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Ethnic context and fertility differential in post-Soviet Kazakhstan

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Abstract

Previous studies have often explained fertility differentials between racial groups by aggregate individual characteristics. Emphasizing a spatial perspective, this study argues that the fertility implications of race may depend on the ethnic composition of the local context. This study tested the explanatory power of contextual ethnic composition, measured by diversity and minority share, with the intriguing case of fertility differentials in post-Soviet Kazakhstan. Multilevel Poisson regressions and decomposition techniques were performed on the pooled 1995 and 1999 Kazakhstan Demographic and Health Surveys. Further sensitivity tests were conducted with the Multiple Indicator Cluster Survey-Kazakhstan 2010–2011 and 2015 surveys. We found that both diversity and minority share are significant contributors to the majority-minority fertility differential. Specifically, context-level ethnic diversity is associated with lower fertility (−0.22, $p < 0.001$) for both Russians and Kazakhs, while a higher share of Russians in the local context reduces the differential between the two groups (−0.26, $p < 0.05$). Sensitivity test using data from the 2010s reproduced the significant effect of the context-level share of Russians on fertility. The findings suggest that minority individuals exhibit lower fertility levels in places where their presence is more suppressed. This study contributes to population geography's recognition of the importance of spatial and contextual processes in shaping fertility outcomes for racial/ethnic minorities by impacting their living environment.

KEYWORDS

childbearing, decomposition, ethnic context, majority-minority fertility differential

1 | INTRODUCTION

It is widely found that racial and ethnic minorities display a unique fertility pattern compared with the majority (Goldscheider, 1971). Explaining the majority-minority fertility differential has been a central question for demographers. Besides academic interest, ethnic fertility differentials entail far-reaching implications for the socio-political landscape of today's multicultural societies, especially in electoral democracies (Aksoy & Billari, 2018; Janus, 2013; Kaufmann, 2010). Demographers have proposed several theoretical frameworks to help understand the fertility differentials between racial and ethnic groups (Agadjanian, 1999; Alagarajan, 2003; Chabé-Ferret & Melindi Ghidi, 2013; Espenshade & Ye, 1994; Forste & Tienda, 1996; Kennedy, 1973; Poston et al., 2006).

Beyond explanations based on aggregate individual-level characteristics, recent scholarship has increasingly noticed the role of context in demographic processes. After all, population geography studies the location and spatial processes on demographic outcomes

(Newbold, 2021), but little is known about how one's spatial location in the ethnic context may influence her fertility behaviours. The current study argues that the formative causes of fertility is context contingent and cannot come into effect via individual behaviours alone. From a spatial perspective, human ecological theory argues that people of different identifications, including racial and ethnic, may self-assort into places where they can access social networks for security and resources (Brown et al., 2009). This ethnic context pattern then affects demographic outcomes. The reinforcing process of mutual support and cohesion buildup among minorities in places with a greater density and share of co-ethnic members leads to profertility behaviours (Puur et al., 2022). Another vein of literature hallmarked by racial stratification theory argues that the effects of being a minority member, including all the social and behavioural ramifications, are contingent on the context that produces the relative meaning of being a minority (Brown, 2018; McDaniel, 1996; Yang et al., 2019). An otherwise dominant racial group may dwindle in size or lose its relative power depending on the local racial/ethnic composition. Overall, the contextual and spatial paradigm invites the thinking of how ethnic contexts influence individuals' fertility outcome (Agadjanian & Nedoluzhko, 2022; Frank & Heuveline, 2005; McDaniel, 1996).

The post-Soviet Kazakhstan presents a curious case for investigating the fertility consequences following a changing context of racial and ethnic composition. The ethnic composition in Kazakhstan illustrates a scenario of a radical majority-minority shift demonstrated by the spatial and temporal shift of the distribution of ethnic Russians. Since 1979, the portion of Russians slowly declined from 40% to today's 20%. Such a majority-minority shift also manifested in the spatial shifts of ethnic composition, with the share of Russians retreating in Southern and Western regions (Laitin, 1998). This heterogeneous distribution begs the question of how local ethnic composition may distinctly affect the fertility behaviours of ethnic groups. With the legacy of Stalinist reification of racial/ethnic boundaries (Laitin, 1998), minority status in post-Soviet states like Kazakhstan became a fundamental factor for various demographic processes but its impact may be contingent on the context that generates the relative size and diversity of different ethnic groups (Agadjanian, 1999; Agadjanian & Qian, 1997; Agadjanian et al., 2013; Guillot et al., 2011).

A contextual paradigm for fertility differential is also needed because the pattern of the R-K fertility gap is somewhat paradoxical. We will show that proximate factors such as younger age at the first intercourse and earlier onset of childbirths among Russian women did not translate into a higher number of children, whereas individual socioeconomic status does not suffice to explain the depressed fertility either.

With combined Kazakhstan Demographic and Health Surveys (KDHS) from 1995 to 1999, this study tests how variables representing context-level ethnic composition are associated with the number of children and whether ethnic identity has interacted with its situated ethnic context to jointly produce the observed fertility differential.

2 | LITERATURE REVIEW

2.1 | Minority status and fertility

The differentials of fertility rate were found between the majorities and minorities of racial/ethnic identity in many societies (Forste & Tienda, 1996; Goldscheider & Uhlenberg, 1969; Kulu & Hannemann, 2016; Poston et al., 2006). Earlier scholarship proposed that minority status itself may be an independent force determining fertility behaviours. An individual's race and ethnicity constitute a significant identifier of his/her position in the economic and symbolic hierarchies. Racial and ethnic identity, once defined and reified, exerts independent influence beyond its social and biological makeups (Smedley, 1998). Goldscheider and Uhlenberg (Goldscheider & Uhlenberg, 1969; Goldscheider, 1971) proposed two potential mechanisms through which minority status is at work. Minorities may resort to a pronatalist subculture for self-affirmation and increase family size to compensate for the perceived political subordinance. Alternatively, when minorities sense greater level of economic and social security, they are more likely to pursue the socioeconomic opportunities at the expense of family size.

The simplification that having a minority status brings in a certain fertility pattern has been criticized as a 'residual approach' that wholesale attributes the portion of the unexplained majority-minority fertility differentials to a posthoc notion of a homogenous minority identity (see critiques by, Forste & Tienda, 1996). Studies on race and ethnicity demonstrate that stable racial/ethnic identities are exceptions rather than patterns (Smedley, 1998), and the social ramifications of racial identity are mostly products of their cultural and political context (Brown, 2003; Kreager, 1997). To uncover the operative mechanisms behind the observed ethnic fertility differentials, scholars have proposed several individual-level characteristics hypotheses as explanations.

2.2 | Individual-level explanations

Important earlier studies resort to explain the majority-minority fertility differentials by the aggregate characteristics of each racial/ethnic group. The so-called characteristics hypothesis argues that minority groups have unique fertility rates because of the unique socioeconomic characteristics aggregated among the individual members. The ethnic differentials in fertility can be attributed to the varying levels of education, economic status, and wealth associated with the average members of each group. Underlying this hypothesis is the premise that reproductive behaviours are more or less rationally decided by individuals who are constrained by limited resources. Goldscheider (1971) noted that the modern economy may reduce fertility rates by providing individuals alternative means of economic security than having more children and changing individuals' priority in life. Individuals may postpone or prevent childbirth when the costs incurred by child-bearing can be better allocated elsewhere with greater returns (Easterlin, 1975; Kirk, 1996). For example, in the United States, fertility rates among minority groups closely correspond to their average socioeconomic statuses, with East Asian and Jewish Americans having the lowest total fertility rates and African and Hispanic Americans having total fertility rates higher than the average (Goldscheider & Uhlenberg, 1969).

