

Fertility policy-making in Iran

Presenting a policy proposal by using social simulation and agent-based modeling approach

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As a main element of population growth, fertility is a subject which has been paid attention and many extensive researches have been performed for the purpose of recognizing effective factors on it. Thus, measurement and identification of fertility rate is one of the important and macro indices not only in the demographic predictions, which is the basis and infrastructure of economic, social and demographic planning for development, but also in evaluation of economic and social conditions of society.

Iran has experienced many considerable changes in fertility in the recent decades. The fertility was fixed and high up to the 1960s but placed in a transition threshold by beginning the family planning programs from the second half of the 1960s, and reduced a little up to the half of 1970s. Concurrent to the Islamic revolution, fertility rates increased but after a short period began to decrease from the early 1990s. The fertility reduction speed and its accessibility way to the replacement level and even lower in the second decade of Islamic revolution was so considerable and excellent that it was called Fertility Revolution. In addition, a kind of social convergence in reducing fertility was observed in different stratum of society, provinces and districts of country.

According to the limitations of methods used in the previous researches and importance of fertility in the Iranian future policy-making, this research tries to recognize and analyze the most important dynamic factors and elements of changes of fertility in Iran by the social simulation techniques by focusing on the agent-based modeling recently identified in demography as agent-based computational demography (ABCD) so that it serves the demographical policymakers as a strategy.

Agent-based models are the small scale models simulating the concurrent behavior and interactions of different factors in order to reproduce and predict the complicated phenomena. This process provides this possibility for the researchers to start with micro levels of system and finally achieve the analysis of macro levels. Simulation model needs to simulate a small statistical population similar to the real society. Therefore, we shall necessarily to have some data on all elements of society especially main variables of research in order to simulate real society in a small scale by inserting such data to a definite number of population. Thus, the most important work in the first step is collecting and finding correct data on specifications of society.

Since a comprehensive and high-accurate database on the Iranian population as well as all required specifications was unavailable, it was decided to use a collection of available data in

the mixed form. Detailed results of leisure time polling plan of statistical center of Iran (2009) were selected as main data, and the results of Iranian population and housing census of statistical center of Iran (1956-2011), results of detailed data of 2% of Iranian population and housing census of that center in the years 2006 and 2011, and expense and income data in year 2009 were used for its completion and also used as simulation database. The data included 46,321 people and profile of each person included some information such as gender, age, place of residence, age of the first pregnancy, number of children and the time of their childbirth, education, beliefs, economic condition (including living facilities, work, etc.), definiteness of spouse, children and parents of each person, etc., and the data was inserted to the software as the initial setup. The most important process was then the identification and compilation of agent-based simulation rules, as some rules were determined for critical living events of the person according to the demographic, economic, cultural and social issues of Iran, and its related four models were designed in agent-based simulator in NetLogo programming language software as the procedures of general model, and ran for a 30-year period of model. According to the results obtained, we ran the related scenarios therein and their results were obtained.

The results showed that the state population peak at the present time is 20-30 years old. Since the fertility ages included 15-49 years old, the birth rate will be high in country and the population growth rate will be more than zero as long as this peak is included in the fertility ages. In the years after 2030 when the population peak will be excluded from these ages, the birth rate will gradually decrease. Due to the inclusion of population peak to the mid-age, the mortality rate will be significantly increased and lead to fall the population growth rate under zero.

With regard to other effective factors on the fertility, it was observed that total marital fertility rate is higher than 3 and women under 35 years old higher than the replacement level. In fact, since the single women are regarded in the fertility rate, it decreases the fertility rate. On the other hand, because the non-marital fertility is not considered in legal structure of the country and also in public culture of Iranian people through which a little percentage of childbirth is made, it shows the link of fertility and marriage. According to the rising process of marriage age, it was visited that what decreases the fertility is reduction of possibility of women marriage rate. Hence, we concluded by executing the related scenarios in agent-based simulator that decrease of marriage rate is found as the most important factors effective on fertility.

The policymakers who assigned the purpose of population programs at increase of fertility to higher than 2 for prevention of population reduction in the country, have used many different programs for increasing the children of family, while this conclusion indicates that the target of population programs shall not be concentrated on the family children but on the increase of marriage possibility. By reducing the marriage age for 2.5 years within 10 years and, subsequently, the increase of marriage possibility, the fertility rate will be reached to the favorite purpose in order to decrease the concerns of the authorities.