

Higher rate of serious perinatal events in non-Western women in Denmark

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ABSTRACT

INTRODUCTION: To elucidate possible mechanisms behind the increased risk of stillbirth and infant mortality among migrants in Denmark, this study aimed to analyse characteristics of perinatal deaths at Hvidovre Hospital 2006-2010 according to maternal country of origin.

METHODS: We identified children born at Hvidovre Hospital who died perinatally and included the patient files in a series of case studies. Our data were linked to data from population-covering registries in Statistics Denmark. Timing, causes of death as well as social, medical and obstetric characteristics of the parents were described according to maternal country of origin.

RESULTS: This study included 125 perinatal deaths. The data indicated that intrapartum death, death caused by maternal disease, lethal malformation and preterm birth may be more frequent among non-Western than among Danish-born women. Obesity and disposition to diabetes may also be more prevalent among the non-Western women.

CONCLUSIONS: The role of obesity, gestational diabetes, preeclampsia and severe congenital anomalies should be a main focus in improving our understanding the increased risk of perinatal death among non-Western migrant women in Denmark. Six of 28 perinatal deaths in the non-Western group were intrapartum deaths and warrants further concern.

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TRIAL REGISTRATION: The linkage of data from patient files to data from Statistics Denmark was approved by the Danish Data Protection Agency. Only anonymised data were used.

An increased risk of perinatal and infant mortality has been established among migrants in Europe, Australia and North America [1]. The mechanisms behind this development are not fully understood. In Scandinavia, it has been established that perinatal death among non-Western migrants was in some cases linked to suboptimal maternity care [2, 3]. Stoltenberg et al have shown that consanguinity was more prevalent among some migrant groups in Norway and that this contributed to increased stillbirth and infant death [4]. Researchers in the field call for further insight into disparities in prevention, screening and treatment activities between migrants

and non-migrants so that tailored interventions can be developed [5].

Denmark has 5.6 million inhabitants of whom 11.1% are migrants. Nationally, 14% of all neonates have a migrant mother. In Copenhagen, this number is approximately 23.6%. From previous Danish studies, we know that the perinatal and child mortality rate among migrants is higher than among non-migrants [6, 7]. Especially among Turkish, Pakistani and Somali children, stillbirth and infant mortality rates are increased compared with Danish children. These differences could not be explained by the mother's socioeconomic status [7]. National register data from 1997-2010 show that stillbirth rates were significantly lower in Danish-born women (0.45%) than in Turkish (0.60%), Pakistani (0.91%), and Somali-born women (1.01%).

To prime an appropriate health intervention for a better reproductive outcome for migrant women in Denmark, we conducted this study aiming to describe and analyse any patterns regarding maternal country of origin in the causes of death and the social, medical and obstetric characteristics of all perinatal deaths that occurred in the 2006-2010 at Hvidovre Hospital, Denmark.

METHODS

Hvidovre Hospital has the biggest maternity ward in Denmark. From 2006 to 2010, a total of 29,119 women, of whom 23.6% were migrants, gave birth in the ward. We traced all cases of perinatal death, i.e. stillbirth and deaths within the first week of life during the five-year period from 1 January 2006 to 31 December 2010. Cases were identified through the obstetric database at Hvidovre Hospital. We collected detailed information from patient files and linked these data to social and medical data from population-covering registries in Statistics Denmark using unique maternal and paternal personal identification numbers. We conducted a series of case studies describing the time of death (antepartum or intrapartum stillbirth or early neonatal death), the primary cause of death, as well as social, medical, and obstetric characteristics according to the mother's country of origin.

Patient files at Hvidovre Hospital

The information came from different sources in the individual patient files: A self-reported questionnaire rou-

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tinely given to all women at first antenatal care (ANC) visit at the hospital, referral notes from the general practitioner (GP) and notifications from medical specialists and midwives at the hospital during the pregnancy, childbirth and postpartum period. This also included emergency hospital contacts and results from ultrasound scans.

