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What Drives Female Fertility in the Philippines? Evidence from 50 Years of National Demographic and Health Surveys

Michael R.M. Abrigo and Katha Ma-i M. Estopace

CONTACT US:

RESEARCH INFORMATION DEPARTMENT
Philippine Institute for Development Studies

18th Floor, Three Cyberpod Centris - North Tower
EDSA corner Quezon Avenue, Quezon City, Philippines

publications@pids.gov.ph
(+632) 8877-4000

https://www.pids.gov.ph

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Michael R.M. Abrigo
Katha Ma-i M. Estopace

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Abstract

We trace the drivers of the Philippines' fertility decline over the last fifty years culminating in 2022 with a below-replacement 1.9 total fertility rate. Applying a modified Kitagawa-Oaxaca-Blinder decomposition on the combined experiences of about 65,000 married women in six rounds of the Philippine National Demographic (and Health) Survey, we show that the most effective contraceptives may not necessarily be delaying marriage or raising modern contraceptive use. Our analyses indicate that the greatest driver of fertility decline over the last half century in the Philippines is improving material measures of well-being, with marriage and contraceptive use playing only secondary roles. While raising female fertility in the future may be a possibility, this will not likely go significantly above replacement levels. Population ageing is an imminent reality for the Philippines.

Keywords: fertility, population, decomposition, Philippines

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What Drives Female Fertility in the Philippines? Evidence from 50 Years of National Demographic and Health Surveys

Michael R.M. Abrigo☼ and Katha Ma-i M. Estopace[1]

1. Introduction

The Philippines' total female fertility rate has recently reached below-replacement level (Philippine Statistics Authority and ICF 2023), joining many advanced economies in the region and elsewhere around the world with fertility levels below 2.1 births per woman. This bodes both future promises and challenges for the country. On the one hand, declining fertility is associated with improved human capital investments per child, thereby improving labor productivity and opening up economic opportunities for future workers. On the other hand, the ensuing declining share of prime age adults in an ageing society may threaten social protection systems, especially when these entitlements are funded primarily through levies on labor income.

Understanding the nature and causes of fertility decline therefore is important to predict future trends in fertility levels and its likely consequences. While having below-replacement fertility rates may not necessarily be welfare-diminishing or may even be economically optimal in some contexts (Lee et al. 2014), ultra-low fertility of below 1.3 births per woman may lead to very rapid demographic change. Social institutions that had been designed to cope with issues arising from such drastic population shifts generally lag behind.

The determinants of female fertility have been largely well known (e.g., Bongaarts 1978; Lee 2020). However, their relative contributions to fertility change, which may vary depending on context (Lee 2020), are not as well studied. This is particularly important in the case of the Philippines, where its total fertility rate (TFR) declined by 0.8 births per woman over a course of five years, when historically the rate of decline had been about 0.5 every decade. Can this be due to timing effects as a result of pandemic jitters from the 2020 COVID-19 global pandemic? Or could this be due to changes in the country's education system that has grown by leap and bounds over the last decade? Alternatively, has the expansion of health financing and reproductive health services over the last decade caused this non-trivial decline in fertility? Are there other causes yet to be discovered? Assessing the contribution of these sources is important in gauging the effectiveness of these interventions, as well as in designing possible remediation policies when necessary.

This study employs a modified Kitagawa-Oaxaca-Blinder decomposition to partition the contribution of different factors affecting female fertility in the country over the last fifty years. The results suggest that the most effective contraceptives may not necessarily be family planning as may be popularly envisioned. Our estimates show that expanding household material measures of well-being, as proxied by an assets index, over the course of five decades have resulted in one less birth per mother, followed only by contributions of increased family planning use and changes in marriage age patterns, which respectively averted about 0.7 births per woman over the same period. Improving child survival and the changing ideal number of

[1] Fellow II and Research Analyst II, respectively, at the Philippine Institute for Development Studies. The authors are grateful for insightful comments and discussion by Marife M. Ballesteros, Aubrey Tabuga, and other participants in the 2023 PIDS Research Workshop Series. All remaining errors are by the authors.
☼ Corresponding author

children also significantly reduced female fertility but at much lower rates of about 0.3 births per woman, respectively.

We contribute to the literature along a number of dimensions. First, by taking a long view we are able to correlate observed fertility trends with important shifts in public policies, economic opportunities, and social outlook that may have had affected household fertility decisions. Within a few years after the government's signing of the 1967 United Nations Declaration on Population, the Commission on Population, the precursor of the modern Commission on Population and Development, was created to recommend, coordinate and evaluate programs on population and development. This began the country's foray on integrating population issues in its wider national development agenda. In 2012, after years of attempts, the government finally legislated the Responsible Parenthood and Reproductive Health Act that provides for universal and free access to comprehensive reproductive health services, including contraceptives, among others.[2]

Other policy innovations may also have had influenced household fertility decisions. In health, for example, the government signed the 1979 Alma Ata Declaration on Primary Health Care, which emphasized community participation in the equitable distribution of health care. This was the impetus for the creation of the cadre of barangay health workers who provides various health promotion and education services in their communities. The 1995 Local Government Code devolved basic health care functions to local governments, including maternal and child care, with the view of making government services more responsive to local needs. In the education front, innovations in the last decade, including mandating senior high school education and providing free tertiary education, may directly influence fertility decisions by delaying marriage and raising the opportunity cost of women's time.

Second, unlike previous local studies that relied on aggregated indices to decompose fertility rate change (e.g., Concepcion and Smith 1977; Cruz 2008; Majumder and Ram 2015), our analyses employ individual level data that allow us to include both proximal and distal factors in explaining the trend in female fertility. Earlier studies have incorporated more distal factors, such as socioeconomic status, education and urbanicity, in their decomposition by employing sub-group estimates of Bongaart's (1978) proximate fertility indices. Our use of individual level data in a linear regression framework provides us an opportunity to not only include a more varied set of explanatory variables, but also to tease out the contribution of these different factors while controlling for potential simultaneity and omitted variable biases in the model.

The results highlight the need to better understand drivers of female fertility decisions in order to design and implement meaningful interventions. While we have uncovered important drivers of fertility trend across time and by age group, our decomposition only explains about two-thirds of the observed decline in female fertility in the last five decades. This leaves a non-trivial 1.4 averted births per woman in the last half century unexplained by our model. This clearly sets a future research agenda to unbundle the remaining causes of fertility decline.

Third, we employed a one-year reference period to calculate age-specific fertility rates (ASFRs), instead of the five- or three-year exposure time used in the country's official statistical system. The longer exposure time theoretically provides tighter confidence bounds on the estimated ASFRs and therefore also the TFR for the same sample size. However, this

[2] See Herrin (2002) for a review of the country's population policy from the 1960s to early 2000s. See Abrigo et al. (2021), Saquing and Nordan (2021) and Ulep et al. (2021) for a review of the Responsible Parenthood and Reproductive Health Act implementation.

comes at a cost of smoothing ASFR and TFR estimates over the reference period, potentially masking important discontinuities induced by real world events, such as the introduction of new policies, including free tertiary education or compulsory senior high school education, or of global economic shocks, including the recent COVID-19 pandemic.

