



Examining the link: educational expansion and non-marital fertility in Croatia

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ABSTRACT

This paper studies the macro-level relationship between education and non-marital fertility in Croatia. Using vital statistics on first births from 1984 to 2021, we explored non-marital fertility trends by mothers' education and assessed the influence of women's educational expansion. We observed a significant increase in the proportion of non-marital births, from under 10% in the mid-1980s to over 30% by 2021. Decomposition analysis showed that behavioural changes, particularly among medium-educated women, significantly influenced the increase in non-marital fertility. This group increasingly opted for childbearing outside of marriage. High-educated women also contributed to the trend, with the behavioural changes more modest in comparison to those of medium-educated women, but amplified by an increase in their group size. Direct standardization showed that higher educational attainment among first-time mothers moderated the proportion of non-marital births, suggesting that the proportion of non-marital births could have been even higher had the educational composition remained constant at 1984 levels. The study confirmed a persistent negative educational gradient, where lower educational attainment was associated with a higher likelihood of non-marital childbearing. The results have important implications for policymakers, as discussed in the paper.

KEYWORDS

non-marital fertility, education, demographic analysis, Croatia, decomposition methods

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1 INTRODUCTION

Recent decades have witnessed a marked increase in non-marital fertility across Europe (Eurostat 2024), a trend recognised as one of the most significant aspects of family change (Sobotka and Toulemon 2008; Perelli-Harris et al. 2010). This increase is closely linked to broader shifts towards more informal partnerships and is largely attributed to the proliferation of childbearing within cohabitation (Kiernan 2001, 2004). Many demographers view non-marital childbearing as a fundamental feature of the 'second demographic transition' (Van de Kaa 1987, 2001; Lesthaeghe 1995, 2010, 2014), the dominant theoretical framework used to understand changes in family formation, which posits a decoupling of marriage and childbearing, influenced by later marriages and rising cohabitation rates. This phenomenon is underpinned by broader economic and ideational shifts, including improving economic conditions and educational expansion, which foster changing attitudes towards premarital sex, non-marital relationships, and separation. As societies become wealthier and more educated, individuals increasingly value personal freedom, challenge traditional authorities, and seek personal fulfilment and self-actualization. The second demographic transition (hereinafter SDT) posits that these trends indicate a shift in societal attitudes towards family and relationships. The shifts in family behaviour are also tied to broader cultural changes. Education, particularly, is seen as a driving force behind these ideational changes, with more educated individuals often leading the way in adopting new family formation patterns. They are more likely to engage in behaviours like cohabiting and having children outside

marriage. Additionally, education provides women with greater economic independence, enabling them to make choices about having children without relying financially on a partner (Klesment and Van Bavel 2017).

Other explanations focus on economic arguments and patterns of disadvantage (POD). Economic constraints and insecurities, coupled with changing job markets, might have made marriage less attainable or desirable, particularly among those who are less educated or economically disadvantaged (Perelli-Harris et al. 2010; Perelli-Harris and Gerber 2011). The POD theory suggests that non-marital family arrangements are often a reaction to economic uncertainty, rather than lifestyle choices. As economic uncertainties have increased globally due to factors like globalization, the job market has become less stable, particularly affecting young people. This instability prompts them to delay marriage and family formation, opting instead for less committed relationship forms. As discussed by Perelli-Harris and colleagues, within the POD framework, individuals still value marriage highly and see it as a symbol of life stability. However, they choose to delay marriage until they feel their economic and life situations are stable enough to support a traditional family structure. Economic risks, including unemployment and precarious employment, have become more stratified by education and social status, and people with lower education levels, facing higher risks of poverty and unemployment, are more likely to delay or avoid marriage, leading to an increase in non-marital childbearing (Buchholz et al. 2009; Lesthaeghe 2020; McLanahan and Percheski 2008; Perelli-Harris et al. 2010; Štípková 2015).

Contrasting perspectives from the SDT and POD theories thus present

different expectations about which educational groups are more prone to non-marital births: according to the SDT view, the highly educated should be the ones more likely to have children outside marriage, while according to the POD view, it should be the low-educated group (Perelli-Harris et al. 2010; Perelli-Harris and Gerber 2011). Lappegård et al. (2018) demonstrated that, while the SDT theory can be helpful in explaining the differences in non-marital childbearing between countries, the POD approach more effectively explains variations among individuals and, to some extent, differences within a country. In line with the POD arguments, many micro-level studies have found evidence of a negative educational gradient in non-marital fertility for a number of European countries (e.g., Konietzka and Kreyenfeld 2002; Perelli-Harris et al. 2010; Ní Bhrolcháin and Beaujouan 2013; Vitali, Aassve and Lappegård 2015; Jalovaara and Andersson 2018), including Central and Eastern European countries (e.g., Sobotka 2008; Hoem, Mureşan and Hărăguş 2013; Štípková 2015) and Croatia in particular (Pavić 2014). However, the rise of non-marital fertility in Europe has coincided with educational expansion – especially prominent among women (Van Bavel 2012) – and sharply declining proportions of the low-educated group. This prompted research (Schnor and Jalovaara 2020) that would reconcile the two seemingly paradoxical trends – an increase in the average level of education coupled with an increase in non-marital fertility, despite the low-educated being especially likely to have their children outside marriage.

Schnor and Jalovaara (2020) explore the relationship between non-marital childbearing and educational expansion

among the Finnish first-time parents from 1970 to 2009. They identify a significant rise in non-marital childbearing primarily attributed to medium-educated and lower tertiary-educated women, despite the highest prevalence of non-marital births among the low-educated population. As educational levels rose, the influence of the low-educated group reduced due to their smaller size, even though they had the highest rates of non-marital births. Conversely, the medium-educated played a crucial role in driving the observed changes due to their substantial numbers and evolving behaviours over the analysed period. The study by Schnor and Jalovaara (2020) underscores the complex interplay between increased educational attainment, evolving societal norms, and economic factors, which collectively influence marital decisions and childbearing patterns. Their findings suggest that changes in societal acceptance of non-marital childbearing and economic pressures particularly impacted medium and lower tertiary-educated individuals, prompting them to delay marriage or choose cohabitation, thus contributing to the rise in non-marital births in Finland.

