# Fertility of Foreign-Born Women: A Study of Duration-Based Total Fertility Rates[1]

Sam Hyun Yoo[2], Bongoh Kye[3], & Seulki Choi[4]

**ABSTRACT**

South Korea's total fertility rate has dropped below 1.0, placing it among the lowest in the world. While extensive research has examined the fertility behaviors of native-born Koreans, little attention has been given to the fertility patterns of immigrant populations. This study addresses this gap by investigating the fertility levels and trends among immigrant women in South Korea between 2006 and 2020. Utilizing the Own-Children Method on a 20% sample from the 2010, 2015, and 2020 Population Censuses, we estimate the Duration-Based Total Fertility Rate (TFRd) and compare these rates between native-born and foreign-born women. Additionally, we explore fertility differences between first-generation and 1.5-generation immigrants, focusing on their age at migration. By centering on TFRd, this research provides important empirical insights into immigrant reproductive behaviors in a non-Western country that has recently transitioned from being a source of emigration to a destination for immigrants. The findings offer valuable perspectives for other developing countries experiencing similar demographic transitions, highlighting how immigrant fertility adapts in a context of persistently low fertility, and contributing to a deeper understanding of fertility dynamics in increasingly diverse populations.

**Keywords:** immigrant, foreign-born, fertility, duration-based, Korea

---

[1] This study builds upon and extends a section of the research project, "Developing New Fertility Indicators on Subpopulations." We gratefully acknowledge the support of Statistics Korea, whose data and resources made this research possible.

[2] Department of Sociology & Hanyang Institute for Population and Policy Research, Hanyang University, Seoul, South Korea; samyoo@hanyang.ac.kr

[3] Department of Sociology, Kookmin University, Seoul, South Korea; bkye@kookmin.ac.kr

[4] KDI School of Public Policy and Management, Sejong, South Korea; corresponding author, chois@kdischool.ac.kr

## INTRODUCTION

Over the past few decades, South Korea has experienced a significant demographic shift, falling into one of the countries with the lowest fertility rates globally. Its Total Fertility Rate (*TFR*) has fallen below 1.0 since 2018 (Statistics Korea 2024). While considerable academic and policy efforts have focused on understanding Korea's fertility decline—especially the unprecedented drop below a TFR of 1.0—most attention has centered on the fertility behavior of native-born Koreans (e.g., Hwang 2023; Yoon 2016; Ma 2016; Yoo 2014, 2022; Yoo & Agadjanian 2021; Yoo & Sobotka 2018). In contrast, the fertility patterns of immigrant populations have remained largely understudied.

Since the 1990s, South Korea has also seen a marked rise in immigration, further complicating its demographic profile. As the country grapples with persistently low birth rates, there is increasing interest in the fertility behavior of foreign-born women and growing expectations about their potential contribution to alleviating the fertility decline (D.-S. Kim 2008; H. S. Kim 2015, 2018a, 2018b; Ryu 2015; Yoo 2017; Yoo & Ryu 2019). Yet, despite this interest, our understanding of fertility levels and trends among foreign-born women remains limited, mainly due to challenges in tracking fertility behaviors before and after migration, compounded by a lack of robust data.

This study seeks to address this gap by investigating the fertility patterns of immigrant women in South Korea between 2006 and 2020. We employ the Duration-Based Total Fertility Rate (*TFRd*) to provide a more accurate measure of immigrant fertility. We use the 20% sample data from the Population Censuses of 2010, 2015, and 2020 and apply the Own-Children Method. We analyze how fertility behavior of foreign-born women changes with the length of residence in South Korea, considering the roles of adaptation and disruption due to migration. We also compare fertility differences between first-generation and 1.5-generation

immigrants.

This research offers several key contributions. First, it spotlights immigrant women in South Korea, a non-Western, non-English-speaking country that has recently transitioned from a country of emigration to one of immigration. This case offers valuable insights into a demographic trajectory that many other developing countries may follow in the future. Second, the study employs a duration-based Total Fertility Rate (*TFRd*) using the Own-Children Method, which helps to avoid tempo distortions commonly seen in conventional TFR estimates (Kulu et al. 2019). This methodological innovation allows for a more detailed understanding of how immigrant women's fertility changes over time. Finally, the study provides empirical evidence on how fertility levels among immigrant women shift in a country with extremely low fertility. As more countries globally experience low fertility, migration from low-fertility to very-low-fertility contexts is expected to rise (UNDESA 2024), making the South Korean experience an important theoretical case for understanding fertility adaptation mechanisms. With an advanced methods and insights, this study not only enriches the current fertility literature but also sets the stage for future research on immigrant fertility, particularly in non-Western settings.

## BACKGROUNDS

### Theories on Immigrant Fertility

The relationship between migration and fertility is complex, drawing significant interest from demographic researchers. To fully grasp the fertility behaviors of immigrant populations, multiple theories and frameworks are examined. Socialization Hypothesis argues that fertility preferences are shaped during formative years and influenced by the norms of the country of

origin (Kulu 2005). Immigrants carry these preferences into the county of destination, which can initially result in fertility patterns that reflect the norms of their home country. For example, women from countries with higher fertility rates may continue to have larger families even after migrating to South Korea. Otherwise, at least women from countries with higher fertility rates may exhibit relatively higher fertility rates than those from other countries, implying that among immigrant groups, fertility levels differ by their country of origin.

In contrast, the Adaptation Hypothesis posits that over time, immigrants adjust their fertility behaviors align with the norms and practices of the host country (Andersson 2004). In the case of South Korea, where native-born women have very low fertility rates due to economic pressures, career aspirations, and high child-rearing costs, immigrant women may initially exhibit higher fertility, but their birth rates are expected to decline as they integrate into Korean society. The adaptation process is influenced by factors such as length of residence.

The Selection Hypothesis proposes that immigrants are not a random sample of their home country's population. Instead, they are self-selected based on specific characteristics, such as education or employment aspirations. These differences can affect fertility decisions. For instance, immigrant women who migrate for work or to pursue better economic opportunities may prioritize employment over childbearing, resulting in lower fertility (Ichou 2014). On the other hand, those migrating for marriage, particularly to countries like South Korea, may have higher fertility intentions, as marriage often signals a readiness for family formation and childbearing.

Migration is often a disruptive event, interrupting established life trajectories, including family formation and childbearing. The Disruption Hypothesis posits that

immigrant women may delay having children immediately before and after migration due to the instability associated with relocation (Lindstrom & Giorguli Saucedo 2007). This disruption is followed by a period of "catching up," during which immigrants may have more children to compensate for the delay. For instance, marriage migrants in Korea may delay childbearing during the migration process but exhibit higher fertility soon after settling in Korea.

The Life-Course Perspective provides a comprehensive framework for understanding how various life events—migration, marriage, childbirth, and employment—are interconnected and influence fertility decisions over time (Elder 1994). According to this perspective, fertility decisions cannot be understood in isolation but must be examined within the context of broader life trajectories. For immigrant women, the timing of migration, integration into the labor market, and family formation are all crucial factors that shape fertility behavior. As a result, the timing of migration, measured as age at the entry, might make meaningful difference in fertility rates.

There are additional theoretical perspectives on immigrant fertility, such as Assimilation, Pluralist, and Segmented Assimilation Hypotheses (Gordon 1964; Portes & Zhou 1993), which are often used to explain fertility changes across generations in developed countries with long histories of immigration. However, these long-term perspectives may not be fully applicable to South Korea, where large-scale immigration only began in the 1990s.

In sum, a multi-theoretical and interdisciplinary approach is essential for understanding the fertility behaviors of immigrant populations. While each theory offers valuable insights, an integrated understanding is needed to capture the complex interplay between migration and fertility. Theories such as the Socialization, Adaptation, Selection, and Disruption Hypotheses, combined with the Life-Course Perspective, underscore the

importance of examining fertility patterns throughout the migration process and in the context of socio-economic, cultural, and policy factors.

In light of these considerations, hypothetical projections can be made regarding fertility changes throughout the migration process. A significant portion of migrants, particularly those from developing countries with relatively high fertility rates, move to advanced societies where fertility rates are generally lower. These migrants often undergo dynamic fertility-related shifts that include postponing or even forgoing childbearing prior to migration, followed by an attempt to fulfill postponed fertility plans post-migration (see Figure 1). For example, migrants from higher-fertility countries may delay childbearing before moving to the host country, but once settled, they often experience simultaneous union formation (marriage) and childbirth, leading to a concentrated period of higher fertility probability in two or three years after migration.