We show that TFRs calculated using a one-year reference period based on around 7,000 to 16,000 married women per survey round provide relatively precise national estimates, with coefficients of variation ranging between 2.1- to 2.5-percent. This provides an opportunity to estimate ASFRs and TFRs using the same survey but with finer temporal disaggregation to capture the dynamism in household fertility decisions.

The rest of the study is organized as follows. In the next section, we discuss the long-term trends in female fertility, and proximal and distal factors that could potentially have had influenced the former's decline. This is followed in Section 3 with a description of the modified Kitagawa-Oaxaca-Blinder decomposition and the data that we employed in this study. We present the results in Section 4. Finally, we conclude the study with a brief summary and some implications for policy and practice.

2. Trends in Philippine age-specific fertility rates (ASFRs) and correlates

Female fertility rates have declined across all age groups in the Philippines over the last 50 years (see Table 1). The largest decline may be observed among younger women, with the ASFR of those aged 25 to 29 dropping the highest at about 20 births per hundred women over the course of five decades. Even adolescent fertility rate has been halved, decreasing to 2.2 births per hundred women by 2022. In turn, this has resulted in a more symmetric ASFR distribution by age compared with previous years that had been skewed towards younger women.

The country's TFR has remained principally due to births by ever-married women.[3] This is despite ever-married TFR declining by about half over the last five decades. In 1973, a married woman may expect to give birth to about ten children over her lifetime following the then prevailing period ASFRs. This has decreased to about five births per ever-married women by 2022. Never-married TFR, on the other hand, has remained low in comparison, although appears to be increasing over the last 30 years.

The decrease in ever-married TFR coincides with a parallel decline in age-specific marital rates. In the 1970s, for example, about half of women aged 20 to 24 had already been married or were in marriage-like unions. This rate has gone down to less than 30 percent in 2022 among women of the same age. These together have ultimately contributed to the decline in the Philippine female TFR in the last half century.

Changes in public policies, economic opportunities, and social outlook, in turn, may have contributed to the declining trends in marriage and in marital fertility. Focusing on the sample of ever-married women, estimates from 50 years of the National Demographic (and Health) Surveys in the Philippines suggest an encouraging increasing trend in consistent contraceptives use, and declining trend in early coital and marital initiation (see Table 2). In 1973, only 12 percent of ever-married women have had used their first family planning method over two years prior to the survey. This has increased to 55 percent by 2003. In 2003, only 27 percent of

[3] This includes both legally sanctioned marriage and marriage-like unions (e.g., pre-marriage cohabitation).

ever-married women have had been consistently using their current family planning method for at least two years, which have gone up to 36 percent by 2022.

Table 1. Age-specific fertility and never-married rates (%): Philippines, 1973-2022

	1973	1983	1993	2003	2013	2022
A. ASFR, all women						
15 - 19	4.1	4.6	4.7	5.0	4.9	2.2
20 - 24	23.0	21.1	18.1	15.6	13.6	7.4
25 - 29	32.0	23.4	20.5	17.5	16.0	11.2
30 - 34	28.8	19.8	18.9	15.7	13.6	10.6
35 - 39	20.3	14.7	12.9	9.8	9.1	5.5
40 - 44	12.6	8.7	5.9	4.8	3.5	2.2
45 - 49	2.7	1.2	0.6	0.6	0.6	0.2
B. ASFR, never married women						
15 - 19	…	…	0.0	0.3	0.8	0.5
20 - 24	…	…	0.6	1.4	2.3	0.5
25 - 29	…	…	0.6	1.2	1.6	1.2
30 - 34	…	…	0.9	0.0	2.3	1.0
35 - 39	…	…	0.0	0.0	0.0	0.4
40 - 44	…	…	0.0	0.0	0.0	0.1
45 - 49	…	…	0.0	0.0	0.0	0.0
C. ASFR, ever married women						
15 - 19	37.6	32.8	44.5	39.5	39.8	30.3
20 - 24	46.2	38.7	40.2	34.2	28.9	24.3
25 - 29	40.8	29.6	28.0	23.9	22.4	16.8
30 - 34	32.6	22.4	21.6	18.5	15.7	12.7
35 - 39	22.1	16.0	14.1	10.8	10.1	6.2
40 - 44	13.5	9.3	6.3	5.1	3.8	2.4
45 - 49	2.9	1.3	0.7	0.6	0.6	0.2
D. Age-specific never-married rate						
15 - 19	89.1	85.8	89.5	88.2	89.5	94.1
20 - 24	50.2	45.5	55.7	56.7	57.6	71.0
25 - 29	21.5	21.0	27.3	28.3	30.9	35.9
30 - 34	11.6	11.9	13.4	14.7	15.8	18.0
35 - 39	8.0	8.0	8.7	9.4	10.1	12.9
40 - 44	7.3	7.0	7.2	7.1	8.2	8.1
45 - 49	6.7	6.7	6.2	6.1	7.2	8.9

Source: Authors' calculation based on various rounds of the ND(H)S (all panels) and decadal Census of Population (Panels A and C). Note: ASFRs are based on a one-year reference period. Age-specific never married rate are based on Census of Population, except for 2022 where NDHS is used. ASFRs for 1973 and 1983 assume zero non-marital fertility.

Table 2. Trends in correlates of recent birth among ever-married: Philippines, 1973-2022

	1973	1983	1993	2003	2013	2022
Age at first marriage	20.0	19.3	20.5	21.0	21.2	21.5
Sexually active in past 2 years (=1)	…	…	0.88	0.91	0.93	0.91
Had used first FP method 2+ years ago (=1)	0.12	0.36	0.49	0.55	…	…
Have been using current FP method for 2+ years (=1)	…	…	…	0.27	0.29	0.36
Had sterilization 2+ years ago (=1)	…	0.06	0.11	0.09	0.07	0.07
Had menstruation in past 2 years (=1)	…	0.94	0.95	0.95	0.96	0.97
Had live birth before age 15 (=1)	0.00	0.01	0.01	0.01	0.01	0.01
Had first marriage before age 15 (=1)	0.07	0.09	0.04	0.04	0.03	0.03
Had coital initiation before age 15 (=1)	…	…	0.04	0.04	0.03	0.03
Desired number of children	4.45	4.06	3.48	3.23	3.02	3.00
Number of living children is at most desired count (=1)	0.74	0.60	0.75	0.74	0.75	0.79
Desired number of children not provided (=1)	0.20	0.07	0.01	0.01	0.00	0.00
Ever experienced child loss (=1)	0.42	0.38	0.35	0.31	0.27	0.21
Highest grade, elementary (=1)	0.62	0.54	0.40	0.29	0.21	0.14
Highest grade, secondary (=1)	0.18	0.26	0.34	0.41	0.48	0.49
Highest grade, college (=1)	0.11	0.16	0.23	0.28	0.30	0.36
Wealth index (standardized to 2013 distribution)	-1.37	-1.06	-0.53	-0.13	0.04	0.27

Source: Authors' calculations based on various rounds of the ND(H)S. Notes: Wealth index is calculated as the first principal component from a principal component analysis of household asset holdings. The wealth indices are normalized relative to the distribution of the assed index of households in the 2013 NDHS. FP – family planning.

