

Federal State-Funded Educational Institution of Higher Education

**RUSSIAN PRESIDENTIAL ACADEMY OF NATIONAL ECONOMY AND
PUBLIC ADMINISTRATION**

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**LONG-TERM FERTILITY DYNAMICS
IN TROPICAL AFRICAN COUNTRIES:
PATTERNS, TRENDS, PERSPECTIVES**

Specialty 08.00.05 – Economics and national economy management
(economic of population and demography)

ABSTRACT

of the thesis presented for the degree of doctor of Economics

Moscow – 2020

Main results of Yu.V. Zinkina's dissertation “Long-term Fertility Dynamics in Tropical African Countries: Patterns, Trends, Perspectives”

Yu.V. Zinkina's thesis for the degree of doctor of Economics in the specialty 08.00.05 – Economics and management of the national economy: regional economy – is a comprehensive study of the problem of extremely rapid population growth and fertility dynamics in Tropical African countries.

The relevance of research. The past decade has brought signs of undeniable improvements in diverse areas of development in Tropical Africa. Rapid growth was observed in many sectors of the economy, including industrial production, banking and finance, ICT, trade, construction and infrastructure development, commercial agriculture, etc.

Significant achievements of recent years observed in various areas of socio-economic development of many African countries contributed to the spread of optimistic views on the prospects for further development of the region among decision-makers and the expert community.

As for the challenges to Africa's development, a significant part of the expert analytical work (most often carried out under the auspices of the African Development Bank, the World Bank and other similar structures) concentrates on short-term challenges, while long-term challenges (and attempts to forecast the development scenarios of the countries of the region in the long term, given these challenges) receive much less attention.

One of these long-term challenges is the continuing extremely rapid population growth, which results from the countries of Tropical Africa lagging behind in the demographic transition, especially its second phase, fertility transition from traditional to modern regime. This factor has received surprisingly little attention in most research studies as well as national programs and policies in the various development areas of African countries. Given the fact that in most countries, due to the accumulated demographic inertia, a doubling of the population in the next 30-40 years is inevitable in any development scenario, this omission can be critical, because such an explosive population growth will

undoubtedly affect all spheres of socio-economic development, as well as socio-political stability. At the same time, there exist a significant number of studies that examine in detail certain aspects of the demographic transition in individual African countries and in the region as a whole – however they generally give little attention to its impact on development prospects.

The fundamental work of Benno J. Ndulu and colleagues at the World Bank, named African Development Challenges (2007), shows that approximately two-thirds of the economic lag of African countries behind the rest of the developing world is due to the influence of demographic factors.

However, despite the gradually increasing recognition of the critical importance of demographic factors for the growth prospects, structural transformation and development of the region, there are still many lacunae in a systematic consideration of trends in fertility, mortality and population growth rates and their implications for ensuring sustainable economic growth and improving the living standards of the general population, as well as for various spheres of socio-economic development and socio-political stability in sub-Saharan Africa. All of the above indicates the high relevance of the issues that are the subject of the study.

The object of the research is the reproductive behavior of the population of Tropical Africa and its influence on the features of the socio-economic development of the region.

The subject of the research is the population of Tropical Africa.

The purpose of the study is to achieve a systemic understanding of the long-term dynamics of fertility rates by identifying their main determinants and their impact on the prospects for the socio-demographic development of the countries of Tropical Africa. The purpose of the study determines the formulation of the following key research **objectives**:

- establish the applicability of the theory of demographic transition to the demographic development of modern Tropical Africa;

- identify the main existing theories and models of fertility transition, applicable to the situation in modern Tropical Africa;
- form a list of the most significant for Tropical Africa determinants of fertility decline in the process of demographic transition based on the experience of developed and developing countries;
- identify social, economic, cultural practices and patterns of the traditional economic system and social relations which contribute to the "resistance" of Tropical Africa to the effect of fertility-decreasing factors;
- propose a systemic explanation of the African "pro-natalist" culture, based on testing the relationship between the factors of persistently high fertility with elements of the traditional economic system and social relations;
- establish the practical potential of certain fertility determinants' influence on the acceleration of the decline in fertility;
- form a list of recommendations for enhancing the action of significant determinants that accelerate the passage of the fertility transition;
- study the existing forecasts of the population of the countries of Tropical Africa and the methodology for their compilation; identify the differences between the methods used therein and the methodology of scenario forecasting of the demographic future;
- determine the list of countries with the greatest demographic risks subject to the procedure of scenario forecasting of the demographic future, as well as a set of scenarios;
- carry out modeling of sets of scenarios of the demographic future for the countries included in the list.