This pattern of concentrated fertility in the early years following migration complicates the analysis of immigrant fertility. Using traditional measures like TFR, which may capture a short-term spike in fertility, might overestimate immigrant fertility while failing to reflect long-term adaptation trends. Over time, as immigrants settle and integrate into the host society, their fertility rates are expected to gradually align with those of the native-born population. However, the extent and rate of this alignment vary depending on factors such as the level of social adaptation, economic integration, and assimilation within the host country. We expect that immigrant fertility in South Korea peaks in two or three years after migration as in other countries. Consequently, accurately measuring the levels and changes in immigrant fertility is essential, but it remains challenging due to data limitations and the complex nature of immigrant fertility patterns

*Figure 1 is about here*

**Challenges in Studying Immigrant Fertility**

Researching immigrant fertility presents several significant challenges, particularly when using conventional fertility measures like the Total Fertility Rate (TFR). The TFR is calculated by summing the age-specific fertility rates (ASFR) of women in a given population, predicting the average number of children a woman will have during her reproductive years. While the TFR is widely used for native populations, its application to immigrant groups poses specific issues, particularly due to the tempo effect or tempo distortion.

The tempo effect occurs when the timing of childbearing shifts upward or downward, leading to over- or underestimation of the TFR. This effect is especially pronounced in immigrant populations because migration often coincides with prime reproductive years. For instance, immigrant women tend to migrate in their twenties and thirties, a period marked by significant life course events such as marriage, employment, and childbearing. As the Disruption Hypothesis suggested, many immigrant women delay family formation and childbearing prior to migration due to the upheaval caused by relocating. Upon settling in their host country, they may experience a fertility surge or "catch-up" effect, leading to temporarily elevated fertility rates in the years immediately following migration (Toulemon 2004; Sobotka 2008; Parrado 2011; Tønnessen & Mussino 2020). Consequently, the TFR in the early years after migration may reflect this spike in fertility, distorting long-term trends and leading to an overestimation of the overall fertility levels among immigrant women.

In addition to the tempo effect, another challenge in studying immigrant fertility is the heterogeneity of immigrant groups. Immigrant populations are far from homogeneous; they vary by country of origin, migration motives, socio-economic status, and cultural norms. Women from high-fertility countries may exhibit significantly different fertility behaviors

than those from low-fertility countries. Furthermore, their reasons for migration—such as labor migration, family reunification, or marriage—can affect fertility intentions and outcomes. This diversity makes it difficult to generalize findings or establish consistent fertility patterns across different immigrant groups (Ichou 2014; Dubuc 2012).

Furthermore, there is ambiguity regarding the identification of the synthetic cohort in the TFR calculation. The TFR is designed to estimate the average number of children a woman will have over her lifetime based on fertility rates at a particular point in time. However, in the context of immigrant women, identifying this synthetic cohort becomes problematic, as these women may have already had children prior to migration or may delay childbearing until they have settled in the host country (Parrado 2011; Murphy 2016; Robards & Berrington 2016). This challenge leads some scholars to suggest calculating a "TFR excluding immigrant women" to provide a clearer picture of the fertility trends within the native population and assess the "net effect" of immigrant fertility on the overall population's TFR (Sobotka 2008).

Recognizing the limitations of using conventional TFR for immigrant groups, researchers have proposed alternatives such as the Duration-Based Total Fertility Rate (TFRd). Unlike the conventional TFR, which focuses on age-specific fertility rates, the TFRd is calculated based on the length of time immigrant women have resided in the host country. This measure breaks down the duration of residence into one-year intervals, calculating fertility rates for each cohort based on their length of stay (Kulu et al. 2019). The TFRd effectively addresses the tempo distortions often seen in conventional TFR estimates by focusing on how fertility behaviors evolve over time post-migration, thereby offering a more accurate picture of long-term fertility trends.

The concept of TFRd has its origins in marital fertility analysis, where fertility rates

are calculated based on the duration of cohabitation following marriage (Retherford et al. 1984; Hoem & Muresan 2011). Similarly, fertility rates in immigrant populations tend to cluster in the early years following migration. Calculating Duration-Specific Fertility Rates (DSFRs) allows researchers to track these patterns and compute the TFRd. This method is advantageous because it can exclude tempo effects caused by shifts in childbearing timing, thus providing a more stable fertility measure for immigrant women.

In summary, while conventional fertility measures like TFR are useful, their application to immigrant groups presents significant challenges due to tempo distortions, heterogeneity within immigrant populations, and difficulties in identifying synthetic cohorts. The TFRd, by focusing on the duration of residence, offers a promising alternative that accounts for these complexities and provides a clearer understanding of immigrant fertility behaviors.

**Immigrant Fertility in South Korea**

Research on immigrant fertility in South Korea has grown significantly in recent years, but it remains relatively underdeveloped compared to countries with longer immigration histories, such as the United States, Canada, and the United Kingdom. Initial studies indicate that foreign-born women, particularly those who migrate for marriage, tend to exhibit higher fertility rates than native-born Korean women. This pattern has been attributed to cultural norms in the countries of origin, where larger families are more common (Ryu 2015). However, more recent research, which accounts for socio-economic factors like education, employment, and income, shows mixed results. Some studies suggest that when these factors are considered, immigrant women's fertility rates are comparable to or even lower than those of native-born women (D.-S. Kim 2008; H. S. Kim 2015).

The challenge in understanding immigrant fertility stems in part from the heterogeneity of immigrant groups. Immigrants come from diverse countries and have different migration motives—some arrive for work, others for marriage, and their fertility behaviors vary accordingly. These complexities make it difficult to generalize findings across the entire immigrant population. Moreover, the definition of "immigrant" in South Korea, particularly under the Multicultural Families Support Act, has influenced how fertility data is interpreted. The law primarily focuses on marriage migrants, often overlooking fertility behaviors that occurred before migration or outside of marriage, leading to an incomplete understanding of immigrant fertility trends.

Over the past two decades, research methodologies have evolved, moving away from simple comparisons of fertility rates between native-born and immigrant women. More sophisticated analyses, such as event history analysis, take into account the life course and duration of residence, offering deeper insights into how fertility behaviors change over time. However, studying aggregate fertility rates among immigrants remains challenging due to varying definitions of "immigrant" and the limitations of available data. In South Korea, immigration is still a relatively recent phenomenon, and the changing composition of immigrant groups further complicates the task of accurately measuring fertility patterns (Sobotka 2008).

Despite the complexities, it is clear that immigration has played a critical role in reshaping South Korea’s demographic landscape. However, foreign-born women’s fertility trends increasingly align with the country’s low fertility norms, suggesting that migration alone cannot resolve the fertility decline. Further research and more nuanced policy approaches are needed to fully understand and address the fertility patterns of immigrant women in Korea.

## DATA & METHODS

### Data

The data used for this study come from the 20% sample of the Population Censuses conducted in 2010, 2015, and 2020, made available by Statistics Korea (Statistics Korea, 2022a). These censuses provide comprehensive demographic, social, and economic information for all residents in South Korea, including both native-born and foreign nationals. The dataset includes crucial variables for analyzing fertility patterns among foreign-born women, such as birth nationality, current nationality, and, most importantly, the year of entry into South Korea.

The inclusion of foreign nationals in the census enables a more nuanced exploration of fertility trends within immigrant populations. Additionally, the data provide information on the relationship to the head of the household, which allows for the identification of children and their mothers within households. This is a key variable for applying the Own-Children Method (OCM), as it enables the accurate linking of children with their biological mothers. Other critical variables include age and sex, which are necessary for calculating age-specific fertility rates (ASFR).

The year of entry is particularly important for this study because it enables the calculation of duration-specific fertility rates (DSFR) and the estimation of the Duration-Based Total Fertility Rate (TFRd) for immigrant women. By analyzing the data over three census years, 2010, 2015, and 2020, this study captures longitudinal changes in fertility behaviors, allowing for a dynamic analysis of how fertility evolves with the length of residence in South Korea.

## Methods

This study employs a combination of the Own-Children Method (OCM) and the Duration-Based Total Fertility Rate (TFRd) to estimate fertility rates among foreign-born women and analyze how their fertility behaviors change over time. This approach addresses the limitations of conventional TFR measures by considering the duration of residence and the impact of migration on fertility.

### *Own-Children Methods (OCM)*

The Own-Children Method (OCM) is a well-established indirect method for estimating fertility in populations where detailed birth history data are not available. This method works by identifying children within a household and matching them to their mothers based on household identifiers and demographic characteristics such as age and sex (Grabill & Cho 1965; Retherford & Cho 1978). The process begins by identifying all children under the age of 15 within a household, who are then matched to their biological mothers using the relationship-to-household-head variable. This matching process ensures that each child is linked to their mother, allowing for the estimation of fertility rates.

