

Family Planning Education to Advance SDGs with Insights on Fertility and Stunting Reduction

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Abstract. Bojonegoro Regency is a 30% contributor to national oil, this certainly affects the regional budget with the highest ranking in Indonesia in 2022. but with this high regional income has not been able to reduce the poverty rate at 10%, this is due to several influencing factors. This research investigates the role of sustainable development policies, to find out how the participation of the Bojonegoro Regency community in handling Parity and stunting prevention, with research focusing on the fields of education, economy, health, social, culture, environment and population, in improving living standards in Bojonegoro Regency, Indonesia. Employing the Structural Equation Model (SEM) to analyze the interrelations among contraceptive use, parity, stunting, and sustainable development. Data collection in this study used documentation and questionnaires at the district and subdistrict levels. The findings highlight that while parity intervention through family planning education did not significantly influence sustainable development (Tvalue = 0.050), interventions aimed at stunting prevention through family planning education significantly contributed to sustainable development goals (Tvalues of 8.402 and 2.758, respectively). Additionally, the direct impact of family planning education on sustainable development was moderately significant (Tvalue = 1.740), suggesting the nuanced role of contraceptive methods in achieving broader development objectives. The study concludes that integrated family planning education and stunting prevention strategies are vital for sustainable development in Bojonegoro, contributing significantly to the discourse on public health and development policy. This research underscores the importance of tailored interventions in family planning education and health education as a means to foster sustainable development, offering valuable insights for policymakers and stakeholders in similar socio-economic contexts.

Key words: SDGs, family planning education, fertility regulation, stunting prevention.

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INTRODUCTION

Development was recognized as a crucial component for progress and the advancement of civilization, involving the utilization of natural and human resources through technology. The concept of sustainable development, emphasizing balancing economic prosperity, social equity, and environmental protection, had been globally acknowledged as essential for ensuring the quality of human life in both present and future contexts (Sahiledengle et al., 2023; Seiler et al., 2021). In Indonesia, national development agendas had prioritized improving human resources and supporting cultural development through programs such as Proud Family Planning, led by the National Population and Family Planning Agency.

This emphasis on sustainable development reflected a comprehensive approach to progress, where the integration of economic growth with social inclusion and environmental sustainability was seen as crucial for the longterm wellbeing of the population (Melania et al., 2024; Mugarura et al., 2021; Rahmadania et al., 2024; Raiten et al., 2024). Through these initiatives, Indonesia aimed to address multiple challenges simultaneously, including those related to health, education, and population management, thereby ensuring a balanced and inclusive development trajectory that could sustain the quality of life for its citizens across generations.

Despite these concerted efforts, strategic challenges such as the declining use of modern contraceptives and the persistently high prevalence of stunting had indicated significant gaps in the effective implementation of family planning and health education programs. These issues underscored a crucial disconnect between policy initiatives and their practical outcomes on the ground (AdjeiMantey & Takeuchi, 2021; Bogler et al., 2019). Furthermore, the challenges were not just national in scope but also manifested distinctly at the regional level, with Bojonegoro County facing its own set of hurdles. The county's endeavors to propel social, economic, and human resource development encountered significant obstacles, compounded by rising population pressures, elevated stunting rates, and targets for poverty reduction that remained unmet.

Bojonegoro County had witnessed these challenges affect its developmental trajectory in tangible ways. The rising population, partly a result of inadequate family planning education and the underutilization of modern contraceptives, placed increased demand for the county's resources and services. Simultaneously, the high stunting rates reflected broader health and nutrition issues that threatened the future human capital of the region. These health challenges, coupled with the struggle to achieve ambitious poverty reduction targets, painted a complex picture of a region striving for sustainable development amidst numerous challenges (Moelyaningrum et al., 2023; Tong et al., 2022). The county's experience highlighted the intricate interplay between demographic trends, public health issues, and economic development goals, emphasizing the need for integrated solutions to address these interconnected challenges.

Addressing this gap was deemed crucial for enhancing the effectiveness of family planning and health education programs, which were fundamental components of sustainable development. This was particularly relevant in regions like Bojonegoro, where demographic dynamics and health issues significantly impacted development outcomes. The necessity to bridge this gap stemmed from the understanding that without effective family planning and health education strategies, efforts to improve economic, social, and environmental conditions would be undermined by growing population pressures and public health challenges.