This paper applies the approach used by Schnor and Jalovaara (2020) to explore a vastly different context. We examine the macro-level relationship between education and non-marital fertility in Croatia, attempting to assess how changes in women's educational structure have influenced their childbearing behaviour. Historically, non-marital childbearing was less common in Croatia during the latter half of the 20th century compared to many other European countries, with notable increases only in recent years (Mrđen 1997; Eurostat 2024). This trend is akin

to what Northern and Western Europe experienced two decades earlier (e.g., Sobotka 2008). Accompanying the rise in non-marital childbearing, there has been a significant educational expansion in Croatia (Croatian Bureau of Statistics 2023a), with highly educated women now forming the largest educational group among younger cohorts, as indicated by the Croatian Census of 2021 (Croatian Bureau of Statistics 2023b). Pavić (2014) analyses individual-level factors affecting non-marital childbearing, indicating that non-marital births are more likely among the lower-educated and economically weaker groups in Croatia. Despite these insights into individual behaviours, a significant gap remains in the research integrating these observations with broader societal trends. While studies such as that by Schnor and Jalovaara (2020) have explored similar phenomena in the Nordic context, the European forerunner in SDT (e.g., Sobotka 2008), the research examining the mechanisms behind the rise of non-marital fertility (Štípková 2015), or linking the micro-level negative educational gradient with the macro-level rise in non-marital childbearing, remains scarce for former socialist countries such as Croatia. This paper aims to address this gap by examining the relationship between education and non-marital fertility among Croatian women, focusing on the first births from 1984 to 2021.

We seek to assess how changes in the educational structure of women have impacted the proportion of children born out of wedlock, describing non-marital fertility trends by mothers' education, and quantifying the effects of female educational expansion on these trends. While we have insights into individual behaviours, our primary interest lies in societal rather than

individual outcomes, focusing on how educational expansion at the population level has shaped the proportion of non-marital births among first-time mothers. Accordingly, this study addresses two central research questions: *What portion of the rise in non-marital childbearing can be attributed to shifts in the educational composition of first-time mothers, as opposed to changes in education-specific fertility behaviour? How would the trend in non-marital fertility differ had the educational composition of first-time mothers remained constant?* The paper advances our understanding of the relationship between education and non-marital childbearing by providing context-specific information from Croatia, contributing to the existing knowledge about demographic trends and societal changes.

2 METHODS

To tackle our research questions, we utilised birth-level vital statistics data provided by the Croatian Bureau of Statistics for the period from 1984 to 2021.¹ The dataset includes information about all live births in Croatia, incorporating demographic and socioeconomic characteristics of parents, where available.

To address potential biases, our analysis focused on first births – a restriction also adopted by other researchers (e.g., Schnor and Jalovaara 2020) to account for the fact that union status at the time of higher-order births often reflects patterns of separation and re-partnering, particularly among unmarried parents who are more likely to separate before a second child is born. This approach has

¹ Note that since 1998, the data collection method has shifted from the mother's permanent residence to the concept of usual resident population.

yielded a total of 785,035 first births for analysis. The educational background of the mother was documented for 755,987 of these births, representing 93.7% of non-marital births and 96.7% of marital births. Information on fathers was less complete, with educational attainment data missing for 35.9% of non-marital births. Due to this limitation, we confined our analysis to first-time mothers.

We carried out the analysis using three educational categories, which correspond to the following ISCED (2011) levels: low (ISCED 0–2), medium (ISCED 3), and high (ISCED 5–8). Educational data refer to the highest level attained by the mother at the birth of her first child, as available in vital records. During the period analysed, the classification of education in the vital records underwent several changes, complicating the further segmentation of medium and high education into finer, directly comparable categories. Despite these challenges, our robustness checks expanded the number of educational categories and assumed consistent correspondence between them over time, aiming to identify potential differences in non-marital childbearing within the medium and high educational strata.

The first step of our analysis involved describing trends in the proportion of the first children born out of wedlock, which included an examination of the overall trends and a breakdown according to mothers' educational levels. We also explored the educational composition of the first-time mothers, assessing how their educational backgrounds have changed over the study period.

We next performed a decomposition of the changes in the proportion of non-marital first births across six carefully chosen multiple-year intervals

between 1984 and 2021: 1984–90 (Croatia as part of Yugoslavia), 1991–95 (wartime), 1996–99 (post-war recovery), 2000–07 (economic upswing), 2008–13 (economic downturn), 2014–21 (post-EU accession). To assess how the educational expansion among first-time mothers shaped non-marital fertility in Croatia, we compared each pair of neighbouring intervals applying the following decomposition formula (Kitagawa 1955; Preston, Heuveline and Guillot 2001: 28–30)

$$\Delta = P^{t_2} - P^{t_1} = \sum_i (C_i^{t_2} - C_i^{t_1}) \times \left(\frac{P_i^{t_2} + P_i^{t_1}}{2} \right) + \sum_i (P_i^{t_2} - P_i^{t_1}) \times \left(\frac{C_i^{t_2} + C_i^{t_1}}{2} \right).$$

Here, Δ represents the total change in the proportion of first children born out of wedlock. It is defined as the difference in the proportion of non-marital first births, P , between the pairs of neighbouring intervals, t_2 and t_1 , as previously outlined. The proportion of first-time mothers that falls into the i th educational category is represented by C_i , where i denotes the educational levels: low, medium, high.

