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STUDIES

FERTILITY AND CHILDBEARING PLANS IN UKRAINE: WAR AND POST-WARTIME EXPECTATIONS

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The paper investigates fertility and childbearing plans in Ukraine, contributing to knowledge on reproductive behaviour during wartime. Ukraine experienced a fertility increase from 2002 to 2012, followed by a steady decline after 2014 that accelerated dramatically with the 2022 Russian full-scale invasion. The ongoing war and resulting data fragmentation present significant challenges for the fertility study. The data from the wartime survey show a widespread postponement of parenthood, often indefinitely or at least until the war's end. We analyse survey data using logit and multinomial regression models to understand the socio-demographic determinants of childbearing intentions in this volatile context. Our regression analyses identified age, sex, current parental status, employment, and education as key predictors. Specifically, the models reveal that being younger, male, employed, and having a tertiary education are associated with a higher likelihood of intention to have a child. A crucial finding from the multinomial logit model is the substantial decline in the likelihood of planning children (both in the near and distant future) among those who already have children relative to childless respondents. Considering these results alongside Ukraine's pre-existing low fertility, a significant compensatory boom after the war appears unlikely. The findings underscore the war's profound and potentially lasting impact on Ukraine's demographic future.

***Keywords**: Ukraine; Fertility; War; Childbearing intentions and plans; Logit model; Multinomial regression model.*

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INTRODUCTION

Fertility determines every country's future demographic potential. War-induced changes in childbearing behaviour and fertility have long-lasting effects, which are felt even when the war is in the distant past. Therefore, the study of the impact of wars on fertility evokes increasing research interest.

Throughout history, there were numerous examples of a significant decline in fertility rates during wars and their subsequent increase after the wars' end. The practice of postponing childbirth during periods of upheaval (such as war, epidemics, socio-economic recessions, or natural disasters) is quite widespread. When the negative factor subsides, these previously postponed births are typically realized, creating what is known as a compensatory effect. This effect is often associated with the phenomenon of the "baby boom", which happened, for example, in particular countries following the end of World War II (1939–1945) (Van Bavel 2013).

However, historical evidence suggests that compensatory growth of fertility varies significantly across countries and circumstances regarding scale, duration, and timing. For instance, demographers Van Bavel and Reher found that the baby boom was most pronounced in non-European developed countries, noticeable in some European countries, and relatively weak in others (2013). Unfortunately, none of these historical examples can serve as a basis for estimating the future compensatory effect in Ukraine.

Even now, certain factors that will likely modify the "established" patterns of fertility changes observed in past experiences can be identified. Against the backdrop of the large-scale and brutal Russian aggression, there is a substantial likelihood that families will reassess their reproductive plans − not only in terms of postponing births in anticipation of a return to normalcy but also in considering the complete abandonment of having children (or additional children).

So, in light of the ongoing Russian military aggression against Ukraine, studying changes in fertility and reproductive behaviour, particularly reproductive plans of the Ukrainian population, is highly relevant. Such research not only aids in predicting fertility trends in Ukraine in a post-war perspective but also provides insights into the general impact of military conflicts on reproductive behaviour.

Our study provides an overview of fertility in Ukraine and aims to examine reproductive intentions in the country during the full-scale war, identifying the key socio-demographic factors that shape childbearing plans.

THEORETICAL FRAMEWORK AND ANALYTICAL DEVELOPMENTS

The study of the impact of wars and social upheavals on reproductive behaviour and fertility is a specific and rather underdeveloped area of

sociodemographic research. The main scientific developments in this research field are covered by the following strands of literature:

1) studies that are focused on changes in the reproductive potential of the population, mainly on the health consequences of wars and other shocks, particularly on the reproductive health of the civilian population of countries involved in the war and the military;

2) studies that are aimed at clarifying changes in reproductive behaviour, including plans, intentions, and ideas about the ideal and desired number of children in the family;

3) studies that analyse the changes that occur under the influence of war on fertility: its dynamics, trends, and characteristics (as a rule, in comparison with the pre-war period).

The first group covers studies mainly in a medical context, but along with physiological aspects, considerable attention is paid to psychological trauma. Medical support and other services are also influenced by war. Bolouki and Zal examined "183 articles published from 1960 to 2018 and related to the effects of war on male and female fertility" (2020, 16). They concluded that "exposure to war can increase the risk of male infertility", and "induce female infertility during and/or after the war" (ibid., 20). However, among the analysed articles, there were no studies that included consideration of such severe reproductive disorders (associated with women's health) as miscarriages, ectopic pregnancies, spontaneous abortions, and others. The issue of war-related sex structure deformation was not investigated, either.

Another analytical review of the literature on the impact of war on fertility was provided by Abu-Musa *et al*. (2008). The analysis showed a clearer impact on female fertility and conflicting evidence for males. The studies of "male US and Danish 1990–1991 Gulf war veterans showed no evidence of reduced fertility," but at the same time, "studies of UK and Australian veterans reported increased risk of infertility" (2008, 43).

Colombian scientists (Ramos Jaraba *et al.* 2020) studied maternal and child health in conflict and post-conflict situations. According to the results, maternal mortality and childbearing in adolescents aged 15 to 19 were statistically higher in municipalities with higher levels of conflict intensity as opposed to municipalities with lower levels.

Further, there has been a moderate increase in maternal mortality rates in countries affected by military conflicts (Urdal and Che 2013). The stressful situation also leads to an increase in premature births.

The war also affects reproductive health via the increase of gender-based violence (Omarjee and Lau 2006).

Studies of the second-mentioned group of available empirical literature are devoted to changes in reproductive behaviour caused by social shocks. Wars can directly or indirectly change individuals' reproductive decisions. Their

consequences also influence through structural factors, for instance, the death of one of the spouses becomes an insurmountable obstacle on the way to the realization of childbearing family plans.

The impact of war conflict on reproductive behaviour relates to the personal sphere but "at the same time has significant long-term implications for development in post-conflict settings" (Bove *et al.* 2022). Vandenbroucke constructed a fertility model according to which a household consisting of individuals in their reproductive ages faced during World War I (1914–1918) at least three possible shocks: an increased risk of women remaining alone after the war, a loss of income due to the mobilization of men, and a reduction in labour productivity (2013). The findings of this study can help to find an answer to the question about the possibility of the compensation effect to restore the loss of fertility in the post-war period. The experience of France shows that though some generations postponed births, "they did not fully compensate the forgone births of the war" (Vandenbroucke 2012).

Delaying birth is often associated with education and career (Sobotka 2004), but the outcomes in these cases can be critically distinct from the consequences of postponement directly through war.

The changes in reproductive behaviour can also be seen as a means to enable generational survival and as a response to child mortality (Guha-Sapir and D'Aoust 2011). In such cases, war conflicts can even boost fertility. One way is proactively replacing real or potential loss: people might want to have children to replace an already lost child (Svallfors 2022). Along with the replacement theory, Rodgers, St. John and Coleman proposed terror management theory, justifying that life-threatening trauma leads to traditional behaviour. Hence, having children is a clear traditional response to such trauma (2005).

Rotondi and Rocca also found that terrorism/war can increase fertility and interpret this as an insurance (or hoarding) effect: parents decide to have more children to insure against future shocks (2022). Usually, such insurance takes place even before the onset of an extreme situation in areas with an increased risk of natural disasters or conflicts (Jocelyn 2009). But despite all the theories, there is always the question: to what extent does war affect the ability to make free reproductive choice?

It is worth noting that conflicts and territorial changes cause deteriorating quality of population data or gaps in the data in the countries that have experienced such conflicts. Because of this, some cross-national comparative studies become incredibly complicated or impossible (Sobotka and Berghammer 2021).

A large body of literature (the third of the mentioned groups) considers the impact of armed conflict on general fertility trends and demographic changes. The long-term consequences were reflected in the deficit of births during World War I, which mechanically led to another deficit 25 years later because of a reduction in the size of the reproductive population (Vandenbroucke 2012). The long wave-like

fluctuations of the birth rates, caused by its decline during the Second World War, followed by fertility increase in the late 1940s and early 1950s, are also manifested in Ukraine (Population of Ukraine 2008).