In Bojonegoro, the urgency to address these issues became apparent as the region struggled to balance demographic growth with sustainable development objectives. The intertwined nature of demographic trends and health issues necessitated a holistic approach to policymaking and program implementation. Recognizing the pivotal role of family planning and health education in shaping development trajectories underscored the importance of revitalizing these programs. By focusing on these areas, Bojonegoro aimed to mitigate the adverse effects of unchecked population growth and poor health outcomes, ultimately fostering a more sustainable and prosperous future for its inhabitants.

Nationally and regionally, the need to improve the utilization of family planning education and reduce stunting rates had become increasingly evident. Across Indonesia, including in areas like Bojonegoro County, the challenges associated with high population growth and significant stunting prevalence emerged as significant barriers to achieving sustainable development goals. Bojonegoro, with its rising population numbers and alarming stunting rates, served as a poignant example of how these challenges could derail efforts towards sustainable progress. The county's struggles reflected broader national and regional challenges, emphasizing the importance of targeted interventions in family planning and health education to address these pressing issues.

In Bojonegoro County, the situation underscored the critical link between public health issues and sustainable development outcomes. The increasing population, compounded by high stunting rates, highlighted the urgent need for effective family planning education and health initiatives tailored to the community's needs (Huang et al., 2020; Kuwornu et al., 2022). These challenges were not merely statistical concerns but

represented real obstacles to the wellbeing and prospects of the county's residents. As such, Bojonegoro's experience accentuated the broader national imperative for enhanced family planning and health education efforts, aiming to improve quality of life and steer communities towards sustainable development pathways.

The relationship between family planning programs and development outcomes, predominantly focusing on the use of modern contraceptives (Sahiledengle et al., 2022; Terfa et al., 2022). These investigations provided valuable insights into how contraceptive use could influence factors such as population growth rates, health outcomes, and economic development. Yet, there was a noticeable gap in comprehensive research that specifically examined the impact of family planning education on parity intervention and stunting prevention, particularly within the unique context of sustainable development in Bojonegoro county. This lack of focused study left critical questions unanswered regarding the effectiveness of educational interventions in family planning as a tool for achieving broader developmental goals.

In Bojonegoro County, the specific dynamics of demographic change, health challenges, and development pressures underscored the necessity for such targeted research. The region's increasing population and high stunting rates presented a compelling case for investigating how enhanced family planning education could contribute to mitigating these issues. Despite the acknowledged importance of contraceptive access, the potential for education to shape knowledge, attitudes, and practices regarding family planning and health had not been fully explored. This gap in research signified a missed opportunity to understand and leverage the full spectrum of strategies available for driving sustainable development efforts forward in Bojonegoro and similar contexts.

The purpose of this research was to assess the impact of family planning education on reducing parity and stunting rates in Bojonegoro County. It aimed to provide a detailed analysis of how educational programs related to family planning could influence demographic trends and health outcomes, particularly in reducing the number of children per woman and combating the high prevalence of stunted growth among children. By examining these factors, the research sought to identify effective strategies that could be employed to address some of the most pressing challenges facing the region. The focus on Bojonegoro County stemmed from its specific demographic and health challenges, making it a critical case study for understanding the potential of family planning education as a pivotal tool in public health and development strategy.

Furthermore, the research endeavored to evaluate the contribution of these interventions to the broader goals of sustainable development in the region. This included analyzing how improvements in family planning and reductions in stunting could enhance the overall quality of life, economic stability, and environmental sustainability in Bojonegoro County. The study recognized that achieving sustainable development goals requires multifaceted approaches that address health, education, and social wellbeing. Through this research, insights were sought into how targeted educational interventions in family planning could serve as foundational components of a sustainable development strategy, offering benefits that extend beyond immediate health outcomes to foster long-term prosperity and resilience in the community.

This study was expected to contribute significantly to the scientific understanding of the intricate interconnections between family planning education, public health, and sustainable development. By delving into these relationships, it aimed to illuminate the crucial role that education plays in shaping public health outcomes and advancing sustainable development goals. The research sought to compile and analyze data that could offer robust, evidence-based insights into how targeted educational programs in family planning could influence demographic trends, improve public health metrics, and support the achievement of sustainable development objectives. The goal was to fill existing knowledge gaps and provide a comprehensive overview of the potential impacts of family planning education on community wellbeing and development trajectories.

