	1	1	33.3	3
7.2	Malnutrition	0	0	2	1	3	50.0	6
7.3	Allergies	0	0	0	1	1	50.0	2
7.4	Blood diseases (leucosis)	0	1	1	1	3	21.4	14
7.5	Diagnosis unidentifiable	0	0	1	1	2	100.0	2
	Total	452	37	119	377	575	34.4	1,670

Surveys were based on 1,730 case reports that recorded important information clearly at the time of death. These surveys indicated that 43.9% of children up to 1 month died, and 27.2% of children aged 1 to 2 months died in the hospital within a day, during the treatment. This death rate decreased as the child's age increased from 1 month of age, but the death rate increased again for children who are two years old (37.0-40.0%). Mortality within 24 hours in a health facility is 29.9% for infants, and the percentage increases to 36.8% when including children up to 2 months of age. 27.2% of children died within 2-3 days after treatment, and 60.4% of children died within a day; some of these children entered the hospital in severe condition and died before treatment results were available (Table 2-30).

Table 2-30

Ratio of child's age to duration of stay in a health facility

Age of child	Duration of stay in health facility				Total mortality within 24 hrs in HF	1-3 days	4-6 days	8-13 days	13 days up	Total
	1hour <	1<2 hour	<2-6 hour <	<6-24 hour <						
Up to 1 month	17 4.3□ 40.5□	12 3.1 32.4	32 8.2 26.9	111 28.3 29.4	**172 43.9 29.9**	**123 31.4 26.2**	58 14.8 20.5	28 7.1 12.2	11 2.8□ 6.4□	392 22.6
Up to 2 months <u>(or 1-2?)</u>	6 5.4□ 14.3□	1 0.9 2.7	7 6.3 5.9	26 23.2 6.9	**40 35.7 6.89**	**35 31.3 7.4**	19 17.0 6.7	12 10.7 5.2	6 5.4□ 3.5	112 6.5
2 months up to 5 months	4 1.2□ 9.5□	6 1.7 16.2	21 6.1 17.6	66 19.2 17.5	**97 28.3 16.9**	**94 27.4 20.0**	57 16.6 20.1	66 19.2 28.7	29 8.5 16.9	343 19.8
6 months up to 11 months	9 2.3□ 21.4□	8 2.0 21.6	23 5.9 19.3	68 17.4 18.0	**108 27.6 18.8**	**81 20.7 17.2**	83 21.2 29.3	58 14.8 25.2	61 15.6 35.5	391 22.6
12 months up to 23 months	3 1.1 7.1	1 0.4 2.7	21 8.0 17.6	46 17.6 12.2	**71 27.2 12.3**	**69 26.4 14.7**	34 13.0 12.0	42 16.1 18.3	45 17.8 26.2	261 15.1
24 months up to 35 months	1 0.8 2.4	5 4.2 13.5	9 7.6 7.6	29 24.4 4.7	**44 37.0 7.6**	**43 36.1 9.1**	11 9.2 3.9	9 15.8 3.9	12 10.1 7.0	119 6.9
36 months up to 47months	1 1.8 2.4	3 5.3 8.1	2 3.5 1.7	15 26.3 4.0	**21 36.8 3.7**	**11 19.3 2.3**	12 21.1 4.2	9 15.8 3.9	4 7.0 2.3	57 3.3
48 months up to 59 months	1 1.8 2.4	1 1.8 2.7	4 7.3 3.4	16 29.1 4.2	**22 40.0 3.8**	**14 25.5 3.0**	9 16.4 3.2	6 10.9 2.6	4 7.3 2.3	55 3.2
Total	42 2.4□	37 2.1	119 6.1	377 21.8	**575 33.2**	**470 27.2**	283 16.4	230 13.3	172 9.9	1,730 100

The reason for high mortality in a health facility for cases where children die within 24 hours is that children are being referred to health facilities late. 470 (27.2%) children who died within 1-3 days during treatment in a health facility had been diagnosed or referred to a hospital late; as a result, the child's condition worsened from the delayed treatment (Table 2-31). A total of 575 (33.2%) cases of child mortality occurred within 24 hours in a health facility, and 470 (27.2%) cases of child mortality occur within 1-3 days; altogether, 1,025 (60.4%) cases were directed to health facilities late. Some cases do not qualify as being late because these cases are considered to be severe upon affliction, such as burns and fractured brainpans.