Similarly, the cultural hypothesis argues that individuals are the embodiment that carries fertility-relevant norms at the aggregate level. Therefore, the cultural hypothesis of fertility proposes that ethnic fertility differentials have a root in the cultural norms formulated and sustained in each group and, more importantly, these cultural elements are not a byproduct of material conditions but maintain their own consistency throughout the history. For example, religiosity may independently explain fertility differentials, including that in fertility rate and the desired number of children, between human groups across the world (Brañas-Garza & Neuman, 2007; Hayford & Morgan, 2008; McQuillan, 2004; Yoo & Agadjanian, 2021). The use of contraceptives itself tends to spread along the cultural and linguistic lines independent of individuals' economic standing in their cultural group (Agadjanian, 2001; McQuillan, 2004). In some cases, a strong cultural institution even determines the forms of economic productions. Childs' works showed how polyandry and monastery residency as an essential cultural (and religious) institution has contributed to the particular form of pastoral agriculture and a low fertility rate among Tibetans (Childs, 2008).

2.3 | The contextual turn: Ethnic contexts

The contextual turn in the study of majority-minority fertility differentials moves beyond the aggregated individual characteristics of race. The contextual paradigm actually questions whether a racial/ethnic group embodies any stable characteristics at all. From a spatial perspective, the human ecological theory posits that spatial proximity to other social members influences individual behaviours. Proximity to co-ethnic members and density of same-race neighbourhoods exert a greater pressure to follow fertility norms; diffusion of resources and social support is also affected by the racial/ethnic context comprised of heterogenous groups (Brown et al., 2009; Puur et al., 2022).

In another vein, racial stratification theory argues that racial/ethnic minorities developed distinct fertility behaviours due to a relative positioning that deprives perceived power and safety rather than wealth and cultural motivations (McDaniel, 1996). The ramifications of one's racial/ethnic identity come from how people within a space define and confine this identity (Neely & Samura, 2011; Smedley, 1998), but such a definition often changes (Alba, 2020). Racial stratification theory proposes to place racial/ethnic groups in a stratified 'ethnic context' and avoid 'a failure to explicate the conditions under which minority group status depresses fertility' (Forste & Tienda, 1996, p. 111). An ethnic context can be stratified along multiple dimensions in a given society, including economic, occupational, demographic, or political (Brown, 2003). These dimensions may not overlap, as some demographic minorities may be stratified high on the economic ladder but lower on the political spectrum. As a result, minority status is fluid and relative, contingent on the context that stratifies power and goods. For fertility differentials, racial stratification theory suggests that the source of fertility differentials should be understood within the evolving context of relative stratification and demographic composition (Agadjanian & Nedoluzhko, 2022; Greenhalgh, 1990).

2.4 | Ethnic composition in ethnic contexts

Different racial/ethnic groups may be stratified along multiple dimensions. While most previous studies have focused on the socioeconomic or political stratification of racial/ethnic groups, ironically less studied is the most basic dimension of the ethnic context: the demographic composition such as diversity, homogeneity, and relative shares of different racial/ethnic groups. Studies have shown that socioeconomic stratification often fails to account for the disparities between racial/ethnic groups that are caused by demographic compositional properties such as diversity and segregation (Brown, 2003; Xie & Lauritsen, 2012). When an otherwise minor group grows in size or the number of ethnic groups has multiplied, the previously marginal and weak position of the minority group will be altered (Blau, 1977; English et al., 2014; Sampson, 1984). Thus, the extent to which demographic processes and outcomes are associated with a specific ethnic identity is subject to the diversity and relative power distribution between all ethnic groups.

Population geography literature also urges scholars to consider how the demographic homogeneity of a place complicates individuals' fertility outcomes. Racial/ethnic composition attracts an increasing attention in population geography due to the growing migrant population forming distinct settlement and neighbourhood patterns in multicultural societies (Zwiers et al., 2018). Studies have found that diversity and the share of minorities improve the self-reported physical and mental health among minorities across the world (Lu & Yang, 2020; Yang & Yang, 2018); the density and share of co-ethnic members at various spatial levels are related to the likelihood of marriage (Feng et al., 2013; Puur et al., 2022). Among the few who have brought the perspective of ethnic composition into fertility research (Kim et al., 2020; Kim & Song, 2015) found that the ethnic composition of the neighbours affects fertility behaviours among immigrant women.

The underlying causative mechanisms that account for the shifts in ethnic fertility differentials in relation to context-level ethnic composition include several proposed pathways. Foremost, with an increased share in the population, minority members may perceive better upward mobility and social support from coethnic members, leading to a favourable child-bearing environment (Frank & Heuveline, 2005; McDaniel, 1996). Whether a minority group chooses a high-fertility strategy depends on its ethnic position in a specific social and political context (McDaniel, 1996). When the relative size is perceived small, the minority community may encourage high fertility as a rational strategy to increase combat strength or vote count (Janus, 2013; Obono, 2003). Furthermore, context-level ethnic composition in terms of homogeneity is related to the likelihood and efficacy of diffusing childbearing norms (Simpson, 2007; Wilson & Kuha, 2018). Finally, when parents are evolutionarily rational actors who take into account the benefits and costs of a child to their own racial/ethnic group, some game-theoretic models show that the optimal number of children is a function of the relative size of the co-ethnic group (Janus, 2013; Osborne, 2004). In summary, it is a minority group's relative size and power in a specific context that determines its fertility rate, and the same racial/ethnic group in different contexts may exhibit different fertility rates.

Although the contextual turn has resulted in fruition, research is scarce on the relationship between fertility and the different types and levels of ethnic composition. However, there is a rich literature in health that shows ethnic composition constitutes a higher-level structure to affect self-reported and diagnosed health outcomes (English et al., 2014; Lu & Yang, 2020; Mays et al., 2007; Yang et al., 2019). In terms of fertility, an earlier study found that the percentage of Latinos help encourages pronatalist behaviours among minorities (Abma & Krivo, 1991). Recently, Agadjanian and Nedoluzhko (2022) showed relative ethnic positioning measured by homophily of social milieu accounts for the depressed fertility desire among European minorities in Kyrgyzstan. Wilson and Kuha (2018) found that context-level diversity and segregation are associated with depressed fertility in the UK. These studies suggest that the ethnic composition of a context relies on multiple pathways to differently affect the fertility outcomes of majority and minority groups.

