Differences in Infant Mortality Rates between Jews and Arabs in Israel, 1975–2000

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Abstract

Background: The infant mortality rate is a health status indicator.

Objectives: To analyze the differences in infant mortality rates between Jews and Arabs in Israel between 1975 and 2000.

Methods: Data were used from the Central Bureau of Statistics and the Department of Mother, Child and Adolescent Health in the Ministry of Health.

Results: The IMR in 2000 was 8.6 per 1,000 live births in the Israeli Arab population as compared to 4.0 in the Jewish population. Between 1970 and 2000 the IMR decreased by 78% among Moslems, 82% among Druze, and 88% among Christians, as compared to 79% in the Jewish population. In 2000, in the Arab population, 40% of all infant deaths were caused by congenital malformations and 29% by prematurity, compared to 23% and 53%, respectively, in the Jewish population. Between 1970 and 2000 the rate of congenital malformations declined in both the Arab and Jewish populations. In the 1970s the rate was 1.4 times higher in the Arab community than in the Jewish community, and in 2000 it was 3.7 times higher.

Conclusion: As in the Jewish population, the IMR in the Arab community has decreased over the years, although it is still much higher than that in the Jewish community. Much remains to be done to reduce the incidence of congenital malformations among Arabs, since this is the main cause of the high IMR in this population.

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Infant mortality rates and stillbirth rates are considered as health status indicators that are used to measure progress in health status. Poverty, poor living conditions, inadequate hygiene, climactic conditions and restricted access to health services are all associated with a high IMR in developing countries [1].

Since the Alma Ata declaration "Health for all by year 2000 and beyond," several programs have been initiated by major non-governmental agencies, such as the WHO, UNICEF and the World Bank, to reduce the rates of maternal and infant mortality. However, while IMRs have declined dramatically during the last century in all developed countries, large differences still persist between the industrialized and the developing countries [1–3].

The population of 156,000 Arabs who were living in the newly established State of Israel in 1948 has increased to the current figure of more than one million, with a total fertility rate exceeding 9.2 per woman in the 1960s and decreasing to around 4.3 in recent years [4]. The Arabs in Israel live in four main geographic areas: two in the Galilee (the northern district of Israel), where they comprise 51% of the population of that area, and in the "triangle" in the center of the country. Another area is the Negev in the south, where the majority of Arab residents are Bedouin, and which is home to most of the Israeli Bedouin population. The fourth area is East Jerusalem, which is home to 20% of the total Israeli Arab community, and whose Arab residents have been included in the total count of the Israeli Arab population from 1969 onwards. Most of the Arabs (60%) live in 115 villages. An additional 20% live in seven towns (large villages, in terms of urban development), about 10% live in six mixed Jewish-Arab towns, and the rest live in over 40 unrecognized villages [4].

The educational level of the Israeli Arab population and the organization of the medical services have improved considerably. Thirty years ago there were villages with minimal medical services, often lacking electricity and accessible roads. Today, every village has one or more medical clinics with a permanent nursing staff and a resident physician, as well as infant welfare station services [5]. There are significant differences between Jews and Arabs with regard to socioeconomic status, conditions of sanitation, the level of education, and attitudes towards child healthcare [5].

The infant mortality rate is used to measure progress in health as compared to other countries, and to compare internally between regional populations for identifying groups at high risk [6]. Since 1979 there has been a continual steady decrease in the IMR, and the rate of decrease has been similar for both the Israeli Arab and the Jewish populations in Israel.

The aims of the present study were threefold: a) to analyze the difference in the IMR between the Arab and the Jewish populations in Israel, b) to show the trend in the IMR difference between these communities, and c) to analyze the difference in the IMR between the subgroups in the Arab population (Moslems, Christians and Druze).

Methods

The IMR is defined as the number of deaths in a calendar year

IMR = infant mortality rate

per 1,000 live births in the same year. The data were extracted from publications of the Central Bureau of Statistics [4] and the Department of Mother, Child and Adolescent Health in the Ministry of Health [5]. Annual statistics are published with data broken down by region, age, and cause of death [4]. In this data set, infant deaths were reported separately for the Jewish and Arab populations. The Arab population was subdivided into three main religious groups: Moslems, Christians and Druze. Up to and including 1995 the IMR figures for the Christian group included a small minority of Europeans and other non-Arabs, and from year 1996 onwards this group was subdivided into Arab Christians and non-Arab Christians.