Table 2-31

Reason of mortality within 1-3 days duration of his/her stay in a HF

No.	Diseases	Number of child died within 1-3 days
1	Disease of respiratory system	207
1.1	ARI	17
1.2	Bronchitis	19
1.3	Laryngotracheitis	16
1.4	Pneumonia	155
2	Diarrhea	71
3	Infectious disease	21
3.1	Salmonella	3
3.2	Dysentery	1
3.3	Hepatitis	8
3.4	Tuberculosis	1
3.5	Meningococcal infection	4
3.6	Congenital lues	4
4	Encephalopathy	71
4.1	Perinatal encephalopathy	34
4.2	Cerebral hemorrhage	18
4.3	Virulent meningitis	13
4.4	Congenital trauma of brain	4
4.5	Brain cyst	1
4.6	Brain commotion	1

No.	Diseases	Number of child died within 1-3 days
5	Surgical disease and trauma	18
5.1	Osteitis	2
5.2	Appendicitis	1
5.3	Generalized peritonitis	1
5.4	Burn	6
5.5	Trauma of abdomen, chest	2
5.6	Abscess	3
5.7	Fractured brainpan	1
5.8	Obstruction	1
5.9	Hernia	1
6	Cardiopathy	9
6.1	Congenital cardiac defect	9
7	Neonatal disease	65
7.1	Malformation	27
7.2	Sepsis	14
7.3	Asphyxia	22
7.4	Dauna	2
8	Other disease	8
	TOTAL	470 27.2%

Of the 1,672 children who came to hospitals, 54.5% (911) of children were considered to be in very severe condition, 40.1% (671) of children were categorized as severe, and only 5.4% (90) of children were not in severe condition. 33.2% of these children died within 24 hours, and 27.2% (470) died within 1-3 days in the hospital.

Of the 1,546 reported cases, 48% were hospitalized by recommendation of family doctors, 24.4% were referred by ambulance doctors, and 11.3% were brought to the hospital by parents.

In regards to efficiency of services, 963 (92.9%) of 1,037 children waited in the admission room for 30 minutes, while 1.4% waited longer than one hour. Of 1,284 patients, 915 (71.3%) were moved immediately to a reanimation unit, 151 (11.8%) were provided with adequate aid, 121 (9.4) received mediocre aid, and 25 (1.9%) were given improper aid.

The duration of time from the onset of disease to when the patient seeks a doctor was recorded in 1,670 report cases. Of these cases, 33.8% sought doctors within 24 hours, 16.7% sought doctors within 48 hours, and 12.9% sought doctors within 72 hours. A total of 63.4% of cases sought a doctor within the first 72 hours, which demonstrates the knowledge of parents regarding the need for medical care.

The duration of outpatient care was reported in 1,093 cases of child mortality. Of these cases, 67.2% of children were treated for 3 days, 17.6% were treated for 6 days, and 15.1% were treated for more than 6 days. These statistics are influenced by late hospitalization.

The duration from the onset of disease until death were reported in 1,619 cases. Of these cases, 39.1% lasted 7 days, 28.7 % lasted more 3 days, 33.2% died within 24 hours in hospital, and 27.2% died within 3 days in hospital. Because only 9.9% died within more than 13 days in a hospital, late hospitalization was a likely factor in 60.4 % of mortality cases.

