

RESEARCH ARTICLE



How family planning and female labor force participation influence population growth in North Sumatra?

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ABSTRACT

This study examines the impact of family planning programs and female workforce participation on population growth in North Sumatra, Indonesia. Understanding these factors is crucial for demographic policy and economic development. Using secondary time-series data from 2003 to 2022, this study employs multiple linear regression analysis to evaluate the relationships among the variables. The findings indicate that family planning programs have a positive but statistically insignificant effect on population growth, whereas female workforce participation has a positive and significant impact. Furthermore, both variables collectively have a significant influence on population growth. These results suggest that while family planning programs alone may not strongly affect population trends, the increasing participation of women in the workforce contributes notably to demographic changes. Policymakers should consider integrating employment and reproductive health policies to achieve sustainable population management.

KEYWORDS

Family planning programs; female workforce participation; population growth; North Sumatra

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1. Introduction

Population growth is a dynamic equilibrium between elements that increase and decrease the population. It is influenced by the number of births, while at the same time reduced by deaths occurring across all age groups. In a spatial context, population mobility also affects fluctuations in population size, with immigration contributing to growth and emigration leading to decline within a region (Huriah et al., 2025; Rochaida, 2016). If not addressed promptly, uncontrolled population

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growth can become a serious issue. A high and unregulated growth rate may adversely affect the welfare of families and society as a whole (Masilo, 2022). Moreover, rapid population growth has implications for social, political, economic, as well as defense and security concerns.

The dynamics of female labor force participation in Indonesia, which has remained stagnant at approximately 51%, are profoundly affected by social norms and the organizational framework of diverse industries (Cameron et al., 2019). Studies show that this stagnation is not just a sign of bad economic times; it is also deeply rooted in the social and cultural factors that affect women's roles and opportunities in the workplace (Utomo et al., 2025; Wicaksono et al., 2024). Furthermore, additional research demonstrates the detrimental effects of industrial frameworks, particularly in industries like apparel, where a trend of defeminization has emerged, challenging earlier beliefs that increased exports lead to feminization (Wicaksono et al., 2024).

The national family planning program has made progress in the area of reproductive health, but it still has trouble aligning with rights-based approaches that can have a big impact on participation rates. The literature underscores the imperative of incorporating rights-based frameworks into family planning initiatives to adequately address the needs and rights of women (Hardee et al., 2019; Hamity et al., 2019). Even though these methods have made progress, they are still not being used enough, which limits their potential to get women to use family planning services (Utomo et al., 2021; Frans et al., 2024).

Moreover, the disparities in female labor force participation, particularly among married women, are affected by socio-economic factors as well as household technological access and the nature of available occupations. Research demonstrates that enhanced access to technology can substantially improve women's employment prospects, thereby fostering increased workforce participation (Frans et al., 2024). The interconnectedness of socio-economic conditions, access to technology, and market dynamics necessitates a holistic approach when examining the factors influencing women's labor participation in Indonesia (Zaen, 2022).

This study aims to investigate the impact of family planning participation and female labor force participation on population growth in North Sumatra, serving as a case study of the broader demographic challenges faced by Indonesia.

2. Literature review

Many studies show that family planning and population growth are closely linked to women's participation in the labor force. Family planning initiatives, originally designed to regulate population growth, profoundly influence women's economic participation by empowering them to make informed choices about the quantity and timing of childbirth, thereby facilitating their investment in education and careers. Less strict birth control rules have caused financial challenges for women because they don't get as much from job and money opportunities Zhao et al. (2023). These results show how important family planning policies are for women to take part in work, since these programs directly affect their chances of getting jobs. This study shows that good family planning can help women get more job opportunities. Including women in family planning has also been linked to them working more paid jobs (Hasan, 2023). This correlation is demonstrated across various socio-economic strata, indicating that women who receive education and support in reproductive health show elevated employment rates (Bukhari et al., 2022). Rural and urban disparities significantly influence the efficacy of linking family planning to labor market outcomes (Paul et al., 2023).

Moreover, the social and economic situation plays a big role in how family planning relates to women working. Studies show that having more education and a better financial position are key in deciding whether women choose to work. For example, Ayaz et al. (2021) highlight that in regions affected by conflict, women face greater challenges in working, showing how socio-economic background and reproductive health issues often go hand in hand. These combined factors show the need for family planning programs that take into account the economic and social barriers women face, particularly in areas with high poverty rates or strong traditional gender roles.

Women make choices about work and family planning based on a number of things. The growing conflict between traditional duties and financial need is forcing women to work as economic contributors (Paul & Goswami, 2022). Rural women, frequently engaged in agricultural labor, make complex decisions regarding family size influenced by economic opportunities and access to health resources, which directly affects their contributions to family income (Paul et al., 2023).

The success of family planning can be achieved through women's economic empowerment. The greater the number of women participating in the workforce,

the better the outcomes in health and family planning (Vu et al., 2021; Akhtar et al., 2020).

There is a link between family planning, population growth, and women's involvement in the workforce. Therefore, it is important to support women's right to improve their employment opportunities. Family planning services can help manage population growth and increase women's participation in the labor market, which in turn will help women achieve their socio-economic goals.

3. Methods

This research provides a demographic economics analysis of the growth of the population, female labor force participation, and family planning programs in North Sumatra from 2003 to 2022. The secondary data used in the analysis was obtained from Statistics Indonesia (BPS).