Ever-married women in the 1970s favored having about four to five children, which has been replaced with a three desired-child norm 50 years later. This may be related with improving child survival, female economic empowerment, and general household economic well-being, among other factors. In 1973, about two in every five ever-married women have had suffered from child loss, which has been halved to one-in-five by 2022. Female education has improved considerably over the last 50 years with about half of ever-married women having secondary education and about a third having tertiary education by 2022, compared with only 18 percent and 11 percent, respectively, in 1973. Indeed, in the last 50 years, average economic well-being has prospered based on household accumulation of durable assets, which has been growing by about 33 percent of a standard deviation every decade using 2013 as reference year.

3. Methodology

In this study, we employ data from 50 years of National Demographic (and Health) Surveys [ND(H)S] in the Philippines, spanning 1973 to 2022, to document the contribution of different factors affecting female fertility. The series of Philippine ND(H)S are nationally representative surveys of women of reproductive age, operationally defined as those between aged 15 to 45 years, that aims to collect information on fertility and mortality levels, fertility preferences, and family planning use, among others. Starting in 1993, the ND(H)S covered all women of reproductive-age regardless of marital history, unlike in earlier rounds that only collected information from ever-married women. Based on individual responses from the ND(H)S, we partitioned the contribution of different factors affecting ASFRs by combining insights from the decomposition procedures of Kitagawa (1955), Blinder (1972) and Oaxaca (1972) as follows.

It is trivial to show that the proportion of women aged a at period t who had given birth, $P_{B,a,t}$, may be decomposed as a linear combination of births by ever-married women, $P^1_{B,a,t}$, and by never-married women, $P^0_{B,a,t}$, using the proportion of ever-married, $P_{M,a,t}$, and never-married, $1 - P_{M,a,t}$, as weights:

$$P_{B,a,t} = P^1_{B,a,t} \cdot P_{M,a,t} + P^0_{B,a,t} \cdot \left(1 - P_{M,a,t}\right) \ . \qquad (1)$$

Taking the difference of $P_{B,a,t}$ across the same age a over two periods t and $t-1$ leads to the following Kitagawa decomposition

$$\Delta P_{B,a,t} \cong \underbrace{\Delta P^1_{B,a,t} \cdot P_{M,a,t}}_{\substack{Due\ to\ change \\ in\ marital \\ fertility}} + \underbrace{\Delta P^0_{B,a,t} \cdot \left(1 - P_{M,t}\right)}_{\substack{Due\ to\ change \\ in\ non-marital \\ fertility}} + \underbrace{\left(P^1_{B,a,t} - P^0_{B,a,t}\right) \cdot \Delta P_{M,a,t}}_{\substack{Due\ to\ change \\ in\ marriage \\ rate}} \ , \qquad (2)$$

where Δ is a time-difference operator. It is easy to see that the change in ASFR may be decomposed as those due to temporal changes in marital fertility rates, non-marital fertility rates, and in marriage rates. In the case of the Philippines, levels and temporal differences in age-specific non-marital fertility rates are both close to zero (see Table 1), which we can drop from the above equation with minimal loss in generality. This also allows us to side-step the issue on the non-inclusion of never-married women in earlier NDS rounds.

The decomposition of the change in ASFR above thus simplifies as

$$\Delta P_{B,a,t} \cong \underbrace{\Delta P^1_{B,a,t} \cdot P_{M,a,t}}_{\substack{Due\ to\ change \\ in\ marital \\ fertility}} + \underbrace{P^1_{B,a,t} \cdot \Delta P_{M,a,t}}_{\substack{Due\ to\ change \\ in\ marriage \\ rate}} \ . \tag{3}$$

In the estimation, we use age-specific marriage rates from the decadal Censuses of Population, which we found to be largely consistent with marital age patterns in the ND(H)S, whenever available, except for 2022, during the COVID-19 pandemic, where we used marital rates directly estimated from the NDHS instead. We multiplied the change in age-specific marital rates with the relevant ASFR estimated from the ND(H)S in the relevant base year to calculate the contribution of changing marital patterns.

In the case of the contribution of changes in marital fertility, we modelled the propensity of an ever-married woman having birth in the past year using linear probability models and individual-level data from ND(H)S. We then used the regression coefficients to decompose the change in age-specific marital fertility rates following Oaxaca and Blinder decomposition as

$$\Delta P^1_{B,a,t} = \underbrace{\left(\bar{X}_{a,t} - \bar{X}_{a,t-1}\right)' \beta_a}_{\substack{Endowment\ (explained) \\ effect}} + \underbrace{\left(\hat{\beta}_{a,t} - \beta_{a,t-1}\right)' \left(\bar{X}_{a,t} + \bar{X}_{a,t-1}\right)}_{\substack{Residual\ (unexplained) \\ effect}} \ , \tag{4}$$

where $\bar{X}_{a,t}$ is a vector of averages of the explanatory variables included in the model, $\beta_{a,t}$ is a vector of regression coefficients for the model using data for year t, and β_a is the vector of regression coefficients for the model using pooled data for years t and $t-1$. We are interested in the endowment effects, which capture the contribution of changing observed characteristics on marital fertility using the pooled regression coefficients as weights.

The residual, i.e., unexplained, effect captures changes in age-specific marital fertility rates that are not explained by temporal differences in observed characteristics of ever-married women. In theory, the unexplained effects could include the contribution of changes in the effectiveness of contraceptives use, which is included as explanatory variable in the model, and of government programs, which are not explicitly included in the models, across time that are captured by differences in the regression coefficients for different years of data.

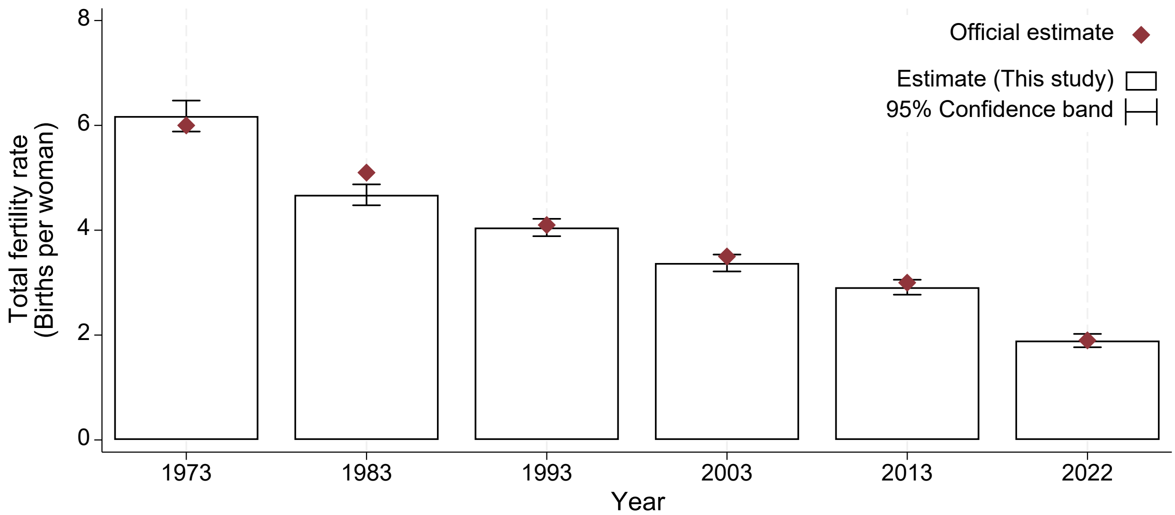
We focus on partitioning the contribution of factors identified in the literature to affect fertility rates: demand for children, contraceptives use, sterility, early exposure, education, child loss, and socio-economic status. Due to differences in data availability, we only include sexual activity for models using data from 1993 to 2022. Socio-economic status is proxied by an assets index estimated as the first principal component based on durable asset holdings of households. The assets indices in each survey round are normalized relative to the distribution of the index in 2013 to allow direct comparison across years.