Once children are matched to their mothers, the next step is to estimate the number of births that occurred within the preceding years. Because the census does not provide direct birth history information, OCM uses survival ratios from standard mortality tables to estimate how many children were born and survived until the census date. The method adjusts for the fact that not all children born in earlier years will have survived to be counted in the census.

Using the matched mother-child pairs, the age-specific fertility rates (ASFR) are

calculated by determining the number of children born to women of different age groups during a specific time period. The ASFR estimates provide fertility rates for each age group, which can be summed to produce the Total Fertility Rate (TFR) for the population under study. This method allows us to estimate fertility levels for both native-born and foreign-born women, even in the absence of detailed birth histories, by back-calculating fertility from the current population of children. OCM enables the estimation of fertility rates for up to 14 years before the census, offering a retrospective view of fertility trends.

Previous studies have shown that the accuracy of fertility estimates decreases the further back in time they are from the point of the survey (Abbasi-Shavazi 1997; Avery et al. 2013; Reid et al. 2020). In this study, we reduce errors by matching children aged 0-4 at the time of the survey and estimating fertility rates up to four years prior to the survey. This method has been applied to estimating immigrant fertility in diverse settings (Abbasi-Shavazi & McDonald 2000; Hacker 2003; Dubuc 2009, 2012; Coleman & Dubuc 2010; Scalone & Dribe 2017). It has also been successfully used to estimate the fertility rates of foreign-born women in South Korea using the same approach (Yoo 2017).

*Figure 2 is about here*

*Duration-Based Total Fertility Rate (TFRd)*

The Duration-Based Total Fertility Rate (TFRd) is calculated specifically for foreign-born women based on the length of their residence in South Korea. While conventional TFR measures focus on age-specific fertility rates, the TFRd accounts for the duration of residence by calculating fertility rates according to the number of years that foreign-born women have lived in South Korea. This method is particularly useful for immigrant populations, where

fertility behaviors are influenced not only by age but also by the time spent in the host country.

The process of calculating the TFRd begins by grouping foreign-born women into duration cohorts based on their length of residence in South Korea. The year of entry variable from the Population Census is used to calculate how long each foreign-born woman has been living in South Korea, measured in one-year intervals. Duration cohorts are categorized accordingly, starting from 0-1 years and extending up to a maximum of 34 years.

For each duration cohort, the Duration-Specific Fertility Rate (DSFR) is calculated. The DSFR represents the number of children born to women within a specific cohort during their time in South Korea. This is analogous to age-specific fertility rates, but the key difference is that it is based on the number of years since migration rather than age. The formula for calculating DSFR involves dividing the number of births (B) by the number of women (W) in the cohort:

$$DSFR_d = \frac{B_d}{W_d}$$

Where *B* and *W* represent the number of births and the population of immigrant women for each duration *d*, respectively. Once the DSFR values are calculated for all duration cohorts, the Duration-Based Total Fertility Rate (TFRd) is obtained by summing the DSFR values across all cohorts. The TFRd formula is as follows:

$$TFRd = \frac{B_0}{W_0} + \frac{B_1}{W_1} + \frac{B_2}{W_2} + \cdots + \frac{B_{34+}}{W_{34+}} = \sum_{d=0}^{34+} \frac{B_d}{W_d} = \sum_{d=0}^{34+} DSFR_d$$

This formular provides the total fertility rate for the foreign-born population, accounting for the duration of residence in South Korea. By focusing on duration-specific fertility, the TFRd offers a clearer understanding of how fertility behaviors evolve as immigrant women spend

more time in the host country.

In addition to calculating the overall TFRd, this study also disaggregates the data by generation to capture differences in fertility patterns among 1.0-generation immigrants (those who migrated at age 15 or older) and 1.5-generation immigrants (those who migrated before age 15). This distinction is important because women who migrate at different life stages are likely to experience different adaptation processes, which can influence their fertility behaviors. The 1.5-generation immigrants, who arrive as children or adolescents, may be more likely to adopt the fertility norms of the host country compared to 1.0-generation immigrants, who arrive as adults (Kulu et al. 2019). By examining these two groups separately, the study provides insights into how migration at different stages of life impacts reproductive behavior.

The use of TFRd offers several advantages over conventional TFR. First, it accounts for the migration effects that are often missed in conventional TFR measures, such as the fertility spike that frequently occurs shortly after migration, as well as the gradual alignment with host country fertility norms over time. Second, the TFRd mitigates tempo distortions, which occur when there are shifts in the timing of childbearing, a common issue among immigrant populations. By focusing on the duration of residence, rather than solely on age, the TFRd provides a more stable measure of fertility, particularly in the context of dynamic immigrant populations.

**Analytical Plan**

The analytical plan for this study involves several key steps. First, we compare the estimated TFR and TFRd for native-born and foreign-born women to highlight differences in fertility

patterns between the two groups. This comparison provides a baseline understanding of how immigrant fertility differs from that of the native population. Next, we analyze how fertility changes with the length of residence, using the TFRd to track shifts in fertility behavior over time. This analysis focuses on identifying patterns of initial high fertility, followed by gradual declines as immigrants adapt to South Korean social and economic conditions. Finally, we explore differences in fertility between 1.0-generation and 1.5-generation immigrants, examining how migration at different life stages influences reproductive decisions.

By using both the OCM and TFRd methods, this study provides a comprehensive analysis of immigrant fertility in South Korea, offering insights into how migration, adaptation, and duration of residence shape fertility patterns in this rapidly changing demographic landscape.

## RESULTS

The Own-Children Method (OCM) was applied to the 20% sample data from the Population Census of Korea to estimate both the Total Fertility Rate (TFR) and the Duration-Based Total Fertility Rate (TFRd) for native-born and foreign-born women. The population census includes foreign nationals who have resided in the country for over three months, whereas the resident registration-based population typically excludes foreigners. To account for this discrepancy, all women, including foreign nationals, were categorized based on their birth nationality as either native-born or foreign-born. Foreign-born women encompass both naturalized citizens and foreigners who were born outside of Korea. The analysis specifically distinguishes between first-generation immigrants—those who were 15 years or older at the time of immigration—and 1.5-generation immigrants—those who immigrated before the age of 15. This distinction is important because calculating the duration-based fertility rates

(TFRd) for women who migrated before reaching reproductive age (i.e., before 15 years old) may introduce distortions, as their duration in the host country would include years before they became biologically capable of childbearing.

**(Age-Based) Total Fertility Rate (*TFR*)**

The initial step of the analysis involved calculating conventional TFR for both native-born and foreign-born women. This was done using the OCM, and the results were compared with official statistics from the Korean Statistical Office (KOSTAT), which relies on birth registration and mid-year resident population data. The TFR estimates derived from the OCM closely aligned with KOSTAT's official figures, with only minor discrepancies noted in 2010 and 2015. The difference in TFR between the two sources was less than 0.05, and by 2015, the difference had become negligible. This consistency demonstrates that the OCM provides a reliable estimate of TFR, particularly when specific birth history data for foreign-born women are unavailable.

When examining the fertility rates of native-born and foreign-born women, it becomes clear that, although the number of foreign-born women in South Korea has increased in recent years, their share of the overall female population remains relatively small. Consequently, the overall TFR in South Korea from 2016 to 2020 was largely driven by the fertility behavior of native-born women. Foreign-born women initially exhibited a notably higher TFR compared to their native-born counterparts, with a peak TFR of 3.673 in 2007. This spike in fertility rates can be linked to the large number of international marriages during this period, particularly between foreign-born women and Korean men, which reached their highest levels in 2005. However, from 2007 onward, the TFR for foreign-born women began to decline steadily, reaching a low of 1.001 by 2020.

The correlation between the peak in TFR and international marriage trends is evident, as the peak in births follows the high rate of international marriages by about two years—the typical timeframe between marriage and the first birth in many families. Age-specific fertility rates for both native-born and foreign-born women between 2006 and 2020 demonstrate that the average age of childbirth has increased over time, while overall fertility has decreased. In contrast, age-specific fertility rates for foreign-born women were less stable, primarily due to their smaller population size, which introduces greater variability in statistical measures. This is further illustrated in Figures 3 and 4, which depict these fertility trends across both groups.

