No socio-economic differences in MAR treatment success: Evidence from Careggi Hospital, Italy

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Introduction

Three phenomena are occurring simultaneously worldwide. Fertility has declined below replacement rate across all high-income countries (Goldstein, Sobotka, & Jasilioniene, 2009; Vignoli, Guetto, Bazzani, Pirani, & Minello, 2020; Zeman & Sobotka, 2020). Mothers are postponing their first birth at older ages (Beaujouan & Sobotka, 2022; Mills, Rindfuss, McDonald, & Te Velde, 2011; Tocchioni, Rybińska, Mynarska, Matysiak, & Vignoli, 2022). Additionally, an increasing number of individuals are resorting to medically assisted reproduction (MAR) to fulfill their fertility desires (De Geyter et al., 2018), with MAR already contributing to eight-to-nine percent of yearly live births in countries such as Spain and Denmark (Goisis et al., 2023).

Fertility postponement implies that when parents are ready to conceive, their fecundity may pose a serious challenge for their chance to conceive a child (Cito et al., 2019), affecting their fertility desires. In this scenario, MAR plays a pivotal role in both granting reproductive rights and fertility desires to parents, as well as in mitigating the consequences of fertility postponement and involuntary childlessness on fertility levels and ultimately on population structure (Lazzari, Potančoková, Sobotka, Gray, & Chambers, 2023).

The share of MAR births is not equally distributed across socio-economic strata. Studies show, for example, substantial socio-economic gradients in the proportion of MAR births across many high-income countries such as the United States, United Kingdom, Denmark, Finland, Spain, and France, with mothers from low-socioeconomic background systematically underrepresented (Goisis et al., 2023; Goisis, Håberg, Hanevik, Magnus, & Kravdal, 2020; Klemetti, Gissler, Sevón, & Hemminki, 2007; Wilcox & Mosher, 1993). However, most studies focus on the proportion of MAR births, leaving which possible factors may explain this phenomenon as an open empirical question. A possible mechanism is that mothers from low socio-economic backgrounds have a different rate of successful MAR

treatments due to, for example, pre-existing health conditions or economic barriers to comply with costly and time-consuming treatments.

In this article, we advance literature on socio-economic gradients in MAR births by studying whether there are socio-economic differences in MAR treatment probability of leading to a birth. We draw on novel center-based data on MAR treatments performed in Careggi Hospital, Florence, Tuscany, between 2016 and 2021, which comprise more than 4,500 treatments.

Data, variables, and Methods

Data on MAR treatments conducted at Careggi Hospital in Florence have been collected by medical personnel overseeing the MAR treatments and include socio-demographic, biometric, and treatment-related information pertaining to MAR treatment and their potential success. The unit of analysis in the dataset is the MAR treatment, and there are approximately 4,500 registered procedures conducted between 2016 and 2021. Treatments at Careggi Hospital can be accessed through the national healthcare system and receive substantial funding until the age of 43, after which the costs become more significant. For instance, an intrauterine insemination costs 100 euros until the age of 43, and the price increases to 475 euros thereafter.[1]

Our outcome is binary, and it assumes value 1 whether the treatment has led to a live birth. The main predictor is a socio-economic indicator of the patient (or potential mother), namely the self-reported occupational level recoded in ISCO-08 1 digit (Ganzeboom & Treiman, 1996). We further operationalize it by distinguishing between high-status occupations (ISCO 1 and 2) and medium/low status occupations (ISCO 3-7). In adjusted models, we include a large set of possible confounders such as: maternal age (continuous); number of treatments; whether the patient is attempting to conceive their first child; seven kind of treatment (i.e. intrauterine insemination, Intracytoplasmic Sperm Injection, Frozen embryo replacement...); whether treatment required third party semen; patient body mass index; region (or a category for foreign country in case of non-Italian patient) of origin; and year of the treatment.