In order to minimize potential simultaneity bias in the regression models, we only included variables that are likely weakly exogenous by limiting explanatory variables to those that have been decided in the past and thereby likely not contemporaneous with fertility decisions. For example, we included contraceptive use in the last two years preceding the survey and not current usage, since those who have had recent births are likely to have amenorrhea, especially if breastfeeding, and thereby affecting current contraceptives use decision. The variables included in the Oaxaca-Blinder decomposition of marital fertility rates are listed in Table 2.

We made a couple of important departures from common methodologies employed in the literature that are worth noting. First, we use past year as reference period in calculating ASFRs, instead of the common three- or five-year exposure time. The official Philippine TFR estimates are based on a five-year reference period prior to 1993, when a three-year reference period was introduced. The longer exposure time used was justified to improve precision of estimates since the sample sizes were quite limited, especially in earlier years.

Figure 1 plots official Philippine TFR estimates using five- and three-year reference periods, and ours based on a one-year reference period. This study's estimates are based on Equation (1), where we set non-marital fertility rate to zero. The figure shows that TFR estimates based on a single-year reference period closely traces the trend based on official estimates, with the official estimates being within the 95 confidence bounds of estimates based on a single-year reference period, except for 1983, when the official estimates are slightly higher. It is noteworthy that TFRs based on a one-year reference period provide relatively precise estimates, with calculated coefficients of variation ranging between 2.1- and 2.5-percent.

Figure 1. Total fertility rate: Philippines, 1973-2022



Source: Authors' calculations based on 1973 and 1983 NDS, and 1993, 2003, 2013 and 2022 NDHS. Notes: Official TFR estimates are based on a five-year reference period for 1973 and 1983, and three-year reference period for other years. This study's TFR estimates are based on a one-year reference periods.

Second, we employed a modified Kitagawa-Oaxaca-Blinder decomposition to partition the contribution of different factors to explain the evolution of fertility rate across time. Previous studies in the Philippines (e.g., Concepcion and Smith 1977; Cruz 2008; Majumder and Ram 2015) and elsewhere largely employed the decomposition due to Bongaarts (1978) that uses six proximate determinants of fertility: union patterns, contraception, lactational amenorrhea and postpartum abstinence, pathological sterility, and abortion. Bongaarts' (1978) decomposition is instructive as it relates TFR with direct behavioral mechanisms, such as marriage and coital patterns, and are particularly useful when estimates are available at aggregated levels. In our analysis based on individual level-data, we included proxies for Bongaarts' indices whenever available, but we also added other relevant variables to explain fertility decisions, as well as to counter potential omitted variables bias in the regression model.

4. Results

We first decomposed the change in observed TFR over the last five decades into two main drivers – change in marital fertility and in marriage rates – using the Kitagawa decomposition in Equation (3). The estimates presented in Table 3 show that the decrease in marital fertility has been the primary driver of fertility decline in the Philippines, explaining almost 90 percent of the observed TFR drop between 1973 and 2022. This is equivalent to about 3.6 births per woman averted due to changing age-specific marital fertility patterns. Changes in the age patterns of marital rates, while playing only a secondary role, is also important in explaining fertility decline in the Philippines, resulting in 0.7 births less per woman over the same horizon.

Table 3. Decomposition of change in total fertility rate: Philippines, 1973-2022

	1970s	1980s	1990s	200s	2010s	Since 1970s
Observed overall change	-1.5	-0.6	-0.6	-0.4	-1.1	-4.2
Due to change in marital fertility	-1.7	-0.2	-0.7	-0.4	-0.7	-3.6
Due to change in marriage rates	0.2	-0.4	0.0	-0.1	-0.4	-0.7

Source: Authors' calculations based on age-specific marital fertility and marriage rates in Table 1.

But what explains marital fertility in the Philippines? Table 4 presents parameter estimates of linear probability models of the propensity of having birth in the past year among ever-married women using data from different waves of ND(H)S. In this set of models, we pooled information from women of all age groups, and estimated separate models for each ND(H)S round while controlling for age group in the estimation. The table also shows the availability of indicators used in the Kitagawa-Oaxaca-Blinder decomposition for each ND(H)S round.

By and large, the estimates presented in Table 4 are in line with expectations from the literature. For example, having higher socio-economic status as measured by household assets index, having achieved desired number of children, and consistent contraceptives use are associated with lower propensity of having birth in the past year. Interestingly, early coital, marital and childbirth initiations are also largely associated with lower propensity of having recent childbirth among ever-married women. It is worth noting that the estimated coefficients vary quite significantly across survey rounds, which may suggest the dynamism of how these different factors influence marital fertility across the years.

In order to partition the contribution of these factors on TFR change across time, we then estimated separate models by survey round similar to Table 4 but for each five-year age groups between ages 15 and 49. We used the resulting parameter estimates, together with the annual averages of the explanatory variables, to calculate the Oaxaca-Blinder decomposition suggested by Equations (3) and (4). These steps, in turn, provide estimates of the contribution of the identified factors on the change in ASFRs between two reference survey years. The decomposition is additive, and the estimates may be organized across different dimensions by calculating sums across identified groups.

Table 4. Linear probability model: Had live birth in past year, ever-married sample

	1973	1983	1993
Sexually active in past 2 years (=1)			-0.001
			(0.012)
Had used first FP method 2+ years ago (=1)	-0.105***	0.019*	-0.061***
	(0.018)	(0.010)	(0.009)
Have been using current FP method for 2+ years (=1)			
Had sterilization 2+ years ago (=1)		-0.032*	-0.100***
		(0.018)	(0.007)
Had menstruation in past 2 years (=1)		0.003	-0.027*
		(0.016)	(0.014)
Had live birth before age 15 (=1)	-0.094	0.101	-0.096***
	(0.101)	(0.072)	(0.033)
Had first marriage before age 15 (=1)	-0.044*	-0.050***	0.092**
	(0.025)	(0.015)	(0.040)
Had coital initiation before age 15 (=1)			-0.151***
			(0.036)
Number of living children is at most desired count (=1)	-0.011	-0.076***	-0.106***
	(0.031)	(0.010)	(0.010)
Desired number of children not provided (=1)	-0.173***	-0.062***	-0.105***
	(0.036)	(0.018)	(0.028)
Ever experienced child loss (=1)	0.068***	0.002	0.022***
	(0.014)	(0.009)	(0.008)
Highest grade, elementary (=1)	0.044**	0.038*	0.044**
	(0.021)	(0.020)	(0.022)
Highest grade, secondary (=1)	0.017	0.020	0.032
	(0.026)	(0.021)	(0.023)
Highest grade, college (=1)	0.006	0.057**	0.064***
	(0.030)	(0.024)	(0.024)
Wealth index	-0.018**	-0.033***	-0.021***
	(0.008)	(0.005)	(0.005)
Age group fixed-effects	Yes	Yes	Yes
Number of ever-married women sample	7,195	10,843	9,685
Number of clusters	6,761	10,061	9,117
Adjusted R sq.	0.121	0.097	0.129

Source: Authors' calculations based on various ND(H)S rounds. Note: Estimates are based on linear probability models with standard errors clustered at the household level. Estimates in parentheses are heteroskedasticity-robust clustered standard errors. The sample covers ever-married women regardless of legal recognition, and includes those in marriage-like unions. *, ***, and *** indicate statistical significance at the 1-, 5-, and 10-percent alpha levels, respectively. FP – family planning.