However, the study of long-term conflict effects, using data from Demographic and Health Surveys (DHS) conducted between 1990 and 2017, gave different results: women aged 40–49 who were exposed to the armed conflict influence before age 11 "had a total of 0.255 more children than women of the same age who were not exposed to conflict early in life" (Madsen and Finlay 2019, 3).

In low-income countries, wars have most likely slowed down long-term fertility transformation, and the birth rate remains at a high level. High infant mortality, social insecurity, poorly developed family planning, lack of maternal and child health services, restricted access to contraceptives, lower female education level, and early start of childbearing are observed widely (Urdal and Che 2013; Agadjanian and Prata 2002). As a rule, during war, several negative factors combine to exacerbate the consequences for fertility (Staveteig 2011).

The war effect can take various, sometimes unexpected, forms. Thus, a comprehensive comparative study, "How the War Changed Me and the Country. Summary of the Year", has shown that the level of tolerance for being childfree in Ukrainian society increased during the full-scale war: the positive-neutral attitude "towards people who do not want to have children has increased from 57% to 67%" (Rating group 2023).

Some studies suggest that the effects of war are comparable to those of an economic crisis (Krimer 2015). This analogy is particularly relevant when considering that in European countries most affected by the recession, birth rates significantly declined, especially among women of young reproductive age (Goldstein *et al.* 2013).

As a rule, fertility drops during the shock period and rebounds or even increases afterwards (Van Bavel and Reher 2013). But how justified are the expectations of a compensatory effect (and, accordingly, an increase in the birth rate) in Ukraine after the war?

The study of childbearing preference of the population of childbearing ages in 2009 (that is, in a relatively prosperous period in Ukraine) revealed that almost 55% of respondents would like to give birth to two children and every fifth indicated that even if they had all the necessary conditions, they would prefer to have only one child (Family and Family Relations 2009). Another sociological survey in 2017 confirmed that "a family with two children remains the most desirable option" (FES 2017, 103).

Perelli-Harris, Gerber and Hilevych conducted 16 online focus groups on childbearing and found patterns whereby experiences of displacement, armed conflict, and economic hardship combined to intensify uncertainty "that discouraged couples from having more than one child" (2024, 27). But the study

was conducted on "the eve of Russia's full scale invasion" and it is logical to assume change in childbearing plans from February 24, 2022.

In sociological surveys during full-scale war in Ukraine, questions on reproductive preferences are practically not raised. The survey of the sociological group of The Razumkov Centre in 2023 was an exception. Thus, we got the opportunity to examine the childbearing intentions of individuals of reproductive age for the wartime and post-war periods in Ukraine and identify some socio-demographic factors influencing these plans.

FERTILITY IN UKRAINE

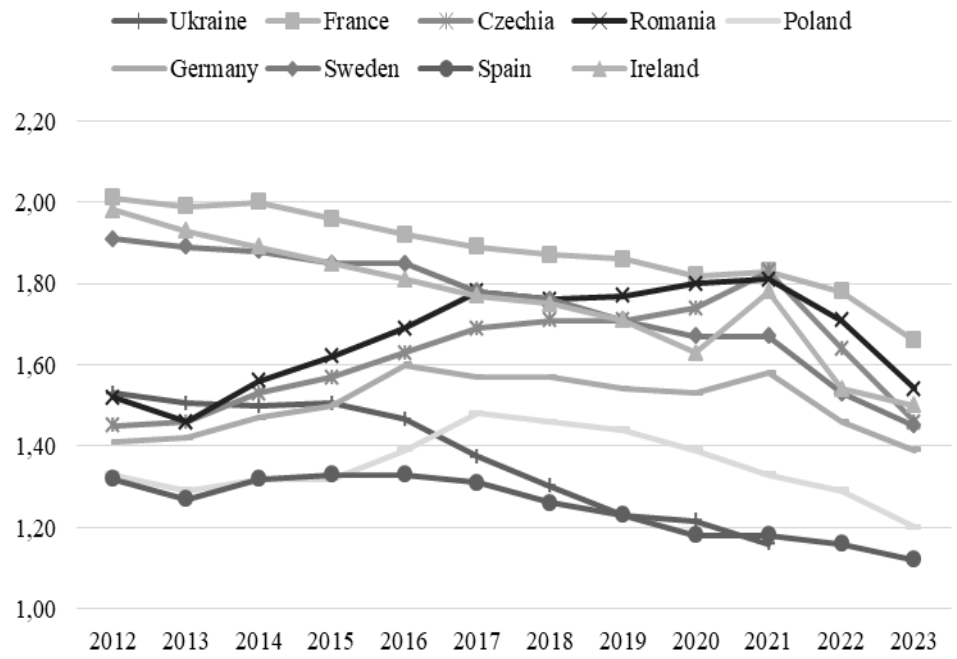
Throughout independence, Ukraine was characterized by a low and lowest-low (Billari *et al*. 2002) fertility level. Three periods of fertility changes can be outlined in Ukraine (The Population of Ukraine 2023). In 1991–2001, there was a sharp drop in births associated with a large-scale decline in the population's quality of life caused by the unfolding transformation crisis. During this period, the decline in the birth rate in Ukraine has significantly exceeded similar changes in European countries. As a result, the total fertility rate decreased by 1.6 times and in 2001 was 1.09 live births per woman (The Population of Ukraine 2008).

The improvement of the socioeconomic situation in Ukraine contributed to a change in the fertility trend towards growth, and by 2012 total fertility rate reached 1.53 (The Population of Ukraine 2023). This trend was also reinforced by significant government support for families with children: in 2005 in Ukraine the birth grant was increased to one of the largest among European countries (Krimer 2013). In subsequent years, notable emphasis was placed on the birth grant as a key support for families with children. The birth grant was further increased between 2008 and 2011, with amounts differentiated by birth order and the duration of payments. Despite the fertility growth between 2002 and 2012, the increase in births was insufficient to compensate for the losses of the previous decade.

Starting from 2013, the total fertility rate in Ukraine has been declining, initially slowly, then with acceleration in the rate, especially during Covid-19. Of course, the "initial pandemic shock was associated with a fall in births in most countries" (Sobotka *et al.* 2024 23), but already in 2021 European countries reported a stable or slightly increasing number of births excluding Great Britain, Poland, Lithuania, and Ukraine (Aksyonova 2024). In 2021 (before the full-scale Russian invasion), Ukraine's total fertility rate (1.16 live births per woman) was one of the lowest in Europe (*Figure 1*).

Figure 1

Total fertility rate, 2012–2023, European countries, live births per woman



Source: Eurostat database for all countries except Ukraine, for Ukraine - the State Statistics Service of Ukraine.

The fertility indicator provided by the 2024 Revision of World Population Prospects was 0.99 for Ukraine, and only four countries – China, the Republic of Korea, Singapore and Ukraine – were below 1 (United Nations 2025). But it is an estimation of a medium scenario. In reality, we don't have enough reliable data for an accurate calculation of total fertility rate in Ukraine.

The transformation of the age-specific fertility profile in Ukraine has been characterized by an increasing contribution of women in the middle and older reproductive age to total fertility, compared to young women, thereby raising the mean age of women at childbirth (Demographic Trends 2020, 32). In Ukraine, the practice of postponing childbirth among younger women has been spreading since the mid-1990s, and the mean age of motherhood in our country demonstrates a tendency to converge with European countries. Nevertheless, the difference remains significant (Kurylo 2019). In Ukraine in 2019 the mean age of women at

childbirth was 27.9 years, while in countries like Italy, Switzerland, Spain and Ireland, this indicator exceeded 32 years.

In Ukraine, the share of births outside of marriage increased during the first two decades of independence and in 2021 was 20.5%.

During 2002–2013, the share of first-order live births gradually decreased (The Population of Ukraine 2023). In 2020, the State Statistics Service of Ukraine stopped collecting information by birth order. Nevertheless, the statistical information of the Public Health Centre of the Ministry of Health of Ukraine provides the opportunity to analyse changes in the share of first deliveries: in 2023, their share was 41.6%, whereas in the pre-COVID period, in 2019, 44.7%, and in 2012, almost 47.0% (2024). To some extent, this may indicate a continuation of the previous trend. However, it should be noted that the statistical information of the Public Health Centre covers only medical institutions and is provided for the territory controlled by Ukraine.