Furthermore, the findings of this research aimed to provide evidence-based recommendations for policymakers and practitioners, offering a foundation for crafting more effective strategies to enhance the quality of life and achieve sustainable development in Bojonegoro and similar contexts. By identifying successful approaches and pinpointing areas for improvement, the study intended to guide the design and implementation of family planning and public health initiatives that are both effective and aligned with

sustainable development principles. The anticipated outcome was a set of actionable insights that could be used to inform policy decisions and programmatic interventions, thereby facilitating progress towards more healthy, equitable, and sustainable communities. The research question is the effectiveness of family planning education on parity intervention and stunting prevention for sustainable development in Bojonegoro Regency.

METHODS

In this study, Structural Equation Model (SEM) was used as a statistical analysis technique to analyze the relationship between variables in a complex model, starting from several steps such as the development of a theoretical model, the creation of structural and measurement models, data collection, validity and reliability tests, data analysis, interpretation of results, to conclusions and recommendations. This study focused on four main variables: family planning education, parity, stunting, and sustainable development. The exogenous variables consist of Parity and Stunting, while the endogenous variables consist of Family Planning and Sustainable Development. Initially, indicators were defined based on these research variables, which then guided the sample selection. For data collection, documentation and questionnaires were used. Documentation data was obtained from archives or reports owned by the Bojonegoro district government, and questionnaires were obtained through the results of filling out questionnaires by the community who became respondents. The collected data was then processed using a combination of descriptive and quantitative analysis tools to ensure a comprehensive examination of the variables in question.

Determining the Population and Sample.

To ascertain the population and sample for our study, districts exhibiting the highest instances of each variable, as per Bojonegoro Regency government data from 2021, were selected. Among Bojonegoro Regency's 28 districts, three were chosen as the primary locations for our research. These were selected based on their high figures in the three variables of interest: family planning education, parity, and stunting. To calculate the sample size, Slovin's formula was applied a methodology known for determining a sample size representative of the entire population, with a set precision level of 15%. This decision was based on the guideline that if the population size does not surpass 1000 individuals, the sample size should be set at a minimum of 1015%. For populations under 100 people, it was suggested that the entire population be sampled, whereas for those exceeding 100, a sample size of 10% 15% or even 20% 25% could be considered appropriate.

Employing the Slovin formula, it was determined that our research sample would be drawn from two districts, specifically Dander and Bojonegoro, with the following distribution of respondents in table 1.

Table 1. Research Sample Size

No	Location	Sample	Variable
1	Dander District	44	Family Planning Education
2	Bojonegoro District	44	Parity
3	Dander District	44	Stunting
4	Bojonegoro & Dander Districts	8	Mix
	Total	140	

RESULTS AND DISCUSSION

The descriptive analysis conducted in the study was instrumental in determining the characteristics of the respondents by analyzing the average score values they attributed to the statements concerning the research variables, which included family planning education, parity, stunting, and sustainable development. Respondents provided their level of agreement with each statement using a scoring weight interval ranging from 1 (Strongly Disagree) to 5 (Strongly Agree).

Upon analysis, the results indicated that the average value of the statements or indicators related to the variable of Parity (X1) was 3.98. This average score demonstrated that respondents generally agreed with the statements pertaining to parity intervention as a method to achieve sustainable development. Each indicator within this variable garnered agreement scores as follows: X1_1 received a mean score of 3.90, X1_2 a score of 3.72, X1_3 a score of 4.11, X1_4 a score of 4.16, and X1_5 a score of 4.01 can be seen in table 2.

These results reflected the respondents' consensus on the significance of parity intervention in the context of sustainable development, with mean scores consistently leaning towards agreement across all indicators within the variable X1.

Table 2. Results of Respondents' Ratings based on Variable Y2

No	Indicator Variable	Mean Score	Description
1	Y2_1	4.21	Agree
2	Y2_2	4.12	Agree
3	Y2_3	3.89	Agree
4	Y2_4	4.19	Agree
5	Y2_5	4.19	Agree
	Mean	4.12	Agree

The outer model analysis, which tested the relationships between the study's variables and their indicators, confirmed the validity of the constructs used. Each indicator's factor loading value exceeded the threshold of 0.5, which is considered sufficient for establishing convergent validity, particularly in the early stages of research when developing a measurement scale.

