



Forty years of fertility transition in Hong Kong

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Abstract

Background Hong Kong's total fertility rate (TFR) has collapsed to one of the world's lowest (0.77 births per woman in 2021), reflecting broader demographic crises in high-income Asian societies. While economic constraints and delayed marriage are widely acknowledged, the interplay of marriage proportion (MP), marital fertility (MFR), and non-marital fertility (NMFR) remains underexplored. This study quantifies these drivers using decomposition analysis, contextualized through the Second Demographic Transition (SDT) and the Capability Approach, to inform policy interventions.

Methods We analyzed census data (1981–2021) from Hong Kong's Census and Statistics Department, employing a decomposition model to partition TFR changes into MP, MFR, and NMFR. Age-specific fertility rates, marriage proportions, and policy timelines were integrated to assess structural and cultural influences.

Results From 1981 to 2021, the TFR declined significantly, with a notable rebound between 2000 and 2015 attributed to improved marital fertility rates. However, a sharp decline resumed post-2016, influenced by falling marriage rates and decreasing marital fertility. The changes in marriage rate, marital fertility rate and nonmarital fertility rate contributed -69%, -14%, and -17%, respectively, to the changes in TFR during the period 1981-2021. These findings suggest that decreasing marriage rates are the primary driver of declining fertility in Hong Kong.

Discussion Hong Kong's fertility crisis highlights the complex interplay between cultural individualism and enduring structural constraints, as framed by the Second Demographic Transition (SDT) and its conservative variant. Pronatalist policies have failed to reverse fertility decline because they inadequately address the dual drivers of declining marriage rates and subsequent reductions in marital fertility—both of which remain central components of the total fertility rate. This sequential fertility decline appears closely linked to unresolved socio-economic and cultural challenges, such as the limited number of births outside marriage, housing unaffordability, inflexible labor markets, and persistent gendered caregiving norms. Achieving sustainable fertility recovery therefore requires comprehensive structural reforms that address

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barriers to marriage and family formation and create a family-friendly social and working environment.

Keywords Hong Kong · Marital fertility rate · Marriage rate · Non-marital fertility rate · Total fertility rate · Decomposition analysis

1 Introduction

Across much of high-income East Asia, fertility has fallen to persistently low levels, with Hong Kong among the most extreme cases. The sustained decline in the total fertility rate (TFR) has unfolded alongside rapid population aging and growing concerns about intergenerational equity and long-term economic resilience. While broad narratives emphasize delayed marriage and rising opportunity costs of childbearing, less is known about how distinct components of fertility dynamics—marriage proportion (MP), marital fertility (MFR), and non-marital fertility (NMFR)—have jointly shaped Hong Kong's trajectory over the long run. This study addresses that gap by providing a four-decade decomposition of TFR change (1981–2021), situating the findings within the comparative literature on the Second Demographic Transition (SDT) and complementary structural perspectives. Despite a rich literature on East Asia's low fertility, quantitative evidence parsing the relative contributions of marriage proportion (MP), marital fertility (MFR), and non-marital fertility (NMFR) over an extended historical window remains sparse for Hong Kong (Chan & Cheung, 2021). Non-marital fertility—accounting for around 40% of births in countries like France (e.g., 41.2% of births to cohabiting parents; Heuveline, 2004) and exhibiting broad geographic variation across Western Europe over the past century (Klüsener, 2015)—has functioned as a demographic buffer against very low fertility. In contrast, in Hong Kong it remains culturally constrained, and its impact has rarely been systematically quantified (Brinton, 2019b, a). Additionally, reliance on pre-2015 data obscures more recent shifts, such as post-2016 emigration waves and pandemic-related economic instability. Prior work has tended to focus on aggregate period indicators or specific determinants (e.g., housing costs, childcare, or labor-market participation), leaving unanswered how shifts in marriage behavior and fertility within and outside marriage combine to drive overall change. Moreover, most policy discussions implicitly assume that strengthening pronatalist measures will translate into higher TFR without clarifying whether the primary constraint is fewer marriages, fewer births within marriage, or both—and whether NMFR plays any material buffering role.

We respond to these gaps in three ways. First, using data from the Census and Statistics Department of Hong Kong (1981–2021), we implement an age-structured decomposition that attributes changes in TFR to movements in MP, MFR, and NMFR. This design makes it possible to identify periods in which marriage behavior dominates, versus periods when changes in marital or non-marital fertility prevail, and to pinpoint the ages at which these shifts are most salient. Second, we integrate the Second Demographic Transition (SDT) framework, recognizing that while Hong Kong shares key features of this transition, it follows a "conservative-variant" trajectory.

This variant reflects delayed marriage, but with a more restrained progression toward non-marital childbearing, influenced by deeply rooted conservative cultural norms. Thus, Hong Kong does not fully replicate the Western SDT pattern, whereas non-marital fertility has significantly risen alongside marriage postponement. To extend the SDT model, we incorporate Capability and Gender-Equity perspectives, which offer a broader view of how cultural and institutional factors interact to shape fertility outcomes. Third, we draw policy implications that are sensitive to the component actually bearing the weight of change—whether policies should prioritize removing barriers to union formation, easing constraints within marriage, or revisiting assumptions about the role of non-marital fertility in this context.

2 Background and literature

The Second Demographic Transition (SDT) posits that post-industrial societies undergo a value shift toward secularization, individualism, and self-actualization, with correspondingly lower attachment to traditional family formation (Lesthaeghe, 2014). A core implication is the emergence of sustained sub-replacement fertility alongside a diversification of union and family forms. Crucially, however, SDT is not a single script: in strongly familistic or “conservative-variant” contexts, non-marital childbearing often remains limited even as other SDT features advance. Evidence from Southern Europe illustrates that low cohabitation and low non-marital fertility can persist under such regimes, implying that a low NMFR is not anomalous in comparative perspective (Lesthaeghe, 2014).

Within the SDT framework, the postponement of marriage is a central mechanism linking value change to fertility outcomes. Delayed union formation compresses the biological window for childbearing and lowers completed fertility, particularly by reducing progression to higher parities (Sobotka, 2017). In Hong Kong, this transition is evident in the sharp decline in marriage among younger cohorts: between 1991 and 2021, the proportion of married women aged 25–29 fell from 68.9% to 20.6% (Census & Statistics Department, 2021a, b). Over the same period, the mean age at first birth rose from 27.0 years (1981) to 32.6 years (2022), a shift associated with heightened age-related subfecundity and reduced likelihood of second births (Chen & Yip, 2017a, b). Moreover, SDT components do not necessarily move in lockstep: increases in cohabitation can be decoupled from fertility postponement and, in normatively conservative settings, may lag due to moral or legal constraints. In Hong Kong, the diffusion of cohabitation—and especially childbearing within cohabitation—appears restrained by prevailing norms, reinforcing the expectation that NMFR’s contribution to overall fertility remains limited (Gietel-Basten & Verropoulou, 2018). Against this backdrop, assessing the marginal impact of the non-marital fertility rate (NMFR) provides a direct empirical test of SDT’s applicability to the Hong Kong context. It also highlights the contrast between Hong Kong and Western countries, where NMFR has contributed to 20–60% of total births (Klüsener, 2015).