The methodological basis of the study is the theory of demographic transition founded and developed by Warren Thompson, Frank Notestein, Adolphe Landry, Kingsley Davis.

Correlation analysis and cross-tabulation method are used to identify social, economic, cultural practices and patterns of the traditional economic system and social relations that contributed to the "resistance" of Tropical Africa to the effects

of fertility decline factors, as well as to form a systemic explanation of African “pronatalist” culture. Binary and multiple linear regression methods are actively used.

An econometric microdata model is used to identify the strongest and most significant determinants of fertility and the desired number of children at the micro level using the example of the United Republic of Tanzania. The method of comparative analysis of statistical data and expert assessments is used.

Finally, for the countries with the highest risks of a “population explosion”, methods of scenario forecasting of the demographic future are applied.

The scientific novelty of the research is in results of scenario modeling of the demographic future of the countries of Tropical Africa with the highest accumulated demographic inertia. "Inertial" scenarios have been modeled, i.e. scenarios that calculate the dynamics of the total population and its age-sex structure given the current trends of fertility and mortality continued unchanged; the "Iranian" scenarios have also been calculated, i.e. scenarios that calculate the dynamics of the total population and its age-sex structure if fertility decline accelerates to the fastest rates known in the history of developing countries – those of Iran in the 1990s.

New is the systematic approach to the analysis of the phenomenon of African "pronatalism" and the proposed cognitive scheme that unites various elements of the traditional economic system, social norms and practices that regulate fertility issues, as well as cause-and-effect relationships between them. This scheme to a large extent underlies the “pro-natalist” culture of Tropical Africa and contributes to explain such a noticeable lag in fertility transition in the region.

The identification of the determinants of the total fertility rate and the desired number of children at the microdata level for the United Republic of Tanzania is also scientifically novel.

The details of the scientific novelty of the research are as follows.

1. It is shown that the theory of demographic transition is applicable to the demographic development of modern Tropical Africa, since this theory explains

the transition from one regime of demographic reproduction to another, which is currently taking place (albeit with its own specific characteristics) in Tropical Africa.

2. It has been established that among the main existing theories and models of fertility transition, the theory of diminishing need for children by Anatoly I. Antonov and Vladimir A. Borisov (in the aspect that a relatively slow decline in fertility is due to the persistence of a relatively high need for children), as well as John Cleland's diffusion theory: fertility is lower where new, modernized social norms spread faster – for example, in Southern African states (where new norms are advocated by South Africa) in comparison with the states of Tropical Africa, as well as in African societies with a higher level of enrollment in secondary education;

3. A list of the most significant determinants of fertility decline during the demographic transition has been established, including the following: infant (up to 1-year-old) and child (up to 5 years old) mortality, income level, education level (especially female), urbanization, participation of women in the market labor, the prevalence of modern birth control practices.

4. It has been revealed that the main social, economic, cultural practices and patterns of the traditional economic and social system which contribute to the "resistance" of Tropical Africa to the effects of fertility decline factors include hoe farming, active participation of women in the production of livelihoods, extended families, polygyny, taboo sexual intercourse after childbirth (and, as a result, long intervals between births).

5. A systemic explanation of the African "pro-natalist" culture is proposed, which is as follows: the beginning of modernization leads to an increase in the birth rate due to the reduction or disappearance of the taboo on postpartum sex; the potential for reducing fertility by increasing the intervals between births is low (since these intervals are extremely long in the traditional fertility regime in Tropical Africa); the potential to reduce fertility by increasing women's participation in the labor market is low (since in Tropical Africa, women's

employment is very high, although it is predominantly in the agricultural sector); the attitude towards an extremely large desired number of children is fixed in society, extended families are widespread.

6. It is shown that the factor most significantly influencing the fertility rate at the national level of African countries is the proportion of women with at least incomplete secondary education. The factor that most significantly affects the desired number of children at the national level is the proportion of women with at least incomplete primary education. The strongest and most significant determinants of the desired number of children at the micro level (on the example of the United Republic of Tanzania) include complete primary education, complete secondary education, residence in the capital (large city), education above upper secondary.