Gestational age (GA) at delivery was calculated from the estimate made by routine ultrasound scanning at week 11-13 or at week 18-20. If both scans were missing ($n = 3$), the GA was calculated according to the first day of the last menstrual period. Information on parity, pregnancy complications in earlier pregnancies, history of stillbirths and fertility treatment prior to this pregnancy and pre-pregnant body mass index (BMI) were registered from the patient files. Parity was defined as the number of times the mother had given birth after

week 22, including the actual birth, counting multiple births as one and including stillbirths.

We categorised the deaths into underlying causes in **Table 1**, inspired by previous classifications [2, 3]. On a case-by-case basis, the category was determined based on results from the autopsy of the foetus and placenta, the death certificate, information from patient files including the conclusions made by a senior obstetrician. If more than one condition was present, the cause ranked highest in the hierarchy listed in Table 1 was chosen. According to current Danish definitions, all stillbirths had a GA of at least 22 completed weeks, whereas neonatal death was defined as children born with signs of life who died within the first week of life, whatever the gestational age at birth. Stillbirth was divided into antepartum (foetal death diagnosed before onset of birth) and intrapartum (foetal death occurring during birth). Perinatal death included all stillbirths and neonatal deaths.

Socio-demographic data from Statistics Denmark

From the Population Registry in Statistics Denmark, we obtained information on both parents' country of birth, maternal education and paternal age. Maternal education was assessed as the highest obtained educational level in the year of giving birth and categorised as follows: < 10 years, 10-12 years and > 12 years of formal education.

Migrants are either born outside Denmark (immigrants) or in Denmark (descendants) of parents not born in Denmark and without Danish citizenship. Thus, descendant women were grouped as migrants. The study population was divided into three ethnic groups: Mothers with Danish origin, mothers of other Western origin and, finally, mothers of non-Western origin according to the classification by Statistics Denmark [8].

Trial registration: The linkage of data from patient files and data from Statistics Denmark was approved by the Danish Data Protection Agency. Only anonymised data were used.

RESULTS

During the study period, a total of 123 women experienced stillbirth or gave birth to a child who died neonatally. In total, 127 perinatal deaths occurred as three out of 11 twin births involved the death of both twins and one woman had two perinatal deaths in the period. Additionally, two of the women had unknown country of origin and were excluded from the analysis. Overall, the proportion of stillbirths at Hvidovre Hospital in the 2006-2010 period was lower than the national rates. However, the stillbirth rates according to country of origin were 0.31% for Danish-born, 0.37% for Turkish-born, 0.73% for Pakistani-born and 1.43% for Somali-born

TABLE 1

Perinatal deaths at Hvidovre Hospital 2006-2010, described by timing of death and underlying cause of death^a by maternal country of origin. The values are n (%).

	Danish (N = 92)	Other Western (N = 5)	Non-Western (N = 28)	Total (N = 125)
Antepartum	71 (77.2)	NA	19 (67.9)	90 (72.0)
Intrapartum	13 (14.1)	NA	6 (21.4)	19 (15.2)
Neonatal	8 (8.7)	NA	3 (10.7)	11 (8.8)
Prioritization				
Termination of pregnancy	5 (5.4)	NA	1 (3.6)	6 (4.8)
Maternal disease	3 (3.3)	NA	2 (7.1)	5 (4.0)
Lethal malformation	5 (5.4)	NA	4 (14.3)	9 (7.2)
Twin-to-twin transfusion	5 (5.4)	NA	0	5 (4.0)
Prematurity/immaturity	3 (3.3)	NA	2 (7.1)	5 (4.0)
Intrauterine growth restriction	4 (4.4)	NA	1 (3.6)	5 (4.0)
Placental insufficiency	36 (39.1)	NA	8 (28.6)	44 (35.2)
Umbilical cord complication	7 (7.6)	NA	3 (10.7)	10 (8.0)
Unknown	24 (26.1)	NA	7 (25.0)	31 (24.8)
Autopsy	56 (60.9)	NA	9 (32.1)	65 (52.0)

NA = not assessed (n too low to report to respect confidentiality).

a) If > 1 condition was present, the causes were prioritized as listed.

women, displaying substantial disparities according to maternal country of origin.