In 1,513 cases, the child's condition on the day of entering the hospital was compared with the condition of the child at death; 12.2-18.1% of cases were referred to a hospital on Wednesdays, 17.1-18.1% referred on Mondays, and 8.4% were referred on Sundays. During holidays, mostly only very severe patients were referred to hospitals; 66.7% of cases referred to the hospital on a holiday were cases in which the patient is in very severe condition, while only 16.7% of these cases were for patients in severe condition. On non-holiday days, 54.5% of very severe condition cases were referred to hospitals (Table 2-32). In regards to children whose conditions were not severe, 5.5% of these cases resulted in child mortality.

Table 2.33

Ratio child's condition and the day referred in hospital

	Very severe	Severe	Not severe	Total
Monday	147 56.8 17.8	96 37.1 15.8	16 6.2 19.3	259 17.1
Tuesday	123 49.4 14.9	115 46.2 19	11 4.4 13.3	249 16.5
Wednesday	153 55.8 18.6	110 40.1 18.2	11 4 13.3	274 18.1
Thursday	102 53.7 12.4	75 39.5 12.4	13 6.8 15.7	190 12.6
Friday	121 54 14.7	89 39.7 14.7	14 6.3 16.9	224 14.8
Saturday	103 56 12.5	71 38.6 11.7	10 5.4 12	184 12.2
Sunday	71 55.9	49 38.6	7 5.5	127 8.4

	8.6	8.1	8.4	
Holidays	4 66.7 0.5	1 16.7 0.2	1 16.7 1.2	6 0.4
Total	824 54.5	606 40.1	83 5.5	1,513

From 1,590 reported cases of mortality for children aged under 3 years, the health provider diagnosed basic diseases in 829 cases. 52.1% of all children who died had been diagnosed with a basic disease, and basic diseases may have influenced the death of these children. Of these 829 cases, 272 (32.8%, 17.1%) had three types of basic diseases, 240 (28.9%, 15.1%) had two types of basic diseases, and 317 (38.2%, 19.9%) had one type of basic disease. Children with a greater number of basic diseases were at higher risk of death (Table 2-34).

The numbers of cases per basic disease that was related to child mortality were 437 (52.7%) cases of rickets, 606 (73.1%) cases of malnutrition, 443 (53.9%) cases of anemia, and 34 (4.1%) cases of exudative diathesis (Table 2-34).

Table 2-34

Basic diseases of mortality for children under 3 years old

Basic disease	Number of basic diseases	% of basic disease	% of children under 3 years of age
Rickets, malnutrition, anemia	263	31.7	16.5
Rickets	134	16.2	8.4
Rickets, malnutrition	131	15.8	8.2
Rickets	93	11.2	5.8
Malnutrition, anemia	71	8.6	4.5
Anemia	68	8.2	4.3
Rickets, anemia	35	4.2	2.2
Exudative diathesis	22	2.6	1.4
Rickets, malnutrition, exudative diathesis	4	0.5	0.2
Rickets, exudative diathesis, anemia	3	0.4	0.2
Malnutrition, exudative diathesis, anemia	2	0.2	0.1
Malnutrition, exudative diathesis	1	0.1	0.05
Anemia, exudative diathesis	1	0.1	0.05
Rickets, exudative diathesis	1	0.1	0.05
Total	829	100	52.18

A factor influencing the cause of child mortality is competitor (Enkhjin, complementary?) diseases. Of all child mortality cases involving basic diseases, 33.2% of

604 cases noted 67 kinds of competitor diseases. The main competitor diseases are pneumonia (32.0%), bronchitis (10.8%), diarrhea (13.6%), encephalopathy (9.4%), ARI (7.6%), cardiac congenital defect (3.0%), and malformation (3.3%); these diseases account for 79.7% of all competitor diseases.

Of all child mortality cases involving basic diseases, 33.2% of 736 cases noted 68 kinds of basic diseases with following (Enkhjin, secondary?) diseases; these following diseases are otitis media (3.9%), myocarditis (7.7%), or lymphadenitis (2.2%).

