



Mortality Rate of Japanese Twins and Triplets

II. Socioeconomic Factors Influencing Infant Deaths of Twins After Birth to One Year of Age

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The rates of infant mortality of twin individuals were 4.38% and 7.76% for mothers healthy and nonhealthy after delivery, respectively, and the difference is significant at the 0.01 level. The lowest infant mortality rate was seen in the mothers with paid work during pregnancy (4.56%), followed by the mothers engaged only in housekeeping (4.72%) and by those self-employed during the pregnancy (4.99%). Infant mortality rate for MZ twins decreased with increased monthly expenditure of the household, whereas the rate for DZ twins remained constant with expenditure. Socioeconomic factors still affect the infant mortality of twins, and the infant mortality rate can be improved.

Key words: Infant mortality, Twins, Socioeconomic factors

INTRODUCTION

In a previous report [2] infant mortality rates (deaths under one year of age) of twin individuals were analyzed according to zygosity, sex, and birth order. Biological factors influencing the rates were also considered. The present study deals with the effects of socioeconomic factors, namely health condition and occupation of the mother and monthly expenditure.

MATERIALS AND METHODS

Data were obtained from original records of Survey B, Socioeconomic Aspects of Vital Events-Plural Births in 1975 (Health and Welfare Statistics and Information Department, Ministry of Health and Welfare [3]). This

TABLE 1. Health Conditions of Mother and Infant Mortality Rate of Twin Individuals

	Health condition of mother								χ^2
	Healthy				Nonhealthy				
	Survivors	Deaths	Total	Infant mortality rate	Survivors	Deaths	Total	Infant mortality rate	
Before pregnancy	7,183	350	7,533	0.0465	183	14	197	0.0711	2.07
During pregnancy	6,543	283	6,826	0.0426	1,006	81	1,087	0.0745	20.50
After pregnancy	6,677	306	6,983	0.0438	689	58	747	0.0776	16.46

survey was conducted in July, 1975 on 6,189 multiple births during the first half of 1974, from January 1 to June 30. Questionnaires were directly distributed to all mothers by Health Center officials, and 1,828 (29.5%) were not returned. Items included in this survey are listed in the above publication. Some details of the survey were also reported elsewhere [1]. Socioeconomic factors analyzed in this report are health condition of the mother before, during, and after the pregnancy, occupation of the mother during pregnancy, monthly expenses of the household, and the number of persons living in the same house.

RESULTS

Infant Mortality Rates by Mother's Health Condition and Occupation

Table 1 shows the relationship between the infant mortality rate of twin individuals and health condition of the mother before, during, and after the pregnancy. In computing the rates, total number of live-born twin individuals was taken as denominator. For mothers who reported being healthy before, during, and after the pregnancy, the rates were, respectively, 4.65%, 4.26%, and 4.38%. Corresponding rates for nonhealthy mothers were 7.11%, 7.45%, and 7.76%, respectively. Within the categories of healthy and nonhealthy mothers the rates before, during, and after pregnancy were similar, but the difference between the two categories was significant at the 0.001 level for during and after pregnancy. Therefore, in the following analysis only the health condition of the mother after delivery was considered.

Table 2 shows numbers of twin pairs and infant mortality rates of twin individuals by health conditions of the mother and survival status and zygosity of twins. In each survival status group the numbers of monozygotic (MZ) and dizygotic (DZ) twin pairs were estimated by Weinberg's method [4]. The infant mortality rates of MZ twins were 4.52% and 6.78% for healthy and nonhealthy mothers, respectively. Corresponding rates of DZ twins were 4.05% and 9.45%, respectively. For all twins the rates were 4.38% and 7.76% for healthy and nonhealthy mothers, respectively, and the difference is significant at the 0.01 level.

Table 3 shows the infant mortality rates of twin individuals according to the occupation of the mother during the pregnancy. The lowest infant mortality rate was seen in mothers with paid work (4.56%), followed by mothers engaged only in housekeeping (4.72%)

TABLE 2. Numbers of Twin Pairs and Infant Mortality Rates of Twin Individuals According to Health Condition of the Mother After Delivery, Survival Status, and Zygosity of Twins

Health condition of the mother after delivery			Sex combinations							MZ	DZ
			MM	MF	FM	FF	UK ^a	Total			
Healthy	Live b-live b	Surv-surv	1,294	311	276	1,277	2	3,160	1,984	1,174	
		Surv-dead	57	8	12	34	0	111	71	40	
		Dead-surv	40	4	3	20	0	67	53	14	
		Dead-dead	22	8	3	18	0	51	29	22	
	Live b-fetal death	Surv-fetal death	44	11	9	62	7	133	86	40	
		Dead-fetal death	6	0	0	4	1	11	10	0	
	Fetal death-live b	Fetal death-surv	17	7	4	15	3	46	21	22	
		Fetal death-dead	6	3	0	4	2	15	7	6	
	Total			1,486	352	307	1,434	15	3,594	2,261	1,318
	Infant mortality rate								0.0438	0.0452	0.0405
Not healthy	Live b-live b	Surv-surv	126	32	20	140	1	319	214	104	
		Surv-dead	9	2	4	7	1	23	10	12	
		Dead-surv	6	0	1	1	0	8	6	2	
		Dead-dead	5	2	0	4	0	11	7	4	
	Live b-fetal death	Surv-fetal death	8	1	3	3	1	16	7	8	
		Dead-fetal death	2	1	0	1	0	4	2	2	
	Fetal death-live b	Fetal death-surv	3	0	0	0	1	4	3	0	
		Fetal death-dead	1	0	0	0	0	1	1	0	
	Total			160	38	28	156	4	386	250	132
	Infant mortality rate								0.0776	0.0678	0.0945

^aSex of one or both twins is unknown.