*Figure 3 & 4 are about here*

The fertility of foreign-born women was further divided based on their age at the time of immigration. This distinction is particularly important as women who immigrated at younger ages, particularly during adolescence, exhibit different fertility patterns compared to those who arrived during adulthood. As a result, TFR was calculated separately for foreign-born women who were 15 or older at the time of immigration (first-generation immigrants) and those who were younger than 15 (1.5-generation immigrants). For the first-generation group, the TFR was slightly higher than the overall TFR for foreign-born women until the early 2010s, after which the rates became similar. In contrast, 1.5-generation immigrants displayed more volatile fertility patterns due to their smaller population size. Notably, from 2017 to 2020, the TFR for 1.5-generation immigrants was consistently lower than that of both first-generation immigrants and native-born women, as shown in Figure 5.

*Figure 5 is about here*

**Duration-Based Total Fertility Rate (*TFRd*) of Foreign-Born Women**

The Duration-Based Total Fertility Rate (TFRd) of foreign-born women provides further insights into fertility trends. The TFRd is based on the duration of stay in South Korea, allowing for a more detailed analysis of fertility changes over time following immigration. The Duration-Specific Fertility Rates (DSFRs) for first-generation immigrants were calculated in two-year intervals from 2006 to 2020, and the results reveal that fertility rates were highest within the first one to two years of residence, followed by a gradual decline as the duration of stay increased. This pattern continued until 2010, after which DSFRs declined sharply across most duration cohorts. By 2020, fertility rates for foreign-born women who had been in the country for 0-6 years had dropped significantly. This decline in fertility rates can be attributed to several factors, including a decrease in international marriages, travel restrictions and separations due to the COVID-19 pandemic, and the resulting economic instability, all of which likely contributed to lower fertility among foreign-born women during this period.

*Figure 6 & 7 are about here*

The TFRd, which aggregates fertility rates across all duration cohorts up to 34+ years after immigration, shows a slow decline over time, reaching 0.712 in 2020. This is consistently lower than the conventional TFR for first-generation immigrants during the observation period, highlighting the impact of tempo distortions—when fertility timing is shifted upward or downward—on conventional fertility measures. The TFRd offers a more accurate estimate of the expected number of children born to first-generation immigrants over

the course of their residence in Korea. The data suggest that, on average, first-generation immigrant women gave birth to fewer than one child after 2012, emphasizing the long-term trend of declining fertility among foreign-born women.

In addition to overall duration, the age at immigration plays a critical role in influencing fertility patterns. Women who immigrated at younger ages generally exhibited higher fertility rates in South Korea. As shown in Figure 8, women who immigrated between the ages of 20 and 24 had the highest TFRd, averaging 1.106 children, while those who arrived at age 40 or older had the lowest fertility rates, averaging just 0.028 children. This finding suggests that younger immigrant women are more likely to engage in family formation and childbearing after settling in Korea, whereas older immigrant women may have already completed childbearing before migrating or are less likely to have children after moving to Korea. Interestingly, women who immigrated between the ages of 15 and 19 showed lower fertility rates (TFRd of 0.826) compared to their 20-24-year-old counterparts, but still had higher fertility rates than women who immigrated at older ages. These trends underscore the importance of both age and duration of stay in understanding fertility patterns among foreign-born women.

*Figure 8 & 9 are about here*

## DISCUSSION AND CONCLUSION

This study set out to measure and better understand the fertility behaviors of immigrant women in South Korea, employing both conventional Total Fertility Rate (TFR) and the Duration-Based Total Fertility Rate (TFRd) to account for migration-specific factors. By

using data from the 20% sample of population censuses and birth registrations, we traced fertility trends among both native-born and foreign-born women between 2006 and 2020.

One of the key findings is that the fertility rates of foreign-born women have experienced a sustained decline since 2007. This decline is consistent whether measured by the conventional TFR or the more nuanced TFRd. Early in the observation period, foreign-born women had significantly higher fertility rates than their native-born counterparts, but by 2020, their TFR had dropped to around 1.0, aligning closely with the rates of native-born women. This trend was particularly pronounced for women aged 15-34, where the most significant drop occurred between 2007 and 2015.

For first-generation immigrants—women who were 15 years or older at the time of migration—the decline in fertility was especially notable. Their TFRd, which accounts for the time they have spent in Korea, was consistently lower than their conventional TFR, indicating the presence of tempo distortions. These distortions often arise when fertility behaviors shift due to the timing of migration, and the TFRd offers a clearer picture of how first-generation immigrant women adjust to their new context. On average, first-generation immigrant women had fewer than one child between 2012 and 2020 after settling in Korea, highlighting their increasingly low fertility.

Interestingly, the highest fertility among first-generation immigrants occurred in the first few years after migration, after which the rates steadily declined as the length of their stay increased. Fertility rates in the first five years after migration dropped between 2006 and 2020, with women who migrated at younger ages showing a higher average number of children born after immigration. This suggests that younger immigrant women are more likely to have children in Korea, while older immigrants are less likely to do so.

The study's use of the duration-based fertility measure (TFRd), as recommended by Kulu et al. (2019), provides a valuable alternative to the conventional TFR in understanding the fertility behaviors of immigrant women. By excluding tempo distortions, this approach helps reveal the true fertility levels of immigrant populations, which might otherwise be obscured by migration-related timing shifts. Despite data constraints, this research offers important insights into the fertility trends of both native and foreign-born women, aligning the observed long-term fertility decline of immigrant women with similar trends in Western countries like the UK, Norway, and the USA (Parrado & Morgan 2008; Coleman & Dubuc 2010; Dubuc 2012).

It is also notable that the TFRd for first-generation immigrant women has been consistently lower than that of native-born women since the late 2000s, dipping below 1.0 by 2012. The convergence of fertility rates between foreign-born and native-born women is a rare phenomenon, and one plausible explanation for this crossover is the selection effect. With the increasing global popularity of Hallyu (K-pop and K-dramas), South Korea has seen an influx of young people from around the world seeking work or study opportunities. This has diversified immigration patterns, which were once dominated by labor migrants and marriage migrants from China and Southeast Asia. As more students and professionals arrive in Korea with little focus on marriage or childbearing, the overall fertility rate among immigrants has declined, driven by a demographic shift toward younger, career-focused individuals less likely to have children.

While these shifts provide a compelling explanation for the observed fertility trends, other factors must also be considered. Demographic changes among immigrant women, assimilation processes, and the declining fertility rates in their countries of origin could all

contribute to the observed patterns. Further research is necessary to unpack these dynamics more fully.

Ultimately, the findings of this study emphasize the importance of using appropriate fertility measures when analyzing immigrant populations. Traditional TFR calculations, while useful, are susceptible to distortions caused by changes in childbearing timing, particularly for migrant women. The duration-based measure (TFRd) offers a more accurate reflection of fertility trends by correcting for these distortions and allowing researchers to capture the true fertility behaviors of immigrant women. Moving forward, it is essential that fertility indicators are used judiciously, tailored to the specific research questions and population groups under study, in order to gain a clearer understanding of fertility dynamics in increasingly diverse societies.

**REFERENCES**


Abbasi-Shavazi, M. J. (1997) “An assessment of the own-children method of estimating fertility by birthplace in Australia.” *Journal of the Australian Population Association* 14(2): 167-185.

Abbasi-Shavazi, M. J. and McDonald, P. (2000) "Fertility and multiculturalism: Immigrant fertility in Australia, 1977–1991." *International Migration Review* 34(1): 215-242.

Alba, R. and Nee, V. (1997) “Rethinking assimilation theory for a new Era of immigration.” *International Migration Review* 31(4): 826-874.

Andersson, G. (2004) “Childbearing after migration: Fertility patterns of foreign-born women in Sweden.” *International Migration Review* 38(2): 747-774.

Avery, C., St. Clair, T., Levin, M., and Hill, K. (2013) “The ‘Own Children’ fertility estimation procedure: A reappraisal.” *Population Studies* 67(2): 171-183.

Baykara-Krumme, H. and Milewski, N. (2017) “Fertility patterns among Turkish women in Turkey and abroad: The effects of international mobility, migrant generation, and family background.” *European Journal of Population* 33(3): 409-436.

Bongaarts, J., and Feeney, G. (1998) “On the quantum and tempo of fertility.” *Population and Development Review* 24(2): 271-291.

Bongaarts, J., and Sobotka, T. (2012) “A demographic explanation for the recent rise in European fertility.” *Population and Development Review* 38(1): 83-120.

Canudas-Romo, V. (2003) *Decomposition Methods in Demography*, Rozenberg Publishers: Amsterdam, Netherlands.

Carter, M. (2000) “Fertility of Mexican immigrant women in the US: A closer look.” *Social Science Quarterly* 81(4): 1073-1086.

Cho, L. J., Retherford, R. D. and Choe, M. K. (1986) *The own-children method of fertility estimation,* Honolulu, HI: Population Institute.