As reviewed above, the contextual ethnic composition of a place may alter the relative stratification of local racial/ethnic groups, we propose two specific hypotheses:

H1. *The share of minority groups has a cross-level interactive effect with minority identity on the number of children. Minority members have a higher number of children when the share of the minority is increased in a context; meanwhile, the effect is reversed for majority members.*

H2. *Diversity has a cross-level interactive effect with minority identity on the number of children. Minority members have a higher number of children when diversity is increased in a context; meanwhile, the effect is reversed for majority members.*

2.5 | The R-K fertility differential

The post-Soviet Kazakhstan presents a rare window to explore the extent that context-level ethnic composition moderates the racial/ethnic implication on fertility. Kazakhstan was a frontier of Russian expansion since the Tsarist time and it has always had a much higher share of ethnic Russians compared with any other former Soviet countries. Due to immigration, famine, and forced resettlement since the 20th century, the share of ethnic Russians in Kazakhstan actually surpassed Kazakhs between 1940 and 1990. However, the emigration of Russians since the dissolution of the USSR and the recent repatriation of overseas Kazakhs quickly changed the ethnic composition of Kazakhstan. Today, the share of ethnic Russians has dropped to 19%, but ethnic Russians remained a majority or a significant presence in the north, southeast, and in major cities.

A uniqueness in the Russian-Kazakh (R-K) fertility differential is that neither group has entirely conformed to the expected trajectory of demographic transition. Figure 1 below shows the age-specific fertility rates calculated from 1995 to 1999 KDHS. There is a depressed Russian fertility overall. However, fertility rate was slightly higher among Russian women before age 20. The age at first birth remained low among Russians (Turner, 1992) and Russian women

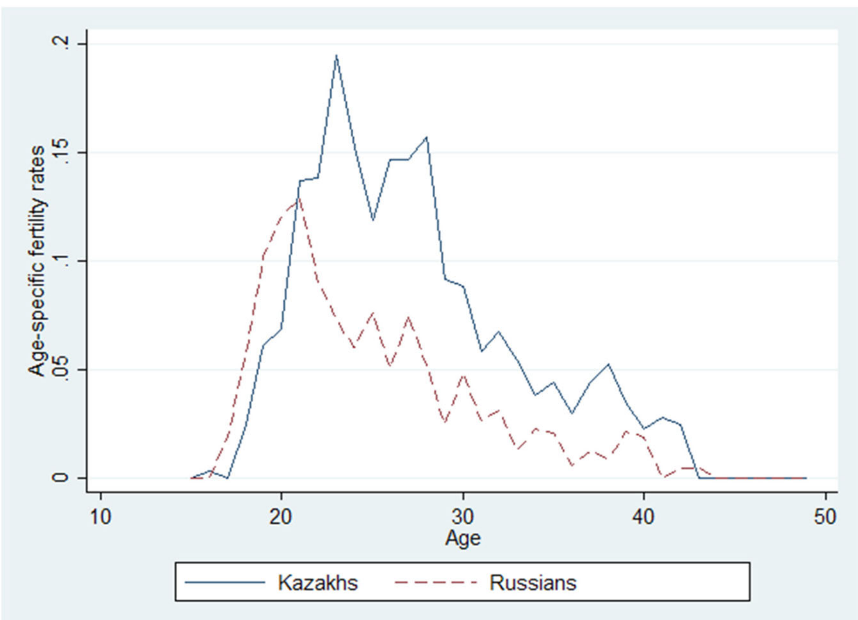


FIGURE 1 Age-specific fertility rates by ethnic identity.

initiated the first union significantly earlier than Kazakhs (Agadjanian, 1999).

Other studies then found that the low fertility rate among Russians is not as much driven by nonmarital childbearing combined with low marriage rate (Perelli-Harris & Gerber, 2011). Contraceptive use throughout the 1990s was below 50% among Russians and fertility control has been achieved largely through induced abortion (Trevitt, 2010). Contraception use also remains at a very low prevalence among Kazakhs (Agadjanian, 2002; Westoff, 2005).

Regarding the characteristics hypothesis, Coale et al. (1979) were the first to detect an anomality against the prevailing characteristics hypothesis. They found that albeit with the rapidly improving socioeconomic conditions and massive modernization projects in Soviet Central Asia, the fertility among Kazakhs had jumped up after the 1960s after a period of decline. This jump has essentially maintained and continued into the 2000s (Agadjanian et al., 2013). SES is unlikely a major cause of their fertility differential because the R-K fertility differential would have been reduced when Kazakhs caught up with Russians in terms of SES. As found by (Coale et al., 1979) and we will show again, the Russians living closer to the Russia–Kazakhstan border and in traditionally Russian stronghold areas actually have higher fertility rate, defying the assumption of a fertility-depressing Russian characteristic. In terms of religiosity as a characteristic, it remains speculative what exactly is a fertility-enhancive Muslim Kazakh culture, as we know that Sunni Islam theology holds more tolerance for divorce and contraceptive use compared with Orthodox Christianity.[1]

Unfortunately, very few have evaluated the contribution of ethnic contexts compared with individual-level explanations, especially in a rapidly changing political entity where the relative positioning and privilege associated with racial identities have tremendously reshuffled. The current study tests whether the relative share and diversity of ethnic groups in a context are associated with the racial-gradient of fertility in post-Soviet Kazakhstan while also considering the contribution of individual-level factors. By nonlinear decomposition of the count data of child ever born by women of childbearing age, this study will quantify the contribution of the theory-informed variables to the R-K fertility differential and exemplify how individual and contextual factors should be considered simultaneously for fertility outcomes.

3 | METHODOLOGY

3.1 | Sample and data set

The data sets used for the purpose of analyzing interethnic fertility differential in Kazakhstan come from the pooled 1995 to 1999 KDHS. Conducted under the guidance of the Demographic and Health Surveys Programme and funded by the US Agency for International Development, the KDHS recruited a nationally representative sample of women between the fertile age of 15 and 49 in Kazakhstan (Academy of Preventive Medicine & Macro International Inc., 2000; National Institute of Nutrition & Macro International Inc., 1996). There were 3771 females in the 1995 KHDS and 4800 females in the 1999 KDHS. A smaller number of male respondents were also interviewed but not included for our analyses. The KDHS used a stratified multistage sampling strategy. Within each Oblast, about 140 (in 1995 KDHS) and 250 (in 1999 KDHS) continuous units (health-service blocks or villages) were selected as primary sampling units (PSU) with a self-weighted probability relative to the population size of the PSU. Finally, a random selection of households was conducted within each PSU, and women aged from 15 to 49 were invited for face-to-face interviews. The overall response rate was 95% in the 1995 KDHS and 94% in the 1999 KDHS.

In addition to the KDHS data, we further compiled the Multiple Indicator Cluster Survey (MICS) Kazakhstan sections from the 2010–2011 to 2015 survey years for a temporal sensitivity test on whether the pattern discovered in the end of 20th century in KDHS remains valid into the 21st century. The MICS is a UNICEF project on key indicators on the well-being of children and women, covering 118 countries starting in the mid-1990s.[2] From all census-enumeration areas of Kazakhstan, the MICS 2010–2011 and 2015 sampled 14228 and 12910 women, with response rate of 98.5% and 98.1%, respectively. The MICS contains the main information comparable with KDHS but omitted ethnic identities for non-Russian and non-Kazakh respondents. Thus, we replicated models with similar individual-level control variables for the percentage of Russians, but not for the diversity index.

3.2 | Measurement

To capture the concept of parity, we measured the number of children ever born and survived. The KDHS documented the childbearing history of each respondent and the survival history for each child up to the time of the interview. We categorized the deaths younger than 61 months old as child mortality according to a definition of UNICEF and excluded them from the final calculation of parity.