Sen’s (1999) Capability Approach complements SDT by emphasizing how structural constraints limit the translation of fertility intentions into realized births. Yi and Zhang (2010) show—using Hong Kong aggregate data and cointegration meth-

ods—that higher housing prices significantly depress fertility. Constraints extend to childcare: an official consultancy for the Social Welfare Department and a Legislative Council research brief both identify a structural undersupply of center-based care for children under age three, with demand far exceeding available places—conditions that raise the effective cost of combining work and family (Hong Kong SAR Social Welfare Department, 2018; Legislative Council Secretariat, 2019). Evidence from Hong Kong also indicates that when households can outsource domestic work, fertility responds positively: employing live-in domestic help is associated with higher odds of first and second births among married couples (Cheung & Kim, 2022; see also Nakamura & Suzuki, 2023). Finally, microdata show a persistent gap between ideal and achieved parity among Hong Kong couples (Chen & Yip, 2017a, b; FPAHK, 2023), consistent with a broader “capability gap” in which aspirations are not converted into outcomes because of housing, childcare, and workplace constraints.

Gender Equity Theory (McDonald, 2000) offers a third, complementary lens on Hong Kong’s fertility dynamics. The theory predicts very low fertility where gender equity advances in individual-oriented institutions (education, employment) outpace reforms in family-oriented institutions (caregiving arrangements, household labor, and leave policies). In Hong Kong, women’s educational attainment and labor-force participation have risen steadily, yet many still face disproportionate domestic responsibilities, limited paternal involvement, and rigid workplace norms (Lee, 2020; Stuart-Basten, 2019). This institutional mismatch can deter union formation by heightening anticipated role conflict—contributing to the decline in the marriage proportion (MP)—and, among those who do marry, can constrain parity progression, thereby suppressing marital fertility (MFR). At the same time, cultural and policy barriers to single motherhood sustain low non-marital fertility (NMFR). Integrating Gender Equity Theory thus helps contextualize each component of our decomposition (MP, MFR, NMFR) and yields clear, testable expectations about how institutional gender norms shape union formation and fertility behavior in Hong Kong.

Beginning in the early 1960s, Hong Kong’s population boom prompted the Family Planning Association of Hong Kong (FPAHK)—with government support in public-health clinics—to launch mass “Two Is Enough” campaigns and expand low-cost contraceptive services (FPAHK, no date (n.d.)). These initiatives, rather than a formal government “antinatalist policy,” shifted social norms and accelerated fertility decline: the total fertility rate (TFR) fell from 3.4 births per woman in 1971 to 1.3 in 1987 (Tu, 2003). By the late 1980s, concerns over population aging and labor shortages led officials to adopt selective pronatalist measures. From 1981 to 2021 the Government introduced (see Table 1) family-friendly statutes—e.g., unpaid statutory maternity leave (1995), paid paternity leave (2015; expanded 2019), and the extension of maternity leave to 14 weeks with wage reimbursement in 2020 (Labour Department, 2021; Information Services Department, 2019)—together with preschool-fee vouchers (Education & Manpower Bureau, 2006) and periodic boosts to public-housing quotas (Hong Kong Housing Authority, 2004). Public campaigns on work–life balance (Information Services Department, 2005) and flexible-work guidelines (Family Council, 2008) attempted to normalize child-rearing within dual-earner households. Yet high housing prices, long working hours, and childcare shortages have blunted these pronatalist efforts, and Hong Kong’s TFR reached a historic low

Table 1 Timeline of government policies and TFR changes

Period	TFR range	Key policies implemented	Outcome/channel (MP = marriage proportion; MFR = marital fertility)
1981–1986	1.93 → 1.37	Territory-wide family-planning campaigns, incl. “Two Is Enough” (Family Planning Association of Hong Kong [FPAHK], n.d.) Expansion of Maternal & Child Health Centres service network (Department of Health, 1985)	Sharp TFR fall: campaigns + contraception ↑ compressed MFR; no pronatalist offsets.
1986–1991	1.37 → 1.28	Ongoing expansion of public-rental & Home Ownership Scheme flats (Hong Kong Housing Authority [HKHA], 1990). Incremental rise in child-allowance tax deduction (Inland Revenue Department [IRD], 1991).	Housing helped some young couples (MP ↑), but benefits offset by long queues; allowance too small to alter costs ⇒ net TFR still fell.
1991–1996	1.28 → 1.19	Statutory maternity leave lengthened from 8 to 10 weeks, unpaid (Labour Department, 1995). Labour Department issued first (non-binding) flexible-work guidelines (Labour Department, 1996).	Unpaid leave + unenforced flexibility → negligible effect on MFR; TFR decline continued.
1996–2001	1.19 → 0.98	School Fee Remission & textbook-subsidy expansion for low-income families (Education Department, 1998).	Short-run cost relief, but major barriers (housing, work hours) unchanged ⇒ MP & MFR kept sliding; TFR reached historic low.
2001–2006	0.98 → 1.20	Quota boost for family-size subsidized flats (HKHA, 2004). Public campaigns promoting “family-friendly Hong Kong” (Information Services Department [ISD], 2005).	Housing quotas modestly eased set-up cost; MFR at ages 30–39 rebounded slightly, giving a mild TFR lift.
2006–2011	0.98 → 1.20	Government Five-Day Week phased in (Civil Service Bureau [CSB], 2012). Pre-primary Education Voucher Scheme launched 2007/08, HK\$13k per child aged 3–6 (Education & Manpower Bureau [EMB], 2006; Wong, 2022). Family Council began promoting flexible work (Family Council, 2008).	Better work–life balance + preschool subsidy → MFR rise (second-birth recovery) outweighed housing drag; TFR stable to slight ↑.
2011–2016	1.20 → 0.88	Statutory paternity leave introduced: 3 days (Employment (Amendment) Ordinance, 2014); expanded to 5 days in 2019 (ISD, 2019).	Limited take-up (<15%) & short duration; high housing prices persisted ⇒ MP stagnant, MFR dipped; TFR decreased again.
2016–2021	0.88 → 0.77	Statutory maternity leave extended to 14 weeks with 80% wage reimbursement (Labour Department, 2021). Consultancy & LegCo briefs confirm 0–3 childcare capacity–price–access gap (SWD, 2018; LegCo Secretariat, 2019). Demand-side stamp-duty “DSMM” housing measures still active (Inland Revenue Department, 2024).	Longer leave helped retention, but childcare shortage + extreme price-to-income ratio (~21×) kept MP & MFR low; TFR hit 0.77.

of 0.77 by 2021 (Census & Statistics Department, 2023), underscoring the structural limits of policy interventions to date (Legislative Council Secretariat, 2019; Social Welfare Department, 2006).