Choe, M. K., and Retherford, R. D. (2009) “The Contribution of Education to South Korea’s Fertility Decline to Below ‘Lowest-Low’ Level.” *Asian Population Studies* 5(3): 267-288.

Coleman, D. A., and Dubuc, S. (2010) “The fertility of ethnic minorities in the UK, 1960s-2006.” *Population Studies* 64(1): 19-41.

Dubuc S. (2016) “Immigrants and ethnic fertility convergence in the UK: the role of global fertility transition and intergenerational social integration.” chapter 5, *Changing population of Britain,* edited by Tony Champion and Jane Falkingham. Rowan Littlefield International Editions.

Dubuc, S. (2009) “Application of the Own-Children Method for estimating fertility by ethnic and religious groups in the UK.” *Journal of Population Research* 26(3): 207-225.

Dubuc, S. (2012) “Immigration to the UK from high-fertility countries: Intergenerational adaptation and fertility convergence.” *Population and Development Review* 38(2): 353-368.

Dudel, C., and Klüsener, S. (2021) “Male–female fertility differentials across 17 high-income countries: Insights from a new data resource.” *European Journal of Population* 37(2): 417-441.

Gans, H. J. (1992) “Second-Generation Decline: Scenarios for the Economic and Ethnic Futures of the Post-1965 American Immigrants.” *Ethnic and Racial Studies* 15(2): 173-192.

Goldstein, S., and Goldstein, A. (1981) “The impact of migration on fertility: An ‘own children’ analysis for Thailand.” *Population Studies* 35(2): 265-284.

Gordon, M. M. (1964) *Assimilation in American Life,* Oxford University Press.

Grabill, W. R. and Cho, L. J. (1965) “Methodology for the measurement of current fertility from population data on young children.” *Demography* 2(1): 50-73.

Hacker, J. D. (2003) “Rethinking the “early” decline of marital fertility in the united states.” *Demography* 40(4): 605-620.

Hervitz, H. M. (1985) “Selectivity, adaptation, or disruption? A comparison of alternative hypotheses on the effects of migration on fertility: The case of Brazil.” *The International Migration Review* 19(2): 293-317.

Hinde, A. (1998) *Demographic methods*, London: Arnold.

Hoem, J. M. and Mureşan, C. (2011) “The total marital fertility rate and its extensions.” *European Journal of Population* 27(3): 295-312.

Hwang, J. (2023). Later, Fewer, None? Recent Trends in Cohort Fertility in South Korea. *Demography*, *60*(2), 563–582. https://doi.org/10.1215/00703370-10585316

Impicciatore, R., Gabrielli, G. and Paterno, A. (2020) “Migrants’ fertility in Italy: A comparison between origin and destination.” *European Journal of Population* 36(4): 799-825.

Kahn, J. R. (1988) “Immigrant selectivity and fertility adaptation in the United States.” *Social Forces* 67(1): 108-128.

Kim, D.-S. (2008). “Effects of Foreign Wife Status and Social Capital on Fertility.” *Korea Journal of Population Studies* 31(3): 1-26. (in Korean)

Kim, H. S. (2015). “A Study on Fertility Differentials between Koreans and International Marriage Families.” *Health and Social Welfare Review* 35(1): 427-454. (in Korean)

Kim, H. S. (2018a). “A Study on Fertility Differentials among Korean Wives and Foreign Wives: Theorizing and Testing Effect Heterogeneities by Countries of Origin.” *Health and Social Welfare Review* 38(2): 42-70. (in Korean)

Kim, H. S. (2018b) “Fertility differentials between Korean and international marriage couples in South Korea.” *Asian Population Studies* 14(1): 43-60.

Kulu, H. (2005) “Migration and fertility: Competing hypotheses re-examined.” *European Journal of Population* 21(1): 51-87.

Kulu, H. and Milewski, N. (2007) “Family change and migration in the life course: An introduction.” *Demographic Research* 17(19): 567-590.

Kulu, H., Milewski, N., Hannemann, T., and Mikolai, J. (2019) “A decade of life-course research on fertility of immigrants and their descendants in Europe.” *Demographic Research* 40(46): 1345-1374.

Mayer, J. and Riphahn, R. T. (2000) “Fertility assimilation of immigrants: Evidence from count data models.” *Journal of Population Economics* 13(2): 241-261.

Milewski, N. (2007) “First child of immigrant workers and their descendants in West

Germany: Interrelation of events, disruption, or adaptation?" *Demographic Research* 17(29): 859-896.

Milewski, N. (2010) "Immigrant fertility in West Germany: Is there a socialization effect in transitions to second and third births?" *European Journal of Population* 26(3): 297-323.

Milewski, N. (2011) "Transition to a first birth among Turkish second-generation migrants in Western Europe." *Advances in Life Course Research* 16(4): 178-189.

Murphy, M. (2016) "The effect of long-term migration dynamics on population structure in England & Wales and Scotland." *Population Studies* 70(2): 149-162.

Parrado, E. A. (2011) "How high is Hispanic/Mexican fertility in the United States? Immigration and tempo considerations." *Demography* 48(3): 1059-1080.

Parrado, E. A., and Morgan, S. P. (2008) "Intergenerational fertility among Hispanic women: New evidence of immigrant assimilation." *Demography* 45(3): 651-671.

Pollak, R. A. (1986) "A reformulation of the two-sex problem." *Demography* 23(2): 247-259.

Portes, A. and Zhou, M. (1993) "The new second generation: segmented assimilation and its variants among post-1965 immigrant youth." *Annals of the American Academy of Political and Social Science* 530(1): 74-96.

Poston, D. L., Chang, C. F. and Dan, H. (2006) "Fertility differences between the majority and minority nationality groups in China." *Population Research and Policy Review* 25(1): 67-101.

Reid, A., Jaadla, H., Garrett, E. and Schürer, K. (2020) "Adapting the Own Children Method to allow comparison of fertility between populations with different marriage regimes." *Population Studies* 74(2): 197-218.

Retherford, R., Cho, L.-J. and Kim, N.-I. (1984) "Census-derived estimates of fertility by duration since first marriage in the Republic of Korea." *Demography* 21(4): 537-558.

Retherford, R.D., and Cho, L.J. (1978) "Age-parity-specific birth rates and birth probabilities from census or survey data on own children." *Population Studies* 32(3): 567-581.

Robards, J. and Berrington, A. (2016) "The fertility of recent migrants to England and Wales." *Demographic Research* 34(36): 1037-1052.

Ryu, J. K. (2015). “Fertility Differentials between Foreign Wives and Korean Wives: A Focus on Total Fertility Rate and Birth interval.” *Korea Journal of Population Studies* 38(3): 49-73. (in Korean)

Scalone, F. and Dribe, M. (2017) “Testing child-woman ratios and the own-children method on the 1900 Sweden census: Examples of indirect fertility estimates by socioeconomic status in a historical population.” *Historical Methods* 50(1): 16-29.

Schoen, R. (1983) “Relationships in a simple harmonic mean two-sex fertility model.” *Journal of Mathematical Biology* 18(3): 201-211.

Schoumaker, B. (2019) “Male fertility around the world and over time: How different is it from female fertility?” *Population and Development Review* 45(3): 459-487.

Shyu, E., and Caswell, H. (2018) “Mating, births, and transitions: a flexible two-sex matrix model for evolutionary demography.” *Population Ecology* 60(1): 21-36.

Sobotka, T. (2008) “The rising importance of migrants for childbearing in Europe.” *Demographic Research* 19(9): 225-248.

Statistics Korea (2021). "Vital Statistics of Immigrants in 2020" Press Release (November 8, 2021). (in Korean)

Statistics Korea (2022a). Population and Housing Census 20% samples microdata (restricted access detailed data) [Data set] doi: 10.23333/R.101001.001

Statistics Korea (2022b). “Birth Statistics in 2021” Press release (August 24, 2022). (in Korean)

Tønnessen, M. (2020) “Declined total fertility rate among immigrants and the role of newly arrived women in Norway.” *European Journal of Population* 36(3): 547-573.

Tønnessen, M. and Mussino, E. (2020) “Fertility patterns of migrants from low-fertility countries in Norway.” *Demographic Research* 42(31): 859-874.

Toulemon, L. (2004) “Fertility among immigrant women: New data, a new approach.” *Population and Societies* 400: 1-4.

US Census Bureau. (2022) “About the Foreign-Born Population.” Retrieved from https://www.census.gov/topics/population/foreign-born/about.html#par_textimage

Wilson, B. (2019) “The intergenerational assimilation of completed fertility: Comparing the convergence of different origin groups.” *International Migration Review* 53(2): 429-457.

