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Examining the Impact of Gender Division of Labor at Home on Women's Reproductive Behavior Using Agent-Based Simulation

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ABSTRACT

Introduction

Since the early 2000s, Iran's fertility has decreased to a level below replacement (Abbasi-Shavazi et al., 2009; Abbasi-Shavai & Esmeili, 2021: 7-12; Abbasi-Shavai & Esmeili, 2022: 257-260). The country's population growth rate has declined from a high of 3.9 percent during 1976-1986 to approximately 0.7 percent per year in recent years (Fathi, 2021: 7). total fertility rate (TFR) was approximately 7 offspring per woman in 1986. By 2006, it had fallen below the replacement level. Currently, the national TFR is 1.74 children per woman (Fathi, 2021; 7). Notably, Tehran province had a fertility rate below the replacement level four years prior to the national average. The current TFR is approximately 1.43 children per woman, which is lower than the national average (Fathi, 2021). Numerous studies have been conducted to address the issue of fertility reduction, emphasizing the gender division of labor at home as a significant factor influencing women's reproductive behavior (Razaghi-Nasrabad et al., 2021; 5-7; Khalajabadi-Farahani, 2016, 128-129; Dorahaki and Nobakht, 2020: 151-153). Therefore, the objective of the current investigation is to forecast the trajectory of the TFR in Tehran province through 2029 by employing an agent-based modeling tool. Furthermore, it will investigate two scenarios: one that investigates the impact of an increase in participation in the gender division of labor at home and another that concentrates on a decrease, with the aim of predicting their impact on women's fertility behavior.

Methodology

This article employs the innovative intelligent method of agent-based modeling (ABM) as a potent instrument. The feedback mechanisms between various factors can be effectively captured by this newly developed modeling style, which, in contrast to traditional mathematical models, also accommodates heterogeneous factors and non-linear relationships. Agent-based modeling enables the simultaneous testing of different policies, thereby facilitating policy analysis. This allows for the analysis of a variety of scenarios, social behaviors, and reactions with the assistance of scientific experts (Bijak et al., 2021). The most effective approach to account for the heterogeneity of women at the micro level is agent-based modeling, which yields more realistic results than those of previous studies. It can also be employed in analogous economic situations to establish a connection between the micro and macro levels for all members of society at the macro level (Billari et al., 2015: 10-15; Esmaeili & Abbasi-Shavazi, 2024: 107-110). ABM is an appropriate approach that can assist policymakers in achieving their goals by implementing effective and targeted policies. In ABM, it is possible to model fictitious communities in software form, and these models can be employed as a computational laboratory to analyze theories and policies. The accuracy, purposefulness, and satisfaction of policies are enhanced by the methodology of ABM, which involves the integration of the micro level perspective (Billari, 2015, 10-15; Bijak et al, 2021). In this style of modeling, based on the interactions between the agents at the micro level, a set of responses under the title of outputs and behavior is created, which is formed from the aggregation of these outputs at the macro level. This modeling pattern is referred to as micro-to-macro modeling or bottom-up modeling because it commences at the micro level and progresses to the macro level. As reported by (Esmaeili, 2023, 233-236; Esmaeili,2023,1 ؛ Fent et al, 2013, 29-30; Billari, 2015. 15; Bijak et al, 2021), the ABM

approach's significant property of establish a connection between the micro and macro levels has been addressed by other academics. The present research, which encompasses the development of the model and the analysis of the data, was conducted in a virtual laboratory. We will construct a more realistic model of the intricate low fertility system of Tehran province in this area, with a particular emphasis on gender equality and the variables that affect the gender division of labor at home, both in terms of increase and decrease. We will simulate circumstances that are associated with these variables using this model. Abbasi-Shavazi et al. (2019) cited a sub-sample from the 'Iran Fertility Transition Survey' (IFTS) for this study. The Abbasi-Shavazi et al. sample size for the current study is 784 married women, and the statistical population consists of all households in Tehran province.

Results

The simulation results suggest a substantial trend of declining fertility in Tehran province over the next ten years. In Tehran, it is anticipated that the total fertility rate (TFR) will decrease to 1.06 children by 2029. Furthermore, Any Logic software was employed to conduct simulations that investigated scenarios that involved modifications to the division of labor at home in relation to gender equality. The results of the agent-based simulations indicate that a 15% reduction in household labor division participation could further reduce the predicted TFR from 1.06 to 1.03 children in 2029. In contrast, the TFR is anticipated to increase from 1.06 to 1.09 children in the same year if there is a 15% increase in participation in the division of gendered labor at home.

Conclusion

It is imperative to emphasize that family-friendly initiatives should adopt cultural and social values that promote men's participation in household responsibilities in the section on suggestions based on the results. This approach is essential for the purpose of combating gender inequality, which is essential for the establishment of an environment that promotes increased fertility rates. A cultural support package that has been proposed is based on extensive research findings and entails the establishment of independent government institutions that are specifically dedicated to family support policies. The objective of this initiative is to resolve the conflict between the responsibilities of domestic and professional life that women face. For instance, the implementation of paternity leave for fathers during childbirth enables them to be present with their families during critical moments. Furthermore, the provision of on-site daycare facilities at workplaces that are both affordable and dependable can significantly alleviate the burden of working mothers. Mothers can concentrate on their professional obligations without the additional burden of locating suitable daycare for their children by guaranteeing that reliable childcare options are accessible. Additionally, the proposal incorporates the provision of government subsidies or additional compensation to working women in order to assist them in fulfilling domestic responsibilities. This initiative would allow women to more effectively balance their work and family responsibilities by enabling service personnel to assist with household duties at least once a month, providing essential support in managing home affairs.

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