The formula breaks down Δ into two components, the compositional effect, and the behavioural effect, detailing how these effects contribute to the total change observed. The first summation in the formula,

$$\sum_i (C_i^{t_2} - C_i^{t_1}) \times \left(\frac{P_i^{t_2} + P_i^{t_1}}{2} \right),$$

represents the *compositional* effect: the difference in educational composition ($C_i^{t_2} - C_i^{t_1}$) weighted by average education-specific non-marital first childbearing for the corresponding t_1 and t_2 . It quantifies the part of the total change in the proportion of non-marital first births that is driven by changes in the educational structure of first-time mothers.

The second summation in the formula,

$$\sum_i (P_i^{t_2} - P_i^{t_1}) \times \left(\frac{C_i^{t_2} + C_i^{t_1}}{2} \right),$$

represents the *behavioural* effect: the difference in education-specific proportions of children born outside marriage ($P_i^{t_2} - P_i^{t_1}$) weighted by the average educational composition of first-time mothers for the corresponding t_1 and t_2 . It quantifies the part of the total change in the proportion of non-marital first births that is driven by the changes in childbearing behaviour of low-, medium-, and high-educated first-time mothers.

In the final step of our analysis, we employed direct standardisation to examine the role that the changes in the educational structure of first-time mothers played in the observed trends in non-marital fertility. We used the educational composition of first-time mothers from 1984 as the standard and compared the actual trend with a

directly standardised one, i.e., the trend that would have been observed if the educational distribution of first-time mothers had not changed.

3 RESULTS

3.1 TRENDS IN NON-MARITAL FIRST CHILDBEARING AND THE EDUCATIONAL EXPANSION AMONG FIRST-TIME MOTHERS IN CROATIA 1984–2021

The trend in non-marital first childbearing from 1984 to 2021 offers insights into the changing patterns of family formation in Croatia. There has been a notable increase in the proportion of first children born outside marriage, as depicted in Figure 1. Beginning at less than 10% in the mid-1980s, this proportion has risen significantly, surpassing 30% by the end of the period under study. Figure 1 traces this trend with two lines: the solid line indicates the

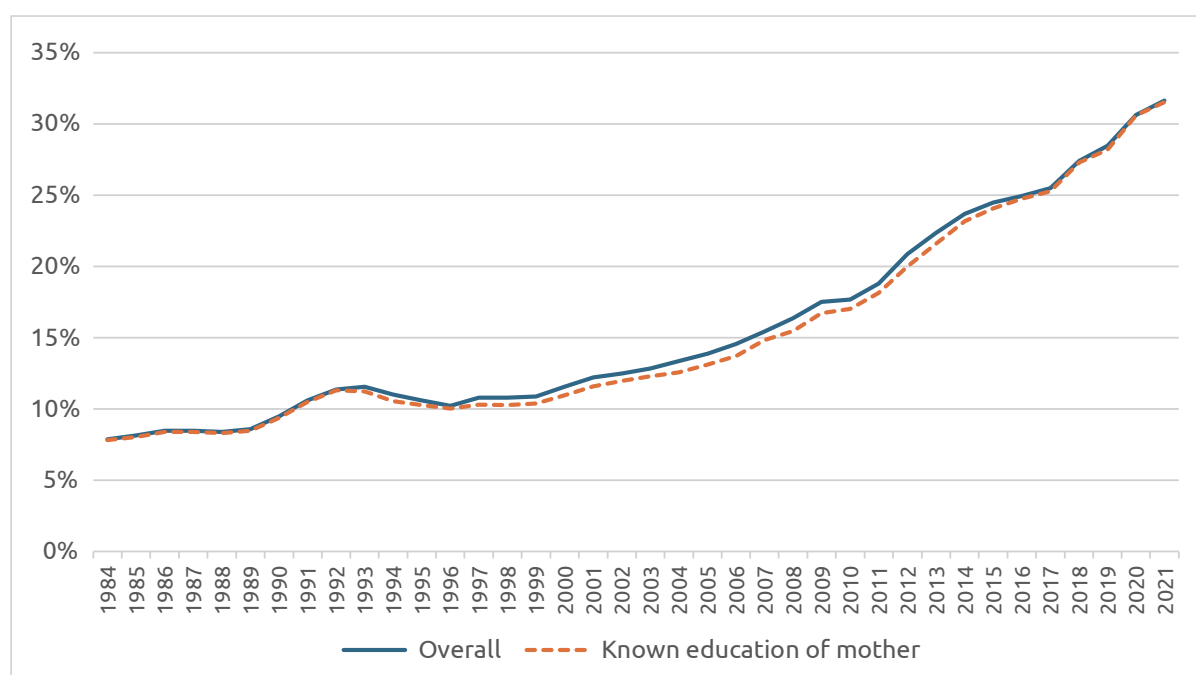


Figure 1 The rising proportion of non-marital first births in Croatia (1984–2021)

Source: vital statistics data provided by the Croatian Bureau of Statistics; authors' own calculations.

overall proportion of non-marital first births, while the dashed line represents births for which the educational backgrounds of mothers are available in the vital records. The position of the dashed line below the solid line suggests that educational information is less complete for unmarried mothers. Nonetheless, the relatively small gap between the two lines indicates that the incomplete registration of mothers' educational backgrounds is unlikely to substantially alter our main findings.

Figure 2 displays the trend in non-marital first childbearing broken down by the educational levels of mothers. The figure illustrates a significant increase across all educational strata, yet it also reveals differing patterns of growth among these groups. In the mid-1980s, less than 15% of the first-born children of the mothers with low education were born out of wedlock, a proportion which grew to almost 80% by the end of the period in question. The trend for mothers with

medium education began to rise steadily in the early 1990s, while the proportion for those with high education saw a more gradual but consistent increase. Throughout the period, mothers with lower educational levels consistently had higher proportions of non-marital first births compared to those with higher education, yet all groups experienced growth in non-marital fertility.

Figure 3 shows the changing educational composition of the first-time mothers in Croatia from 1984 to 2021, with a clear shift towards higher education. In 1984, more than half of new mothers had medium level of education, while 30.6% had low education, and just 11.7% had high level of education. By 2021, the proportion of mothers with low level of education had fallen to a mere 2.6%, while those with medium level accounted for 46.2%. Remarkably, the percentage of mothers with high level of education more than quadrupled, representing 51.2% of the total.