3 Methods

Data Sources: Hong Kong birth and marriage data were obtained from the Census and Statistics Department (C&SD) of the Hong Kong SAR Government for the period 1981–2021. Birth figures include those whose mothers were Hong Kong nationals residing in Hong Kong at the time of birth, as well as Hong Kong nationals who gave birth overseas and returned with their child within the child’s first 12 months (approximately 1,000–2,000 births annually). Foreign domestic helpers (approximately 300,000) were excluded from the total fertility rate calculation, as the number of births is small and mothers and newborns usually return to their country of origin after birth.

3.1 Measures

3.1.1 Total fertility rate (TFR)

Age-specific fertility rates (ASFR) were calculated by aggregating fertility across reproductive ages. The numerator includes live births to Hong Kong–resident women as well as to Mainland-born women whose spouses are Hong Kong residents. By contrast, births in Hong Kong to Mainland women whose spouses are not Hong Kong residents (so-called “Type II births”) are excluded. This definitional boundary has substantive implications: in 2010, 2011, and early 2012, Type II births numbered 32,653, 35,736, and 25,174, respectively, representing approximately 31.4%, 32.5%, and 30.5% of total births during this period (Census and Statistics Department, 2021a). The denominator comprises the resident female population of reproductive age, including both locally born women and Mainland-born women who married Hong Kong residents and subsequently obtained residence, thereby ensuring consistency between the numerator and denominator.

Marriage Proportion (MP) Percentage of married women by age group.

Marital Fertility Rate (MFR) Births per 1,000 married women (including cohabitation).

Non-Marital Fertility Rate (NMFR) Births per 1,000 unmarried women (excluding cohabitation).

Analytical approach: A decomposition model partitioned TFR changes into three components:

$$\Delta TFR = \Sigma [(AMFR_x - ANMFR_x) \times \Delta MP_x + (1 - MP_x) \times \Delta ANMFR_x + MP_x \times \Delta AMFR_x]$$

where $AMFR_x$ = age-specific marital fertility rate, $ANMFR_x$ = age-specific non-marital fertility rate, and MP_x = marriage rate.

Comprehensive details of our decomposition approach are provided in Appendix 1.

4 Results

Table 2 delineates the temporal trajectories of Hong Kong's total fertility rate (TFR), total marital fertility rate (TMFR), marriage proportion (MP), and non-marital fertility rate (NMFR). The TFR showed an initial downward trend, followed by an upward trend from 2001 to 2011, and then decrease from 2011 to 2021. It rapidly declined from 1.93 in 1981 to 0.98 in 2001 and has since fluctuated below the very low level. Between 2001 and 2011, the TFR slightly increased by 0.23. During 2011–2021, the TFR decreased again, reaching 0.77 in 2021. TMFR initially declined from 1.47 (1981) to 1.02 (2006), then rebounded to 1.73 (2016) before dropping back to 1.47 (2021). MP steadily declined from 90.1% (1981) to 71.8% (2021), with the sharpest drops among younger cohorts (e.g., ages 25–29: from 68.9% to 20.6%). NMFR fell dramatically from 13.45 (1981) to 2.83 (2021), with a brief rebound to 4.32 in 2016.

There are significant disparities across age groups in the ASFR, TMFR, MP, and ASNMR. As illustrated in Figure 1a, age-specific fertility rate (ASFR) curves reveal three salient trends: a progressive delay in peak fertility age, a decline in peak intensity, and a rightward shift in the overall fertility distribution. The peak ASFR decreased from 153.0 births per 1,000 women aged 25–29 in 1981 to a low of 71.6 at ages 30–34 in 2006, followed by a notable rebound to 93.0 in the same age group by 2016, before declining again to 63.8 in 2021. Importantly, the age at which fertility peaks shifted markedly from 25 to 29 (dominant through 2001) to 30–34 from 2006 onward, reflecting fundamental changes in reproductive timing and behavior.

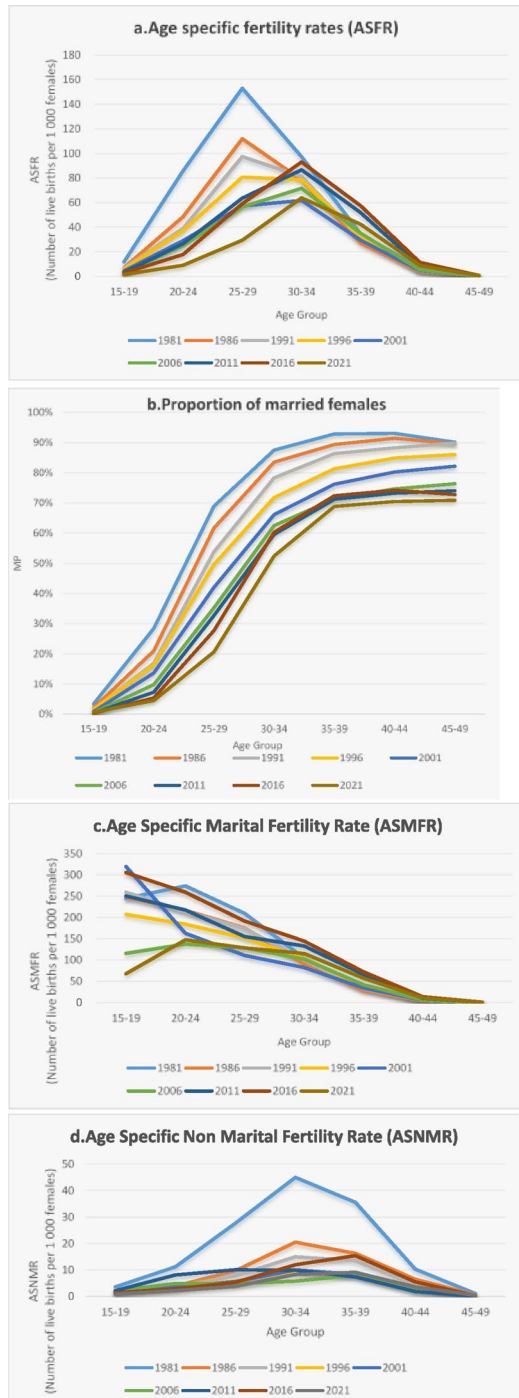
This rightward shift, indicative of delayed marriage and childbearing (see Appendix A.2), is further supported by evolving fertility progression patterns. In 1981, childbearing was heavily concentrated in the late twenties—evidenced by a steep increase of 67.1 births per 1,000 females between ages 20–24 and 25–29. After 2011, however, curves exhibit more gradual slopes, with nearly equal increases from ages 20–24 to 25–29 and from 25–29 to 30–34 (a 41.3% rise vs. a 33.9% rise in 2016,