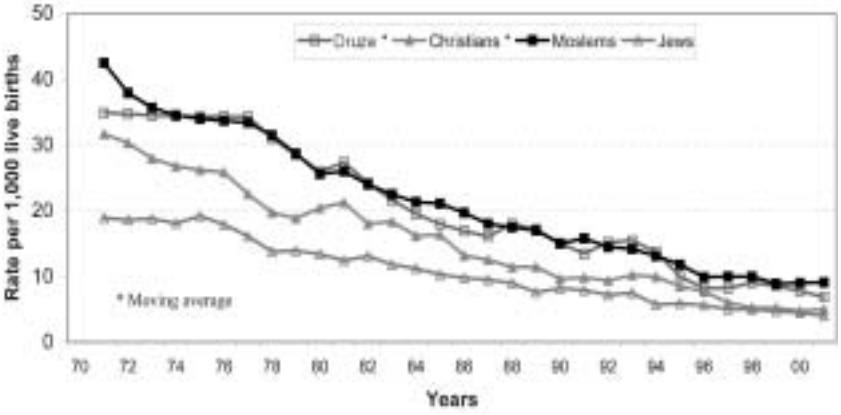

Figure 1. Trends in IMR by religion, 1970–2000 (rate per 1,000 live births).

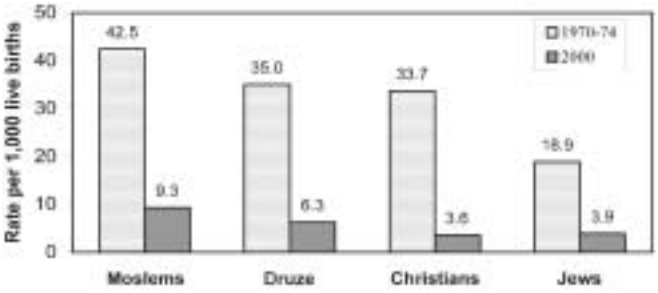

Figure 2. Change in IMR by religion, 1970–2000 (rates per 1,000 live births).

Results

Following the establishment of the State of Israel in 1948, the IMR for the Arab population declined dramatically from 62.5 per 1,000 live births in 1955 to 20.4 in 1984. Between 1950 and 1960 the IMR among Arabs may have been higher than reported due to under-registration of births and early infant deaths. From 1970 the reporting of the IMR for the Arab community has been more accurate [4,8].

Trends in infant mortality

The IMRs between the years 1970 and 2000 are shown in Figure 1. The absolute gap between the IMR in the Jewish population and that in the Arab population has narrowed considerably during this period, falling from 20.0 per 1,000 live births in 1970 to 4.8 in 2000, although the relative gap between Arabs and Jews has remained twice as high in the Arab population as in the Jewish population throughout the whole period.

The IMR in 2000 was 8.6 per 1,000 live births in the Arab population (9.3 in Moslems, 3.6 in Christians and 6.3 in the Druze) compared to 3.9 in the Jewish population [Figure 2]. In the southern district of Israel, the average IMR for the years 1998–1999 was 12.3 per 1,000 live births in the Bedouin community, compared to 5.1 among Jews living in the same area [4]. Between the years 1970 and 2000 the IMR in the Moslem community decreased by 78%, in the Druze community by 82%, and in the Christian community by 88%. The corresponding figure for the Jewish population for the same period was 79% [4].

IMR by age of death in 2000

The distribution of infant mortality by age indicates that the percentage of deaths occurring during the first week of life (perinatal mortality) was lower in the Arab population (39% of total infant deaths) than in the Jewish population (49% of total infant deaths). The percentage of deaths in infants aged 28–365 days (post-neonatal mortality) was correspondingly higher in the Arab population (44% of total infant deaths) than in the Jewish population (31% of total infant deaths) [5].

In all age groups the IMR was higher in the Arab population as compared to the Jewish population. The mortality ratio was particularly high among those aged 28–365 days: the post-neonatal mortality rate was 3.1 times higher in the Arab population as compared to the Jewish population.

IMR by mother's age at delivery in 2000

Among Arabs the IMR varied between 20 among women under age 21 years and 7 among women aged 40 and over. The corresponding rates among Jewish women were 14.6 and 3.0 respectively. For mothers under age 21 in both the Arab and Jewish populations the IMR was higher than the average in each group. The lowest IMR in the Arab population was found in mothers in the 31–35 year age group (6.8) as compared to 2.8 among Jewish mothers aged 31–35. In all age groups the IMR was higher in the Arab population as compared to the Jewish population. The rate ratio (Arabs/Jews) varied between 1.37 among younger mothers and 2.43 in those aged 31–35 years [5].