Table 3. *(continued)*

	2003	2013	2022
Sexually active in past 2 years (=1)	-0.025*	0.039***	-0.020
	(0.013)	(0.012)	(0.013)
Had used first FP method 2+ years ago (=1)	-0.007		
	(0.009)		
Have been using current FP method for 2+ years (=1)	-0.166***	-0.165***	-0.123***
	(0.008)	(0.005)	(0.005)
Had sterilization 2+ years ago (=1)	0.057***	0.040***	0.035***
	(0.005)	(0.004)	(0.003)
Had menstruation in past 2 years (=1)	0.008	0.029***	-0.009
	(0.013)	(0.011)	(0.016)
Had live birth before age 15 (=1)	-0.037	-0.083**	-0.025
	(0.039)	(0.037)	(0.028)
Had first marriage before age 15 (=1)	0.011	0.000	-0.036*
	(0.029)	(0.030)	(0.019)
Had coital initiation before age 15 (=1)	-0.046	0.006	-0.025
	(0.028)	(0.030)	(0.019)
Number of living children is at most desired count (=1)	-0.089***	-0.082***	-0.062***
	(0.009)	(0.008)	(0.008)
Desired number of children not provided (=1)	-0.057	-0.093**	-0.132***
	(0.036)	(0.044)	(0.031)
Ever experienced child loss (=1)	0.006	0.000	0.007
	(0.008)	(0.007)	(0.007)
Highest grade, elementary (=1)	-0.010	0.040*	-0.026
	(0.028)	(0.021)	(0.034)
Highest grade, secondary (=1)	-0.019	0.053**	-0.020
	(0.028)	(0.021)	(0.034)
Highest grade, college (=1)	0.012	0.055**	-0.014
	(0.029)	(0.022)	(0.035)
Wealth index	-0.019***	-0.021***	-0.009*
	(0.004)	(0.005)	(0.005)
Age group fixed-effects	Yes	Yes	Yes
Number of ever-married women sample	9,324	10,643	16,421
Number of clusters	8,692	9,660	15,359
Adjusted R sq.	0.139	0.142	0.118

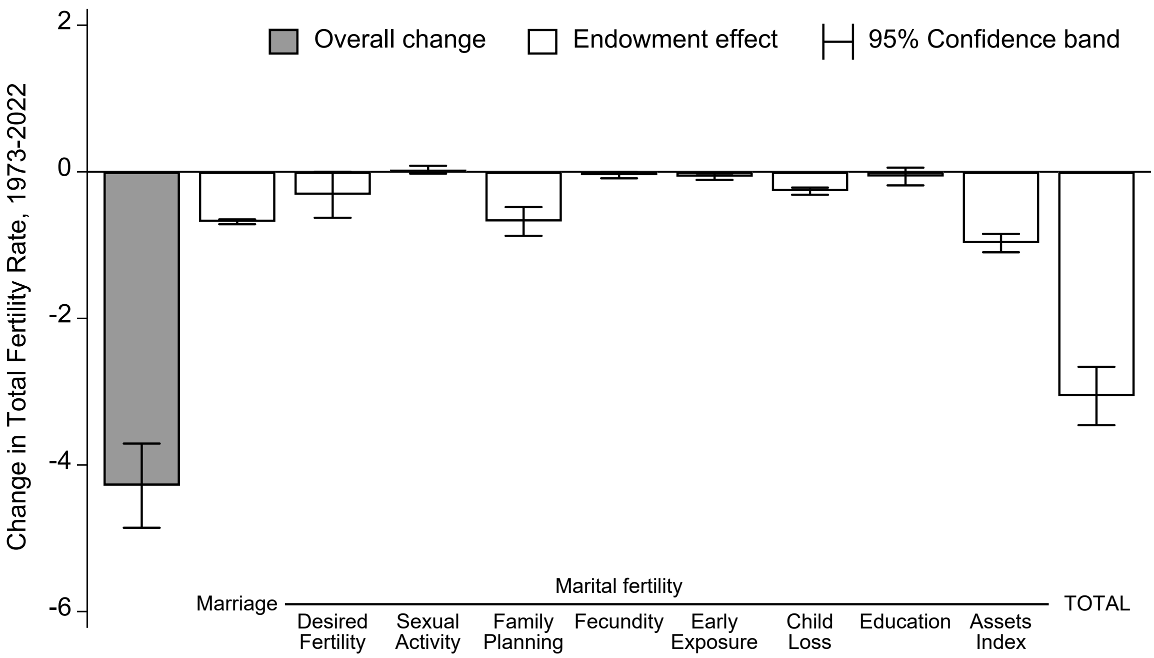
Source: Authors' calculations based on various ND(H)S rounds. Note: Estimates are based on linear probability models with standard errors clustered at the household level. Estimates in parentheses are heteroskedasticity-robust clustered standard errors. The sample covers ever-married women regardless of legal recognition, and includes those in marriage-like unions. *, ***, and *** indicate statistical significance at the 1-, 5-, and 10-percent alpha levels, respectively. FP – family planning.

Figure 2 presents the cumulative contribution of the included factors to explain TFR change in the Philippines between 1973 and 2022. In order to ease discussion, we combined the following related factors in the Oaxaca-Blinder decomposition under common headings: (i) early coital, marital and childbirth initiation as early exposure; (ii) contraceptives use indicators as family planning; and (iii) sterilization and menstruation as fecundity.

The estimates suggest that the most important driver of fertility decline may not necessarily be contraceptives as may be popularly envisioned. Indeed, our estimates show that improving socio-economic status has contributed to about one birth less per woman over the course of five decades, followed only by changing marriage patterns and increasing family planning use, which have both averted about 0.7 births per woman over the same period. Declining desired number of children and improving child survival had also been important drivers of fertility decline, respectively resulting in about 0.3 births less per woman since the 1970s.

These five factors together account for about sixty percent of the observed fertility decline in the Philippines over the last fifty years: improving socio-economic status (20.7%), changing marriage patterns (14.5%), increasing family planning use (14.4%), declining desired number of children (6.7%) and improving child survival (5.6%). Other factors, such as changes in sexual activity, sterility, early exposure and educational attainment, appear to have limited contribution on fertility decline through changes in marital fertility. However, it must be emphasized that these factors may also contribute to fertility decline via other channels, such as through marital timing, which we did not consider in this study.

Figure 2. Decomposition of total fertility rate change: Philippines, 1973-2022



Source: Authors' calculations.

Disaggregation of the contribution of different factors affecting fertility decline across time sheds some interesting insights on the evolution of female TFR and social conditions in the Philippines (see Figure 3).

