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J Epidemiol Community Health 2009;63;106-112; originally published online 17 Oct 2008;
doi:10.1136/jech.2008.078741

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Ethnic disparity in stillbirth and infant mortality in Denmark 1981–2003

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Accepted 29 September 2008

ABSTRACT

Objective: Ethnic minorities constitute a growing part of the Danish population but little is known about ethnic disparity in early life mortality in this population. The aim of this study was to investigate ethnic disparities in stillbirth risk and infant mortality in Denmark from 1981 to 2003.

Methods: From population-covering registries, all live and stillbirths of women from the five largest ethnic minority groups and of women from the (Danish) majority population (N = 1 333 452) were identified. The liveborn were followed up for vital status to the age of 1 year. Log-binomial regression was used to estimate relative risks according to ethnic group. The main outcome measure was stillbirth and infant death.

Results: Compared with the majority population, the relative risks of stillbirth were 1.28 (95% CI: 1.07 to 1.53) for Turkish, 1.62 (1.25 to 2.09) for Pakistani and 2.11 (1.60 to 2.77) for Somali women. The relative risks of infant mortality were 1.41 (1.22 to 1.63), 1.88 (1.53 to 2.30) and 1.39 (1.03 to 1.89) for children born to Turkish, Pakistani and Somali mothers respectively. The fetal and infant mortality in offspring of Lebanese and Former Yugoslavian women was not different from the mortality in the Danish group. The differences found were, in general, not attributable to ethnic differences in socioeconomic position. Turkish, Pakistani and Somali children had an excess relative risk of infant death due to congenital malformations and the risk of death from perinatal causes was increased among the Pakistani offspring.

Conclusion: Among the five largest ethnic minorities, the Turkish, Pakistani and Somali population had substantially higher fetal and infant mortality compared with the Danish majority population, while the Lebanese and Former Yugoslavian minorities were at the same level as the majority population. The excess risk was not attributable to socioeconomic conditions.

Excess infant mortality has been documented in ethnic minority populations compared with the majority population in the United States and in several European countries.^{1–11} Infant mortality is considered a central indicator of child health,⁶ and systematic differences in the occurrence of death in early life among subgroups of the population could be regarded as a problem in a universal welfare state such as Denmark, where social equality in health is an aim for the public health sector.¹² Ethnic inequality in opportunities to survive the first year of life can be viewed as unjust and must be investigated as a prerequisite for preventive strategies.

In the 1960s, a wave of immigration to Denmark of young men from Turkey, Pakistan and

Yugoslavia started due to shortage of labour. Despite a stop to immigration in 1973, the number of immigrants from low-income countries increased fivefold from 1980 to 2000. This was primarily due to family unification, but also to an influx of refugees from the Middle East, Yugoslavia and Somalia. Ethnic minorities today constitute about 8% of the Danish population and the percentage is increasing. As the fertility rate of many immigrant groups has been considerably higher than that of women born in Denmark, children born to ethnic minority women constitute a growing number of newborns. However, to our knowledge, no contemporary information has been published on the survival of children from ethnic minorities in Denmark.

The overall aim of this study was to investigate ethnic disparity in stillbirth, infant mortality and cause-specific infant death in Denmark from 1981 to 2003. Furthermore, we evaluated the influence of socioeconomic position on the association between ethnicity and mortality.

MATERIALS AND METHODS

Study population and definition of ethnicity

The Danish Medical Birth Registry contains medical information for all births in Denmark. We identified all births in Denmark between 1981 and 2003 and linked these to the Causes of Death Registry and to socioeconomic and demographic data, including country of birth, on the mother and father from other national registries at the national Danish statistics bureau, Statistics Denmark. Births to mothers from the five largest ethnic minority groups were compared with births in the majority population. In this study, ethnicity was defined by the country of birth of the mother. We note that the term “ethnicity” and its use in health research is a debated and controversial topic. We refer the reader to other works for a discussion of these issues.^{13–15} Children, still- and liveborn, of women with Danish, Turkish, Lebanese, Pakistani, Former Yugoslavian and Somali origin were included in the study. The ethnic group denoted as Former Yugoslavian consisted of Yugoslavia, Bosnia–Herzegovina, Serbia–Montenegro, Croatia, Macedonia and Slovenia. In order to ensure complete follow-up in the analysis of stillbirth, we included all births with an estimated date of conception after 1 May 1980, based on information about date of birth and gestational age at birth. In the analysis of infant death, all children were followed until their first birthday. The study population for analyses consisted of 1 333 452 births, comprising 5843 stillbirths and 1 336 241 live births.