Table 2 TFR, TMFR, MP and NMFR levels and trends in Hong Kong

Year	TFR	TMFR	MP (%)	NMFR
1981	1.93	1.47	90.1	13.45
1986	1.37	1.24	89.7	5.94
1991	1.28	1.29	89.8	4.79
1996	0.93	1.19	86.0	3.25
2001	0.98	1.08	82.2	3.29
2006	1.2	1.02	76.4	2.82
2011	1.21	1.48	74.0	3.97
2016	0.88	1.73	72.8	4.32
2021	0.77	1.47	71.8	2.83

TFR and TMFR represent the total fertility rate per woman and per married woman, respectively. NMFR represents the fertility rate per 1,000 unmarried women. Data for women aged 15–49 are included in the calculation of TFR, MP, TMFR, and NMFR.

Fig. 1 ASFR, MFR by age, MP by age and ASNMR from 1981 to 2021 (per 1000)



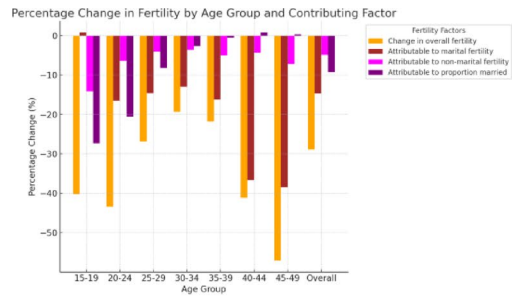
respectively). Concurrently, fertility rates among women aged 35 and older increased substantially (e.g., a 31% rise in the 40–44 age group between 2011 and 2016), confirming both the dispersal of reproductive timing and the emergence of a bimodal fertility pattern centered on women aged 30–39. These structural changes reflect a societal transition from tightly clustered early fertility toward more protracted and delayed family formation.

Figure 1b shows the proportion of married women (MP) by age. From 1981 to 2021, the proportion of married women declined in the peak reproductive years (ages 20–34). The sharpest decline was seen for ages 25–29 (from 68.9% to 20.6%) and ages 30–34 (from 87.5% to 52.4%). The MP curve indicates the greatest marriage delays occurred among younger cohorts before 2001. We also observed an increase before 2011 in the marriage proportion among women aged 20–24 and 25–29. This was primarily due to the influx of mainland women who married Hong Kong men and entered Hong Kong through the One-Way Permit scheme (approximately 50,000 annually), temporarily increasing the base number of marriages sharply (C&SD, 2025).

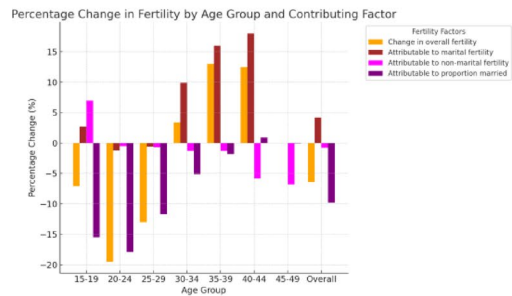
Figure 1c illustrates the ASMFR, which exhibited complex fluctuations across different age groups over time. From 1981 to 1986, there was a significant decline in ASMFR across all ages. In the subsequent period from 1986 to 1996, the ASMFR continued to decrease among the younger age group (15–29 years), while noticeably rising among older age group (30–45 years). Between 1996 and 2001, a moderate decline in ASMFR was observed across all age groups. From 2001 to 2006, the ASMFR decreased for the 15–29 age group, contrasted by a moderate increase for the 35–49 age group. Notably, between 2006 and 2016, ASMFR increased markedly among the 20–34 age group, particularly in 2011 and 2016, indicating a temporary rise in fertility among married women in early and peak reproductive ages. This increase could be related to the mainland born women married to Hong Kong men, whose fertility intentions were relatively higher than their local counterparts. However, this increase was not sustained, and the fertility gap between the local and mainland born women has been narrowing (2025, KAP). By 2021, ASMFR had declined again across all age groups, with the sharpest reversals occurring in the 25–34 cohort. This pattern suggests a short-lived rebound in marital fertility that was subsequently reversed in the most recent period.

Figure 1d presents NMFR by age, which shows a clear declining trend across all age groups. In 1981, rates peaked for women aged 30–34 (45.0 per 1,000 unmarried women) and 25–29 (27.7 per 1,000). The ASNMR in 1981 was notably higher than in all subsequent years, particularly among women in their peak reproductive ages (25–34). By 1996, these rates had dropped significantly, with the 25–29 group falling to 5.8. Although a modest rebound occurred in 2011—especially in the 20–24 (8.1) and 25–29 (10.1) age groups—the overall trend continued downward. By 2021, non-marital fertility rates were notably low across all groups, with the 15–19 age group at 0.9 and the 20–24 group at 2.2 per 1,000 (Fig. 2).

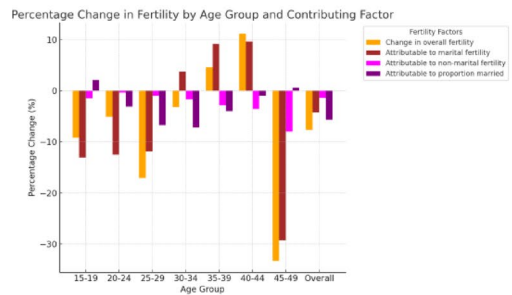
Fig. 2 **a** Fertility change attribution 1981-1986. **b** Fertility change attribution 1986-1991. **c** Fertility change attribution 1991-1996. **d** Fertility change attribution 1996-2001. **e** Fertility change attribution 2001-2006. **f** Fertility change attribution 2006-2011. **g** Fertility change attribution 2011-2016. **h** Fertility change attribution 2016-2021



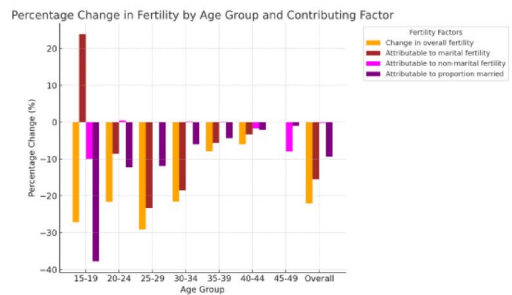
(a)



(b)