The model employed in this investigation is shown in equation (1).

$$\log \text{POP}_t = \alpha + \beta_1 \log \text{FPP}_t + \beta_2 \log \text{FLF}_t + e_t \quad (1)$$

Where POP is the population growth, FPP is family planning program, FLF is female labor force, log is the logarithm, α is the constant, β_1 - β_2 is the regression coefficient, e is the error term, and t is the time.

4. Results

4.1. Results of model selection

The regression outcomes presented in Table 1 reveal that the coefficient of the family planning program ($\beta_1=0.0399$, $p=0.3417>0.05$) is positive yet statistically insignificant. This finding indicates that fluctuations in family planning participation among eligible couples have no substantial impact on population growth in North Sumatra.

Conversely, the coefficient for women's labor force participation ($\beta_2=0.4737$, $p=0.0000<0.05$) is both positive and statistically significant. This suggests that an increase in the number of working women contributes meaningfully to the rise in population growth. The joint significance test further strengthens these results. The

F-statistic (Prob = 0.000001 < 0.05) confirms that, when considered together, family planning and female labor participation significantly explain variations in population growth. In addition, the R-squared value of 0.8026 indicates that 80.26% of the changes in population growth during 2003–2022 can be attributed to these two explanatory variables, while the remaining 19.74% is likely driven by external factors such as migration, health conditions, education, and broader demographic trends.

Table 1. Results of multiple regression estimation

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	8.862134	0.912444	9.712520	0.0000
LogFPP	0.039930	0.040825	0.978981	0.3417
LogFLF	0.47 3798	0.066090	7.168986	0.0000
R-squared	0.802665	Mean dependent variable		16.42018
Adjusted R-squared	0.779449	S.D. dependent variable		0.069856
S.E. of regression	0.032806	Akaike information criterion		-3.858899
Sum of squared residuals	0.018297	Schwarz criterion		-3.709539
Log likelihood	41.58899	Hannan-Quinn criterion		-3.829743
F-statistic	34.57393	Durbin-Watson statistic		1.293521
Probability of F-statistic	0.000001			

Note: Dependent variable is Population Growth (POP)

Source: Own calculation

5. Discussion

5.1. The effect of family planning programs on population growth

The impact of family planning programs on population growth in North Sumatra demonstrates a nuanced relationship that calls for careful interpretation. The results indicate that greater implementation of family planning initiatives does not significantly influence population change, as reflected by a negligible increase of only 0.0399 individuals and a significance level above $\alpha = 0.05$. This points to a positive but statistically insignificant correlation, thereby rejecting the initial hypothesis.

Previous studies have shown how important family planning is for controlling fertility and improving the health of mothers and children. Family planning policies have led to the widespread use of birth control, which has been linked to about 73% of the decline in fertility in Southeast Asia, including North Sumatra (Raharja et al., 2021).

For example, comprehensive services have been linked to lower maternal and child mortality (Hatcher et al., 2023). However, variations in program participation and limited male involvement in decision-making remain challenges that affect program effectiveness and satisfaction (Amini et al., 2024; Hutchinson et al., 2021).

Furthermore, findings by Utomo et al. (2021) show that the effects of family planning are intertwined with socio-economic conditions, reflecting its multidimensional influence. Elements such as contraceptive accessibility, cultural attitudes, and educational attainment play a significant role in determining program success (Zaen, 2022; Mollet & Mollet, 2024).

The case of North Sumatra illustrates that while family planning has a positive direction of influence, its statistical impact on population growth is limited. These findings emphasize the need for more holistic approaches that integrate demographic, health, and socio-economic perspectives to strengthen the effectiveness of family planning initiatives and inform future policies.

5.2. The effect of women's employment on population growth

The magnitude of the effect of working women on population growth is 0.4737 with a significant value at prob. $0.0000 < \alpha = 0.05$, thus it can be concluded that, working women have a positive and significant effect on population growth in North Sumatra. If there is an increase in working women by 1 person, then population growth in North Sumatra will increase significantly by 0.4737 people, assuming other variables are constant. Then the hypothesis in this study is accepted. The relationship between women working is in line with the trend of population and economic growth (Tumangger et al., 2024). According to Klasen (2019) when women work and earn an income, it can help improve the quality of life for their families and children.

Sumatra reveals a statistically significant effect, indicating a correlation between the increase in working women and population dynamics. The existing literature shows that women's participation in the labor force is linked to demographic trends and economic growth.

Research by Nazah et al. (2021) examines the relationship between female labor participation and fertility rates, suggesting that women's employment can influence their reproductive choices, but does not uniformly establish a clear causal direction.

The hypothesis that an increase in the number of working women influences population growth is supported by the evidence of women's increased capacity to

balance work and family. Studies on contraceptive use sheds light on how family planning resources are navigated by employed women, suggesting a nuanced relationship between employment and fertility (Idris, 2019). Studies also show that when more women are working, their views on balancing work and family life change, which helps increase the population and also supports their efforts to achieve better economic and social conditions (Furtado, 2015).

6. Conclusion

The findings of this study indicate that, when examined individually, the family planning program exerts a positive but statistically insignificant effect on population growth in North Sumatra, whereas female labor force participation demonstrates a positive and significant effect. Taken together, however, both variables are found to have a significant joint influence on population growth in the region.

Conflict of interest

The authors declare that there are no conflicts of interest regarding this publication.

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