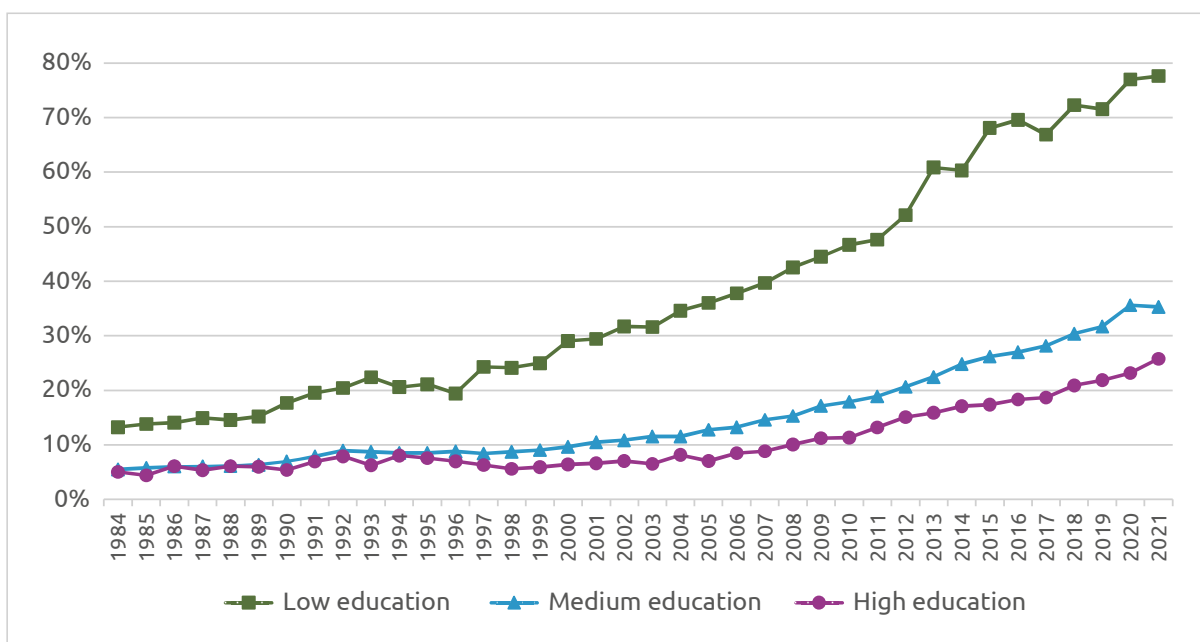


Figure 2 Comparison of non-marital first birth proportions among mothers with different educational levels (1984–2021)

Source: vital statistics data provided by the Croatian Bureau of Statistics; authors' own calculations.

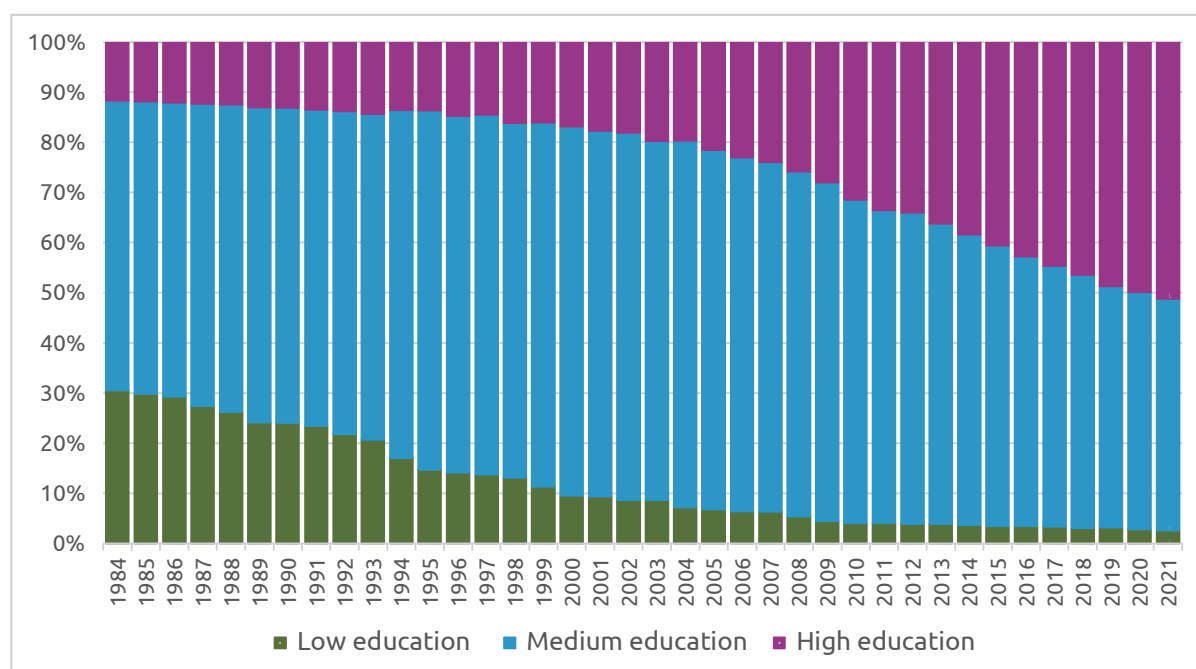


Figure 3 Educational composition of first-time mothers in Croatia (1984–2021)

Source: vital statistics data provided by the Croatian Bureau of Statistics; own calculations.

Throughout the analysed period, the negative educational gradient in non-marital first childbearing persisted. Simultaneously, there was an educational expansion among first-time mothers. Moving forward, we explored these trends using multiple-year intervals within a decomposition framework, to gain a deeper understanding of the underlying changes in non-marital first childbearing.