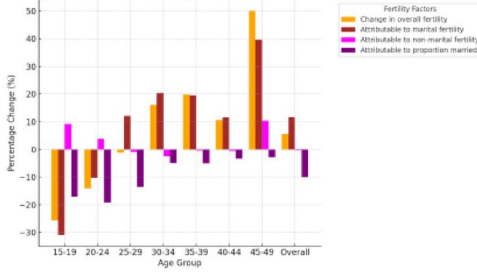


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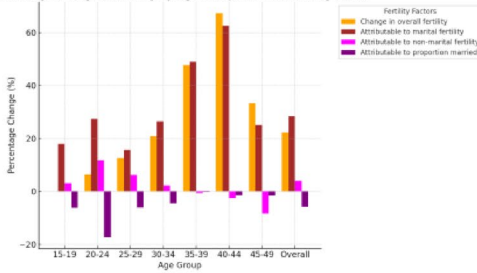
(d)

Percentage Change in Fertility by Age Group and Contributing Factor



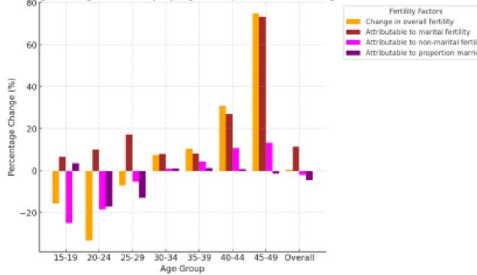
(e)

Percentage Change in Fertility by Age Group and Contributing Factor



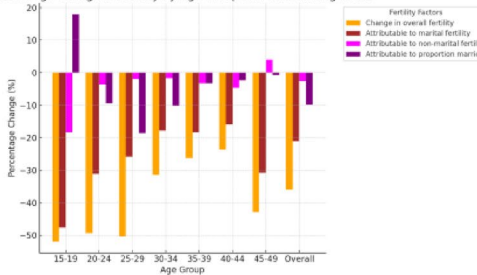
(f)

Percentage Change in Fertility by Age Group and Contributing Factor



(g)

Percentage Change in Fertility by Age Group and Contributing Factor



(h)

Fig. 2 (continued)

5 Benchmark decomposition of the TFR change

Table 3 shows the decomposition findings exploring the contributions of TMFR, MP, and NMFR to changes in the TFR. Between 1981 and 1986, there was a substantial decline in Hong Kong's TFR (1.933 to 1.367), which was primarily attributed to reductions in marital fertility (51%), non-marital fertility (17%), and marriage proportion (32%). From 1986 to 1991, there was a moderate decrease in TFR (1.367 to 1.281), which appeared to be driven by marriage postponement (153%) and non-marital fertility (12%), offset by an increase in marital fertility (−66%). The fertility decline resumed in 1991, with TFR falling from 1.281 in 1991 to 1.191 in 1996, and further to 0.931 in 2001. Reductions in MFR and MP were the most important factors in determining TFR during this period (38% and 50% for 1991–1996, and 62% and 37% for 1996–2001, respectively). From 2001 to 2016, there was a slight rebound (0.931 to 1.205), reflecting an increase in MFR despite the continuous negative impact of MP. However, from 2016 to 2021 there was a steep and significant decrease in TFR (1.205–0.772). This was attributed to a significant decline in MFR (63%) and MP (29%), reflecting an increasing number of married couples with no children and a continuous reduction of marriage rate, respectively.

Between 1981 and 2021, the decomposition of changes in TFR reveals distinct temporal shifts in the underlying age-specific determinants. During the early period (1981–1986), TFR declined substantially across all age groups, with the largest reductions observed among women aged 15–24. This decline was predominantly driven by reductions in the proportion married and decreases in marital fertility, particularly among older reproductive ages. In contrast, between 1986 and 1991, while fertility continued to decline in younger age groups, older groups (30–44) began to exhibit fertility increases, primarily attributable to rising marital fertility, indicating a shift toward delayed childbearing. The 1991–1996 period saw modest overall fertility decline, with age-specific patterns reflecting a transition: younger women experienced continued reductions, while older women showed mild increases due to rising marital fertility and shifts in marital patterns. From 1996 to 2001, the downward trend persisted, driven by sharp declines in marital fertility and a substantial decrease in the

Table 3 Decomposition of the change in TFR by MP, MFR and NMFR for the period 1981–2021.

Period	Initial TFR	Final TFR	Change in TFR	Marriage Proportion (MP)	Marital fertility (MFR) (%)	Non-marital fertility (NMFR) (%)	Percentage change in overall fertility (%)
1981–1986	1.933	1.367	−0.566	32%	51	17	100
1986–1991	1.367	1.281	−0.086	153%	−66	12	100
1991–1996	1.281	1.191	−0.090	50%	38	12	100
1996–2001	1.191	0.931	−0.260	37%	62	1	100
2001–2006	0.931	0.984	0.053	−779%	902	−23	100
2006–2011	0.984	1.204	0.220	−22%	107	15	100
2011–2016	1.204	1.205	0.001	−94%	237	−42	100
2016–2021	1.205	0.772	−0.433	29%	63	8	100
1981–2021	1.933	0.772	−1.161	69%	14	17	100

proportion married, especially among women aged 15–29. However, a notable reversal occurred between 2001 and 2006, when overall fertility increased, led by gains in marital fertility across most age groups, particularly ages 30–49, despite continued declines in marriage rates. This upward trend was reinforced during 2006–2011, when TFR rose sharply, especially among women aged 30 and above, again primarily due to increases in marital fertility. In the 2011–2016 period, overall TFR remained relatively stable, masking divergent trends: fertility declined among women under 30 due to falling non-marital fertility and reduced marriage, while older groups (30–49) experienced continued increases in both marital and non-marital fertility. Finally, between 2016 and 2021, a marked decline in overall fertility re-emerged, driven largely by significant reductions in marital fertility and a persistent decline in the proportion married across nearly all age groups. These findings underscore a long-term shift toward delayed and declining fertility, shaped primarily by decreasing marriage rates and transformations in fertility behaviors within and outside of marriage.

6 Decomposition of the TFR change by age groups

Table 4 presents the decomposition of TFR changes by age group. The decline in TFR for the 15–19 age group had minimal impact on overall TFR changes. Although married women aged 15–19 exhibit relatively high age-specific fertility rates, their low prevalence and small sample sizes substantially limit their contribution to the total fertility rate.

For the 20–24 age group, the decreases were primarily driven by declining MP. In the 25–29 age group, both the decline in MFR and MP significantly affected TFR, contributing 16% and 32% to the overall decrease, respectively. Additionally, the decrease in NMFR in this age group had the largest impact on TFR compared to other age groups, accounting for 6% of the decline.

