

Research Letter

Rising Stillbirth Rates in Germany

An Analysis of Changes in the Age and Nationality Structure of Women Giving Birth Between 2009 and 2018

During the last decade, a continuous increase in the rate of stillbirths has been observed in Germany ([1], *Figure*). So far, the reasons for this trend are not well understood. It is conceivable that the rising stillbirth rate is explained by demographic changes. For instance, the age of the woman giving birth has an impact on the risk of stillbirth—with increased risks in teenage pregnancies and pregnancies of women over 35 years of age (2). Furthermore, there is empirical evidence of higher stillbirth rates among immigrant women (3). An increase in births in higher-risk populations could therefore influence the overall stillbirth rate.

The aim of this study is to quantitatively assess whether the increasing stillbirth rate in Germany is attributable to structural changes in the population with regard to the age and nationality of women giving birth.

Methods

The annual numbers of stillbirths and live births by age and nationality of the women who gave birth during the period 2000–2020 is sourced from the German Federal Statistical Office (Statistisches Bundesamt, Destatis) and the Federal Health Reporting (Gesundheitsberichterstattung des Bundes, GBE). The period covered by the analysis starts in 2009 with the reversal of the trend in stillbirth rates and ends in 2018 with the change in definition of stillbirths (*Figure*). As of November 2018, a stillbirth is defined as a fetal death if the fetus had a minimum weight of 500 g or the pregnancy lasted for a minimum of 24 weeks. Before this change, the only criteria used was weight. Saarland and Bremen could not be included in this analysis as no data was

available. With regard to the age of the woman giving birth, cases with missing data were added to the oldest category. Due to data protection guidelines, cell counts of one or two were not given exactly and had to be randomly imputed. We ensured that the sum of deaths after imputation matched the provided table margins.

Decomposition analysis was used to split the increase in the stillbirth rate between 2009 and 2018 into a structural effect and a mortality effect. This approach is used to analyze whether the increase is due to changes in the age or nationality structure of women giving birth.

The structural effect describes how the stillbirth rate changes in the presence of stable mortality, i.e., only due to changes in the population structure. By contrast, the mortality effect represents the change in mortality assuming a constant population structure. In this context, constant means that the weighting is based on the average of both years. The sum of the structural and mortality effects is the difference in the stillbirth rate (4). Decomposition analyses were performed separately by age and nationality.

Results

Between 2000 and 2009, the stillbirth rate declined from 4.000 to 3.511 stillbirths per 1000 births. Over the course of the following 10 years, the rate increased to 3.833 in 2018 with statistically significant monotonic trend (Mann-Kendall test with adjustment for autocorrelation (5); $p = 0.005$). Thus, the stillbirth rate increased by an average of 0.785% annually between 2009 and 2018 (0.360; 1.121; using Poisson regression). In 2018, the highest stillbirth rates were found in women aged under 20 or over 40

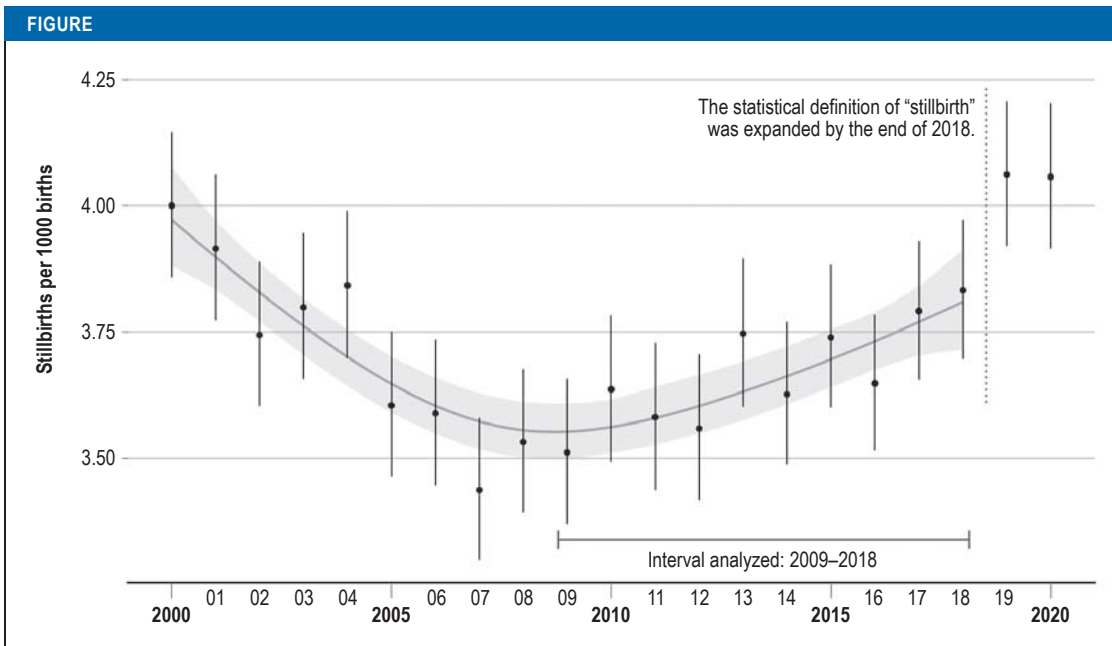
TABLE

Descriptive results as well as results of the time-trend and decomposition analyses*