Specifically, the factor loading values were as follows: X1_1 at 0.634, X1_2 at 0.699, X1_3 at 0.822, X1_4 at 0.807, X1_5 at 0.628, X2_1 at 0.747, X2_2 at 0.719, X2_3 at 0.791, X2_4 at 0.711, X2_5 at 0.735, Y1_1 at 0.939, Y1_2 at 0.904, Y2_1 at 0.698, Y2_2 at 0.816, Y2_3 at 0.515, Y2_4 at 0.846, and Y2_5 at 0.854 can be seen in table 6. These results indicated that the latent variables parity, stunting, family planning education, and sustainable development were all validly represented by their respective indicators. The indicators for each variable were found to adequately measure or reflect the constructs they were intended to assess. This analysis led that the research data being valid and reliable, laying a solid foundation for subsequent analyses within the study.

Table 3. Factor Loading Value

No	Variabel	Value	Description
1	X1_1	0.634	Valid
2	X1_2	0.699	Valid
3	X1_3	0.822	Valid
4	X1_4	0.807	Valid
5	X1_5	0.628	Valid
6	X2_1	0.747	Valid
7	X2_2	0.719	Valid
8	X2_3	0.791	Valid
9	X2_4	0.711	Valid
10	X2_5	0.735	Valid
11	Y1_1	0.939	Valid
12	Y1_2	0.904	Valid
13	Y2_1	0.698	Valid
14	Y2_2	0.816	Valid

15	Y2_3	0.515	Valid
16	Y2_4	0.846	Valid
17	Y2_5	0.854	Valid

The assessment of discriminant validity through the HeterotraitMonotrait Ratio (HTMT) yielded acceptable values. The HTMT ratios for the study were as follows: between the variables X1 and X2, the ratio was 0.711; between X1 and Y1, it was 0.429; and between X1 and Y2, it was 0.521. For the pairs X2 and Y1, and X2 and Y2, the ratios were 0.764 and 0.678, respectively, while the ratio between Y1 and Y2 was 0.576 can be seen in table 7. All these HTMT values fell below the recommended threshold of 0.85, validating that each set of constructs was distinct and that the study met the standards for discriminant validity. This aspect of the analysis constructs within the research were adequately differentiated and that the measurement model was robust.

Table 4. HeterotraitMonotrait Ratio (HTMT)

	X1	X2	Y1	Y2
X1				
X2	0.711			
Y1	0.429	0.764		
Y2	0.521	0.678	0.576	

The evaluation using the FornellLarcker Criterion, which involves comparing the square root of the Average Variance Extracted (AVE) to the correlations between constructs, yielded satisfactory results. For each construct, the square root of the AVE was indeed greater than the correlations with other constructs, meeting the criterion for discriminant validity. Specifically, for construct X1, the square root of the AVE was 0.723, surpassing its correlation values with other constructs can be seen in table 8. Similarly, for X2, with an AVE root of 0.741, it exceeded the correlation values with X1, Y1, and Y2. The Y1 construct had an AVE root of 0.922, which was higher than its correlations with X1, X2, and Y2. Lastly, the Y2 construct's AVE root was 0.757, which also was greater than its correlations with the other three constructs.

These results indicated that the variables within the study were welldefined and distinct from one another, which affirmed the reliability of the measurement model used in the research. The constructs of parity, stunting, family planning education, and sustainable development had been effectively captured and could be considered independent in the context of this study.

Table 5. FornellLarcker Criterion (root AVE)

	X1	X2	Y1	Y2
X1	0.723			
X2	0.560	0.741		
Y1	0.348	0.627	0.922	
Y2	0.453	0.576	0.489	0.757

The crossloading analysis of the study's constructs demonstrated that each item's loading on its respective construct was higher than its crossloadings with other constructs. This pattern across the data supported the discriminant validity of the measurement model. The indicator X1_1 had a loading of 0.634 on its own construct (X1), which was higher than its crossloadings with constructs X2, Y1, and Y2, which were 0.424, 0.239, and 0.205, respectively can be seen in table 9. Similarly, indicator Y1_1 had a strong loading of 0.939 on Y1, considerably higher than its crossloadings with other constructs, thus confirming its proper placement within the model.

These findings validated that the indicators used to measure parity, stunting, family planning education, and sustainable development were appropriately associated with their respective latent variables and not with others. The study concluded that the measurement model satisfied the criteria for discriminant validity, affirming the robustness of the constructs and the reliability of the instruments used to measure them.