7. The list of recommendations for enhancing the action of significant determinants accelerating the passage of the fertility transition includes the following: introducing, along with universal primary education, universal secondary education and stimulating school-age girls (and their families) to continue their educational careers at least until the end of secondary school; activation of programs to inform and ensure accessibility for the population of modern methods of birth control; motivating young girls (especially middle and high school age) to postpone marriage in favor of completing schooling.

8. The existing forecasts of the population size of the countries of Tropical Africa and the methodology for their compilation are shown to be characterized by a number of methodological limitations that do not allow the use of these forecasts, in particular, to determine the differences in the projected population size and age-sex structure depending on one or another state policy in areas capable of influencing the trajectory of fertility decline.

9. The list of countries with the greatest risks due to accumulated demographic inertia includes most of the countries of East Africa (excluding Rwanda), as well as Nigeria and the Sahel countries.

10. It is shown from the difference between the “inertial” scenarios, which calculate the dynamics of the total population and its age-sex structure given the current trends of fertility and mortality continued unchanged, and the “Iranian” scenarios, which calculate the dynamics of the total population and its age-sex structure if fertility decline accelerates to the fastest rates known in the history of developing countries – those of Iran in the 1990s, that a significant increase in population in the next 30–35 years is inevitable for all analyzed countries (Mozambique, Niger, Nigeria, Tanzania, Uganda, Ethiopia) due to the colossal demographic inertia accumulated to date. All countries except Uganda are projected to grow to nearly double in 30 years; in Uganda, slightly smaller growth is projected due to the recent acceleration in declining fertility.

The results of the study are of **practical importance**, since they can subsequently be used to obtain answers to three paramount questions - 1) what "requirements" does the demographic situation put forward to the trajectories of development of the countries of Tropical Africa; 2) what trajectories of the demographic future are optimal in terms of development goals, achieving sustainable economic growth and improving the standard of living of broad population; 3) what specific steps and measures need to be taken to ensure demographic development along these optimal trajectories.

The thesis materials can be used in practical work by the Ministry of Foreign Affairs of the Russian Federation, the Ministry of Economic Development of the Russian Federation and other Ministries.

The structure of the thesis is determined by the goals and objectives of the research. It consists of an introduction, five chapters, a conclusion and a bibliography.

The Introduction substantiates the relevance of the chosen topic, its scientific novelty, sets the goals and objectives of the thesis.

Chapter 1 provides a general description of the demographic transition theory. A systematic review of the main existing theories and models of fertility transition is given: 1) an approach based on causation with the previous decline in

mortality; 2) economic and socio-economic approach, including the microeconomic theory of fertility by Gary S. Becker, John Caldwell's theory of intra-family intergenerational transfers, and Richard Easterlin's socio-economic model of “supply and demand for children”; and, finally, 3) the “ideational value” approach, which can subsume the diffusion theory of fertility decline with the spread of new ideas, knowledge and social norms by John Cleland, as well as the theory of weakening the need for children by Vladimir A. Borisov and Anatoly I. Antonov. It is the third group of theories that is of greatest interest in the context of the goals and objectives of this research.

In Chapter 2, the lag of Tropical Africa in fertility transition is interpreted in line with the ideas of Borisov and Antonov – to understand “pro-natalism” it is necessary to identify social, economic, cultural factors that contribute to maintaining a high need for children. In particular, of considerable interest to us are: the practice of tabooing sexual intercourse for a woman for a long time after the birth of a child and, thus, ensuring long intervals between births; polygyny; the prevalence of extended families and the system of social ties based on kinship; the level of participation of women in productive work.

These elements, as well as the causal relationships between them, can be combined into a cognitive scheme. The connections among them have been tested by us using the “Ethnographic Atlas of J. P. Murdoch”. The test results support both the general logic of our hypothesis and the presence of specific connections between its individual components. Traditional economic systems prevalent in sub-Saharan countries have a number of fundamental historical differences from those in other regions of the developing world (such as being based mostly on hoe agriculture and heavily relying on women doing the agricultural work). These differences have a strong influence on values, social norms and behaviors related to fertility and reproduction, maintaining the sustainability of the high fertility regime in the countries of Tropical Africa and causing greater “resistance” of African societies to a number of factors that significantly accelerated the transition of fertility in other regions. developing world.