About two-thirds of the TFR decline due to higher contraceptives use comes from the 1970s, coinciding with the increased attention on family planning in the immediate years after the country's signing of the United Nations Declaration on Population and the creation of the Commission on Population. Along the same vein, the contribution of improving child survival had been strongest in the 1980s in the immediate years after the country's signing of the 1979 Alma Ata Declaration on Primary Health Care and the eventual adoption of primary health care concepts in the government's medical and public health functions.

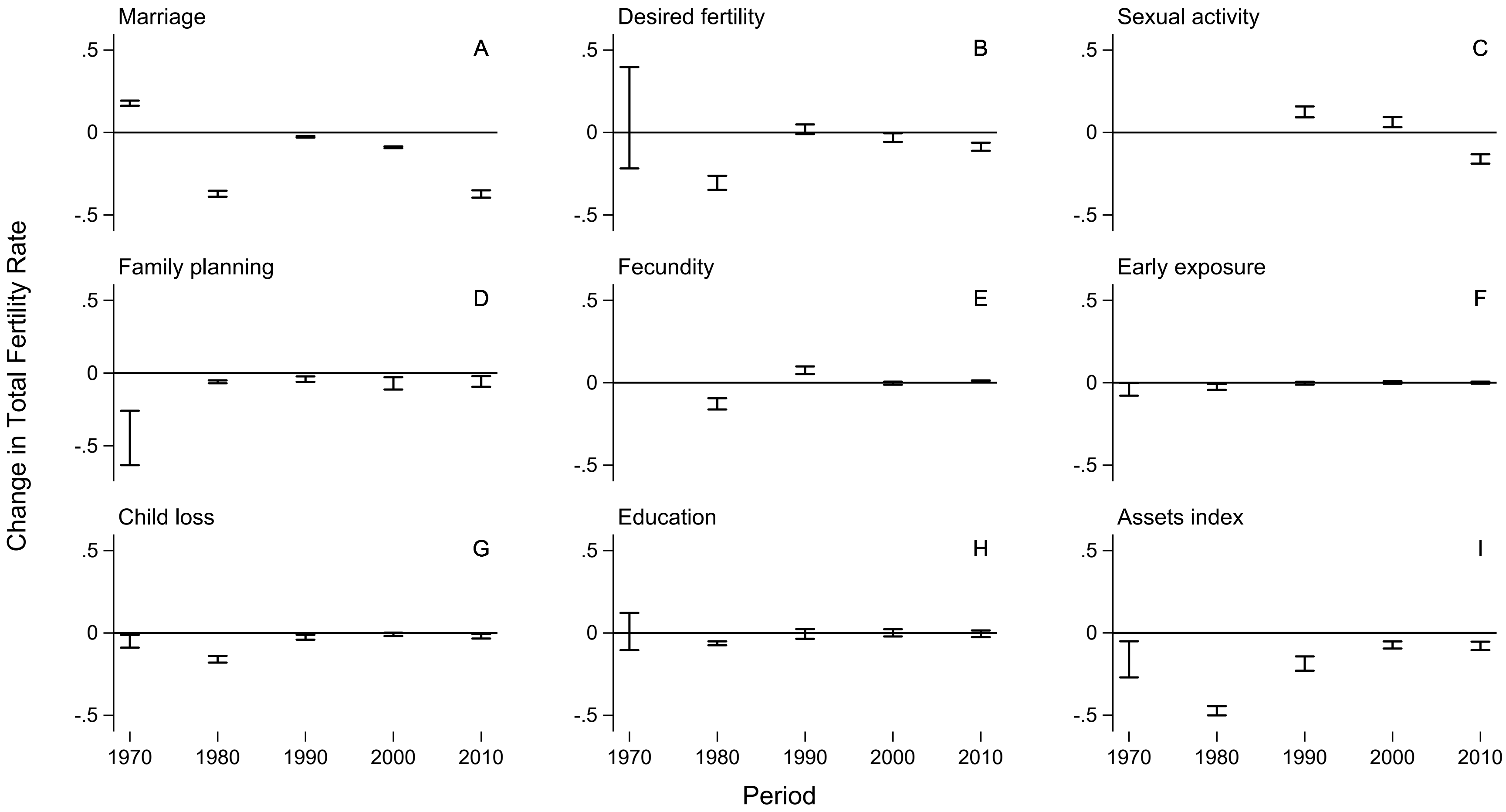
The contribution of improving socioeconomic status has also been variable, but largely reflect changes in the levels of living standards across the decades. The largest TFR decline due to improving socio-economic status may be observed in decades with significant improvements in average assets index, such as between 1983 and 1993 (see Table 2).

Figure 3 also provides an opportunity to trace the cause of the recent decline in female TFR from 3.0 births per woman in 2013 to 1.9 births per woman in 2022. The estimates show that about a third of the decline in the last decade, equivalent to 0.4 births averted per woman, was due to changing marital age patterns, followed by a drop in sexual activity, explaining 15% of the TFR decline, during the tail-end of the COVID-19 pandemic. Over the same period, important education interventions had been introduced, such as mandating senior high school attendance and providing free tertiary education, which may also have contributed to delaying marriage, especially among younger women. Increased contraceptives use during the COVID-19 pandemic also contributed to the decline in TFR during this period contrary to early predictions that family planning supply interruptions as a consequence of community lockdowns during the pandemic would lead to higher unplanned pregnancies.

Figure 4 presents the cumulative contribution of each factor by age group, highlighting differences in their importance in the decline of ASFRs across the lifecycle. The significance of changing marital patterns appear to be highest among the youngest women, explaining as much as 76% of the decline in the ASFR of women aged 15 to 19 over the last 50 years, dropping to around 40% among those aged 20 to 24 and 17% for those aged 25 to 29. The role of increased contraceptives uptake, on the other hand, are more important in explaining the ASFR decline among older women, particularly those in the 30 to 44 age group. Improving material measures of well-being as captured by household assets index has been influential in pushing fertility down among women in their 20s and 30s, averting around 20 births per 100 women for this age group.

Other factors have increased fertility rates for some age groups. For example, changing prevalence of early coital, marital and childbirth initiation together contributed to declining marital fertility among those aged 15 to 19, but has increased it slightly for older women. Similarly, improving female educational attainment has increased the ASFR among those aged 25 to 29, but decreased it for other age groups. Changing sexual activity over the last five decades also increased ASFR through marital fertility although their contribution to the overall ASFR decline is minimal across all age groups.

Figure 3. Decomposition of total fertility rate change by period: Philippines, 1973-2022



Source: Authors' calculations.