Outcome measures

In the study period, the national definition of stillbirth was a birth with no signs of life after 28 completed weeks of gestation. Infant death was defined as death of a liveborn child within the first year of life (365 days) and further divided into neonatal (0–27 days) and postneonatal (28–264 days) mortality.¹⁶ For infant deaths, data on causes of death were available. The relative risks of infant death from the three most frequent causes—sudden infant death syndrome (SIDS), congenital malformations and perinatal causes (eg, diagnoses related to asphyxia and preterm birth, such as intracranial haemorrhage, sepsis and necrotising enterocolitis)—according to maternal ethnicity were analysed. In Denmark, causes of death were registered using ICD-8 codes from 1981 to 1992, whereas ICD-10 codes were used from 1993 onwards. Causes of death were available in the registries until the end of 2001, and follow-up of cause-specific mortality analyses ended by 2001.

Socioeconomic position

Socioeconomic position measures used were household income and maternal education. Income was measured as the disposable household income adjusted for household size. Adjustment was done according to an income equivalence function used by the Danish Ministry of Finance¹⁷ and was calculated as (sum of the parents' incomes)/(sum of adults and children in the household raised to the power of 0.6). The variable was categorised in percentiles (<5%, 5–24%, 25–49% and 50–100%) calculated according to the income distribution in the total study population. Children from households with a negative income (most often as a result of tax transaction procedures) or with no information on income were excluded (1.3% of study population). The group with income in the 50–100% percentile served as the reference group.

Maternal education was assessed as the highest obtained education as of 1 October in the year preceding birth. Maternal education was categorised according to the international ISCED classification system¹⁸ and converted into four educational groups reflecting the number of years of completed highest educational attainment: no information, 1–9 years, 10–12 years and >12 years. A substantial proportion of the ethnic minority group mothers had missing information on educational attainment in the register, and therefore a separate category for unclassified educational level was formed. Women with 10–12 years of education constituted the reference group.

Statistical analysis

Mortality rates were calculated using the conventional definitions. The stillbirth rate was calculated as all stillbirths divided by all births, and the infant mortality rate was calculated from the number of deaths in the first year of life in relation to all live births. Further, the neonatal and postneonatal mortality rates were calculated.

We used multiple log-binomial regression to estimate the relative risk of stillbirth, infant death and its components (neonatal and postneonatal death), and cause-specific death in the first year of life due to SIDS, congenital malformations and perinatal causes. All analyses of risk of death were adjusted for calendar year as a continuous variable.

To examine to what extent ethnic differences in risk of mortality were explained by ethnic differences in socioeconomic position (household income and maternal education), we conducted two sets of analyses. In the first, we controlled for the socioeconomic characteristic and, in the second, we

restricted the analyses to the best-off category of the socioeconomic characteristic.

RESULTS

During the study period, a total of 1 278 539 children with Danish-, 22 717 with Turkish-, 9280 with Lebanese-, 8481 with Pakistani-, 8020 with Former Yugoslavian- and 6415 with Somali-born mothers were born in Denmark (table 1). Almost half the Danish women gave birth to their first child, while higher parity was more common among ethnic minority women. In general, 3% of the children were twins or more, although the frequency was slightly lower for Pakistani and Somali children. Around 6% of the children were born preterm, but a higher proportion of preterm births was seen among the Turkish, Pakistani and Former Yugoslavian minority groups. The ethnic minority mothers, except the Somali mothers, were on average younger than the Danish mothers. The father was registered in approximately 98% of the births, although this was less for the Somali group. Very few children born to ethnic minority mothers had ethnic Danish fathers. A sizeable proportion of ethnic minority parents had no information registered on educational level. Still, a clear tendency was seen to higher representation of ethnic minority parents in the lowest educational level. The level of household income was markedly lower for minority than majority mothers.