Before the full-scale war, the State Statistics Service of Ukraine provided fertility data. Still, now this information is not published because of martial law (in line with the Law of Ukraine "On the Protection of the Interests of Subjects of Submission of Reports and Other Documents During the Period of Martial Law or State of War" (Verkhovna Rada 2022). During the war period, the relevant provider of some birth data in Ukraine is the Ministry of Justice of Ukraine (Department of State Registration), which publishes information on the number of issued birth certificates According to the Ministry of Justice of Ukraine, 206,032 children were born in the controlled territory in 2022, 187,387 in 2023 and 176,679 in 2024 (2025).

Millions of Ukrainians were forced to leave the country because of the war. According to the UN Population Fund (UNFPA), at the start of the full-scale war, "there were around 265,000 pregnant women in Ukraine, some 80,000 of whom are expected to deliver over the coming three months" (2022, 1). A significant proportion of pregnant women went abroad and gave birth outside of Ukraine, and we currently do not have accurate information on the number of such cases. The number of births in the occupied territories of Ukraine is also unknown, but not all pregnant women were able to leave the captured settlements quickly. According to data from the United Nations High Commissioner for Refugees (UNHCR), as of April 2025 almost 7 million Ukrainian refugees live abroad (2025). Large-scale emigration became a significant factor in the decline in the number of births in Ukraine.

It is worth noting that comparing data on births for the years 2021–2022–2023 is a rather forced step because we have different coverage of the territories (because part of the country's territory is occupied) and different numbers of the population, its sex and age structure (mainly due to mass migration). We also observe different distributions of the population within the territories controlled by Ukraine and changes are not stopping (Demographic Trends 2020). They will

likely be unstoppable as long as the war continues. In Ukraine, the surveys of internally displaced persons are regularly conducted to determine their living conditions in a new location, current needs, and the assistance received (IOM 2025), but none of these surveys reflect their reproductive preferences or questions about children born and pregnancies at the new place of (temporary) residence.

As a rule, during economic crises or other external shock periods, people tend to postpone having a child or revise their childbearing plans in uncertain times (Sobotka *et al.* 2024). This reproductive behaviour largely explains the significant decrease in the number of births during periods of full-scale war. It is becoming increasingly clear that "the experience of armed conflict and displacement in Ukraine led to existential uncertainty unlike any other low-fertility country in the world" (Perelli-Harris *et al*. 2024). The uncertainty factor may increase the desire to postpone having a child. Still, prolonged delay may increase the risk of staying childless (Beaujouan 2023), incomplete realization of childbearing plans, and decrease the cumulative cohort birth rate (Sobotka *et al.* 2011; Aksyonova and Kurylo 2018).

The separation of families and couples caused by both the departure of women with children abroad and long stays away from home of service members and volunteers also does not promote fertility.

The childbearing plans may change due to the worsening economic situation and prospects for individuals, families, and the country. Living conditions under full-scale invasion (new environment in cases of resettlement within Ukraine, temporary housing due to the destruction of houses, loss of work or change of workplace, disruption of the daily routine due to frequent air strikes and curfews, difficulties or even impossibility to use services, etc.) could have a negative impact. The socioeconomic challenges and problems within the healthcare system have also been exacerbated by the war. Issues concerning reproductive health services, pediatric care, or access to family planning can also influence reproductive planning and behaviour (Guha-Sapir and D'Aoust 2011).

DATA AND METHODS

In the study, we use the results of the survey conducted by the sociological group of The Razumkov Centre in September – October 2023. At the moment, this is the only survey that includes questions about reproductive intentions and plans of people in Ukraine during wartime. To some extent, the survey sheds light on changes in fertility in our country's post-war period.

It was conducted using stratified multistage sampling with random selection at the first stages of sample formation and the quota method of respondent selection at the final stage (when respondents were selected according to sex-age quotas). The face-to-face interviews were conducted only in those territories controlled by the Ukrainian government and where there were no hostilities. The

structure of the sample population reproduces the demographic structure of the adult population of the territories where the survey was conducted as of the beginning of 2022 (by age, sex, and type of settlement). A total of 2,019 respondents aged 18 and over were interviewed. The sampling error does not exceed 2.3%. At the same time, additional systematic deviations of the sample may be caused by the consequences of Russian aggression, particularly the forced evacuation of millions of citizens (Libanova 2023). Reproductive plans concern people of reproductive age, so in our study, we limited the respondents to the reproductive age group (1 103 people under 50).

To examine reproductive plans, answers to the survey questions regarding having children, the number of children, and planned children were analysed. The survey participants were asked if they planned to have children/or additional children and when they intended to do so.

The answers to these questions were analysed using quantitative data analysis techniques (statistical methods of association analysis and econometric modelling). Observations with the responses "cannot answer" or "prefer not to answer" were removed from the final dataset used for the estimation of the econometric model.

In our study we use the Logit model, a binary response model, allowing an estimation of the partial effect of any explanatory variable on the binary dependent variable (Wooldridge 2012).

Regarding the specification of the Logit model, in general, this model can be described as:

$$P(y = 1|x) = \Phi(z) = \Phi\left(\beta_0 + \beta_1 x_1 + \cdots + \beta_\kappa x_k\right) = \Phi\left(\beta_0 + \boldsymbol{x\beta}\right) \quad (1)$$

where $0 < \Phi(z) < 1$ and $\boldsymbol{x\beta} = \beta_1 x_1 + \cdots + \beta_\kappa x_k$

The probability that y=1 (conditional on the X_κ) is described by the logistic function Φ(z):

$$\Phi(z) = \frac{e^z}{1 + e^z} \quad (2)$$

In the Logit model:

$$P(y = 1|x) = \Phi(x\beta) \quad (3)$$

where:

$\Phi(\cdot)$ – is the logistic function,

y – binary response variable, *planning/intending to have children* or *not*

x – explanatory variables: *sex; age; level of education; employment status; financial situation.*

We also use the multinomial regression model, which is designed to analyse the determinants of outcome variables with more than two unordered categories (Greene 2018).

Regarding the specification of the multinomial regression model, in general, the multinomial logit model estimates the probability that individual *i* chooses category *j* as:

$$\mathrm{P}(Y_I = j|X_i) = \frac{exp\ (X_i \cdot \beta_j\ )}{\sum_{k=1}^{j} exp\ (X_i \cdot \beta_k\ )} \quad (4)$$

To ensure model identification, one outcome (typically the first or last) is set as the *reference category,* and its coefficients are normalized to zero:

$$\beta_{ref} = 0 \quad (5)$$

Thus, for all j≠ref the model becomes:

$$\mathrm{P}(Y_I = j|X_i) = \frac{exp\ (X_i \cdot \beta_j\ )}{1 + \sum_{k \neq ref} exp\ (X_i \cdot \beta_k)} \quad (6)$$

Our multinomial logit model estimates the relative log-odds of intending to have children/additional children in the near or uncertain future compared to no such intention. The following explanatory variables were included in the model: age and sex of the respondent, financial situation, employment status, presence of children, and education level.

In the multinomial model, the dependent variable reflects three categories of respondents: no intention to have children (as the reference category); intend to have children in the nearest years, regardless of when the war ends; intention to have children, but not sure when (after the war and unknown when exactly). In this model, along with the abovementioned explanatory variables, a factor of already having children was incorporated.

The presence of children, sex, employment status (having a job or not), and education (having a tertiary education or not), are binary variables. For the employment status, the base group is “not having a job”, which includes those who are “not employed, but looking for a job” plus “not employed and not looking for a job”. Age is a continuous variable in our model, measured in years.