Twenty-four kinds of complications were recorded from 1,308 cases; these complications account for 82.5% of all complications and include respiratory failure (37.1%), intoxication dehydration (19.2%), infection-intoxication shock (21.1%), and heart incompetence (5.1%). Altogether, competitor diseases, following diseases, and complications are negative factors that influence the causes of child mortality.

Information about infant lifespan was recorded in 1,474 cases of child mortality. Of the reported cases, 1,071 (72.7%) children were healthy as infants, while 403 (27.3%) infants received treatment.

The regularity of the practice of immediately suckling babies at the breast after birth was recorded in 1,227 children; 920 (75%) babies began suckling on the labor bed, 169 (13.8%) babies were suckling within 2 hours, 44 (3.6%) babies were suckling within 6 hours, 23 (1.9%) babies were suckling within 12 hours, 19 (1.5%) babies were suckling within 24 hours, and 52 (4.3%) babies began suckling after 24 hours. The reasons for late suckling by the infants were problems related to the child or mother.

In regards to the rapidity at which the umbilical cords of the children healed, 1,316 (92.2%) out of 1,428 umbilical cords healed quickly, 103 (7.2%) umbilical cords healed slowly, and 9 (0.6%) umbilical cords healed very slowly.

The growth of the child was monitored in 1,574 cases; 739 (47.0%) children had normal development, 809 (51.4%) children had low weight for age, 3 (0.2%) children had low height for age, and 24 (1.5%) children had high weight for age.

The mental development of children was reported in 1,239 cases; 318 (25.7%) children had mental development that was late for their age, and 24 (3.9%) children had neuropathy.

From all 1,531 reported cases, 792 (51.7%) children were healthy. Of the 739 (48.3%) children that were considered ill, 345 (22.5%) children were premature infants.

Eating disorders were also assessed for all 1,531 cases. Of these cases, 12.3% of the children were eating other milk or foods, and 19.8% of children were breastfed and taking other milk or foods. The reason that 75.2% of the 133 children who were not breastfed was that the mothers did not have any milk in their breasts.

Of the 1,198 children who had taken complementary foods, 29.1% did not take complementary food at the appropriate age; thus, these undernourished children developed basic diseases.

Data regarding the vaccinations of 1,555 children indicated that 1,080 (69.4%) children were satisfactorily vaccinated, 185 (11.9%) received only half of the necessary vaccinations, and 290 (18.6%) children were not vaccinated. Of the 290 unvaccinated children, 65.6% were not vaccinated because of illness, 19.8% were not vaccinated due to the fault of the parent, and 14.6% were not vaccinated due to the fault of the health worker.

Of the 1,692 children who were examined in the hospital, 756 (44.7%) were adequately examined, 674 (39.7%) were not examined, 201 (11.9%) were not adequately examined for analysis (lumber puncture), and 59 (3.5%) children were examined late. Of the children who were not examined, 34.7% were not in the hospital for a long time, 20.6% had a very severe condition, and 5.8% of the patients were inaccurately discharged.

Some children were victims of different types of malpractice (Table 2.35). Only

26.3% of children received effective treatment. The 17 types of malpractice occurred a total of 1,885 times; the drug selection was wrong for 14.2% of the cases, the drug dosage was wrong for 13.6% of the cases, emergency aid was administered late for 11.5% of the cases, disintoxication treatment was half of the appropriate amount for 12.0% of the cases, the complication was not cured for 8.4% of the cases, and the competitor disease was not cured for 2.1% of the cases. These acts of malpractice influenced child mortality.