It is noted that Tropical Africa not only entered the fertility transition later than other regions of the developing world for the reasons described above, but the fertility transition in many countries of the region has stalled since the mid-90s, and in some cases the decline in fertility has not resumed until now. The factors that potentially contributed to the end of the decline in fertility in developing countries are considered.

Chapter 3 identifies the potential of some of the main determinants of fertility decline, which have played a key role in fertility transitions in other developing countries and regions, to accelerate the rate of fertility decline in Tropical Africa (and in general, the potential for their influence on fertility in this region, given its specific characteristics). Cross-national multiple regression with the total fertility rate as the dependent variable identified the proportion of women with at least incomplete secondary education as the only significant factor. The application of the econometric model to the microdata of the Demographic and Health Surveys conducted in Tanzania confirms the results of a cross-national study - the factor that most strongly (by -1.14 children) reduces the desired number of children is that a woman has primary education (relative to the desired number of children in women having no education). An important factor is also living in the capital (or a large city), which reduces the desired number of children by 1.07 compared to living in rural areas.

Our results actually confirm the applicability of the group of “diffusion” demographic theories to Africa, where the role of primary education in reducing fertility turns out to be key, since it affects the values that form the sociocultural context, which, in turn, determines the desired number of children in the family. At the same time, a higher level of education (secondary education), in all likelihood, provides a woman with a greater opportunity for the practical realization of her desired number of children.

Chapter 3 further analyzes the most important direct and indirect determinants of fertility, which can act as modifiable control parameters – primary

and secondary female education, prevalence of contraception use, age at first marriage of girls.

Chapter 4 shows the significant increase in the 2013 UN projections for the Tropical African populations compared with the 2000 projections. Presented is a comparison of data from the Demographic and Health Surveys and estimates of the UN Population Division in terms of the total fertility rate. It has been revealed that for a number of countries, UN forecasts are based on the premise of a fertility decrease in recent years and the continuation of this trend in the future; the DHS data, however, record fertility stagnation (often at a very high level), or even its growth.

Section 1 of Chapter 5 describes two baseline scenarios of the demographic future calculated for each country: the inertial scenario, which makes it possible to forecast the population size and age structure if fertility decline continues at a constant current rate, and the optimistic scenario, assuming an immediate acceleration of the decline in fertility to the fastest rates of fertility transition in the developing world – those in Iran in the 1980s – 1990s, where fertility declined from a level comparable to many countries in Tropical Africa at the present time, to the level of simple reproduction (i.e., from 6 to about 2 children per woman) in 20 years. This scenario may seem unrealistic, but the experience of Rwanda in recent years shows that such an acceleration in the rate of decline in fertility in Tropical Africa is quite possible and achievable.

The purpose of calculating the forecasts of the population size of the countries of Tropical Africa under this scenario is not to estimate its probability, but to understand what increase in the population in general and individual age groups in particular is inevitable even with the maximum acceleration of the fertility transition – due to the force of the demographic inertia accumulated in recent years.

Section 2 of Chapter 5 presents the results of the author's forecast calculations of the size and age structure of the population of a number of countries in Tropical Africa (Mozambique, Niger, Nigeria, Tanzania, Uganda, Ethiopia)

according to the demographic scenarios described above. Some of the most important aspects of the influence of demographic factors in the medium and long term (until 2050) are considered.

In order to avoid the most serious threats to socio-economic development and socio-political stability, it is necessary to significantly accelerate the passage of the birth rate transition - however, even with the “Iranian” rate of its decline, population growth close to doubling, or even exceeding it, will be inevitable by 2050 in all countries considered, and this circumstance must be taken into account when planning and forecasting the development of the countries of Tropical Africa in the medium and long term.

For most of the countries of Tropical Africa, a significant increase (by 1.5 - 2 times) in the population in general and in individual age groups in particular is inevitable even with the maximum possible acceleration of the fertility transition - due to the accumulated demographic inertia in recent years; this factor is of paramount importance for all forecasts of the development of the countries of this region, and it must be taken into account in all national and international programs affecting certain aspects of the development of the countries of Tropical Africa. The school-age child count is extremely important in light of the achievement of Millennium Development Goal 2, which mandated that by 2015, children worldwide, boys and girls alike, have full primary schooling. Africa has not been able to achieve this goal by 2015, but remarkable progress has been made in recent years. A forecast of the further dynamics of the number of school-age children is necessary to calculate the growth of public spending on education (as the number of the age group of schoolchildren increases), the need for the construction of new schools and the number of places in them, etc. Our results show that the absence of an acceleration in fertility decline (development according to the “inertial scenario”) can bring the educational structure of African countries to the brink of disaster – it can hardly be considered a probable scenario that Nigeria in 30-35 years will be able to create a total of almost 90 million new school places. For the rest of the countries (except Uganda, where fertility has declined at a relatively fast