3.2 COMPONENTS OF CHANGE IN NON-MARITAL FIRST CHILDBEARING

Table 1 presents the impact of changes in non-marital fertility among first-time mothers, categorized by their educational levels. It outlines the behavioural effects reflecting shifts in non-marital first childbearing, the compositional effects caused by the changes in the relative size of each educational group, and the total effect, which combines the

two. In the following interpretation, we refer to the results as shown in Table 1, with the sums that in some instances might not match due to rounding.

Between 1984–90 and 1991–95, the proportion of first children born outside marriage rose by 2.39 percentage points, from 8.37% to 10.76%. There was an increase in non-marital fertility across all educational categories, but it was the largest among the medium-educated first-time mothers. Low-educated women had a behavioural effect of 1.44 percentage points. However, the decline in the share of low-educated women resulted in the negative compositional effect of -1.37 . These effects combined to the small total impact of 0.07 on the overall increase in non-marital childbearing for low-educated women. First-time mothers with medium education displayed the more substantial contribution of 1.99 percentage points, driven by both behavioural effects (1.53)

Table 1 Results of the decomposition analysis

Time (from → to)	Education	Effect		
		Behavioural	Compositional	Total
1984–90 → 1991–95	Low	1.44	–1.37	0.07
	Medium	1.53	0.46	1.99
	High	0.24	0.09	0.33
	Total	3.20	–0.81	2.39
1991–95 → 1996–99	Low	0.38	–1.45	–1.07
	Medium	0.16	0.43	0.59
	High	–0.16	0.11	–0.05
	Total	0.38	–0.91	–0.53
1996–99 → 2000–07	Low	1.07	–1.48	–0.41
	Medium	2.21	0.05	2.26
	High	0.23	0.33	0.55
	Total	3.51	–1.10	2.41
2000–07 → 2008–13	Low	0.92	–1.44	–0.52
	Medium	4.57	–1.17	3.39
	High	1.40	1.15	2.55
	Total	6.89	–1.46	5.42
2008–13 → 2014–21	Low	0.81	–0.65	0.16
	Medium	6.31	–3.02	3.29
	High	2.90	2.29	5.19
	Total	10.01	–1.38	8.63

Source: vital statistics data provided by the Croatian Bureau of Statistics; authors' own calculations.
 Note: the sums might not match due to rounding.

and compositional effects (0.46), which indicates that their propensity to have children outside of marriage grew alongside their relative group size. The contribution of 0.33 percentage points by the high-educated first-time mothers was driven more by behavioural shifts in non-marital childbearing (0.24) than by their increasing group size (0.09).

The proportion of non-marital first births dropped to 10.24% by 1996–99, the decrease of –0.53 percentage points relative to the previous five-year interval. This decline is mostly attributable to low-educated mothers: while they increasingly had children out of wedlock (a positive behavioural effect), their group size shrank (a negative compositional

effect), resulting in the total effect of –1.07. High-educated women contributed another –0.05 percentage points, stemming entirely from their declining tendency to have children outside marriage, in contrast to their low-educated peers. For the medium-educated first-time mothers, both behavioural and compositional effects were positive.

Between 1996–99 and 2000–07, the proportion of first children born outside marriage rose again, this time by 2.41 percentage points. Low-educated mothers, despite exhibiting the positive behavioural effect of 1.07, saw their contribution to the overall increase in non-marital first childbearing, largely offset by the more substantial negative

compositional effect of -1.48 . For medium-educated mothers, behavioural (2.21) and compositional (0.05) effects both drove the considerable total contribution of 2.26 percentage points, indicating a greater tendency for non-marital childbearing and a relatively stable group size. High-educated mothers showed the moderate total contribution of 0.55 percentage points, with both behavioural (0.23) and compositional (0.33) effects playing a significant role, suggesting that while their propensity for non-marital childbearing increased, their growing group size was a more pronounced factor.

The trend from 2000–07 to 2008–13 indicates an overall substantial increase in non-marital first childbearing of 5.42 percentage points. For low-educated mothers, the behavioural effect of 0.92 was more than offset by the stronger negative compositional effect of -1.44 , leading to the total contribution of -0.52 percentage points. This reflects a continued pattern where, despite an increase in non-marital fertility within this group, the significant reduction in their relative size slows the increase in the overall proportion of non-marital first births. Medium-educated mothers experienced the pronounced total increase of 3.39 percentage points, propelled by the large behavioural effect of 4.57 , while the negative compositional effect of -1.17 suggests that their size shrank. High-educated mothers accounted for the increase of 2.55 percentage points, with behavioural changes adding 1.40 points and compositional changes adding 1.15 points. This reveals that highly educated mothers were not only increasingly having children outside marriage, but their segment was also growing.

From 2008–13 to 2014–21, the rise in the proportion of non-marital first

births reached 8.63 percentage points, the highest observed within the period analysed. Low-educated mothers made a modest addition of 0.16 percentage points, with their growing inclination to have children outside marriage (0.81) lessened by negative compositional change (-0.65). Medium-educated mothers contributed to the total increase with 3.29 percentage points, predominantly due to a sizeable behavioural change (6.31), although this was counterbalanced by a considerable reduction in their group size (-3.02). High-educated mothers led with the total contribution of 5.19 percentage points, where the behavioural change (2.90) was amplified by an increase in their group size (2.29), underscoring not only an increasing tendency for non-marital childbearing, but also an expansion in their representation among first-time mothers.

In summary, throughout the study period, there has been an increase in non-marital fertility across all educational strata. However, the medium- and high-education groups have been particularly notable, displaying both behavioural and compositional changes. Among medium-educated mothers, the most substantial behavioural shifts were observed, indicating a significant transformation in their attitudes and practices regarding non-marital childbearing, even as their numbers declined. In contrast, the contribution of highly educated mothers was primarily driven by the growth in their group size, rather than striking changes in fertility behaviour. Clearly, while behavioural changes were more pronounced in general, the compositional changes among highly educated mothers played an important role, significantly influencing the overall rise in non-marital births. Building on these findings, the final step of our

analysis used direct standardization to further dissect the impact of changes in the educational distribution of first-time mothers on the trend of non-marital fertility, employing the educational structure from 1984 as the baseline to isolate the effects stemming purely from compositional shifts.