Table 2-35

Types of malpractice influencing child mortality

No.	Type of malpractice	Occurrence	% of total malpractice
1	Drug dose is wrong	148	7.85
2	Daily dose is wrong	99	5.25
3	Course dose is wrong	11	0.58
4	Treatment is started late	276	14.64
5	Drug selection is wrong	267	14.16
6	Basic disease is not cured	71	3.77
7	Without treatment control	55	2.92
8	Emergency aid is late	217	11.51
9	Complication is not cured	159	8.44
10	Combined disease is not cured	38	2.02
11	Competitor disease is not cured	40	2.12
12	Basic treatment is not effective	107	5.68
13	Disintoxication treatment is half	227	12.04
14	Used wrong antibiotics	84	4.46
15	Surgical management is late	22	1.18
16	Child was fed incorrectly	59	3.12
17	Other	5	0.26
Total		1885	100

Factors that influenced malpractice include late referrals to hospitals, inaccurate or partly accurate diagnoses, irresponsible doctors, a lack of emergency aid, and the lack of essential drugs (Table 2-36).

Table 2-36

Obstructions to effective healthcare

No.	Types	Cases		% of all cases (1,821)
		Number	%	
1	Patient applied to doctor late	592	31.6	32.5

2	Patient referred to hospital late	669	35.7	36.7
3	Patient was not examined	39	2.1	2.1
4	Patient was assessed wrong	275	14.7	15.1
5	Patient was diagnosed wrong	75	4.0	4.1
6	Patient was not given emergency aid	62	3.3	3.4
7	Doctor was irresponsible	95	5.1	5.2
8	Nurse did not work by doctor's instructions	7	0.4	0.4
9	Nurse executed doctor's instruction half	6	0.3	0.3
10	Essential drug was missed	53	2.8	2.9
11	□□□□□□□□ □□□□□□□□□□□	3	0.2	0.2
Total		1,876	100	102.9

Nine types of complications influenced child mortality; a total of 3,214 cases were recorded (Table 2-37). The most prevalent complications were inspiratory acute deficiency and infection-intoxication syndrome. Infection-intoxication syndrome occurred during ARI, dysentery, and sepsis.

Table 2-37

Complications influencing child mortality

□	Complication	Cases		□□□ □□□ □□□□□□□□□ □□□□□ □□□□□ □□□□□□□□□□□
		Number	%	
1	Inspiratory acute deficiency	1,252	41.5	68.8
2	Cardiovascular acute deficiency	931	30.9	51.1
3	Renal gland acute deficiency	15	0.5	0.8
4	Pyopneumothorax	5	0.2	0.3
5	Acute bleeding	40	1.3	2.2
6	□□□□□□□ □□□□□□ □□□□□	11	0.4	0.6
7	Shock	38	1.3	2.1
8	Dehydration	364	12.1	20.0
9	Infection-intoxication syndrome	358	11.9	19.6
Total		3014	100.0	

The child's living conditions influenced 29.3% of all cases of child mortality; the aspects related to living conditions that influence quality of life and health are food, shelter, and income (Table 2-38).

Table 2-38

Living conditions influencing child mortality

□	Living condition	Number of child	Percentage of cases	Percentage of total mortality
1	Starvation without enough food	281	52.7	15.4
2	Apartment is cold; ger is not heated with firewood or coal	37	6.9	2.0
3	Do not buy drugs because of a lack of money	19	3.6	1.0
4	Water supply is bad; street life	9	1.7	0.5
5	No income	187	35.1	10.3
Total		533	100.0	29.3

The factors that influence under-5 mortality were specific diseases, accident/trauma, and birth defects. These factors occurred at different frequencies depending on the age group of child. Problems with infrastructure also influence child mortality; such problems include the distance between homes and hospitals, an inability to communicate without telephones, bad roads, a shortage of doctors, a lack of essential drugs, a lack of equipment, and poor heating in hospitals. Other factors are related to the unsatisfactory knowledge and skill of doctors; examples of medical incompetence are wrong diagnoses, inability to diagnose, inaccurate assessments, failure to administer emergency aid, provision of incorrect advice, tardy transfer of patient into hospital, and poor ambulance services. Child mortality is also associated to poor knowledge of parents about seeking care; thus, patients were referred to and attended by doctors late. All of the aforementioned reasons are the factors that influence child mortality and complicate diseases (Table 2-39).