From table 2, it follows that an excess stillbirth rate was found for the Turkish and Pakistani mothers as well as a pronouncedly increased stillbirth rate for the Somali mothers. Furthermore, offspring of Turkish and Pakistani women had an elevated level of neonatal and postneonatal mortality compared with the children of Danish-born mothers.

The relative risks of stillbirth and infant mortality adjusted for calendar year were increased for the Turkish, Pakistani and Somali minorities compared with the majority population (table 3).

When adjusted for household income, the relative risk of stillbirth for all minority groups decreased compared with the crude risk only adjusted for calendar year (tables 3 and 4). We tested for interaction between ethnicity and the socioeconomic characteristics. For stillbirth, we found no interaction between ethnicity and socioeconomic characteristics (p value for interaction term: household income $p=0.15$, maternal education $p=0.62$). We did find a statistically significant interaction between ethnicity and socioeconomic characteristics in the analysis of infant mortality (household income $p=0.04$, maternal education $p=0.01$) (data not shown). In a stratified model based on a subpopulation restricted to families with household income in the 50–100% percentile only, it was found that the risk of stillbirth in Turkish, Lebanese, Pakistani and Somali women was increased compared with ethnic majority women.

The adjustment for maternal education also attenuated the relative risk estimates for stillbirth. In the stratified model, there was an excess risk of stillbirth in Pakistani and Somali mothers with 10–12 years of education compared with ethnic majority women with the same educational level.

The analyses of infant mortality displayed same overall tendencies. First, when adjusted for income and maternal education, the RR attenuated when compared with the crude RR (tables 3 and 4). Second, in the stratified model, the risk of infant death for children from high-income households was elevated for Turkish, Pakistani and Somali children compared with Danish children from high-income households. Third, the risk of infant death in the analysis restricted to births to

Research report

Table 1 Characteristics of children born in Denmark from 1981 to 2003 according to maternal ethnicity (country of birth)

	Ethnicity						p Value*
	Danish	Turkish	Lebanese	Pakistani	Former Yugoslavian	Somali	
Number of children	1 278 539	22 717	9280	8481	8020	6415	
Maternal parity (%)							
0	45.8	35.7	24.6	28.9	39.3	20.8	<0.0001
1	38.3	32	24.5	27.5	37.8	23.8	
2+	15.9	32.3	50.9	43.6	22.9	55.4	
Multiple births (%)							
Singletons	96.9	97.4	97.4	97.9	97.1	97.6	<0.0001
Twins or more	3.1	2.6	2.6	2.1	2.8	2.4	
Gestational age at birth (%)							
<37 weeks	5.9	6.5	5.1	7.1	6.6	4.3	<0.0001
37 weeks +	93.1	92.3	93.9	92	92.5	94.8	
Missing	1	1.2	1	1	0.9	1	
Maternal age at birth (%)							
<25 years	21.2	52.8	46.4	35	41.1	20.2	<0.0001
25–29 years	39.6	27.4	29.8	34.9	31.4	37.8	
30–34 years	28.4	13.5	16.1	20	18.6	30.2	
35+ years	10.9	6.2	7.8	10.1	8.9	11.9	
Mean age (SD)	28.4 (4.8)	25.1 (5.3)	25.8 (5.4)	27.2 (5.2)	26.4 (5.4)	28.7 (4.9)	<0.0001
Father registered (%)							
Father registered	98.4	98.8	98.8	97.4	96.8	91	<0.0001
Father not registered	1.6	1.3	1.2	2.6	3.3	9	
Ethnicity of father (%)							
Danish origin	94.6	0.7	0.4	0.9	7.2	1	<0.0001
Immigrant/descendant	3.3	95.6	96.7	94	86.6	86.5	
Missing	2	3.6	2.9	5.2	6.2	12.6	
Maternal education (%)							
1–9 years	30.7	59.9	55.8	43.2	38.9	35.7	<0.0001
10–12 years	43.4	16.1	24.8	28.5	38.7	29	
>12 years	25.2	1.6	4.4	5.6	8.3	4.8	
No information	0.7	22.4	15.4	22.7	14.1	30.5	
Paternal education (%)							
1–9 years	24.4	57.2	35.1	37.7	27	19.2	<0.0001
10–12 years	50.5	18.9	26	35.7	44.1	30.9	
>12 years	21.4	5.4	11.1	9.5	11.6	17.7	
No information	3.8	18.5	27.9	17.1	17.3	32.2	
Household income percentile (%)							
<5%	4.6	7	34	10.8	8	9.2	<0.0001
5–24%	19	35	18.4	42	26	32.8	
25–49%	24.4	35.1	37.9	30.2	32	42.4	
50–100%	51.6	22.8	9.4	17.3	33.5	15.3	
Missing	0.3	0.2	0.3	0.2	0.5	0.3	