3.3 THE ROLE OF EDUCATIONAL EXPANSION IN THE RISE OF NON-MARITAL FIRST CHILDBEARING

Figure 4 depicts the results of direct standardisation of the non-marital first childbearing in Croatia from 1984 to 2021, comparing the actual observed proportion of non-marital first births to the standardised trend which assumes an unchanging educational structure of first-time mothers from 1984. The standardised proportions are consistently higher than both sets of actual

proportions. This discrepancy suggests that if the educational composition of first-time mothers had not changed from that of 1984, the proportion of non-marital first births would have been higher than what was actually observed.

The standardisation procedure used the educational structure of the first-time mothers in 1984 as the constant reference point to calculate what the proportion of non-marital first births would have been if the educational composition had not changed over time (as in fact it had). Since the standardised proportions are higher than the actual ones, it indicates that the increasing educational levels of the first-time mothers over the period have acted as a moderating factor against the trend of non-marital fertility.

This means that while there was indeed an increase in the overall proportion of non-marital first births, this increase could have been even more

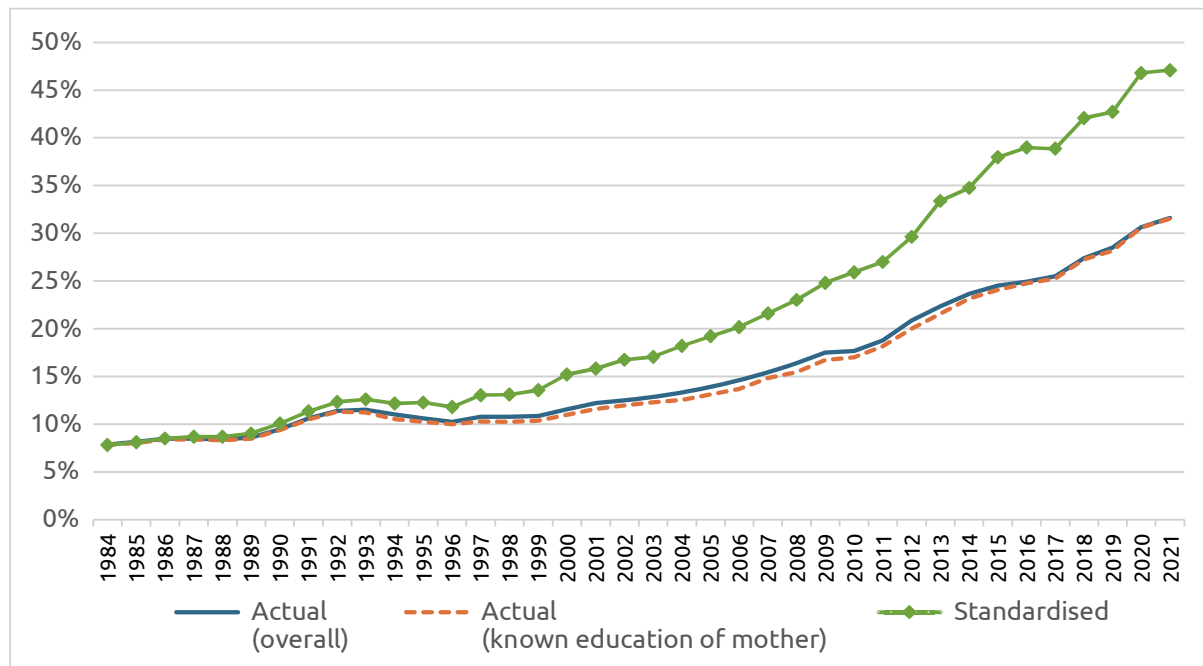


Figure 4 A comparison of actual and educational-structure standardised proportions of non-marital first births in Croatia (1984–2021)

Source: vital statistics data provided by the Croatian Bureau of Statistics; authors' own calculations.

pronounced if the educational levels of mothers had remained as they were in 1984. The findings suggest that as education levels increased, the proportion of non-marital first births did not increase as much as it would have if the educational distribution had remained constant.

Therefore, the analysis shows that the educational expansion among first-time mothers had a dampening effect on the rise of non-marital first births in Croatia. Had the educational composition of mothers stayed at lower levels (i.e., the 1984 levels), our results suggest we would have seen a higher proportion of non-marital births, implying that higher education is associated with lower proportions of children being born out of wedlock. From the mid-1980s until around 2000, the gap between the actual and standardised proportions was relatively minor, suggesting that during this period, changes in the educational composition of first-time mothers had less impact on the rise in non-marital births. However, after 2000, this gap widens significantly, reflecting a more substantial influence of educational composition on non-marital fertility trends.

4 DISCUSSION

Throughout the analysed period, non-marital fertility in Croatia followed a dynamic pattern – initially increasing, then showing a slight decrease from 1991–95 to 1996–99, followed by significant increases thereafter. The early rise mirrors broader European trends, where non-marital births have become increasingly common amid educational expansion and shifting social norms (Schnor and Jalovaara 2020). The decline in the mid-1990s may have been

influenced by ‘retraditionalisation’, a phenomenon observed across several post-socialist countries during the times of significant socio-political upheaval, characterised by a temporary reversion to more traditional marital and family norms (Petrović 2011). This decline was primarily driven by a decrease in the group size of low-educated mothers, more likely to have children outside of marriage (e.g., Sobotka 2008; Perelli-Harris et al. 2010; Pavić 2014). This suggests that broader demographic shifts, particularly educational expansion, played a more significant role than retraditionalisation per se. Nonetheless, the observed negative behavioural effects among highly educated mothers during this period align with the retraditionalisation narrative, possibly reflecting a temporary return to conservative values amid the national tumult. Generally speaking, the 1990s were a period of significant social and economic transformation across former socialist countries, including Croatia, where shifts in societal norms and economic conditions influenced family formation and fertility trends in many and diverse ways (Frejka 2008; Sobotka 2008; Sobotka and Toulemon 2008), with varying responses among different educational strata (Štípková 2015).