United Nations Department of Economic and Social Affairs, Population Division (2024). *World Population Prospects 2024: Summary of Results* (UN DESA/POP/2024/TR/NO. 9).

Yoo, S. H. (2014). Educational differentials in cohort fertility during the fertility transition in South Korea. *Demographic Research*, *30*, 1463–1494.

Yoo, S. H. (2017). “The Fertility Level of Migrant Women in South Korea: Understanding the Puzzle” *Korea Journal of Population Studies* 40(1): 29-55. (in Korean)

Yoo, S. H. (2022). “Total number of births shrinking faster than fertility rates: Fertility quantum decline and shrinking generation size in South Korea.” *Asian Population Studies*, 1–22. https://doi.org/10.1080/17441730.2022.2054090

Yoo, S. H., & Agadjanian, V. (2021). “The paradox of change: Religion and fertility decline in South Korea.” *Demographic Research*, *44*(23), 537–562.

Yoo, S. H. and Ryu, J. (2019). “Intermarriage and Divorce in South Korea.” *Korea Journal of Population Studies* 42(2): 25-50. (in Korean)

Yoo, S. H., and Sobotka, T. (2018) “Ultra-low fertility in South Korea: The role of the tempo effect.” *Demographic Research* 38(22): 549–576.

Yoon, S.-Y. (2016). Is gender inequality a barrier to realizing fertility intentions? Fertility aspirations and realizations in South Korea. *Asian Population Studies*, 1–17. https://doi.org/10.1080/17441730.2016.1163873

Zhou, M. (1997) “Segmented Assimilation: Issues, Controversies, and Recent Research on the New Second Generation.” *International Migration Review* 31(4): 975-1008.

**FIGURE 1. Theoretical Outlook on Changes in Fertility Before and After Immigration**

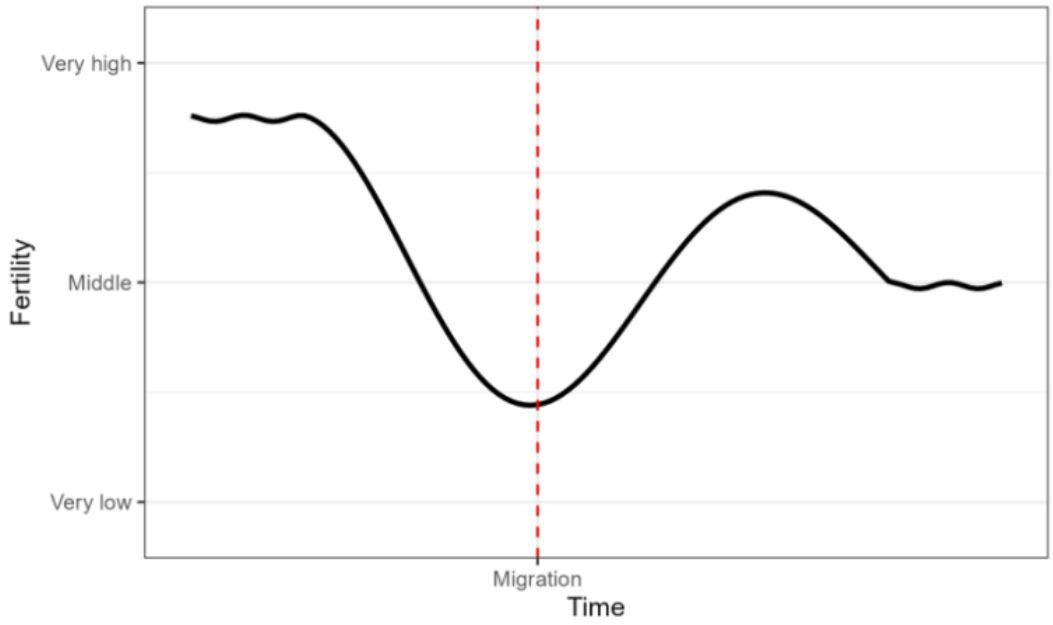
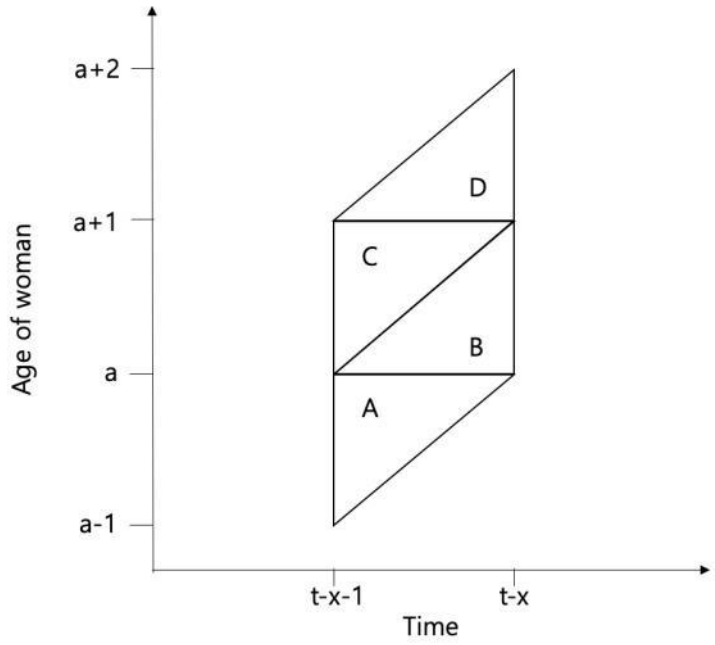


**FIGURE 2. Estimation of Age-Specific Fertility Rates Using the Own-Children Method: An Example in Lexis Diagram**

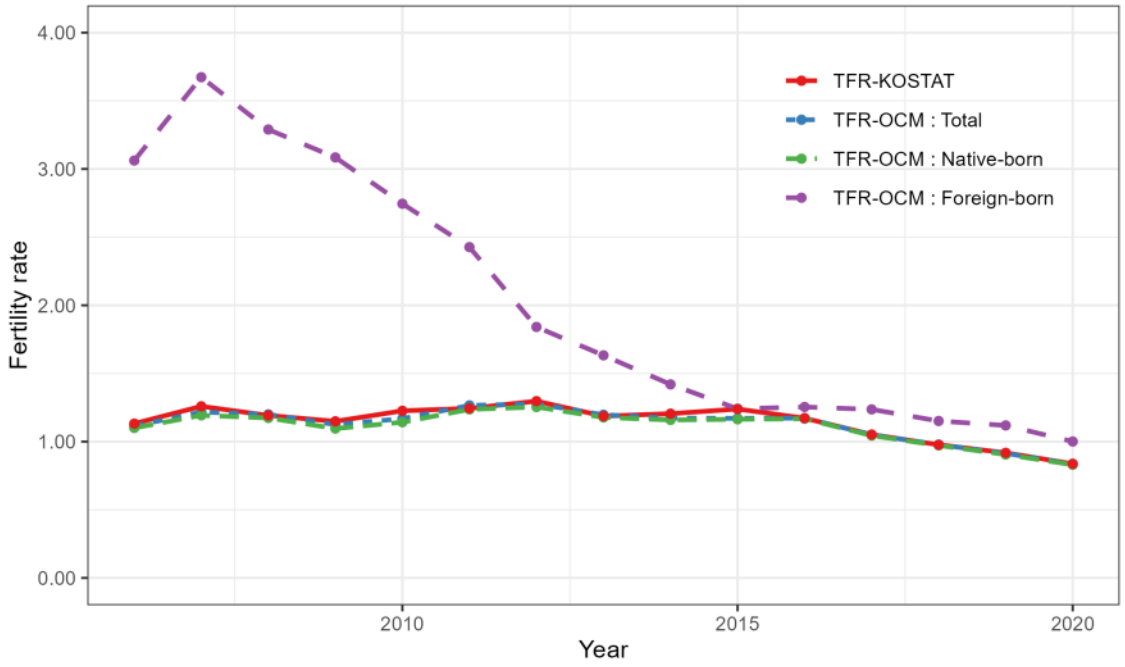



*Note*: 1) The estimation of age-specific fertility rates for women aged X at the time of the Population Census survey year uses populations of women and children of age X.

2) The number of births in square BC can be calculated as half the sum of parallelogram AB and CD; the average age population of women in square BC is calculated as the average of the population at the beginning of the year on the left side of BC and the population at the end of the year on the right side of BC.