*p Value for a chi-square (categorical variables) test or a log-likelihood test (continuous variables).

mothers with an educational attainment equivalent to 10–12 years was particularly high for the offspring of Pakistani and Somali mothers, compared with the ethnic majority mothers. Within these relatively privileged groups, we observed larger ethnic disparities (table 4). Adjustment for gestational age attenuated the estimates only marginally. For the Somali children, the pattern was reversed so that adjustment for gestational age had a protective effect on the risk of death, which might result from a lower percentage of these mothers giving birth before 37 gestational weeks compared with Danish mothers (data not shown).

We found an excess risk of infant death from perinatal causes among the Pakistani offspring compared with the children of Danish mothers (table 5). Children with mothers of Turkish, Pakistani and Somali origin had an excess risk of death caused

by congenital malformations, but a lower risk of death caused by SIDS, although this was not statistically significant.

DISCUSSION

This study documents the existence of considerable ethnic disparities in fetal and infant mortality in Denmark. Women of Turkish, Pakistani and Somali origin had higher stillbirth risk and their offspring had higher infant mortality rates than the ethnic majority population. In particular, the stillbirth risk for Somali mothers and the neonatal infant mortality rate in children of Pakistani mothers were high. In general, the disparities were not attributable to socioeconomic factors. Children of Turkish, Pakistani and Somali mothers had a particularly increased risk of infant death caused by congenital malformations, and an excess risk was found for death from

Table 2 Number of births (liveborn and stillborn), number of deaths in the first year of life and stillbirth and infant mortality rates according to maternal ethnicity, Denmark 1981–2003

	Numbers						Mortality rates			
	All births	Still births*	Live births	Neonatal deaths	Postneonatal deaths	Infant deaths	Stillbirth†	Neonatal‡	Postneonatal‡	Infant‡
Danish	1 278 539	5501	1 273 038	5212	2690	7902	4.3	4.1	2.1	6.2
Turkish	22 717	122	22 595	109	78	187	5.4	4.8	3.5	8.3
Lebanese	9280	39	9241	32	20	52	4.2	3.5	2.2	5.6
Pakistani	8481	58	8423	64	31	95	6.8	7.6	3.7	11.3
Former Yugoslavian	8020	39	7981	28	15	43	4.9	3.5	1.9	5.4
Somali	6415	52	6363	33	10	43	8.1	5.2	1.6	6.8
Total	1 342 084	5843	1 336 241	5508	2868	8376	4.4	4.1	2.1	6.3

*Defined as the birth after 28 gestational weeks of a child not showing any signs of life.

†Per 1000 births.

‡Per 1000 live births.

perinatal causes among the Pakistani offspring. The fetal and infant mortality in offspring of Lebanese and Former Yugoslavian mothers was not different from the mortality in offspring of Danish mothers.