3.2.1 | Minority status

Ethnicity is a binary indicator separating the Russian-speaking ethnicities[3] and the titular majority Kazakhs, where we consider Russian-speaking ethnicities to be the minority. We excluded other minority groups (e.g., Uzbeks, Koreans, and Dungan) from analyses.

[1]There is great flexibility and no definitive ruling on contraceptive use in most schools of Islamic law (Obermeyer, 1994).

[2]https://mics.unicef.org/surveys

[3]Russian speakers also included other European-origin populace such as Ukrainians and Volga Germans due to their similar cultural experience and the tendency among the non-Turkic ethnicities in Central Asia to collectively identify them as Russian-speakers (*russkoyazychniy*) (Agadjanian et al., 2008; Barrington, 2001).

3.2.2 | Individual characteristics

we measured important socioeconomic factors by a respondent's educational level (primary, secondary, secondary-special, higher), occupations (professional, agricultural, and not working), and a wealth index that summates the possession of various assets and goods. This index is calculated and weighted according to the DHS surveys' convention.[4] Individual's religious identification was broadly categorized into Muslim, Christian, and not religious. Due to migration's effect on fertility desire and acculturation (Catney & Simpson, 2014), we also controlled for the recent history of migration, measured as the length of years since the last change of residence.

3.2.3 | Contextual ethnic composition

In this study, we rely on the compositional information derived from the KDHS household surveys for such contextual factors. Based on the data of the respondents selected from each PSU, we calculated the following context-level variables for each PSU: the percentage of Russians in the local PSU, in the 1st-degree adjacent PSUs, and that in the 2nd-degree adjacent PSUs; Simpson Index for ethnic diversity[5] in local, the 1st-degree and 2nd-degree adjacent PSUs. These measurements capture the ethnic composition and relative share of ethnic diversity in each PSU. For the MICS data, diversity measures were not developed due to the lack of detailed designation of other ethnic groups.

3.2.4 | Control variables

We controlled for the length since the first union, which may confound fertility by exposure risk (Bongaarts & Potter, 2013; Bongaarts, 1978). At the context-level, we controlled for community-level aggregated educational level, the mean wealth level, the percentage of rural residence, the percentage of nonreligious to account for other dimensions of the racially stratified ethnic context. We included a fixed effect of survey year to account for the heterogeneity of two survey times.

All variables used for the sensitivity test with the MICS 2010–2011 and 2015 data have replicated the same measurement strategy unless the information is unavailable in MICS, in which case the variable will be omitted for sensitivity test.

3.3 | Analytical strategies

Regression technique: We employed multilevel Poisson regression to estimate both random effects and fixed effects of the independent variables. When a sample originated from a set of clusters of sample sites, the units from the same sample site necessarily share similarity and have reduced variance among them. This situation of biased variance applies to the most common scenario in modern social survey—multistage complex sampling. The samples of DHS were taken from multiple different PSUs and individual respondents from each PSU. Such complex sampling allows researchers to investigate contextual effects taking place at PSU but also presents the variance deflation problem mentioned above. In such scenario, an important assumption of ordinary least-square regression—independent and identical distribution—is violated. Fortunately, multilevel models allow parameters at individual-level to freely vary and cluster at a higher measurement level which effectively corrects the standard error (Raudenbush & Bryk, 2002). For ith individual residing in jth PSU, a multilevel model that takes Poisson distribution as the probability link expresses as:

$$\log \mu_{ij} = (\alpha_0 + a_1 Z_j + \mu_{0j}) + (\gamma_0 + \gamma_1 \cdot Z_j + \mu_{1j})X_{ij} + \beta' W_i + \epsilon_i,$$

where μ_{ij} is the number of children of ith woman in jth PSU; α is the overall intercept, μ_{0j} is the context-level intercept of the PSUs, X_{ij} is the dichotomous ethnic variable, Z_j is context-level ethnic composition variable, and γ_0 and μ_{1j} are coefficients for cross-level random effects; W_i is a series of individual-level covariates; PSU_j is context-level errors and ϵ_i is the individual-level residuals.

Decomposition technique: Whereas multilevel regression estimates the effect size and significance of our focal fixed effects, decomposition techniques can quantify and distinguish these fixed effects in terms of their magnitude. The variation in coefficients and variance are often analysed in an unsystematic manner by parametric regressions because the changes in coefficients or residuals by themselves do not *simultaneously* take account of the mutually exclusive components of a regression. On the other hand, the Blinder–Oaxaca (B–O) decomposition technique breaks a regression's coefficients into two exclusive portions: that can be attributed to the difference in characteristics (covariates) between two demographic groups, and that arises from the different return to the same coefficient (Oaxaca & Ransom, 1994). For the fertility of Russians and Kazakhs in this study, a formal illustration of B–O decomposition follows:

$$\overline{y_r} = \beta_r \overline{x_r} + \epsilon, \quad \overline{y_k} = \beta_k \overline{x_k} + \eta. \tag{1}$$

The average number of children born to Russian mothers ($\overline{y_r}$) equates the average characteristics among Russian mothers ($\overline{x_r}$) multiplied by a vector of coefficients β_r plus a random residual of ϵ which has a population mean of 0. The same interpretation goes for the fertility of Kazakhs ($\overline{y_k}$). Subtracting $\overline{y_r}$ from $\overline{y_k}$ gets:

$$\overline{y_k} - \overline{y_r} = (\overline{x_k} - \overline{x_r})\beta_r + (\beta_k - \beta_r)\overline{x_k}. \tag{2}$$

The first term on the right-hand side of this equation is easily recognized as the difference in characteristics (therefore the explained component). The second term shows that there is a

[4] https://dhsprogram.com/topics/wealth-index/; for Kazakhstan particularly see https://dhsprogram.com/programming/wealth%20index/Kazakhstan%20DHS%201995/kazakhstan%201995.pdf

[5] $D = 1 - \Sigma\frac{n_i(n_i-1)}{N(N-1)}$, where n is the size of ith ethnicity and N is the total population size.

different return to the coefficient, hence the component for the group effect. If the first term can entirely explain the difference in the outcome variable between two groups, β_k would equal β_r. As Fairlie (2005) shows, the sample mean is the predicted probability when all independent variables are at the mean. With slight modification, subsequent studies have proposed an extension of the original B–O decomposition to accommodate nonlinear regressions (Fairlie, 2005; Kim, 2013; Powers et al., 2011; Yun, 2005).

In this study, we first showed the bivariate associations between ethnicity and all the variables to showcase the fertility patterns associated with minority status. Next, variables informed by individual-level characteristics hypotheses and context-level racial stratification theory, along with control variables, sequentially entered multilevel Poisson regression. Finally, we used the modified B–O decomposition by Bauer and Sinning (2008) to decompose Poisson regressions into the portion explained by covariates and an unexplained group-effect portion. Analyses were conducted in the environment of Stata 15.

4 | RESULTS

4.1 | Descriptive statistics

We first compared the differences in several variables between Russians and Kazakhs to gain background knowledge of the fertility differential. In Table 1, Russians and Kazakhs differ significantly in almost every indicator despite a history of coexistence for nearly 300 years in Central Asia. First of all, confirming previous findings on the R-K fertility differential, sampled Russian females had a much lower average number of children ever born than Kazakhs (1.39 < 1.8, $p < 0.001$). A graph of age-specific fertility rate in Figure 1 clearly shows the suppressed fertility rate among Russians at almost all ages except for teenage. Furthermore, the R-K fertility differential cannot be a result of proximate determinants alone because Russians, despite having lower fertility rate, ironically underwent a longer time since their first intercourse (13 vs. 9.2 years). Russian females are also more likely to be currently married (65% vs. 62%) or divorced/widowed (16% vs. 9%).