Concerning the characteristic of the financial situation, it was introduced in the model as a categorical variable. Taking into account the specifics of living standards in Ukraine during wartime, the financial situation by self-estimation was defined as: a hard situation (including those who "don't have enough money even for basic food") as the base group; sufficient (including those, who "can afford food and essential inexpensive items "plus those, who "can generally afford our living expenses, but buying durable goods is difficult") and good (includes those,

who "live comfortably, but we are still unable to make some purchases" plus those who "can afford to buy almost everything we want").

In constructing these variables for the econometric models, we relied on the results of preliminary data analysis, which was based on the formulation of the corresponding questions and responses in the survey questionnaire.

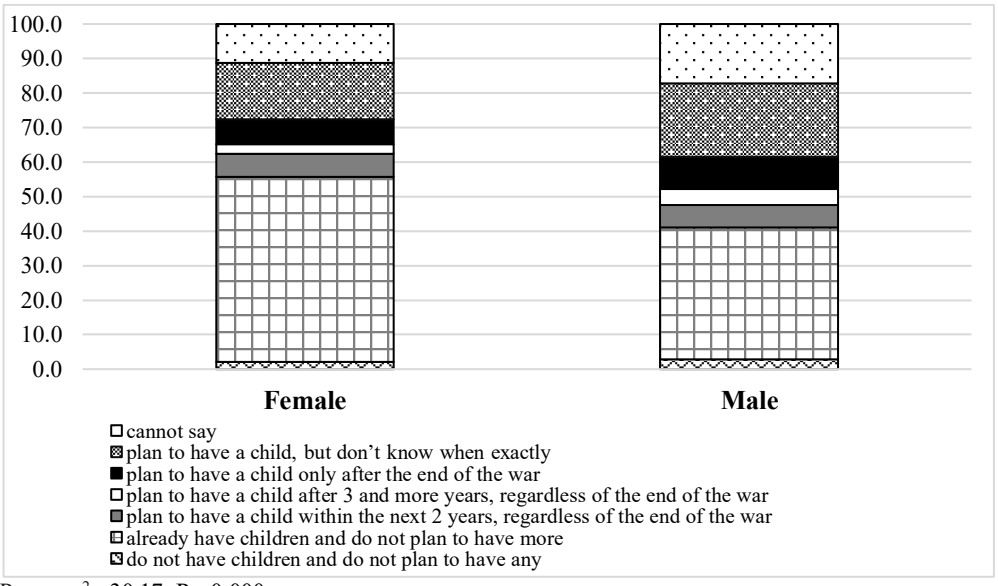
PRELIMINARY DATA ANALYSIS

In the first stage of our analysis, we looked at the association between reproductive plans and different characteristics of respondents – sex, age, having children, education level, material well-being, and employment status, number of children – and analysed corresponding distributions and association between variables of interest (*Figure 2–7*).

To start with sex, a highly statistically significant association of it with reproductive plans was found (*Figure 2*). Women respondents, compared to men, more often already have children. Among the male respondents, there is a higher proportion of those who are inclined to have children in the future, but they mostly do not know when exactly they plan to have a child/children, or they plan to have children after the end of the war. Among men, there is also a higher share of those who are undecided about their reproductive plans (the answer “cannot say”).

Figure 2

Distribution of female and male respondents by their reproductive plans, in percentage

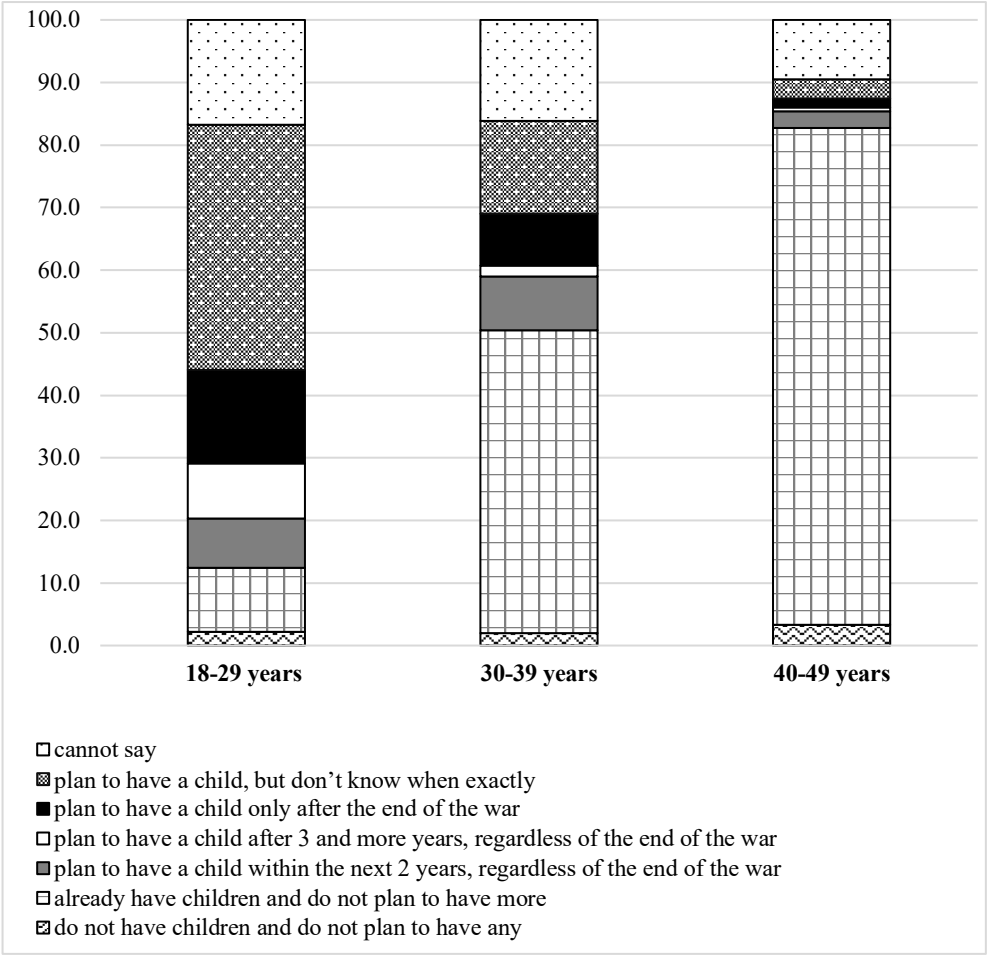


Person χ^2 =30.17; Pr=0.000.

Regarding age, the association between reproductive plans and defined age groups is also statistically significant (*Figure 3*). As respondents age, the share of those who have children increases, and the share of those undecided about their reproductive plans decreases. In older age groups, the share of respondents who postpone the birth of a child for an indefinite period also decreases.

Figure 3

Distribution of respondents of different age groups by their reproductive plans, in percentage



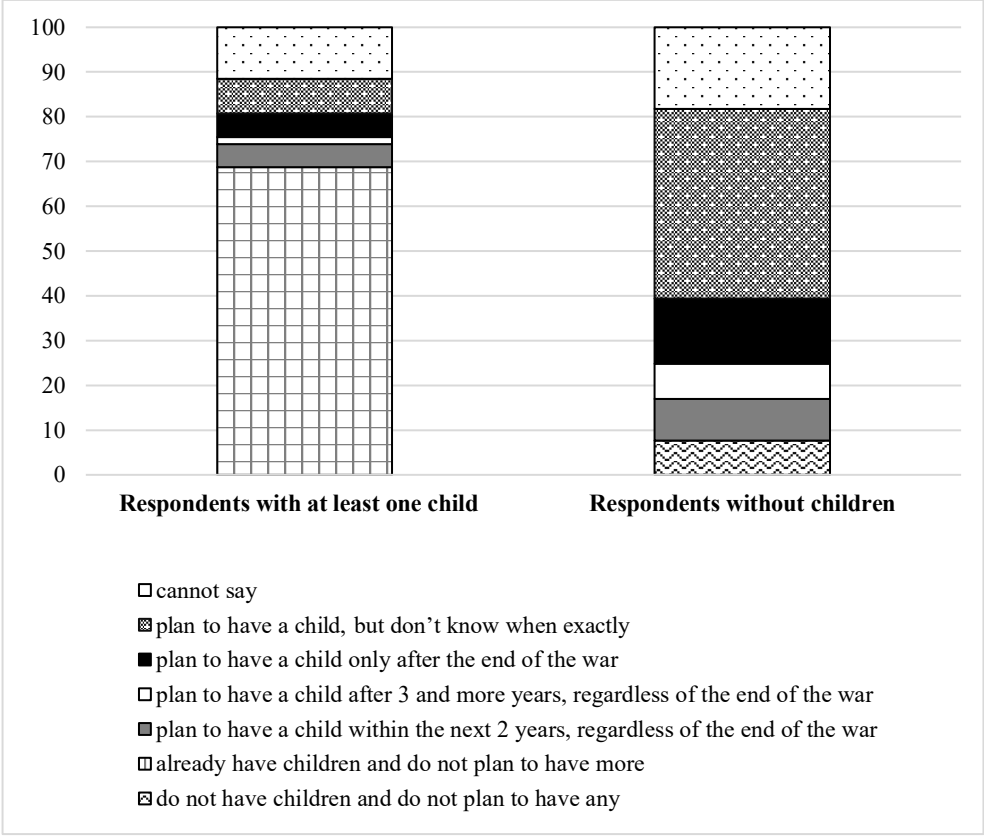
Pearson χ^2=420.10; Pr=0.000.