IMR by cause of death in 2000

The difference in the IMR between Arabs and Jews for the five most frequent causes of death in the year 2000 is shown in Table 1 [5]. Congenital malformations constituted the leading cause of infant mortality in the Arab population; in this group 40% of all infant deaths resulted from CM and 29% were caused by prematurity, compared to 23% and 53% respectively in the Jewish population. The IMR as a result of CM expressed as rates for Arabs and Jews were 3.4 and 0.9 respectively (rate ratio 3.7). Congenital malforma-

CM = congenital malformations

Table 1. Infant mortality by cause of death and population group. Number of deaths from each cause; rate, and percentage in year 2000

	Arabs			Jews		
Cause of death	**N**	**%**	**Rate**	**N**	**%**	**Rate**
Congenital malformations	142	40	3.4	83	23	0.9
Prematurity	104	29	2.5	195	54	2.1
Maternal and obstetric conditions	30	8	0.7	25	7	0.27
Infectious diseases	15	4	0.4	11	3	0.1
Other perinatal conditions	12	3	0.3	15	4	0.2
External causes	6	2	0.14	7	2	0.07
Other	37	10	0.9	14	4	0.2
Unknown	13	4	0.4	12	3	0.1

tions include malformations of any of the following systems: nervous, cardiovascular, respiratory, digestive, genitourinary, and musculoskeletal [5]. Chromosomal abnormalities can also result in malformations.

Trend in IMR from CM

The trend over time of ethnic disparity in the IMR from CM during the period 1970–2000 in Arabs and Jews is shown in Figure 3. Between 1970 and 2000 this rate declined in both groups. The decline was far greater among Jews (from 4.4 to 0.9 per 1,000 live births) than among Arabs (from 6.5 to 3.4 per 1,000 live births) [4,5].

Geographic comparisons

A comparison of the IMR in selected Arab villages and towns (population more than 10,000) in Israel for the period 1996–2000 shows that the distribution of the IMR varied between 12.9 per 1,000 live births in the village Kafr Kana, located in northern Israel, to 3.9 per 1,000 live births in Tamra village, which is near Haifa [9]. In the Jewish population in the same period (data not shown), the infant mortality rates in Jewish towns and cities in the center of the country ranged from 10.6 per 1,000 live births in Or Akiva to 1.8 in Givatayim [9]. The average IMR in the total Israeli population in that period was 6.6 per 1,000 live births.

International comparisons

The IMR varies between countries [10]. High rates have been reported in countries with a low socioeconomic status, especially in Asia and Africa, and low rates in countries with a high socioeconomic status, especially in the United States and Europe. Comparison of the IMR in selected Arab countries shows that the Israeli Arab community had the lowest rate (8.7 per 1,000 live births). Among the Arab countries bordering on Israel, the estimated IMRs for 2000–2005 were 41.0 in Egypt, 24.0 in Jordan, 22.0 in Syria, and 17.0 in Lebanon [11].

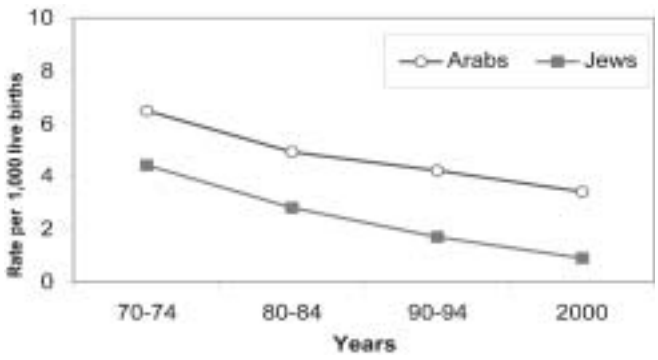

Figure 3. IMR due to congenital malformations in Israel by population group, 1970-2000 (rates per 1,000 live births).

Discussion

This population-based study shows that the IMR in Israel has declined dramatically across the entire population spectrum over the last 30 years. The absolute gap in the IMR between Arab and Jewish communities has also decreased steadily during the same period, falling from 20.0 per 1,000 live births in 1970 to 4.6 in 2000, although the relative gap between Arabs and Jews has remained twice as high in the Arab population throughout the whole period. However, since 1997 the IMR among Christian Arabs has been similar to that in the Jewish population.