Regarding contextual ethnic composition, both groups live in ethnically concentrated contexts. The community of a Russian respondent has on average 61% Russians, while the community of a Kazakh respondent has only 22% Russians. This phenomenon is not merely a numerical tautology because it exists even outside the same community of the surveyed respondent: for a Russian woman, her 1st-degree neighbouring communities featured on average 50% Russians (for a Kazakh respondent, the number is only 31%) and her 2nd degree neighbouring communities had on average 49% Russians (the number is 32% for a Kazakh respondent). Simpson diversity index also registers higher in the communities where a Russian was found, no matter if they are the local community (0.56 > 0.33), or adjacent ones (0.49 > 0.40). For other contextual variables, fewer Russians lived in the countryside, the local wealth, educational, and nonreligious share were all significantly higher for Russians (Table 1).

TABLE 1 Descriptive statistics by ethnicity and mean comparison using two-sample *t* test.

	Kazakh (n = 4482)	Russian (n = 3293)	T value
Individual factors			
Number of children	1.80 (0.03)	1.39 (0.02)	11.39***
Age	29.93 (0.14)	32.31 (0.18)	−10.51***
Education	4.06 (0.01)	4.03 (0.01)	2.71**
Wealth	0.25 (0.004)	0.47 (0.004)	−35.02***
Occupation (%)			
Not working	0.48 (0.01)	0.36 (0.01)	10.70***
Professional	0.24 (0.01)	.24 (0.01)	0.02
Agricultural	0.04 (0.003)	0.02 (0.003)	2.96**
Religion (%)	0.94 (0.01)	0.70 (0.004)	24.31***
Muslim	0.94 (0.004)	0.01 (0.001)	210.0***
Christian	0.01 (0.001)	0.70 (0.01)	−99.8***
Not religious	0.06 (0.003)	0.27 (0.01)	−27.7***
Marital status			
Never married	0.29 (0.01)	0.20 (0.01)	9.89***
Married	0.62 (0.01)	0.65 (0.01)	−2.64**
Divorced/widowed	0.09 (0.004)	0.16 (0.01)	−9.43***
Since last migration	12.89 (0.18)	7.93 (0.20)	18.31***
Years since 1st intercourse	9.21 (0.13)	13.02 (0.16)	−18.64***
Contextual factors			
Local Russian prevalence (%)	0.22 (0.004)	0.61 (0.004)	−66.37***
Russian (%) in 1st degree neighbouring psu	0.31 (0.004)	0.50 (0.004)	−35.93***
Russian (%) in 2nd degree neighbouring psu	0.32 (0.003)	0.49 (0.004)	−32.51***
Local diversity	0.33 (0.004)	0.56 (0.003)	−44.43***
Diversity in 1st degree neighbouring psu	0.40 (0.002)	0.49 (0.002)	−27.54***
Diversity in 2nd degree neighbouring psu	0.39 (0.002)	0.48 (0.002)	−27.31***
Rural residents (%)	0.54 (0.01)	0.26 (0.01)	27.38***
Local wealth	0.27 (0.003)	0.45 (0.004)	−35.26***
Local education	4.02 (0.003)	4.06 (0.004)	−7.32***
Local nonreligious (%)	0.09 (0.002)	0.19 (0.003)	−34.42***

Note: Significance tests are based on Welch's approximation for samples with unequal variance. Standard errors for means in parentheses.

Abbreviation: PSA, primary sampling unit.

*p < 0.05; **p < 0.01; ***p < 0.001.

4.2 | Regression results

Poisson regressions in Table 2 test the effects of fixed effects and randomize the intercept at PSU level. Model 0 lays a baseline comparison in which only ethnicity is included. Being Kazakh yields a positive coefficient of 0.19 ($p < 0.001$) for the number of children. Model 1 features individual-level characteristics. Ethnic identity is still a significant indicator of the number of children, but the magnitude (0.24, $p < 0.001$) has increased from the baseline model. Other individual-level characteristics including educational level, occupation, family wealth, religion, marital status, and length since the first intercourse are, to varying degrees, significantly associated with the number of children. However, collectively, these individual characteristics did not explain, nor did they remotely reduce the puzzle of, the R-K differential because the effect size of the Kazakh coefficient has increased from 0.19 to 0.24. This means the racial gradient in fertility became even more pronounced after these

TABLE 2 Multilevel Poisson regression on number of children.

	Model 0		Model 1		Model 2	
	Coefficient	s.e.	Coefficient	s.e.	Coefficient	s.e.
Kazakh (ref = Rus.)	0.19***	0.02	0.24***	0.06	0.21***	0.06
Age			−0.004	0.003	−0.004	0.003
Education			−0.04**	0.01	−0.03	0.02
Wealth			−0.48***	0.04	−0.30***	0.06
Occupation (ref = others)						
Professional			0.05*	0.03	0.04	0.02
Unemployed			−0.01	0.02	−0.01	0.02
Agricultural			0.16***	0.04	0.15**	0.04
Religion (ref = no religion)						
Muslim			0.15**	0.05	0.12*	0.05
Christian			−0.02	0.03	−0.02	0.03
Others			0.04	0.11	0.05	0.11
Marital status (ref = never married)						
Married			3.69***	0.13	3.69***	0.13
Divorced/widowed			3.44***	0.14	3.46***	0.14
Since last migration			0.00	0.00	0.00	0.00
Years since 1st intercourse			0.05***	0.003	0.05***	0.003
Survey wave			0.09***	0.02	0.08***	0.02
Contextual						
Percent Russian					−0.02	0.06
(1st degree adjacent)					−0.14	0.09
(2nd degree adjacent)					−0.01	0.06
Diversity					−0.22***	0.06
(1st degree adjacent)					0.03	0.10
(2nd degree adjacent)					0.09	0.10
Rural percent					0.04	0.03
Average wealth					0.02	0.10
Average education					−0.14*	0.06
Percent nonreligious					0.06	0.10
N1, N2	7775	355	7734	355	7734	355
Log-likelihood	−13,480		−8855.7		−8830.5	
AIC, BIC	26,965	26,986	17,745	17,863	17,711	17,884

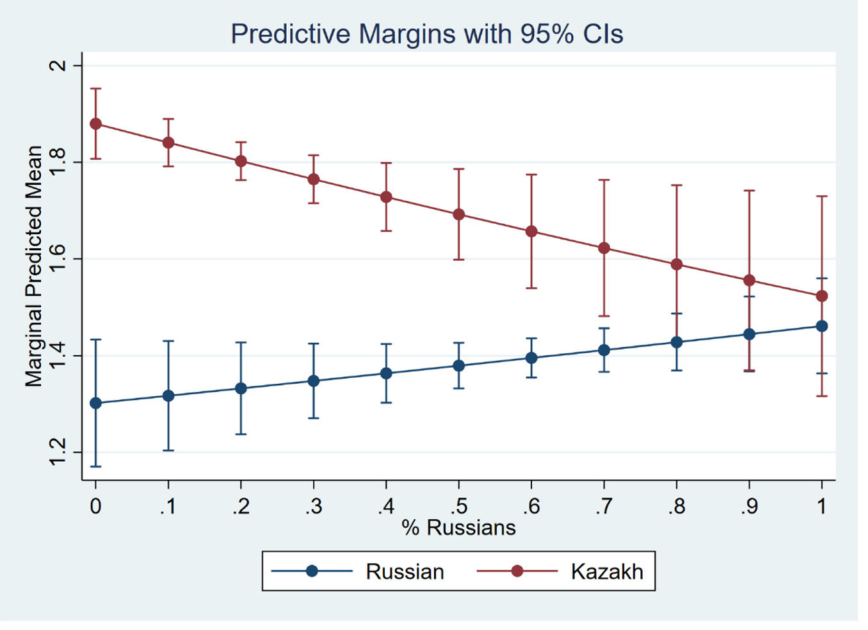
*$p < 0.05$; **$p < 0.01$; ***$p < 0.001$.