We found a highly statistically significant association between the presence of children (having children or not) and further reproductive plans. Respondents without children are more likely to plan to have them in the future than respondents

who already have a child/children (*Figure 4*). However, even among the respondents who did not have children but would plan to have them in the future, people who do not know when exactly they will realize their reproductive plans and also those who are going to do it after the end of the war form the majority.

Figure 4

Distribution of respondents having and not having children by reproductive plans, in percentage

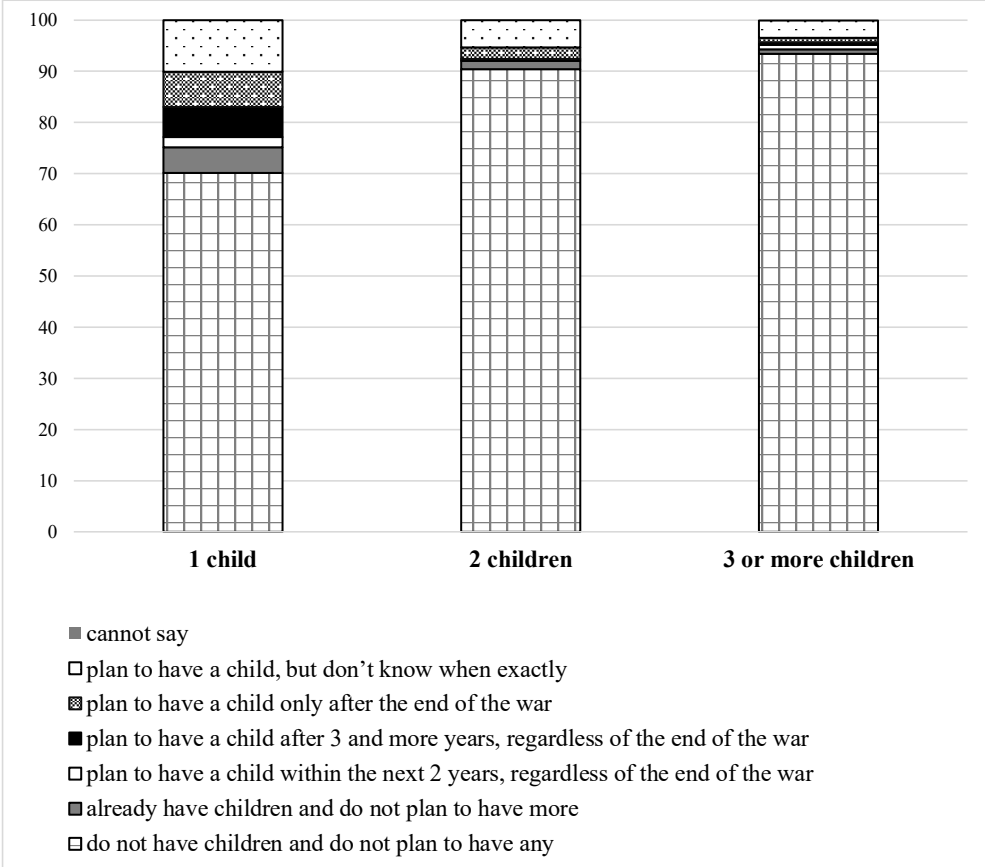


Pearson χ^2=561.7; Pr=0.000.

Additionally, when looking at respondents who are parents, we found a significant association between the number of children they already have and reproductive plans. Even parents with one child in Ukraine now rarely plan to have more children in the future (*Figure 5*). However, respondents who have two or more children, particularly three or more, much less often plan to have additional children in the future than parents with only one child in Ukraine.

Figure 5

Distribution of respondents, who are parents with different numbers of children by reproductive plans, in percentage

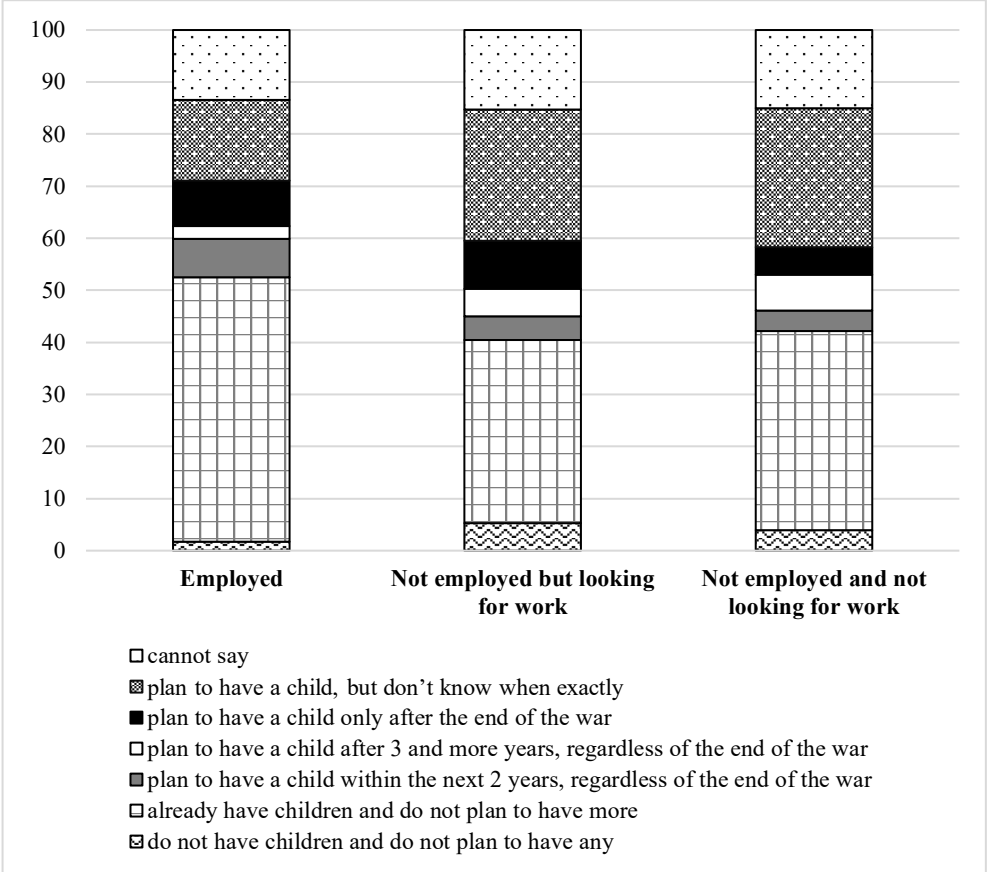


Pearson χ^2=92.6; Pr=0.000.

Concerning employment status, the association between reproductive plans and defined groups by this characteristic is also statistically different from zero (*Figure 6*). We can see that the share of parents among employed respondents is higher than among people who currently have no job. As for the reproductive plans of the respondents, those who do not have a job (both unemployed and those who are not looking for a job) have the most in common.