TABLE 3. Infant Mortality Rates of Twin Individuals According to the Occupation of the Mother During Pregnancy

Survival status at 12 months	Employment or working status of the mother during pregnancy		
	Paid work	Self-employed	Engaged only in housekeeping, not working
Surviving-surviving	837	429	2,206
Surviving-dead	32	14	88
Dead-surviving	17	13	45
Dead-dead	13	8	41
Surviving-fetal death	35	22	92
Dead-fetal death	5	3	7
Fetal death-surviving	20	6	24
Fetal death-dead	5	2	9
Total	964	497	2,512
Infant mortality rate	0.0456	0.0499	0.0472

and by self-employed mothers (4.99%), but the differences among them are not significant at the 0.05 level.

Table 4 shows the infant mortality rates of twin individuals according to the occupation and health conditions of the mother after the delivery. The difference between healthy

TABLE 4. Infant Mortality Rates of Twin Individuals According to the Occupation and Health Condition of Mother After the Delivery

Employment or working status of the mother during pregnancy	Healthy		Nonhealthy		P
	Number of mothers	Mortality rate	Number of mothers	Mortality rate	
Paid work	879	0.0430	85	0.0719	NS ^a
Self-employed	451	0.0528	45	0.0227	NS ^a
Engaged only in housekeeping, not working	2,254	0.0425	256	0.0894	<0.005

^aNS: not significant at the 5% level.

TABLE 5. Infant Mortality Rates of Monozygotic and Dizygotic Twins and Mean Number of Persons Living in the Same House According to Monthly Expenditure of the Households

Monthly expenditure (yen)	Number of twin pairs		Infant mortality rate			Number of household	Mean number of persons living in the same house
	MZ	DZ	MZ	DZ	Total		
<80,000	347	232	0.0784	0.0493	0.0667	640	5.00
80,000 ≤ <100,000	506	340	0.0524	0.0514	0.0520	947	4.96
100,000 ≤ <120,000	674	388	0.0428	0.0368	0.0406	1,150	5.21
120,000 ≤ <140,000	428	214	0.0431	0.0286	0.0382	679	5.31
140,000 ≤ <160,000	275	146	0.0336	0.0709	0.0465	452	5.56
160,000 ≤	248	122	0.0228	0.0500	0.0319	394	5.92
Total	2,478	1,442	0.0467	0.0456	0.0463	4,262	5.24

and nonhealthy mothers was significant only in the group of mothers who engaged in housekeeping and did not work, where the former rate was 4.25% and the latter 8.94%.

Infant Mortality Rates and Monthly Expenditure

Table 5 shows the infant mortality rates of MZ, DZ, and all twin individuals according to monthly expenditure of households. In MZ twins the highest mortality rate is seen in the lowest expenditure class (under 80,000 yen), followed by the class with the next lowest expenditure (Figure). The regression coefficient of the infant mortality rate for MZ twin individuals on monthly expenditure (per million yen) was -0.467 ± 0.081 , which is significant at the 0.01 level, indicating the mortality rate of MZ twins decreased with the expenditure per month. However, the regression coefficient for DZ twins was 0.076 ± 0.188 , which is not significant. The regression coefficient for all twins was -0.270 ± 0.087 , again significant at the 0.05 level.

DISCUSSION

According to Imaizumi et al. [2], there was no difference in overall infant mortality rates between MZ and DZ twins in the 1974 data. However, the rates vary according to health condition of mother after delivery in DZ twins, the infant mortality rate being lower for healthy mothers (4.1%) than for nonhealthy mothers (9.5%) (Table 2). Another socio-



Fig. 1. Infant mortality rates of monozygotic and dizygotic twin individuals according to monthly expenditure of the households.

economic factor involved is the occupation of mother during pregnancy. Although there were no differences among the rates according to the occupation of the mother during pregnancy (Table 3), a significant difference was seen between the rates for healthy and nonhealthy mothers who engaged in housekeeping (Table 4). This might be owing to ill-health of mothers who had to remain at home after pregnancy and did not pay much care to their children.

Still another socioeconomic factor is the monthly expenditure of the household, and in MZ twins the regression coefficient of the infant mortality on monthly expenditure was negative and significant. However, it is important to know whether or not monthly expenditure is related to the number of persons living in the same house. Overall, the mean number of persons living in the same house was 5.24 (Table 5). The highest number (5.92 persons) is obtained in the highest monthly expenditure class (over 160,000 yen), whereas the lowest value (4.96) is seen in expenditure class between 80,000 and 100,000 yen. In the lowest monthly expenditure class (under 80,000 yen), mean number of persons was 5.00. Then, excluding the lowest monthly expenditure class, the mean number of persons living in the same house increased slightly with monthly expenditure. This increased mean number of persons was only 0.96. Therefore, it seems likely that monthly expenditure was independent of the number of persons living in the same household, and it can be concluded that the infant mortality rate of MZ twins is decreased with the expenditure per month (Table 5 and Figure). Also, it seems likely that, for MZ twins, who are more prenatally and perinatally handicapped as compared to DZ twins, the lower the living standard the greater the mortality before one year of age. Most mothers failed to report the method of nutrition for children who died before one year of age and, therefore, an analysis of mortality for this item was impossible.

The above results suggest that socioeconomic factors still affect the infant mortality of twins, which in turn suggests that the mortality rate can be even further reduced.

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