TABLE 3 Multilevel Poisson cross-level interaction models.

Cross-level interactions	Cross-level at local stratum		Cross-level with adjacent strata		Cross-level with further strata		Combined	
	Coefficient	s.e.	Coefficient	s.e.	Coefficient	s.e.	Coefficient	s.e.
% Russian (local) × Kazakh	−0.34**	0.12					−0.26*	0.13
% Russian (1st degree adjacent) × Kazakh			−0.33*	0.14			−0.06	0.19
% Russian (2nd degree adjacent) × Kazakh					−0.37**	0.14	−0.20	0.18
Diversity (local) × Kazakh	−0.08	0.12					−0.16	0.13
Diversity (1st degree adjacent) × Kazakh			0.19	0.19			0.14	0.21
Diversity (2nd degree adjacent) × Kazakh					0.21	0.20	0.17	0.21
All main effects (redacted)								
N1, N2	7734	355	7734	355	7734	355	7734	355
Log-likelihood	−8827		−8836		−8837		−8823	
AIC, BIC	17,706	17,879	17,721	17,895	17,723	17,897	17,711	17,940

Note: Ethnicity is a random effect at PSU. All main effects remain as configured in Table 2 model 2, only multiplicative terms are shown.
Abbreviation: PSA, primary sampling unit.
*$p < 0.05$; **$p < 0.01$; ***$p < 0.001$.

FIGURE 2 Predicted number of children by local share of Russians and ethnicity.



characteristics were accounted for. This manifests in that, ironically, Russian females had a longer time since the first intercourse, a bit lower educational level, and were more likely to be currently married.

On top of individual-level characteristics, model 2 introduces variables related to ethnic context. Among them, the local diversity index is negatively associated with the number of children (−0.22, $p < 0.001$) after controlling for the percentage rural, local wealth and educational level, and the percentage nonreligious. Then, we intersected the effect of racial/ethnic identity by contextual ethnic composition. If the effect of ethnicity is contingent on the local ethnic context, these cross-level interaction terms would have a significant effect on the number of children.

In Table 3, results showed that the local context indeed moderates the effect of being a minority member. First, the minority status effect depends on local racial/ethnic composition in terms of minority share. Kazakhs tend to have fewer children in Russian-dominated areas (−0.34, $p < 0.01$), whereas the Russians therein have a greater number of children. Figure 2 shows the marginal predictive

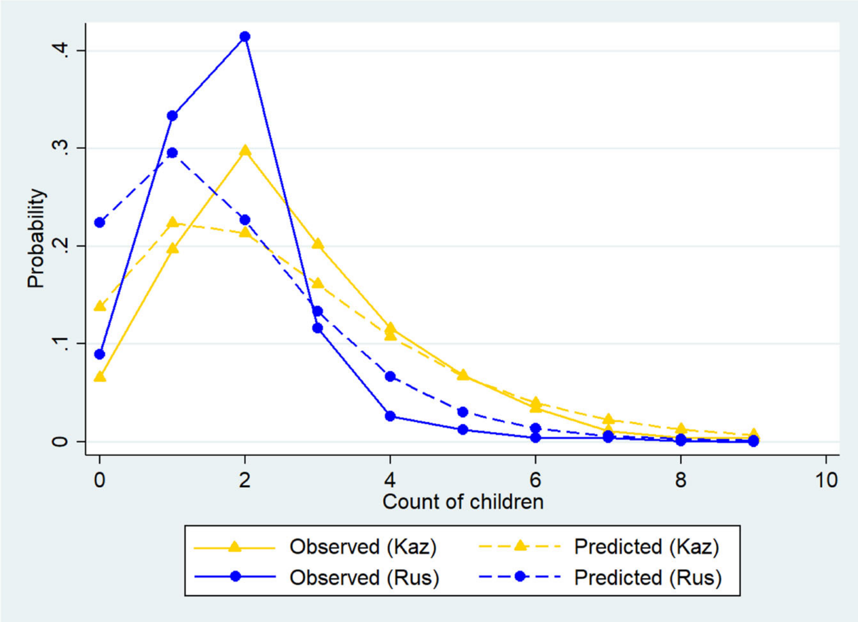


FIGURE 3 Number of children predicted by the model versus observed, by ethnic identity.

value of the number of children by racial identity and the share of Russians. The graph clarifies that the interaction effect is not merely statistically significant, evidenced by the *p* value, but also substantively meaningful. As the share of Russians hikes, Kazakh parity declines and Russian parity increases. This indicates that the fertility rate becomes suppressed when an otherwise majority group, that is, the Kazakhs here, have become a minority group in a place. However, the minority status effect is not contingent on context-level ethnic diversity, as the interaction between the Simpson diversity index and ethnic status is not significant.

It may be argued that Russian-heavy areas are formed as a result of their Russian residents having higher fertility rate. This scenario is unlikely and historically inaccurate because most Russian-heavy areas in Kazakhstan (the north and southeast parts of Kazakhstan) have remained demographically stable and a traditional Russian stronghold since the Tsarist time. Furthermore, even if individuals' fertility behaviour may change the demographic composition of an entire community over the long term, it cannot easily change the demographic composition of adjacent communities. Table 3 shows significant interactions between a woman's ethnic identity and the minority share in communities adjacent to (−0.33, $p < 0.05$) and nearby her own community (−0.37, $p < 0.01$). The overall picture is clear that living among ethnic others suppresses fertility. This final model also well fits the observed data structure. Figure 3 shows that, given our Poisson model specification and choice of parameters, the model-predicted number of children born to Kazakh and Russian women, respectively, approximates the observed distributions.

4.3 | Decomposition results

To quantify the relative contribution from each variable to the R-K fertility differential, we deployed nonlinear B–O decomposition technique to the number of children by ethnicity. Table 4 presents the explained component and unexplained component of the R-K fertility differential as caused by each variable. For interpretive convenience, we will focus on the total percentage explained. The meaning of a positive percentage is self-explanatory and a negative percentage indicates that this variable causes a greater discrepancy in the fertility differential.

Among individual characteristics, we found that greater wealth (15%), certain occupations, being a Muslim (13%) explain some portion in the R-K fertility differential. However, marital status (−3%), length since the first union (−56%) negatively contributed to explaining the differential. As we found in Table 2, Russian women have a lower number of children even when they had a greater length since the first intercourse, and were more likely to be currently married. Again, the B–O decomposition here confirms this paradox.