Subsequent increases in non-marital fertility have notably been driven by behavioural changes among the medium-educated, who have become the most significant contributors to this trend. Such shifts in behaviour among the medium educated, observed in other countries as well, have been attributed to their navigation through shifting economic conditions and partnership dynamics, which have lessened the traditional emphasis on marriage before childbearing (Schnor and Jal-

ovaara 2020). More recently, the largest contributions to the rise in non-marital births have come from highly educated mothers. This trend aligns with findings from Cherlin (2021), indicating a growing acceptance of non-marital childbearing among the highly educated, driven by broader societal acceptance and changes in personal values regarding family formation. However, behavioural shifts among the highly educated were less pronounced compared to those among the medium-educated. In the case of the highly educated, the increase in non-marital childbearing was reinforced by the compositional effect – the relative size of this group rose significantly – while for the medium-educated, the compositional effect has started to work in the opposite direction, thus working to slow down the increase in non-marital fertility in Croatia.

We performed additional analyses using a larger number of educational categories. Specifically, we divided medium education into two categories (lower and upper medium education), and high education into two categories (lower and upper high education) to examine how the results change and whether there was heterogeneity within these educational strata, as suggested by other studies. Unlike Schnor and Jalovaara (2020), who observed diversity within the tertiary education category – with family patterns among lower-tertiary educated individuals differing from those of the upper-tertiary educated, and lower-tertiary educated becoming more similar to the medium-educated – we found no evidence of such differences. Our findings (not shown, but available upon request) indicate negligible differences in the proportions of first children born outside marriage between the lower and upper levels of highly educated

mothers (or fathers). The proportions of non-marital first births for the two categories of highly educated mothers closely align. The most educated group of first-time mothers continued to make the largest contribution to the increase in non-marital fertility during the most recent period of our study (from 2007–13 to 2014–21). Additionally, we observed emerging differences within the medium-educated category, which have only begun to grow in magnitude in recent years. For both groups of medium-educated first-time mothers, the behavioural effects were positive throughout the analysis, with varying compositional effects that turned negative in more recent periods, aligning well with the presented findings.

Due to data limitations on fathers, we opted to show only the results for mothers. However, we also performed the analysis for fathers. The findings correspond well to the existing literature (Schnor and Jalovaara 2020). The educational expansion was less pronounced among first-time fathers compared to first-time mothers. The medium-educated still comprise the majority of first-time fathers even in the most recent years in our dataset, and this group contributed most to the increase in non-marital childbearing. However, it is important to remember that our data does not cover the fertility behaviour of fathers as thoroughly as that of mothers, with a substantial proportion of births missing information on the father's educational background, especially in the cases of non-marital births.

Our results reveal a persistently negative educational gradient in non-marital first childbearing in Croatia (see Pavić 2014), which is becoming more pronounced, as indicated by the expanding percentage-point difference in the

proportions of children born outside of marriage between the lower and higher educational levels. This gradient might significantly impact the life trajectories of children born to unmarried mothers, resonating with McLanahan's concept of 'diverging destinies', where children face diverse social and economic challenges based on their parents' education, leading to varying life outcomes (McLanahan 2004; McLanahan and Percheski 2008; McLanahan and Jacobsen 2015). Nonetheless, the observed rise in the non-marital fertility among the medium- and high-education categories should not be disregarded. As Schnor and Jalovaara (2020) show for Finland, and as our study corroborates for Croatia, non-marital childbearing has increased during the times of educational expansion across all educational groups. These shifts underscore the need for policymakers to consider the complex realities of family structures today. The broadening prevalence of non-marital births implies that the risks associated with family instability and economic insecurity now affect a larger segment of the population, potentially shaping the development and future prospects of an increasing number of children born out of wedlock.

One limitation of this study is the inability to differentiate between non-marital births to cohabiting couples as opposed to non-marital births to single mothers. Unfortunately, vital statistics data do not contain information about the union context of the mother (except for whether the child was born in or out of wedlock). Exploring the educational differences in childbearing among married, cohabiting, and single mothers presents a valuable avenue for future research, potentially uncovering significant trends and policy implications.

Additionally, our study did not explore the extent to which first-time mothers marry after having their first child outside of marriage. This aspect of family dynamics is significant because the transition from cohabitation or single parenthood to marriage among first-time mothers could provide insights into the changes in family stability and child well-being across educational strata. Schnor and Jalovaara (2020) highlight the importance of understanding such transitions, particularly as they relate to the educational expansion and its influence on non-marital childbearing trends. Moreover, Cherlin (2021) suggests a growing trend among college-educated women to have their first child outside of marriage, often within cohabiting unions that later transition into marriage. This change indicates a shift in the role of marriage in family formation among the highly educated, possibly influenced by economic factors, as well as the growing societal acceptance of cohabitation and non-marital childbearing.

Our study used a descriptive approach to better understand the dynamics behind non-marital fertility changes in Croatia and the demographic groups driving them. However, it did not explore the underlying causes of these changes. We used decomposition methods to analyse how different educational groups influenced the proportion of first children being born outside of marriage. Despite its strengths, this approach did not explain why educational expansion brought about changes in non-marital childbearing, a significant drawback given the importance of understanding causal factors for scholars and policymakers developing theories and crafting policies from solid empirical evidence. Nonetheless, identifying the primary drivers of these trends remains crucial

for effective policy formulation. While decomposition alone does not reveal the causes behind the observed shifts, it is essential in measuring how behavioural changes within different educational groups of first-time mothers contribute to the overall increase in non-marital fertility.