Table 2-39

Factors that influence child mortality

	Factors	Cases		Percentage of all mortality (1,821)
		Number	Percentage	
1	Poor infrastructure: Sparse country/hospital distance Without telephone Road is bad	353 249 50 54	10.0 7.0 1.4 1.5	19.4 13.7 2.7 3.0
2	Without doctors	20	0.6	
3	Patient applied to hospital late	592	16.7	32.5
4	Patient referred to hospital late	669	18.9	36.7
5	Essential drugs are missing	136	3.8	7.5
6	Equipment supply is bad	96	2.7	5.3
7	Doctor knowledge/skill is insufficient	314	8.9	17.2
8	Cannot diagnose	54	1.5	3.0
9	Diagnose is wrong	75	2.1	4.1
10	Patient is assessed wrong	275	7.8	15.1
11	Emergency aid unavailable	62	1.7	3.4
12	Treatment course is wrong	97	2.7	5.3
13	Patient is moved late	3	0.08	0.2
14	Oxygen is needed but unavailable	168	4.7	9.2
15	Transportation is wrong	28	0.8	1.5
16	Hospital is cold	12	0.3	0.6
17	Doctor is irresponsible	95	2.7	5.2
18	Parents are irresponsible	490	13.8	26.9
19	Total	3,539	100	194.3

Of all 1,814 children (with 7 uncertain cases) who died, 827 (45.0%) children had autopsies. In 725 cases (88.9%), the diagnosis was appropriate. In 91 (11.1%) cases, the diagnosis was different from the result of the autopsy in some manner, and from these 91 cases, the diagnosis of basic diseases was different in 65 (8.0%) cases (Table 2-40).

Table 2-40

Result of autopsy

Result of autopsy	Number	Percentage
Autopsy performed on child	*827*	*45.0*
Diagnosis is appropriate	726	88.9
Diagnosis is different	91	11.1
Diagnosis of basic disease is different	65	8.0
Diagnosis of competitor disease is different	10	1.2
Diagnosis of combined disease is different	11	1.3
Diagnosis of complication is different	5	0.6

Teratological (?) diagnoses revealed disagreements. These diagnoses identified 20 (20%) cases of abnormal progression of disease, 8 (8.0%) cases of rare incidents, 17 (14%) cases of late hospitalization, 24 (24%) cases of inadequate assessment by a doctor, and 5 (5.0%) cases in which the patient did not heed medical advice. Of the 1,814 cases of child mortality, 55.0% (987) did not have an autopsy; the reasons were 53.9 % of the cases did not have a specialist to perform the autopsy, parents refused the procedure in 32.7 % of the cases, and 13.3% of the cases denied autopsy for other reasons (Table 2-36).

The profile of the mothers influenced child mortality. When the age of the mother is compared, 92.3 % of the children who died had mothers of reproductive age (20-39 years old), 5.2% (79) of the children had mothers aged 15-18, 2.5% (38) of the children had mothers older than 40 years old, and one mother was older than 50 years old (Table 2-41).

Table 2-41

Age of mother of child who died

Mother's age	Cases	
	Number	Percentage
15-19	79	5.2
20-24	462	30.5
25-29	482	31.8
30-34	277	18.3
35-39	177	11.3
40-44	31	2.0
45-49	6	0.4
> 50	1	0.1
Total	1,515	100

The most deliveries (80.6%) occur by women aged 20-34, and the number of deliveries decreases with age; this trend is not only consistent with the mothers of children who die but also with the general principles of maternity. The occupations of the mothers of children who died are also significant. A quarter of the mothers are herders; the health care of herders is compromised because of their difficult living conditions (far hospitals, bad roads, no transportation, unavailable doctor). 47.9% of mothers with children who died are housewives; this statistic indicates that their knowledge about seeking care is poor (Table 2-42).