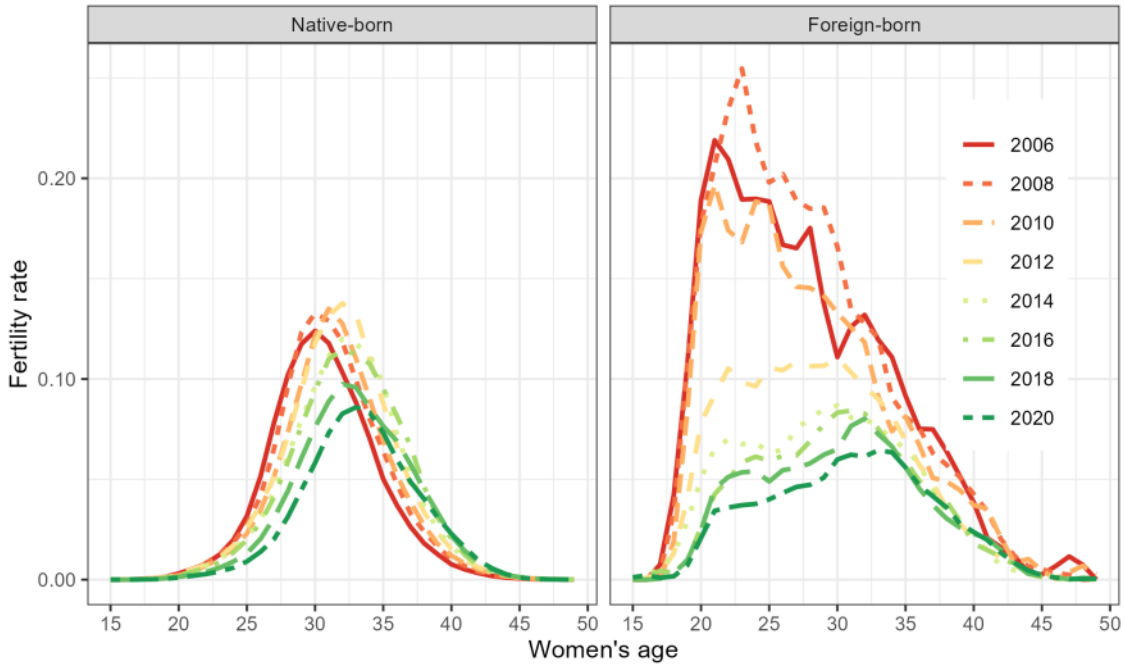
Source: Retherford and Cho(1978: 570).

**FIGURE 3. Comparison of the KOSTAT Total Fertility Rate and Group-Specific Total Fertility Rates, 2006-2020**



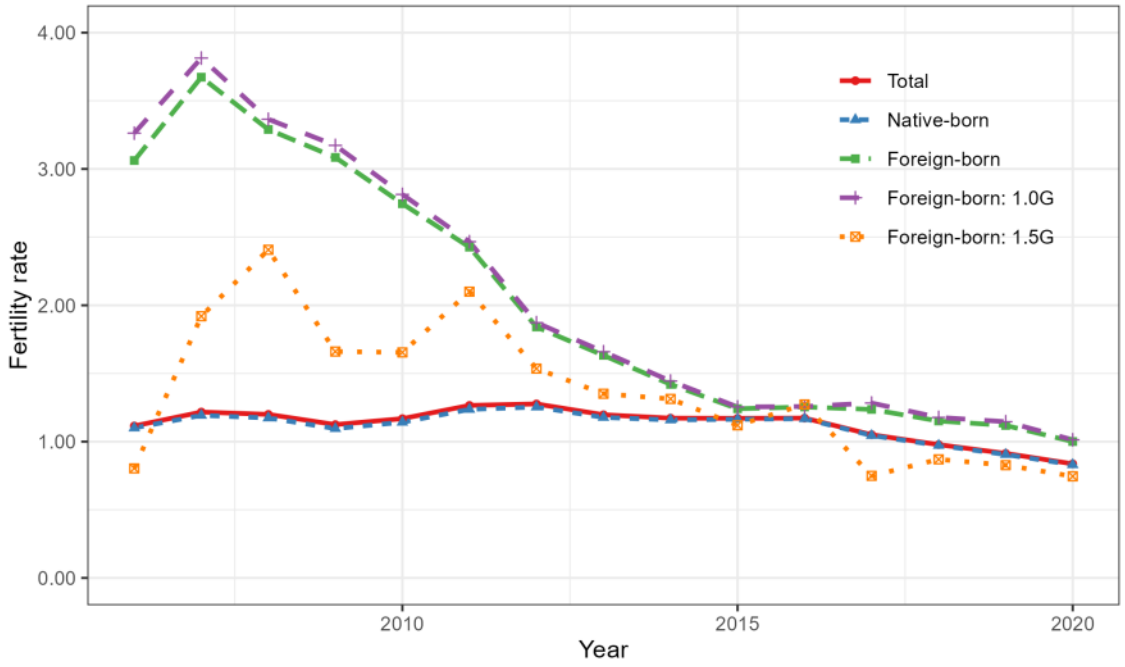

*Source*: TFR-KOSTAT is the Total Fertility Rate from the Korean Statistical Office (kosis.kr); TFR-OCM is the group-specific Total Fertility Rates based on the Population Census samples data in 2010, 2015, and 2020.

**FIGURE 4. Age-Specific Fertility Rates of Native-Born and Foreign-Born Women, 2006-2020**




*Source*: Own computations based on the Population Census samples data in 2010, 2015, and 2020.

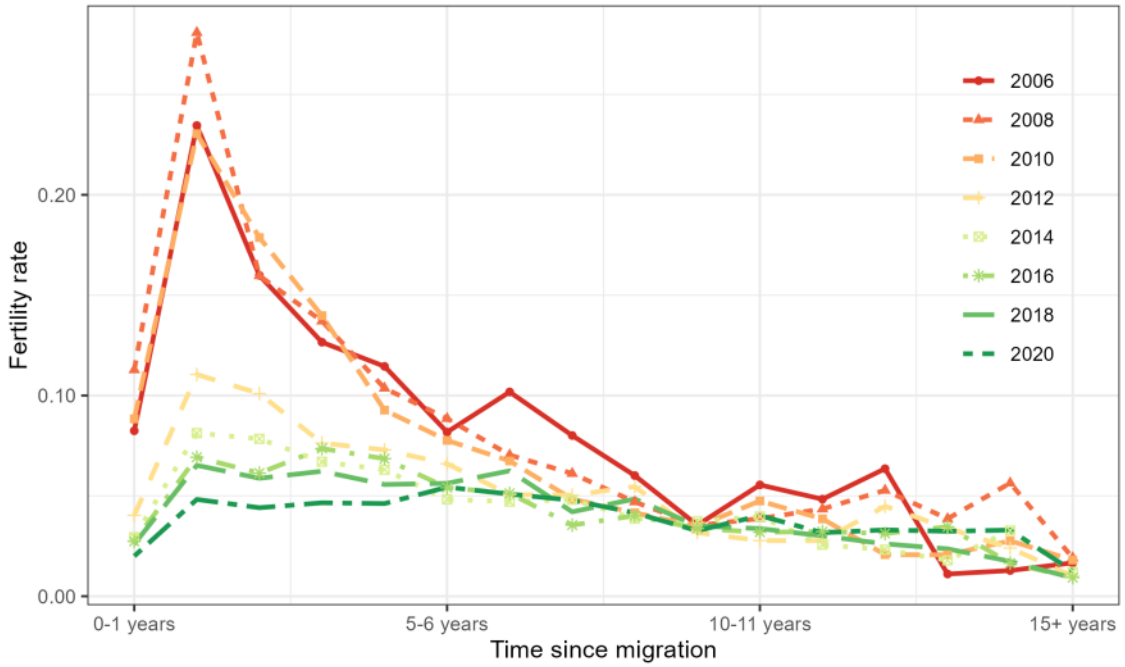
**FIGURE 5. Total Fertility Rates of Foreign-Born and Immigrant Generational Women, 2006-2020**




*Note:* For all women (total), native-born women, all foreign-born women, foreign-born 1.0 generation women, and foreign-born 1.5 generation women; The distinction between the foreign-born 1.0 and 1.5 generations is based on age at entry, either above or below 15 years (see the text).

*Source*: Own computations based on the Population Census samples data in 2010, 2015, and 2020.