Among contextual variables, the percentage of Russians in one's community explains as large as 13% of the fertility differential, followed by the percentage of Russians in adjacent communities (7%). Diversity in the local community accounts for 8% of the differential. These ethnic compositional factors collectively explain up to a quarter of the fertility differential (28%). The evidence reinforces racial stratification theory in that the effect of minority status on fertility outcomes reflects not just the aggregated individual characteristics of minority members but also how minorities are relatively positioned in a particular social and demographic context.

4.4 | Temporal sensitivity test using MICS-Kazakhstan 2010–2011 and 2015

The fertility phenomena observed shortly after the independence of Kazakhstan using the KDHS 1995 and 1999 may not hold in the long

TABLE 4 Decomposition of fertility rate into the endowment and the return to coefficient components using the original twofold weighting matrix by Blinder and Oaxaca.

Decomposed target: $y_{kaz} - y_{rus} = 1.806–1.398$	Explained (endowment) component	Unexplained (return to coefficient) component
Individual factors		
Age	0.02	−0.16
Education	−0.003**	0.03
Wealth	0.15***	−0.15*
Occupation (ref = others)		
Professional	0.01*	0.04
Unemployed	−0.00	−0.00
Agricultural	0.005*	−0.00
Religion (ref = no religion)		
Muslim	0.13*	0.00
Christian	0.04	−0.06
Others	0.00	−0.00
Marital status (ref = never married)		
Married	−0.03***	0.02
Divorced/widowed	−0.02***	−0.06***
Since last migration	0.01	0.01
Years since 1st intercourse	−0.56***	1.08***
Survey wave	0.00***	0.09***
Contextual factors		
Percent Russian	0.13**	−0.31**
(1st degree adjacent)	0.07*	−0.18
(2nd degree adjacent)	0.05	−0.11
Diversity	0.08***	−0.12
(1st degree adjacent)	−0.00	0.00
(2nd degree adjacent)	−0.02	0.06
Rural	0.00	−0.08***
Average wealth	−0.04	0.04
Average education	0.01	0.92
Percent nonreligious	−0.02	−0.02
Column total[a]	0.064	0.34
As percentage of total differential	15.7%	84.3%

Note: Standard errors adjusted by clustering at PSU.
Abbreviation: PSA, primary sampling unit.
[a]Column totals may not exactly equal the column sum of all cells due to rounding.
*$p < 0.05$; **$p < 0.01$; ***$p < 0.001$.

TABLE 5 Time sensitivity test using the 2010–2011 and 2015 MICS Kazakhstan data.

	M0	M1	M2	M3
Kazakh (ref = Rus.)	0.31***	0.31***	0.38***	0.33***
Survey year 2015	0.12***	0.12***	0.20***	0.20***
Age			0.05***	0.06***
Education			−0.20***	−0.19***
Wealth			−0.10***	−0.09***
Marital status (ref = married)				
Divorced/ widowed			−0.59***	−0.59***
Never			−1.45***	−1.48***
% Russian				−0.48***
% Russian × Kazakh				−0.24**
N1, N2	26,684, 840	26,684, 840	26,650, 840	26,650, 840
RE			0.03 (0.17)	
Intercept	0.11 (0.31)	0	0.02 (0.15)	0.02 (0.14)
Kazakh		0.14 (0.37)		0.02 (0.11)
AIC, BIC	45,257, 45,287	45,233, 45,277	36,503, 36,585	36,380, 36,476

Note: Multilevel regressions on the number of children with random effect of ethnicity.
*$p < 0.05$; **$p < 0.01$; ***$p < 0.001$.

term, and the emigration of ethnic Russians may slowly alter the landscape of contextual ethnic composition. To test whether our previous models are limited by their temporal context, we conducted a temporal sensitivity test using more recent data from the MICS-Kazakhstan 2010–2011 and 2015 survey years. Table 5 replicated the multilevel regressions with a similar configuration to Table 3, except for the omitted variables unavailable in MICS. In the baseline model 0, adjusting for the survey year, ethnic Kazakhs tend to have 0.31 more children compared with Russians. Model 1 allows for the random variance of the coefficient of ethnicity across census areas, but the fixed effect of being Kazakh did not change. Model 2 added individual-level background controls, showing that educational level, household wealth index, being divorced/widowed and never married were negatively associated with the number of children, while age has a positive effect. The final model with the cross-level interaction (−0.24, $p < 0.01$) between the context-level percentage of Russians and ethnic status indicated that Kazakhs have fewer children in areas with more Russians, and, vice versa, Russians have more children in Russian-heavy areas. The effect size of −0.24 also approximates the figure of −0.26 in Table 3. Overall, contextual ethnic composition's effect on individual fertility is observed in the 21st century Kazakhstan as in the 1990s.

5 | DISCUSSION

Scholars have long noticed across many societies the pronounced fertility differentials between majority and minority groups who live in the same place (Alagarajan, 2003; Chabé-Ferret & Melindi Ghidi, 2013; Espenshade & Ye, 1994; Forste & Tienda, 1996; Kennedy, 1973; Poston et al., 2006). Beyond academic interests, majority-minority fertility differentials are laden with political consequences in multicultural societies as populists count on the perceived threat of a growing minority population for their nativist agenda (Janus, 2013) and many community leaders encourage pronatal behaviours for greater political influence (Aksoy & Billari, 2018; Kaufmann, 2010). Rapid changes in the sizes and power of ethnic groups in post-Soviet Kazakhstan offer an intriguing case that opens the debate of whether individual characteristics or contextual factors can account for the observed fertility differential. Most demographical and sociological theories in the past have focused on the aggregate individual characteristics of a given race or ethnicity, but mounting attention is now paid to how contextual factors affect the fertility implications of racial/ethnic status.

To explain the majority-minority fertility differential, scholars have proposed that individual attributes—such as socioeconomic status—can account for the unique level of fertility in each race/ethnicity. Representative of these theories, the characteristics hypothesis argues that the fertility of a society is influenced by aggregate socioeconomic status (Easterlin, 1975; Kirk, 1996). In this study, we found two indicators of SES characteristics particularly important in determining the R-K fertility differential: wealth index and occupation. Women living in wealthier households and working as professionals had fewer children. Russian women scored higher on both indicators than Kazakhs, which explains why the number of children is lower among Russians. We conclude that individual-level characteristics are important and can partly explain the fertility differential between the majority and minority. However, biologically relevant proximate determinants pose an irony as Russian females actually entered their first intercourse earlier than Kazakhs and were more likely to be currently married. In subsequent decomposition analysis, these proximate determinants exacerbated the R-K differential rather than explaining it.