Figure 6

Distribution of respondents with different employment status by reproductive plans, in percentage



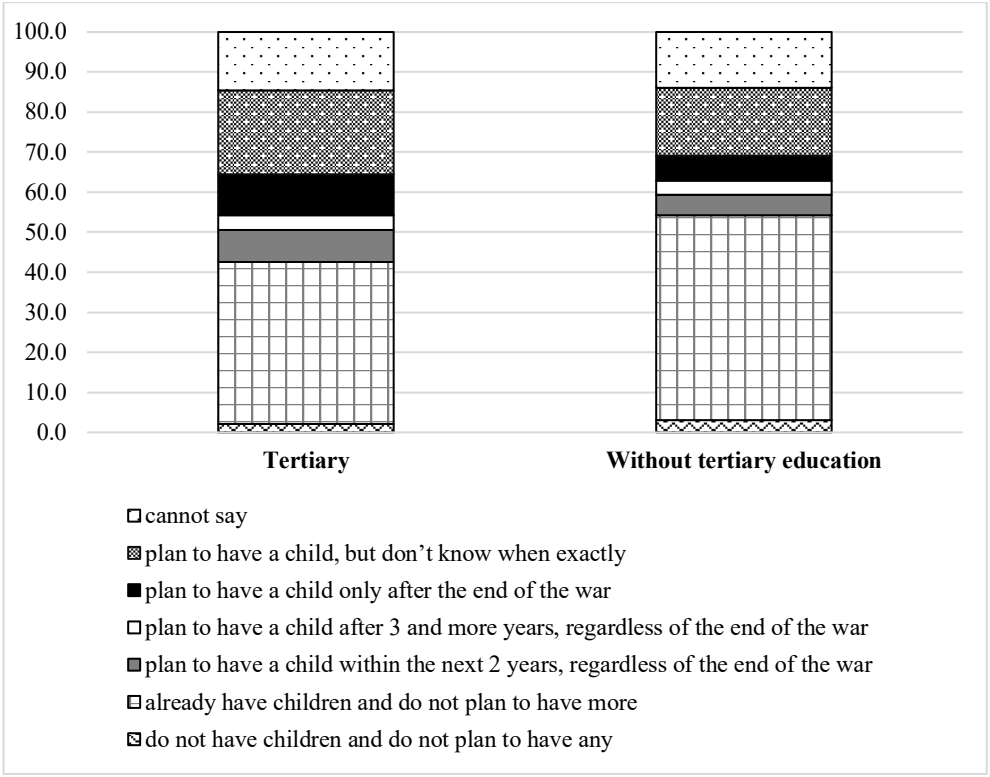
Pearson χ^2=57.22; Pr=0.000.

The education's association with reproductive plans is statistically significant at the 5% level; it is worth mentioning the presence of differences between respondents with and without tertiary education (*Figure 7*).

Among individuals without tertiary education, a larger proportion already has children and do not intend to have any more in the future. In contrast, among those with tertiary education, the relative share of individuals planning to have a child within the next two years – as well as those expressing a desire to have one after the war or in the more distant future – is higher.

Figure 7

Distribution of respondents with different levels of education by their reproductive plans, in percentage



Pearson χ^2=37.13; Pr=0.034.

As for the financial situation, the association between reproductive plans and self-assessment of the family's financial situation is statistically insignificant only at a 10% significance level. As financial well-being improves, the proportion of those who plan to have a child in the short or medium term increases. In particular, among individuals who can afford to buy almost everything they need, there is a substantially higher share of respondents intending to have a child either in the near future or within the next three years, regardless of the end of the war. In contrast, among groups with low financial capacity, respondents who already have children and do not plan to have more, or those who do not plan to have any children at all, predominate.

Therefore, the analysis of the relationships between the main socio-demographic characteristics of respondents and their reproductive plans during the war, based on survey data, confirmed the statistical significance (at different

significance levels) of the associations between reproductive plans and factors such as sex and age, educational level, presence and number of children, employment status and financial situation.

Based on these results, in the second step, the econometric models were estimated to analyse the effects of respondents' socio-demographic characteristics on whether respondents plan to have children in the future.

Given that the presence of children yielded the highest chi-square statistic among all variables significantly associated with future reproductive intentions, we divided the sample into two groups: respondents who already have children, and those who do not. Then we estimated two logit models, using sex, age, financial situation, employment status, and educational level as explanatory variables.

Table no. 1 outlines descriptive statistics for variables included in the model. Less than half of the sample intends to have children. Among those respondents who plan to have children, slightly more than one-fourth intend to have children in the next years, regardless of when the war ends.

Table no. 1

Descriptive statistics for the variables incorporated in the model

Variable	Obs	Mean	Std. Dev.	Min	Max
Intend to have children *(base group – no)*	926	0.43	0.49	0	1
Intend to have children *(1 – no, 2– yes, in the next years, regardless of when the war ends, 3 – yes, but not sure when)*	926	1.74	0.90	1	3
Having children (*base group – no children*)	926	0.69	0.46	0	1
Age, years	926	34.87	8.97	18	49
Sex *(base group – women)*	926	0.48	0.50	0	1
Financial situation *(base group – hard situation, 1– sufficient, 2 – good)*	926	0.65	0.65	0	2
Employment status *(base group – non–having job)*	926	0.70	0.46	0	1
Education *(base group –without tertiary education)*	926	0.46	0.50	0	1

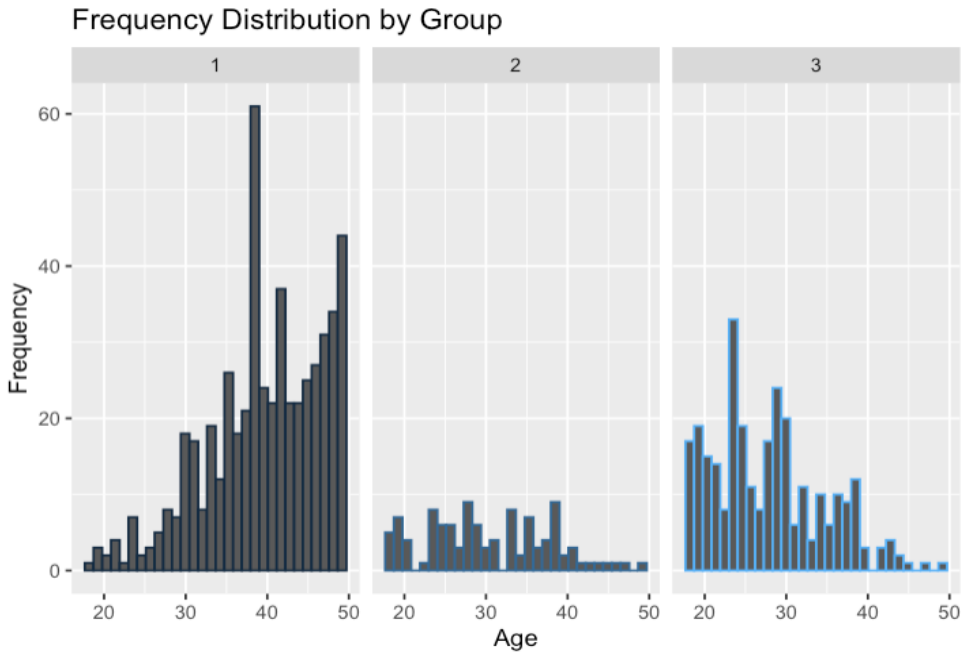
The sample is quite balanced in terms of gender, the average age of the respondents is 35 years, and more than two-thirds already have kids. Less than half of the respondents in the sample have some or completed tertiary education, and on average, 70% of respondents are employed. Regarding the financial situation, 44% of respondents have a difficult one, 46% are sufficient, and only 10% are good.