Table 6. Cross Loading

	X1	X2	Y1	Y2
X1_1	0.634	0.424	0.239	0.205
X1_2	0.699	0.500	0.283	0.271
X1_3	0.822	0.386	0.244	0.396
X1_4	0.807	0.454	0.311	0.439
X1_5	0.628	0.254	0.156	0.260
X2_1	0.400	0.747	0.484	0.292
X2_2	0.328	0.719	0.501	0.409
X2_3	0.447	0.791	0.430	0.569
X2_4	0.473	0.711	0.494	0.475
X2_5	0.422	0.735	0.409	0.338
Y1_1	0.319	0.631	0.939	0.497
Y1_2	0.324	0.514	0.904	0.397
Y2_1	0.218	0.342	0.289	0.698
Y2_2	0.462	0.509	0.422	0.816
Y2_3	0.158	0.241	0.222	0.515
Y2_4	0.340	0.501	0.401	0.846
Y2_5	0.428	0.502	0.454	0.854

The reliability of the measurement model in the study was confirmed through the calculation of Cronbach's alpha and Composite Reliability (rho_c) values. The Cronbach's alpha values, both standardized and unstandardized, alongside the Composite Reliability for each construct, were all above the acceptable thresholds of 0.6 and 0.7, respectively. Specifically, for construct X1, Cronbach's alpha was 0.771 standardized and 0.805 unstandardized, with a Composite Reliability of 0.844 and an AVE of 0.522. Construct X2 exhibited a similar pattern of reliability, with Cronbach's alpha values of 0.796 standardized and 0.799 unstandardized, a Composite Reliability of 0.859, and an AVE of 0.550 can be seen in table 10. For the constructs related to the family planning education and sustainable development (Y1 and Y2), the reliability was even more pronounced. Y1 had Cronbach's alpha values of 0.824 and 0.851 with a Composite Reliability of 0.918 and an AVE of 0.849. Y2 also showed strong reliability, with Cronbach's alpha values of 0.808 and 0.856, a Composite Reliability of 0.867, and an AVE of 0.572.

These results indicated that the constructs were measured with a high level of reliability, and the data gathered were both valid and reliable, thus allowing for further analysis to be conducted with confidence. The outer model was deemed robust, suggesting that the research data were soundly underpinning the study's subsequent conclusions and recommendations.

Table 7. Cronbach's alpha & Cronbach's reliability

	Cronbach's alpha (standardized)	Cronbach's alpha (unstandardized)	Composite reliability (rho_c)	Average variance extracted (AVE)
X1	0.771	0.805	0.844	0.522
X2	0.796	0.799	0.859	0.550
Y1	0.824	0.851	0.918	0.849
Y2	0.808	0.856	0.867	0.572

The structural model analysis (inner model) was conducted to evaluate the relationships between latent variables, utilizing RSquare and QSquare values for the research model. The RSquare values obtained for Y1 and Y2 were 0.393 and 0.384, respectively. These values, exceeding the benchmarks of 0.25 and 0.32, indicated that the family planning education variable significantly influenced dependent variables such as sustainable development. Specifically, the RSquare value of 0.393 for Y1 suggested that 39% of the variability in the family planning education construct could be explained by the variability of the parity intervention construct and stunting prevention, with the remaining variability attributed to factors outside the model. Similarly, the RSquare value of 0.384 for Y2 indicated that 38% of the variability in sustainable development could be accounted for by the constructs of parity intervention and stunting prevention can be seen in table 11.

Table 8. RSquare

	Rsquare
Y1	0.393
Y2	0.384

Furthermore, the predictive relevance (Q2) of the model was evaluated, resulting in a Q2 value of 0.626 or 62.6%. This outcome, achieved through the formula $Q2 = 1 - (1 - R1^2) - (1 - R2^2)$, confirmed that the model used in the study met the requisite standards, demonstrating that the constructs employed had substantial predictive relevance. These results underscored the effectiveness of the structural model in explaining the

Table 9. Path Coefficient

	Original sample (O)	Sample mean (M)	Standard deviation (STDEV)	T statistics (O/STDEV)	P values
X1-> Y1	-0.005	0.014	0.102	0.050	0.961
X1 -> Y2	0.191	0.193	0.087	2.192	0.029
X2 -> Y1	0.630	0.624	0.075	8.402	0.000
X2 -> Y2	0.335	0.354	0.121	2.758	0.006
Y1 -> Y2	0.213	0.204	0.122	1.740	0.083

impact of interventions like family planning education on Sustainable development, substantiating that the research model was both reliable and capable of offering meaningful insights into the dynamics between family planning, stunting prevention, and sustainable development goals.