	Births (in %)		Stillbirths (in %)		Stillbirth rate [95% CI]	
	2009	2018	2009	2018	2009	2018
Age of the women giving birth						
< 20	19 165 (2.9)	14 112 (1.8)	95 (4.1)	76 (2.6)	4.957 [4.010; 6.060]	5.385 [4.243; 6.741]
20–24	93 874 (14.3)	76 688 (9.9)	353 (15.4)	314 (10.6)	3.76 [3.378; 4.174]	4.095 [3.654; 4.573]
25–29	193 828 (29.6)	209 069 (26.9)	614 (26.7)	734 (24.7)	3.168 [2.922; 3.429]	3.511 [3.261; 3.774]
30–34	205 881 (31.4)	281 190 (36.3)	668 (29)	988 (33.2)	3.245 [3.003; 3.500]	3.514 [3.298; 3.740]
35–39	114 417 (17.5)	160 244 (20.7)	420 (18.3)	651 (21.9)	3.671 [3.328; 4.039]	4.063 [3.756; 4.387]
≥ 40	27 853 (4.3)	33 879 (4.4)	150 (6.5)	208 (7)	5.385 [4.558; 6.320]	6.139 [5.333; 7.032]
Nationality of the women giving birth						
German	545 068 (83.2)	589 962 (76.1)	1 887 (82)	2 159 (72.7)	3.462 [3.307; 3.622]	3.660 [3.507; 3.817]
Non-German	109 950 (16.8)	185 220 (23.9)	413 (18)	812 (27.3)	3.756 [3.403; 4.136]	4.383 [4.088; 4.696]
Germany	655 018	775 182	2 300	2 971	3.511 [3.369; 3.658]	3.833 [3.696; 3.972]
Changes 2009–2018 ...					0.322 (+ 9.17 %)	
... Explained by changes in the age structure of women giving birth (structural effect)					–0.025	
... Explained by changes in stillbirth rates within age groups (mortality effect)					0.346	
... Explained by a changes in origin of the woman giving birth (structural effect)					0.036	
... Explained by changes in the stillbirth rates with the origin groups (mortality effect)					0.285	

* Source: Destatis, 2022 Federal Health Reporting (GBE); 95% CI, 95% confidence interval

Trends in stillbirth rates in Germany, 2000–2020
 Annual rates are shown with 95% Poisson confidence intervals. A smooth trend spanning the years 2000–2018 has been added as a visual aid to interpretation.
 Source: Destatis, 2022 Federal Health Reporting (GBE)



years. The lowest rates were observed in women aged 25–29 and 30–34 years.

The stillbirth rate was significantly higher among women of non-German nationality compared to women of German nationality. Between 2009 and 2018, the stillbirth rate increased across all population groups (Table). Births shifted from younger to older age groups, while the proportion women with non-German nationality giving birth increased (Table).

Decomposition of the stillbirth rate between 2009 and 2018 reveals that the change in age structure alone would have lowered the stillbirth rate by 0.025 stillbirths. The mortality change alone would have resulted in a higher than observed stillbirth rate by 2018, increasing by 0.346 stillbirths instead of 0.322. The higher proportion of women with non-German nationality giving birth would cause the stillbirth rate to increase by only 0.036. The effect of higher fetal mortality was much greater within the groups of German and non-German women giving birth. Increased fetal mortality alone would have caused a rise in stillbirth rate by 0.285 stillbirths.

Discussion

We evaluated whether selected structural changes among women giving birth played a major role in the unexpected reversal of the trend in stillbirth rates in Germany. To this end, data on live births and stillbirths were analyzed by age and nationality of the women giving birth, as the risk of stillbirth differs substantially between these population groups (2, 3).

Our findings show that in Germany there is a change in the age structure of women giving birth. Births are shifted to higher age groups. In addition, the proportion of women with non-German nationality giving birth has increased in Germany. However, these changes in population structure can explain only a small part of the change in stillbirth rates. With respect to age, there are opposing effects. As births shift from younger to older age

groups, births are merely shifted between two high-risk groups, whereas the proportion of women giving births with the lowest risk (25– to 34-year-olds) has virtually remained the same.

Fetal mortality increases accounted for most of the change in stillbirth rates. Thus, the reasons for the increase in the stillbirth rate in Germany lie beyond obvious demographic shifts.

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Conflict of interest statement

RR states that he had his fees for the Congress of the German Society of Perinatal Medicine waived because he himself was giving a lecture on the topic of “Demographic Development” there (no direct reference to the article topic). The remaining authors declare that no conflict of interest exists.

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