A comparison of the socio-demographic profiles of respondent groups, distinguished by their reproductive intentions (individuals who do not intend to have children; those planning to have children in the nearest years regardless of when the war ends; and those who plan to have children in the more distant future), revealed that among those without future reproductive plans the proportion of

individuals who already have a child/children is particularly high. Respondents in this group also turned out to be the oldest among all groups (see *Figure 8*, *Table no. 2*), with an average age of approximately 40. It is not unexpected that respondents in the second group – those who are not inclined to postpone childbirth for more than 2–3 years – are, on average, older (with a mean age above 30) compared to those who plan to realize their reproductive intentions only after the war or in the more distant future (whose mean age is slightly below 28).

Figure 8

Distribution of respondents with different childbearing intentions by age



1–no intention to have children;
2–intend to have children in the nearest years, regardless of when the war ends;
3–intention to have children, but not sure when (after the war, and unknown when exactly)

Among respondents who intend to have children (whether in the near or more distant future), the share of men is higher compared to the group that no longer plans to have a child or additional children. The proportion of employed individuals was relatively higher in the group of those who no longer plan to have children/additional children compared to the other groups.

Results of the conducted statistical test (ANOVA) suggest that there is a statistically significant difference (at least 5% significance level) in the mean values of all socio-demographic variables across the three groups of respondents.

Table no. 2

Descriptive statistics of respondents by the group based on intention to have children

	Group 1		Group 2		Group 3		F-value (p-level) ANOVA test
	no intention to have children ***(56% of the sample)***		*intention to have children in the nearest years, regardless of when the war ends* ***(12% of the sample)***		*intention to have children, but not sure when* (*after the war,* and *unknown when exactly*) ***(32% of the sample)***		
	Mean	Std. Dev.	Mean	Std. Dev.	Mean	Std. Dev.	
Having children (*base group – no children*)	0.95	0.22	0.44	0.50	0.31	0.46	630.16*** (0.00)
Age, years	39.67	6.99	30.29	7.57	27.74	6.80	558.47*** (0.00)
Sex *(base group – women)*	0.43	0.49	0.55	0.50	0.56	0.50	15.28*** (0.00)
Financial situation *(base group – hard situation, 1– Sufficient, 2 – Good)*	0.60	0.64	0.75	0.66	0.70	0.65	5.39** (0.02)
Employment status *(base group – non–having job)*	0.75	0.43	0.68	0.47	0.63	0.48	13.82*** (0.00)
Education *(base group –without tertiary education)*	0.41	0.49	0.52	0.50	0.53	0.50	10.56*** (0.00)

*Notes: Double and triple asterisks (**, ***) indicate significance at the 5% and 1% levels.*

RESULTS OF MODELLING

Obtained empirical results (*Table no. 3*) provide estimates of selected socio-demographic factors' effects on the dependent variable — the intention to have children. They suggest that for respondents who already have children, significant determinants of future reproductive plans are age (negative effect), sex (for men, on average probability of planning more children is higher) financial situation (positive effect of sufficient financial conditions compared to the hard financial situation), and having tertiary education (positive effect holding other factors fixed). All mentioned explanatory variables have statistically significant effects on the intention to have more children (at least at 5% significance level).

Table no. 3

Logit model estimation results

	Average marginal effects			
	Respondents who have children		Respondents who do not have children	
	Coeff.	Std.Error	Coeff.	Std.Error
Age, years	-0.022***	0.002	-0.011***	0.002
Sex *(base group –women)*	0.078**	0.029	0.009	0.028
Financial situation *(base group – hard situation)*				
Sufficient	0.063**	0.031	-0.042	0.041
Good	0.015	0.050	0.029	0.045
Employment *(base group – non–having job)*	-0.032	0.032	0.094**	0.037
Education level *(base group – without tertiary education)*	0.062**	0.029	0.028	0.030
Number of observations	641		285	
Pseudo R2	0.20		0.26	

Notes: Single, double, and triple asterisks (, **, ***) indicate significance at the 10%, 5% and 1% level*

Growing age is also an important factor negatively affecting the future reproductive plans of respondents who do not have children. Employment is the second factor that significantly and positively affects the intention to have the first child. The calculated average marginal effect indicates that for childless individuals, having a job is associated with a 9.4 percentage point increase in the probability of planning to have children, relative to those who do not have a job (while controlling for age, sex, financial situation, and education).

Table no. 4 presents the estimation results for the multinomial logit model. The calculated marginal effects are reported in *Table A1* of *Appendix A*.

Table no. 4

Multinomial logit model estimation results

	Coeff.	Std.Error	Significance level
1 – No intend to have children			
2 – Intend to have children in the next years, regardless of when the war ends			
Age, years	-0.133	0.018	***
Sex *(base group – women)*	0.420	0.254	*
Financial situation *(base group – hard situation)*			
Sufficient	0.396	0.273	
Good	0.333	0.435	

Employment *(base group – non–having job)*	0.109	0.292	
Education level *(base group – without tertiary education)*	0.383	0.254	
Having children (*base group – no children*)	-2.548	0.311	***
Constant	4.385	0.654	***
3 – Intend to have children, not sure when exactly			
Age, years	-0.172	0.016	***
Sex *(base group – women)*	0.468	0.219	**
Financial situation *(base group – hard situation)*			
Sufficient	0.283	0.231	
Good	0.127	0.379	
Employment *(base group – non–having job)*	0.102	0.249	
Education level *(base group – without tertiary education)*	0.495	0.217	**
Having children (*base group – no children*)	-2.841	0.272	***
Constant	6.596	0.593	***
Number of observations	926		
Pseudo R2	0.35		

Notes: Single, double, and triple asterisks (, **, ***) indicate significance at the 10%, 5% and 1% level.*

Thus, having children is associated with substantially lower log-odds of intending to have more children (both in the near years, regardless of when the war ends, and at an unspecified future time), relative to not intending to have any (more) children.

For the second group, the results also suggest that older age and being a woman decrease the likelihood that respondents will intend to have children in the next years (regardless of when the war ends) as opposed to having no intention to have children.

Regarding the group of respondents who plan to have children in the more distant future (either after the war, or when exactly is unknown), older reproductive age, being a woman and having no tertiary education decrease the likelihood that a respondent will intend to have children (with no certainty when) compared to having no intention to have children.

DISCUSSION AND CONCLUSIONS

This study contributes to the knowledge of reproductive intentions during full-scale war. Living under wartime conditions for an extended period is uncommon for European populations, making the documentation of reproductive plans valuable for understanding the possible reproductive behaviour of individuals during and after the war and highly relevant for further research.

At any time, the decision-making process regarding childbirth is inherently complex and shaped by multiple influences.

There is currently a lot of research on the various effects of military conflicts on fertility and childbearing intentions. The findings of these studies, on the one hand, reflect a clear tendency to postpone childbirth (until the end of the war or other shock time). On the other hand, these studies do not indicate the high likelihood of a significant post-war fertility increase.

It is also essential to take into account that most available evidence comes from low–and middle–income countries. War conflicts mainly occurred in countries that differed from Ukraine's demographic development (were at various stages of the first demographic transition).

Ukraine now has the lowest birth rate, which is a consequence of the synergistic action of numerous negative factors (economic crisis, pandemic, war). During socio-economic crises and other upheavals, Ukrainian families often decided to have their first child, while the birth of a second, third, or subsequent child is often postponed or abandoned. Socio-demographic surveys from earlier, peaceful decades indicate that Ukrainian society generally aspired to the two-child family model. Uncertainty about the future, insufficient material well-being, and housing problems were the top factors influencing childbearing behaviour in peacetime.

The Russian war against Ukraine actually began in 2014, and with each passing year, anxiety and uncertainty about the future have deepened. Many individuals doubt their ability to create suitable conditions for raising the desired number of children or to secure their own and their children's futures. It should also be mentioned that the full-scale invasion was preceded by the challenging period of the COVID-19 pandemic.

Our findings for the time of full-scale war show that nearly 55% of respondents who already have one child do not plan to have more; 82% of respondents with two children do not plan additional children; and almost 90% of those with three or more children do not plan to expand their families. A small number of respondents are childless and express no intention to have children. It is worth noting that in this 2023 survey, the share of those who don't have a definite answer about reproductive plans is also relatively high.