The existing theories that leverage aggregate socioeconomic or behavioural attributes of racial/ethnic members to explain their observed fertility patterns rely on a hidden assumption: belonging to a specific racial/ethnic group is a fixed identity and certain characteristics are particular to the specific racial group. However, racial stratification theory proposes that the boundary between racial/ethnic groups is fluid, and ramifications of racial identity, including fertility behaviours, often depend on the context that defines and stratifies different races. Thus, minority status must be placed in each context where the varying power and size of the minority groups constitute a background for individuals to decide their childbearing behaviour (Chabé-Ferret & Melindi Ghidi, 2013; Espenshade & Ye, 1994; McDaniel, 1996). Particular context-level factors such as the composition of ethnicities (including their homogeneity, heterogeneity, segregation, and relative share) have an overarching impact on how individuals think and behave. Population geography in recent years also pays increasing attention to how racial/ethnic composition at various spatial levels (neighbourhood, census area, county, etc) has an overarching effects on individual demographical outcomes, including marriage, health, and fertility (Feng et al., 2013; Kim et al., 2020; Puur et al., 2022).

Exploring the moderation role of contextual ethnic composition, measured by minority share and Simpson diversity index, the results from this study strongly support the contextual paradigm. We found that Russian females bore significantly more children in communities and adjacent communities with a greater share of Russians. Kazakh females, on the other hand, had significantly fewer children when their communities and adjacent communities had more Russians. When the share of the Russian minority rose above 80% (which ironically means Russians are no longer a minority in this community), there would be no observed difference in the number of children between Russians and Kazakhs. We also found that context-level ethnic diversity is negatively associated with the number of children for Russians and Kazakhs alike. These contextual ethnic variables explained a significant portion of the R-K fertility differential after accounting for other individual- and context-level characteristics. Sensitivity test using the MICS-Kazakhstan 2010–2011 and 2015 data sets also showed that minority share suppresses the positive effect of being Kazakh on fertility. Similar results from the newer data set indicate that contextual ethnic composition has a lingering effect on the majority-minority fertility differential in Kazakhstan long after the republic's independence into the 21st century. The changes in the social landscape of Kazakhstan, brought by the exodus of ethnic Russians and a shifting power distribution favoring ethnic Kazakhs, may not have altered the fundamental mechanism of how contextual ethnic composition affects an individual's fertility behaviours.

We provide three tentative explanations to link this contextual phenomenon to micro-level processes. First is the security hypothesis: when minorities are numerically and socially outpowered, they may have to invest more in survival and economic stability while postponing childbearing. But they will experience better well-being when seeing a higher share of their group in the local context or less dominance of the majority group (English et al., 2014; Lu & Yang, 2020; Yang et al., 2019). Russians from Russian-heavy areas may perceive better upward mobility and socioeconomic prospects and the intention of child-bearing. We found that an otherwise majority group—the Kazakhs—had suppressed fertility rate when they had become an actual minority group in Russian-heavy contexts. In fact, the slope of the declining Kazakh fertility rate as a function of the portion of Russians in the local community was much steeper than the slope of the rising Russian fertility rate. This evidence espouses a nonessentialist racial identity theory (Smedley, 1998): it is the context-dependent meaning and rich life experiences of being a minority *relative to* the dominant group in a specific living space that influence individuals' sense of security, childbearing intention, upward mobility, and, ultimately, their fertility behaviours. In short, for fertility behaviours, minority status is a context-dependent social construct.

Second, the spatial diffusion process indicates that groups of higher density may exert a multiplicative effect on consolidating social support and pronatalist norms (Agadjanian & Nedoluzhko, 2022; Puur et al., 2022). Because opportunities, concrete rewards, and useful information are intensively transmitted within racialized social networks (McDonald, 2011), more co-ethnic members in the local context implicate stronger social support and norm reinforcement (Yang et al., 2016). As the share of Russians increases, the support network may become more saturated and effective in spreading traditional values; people may subscribe to a more optimistic outlook as told by peers; their desired fertility may increase accordingly.

Third, it may be economically rational to have more children when one belongs to the dominant group. Game-theoretic models with restrictive rationalist assumptions have demonstrated that a specific threshold of population share is desirable for participants in the 'fertility market' (Janus, 2013). If the payoff of having an additional child is a function of the per capita resource possessed by one's own race. Per capita resource is a function of (1) total resource produced by their own race, (2) minus resource transferred to other race, and (3) divided by the size of their own race. The mixed-strategy Nash equilibrium between having or not having an additional child is: $\frac{np - \tau m}{n} = \frac{(n+1)p - \tau(m-1)}{n+1}$, where n is the share of own race, p is a productivity coefficient, τ is a coefficient that determines the transference of resource to another race, m is the share of another race and is complementary of n. Solve the above equation gets -n = m. This inverse ratio suggests a typical zero-sum game where individuals allocate their preference for a child when their group grows in size against others (Osborne, 2004).

This study harkens back to the literature on the majority-minority fertility differential by comparing the case of post-Soviet Kazakhstan with findings from Western settings. Russian minorities are not a disadvantaged minority in the conventional sense due to their historical privileges and higher socioeconomic status today. The fertility competition strategy deployed by many underprivileged minorities in electoral democracies would not appropriately apply (Greenhalgh, 1990; Janus, 2013). But the Russian minorities in post-Soviet Kazakhstan do not either follow the fertility pattern of dominant racial/ethnic groups—usually with a delayed first union and later start of childbearing (Frank & Heuveline, 2005). This study revealed that Russian females had an earlier first intercourse and their age-specific fertility rate peaked earlier than the Kazakhs. The ambiguity of the relative positions of racial/ethnic groups on the racial stratification ladder in Kazakhstan complicates the applicability of the conventional individual-level demographic theories. From this starting point, this study contends that the fertility effects of race/ethnicity must be understood in relation to the ethnic context, rather than as direct results of the characteristics of any racial/ethnic groups.

Some may argue that Russian-dominant areas were caused by individual Russians having more children. However, three reasons render this counterargument less probable. First, the Russian-dominated areas in Kazakhstan have remained demographically stable and a traditional Russian stronghold since the Tsarist time. Second, we showed that the ethnic composition effect has a clustering effect that spills over to the 1st-degree and 2nd-degree adjacent communities. Even taking for granted that individuals can collectively change the ethnic composition of their local context, how their fertility behaviours can possibly change their adjacent communities requires an overstretched speculation. Finally, the same moderation effect of context-level minority share was observed in KDHS from the 1990s and our sensitivity test using MICS data from the 2010s, and contexts are much more recalcitrant to temporal changes than individual behaviours. Taken together, it is more realistic and theoretically robust for context-level ethnic composition to interact with one's racial/ethnic identity to influence fertility behaviour.

6 | CONCLUSION

The case of R-K fertility differential in post-Soviet Kazakhstan offers a rare scenario in which shift in ethnic composition can happen quickly to become consequential for fertility behaviours. Beyond group and individual characteristics, this study has utilized a contextual perspective and demonstrated that context-level ethnic composition is an important dimension that independently contributes to the fertility rate and also interacts with ethnic identity to affect the majority-minority fertility differential. Particularly, ethnic diversity is negatively associated with the number of children for both majority and minority; meanwhile, a greater share of minority in a context is a facilitative condition for the minority to have more children. The findings were also replicated using the MICS data from the 2010s. Overall, this study suggests that the majority-minority fertility differential can be seen as a contextual product resulting from how a local context defines and positions minorities.

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CONFLICT OF INTEREST STATEMENT

The authors declare no conflict of interest.

DATA AVAILABILITY STATEMENT

The data that support the findings of this study are available in the DHS at https://dhsprogram.com/. These data were derived from the following resources available in the public domain: - the DHS Kazakhstan, https://dhsprogram.com/Countries/Country-Main.cfm?ctry_id=19

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