Figure 4. Decomposition of age-specific fertility rate change: Philippines, 1973-2022

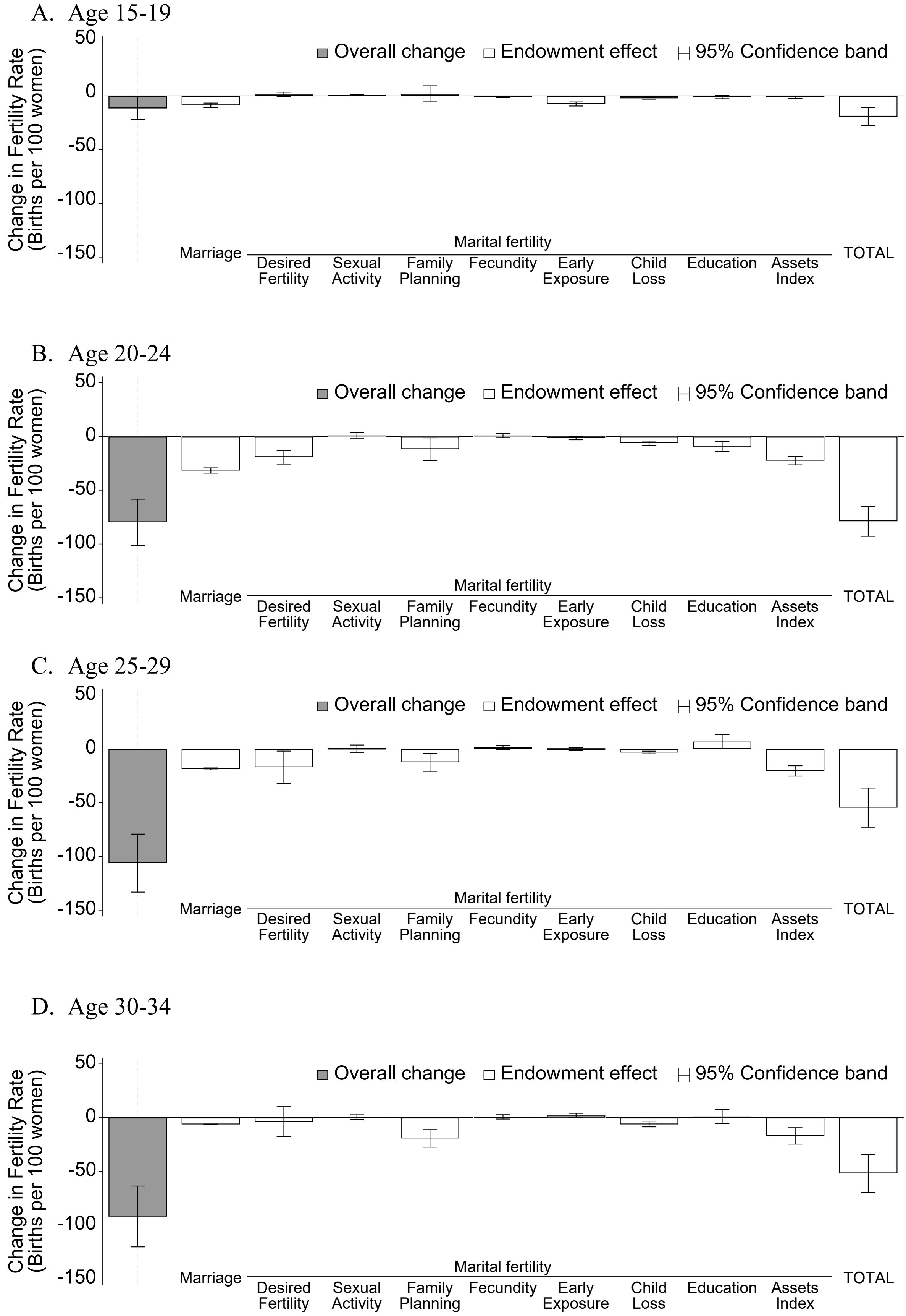
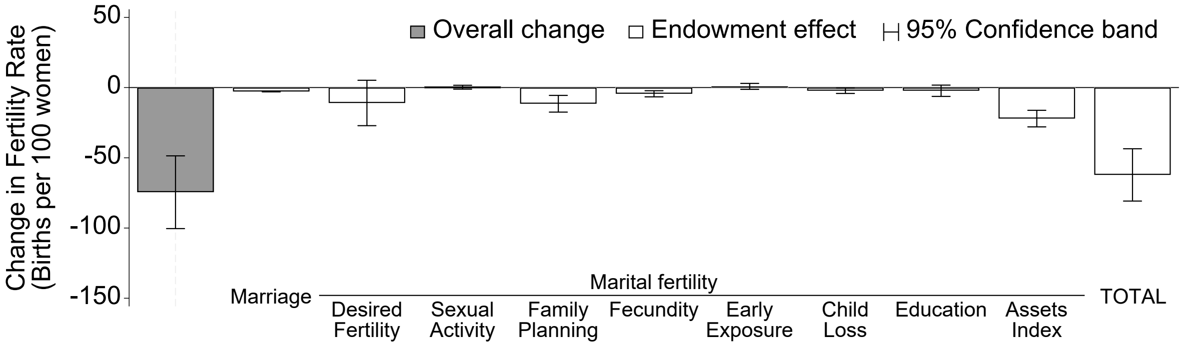
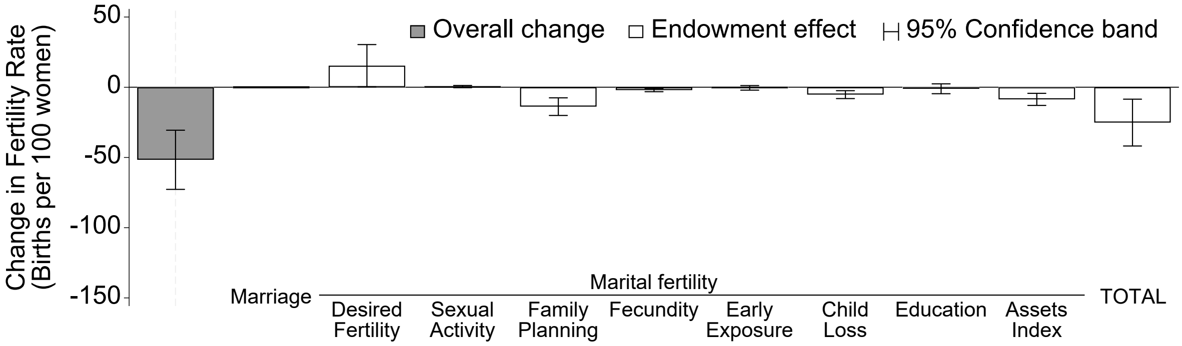