The reduction in IMR in the Arab population in Israel reflects the improvements in medical care and living conditions during the last three decades, together with improving comprehensive preventive and curative health services, and training of public health nurses who work in Mother and Child Health Centers. In parallel, several emergency field pediatric units were set up during the same period [12]. An extensive network of health insurance fund community clinics and Mother and Child Health Centers are located in nearly every village. The gap in the IMR between Jews and Arabs appears to have narrowed, particularly in the period 1975–1984 [4]. Hospital deliveries increased in the Arab community, from 55% in 1960 to 92% in 1971, and to virtually 100% in the late 1970s [13]. Examination of the differences in the IMR between Arabs and Jews according to the age at death shows that the percentage of deaths in the post-neonatal period is higher among Arab infants than among Jewish infants (42.9% and 30.4% of total infant deaths respectively), and post-neonatal mortality rates are 3.3 times higher among Arab infants than Jewish infants.

In 2000, prematurity was the second leading cause of death in infancy among Arab infants, after congenital malformations. Among the Jewish population it was the leading cause of infant deaths. The IMR from prematurity was 2.5 per 1,000 live births among the Arab population, compared to 2.1 per 1,000 live births among Jews.

During the period 1969–1984 there was a striking decline in the IMR from infectious diseases in both population groups. A reduction in the IMR due to congenital malformations was also seen in both groups; this was twice as high among Arabs than among Jews in 1984 (5.8 and 2.9 per 1,000 live births, respectively) [8]. The rate continued to decline until 2000.

Some significant differences in the perinatal characteristics of Jews and Arabs still exist. For example, multiple births accounted for nearly half the cases of very low birth weight infants in the Jewish population, but only for 35% in the Arab community. This may be due in part to assisted reproduction, which is performed

less frequently in the Moslem community. Another factor is that Arab women who live in small rural villages at some distance from the medical center maternity units may delay seeking medical care. Such women also receive prenatal care less frequently, despite the fact that this is available and easily accessible. A high mortality level was recently reported among Moslem very low birth weight babies without congenital malformations (personal communication).

The difference between Arabs and Jews in the percentage of the IMR that is caused by congenital malformations can be explained by the high prevalence of consanguineous marriages in the Arab population. The prevalence of consanguineous marriages and its association with CM in the Arab population has been discussed in several Israeli studies in the last decade [14–21]. Consanguinity is common among the Arab population generally, and in the Israeli Arab community in 1992 approximately 44% of all marriages were consanguineous, half of them between first cousins [14]. By 1998, the percentage of consanguineous marriages in this community had fallen to 32% [20].

Higher rates of major CM were observed among the offspring of related parents; specifically, 15.8%, 15.1%, and 8.7% among children of first cousins, distant relatives, and unrelated parents, respectively [15]. Significant differences in IMRs were found between the groups, including deaths during the first month and the first year of life. There was a significantly higher proportion of CM as the cause of neonatal death in first-cousin marriages as compared to the group of unrelated parents [18].

Differences in infant mortality rates between the urban and rural Arab populations in Israel have been reported, with rates being consistently higher in the rural population. Between the years 1977 and 1999 the IMR declined steadily in both urban and rural Arab populations, decreasing from 30.3 per 1,000 live births in 1977 to 12.9 in 1999 in the rural population and from 23.8 to 8.2 respectively in the urban population [4]. Biener et al. [6] reported a difference in IMR between the urban and rural populations in the Western Galilee in 1985. In the urban Arab population the rate was 6.1 per 1,000 live births, and in the villages it was 23.9. This difference was statistically significant ($P < 0.0001$). However, the rates reported in this study are probably not representative of the situation in the Israeli Arab population in the country as a whole; the IMR for the entire Arab population as reported by the Central Bureau of Statistics in 1985 was 19.7 in the rural population compared to 18.4 among city dwellers.

In a recent study, Melamed and co-workers [22] evaluated the differences between preterm delivery rates and outcomes in Jews and Bedouins in southern Israel. They concluded that the increased IMR in the Bedouin population could be explained by the presence of congenital anomalies. The higher incidence of congenital anomalies in this population was attributed to a high frequency of consanguineous marriages, low utilization of prenatal care and diagnostic facilities, and religious and cultural objection to termination of pregnancy [22]. In addition to the high incidence of congenital anomalies among the Bedouin population in the Negev, the difference in the IMR between this community and the rest of the Israeli Arab population is due to lower socioeconomic and educational levels in the Bedouin community. Approximately 50% of this community lives in settlements with minimal medical services, electricity and accessible roads. In contrast, among the non-Bedouin Arab population living in the villages, the living standards are higher, and in the villages there are medical clinics with permanent nursing staff, a resident physician, and also infant welfare station services [23].