It was rather unexpected that wartime results concerning the childbearing plans of parents-respondents are close enough to the corresponding findings of the survey of families in Ukraine during peacetime (in 2009), which showed that over 53% of parents with one child did not plan to have more children, and among respondents with two children, over 84% did not intend to have an additional child (Family and Family Relations 2009).

When it comes to all reproductive-age respondents to the survey at the end of 2023, only 12% of them planned to have children or additional children in the next two or three years, regardless of the end of the war, and 32% planned to have

children but were not sure when (only after the war and/or unknown when exactly in the future). Respondents who indicated their reproductive plans to have a child only after the war or are not sure when exactly tend to be younger, more educated, and report relatively better financial standing than people whose plans are marked as regardless of the end of the war.

Socio-demographic characteristics remain important predictors of fertility intentions in the context of wartime. Obtained modelling estimates (logit model) confirm that for individuals who already have children, such factors as younger age, being a man, sufficient financial situation, and tertiary education, each independently contribute to a higher likelihood of intending to have additional children, holding other factors constant. For childless individuals, being relatively young and having a job increases the likelihood of planning to have a first child.

The results of the multinomial regression demonstrate that for younger individuals, men, and childless individuals, the probability of intending to have children both soon or in the more distant future is substantially higher than for individuals of relatively older reproductive age, women, and those who have children, compared to having no childbearing intention. The presence of children emerges as a particularly strong deterrent for childbearing plans during wartime in Ukraine.

The factor of tertiary education increases the likelihood of intending to have children only after war or at an unspecified time in the future (as opposed to having no childbearing intention).

Our results underscore that even under the extreme conditions of war, fertility intentions in Ukraine largely follow patterns described by the theory of the second demographic transition, with age, education, and employment status continuing to influence respondents' plans regarding childbearing. This highlights the resilience of socio-demographic and economic factors in shaping fertility intentions. At the same time, we expected a more substantial influence of respondents' household financial situation on childbearing plans, given that this factor had been among the top priorities influencing fertility intentions in peacetime Ukraine.

Using unique data from the survey conducted in 2023, we examined the influence of only primarily objective socio-demographic factors on respondents' fertility intentions during the war and in the post-war period. However, as we discussed in our previous work on wartime fertility (Kurylo and Aksyonova 2023) and as other researchers have noted in the context of economic uncertainty (Vignoli *et al.* 2020), the role of subjective factors increases under such conditions in shaping reproductive behavior, especially the role of individuals' narratives and expectations about the future. In order to investigate the effect of these factors, a separate special data collection and study are required. Unfortunately, we do not have such an opportunity in wartime in Ukraine due to financial and organizational constraints.

It is worth noting that our study has some limitations, which are driven by data availability issues. Despite the uniqueness of the data used, the sample is representative only of Ukraine at the country level (not for regions), and it does not contain information on some socio-demographic characteristics of respondents, such as marital status, which could have been relevant for the conducted analysis.

This survey data reflects childbearing intentions at a specific time during an ongoing conflict. The findings might not fully capture possible further shifts in plans, especially if the war's duration, outcome, or post-war reconstruction conditions differ substantially from individuals` expectations. Respondents may also have experienced difficulties in articulating their long-term plans amid uncertainty.

It is also worth noting that since the start of the Russian full-scale invasion, national data on fertility have become fragmented and disintegrated. This limitation complicates the interpretation of reproductive plans in the context of general fertility trends.

Given the lack of reliable data, our research does not incorporate forced migration considerations. The questionnaire did not include a question about the respondents' displacement. Thus, the reproductive plans were studied regardless of where the respondent lived before the full-scale aggression. The childbearing intentions of individuals in the occupied territories and forced emigrants remain unclear. Future studies can extend the conducted analysis by addressing these limitations, subject to data availability.

Overall, the reproductive intentions expressed by the population during the war in Ukraine do not suggest the possibility of a significant rise in the birth rate, either in the coming years or immediately after the war. There is also a considerable risk that some forced migrants who have left Ukraine will settle abroad permanently or continue seeking safer regions to live in. This migration factor is also likely to constrain any post-war increase in birth numbers in Ukraine.

The realization of postponed births and any potential rise in fertility will also depend on the duration of the war, on the pace of rebuilding cities and villages, and on the scale of international investment and aid. Nevertheless, some degree of compensatory fertility growth in the post-war period is possible, particularly with a time lag. Such an increase will depend, among other demographic and socio-economic factors, on the presence of a comprehensive and well-designed family policy.

Appendix A

Table A1

Marginal effects of the multinomial logit model

represent the change in the probability of each outcome category for a unit change in a predictor variable, holding other variables constant

	dy/dx	Std.Error	Significance level
Age, years			
1 – No intend to have children	0.02	0.00	***
2 –Intend to have children in the next years, regardless of when the war ends	0.00	0.00	**
3 –Intend to have children, not sure when exactly	-0.01	0.00	***
Sex *(base group – women)*			
1 – No intend to have children	-0.05	0.02	**
2 –Intend to have children in the next years, regardless of when the war ends	0.01	0.02	
3 –Intend to have children, not sure when exactly	0.04	0.02	
Financial situation *(base group – hard situation)*			
Sufficient			
1 – No intend to have children	-0.04	0.02	
2 –Intend to have children in the next years, regardless of when the war ends	0.02	0.02	
3 –Intend to have children, not sure when exactly	0.01	0.03	
Good			
1 – No intend to have children	-0.02	0.04	
2 –Intend to have children in the next years, regardless of when the war ends	0.02	0.04	
3 –Intend to have children, not sure when exactly	0.00	0.04	
Employment *(base group – non–having job)*			
1 – No intend to have children	-0.01	0.03	
2 –Intend to have children in the next years, regardless of when the war ends	0.00	0.02	
3 –Intend to have children, not sure when exactly	0.01	0.03	
Education level *(base group – without tertiary education)*			
1 – No intend to have children	-0.05	0.02	**
2 –Intend to have children in the next years, regardless of when the war ends	0.01	0.02	
3 –Intend to have children, not sure when exactly	0.04	0.02	*
Having children (*base group – no children*)			
1 – No intend to have children	0.31	0.02	***
2 –Intend to have children in the next years, regardless of when the war ends	-0.08	0.02	***
3 –Intend to have children, not sure when exactly	-0.23	0.02	***

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Lucrarea are ca subiect fertilitatea în Ucraina, și intențiile de fertilitate pe timp de război, contribuind la o mai bună înțelegere a comportamentului reproductiv în condiții de război. Ucraina a cunoscut o creștere a fertilității între 2002 și 2012, urmată de un declin constant după 2014, care s-a accelerat dramatic odată cu invazia rusă la scară largă din 2022. Războiul în curs de desfășurare și fragmentarea rezultată a datelor reprezintă provocări semnificative pentru studierea fertilității. Datele din sondajul din timpul războiului arată o amânare generalizată a deciziei de a deveni părinte, adesea pe termen nedefinit sau cel puțin până la sfârșitul războiului. Analizăm datele sondajului folosind modele de regresie logistică binomială și multinomială pentru a înțelege determinările socio-demografice ale intențiilor de a avea copii în acest context volatil. Analizele noastre de regresie au identificat vârsta, sexul, statutul parental actual, statutul ocupațional și educația ca factori cheie. Mai precis, modelele arată că a fi mai tânăr, bărbat, a avea un loc de muncă și educație terțiară sunt caracteristici asociate cu o probabilitate mai mare de a intenționa să ai un copil. O constatare importantă a modelului multinomial este scăderea substanțială a probabilității de a planifica să aibă copii (atât în viitorul apropiat, cât și în cel îndepărtat) în rândul celor care au deja copii în raport cu respondenții fără copii. Având în vedere aceste rezultate, alături de fertilitatea scăzută preexistentă a Ucrainei, o creștere compensatorie semnificativă după război pare puțin probabilă. Constatările subliniază impactul profund și potențial de durată al războiului asupra viitorului demografic al Ucrainei.

Cuvinte-cheie: *Ucraina; Fertilitate; Război; Intenții și planuri de fertilitate; Model logistic; Model de regresie multinomială.*

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