Ethnicity may be regarded a *marker of risk* rather than a risk factor in itself.¹⁹ Being part of an ethnic minority group may imply a combination of many other risk factors, which in turn increase the risk of adverse health outcomes. We find it justifiable—and of public health importance—to report the mortality rates and the unadjusted relative risks as they document the disparity in mortality between the ethnic groups in Denmark. The mechanisms that may mediate these disparities are likewise important to investigate, as these may be a future route of intervention. Social and economic factors are considered to be such fundamental mediators.²⁰ The ethnic minority groups included in this study are socio-economically disadvantaged compared with the majority population in Denmark, and social disadvantage is a risk factor for fetal and infant health and mortality.^{21–25} Adjustment for educational status or household income and maternal age and parity did not change the estimates and, furthermore, in the analyses restricted to women at the upper end of household income distribution, the Turkish, Pakistani and Somali minorities had an excess risk of stillbirth and infant mortality compared with the majority population with the same income level. The broadly defined category of the highest income level leaves a possibility that this result may be biased by residual confounding.

Preterm birth is a well-known risk factor for infant death.^{25–27} A higher proportion of the Turkish and Pakistani mothers gave birth before 37 gestational weeks, and preterm birth might explain some of the excess risk of death in these groups. Such a

tendency could be confirmed for the Turkish and Pakistani group with regard to stillbirth and infant mortality when adjusting for gestational age, although this was not pronounced.

This study was based on population-covering registry information, which gave an opportunity to study ethnic disparities in early life mortality where sampling errors were precluded. However, the measurements of exposure and outcome still give rise to discussion. According to Statistics Denmark, the data quality with respect to country of birth of mothers is reliable,²⁸ and misclassification of the exposure variable is not considered to cause bias in the conclusions of the study.

Stillbirth and infant deaths are fortunately rare events, and studying ethnic disparity in these outcomes requires large data sets. The information on infant deaths in Danish registers is regarded as having high reliability, and the information used has been validated by using information on death from two different sources.²⁹ The reliability of causes of death is more questionable. It is difficult to know whether the registered primary cause was indeed the cause that brought about the death, and the registration is based on the judgement of individual doctors. A Danish study on autopsy indicates that the validity is fair; in a region of Denmark, 70% of stillbirths and 57% of infant deaths were autopsied and the cause of death was not changed in 90% of the cases.³⁰

An excess risk of death in early life and mortality caused by congenital malformations and SIDS have been described for Turkish minority children in the Netherlands,^{1–3} and it has been reported from England, Wales and Norway that offspring of Pakistani immigrants have increased fetal and infant mortality.^{4–6, 31–32} The British study showed that the excess mortality was due to congenital malformation.⁶ Norway is, to our knowledge, the only country in the world where the familial relation between the parents is registered consistently for all births, and it has been shown that consanguinity (where parents are cousins or more closely related) exists for 44% of all second-generation Pakistani children, 17% of second-generation Turkish children and 7% of second-generation Somali children.³³ It has been argued that almost 30% of deaths in the first year of life in the Pakistani group in Norway are caused by consanguinity.³² No information on consanguinity is available in Denmark. But if consanguinity patterns in Denmark are similar to those observed in Norway, it is possible that consanguinity could explain the observed differences in stillbirth and infant mortality. If consanguinity is the mechanism responsible, policy should be enacted to address the problem. However, until information on consanguinity is collected in Denmark, this

Table 3 Relative risks (RR) and 95% confidence intervals (95% CI) for stillbirth and infant mortality in ethnic minority groups compared with the ethnic majority, Denmark 1981–2003

	Stillbirth	Infant mortality
	RR* (95% CI)	RR* (95% CI)
Danish	1	1
Turkish	1.28 (1.07 to 1.53)	1.41 (1.22 to 1.63)
Lebanese	1.04 (0.76 to 1.43)	1.05 (0.80 to 1.38)
Pakistani	1.62 (1.25 to 2.09)	1.88 (1.53 to 2.30)
Former Yugoslavian	1.18 (0.86 to 1.62)	0.95 (0.69 to 1.29)
Somali	2.11 (1.60 to 2.77)	1.39 (1.03 to 1.89)

*Adjusted for calendar year.