[1] Source: /https://www.aou-careggi.toscana.it/internet/images/docs/file/Day%20Service%20e%20PACC/PMA%20omologa%20informativa.pdf and for heterologous: https://www.aou-careggi.toscana.it/internet/images/docs/file/Day%20Service%20e%20PACC/PMA%20eterologa%20informativa.pdf

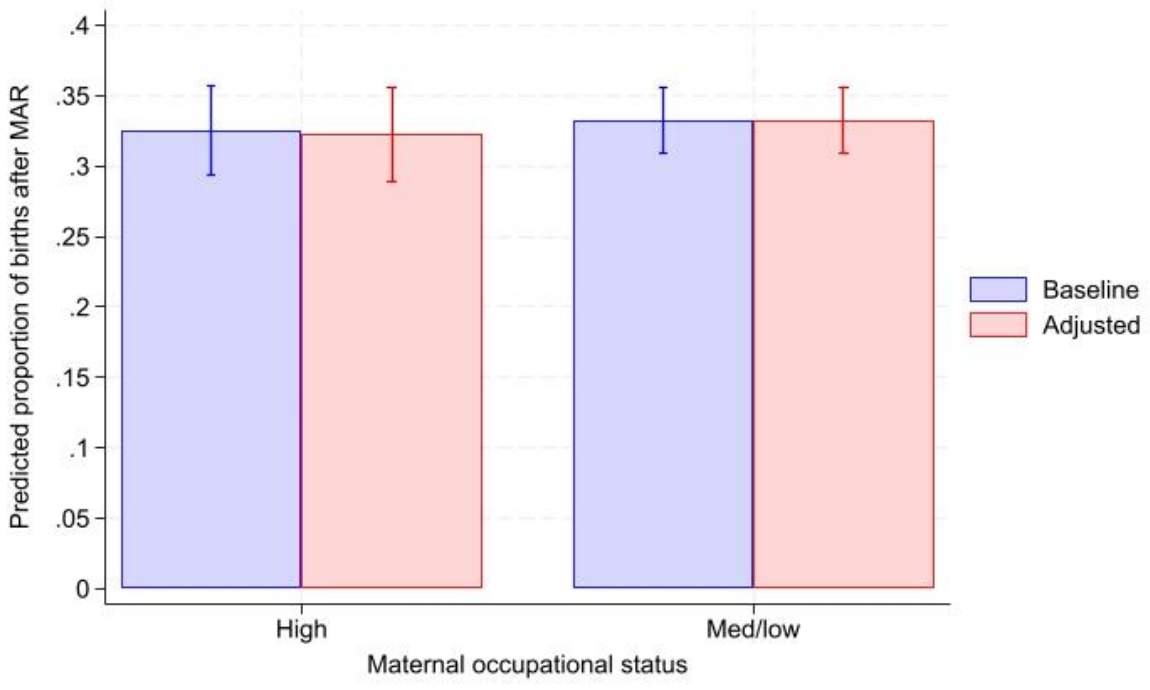
We estimate two sets of linear probability models (LPMs), with and without adjustments, and compute predicted probabilities. Baseline model only predicts the probability of delivering a child after MAR treatment as a function of socio-economic status. Adjusted model includes the set of covariates specified in the previous paragraph.

Preliminary results

Figure 1 below presents the predicted probabilities, represented as bars, along with their respective 95% confidence intervals, depicting the probability of successful childbirth following MAR treatment categorized by maternal occupational status. The blue bars represent predicted probabilities derived from the baseline model, while the red bars denote those from the adjusted model. Overall, we do not observe any difference in the probability of delivering a child after MAR treatment, both before and after adjustment for relevant confounders.

Future analyses will further explore the consistency of this finding across the large set of variables collected among patients.

Figure 1. Predicted probabilities of having a birth after MAR by maternal occupational status. Careggi Hospital, Florence, Italy, 2016-2021



Note: predicted probabilities for baseline models obtained from a simple LPM including only the socio-economic indicator. Adjusted predicted probabilities are obtained from LPM including controls for maternal age (metric), nr of treatments; whether the patient is attempting to conceive the first child; kind of treatment (i.e. intrauterine insemination,

Intracytoplasmic Sperm Injection, Frozen embryo replacement...); whether treatment required third party semen; patient body mass index, region (or country in case of non-Italian patient) of origin, and year of the treatment.

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