The group of non-Western-born mothers consisted of six Pakistani-born, five Somali-born, four Turkish-born, and three Indian-born women together with one woman born in each of the following countries: Gambia, Nigeria, Chile, Jordan, Philippines, Vietnam, Thailand, Moldova, Bosnia and Macedonia (n = 28). In order to protect the anonymity of the women's information, we do not present the results of other Western-born women in the tables; moreover, the size of this group was significantly smaller (n = 5).

The proportion of intrapartum death seems to be higher in non-Western women than in women born in Denmark (Table 1). The distribution of underlying causes of deaths is shown in Table 1 and differed most between the regions of origin for maternal disease, lethal malformation and prematurity. Regarding death caused by maternal disease, both cases among offspring of non-Western mothers were due to eclampsia and preeclampsia. One of the deaths in offspring of Danish mothers was caused by eclampsia.

A high proportion of women of non-Western origin had no information on pre-pregnancy BMI (21%) (Table 2). Nevertheless, only 7% of the women for whom BMI information was available were within the normal BMI, between 20 and 25, compared with 47% of the Danish-born women. The results suggest that diabetes in the family was more common in women of non-Western origin, whereas congenital malformations, Down's syndrome and other hereditary diseases in the family and maternal chronic diseases were more often registered for the Danish-born mothers.

In the non-Western group, 50% of the children were born extremely preterm compared with 39% of the Danish group (Table 3). Furthermore, of the non-Western mothers, 61% were multiparous and 50% had a complicated obstetrical history compared with 34% and 29%, respectively, in the Danish group.

DISCUSSION

In this case series study of all perinatal deaths in a large hospital in Denmark, we found that women of non-Western origin seemed more inclined to experience intrapartum death. Our data suggest that preeclampsia, lethal malformations and preterm birth could constitute a larger proportion of the underlying causes for perinatal deaths among non-Western women than among Danish women. Obesity and diabetes disposition may also be more prevalent among the non-Western mothers. Maternal obesity and diabetes disposition are risk factors for stillbirth and neonatal death [9], and these factors have previously been reported as more common among non-Western migrants to Western

countries [10], supporting our findings. However, we found that the GPs had reported less pre-pregnant maternal morbidity in the non-Western group, which may reflect differences in the maternal perception of what chronic diseases are or that GPs find it difficult to obtain the relevant information from migrant mothers. Migrants in Denmark have been shown to be socioeconomically disadvantaged [7], which is a known risk factor for foetal and infant mortality [11]. The indication of so-

TABLE 2

Selected parental characteristics, all perinatal deaths at Hvidovre Hospital, 2006-2010, by maternal country of origin. The values are n (%).

	Danish (N = 92)	Other Western (N = 5)	Non-Western (N = 28)	Total (N = 125)
<i>Maternal age at delivery</i>				
≤ 21 yrs	3 (3.3)	NA	2 (7.1)	5 (4.0)
22-27 yrs	16 (17.4)	NA	5 (17.9)	21 (16.8)
28-34 yrs	52 (56.5)	NA	17 (60.7)	69 (55.2)
≥ 35 yrs	21 (22.8)	NA	4 (14.3)	25 (20.0)
<i>Maternal education</i>				
< 10 yrs	16 (17.4)	NA	5 (17.9)	21 (16.8)
10-12 yrs	34 (36.9)	NA	10 (35.7)	44 (35.2)
> 12 yrs	42 (45.7)	NA	6 (21.4)	48 (38.4)
Unknown	0	NA	7 (25.0)	7 (5.6)
<i>Family history of</i>				
Diabetes	31 (33.7)	NA	11 (39.3)	42 (33.6)
Congenital heart disease	7 (7.6)	NA	2 (7.1)	9 (7.2)
Congenital malformations	7 (7.6)	NA	0 (0)	7 (5.6)
Down syndrome	2 (2.2)	NA	0 (0)	2 (1.6)
Other hereditary diseases	18 (19.6)	NA	2 (7.1)	20 (16.0)
<i>Parents cohabitation</i>				
Yes	74 (80.4)	NA	16 (57.1)	90 (72.0)
No	12 (13.1)	NA	5 (17.9)	17 (13.6)
Unknown	6 (6.5)	NA	7 (25.0)	13 (10.4)
<i>Maternal smoking habits</i>				
Light smoker (0-10 cigarettes/day)	10 (10.9)	NA	1 (3.6)	11 (8.8)
Moderate/heavy smoker (> 10 cigarettes/day)	6 (6.5)	NA	2 (7.1)	8 (6.4)
Non-smokers	74 (80.4)	NA	25 (89.3)	99 (79.2)
Unknown	2 (2.2)	NA	0	2 (1.6)
<i>Maternal alcohol intake</i>				
Yes	5 (5.5)	NA	0	5 (4.0)
No	82 (89.1)	NA	28 (100)	110 (88.0)
Unknown	5 (5.4)	NA	0	5 (4.0)
<i>Maternal BMI before pregnancy</i>				
< 20 kg/m ²	17 (18.5)	NA	8 (28.7)	25 (20.0)
20-25 kg/m ²	43 (46.7)	NA	2 (7.1)	45 (36.0)
25.1-30 kg/m ²	18 (19.6)	NA	10 (35.7)	28 (22.4)
> 30 kg/m ²	6 (6.5)	NA	2 (7.1)	8 (6.4)
Unknown	8 (8.7)	NA	6 (21.4)	14 (11.2)
<i>Maternal chronic disease</i>				
Yes	31 (33.7)	NA	3 (10.7)	34 (27.2)
No	58 (63.0)	NA	23 (82.2)	81 (64.8)
Unknown	3 (3.3)	NA	2 (7.1)	5 (4.0)

