IUSSP XXV INTERNATIONAL POPULATION CONFERENCE - TOURS, JULY 18-23, 2005

On the association between late parental age and the risk of stillbirth: Evidence from North Italy

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Extended abstract

1. Introduction

The continuous increase of age at childbearing in many industrialized countries raises the question on the implications of late maternal and paternal age on the risk of negative outcome. Currently, Italy is among the countries with the highest level of age at entry into parenthood. This is particularly true for paternal age. For those born in the early 1960s, the median age at first child is above 33 for Italian men, while it is generally below 30 in other European countries (FFS data). This makes the Italian case particularly interesting in the study of the implications of late fertility (Rivellini et al. 2004).

While delayed childbearing is associated with some positive economic and psychological outcomes, the biological implications are generally negative. The possible negative outcomes concern medical complications during pregnancy and delivery, such as pre-term delivery, low birth weight, an the necessity of caesarean section (Gilbert et al. 1999; Micheli, Rivellini 2002), as well as maternal mortality, foetal and neonatal mortality, and long-term negative consequences for mothers and children (Alonzo 2002; Tarin et al. 1998).

In this study, we shall consider a specific late fertility implication: the risk of stillbirth. Specifically, our aim is to estimate the extent of the increase in the incidence of stillbirth with parental age (particularly after 40 years old), controlling for both biological and social variables. Stillbirth is defined as any baby born with no signs of life after 24 weeks of pregnancy. There are several causes of stillbirth, including: diabetes, maternal high blood pressure, problems with the placenta, premature rupture of the membranes surrounding the baby, etc. Many of them are associated with mother characteristics, and in particular with maternal age. While various empirical studies have considered the relationships between age of the mother and risk of stillbirths, those which considered the effect of paternal age are rare.

Recently Rychtarikova et al. (2004), analysing a Czech individual dataset for the period 1986-1990, found evidence of a paternal age impact on stillbirth, controlling for maternal age and some possible
confounders. They state that the effect of paternal age can be considered causal, since there is a plausible biological mechanism that can be proposed to explain that relationship, i.e. the genetic damage of spermatozoa with increasing age of the man.

Our aim is to replicate their analysis to another large and homogenous dataset to find more empirical evidence of the impact of paternal age on the risk of stillbirth. We are able to use additional controlling factors. Moreover we account for correlation within municipalities using the GEE (generalized estimating equations) approach for logistic regression models (Diggle, Liang, Zeger 1994).

2. Data

Our dataset is based on birth records from vital statistics registered in northern Italy. In particular, in this study we refer to all the births in Lombardy (the most populated Italian region and protagonist of the postponment process) in the years 1994, 1995, 1996. These are the last years with the old criteria of registration of the vital statistics. Subsequently the criteria have been changed reducing the information collected (Buratta et al. 2003).

The main information available for our study are as follows: vitality of the child at birth, relevant parental characteristics (such as: age at childbirth, education, place of residence, consanguinity) and pertinent information relating to the childbirth (such as: duration of gestation, birth weight, type of childbirth).

It is a large and homogenous database (more than 200,000 records), allowing for consistent estimated risks of negative outcome at advanced ages.

3. Variables and method

Our main aim is to study the association between the risk of stillbirth and maternal and paternal age. Therefore in our statistical model we use the binary variable that indicates the stillbirth versus alive birth outcome as response, and the parental age as explanatory variable. From the available information in our dataset we use as control factors: education of the mother and the father, consanguinity between parents, birth order, sex of the foetus, demographic size of the municipality.

Basically, we replicate for the Lombardy case the Rchtarikova et al. (2004) analysis adding as control factors consanguinity between parents and demographic size of the municipality. Moreover, we account for correlation within municipalities and unobserved heterogeneity at the municipality level by using the GEE approach for logistic regression models.

Rychtarikova et al. (2004) consider also prematurity as a control factor. But, as they admit, "a causal loop is, however, involved here, as foetal causes of death can lead to a premature delivery, in this case, preamturity will be a consequence and not a cause" (pg. 31). Moreover, they don't find any evidence of a relationship between paternal age and prematurity. Therefore we have decided to not use that variable.

4. Some first results

Our dataset consists of 214,591 live births and 774 stillbirths. We estimated two models. The first with the same covariates used by Rychtarikova et al. (2004), and the second with additional covariates (consanguineity and demographic size of the municipality) and the GEE approach to account for correlation within municipalities. At the moment we have the estimates we obtained from the first model.

Our results essentially confirm the findings obtained by Rychtarikova et al. (2004). Not only maternal age, but also paternal age has a significant impact on the risk of stillbirth, controlling for other important confounders. In particular the risk of stillbirth is 1.9 times higher for a woman aged 40 and more in comparison to a woman in her 20s. The risk of stillbirth is 1.37 times higher for a man aged 40 and more in comparison to a man in his 20s. The effects of the control variables are in the expected direction.

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