Figure 4. *(continued)*

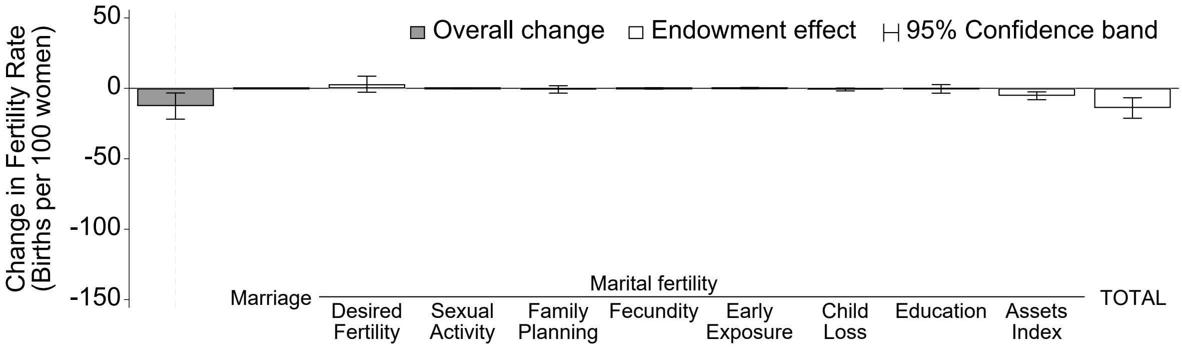
E. Age 35-39



F. Age 40-44



G. Age 45-49



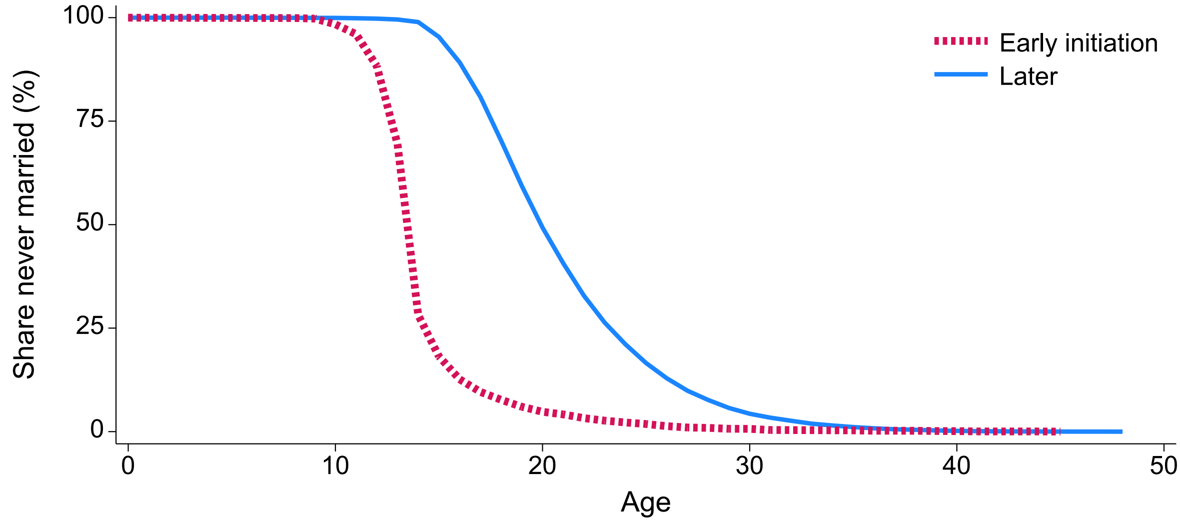
Source: Authors' calculations.

As we have earlier noted, the decomposition suggests that early exposure and education have limited contribution in limiting marital fertility over the last 50 years. It must be emphasized, however, that the contribution of these factors may also work through other channels, such as by changing marriage patterns across the lifecycle (Abalos 2014).

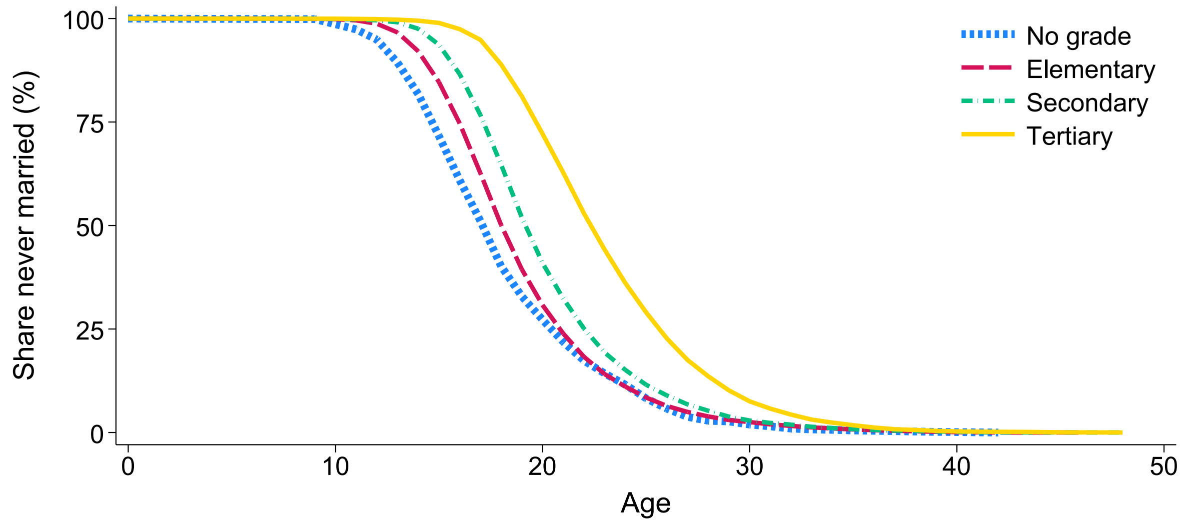
Figure 5 tracks the proportion of never-married women by current age and age of coital initiation (Panel A) and educational attainment (Panel B). As may be expected, those who had earlier coital initiation, in this case before age 15, are likely to be married or be in marriage-like unions sooner compared with women who had their coital initiation later. The difference in marriage timing between the two groups is quite significant with about half of those who had early exposure being married before age 14, while half of those who had later exposure at around age 20. Educational attainment also appears to strongly predict marriage timing with those having higher educational levels marrying later. These pieces of evidence suggest that the contribution of education and early exposure on female fertility are also significant and should not be discounted.

Figure 5. Early coital initiation, education and marriage timing

A. Early coital initiation and marriage timing



B. Education and marriage timing



Source: Authors' calculation based on pooled 1993, 2003, 2013 and 2022 NDHS.

5. Conclusion

We employed a Kitagawa-Oaxaca-Blinder decomposition to document the contribution of different drives of female fertility decline in the Philippines over the last fifty years. While the results are not quite surprising, they are nonetheless informative. The estimates show that the most effective contraceptives may not necessarily be family planning or foregoing marriage. The most effective contraceptive based on the country's collective experience over the last fifty years appears to be improving household living conditions, which raises the opportunity costs of having children. Family planning use and changing marital patterns, together with improving child survival and declining demand for children, although also important, were only secondary in explaining the fifty-year trend in the country's female TFR.

The decomposition highlights the role of public policies in shaping household fertility decisions. We documented important shifts in TFR driven by factors that were likely affected by coinciding innovations in government. While these changes in female TFR may not be directly attributed to these specific policies in our analysis they are however indicative of such potential, and may be explored more formally and intently in future studies.

The study is only able to uncover around two-thirds of the cause of fertility decline in the country. This leaves about 1.4 averted births per woman over the course of fifty years unexplained by our model. Unpacking the reasons for this remaining unexplained decline in female fertility may be useful in designing and implementing more responsive population and development strategies moving forward.

What could be the future of female fertility in the Philippines? The global experience shows that countries that have breached replacement fertility are likely to remain below replacement level indefinitely. There may be an opportunity to raise female fertility once those who have delayed marriage due to the COVID-19 pandemic or from the additional years in basic education finally enter into marital or marriage-like unions. Also, non-marital fertility has been increasing, although remains at trivial levels. But TFRs will not likely return to pre-pandemic levels significantly beyond replacement TFR as the rising opportunity costs of women's time and of having children temper the potential TFR increase from delayed marriage and rising non-marital fertility. Increasing female TFR is an expensive endeavor.

Population ageing therefore is an imminent reality that the country should prepare for.

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