For the 30–34 age group, the increase in MFR positively influenced TFR, offsetting 3% of the decrease, although the decline in MP continued to exert a negative influence. A similar pattern was observed in the 35–39 age group, where the positive impact of MFR on TFR was even more pronounced, comprising 8% of the increase, while the decline in MP contributed a modest negative effect of 2%.

Table 4 The decomposition results of MFR, NMFR and MP by age groups for HK (1981–2021)

Age groups	Marital fertility (MFR) (%)	Non-marital fertility (NMFR) (%)	Married Proportion(MP) (%)
15-19	2	1	2
20-24	9	3	21
25-29	16	6	32
30-34	−3	5	12
35-39	−8	2	2
40-44	−1	1	0
45-49	0	0	0
Overall	14	17	69

In the 40–44 age group, the rise in marital fertility increased TFR, with MP having no significant effect, while the decline in NMFR accounted for 1% of the decrease. For the 45–49 age group, the impact on TFR was negligible.

7 Discussion

Hong Kong's trajectory is consistent with a conservative-variant SDT, in which union postponement occurs without a corresponding normalization of childbearing outside marriage (Lesthaeghe, 2014, 2022). SDT research emphasizes that family-form changes are not synchronous: the rise of births outside wedlock often decouples temporally from fertility postponement, reflecting different drivers—"willingness" (normative acceptance/legal recognition) for non-marital childbearing versus "readiness" (education, employment, and resource constraints) for delayed parenthood (Lesthaeghe, 2014; Sobotka & Toulemon, 2008). Cross-national comparisons identify several conservative-variant cases—Switzerland, Germany, and Belgium, with the Netherlands to a lesser extent—where cohabitation and single living expanded, but births remained concentrated within marriage and non-marital fertility rose slowly and to lower levels (Lesthaeghe, 2014). In line with that pattern, our decomposition for 1981–2021 shows that the long-run TFR decline was overwhelmingly due to falling MP (69%), with secondary, non-compensatory contributions from NMFR (17%) and MFR (14%).

Despite the contribution to the overall changes in TFR, the NMFR is quite low in absolute terms. Several factors keep NMFR low: Deep-seated Confucian norms equating childbearing with legitimate marriage (Cheung & Yeung, 2020); limited welfare benefits for single parents, who receive no universal cash allowance and face strict means-testing for public housing (Social Welfare Department, 2006); and partial but insufficient substitution by grandparental or paid care. Crowded living conditions restrict multigenerational co-residence, and the live-in helper system primarily serves dual-earner married couples (FPAHK, 2023).

These constraints keep NMFR at levels that are both statistically and substantively negligible for overall fertility, corroborating Lesthaeghe's (2014) view that in East Asian "conservative-variant" settings, marriage remains the primary gatekeeper of legitimate parenthood.

Sen's (1999) Capability Approach highlights how reproductive intentions are filtered through the "capability set" available to individuals. In Hong Kong, three bottlenecks—housing unaffordability, childcare scarcity, and inflexible working hours—severely limit young adults' ability to form unions and achieve desired parity. Gender-Equity Theory (McDonald, 2000) adds that gender equality in education and the labor market has outpaced changes in the domestic sphere, generating a "gender mismatch" cost that suppresses MFR. Extended maternity leave and modest childcare subsidies have produced short-lived catch-up fertility among women aged 35–44, but they have not reversed the structural decline in MP.

In comparison with Southern Europe, where similar conservative-variant trajectories have been observed, Hong Kong's fertility dynamics share commonalities but

also notable differences. In the 21st century, countries such as Italy, Spain, and Portugal experienced marriage postponement followed by a gradual rise in non-marital fertility, albeit still constrained by cultural norms. This mirrors Hong Kong's situation, where marriage delay occurs but non-marital fertility remains much lower. Unlike in Southern Europe, where cohabitation became more normalized and non-marital fertility rose, Hong Kong's cultural constraints and lack of policy support for non-marital families have kept NMFR at very low levels, reflecting a stronger preference for marriage-based childbearing (Lesthaeghe, 2014; Heuveline, 2004). In Southern Europe, the increase in non-marital fertility was supported by policy changes that facilitated cohabitation and single-parent families—a trend not yet seen in Hong Kong, where family policies still predominantly support married families (Brinton, 2019b, a).

A periodized review of policy interventions reveals marked lags and threshold effects in Hong Kong's demographic response. During 1981–1986, intensive contraceptive-promotion efforts coincided with a steep contraction in marital fertility and a sharp fall in TFR from 1.93 to 1.37 (C&SD, 2022; Chan, 2018). In 1986–1991, overall marriage prevalence (MP) remained broadly flat (89.7% → 89.8%), yet age-specific marriage postponement—captured in our decomposition—made MP the main negative contributor to TFR, while incremental family-policy adjustments and the continued expansion of subsidized home ownership had limited demographic effects (C&SD, 2022). Over 1991–2001, longer—but largely unpaid—maternity leave coincided with tandem declines in marriage prevalence and marital fertility, pushing TFR below one in 1996 (0.93) before a slight rebound in 2001 (0.98) (C&SD, 2022; Labour Department, 2010). A partial respite emerged in 2006–2011 as the TFR rose to 1.20, driven by catch-up fertility among women aged 35–44 and consistent with rising MFR in the decomposition; paid maternity protections were already in place, while the formal introduction of statutory paternity leave followed later in 2015 (C&SD, 2022; Labour Department, 2010, 2015). By 2016–2021, record housing prices and heightened uncertainty again depressed both marriage formation and marital fertility, producing a 0.433-point drop in TFR (from 1.205 to 0.772) (C&SD, 2022; Rating and Valuation Department [RVD], 2022). Taken together, these episodes confirm that discrete financial or leave-based incentives are insufficient to arrest fertility decline unless coupled with deeper reforms that tackle unaffordable housing, labor-market rigidity, and gender-asymmetric caregiving norms (Legislative Council Secretariat, 2019; McDonald, 2000; Sen, 1999; Yi & Zhang, 2010).

Finally, SDT theory links sustained sub-replacement fertility and the pluralization of family forms to increasing reliance on international migration to stabilize population and labor supply—especially as population aging accelerates and welfare pressures grow (Lesthaeghe, 2014, 2022). Hong Kong's long-standing reliance on foreign labor and the post-2016 out-migration underscore the need to analyze fertility, migration, and aging jointly in order to assess demographic sustainability (C&SD, 2022).

8 Limitations

This study has several limitations. First, although we employ age-specific fertility rates (ASFR, ASMFR, ASNMFRR) and aggregate them to obtain TFR, TMFR, and NMFR, we do not apply age standardization across periods. As a result, shifts in cohort size and age composition may influence component contributions, since changes in rates are not separated from changes in age weights under a fixed reference distribution.