Table 2-42

Occupation of mother of child who died

Occupation	Cases	
	Number	Percentage
Office worker	88	5.2
Worker	280	16.5
Cattle-breeder	433	25.5
Peasant	8	0.5
Student	45	2.7
Housewife	813	47.9
Other	30	1.8
Total	1,697	100

Of 1,479 families, 141 (10.1%) mothers had unsuitable family situations. Of these 141 cases, 121 mothers were single, 13 mothers were divorced, and 7 mothers were widows.

The mothers' work conditions were studied in 1,137 cases; 1.6% of the mothers worked with poisons, 1.1% worked under difficult conditions, 3.3% employed intellectual labor, and 6.5% used physical labor.

Of the 1,484 mothers whose children had died, 31.9% of the children died in the mother's first pregnancy, 25.5% in the mother's second pregnancy, 14.8% in the mother's third pregnancy, 11.6% in the mother's fourth pregnancy, and 6.8% in the mother's fifth pregnancy. In total, 90.6% of child mortality occurred during the first to fifth pregnancy.

The condition of the child in the uterus during pregnancy is most important; therefore, the mother's health was considered during the pregnancy to the end of the pregnancy. From the medical histories of 1,398 mothers, 180 mothers had the following diseases during the pregnancy: 152 cases of any chronic disease, 11 cases of frequent ARI, 2 cases of an acute infection, 11 cases of a venereal disease, and 4 cases of tuberculosis.

Out of 1,767 cases, 77.4% (1,367) of pregnancies were carried to a full term, 16.6% (294) of pregnancies were premature births, 0.8% (14) of pregnancies were stillbirth, 2.9% (52) had amblosis, and 2.3% (40) had abortions. Of the 294 premature births, 153 (52.0%) mothers delivered prematurely one time, 106 (36.1%) mothers delivered prematurely two times, 25 (8.5%) mothers delivered prematurely three times, 9 (3.1%) mothers delivered prematurely four times, and only one mother delivered prematurely five times. Of the 14 stillbirths, 13 mothers had stillbirths one time, and 1 mother had a stillbirth two times.

Of the 52 women who had amblosis, 27 women had amblosis one time, 18 women had amblosis two times, 5 women had amblosis three times, and 2 women had amblosis four times. Of the 40 women who had abortions, 21 women had an abortion one time, 14 women had an abortion two times, 3 women had an abortion three times, and 2 women had an abortion four times. Abortions may negatively influence pregnancies because abortions performed on a previous pregnancy may affect the circulation of the placenta and fetus during a following pregnancy.

Information about mothers whose child had died in a previous pregnancy was studied; such information included details regarding previous diseases, previous pregnancies, living conditions, and complications during delivery of their last pregnancy. Of 1,420 mothers, 78.9% (1,120) were not sick during their last pregnancy, while 21.1% (300) were sick with the diseases listed in Table 2-43.

Table 2-43

Mother's diseases during previous pregnancy

No.	Name of disease	Number of cases	Percentage of cases	
			From mother with disease	From mother with pregnancy
1	Acute respiratory infection	65	21.7	4.6
2	Other viral infection (HBV viral hepatitis B)	10	3.3	0.7
3	Hypertonia	76	25.3	5.3
4	Hypotension	61	20.3	4.3
5	Allergic disease	4	1.3	0.3
6	Trauma	3	1.0	0.07
7	Chronic disease's	51	17	3.6
8	Other	30	10	2.1
Total		300	100	21.1

The diseases that afflicted mothers most in their last pregnancy were hypertonia, ARI, and anemia.

Living conditions of mothers during pregnancy were studied, and in 707 (38.8%) cases, the mother's living conditions influenced fetal development (Table 2-44).