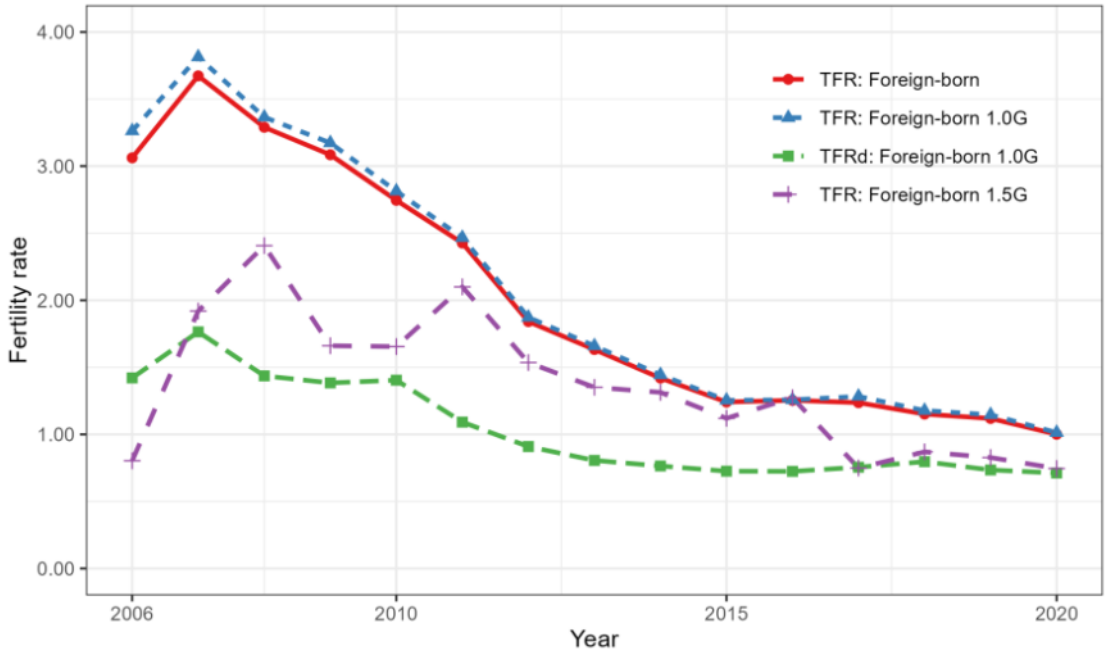
**FIGURE 6. Fertility Rates by Duration After Immigration for 1.0 Generation Immigrant Women, 2006-2020**




*Note:* The data were aggregated for the years spanning 2006 to 2020 and focus on female immigrants who were 15 years or older at the time of their entry.

*Source*: Own computations based on the Population Census samples data in 2010, 2015, and 2020.

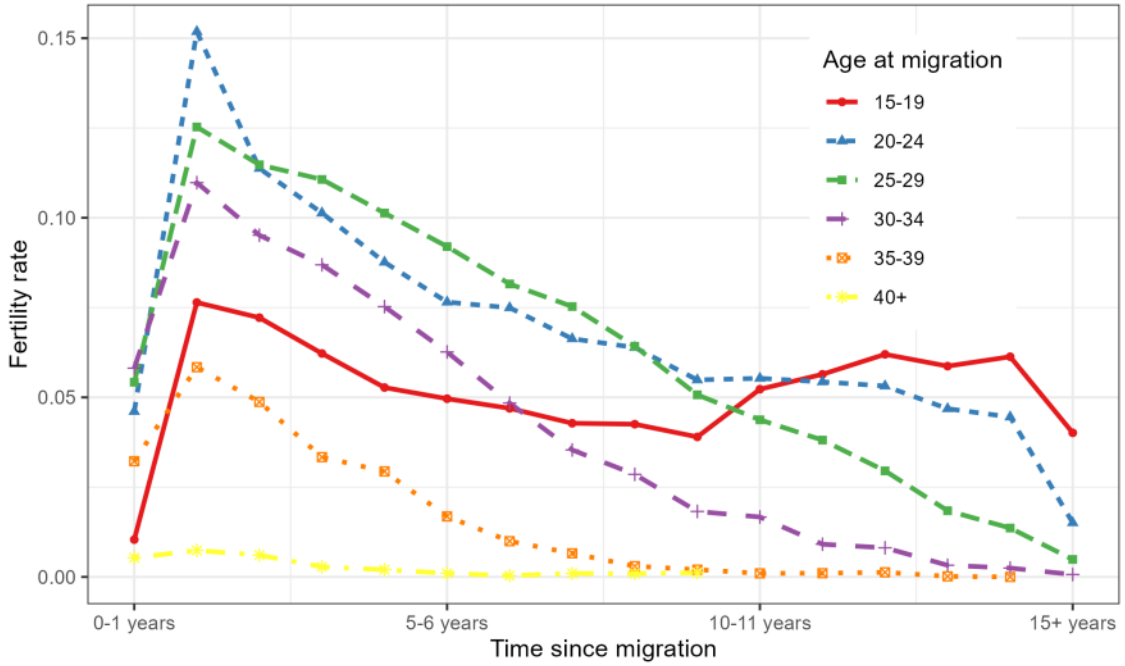
**FIGURE 7. Total Fertility Rate (TFR) and Duration-Based Fertility Rate (*TFRd*) Across Immigration Generations of Foreign-Born Women, 2006-2020**




*Note:* The data were aggregated for the years spanning 2006 to 2020 and focus on female immigrants who were 15 years or older at the time of their entry; The 1.0 generation of immigrants includes foreign-born women who were 15 years or older at the time of their entry, whereas the 1.5 generation includes those who were under 15 years of age upon entry.

*Source*: Own computations based on the Population Census samples data in 2010, 2015, and 2020.

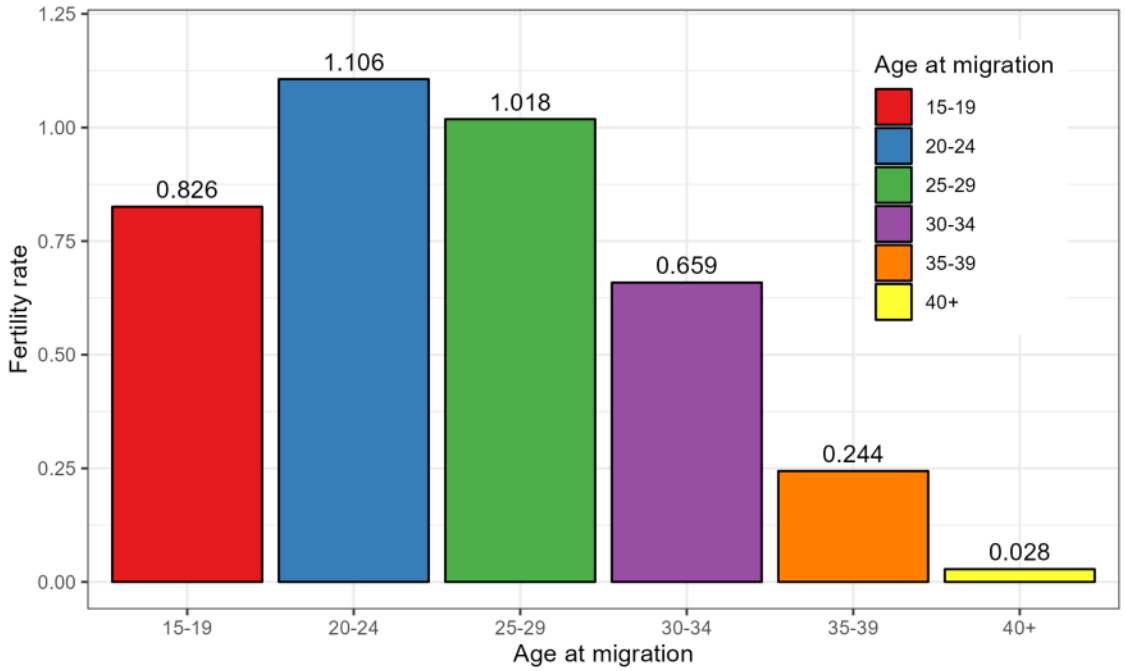
**FIGURE 8. Period-Specific Fertility Rate by Age at Time of Entry for 1.0 Generation Immigrant Women, 2006-2020**




*Note:* The data were aggregated for the years spanning 2006 to 2020 and focus on female immigrants who were 15 years or older at the time of their entry.

*Source*: Own computations based on the Population Census samples data in 2010, 2015, and 2020.

**FIGURE 9. Duration-Based Total Fertility Rate by Age at Time of Entry for 1.0 Generation Immigrant Women, 2006-2020**




*Note:* The data were aggregated for the years spanning 2006 to 2020 and focus on female immigrants who were 15 years or older at the time of their entry.

*Source*: Own computations based on the Population Census samples data in 2010, 2015, and 2020.