Second, the minimum analytic unit is five years; the absence of annual series constrains the detection of short-run shocks, precise policy timing, and within-interval reversals.

Third, following C&SD practice, the non-marital fertility rate (NMFR) is derived from births registered to women recorded as single; births within cohabiting unions are not separately identified. This makes our NMFR a conservative indicator in international comparison and may introduce numerator–denominator misalignment, potentially overstating MFR and understating NMFR.

Fourth, the analysis relies on 1981–2021 vital registrations, which include residents delivering locally or returning within 12 months after overseas delivery. Approximately 350,000 foreign domestic helpers (most of them female) are excluded from denominators, as they are typically sent back to their country of origin if they give birth. Moreover, official fertility data do not distinguish women by detailed union status (e.g., married, cohabiting, divorced, widowed). We are therefore unable to construct more refined denominators for fertility rates. This prevents us from testing whether our findings are robust to alternative classifications of marital and non-marital childbearing, or from conducting sensitivity analyses that account for variation across different union types.

Fifth, consistent with official definitions, births in Hong Kong to Mainland women whose spouses are not Hong Kong residents (“Type II births”) are excluded from fertility numerators. At the peak (2010–2012), such cases accounted for nearly one-third of all live births (Census and Statistics Department, 2012), implying that our estimates reflect resident fertility levels rather than all births occurring in Hong Kong.

Finally, while migration and gender-equity pathways are central to our interpretation, they are not directly estimated here due to data limitations.

9 Conclusions

Hong Kong’s ultra-low fertility is propelled by the twin mechanisms of delayed or foregone marriage and constrained progression after the first birth, rather than by a deficit of non-marital childbearing. A policy package aiming to lift fertility should prioritize: Lowering entry barriers to marriage (housing and early-child costs),

strengthening within-marriage support (affordable childcare, meaningful paternity leave, flexible work), and realigning domestic gender roles to match gains in women’s public-sphere status. Expanding acceptance of non-marital fertility is unlikely

to compensate for these structural and cultural realities in Hong Kong, which differ substantially from those in Western countries.

10 Future directions

Future work would benefit from person-level microdata disaggregated by union status, residence/migration background, parity, and age, so that numerators and denominators can be aligned and a cohabitation-specific fertility rate recovered. With richer data, researchers could move from five-year intervals to annual series and apply age standardization or age–period–cohort models to distinguish timing (postponement and catch-up) from quantum change.

We also recommend targeted robustness checks (e.g., alternative residency/overseas-birth inclusions, age reweighting) and, where feasible, the development of a joint descriptive framework for fertility, migration, and aging. For policy assessment, carefully designed quasi-experimental evaluations can be considered as appropriate.

Appendix I: The decomposition formulae

There are three independent factors in our decomposition model.

Age-specific marital fertility rate (AMFR): This expresses the number of births by a married woman at any given age.

Age Specific non-marital fertility rate (ANFR): This rate is calculated similarly to the AMFR for never-married women.

Marriage Rate (MR): This is the proportion of currently married females in a particular age group.

Non-marriage Rate (NR): This is the proportion of currently non-married females (never married, divorced, or widowed) in a particular age group.

Other study measures were as follows:

$B(x, t)$ = Number of births given by females in age group x in the year t ;

$B^{IM}(x, t)$ = Number of births from married females in age group x in year t ;

$B^{OM}(x, t)$ = Number of births by not-married females in age group x in year t ;

$K(x, t)$ = Number of females in age group x in the middle of year t ;

$K^{IM}(x, t)$ = Number of married females in age group x in the middle of year t ;

$K^{OM}(x, t)$ = Number of not-married females in age group x in the middle of year t ;

A bar over a variable (i.e. $\bar{a}$) denotes the average of the variable over two time-points, and a delta in front of a variable (i.e. $\Delta a = a^{t_1} - a^{t_0}$) denotes the change of the variable over two time-points: t_0 and t_1 .

$$\begin{aligned}
\Delta TFR &= \sum_x (AFR(x, t_1) - AFR(x, t_0)) \\
&= \sum_x \left(\frac{B(x, t_1)}{K(x, t_1)} - \frac{B(x, t_0)}{K(x, t_0)} \right) \\
&= \sum_x \left(\frac{B^{OM}(x, t_1) + B^{IM}(x, t_1)}{K(x, t_1)} - \frac{B^{OM}(x, t_0) + B^{IM}(x, t_0)}{K(x, t_0)} \right) \\
&= \sum_x \left(\frac{B^{OM}(x, t_1)}{K(x, t_1)} - \frac{B^{OM}(x, t_0)}{K(x, t_0)} \right) \\
&\quad + \sum_x \left(\frac{B^{IM}(x, t_1)}{K(x, t_1)} - \frac{B^{IM}(x, t_0)}{K(x, t_0)} \right) \\
&= \sum_x \left(\frac{B^{OM}(x, t_1)}{K^{NM}(x, t_1)} \times \frac{K^{NM}(x, t_1)}{K(x, t_1)} - \frac{B^{OM}(x, t_0)}{K^{NM}(x, t_0)} \times \frac{K^{NM}(x, t_0)}{K(x, t_0)} \right) \\
&\quad + \sum_x \left(\frac{B^{IM}(x, t_1)}{K^M(x, t_1)} \times \frac{K^M(x, t_1)}{K(x, t_1)} - \frac{B^{IM}(x, t_0)}{K^M(x, t_0)} \times \frac{K^M(x, t_0)}{K(x, t_0)} \right) \\
&= \sum_x \left[\frac{1}{2} \left(\frac{B^{OM}(x, t_1)}{K^{NM}(x, t_1)} + \frac{B^{OM}(x, t_0)}{K^{NM}(x, t_0)} \right) \times \left(\frac{K^{NM}(x, t_1)}{K(x, t_1)} - \frac{K^{NM}(x, t_0)}{K(x, t_0)} \right) \right. \\
&\quad \left. + \frac{1}{2} \left(\frac{K^M(x, t_1)}{K(x, t_1)} + \frac{K^M(x, t_0)}{K(x, t_0)} \right) \times \left(\frac{B^{IM}(x, t_1)}{K^M(x, t_1)} - \frac{K^M(x, t_0)}{K(x, t_0)} \right) \right] \\
&\quad + \sum_x \left[\left(\frac{B^{IM}(x, t_1)}{K^M(x, t_1)} + \frac{B^{IM}(x, t_0)}{K^M(x, t_0)} \right) \times \left(\frac{K^M(x, t_0)}{K(x, t_0)} - \frac{K^M(x, t_1)}{K(x, t_1)} \right) \right. \\
&\quad \left. + \frac{1}{2} \left(\frac{K^M(x, t_1)}{K(x, t_1)} + \frac{K^M(x, t_0)}{K(x, t_0)} \right) \times \left(\frac{B^{IM}(x, t_1)}{K^M(x, t_1)} - \frac{B^{IM}(x, t_0)}{K^M(x, t_0)} \right) \right] \\
&= \sum_x (\underline{ANFR}(x) \times \Delta NR(x) + \underline{NR}(x) \times \Delta ANFR(x)) \\
&\quad + \sum_x (\underline{AMFR}(x) \times \Delta MR(x) + \underline{MR}(x) \times \Delta AMFR(x)) \\
&= \sum_x \left(\frac{(\underline{AMFR}(x) - \underline{ANFR}(x)) \times \Delta MR(x) + (\underline{NR}(x) - \underline{AMFR}(x)) \times \Delta ANFR(x)}{(1 - \underline{MR}(x)) \times \Delta ANFR(x) + \sum_x (\underline{MR}(x) \times \Delta AMFR(x))} \right) \quad (1)
\end{aligned}$$