Table 2-44

Inappropriate living conditions during pregnancy

1	Unsuitable home	136	19.2
2	Insufficient food	160	22.6
3	Without home	9	1.3
4	Without income	184	26.0
5	Mother is a smoker	11	1.6
6	Husband is a smoker	170	24.0
7	Mother is a drinker	5	0.7
8	Husband is a drinker	32	4.5
Total		707 (38.8%)	100.0

In 707 (38.8%) child mortality case reports, fetal development was influenced by the pregnant mothers' living conditions, which include food, income, and the use of cigarettes or vodka.

Out of 1,524 pregnancies, 61.9 % (944) did not have any complications during pregnancy, while 38.1% (580) did have complications. Late or early toxemia of pregnancy was the most common complication (Table 2-45).

Table 2-45

Complications of pregnancy

□	Name of complication	Complication		Percentage of complication
		Frequency	Percentage	
1	Early toxemia of pregnancy	244	16.0	42.1
2	Threatened abortion	30	2.0	5.2
3	Late toxemia of pregnancy: Nephropathy of pregnancy Eclampsia	258 56 23	16.9 3.7 1.5	6.7 4.0
4	Anemia	16	1.0	2.8
5	Excessive amniotic fluid	11	0.7	1.9
6	Early rupture of amniotic sac	21	1.4	3.6
Total		580	38.1	100

The duration between pregnancies of mothers whose children die is 2-3 years for 65.4% of all cases; 42 mothers had given birth within a year. A total of 241 (27.8%) mothers had stillbirths when becoming pregnant within a year, while 175 (20.2%) mothers had stillbirths when becoming pregnant within 1.5 years; these cases indicate that pregnancies were not spaced apart enough.

Of 1,589 mothers, 65.8% gave birth at maternity centers, 30.3% gave birth at sum hospitals, 3.3% gave birth at home, and 0.5% gave birth on the road (in a vehicle).

Of 1,368 mothers, 80.7% (1,104) had normal deliveries, 142 (10.4%) had rapid labor, and 122 (8.9%) had delayed labor. Of 1,453 mothers, 74.9% gave birth without complications, while 374 (25.7%) mothers did have some complication (Table 2-46).

Table 2-46

Condition of complication from last pregnancy

Name of pregnancy complication	Cases		Percentage in labor
	Number	Percentage of complications	
Transverse fetal position	36	9.6	2.5
Powerless labor	80	21.4	5.5
□□□□□□□ □□□□□□	34	9.1	2.3
Early rupture of the amniotic sac	96	25.7	6.6
□□ □□□□□□□□□	42	11.2	2.9
Prolapse of the umbilical cord, arm	6	1.6	0.4
Placental presentation, separation	30	8.0	2.1

Other	50	13.4	3.4
Total	374	100.0	25.7

Early rupture of the amniotic sac and powerless labor were the most common complications during pregnancy. Of 1,262 case reports, 235 (18.7%) mothers had operative obstetrics; these procedures mostly include 102 (8.1%) cesarean sections and 68 (5.4%) □□□□□□□□□□ □□□□□□□ (Table 2-47).

Table 2-47

Operative obstetrics

Name of operative obstetrics	Mothers		Percentage in operative obstetrics
	Number	Percentage	
□□□□□□□□□□□ method	24	1.9	10.2
□□□□□□□ □□□□□□□	68	5.4	28.9
Cesarean section	102	8.1	43.4
□□□□□□□□ □□□□□□	10	0.8	4.3
Other	31	2.5	13.2
Total	235	18.7	100.0

Of 1,271 cases, 23 (1.8%) children were fathered by men aged 5-19 years old while 1,148 (90.3%) children were fathered by men aged 20-39 years old. The occupations of these men include 420 (28.4%) herders, 330 (22.3%) laborers, 594 (40.2%) unemployed, 70 (4.7%) office workers, 21 (1.4%) students, and 15 (1.0%) businessmen.

Details about the father's health are rarely recorded in case reports. Of the 48 cases that were recorded, 12 fathers had a chronic disease, 6 fathers had tuberculosis, 5 fathers had an allergic disease, 3 fathers had hypertonia, and 22 fathers had some other disease.