rate in recent years), the “inertial” scenario also implies at least a doubling of the school-age child population, which these countries will hardly be able to cope with - especially considering that not all African countries were able to even achieve Millennium Development Goal 2 – universal primary education enrollment. As time passes, the explosive growth of the school age population will not “dissipate” - it will turn into the explosive growth of the youth population, which is key factor for forecasting the risks of socio-political instability. Finally, let us consider the projected values of the dependency ratio, one of the key demographic indicators for the economy. The values of the dependency ratio comparable to those in the “Asian tigers” during their prime are only achievable in Africa if the “Iranian” scenario of fertility decline is realized - i.e. fertility reaches the level of simple reproduction in the next 20-25 years. Under the “inertial” scenario of demographic development, the dependency ratio remains extremely unfavorable for economic growth and development. Moreover, we emphasize that in this case, the main burden on the working-age will fall on the account of young dependents – a situation that is less favorable for countries than the demographic burden due to the elderly, who, as a rule, accumulate savings during their working life and can invest them, thus contributing to economic development.

Comparison of the inertial scenario with the optimistic one makes it possible to quantify how much demographic risks can be mitigated for socio-economic development and socio-political stability in the countries under consideration, if in the very near future large-scale effective measures are applied to accelerate the decline in the birth rate, and to prioritize this task for the level of national government planning and international development assistance priorities.

In the Conclusion, the main conclusions of the dissertation are formulated.

Approbation of research results. The main provisions of the thesis were tested at international and Russian conferences, in particular, at such scientific events as the Notestein Seminar at the Office of Population Research, Princeton University (May 9, 2017), Seminar of the United Nations Population Division (New York, USA), February 20, 2013; the annual conferences of the African

Econometric Society in Cairo (Egypt) 7-9 July 2010, Nairobi (Kenya), 12-15 July 2011, Kampala (Uganda) 25-28 July 2012, Accra (Ghana) 24-26 July 2013; 40th (2011), 42nd (2013) and 44th (2015) International Conferences of the Society for Cross-Cultural Research (USA); 1st and 2nd International Conferences on Political Demography and Macrosociological Dynamics (Moscow, RANEP, 2013 and 2014); International seminars on demographic problems of the Institute for Demographic Research of Nairobi University (Nairobi, Kenya, July 18, 2011, July 23, 2012), XII, XIII, XIV Conferences of the Association "History and Computer" (Moscow, Lomonosov Moscow State University, October 22-24, 2010; September 21-23, 2012; October 3-5, 2014); XII Conference of Africanists "Africa in the context of a changing paradigm of world development" (Moscow, Institute for African Studies, Russian Academy of Sciences, May 24-26, 2011); International Conference "Socio-economic and technological innovation in a globalizing world" (Delhi, India, National Institute of Science, Technology and Development Studies, November 2-5, 2011); XIV April International Scientific Conference on the Problems of Economic and Social Development (Moscow, HSE, April 2-5, 2013); International conference "Cliodynamics: Mathematical Modeling of Historical and Socio-Economic Processes" (Vladivostok, Far Eastern Federal University, May 20-22, 2013); International Conference of the Consortium of Global Studies (Moscow, Lomonosov Moscow State University, June 20-23, 2013); Seventh International Scientific Conference "Cliodynamics: Complex System Analysis and Mathematical Modeling of Global, Regional and Country Dynamics" (Moscow, HSE, June 9-11, 2014), etc.

Publications. The main results of the thesis, including the results of applying the methodology of scenario forecasting of the demographic future, have been presented in 33 published works, of which 18 papers have been published in scientific journals included in the list of peer-reviewed publications recommended by the Higher Attestation Commission of the Ministry of Science and Higher Education of the Russian Federation, 10 articles - in journals included in the Scopus and Web of Science databases.

The dissertation consists of an introduction, four chapters, a conclusion and a bibliography (431 source).