The IMR varied between Moslem Arabs, Christian Arabs and Druze. In 2000 it was 9.3 among Moslems, 3.6 among Christians and 6.3 among the Druze. The total number of births in each group was 35,740, 2,789 and 2,708 respectively [4]. The average family size in 2000 was 5.5 in the Moslem community, 3.6 among Christian Arabs, and 4.7 among the Druze. In that year, 90.8% of Moslems lived in urban areas and 9.2% in rural areas. The comparable figures for the Christian Arab population were 99.3% and 0.7%, and for the Druze, 97.5% and 2.5% [4].

One reason for the higher IMR among Moslem Arabs is that this group includes the Bedouin population, which comprises 11.9% of the total Moslem population. The average IMR in the Bedouin community in the southern district of Israel was 12.3 per 1,000 live births for the years 1998–99, for reasons discussed above, and this therefore pushes up the average rate for the Moslem community as a whole [4]. The question of consanguinity is a very important factor – in the Bedouin community more than 60% of all marriages are consanguineous, compared to 32% among the rest of the Moslem Arabs [20]. In the Christian Arab community the figure is lower (personal communication).

Another reason is that almost all the Christian Arabs and the Druze live in urban areas, whereas a more significant percentage of the Moslem Arabs lives in rural areas. Socioeconomic factors should also be taken into consideration, such as the difference in family size between the Moslem Arabs, who have larger families and higher average housing density (i.e., number of people per room) than the Christians and Druze [4].

In addition to the main reasons for infant mortality noted above, other causes also have to be considered. According to the data, non-specific "other" causes account for 12% of all infant deaths in the Arab community and 5% in the Jewish community. Infections account for 8% among Arabs and 6% among Jews, and sudden infant death accounts for 5% among Arabs and 3% among Jews [5]. Mortality rates are higher among Arabs than Jews for each of the above mentioned causes – four times higher for infectious diseases, twice as high for external causes, 2.6 times higher for sudden infant death, and 4.5 times higher for "other" causes [Table 1].

Recently, serious steps have been taken to reduce the incidence of congenital malformations in the Israeli Arab community. These include a wide campaign in the media, training programs for health service providers, education for the population in general and community leaders, including religious leaders, in particular, and encouraging the community to avail themselves of prenatal diagnostic and genetic counseling services. Research is also being undertaken to identify the specific genetic disorders prevalent in each village or town throughout the country and to map the genes where possible. As a result of some of these measures, it was found

in a recent study that the frequency of consanguineous marriages has decreased [20].

One important problem that is encountered in the Israeli Arab population is the reluctance to accept prenatal diagnosis for the detection of fetal congenital malformations. Jaber et al. [24] showed that among Israeli Arab women, half of those interviewed believed that prenatal testing was not an accurate tool for diagnosing an affected fetus, and 57% said that they would not agree to a termination of pregnancy in the event of a severely affected fetus. The refusal in traditional religious Moslem communities to accept the concept of termination of pregnancy in the event that prenatal diagnosis has definitively identified a fetus with a major CM or a genetic disorder is the main problem in the Arab population. Prenatal diagnosis is available for many of the disorders that are prevalent among the Israeli Arab community, and this can be performed in most of the maternity hospitals in Israel.

Several factors were thought to explain the differences in the IMR between countries, such as inadequate prenatal care, poor hygienic conditions and lack of health services. However, it has also been shown that variation in the incidence of consanguineous marriages within the populations in Arab countries is the main factor that differentiates these IMRs as compared to western countries [15,17].

Conclusions

The main determinant associated with the infant mortality rate in the Arab population is congenital malformations. The incidence of congenital malformations is higher in the Israeli Arab population mainly due to the high frequency of consanguineous marriages in this community. In order to combat the burden of consanguinity, a multi-faceted approach is necessary [17]. This includes:

- Public health intervention, especially by means of health education, with the aim of reducing the incidence of consanguineous marriages, starting at the school level, with the emphasis on increasing awareness within the Israeli Arab community regarding the association between consanguineous marriages and CM.
- Introducing health education for Moslem preachers in the mosques and the community with regard to the association between consanguineous marriages and CM so that they can act as health agents.
- Informing Moslem couples who are already in a consanguineous marriage, and those members of the community who are about to marry a relative, about the importance of prenatal testing and genetic counseling.
- Advising families that according to Moslem religious laws, in spite of the fact that many people do not accept the concept, termination of pregnancy is permitted during the first 120 days in the event of a severely affected fetus.
- Attempting to identify the causative gene for the disease that is prevalent in a particular village or town, and when the gene is found, screening programs should be established.
- Emphasizing the importance of taking a folic acid supplement prior to and during the first months after conception as a primary prevention of fetal neural tube defects.

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