Table 4 Relative risks (RR) and 95% confidence intervals (95% CI) for stillbirth and infant mortality in ethnic minority groups compared with the ethnic majority, Denmark 1981–2003

	Stillbirth				Infant mortality			
	Model with household income		Model with maternal education		Model with household income		Model with maternal education	
	Adjusted for household income* RR (95% CI)	Subanalysis restricted to individuals with household income in the 50–100% [†] RR (95% CI)	Adjusted for maternal education [‡] RR (95% CI)	Subanalysis restricted to individuals with 10–12 years of maternal education [§] RR (95% CI)	Adjusted for household income* RR (95% CI)	Subanalysis restricted to individuals with household income in the 50–100% [†] RR (95% CI)	Adjusted for maternal education [‡] RR (95% CI)	Subanalysis restricted to individuals with 10–12 years of maternal education [§] RR (95% CI)
Danish	1	1	1	1	1	1	1	1
Turkish	1.14 (0.95 to 1.37)	1.43 (0.97 to 2.10)	1.10 (0.92 to 1.33)	0.91 (0.53 to 1.56)	1.27 (1.10 to 1.47)	1.41 (1.00 to 1.98)	1.16 (1.00 to 1.35)	1.40 (0.95 to 2.05)
Lebanese	0.83 (0.61 to 1.15)	1.65 (0.69 to 3.95)	0.91 (0.67 to 1.25)	1.03 (0.54 to 1.98)	0.79 (0.60 to 1.05)	1.10 (0.41 to 2.94)	0.88 (0.67 to 1.16)	1.46 (0.85 to 2.38)
Pakistani	1.41 (1.09 to 1.83)	2.33 (1.32 to 4.09)	1.46 (1.12 to 1.89)	1.69 (1.04 to 2.76)	1.64 (1.33 to 2.01)	2.30 (1.39 to 3.81)	1.63 (1.32 to 2.00)	2.29 (1.58 to 3.32)
Former Yugoslavian	1.05 (0.77 to 1.45)	0.96 (0.50 to 1.84)	1.08 (0.79 to 1.49)	0.92 (0.51 to 1.67)	0.85 (0.62 to 1.16)	0.85 (0.46 to 1.58)	0.85 (0.62 to 1.16)	0.93 (0.55 to 1.57)
Somali	1.72 (1.31 to 2.26)	2.05 (0.98 to 4.29)	1.85 (1.40 to 2.46)	2.88 (1.86 to 4.46)	1.14 (0.84 to 1.55)	2.47 (1.33 to 4.59)	1.16 (1.00 to 1.35)	2.16 (1.36 to 3.43)

*Adjusted for calendar year and household income.

†Adjusted for calendar year.

‡Adjusted for calendar year and maternal education.

§Adjusted for calendar year.

explanation remains somewhat speculative. For the Somali minority group, studies from Norway and Sweden have shown that complications during labour³⁴ and factors related to the healthcare system, such as delay in seeking healthcare, mothers refusing caesarean sections, inadequate medication and miscommunication in ante- and perinatal care,³⁵ could be explanations for excess perinatal death in this group. No association between female circumcision and perinatal mortality has been found among Somali mothers and children in Sweden;³⁶ however, a practice of self-starvation during pregnancy has been reported among Somali mothers in Sweden.³⁷ This practice is considered to be a means of restricting the growth of the fetus in order to give an easier birth, and it should be understood as a practice with roots in traditions from the country of origin where maternal risk in relation to childbirth is high.

Health behaviours and access to and use of the healthcare system as well as ethnic differences in health beliefs and language barriers affecting the quality of care received are considered risk factors for early death among ethnic minority children.^{1–3 38} In Denmark, access to the healthcare system is free of charge to all with residence in the country, but it has been found that, during pregnancy, minority women use antenatal care less than ethnic majority women.^{39 40} Moreover, it has been assessed that minority women from low-income countries have insufficient knowledge about reproductive health issues,⁴¹ which could lead to no or late reaction to symptoms during pregnancy and difficulties in communication with healthcare staff. Little is known about the health behaviours of pregnant ethnic minority women and their offspring in early life, but a Danish cohort study has demonstrated that there are no differences with regard to smoking in the residence and breastfeeding between the minority and majority ethnic populations.³⁹