NA = not assessed (n too low to report to respect confidentiality); BMI = body mass index.

cio-demographic vulnerability of the migrant women in the present study may be an important contextual factor that healthcare providers need to consider.

Non-Western migrant women seemed to have more complicated obstetric histories, which could be due to higher parity and thus to less use of ANC [12], which has earlier been established as a risk factor for neonatal death [9]. The possibility of a higher proportion of intrapartum death among non-Western migrants is of interest as intrapartum death is essentially assessed as preventable [13]. The finding that two of 28 cases of

perinatal death were caused by preeclampsia/eclampsia in the non-Western group is of concern. It has been reported that migrant women in Denmark lack knowledge about reproductive health issues [14], and it could be speculated that the group of non-Western women may be facing more difficulties in accessing timely care.

In Denmark, it seems that migrant mothers use ANC less than the majority of the population [15]. Several international studies have suggested that maternal health among migrants is negatively affected by barriers in language, culture and healthcare knowledge [1, 16]. Audits of perinatal deaths in Norway and Sweden have indicated suboptimal obstetrical care for women of non-Western origin [2, 3]. Several of the migrant mothers in the present study reported to be in need of interpreters, but they lacked this resource for all their contacts with healthcare providers during pregnancy and childbirth. This finding may indicate that it is important to study health services quality to improve reproductive health in migrant women in Denmark as well.

Increased risk of preterm birth as compared with the majority of the population has been demonstrated for migrants in several settings [9, 15], and preterm birth is a well-known risk factor for infant death [17]. It was considered a major explanation for the higher perinatal mortality among migrant women in the Netherlands [18] and to a lesser degree in Denmark [19].

In parallel to the findings here, previous Danish studies have also reported an increased risk of lethal congenital anomalies among the offspring of non-Western migrants [7, 13]. In the United States [9], consanguinity and a lower use of antenatal screening and terminations due to foetal anomaly may be two explanations for death or congenital anomalies. Based on Norwegian data, it has been suggested that almost 30% of infant deaths in offspring of Pakistani women was caused by consanguinity [4]. Consanguinity is not routinely registered in Denmark and in order to assess the significance of consanguinity, we applied an indirect approach and studied how a number of selected anomalies suspected to be of autosomal recessive origin were distributed according to maternal country of birth [20]. Particularly, offspring of Turkish and Pakistani mothers had an increased risk of autosomal recessive diseases, indicating that consanguinity plays an aetiological role in adverse reproductive outcomes among migrants in Denmark.