5 CONCLUSION

This study has examined the interrelationship between educational expansion and the evolution of non-marital fertility patterns in Croatia over the period from 1984 to 2021. The findings elucidate a significant transformation in both the educational attainment of the first-time mothers and their fertility decisions, underscored by a substantial increase in the proportion of first births occurring outside of marriage – from under 10% in the mid-1980s to over 30% by the end of the study period. The increase of non-marital fertility coincided with a pronounced educational expansion among women. The educational profile of first-time mothers shifted dramatically, with a decrease in the proportion of those with low educational attainment and an increase among those with higher education. By 2021, the majority of first-time mothers had achieved a high level of education.

Through decomposition analysis, this paper distinguished between the compositional and behavioural effects contributing to the observed trends. It was found that behavioural changes – particularly within the medium-educated group – dominantly influenced the increase in non-marital fertility. This group exhibited significant shifts in fertility behaviour, increasingly opt-

ing for childbearing outside marriage. Meanwhile, the growing proportion of highly educated mothers also contributed to the trend, although their impact was more pronounced through compositional shifts. Further insights were gained through the application of direct standardization, revealing that the increased educational attainment acted as a moderating factor on non-marital fertility rates. The analysis suggested that had the educational composition of first-time mothers remained constant at 1984 levels, the proportion of non-marital births could have been higher, indicating that higher educational levels generally correlate with lower non-marital fertility rates.

Moreover, the study confirmed a persistent negative educational gradient in non-marital fertility, where lower educational attainment was associated with a higher likelihood of non-marital childbearing. This gradient presents significant implications for social policy, particularly the need for enhanced support and resources for lower-educated mothers, who face not only higher probabilities of non-marital childbearing, but also greater socioeconomic challenges. In sum, the dynamics of educational expansion and non-marital fertility in Croatia offer a compelling lens for viewing broader societal changes. This study contributes to the demographic literature by detailing how the shifts in educational attainment among women shape familial and reproductive behaviours in the Croatian context. The findings underscore the importance of considering educational backgrounds in the formulation of policies aimed at addressing family formation and child welfare in contemporary society.

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Data Availability Statement

The data supporting the findings of this study were provided by the Croatian Bureau of Statistics and were available to the authors only in a secure data safe-room, due to confidentiality requirements for working with individual-level birth data. As such, the data cannot be shared publicly. However, all derived analyses and intermediate results in their aggregated form can be obtained from the authors upon request.

Coauthor Contributions

Petra Međimurec: Conceptualization, Methodology, Formal Analysis, Visualization, Writing – Original Draft. **Ivan Čipin:** Conceptualization, Investigation, Supervision, Writing – Review & Editing. **Dario Mustač:** Conceptualization, Validation, Writing – Review & Editing.

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Kakva je povezanost: obrazovna ekspanzija i izvanbračni fertilitet u Hrvatskoj

PROŠIRENI SAŽETAK

Istraživanja pokazuju da niže obrazovani češće imaju djecu izvan braka. Međutim, usporedno s porastom udjela djece rođene izvan braka, odvijala se obrazovna ekspanzija. Postojeća literatura sugerira da, iako je među nisko obrazovanim udio djece rođene izvan braka i dalje najveći, njihov sve manji udio u populaciji ograničava doprinos koji imaju zabilježenom rastu izvanbračnog fertiliteta. Na tom temelju, ovaj rad na primjeru Hrvatske istražuje izvanbračni fertilitet među ženama koje su rodile svoje prvo dijete, s ciljem da se odgovori na sljedeća istraživačka pitanja: Koliko se porasta u izvanbračnom fertilitetu može pripisati promjenama u obrazovnoj strukturi majki u usporedbi s promjenama u fertilitetnom ponašanju pojedinih obrazovnih skupina? Kakav bi bio trend u izvanbračnom fertilitetu da je obrazovna struktura majki ostala nepromijenjena? Koristeći se podacima iz vitalne statistike od sredine 1980-ih nadalje, ovaj rad istražuje udio prve djece rođene izvan braka među nisko, srednje i visoko obrazovanim ženama. Primjenom dekompozicijske analize, raščlanili smo na komponente ukupne promjene u izvanbračnom fertilitetu tijekom šest uzastopnih razdoblja: 1984.–90., 1991.–95., 1996.–99., 2000.–07., 2008.–13. i 2014.–21. Metodom direktne standardizacije istražili smo ulogu koju su promjene u obrazovnoj strukturi majki odigrale vezano uz zabilježene trendove u izvanbračnom fertilitetu. Nalazi otkrivaju znatan porast u udjelu prve djece rođene izvan braka, s ispod 10 % sredinom 1980-ih na više od 30% do 2021. U skladu s trendovima u drugim zemljama, rezultati pokazuju da je izvanbračni fertilitet porastao u svim obrazovnim skupinama. Dekompozicijska analiza pokazala je da su recentnom porastu izvanbračnog fertiliteta u najvećoj mjeri doprinijele promjene u ponašanju među srednje obrazovanim ženama: kod te se skupina žena rađanje izvan braka intenziviralo. Trendu su doprinijele i visoko obrazovane žene; iako su bihevioralni učinci bili manje izraženi u usporedbi sa srednje obrazovanim ženama, njihov doprinos pojačali su strukturni učinci, odnosno rastuća veličina te obrazovne skupine. Direktna standardizacija pokazala je da je obrazovna ekspanzija usporila rast izvanbračnog fertiliteta: da je obrazovna struktura majki ostala nepromijenjena, naši rezultati sugeriraju da bi udio djece rođene izvan braka bio veći. Rezultati potvrđuju postojano negativan obrazovni gradijent u izvanbračnom fertilitetu u Hrvatskoj. Naši nalazi imaju važne implikacije za kreatora politike, o čemu se u radu raspravlja, i pomažu unaprijediti razumijevanje odnosa između obrazovanja i izvanbračnog fertiliteta spoznajama specifičnim za hrvatski kontekst.

KLJUČNE RIJEČI

izvanbračni fertilitet, obrazovanje, demografska analiza, Hrvatska, metode dekompozicije