In this study, it was not possible to study fetal and infant mortality in descendants of immigrants in Denmark, because of lack of information on country of origin of descendants. Research from other countries shows heterogeneous tendencies. In England, no increase in birth weight was found from second- to third-generation Pakistani children.⁴² In the Netherlands, an increased infant mortality rate in third-generation Turkish children was found compared with second-generation Turks, as well a direct association between the duration of the mothers' residency in the host country and the mortality rate of the offspring, while for third-generation children of Surinam origin, the infant mortality was lower compared with the second generation.² Thus, the interaction between host society and minority group seems to have an impact on the survival in early life, and the future will show whether improved survival is obtained with generational status in Denmark.

CONCLUSION

This study is the first population-wide study in Denmark investigating ethnic disparity in death in early life. We have shown a considerably higher risk of fetal or infant death in offspring of women from some ethnic minorities compared with offspring of Danish mothers. Remarkably, other ethnic minorities had no such excess risk. The excess risk of death seemed not to be mediated by differences in socioeconomic position. We need to investigate ethnic differences in health behaviours concerning pregnancy and childhood, which could be brought about by surveys, but qualitative studies on differences in ethnic beliefs are also needed. There might be procedures in the relation between minority populations and the healthcare system that could be improved, such as the use of

Table 5 Relative risks* (RR) and 95% confidence intervals (95% CI) of selected causes of infant mortality in ethnic minority groups compared with the ethnic majority, Denmark 1981–2001

	Perinatal causes†		Congenital malformations‡		SIDS§	
	N of cases	RR (95% CI)	N of cases	RR (95% CI)	N of cases	RR (95% CI)
Danish	2989	1	2805	1	1169	1
Turkish	50	1.00 (0.75 to 1.32)	75	1.58 (1.23 to 2.03)	10	0.56 (0.30 to 1.05)
Lebanese	15	0.81 (0.49 to 1.35)	22	1.35 (0.86 to 2.13)	6	1.19 (0.53 to 2.66)
Pakistani	33	1.75 (1.24 to 2.46)	29	1.52 (1.01 to 2.30)	2	0.29 (0.07 to 1.15)
Former Yugoslavian	13	0.81 (0.47 to 1.39)	12	0.81 (0.44 to 1.51)	3	0.62 (0.20 to 1.92)
Somali	7	0.62 (0.29 to 1.30)	21	2.55 (1.66 to 3.93)	1	0.41 (0.06 to 2.92)

*Adjusted for calendar year.

†Perinatal causes: IDC-8 = 760–779 and ICD-10 = P00–P96.

‡Congenital malformations: IDC-8 = 740–759 and ICD-10 = Q00–Q99.

§SIDS (sudden infant death syndrome): ICD-8 = 795 and ICD-10 = R95.

What is already known on this subject

Ethnic disparities in stillbirth and infant death exist in many countries.

What this study adds

- ▶ In Denmark, Turkish, Pakistani and Somali women had higher stillbirth risk and their offspring had higher risk of infant mortality than the majority population.
- ▶ In Denmark, Lebanese and Former Yugoslavian women did not differ from the majority ethnic population in terms of stillbirth risk and offspring infant mortality.
- ▶ The excess risk of mortality seemed not to be explained by differences in socioeconomic position.

Policy implications

- ▶ The ethnic inequality in risk of stillbirth and infant mortality should be monitored to ensure equity in health.
- ▶ The mechanisms responsible for the ethnic disparity should be explored.

interpreters and improved communication, health education of minority women on pregnancy and delivery in a modern society and more healthcare staff from a minority background.

Ethnic disparity in opportunities to survive the first year of life can be considered unjust and unacceptable in a welfare state such as Denmark, and we want to stress the obligation to conduct further investigations into the mechanisms leading from ethnicity to death in early life so that preventive strategies can be launched.

Acknowledgements: We thank Camilla Schmidt Morgen, National Institute of Public Health, Denmark, for valuable comments on the paper.

Funding: None declared.

Competing interests: None.

Ethics approval: Not necessary in this type of research according to Danish legislation.

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