Strengths and weaknesses

Coverage of all perinatal deaths in a five-year period at the largest maternity ward in Denmark makes these data suitable for describing the relation between maternal country of origin and perinatal death. A limitation of this case study series is the lack of a control group and

TABLE 3

Child and obstetric characteristics in women experiencing perinatal death at Hvidovre Hospital, 2006-2010, by maternal country of origin. The values are n (%).

	Danish (N = 92)	Other Western (N = 5)	Non-Western (N = 28)	Total (N = 125)
<i>Child gender</i>				
Boy	48 (52.2)	NA	14 (50.0)	62 (49.6)
Girl	44 (47.8)	NA	14 (50.0)	58 (46.4)
<i>Birthweight</i>				
< 500 g	20 (21.7)	NA	5 (17.9)	25 (20.0)
500-1,500 g	17 (18.5)	NA	7 (25.0)	24 (19.2)
1,501-2,500 g	19 (20.7)	NA	6 (21.4)	25 (20.0)
2,501-3,500 g	27 (29.3)	NA	7 (25.0)	34 (27.2)
> 3,500 g	8 (8.7)	NA	2 (7.1)	10 (8.0)
Missing	1 (1.1)	NA	1 (3.6)	2 (1.6)
<i>Gestational age at birth</i>				
Very preterm (22-33 weeks)	36 (39.1)	NA	14 (50.0)	50 (40.0)
Moderate preterm (34-36 weeks)	21 (22.8)	NA	2 (7.1)	23 (18.4)
Term birth (37-41 weeks)	31 (33.7)	NA	10 (35.7)	41 (32.8)
Post term birth (≥ 42 weeks)	1 (1.1)	NA	1 (3.6)	2 (1.6)
Unknown	3 (3.3)	NA	1 (3.6)	4 (3.2)
<i>Delivery order</i>				
1	81 (88.0)	NA	28 (100)	109 (87.2)
2	11 (12.0)	NA	0	11 (8.8)
<i>Parity</i>				
1	61 (66.3)	NA	11 (39.3)	72 (57.6)
2	22 (23.9)	NA	8 (28.6)	30 (24.0)
3	5 (5.4)	NA	4 (14.3)	9 (7.2)
≥ 4	4 (4.4)	NA	5 (17.8)	9 (7.2)
Unknown	0	NA	0	0
<i>Former complications during pregnancy</i>				
Yes	27 (29.3)	NA	14 (50.0)	41 (32.8)
No	64 (69.6)	NA	12 (42.9)	76 (60.8)
Unknown	1 (1.1)	NA	2 (7.1)	3 (2.4)
<i>Former stillbirth</i>				
Yes	1 (1.1)	NA	2 (7.1)	3 (2.4)
No	91 (98.9)	NA	26 (92.9)	117 (93.6)
Unknown	0	NA	0	0
<i>Fertility treatment in current pregnancy</i>				
Yes	13 (14.1)	NA	1 (3.6)	14 (11.2)
No	76 (82.6)	NA	25 (89.3)	101 (80.8)
Unknown	3 (3.3)	NA	2 (7.1)	5 (4.0)

NA = not assessed (n too low to report to respect confidentiality).

the restricted number of cases, which makes formal statistical testing of differences according to maternal country of origin unwarranted. In total, 69 mothers (55.2%) had an autopsy of their child performed, but only 32.1% were non-Western mothers, which may bias the results of the study. In general, the percentage of missing information was higher in the non-Western group, which could be a source of error.

The fact that the data originated from a single hospital raises the issue of generalisation to other settings; however, based on a telephone survey to all maternity units in Denmark, there is no evidence that Hvidovre Hospital's approach to pregnancy and birth care for migrants differs from that of the majority of hospitals in Denmark. From national register data we know that non-Western migrants in Denmark have an increased risk of perinatal death [7], and the present study adds to this finding by providing more patient-specific details than was possible in the register-based study.

PERSPECTIVES AND CONCLUSIONS

This study has specified the need for further inquiry into the causes behind the increased risk of stillbirth and infant death among migrants in Denmark. The finding that six of 28 cases of non-Western origin were intrapartum deaths cause concern, and it is relevant to study if maternal diseases, lethal malformations and preterm birth are related to the higher mortality rate in this group. ANC with a focus on symptoms of suboptimal health of the mother and child and an adequate response to such signs may, together with increased awareness among healthcare providers, be one step towards equalising birth outcomes in women in Denmark.