The over-time change in TFR between any two time points: t_0 and t_1 can be further split into three parts: The first term on the right side of Equation (1) represents the effect of changes in marital distribution, the second term is the change in non-marital fertility rate, and the third term captures the change in marital fertility (Table 5)

Table 5 Age specific fertility rates and total fertility rates of Hong Kong

Year	Age specific fertility rates							TFR per 1000 woman
	15-19	20-24	25-29	30-34	35-39	40-44	45-49	
1981	11.7	85.9	153.0	97.3	34.4	6.8	0.7	1933
1986	7.0	48.6	111.9	78.5	26.9	4.0	0.3	1367
1991	6.5	39.1	97.4	81.2	30.4	4.5	0.3	1281
1996	5.9	37.1	80.7	78.6	31.8	5.0	0.2	1191
2001	4.3	29.1	57.2	61.7	29.3	4.7	0.2	931
2006	3.2	25.0	56.5	71.6	35.1	5.2	0.3	984
2011	3.2	26.6	63.6	86.6	51.8	8.7	0.4	1204
2016	2.7	17.8	59.1	93.0	57.3	11.4	0.7	1205
2021	1.3	9.0	29.4	63.8	42.3	8.7	0.4	772

Tables 6 gives the age-specific proportion of married women for the period 1981–2021. The proportion of married women has reduced consistently and substantially in all age groups. The age group of 25–29 has the largest reduction from 68.9% in 1981 to 20.56% in 2021 and it would be the most fertile group among married women (Tables 7, 8 and 9).

Table 6 Proportion of married females by age group of Hong Kong (%), 1981–2021

Year	Age group						
	15–19	20–24	25–29	30–34	35–39	40–44	45–49
1981	3.4	28.4	68.9	87.5	92.9	93.0	90.1
1986	2.0	21.0	61.7	83.5	89.4	91.4	89.6
1991	1.6	16.9	53.8	78.4	86.4	88.3	89.8
1996	1.7	16.3	49.6	71.8	81.3	84.9	86.0
2001	0.8	13.6	42.0	66.1	76.2	80.2	82.2
2006	0.5	9.8	35.2	62.5	71.4	74.7	76.4
2011	0.4	7.3	32.7	59.6	71.2	73.3	74.0
2016	0.4	5.4	27.7	60.3	72.4	74.2	72.8
2021	0.7	4.5	20.6	52.4	68.9	70.5	70.9

Table 7 Age-specific marital fertility rates of Hong Kong (1981–2021)

Year	Age Group						
	15–19	20–24	25–29	30–34	35–39	40–44	45–49
1981	245.2	274.3	209.5	104.7	34.3	6.5	0.6
1986	248.6	216.9	175.4	89.9	28.2	3.8	0.3
1991	259.1	213.7	174.2	99.5	33.1	4.6	0.3
1996	207.1	184.3	151.8	103.5	36.4	5.1	0.2
2001	319.9	162.9	110.8	82.4	34.1	4.9	0.2
2006	115.6	137.4	128.8	102.0	41.9	5.6	0.3
2011	250.4	217.4	154.9	133.0	66.0	10.0	0.4
2016	305.6	259.3	191.3	144.5	71.9	13.2	0.8
2021	67.7	147.6	128.1	115.1	57.0	10.7	0.5

Number of live births per 1000 married females

Table 8 Age-specific non-marital fertility rates of Hong Kong, 1981–2021

Year	Age Group						
	15–19	20–24	25–29	30–34	35–39	40–44	45–49
1981	3.6	11.2	27.7	45.0	35.6	10.3	1.1
1986	1.9	3.9	9.7	20.5	16.3	6.5	0.6
1991	2.4	3.6	7.8	15.0	13.5	4.2	0.4
1996	2.3	3.4	5.8	9.6	8.2	3.0	0.2
2001	1.7	3.6	5.6	10.0	8.4	2.5	0.1
2006	2.1	4.9	4.8	5.8	8.0	2.4	0.2
2011	2.2	8.1	10.1	9.9	7.4	1.9	0.1
2016	1.4	2.9	5.3	12.0	15.4	5.5	0.3
2021	0.9	2.2	3.8	8.3	9.1	3.6	0.4

Number of live births per 1000 non-married females

Table 9 Proportion of nonmarital birth among all the births by age group (%)

Year	Age Group						
	15-19	20-24	25-29	30-34	35-39	40-44	45-49
1981	1.4	3.9	13.2	25.6	29.1	19.6	8.5
1986	0.8	1.8	4.7	10.0	10.8	15.5	6.5
1991	1.0	1.7	4.3	8.1	9.9	10.8	5.2
1996	1.0	1.7	3.3	6.4	7.7	8.6	3.2
2001	0.9	1.7	3.1	6.5	7.2	8.1	2.8
2006	1.0	2.2	3.5	5.4	7.8	8.1	3.2
2011	0.9	3.6	6.1	7.0	7.5	5.1	2.1
2016	0.8	1.8	3.7	7.5	11.9	7.8	2.5
2021	0.7	1.5	2.8	6.2	8.3	6.9	2.2

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Data availability All statistical data used for this study are openly accessible in the cited databases, specifically the Census and Statistics Department (CSD) of Hong Kong.

Declarations

Conflict of interest There is no conflict of interest of this paper.

Ethical approval Since this study does not involve human participants, animals, or sensitive ethical issues, ethical approval is not required.

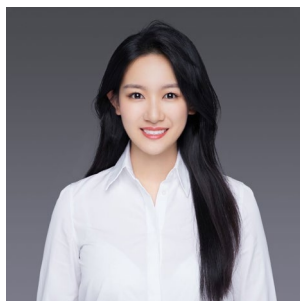
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