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LITERATURE

- Gissler M, Alexander S, MacFarlane A et al. Stillbirths and infant deaths among migrants in industrialized countries. *Acta Obstet Gynecol Scand* 2009;88:134-48.
- Essen B, Bodker B, Sjoberg NO et al. Are some perinatal deaths in immigrant groups linked to suboptimal perinatal care services? *BJOG* 2002;109:677-82.
- Saastad E, Vangen S, Froen JF. Suboptimal care in stillbirths – a retrospective audit study. *Acta Obstet Gynecol Scand* 2007;86:444-50.
- Stoltenberg C, Magnus P, Lie RT et al. Influence of consanguinity and maternal education on risk of stillbirth and infant death in Norway, 1967-1993. *Am J Epidemiol* 1998;148:452-9.
- Gissler M, Alexander S, MacFarlane A et al. Stillbirths and infant deaths among migrants in industrialized countries. *Acta Obstet Gynecol Scand* 2009;88:134-48.
- Pedersen GS, Mortensen LH, Andersen AM. Ethnic variations in mortality in pre-school children in Denmark, 1973-2004. *Eur J Epidemiol* 2011;26:527-36.
- Villadsen SF, Mortensen LH, Andersen AM. Ethnic disparity in stillbirth and infant mortality in Denmark 1981-2003. *J Epidemiol Community Health* 2009;63:106-12.
- Statistics Denmark. www.dst.dk/Statistik/emner/indvandrerer-og-efterkommere/indvandrerer-og-efterkommere (12 May 2015).
- Hessol NA, Fuentes-Afflick E. Ethnic differences in neonatal and postneonatal mortality. *Pediatrics* 2005;115:e44-e51.
- Wandell PE, Carlsson A, Steiner KH. Prevalence of diabetes among immigrants in the Nordic countries. *Curr Diabetes Rev* 2010;6:126-33.
- Rom AL, Mortensen LH, Cnattingius S. A comparative study of educational inequality in the risk of stillbirth in Denmark, Finland, Norway and Sweden 1981-2000. *J Epidemiol Community Health* 2012;66:240-6.
- Hessol NA, Vittinghoff E, Fuentes-Afflick E. Reduced risk of inadequate prenatal care in the era after Medicaid expansions in California. *Med Care* 2004;42:416-22.
- Langhoff-Roos J, Larsen S, Borch-Christensen H. Potentially avoidable perinatal deaths in Denmark and Sweden 1991. *Ugeskr Læger* 1997;159:5378-82.
- Rasch V, Knudsen LB, Gammeltoft T et al. Contraceptive attitudes and contraceptive failure among women requesting induced abortion in Denmark. *Hum Reprod* 2007;22:1320-6.
- Knudsen LB, Mac F, Kristensen FB et al. The use of free maternal preventive services among immigrant pregnant women in Denmark during 1983-1987. *Ugeskr Læger* 1990;152:3611-4.
- Essen B, Hanson BS, Ostergren PO et al. Increased perinatal mortality among sub-Saharan immigrants in a city-population in Sweden. *Acta Obstet Gynecol Scand* 2000;79:737-43.
- Slattery MM, Morrison JJ. Preterm delivery. *Lancet* 2002;360:1489-97.
- van Enk A, Buitendijk SE, van der Pal KM et al. Perinatal death in ethnic minorities in The Netherlands. *J Epidemiol Comm Health* 1998;52:735-9.
- Pedersen GS, Mortensen LH, Gerster M et al. Preterm birth and birth-weight-for-gestational age among immigrant women in Denmark 1978-2007: a nationwide registry study. *Paed Perinat Epidemiol* 2012;26:534-42.
- Gundlund A, Hansen AV, Pedersen GS et al. A register-based study of diseases with an autosomal recessive origin in small children in Denmark according to maternal country of origin. *Paediatr Perinat Epidemiol* 2015;29:351-9.