The study formulated hypotheses to explore the relationships between the exogenous latent variables of parity intervention and stunting prevention and the endogenous variables of family planning education and sustainable development. Additionally, it examined the relationship between family planning education and sustainable development. The hypothesis testing, conducted through pvalue analysis can be seen in table 12. The hypothesis testing for the relationship between the parity intervention (X1) and family planning education (Y1) yielded a pvalue of 0.961. This result led to the rejection of the first hypothesis, indicating that the parity variable did not significantly affect interventions carried out through family planning education.

The examination of the parity intervention variable (X1) on sustainable development (Y2) produced a pvalue of 0.029, confirming that the second hypothesis had a significant effect. It was found that the parity intervention variable significantly influenced sustainable development. Testing the hypothesis concerning the impact of the stunting variable (X2) on family planning education (Y1) resulted in a pvalue of 0.000. This outcome affirmed that the third hypothesis had a very significant effect, showing that the stunting variable significantly impacted the prevention efforts carried out through family planning education.

The relationship between the stunting prevention variable (X2) and sustainable development (Y2) was also significant, with a pvalue of 0.006. This result supported the fourth hypothesis, indicating that stunting prevention significantly affected sustainable development. The hypothesis regarding the impact family planning education (Y1) on sustainable development (Y2) produced a pvalue of 0.083. This finding led to the

rejection of the fifth hypothesis, demonstrating that the family planning education variable did not significantly influence sustainable development.

These results highlighted the critical roles that parity intervention and stunting prevention play in influencing sustainable development. The findings also underscored the limited direct effect of family planning education on sustainable development, suggesting the need for a broader approach to achieving sustainability goals.

Table 10. Specific Indirect Effect

	Original sample (O)	Sample mean (M)	Standard deviation (STDEV)	T statistics (O/STDEV)	P values
X1 > Y1 > Y2	0.001	0.001	0.024	0.045	0.964
X2 > Y1 > Y2	0.134	0.127	0.080	1.682	0.093

The testing for indirect effects aimed to ascertain if there were mediating influences of exogenous variables on endogenous outcomes via other variables within the model. This evaluation revealed the following outcomes can be seen in table 13. The analysis of the indirect effect of the parity variable (X1) on sustainable development (Y2) through family planning education (Y1) yielded a pvalue of 0.964, based on the original sample, mean, standard deviation, and T statistics. This high pvalue, exceeding the significance threshold of 0.1, indicated that there was no significant indirect effect of parity intervention on sustainable development through family planning education.

Similarly, the indirect effect of the stunting variable (X2) on sustainable development (Y2), mediated by family planning education (Y1), was examined. This test produced a pvalue of 0.093, which, despite being close to the significance threshold, still did not meet the criteria for declaring a significant mediating effect, as it was just above the 0.1 threshold for significance. These findings lead to family planning education does not serving as a significant mediator in the relationship between parity or stunting interventions and sustainable development. The lack of significant indirect effects suggests that the pathways from parity and stunting interventions to sustainable development outcomes are not significantly influenced through family planning education.

The research conducted provided significant findings related to the hypotheses concerning parity intervention, stunting prevention, and family planning education and their impact on sustainable development within Bojonegoro Regency can be seen in figure 1.

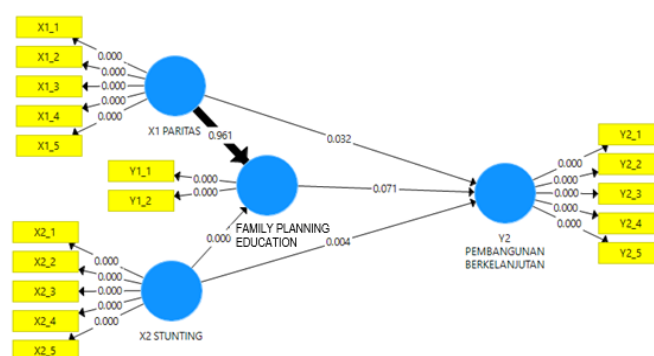


Figure 1. Indirect Hypothesis Test Framework

The analysis determined that parity intervention (X1) through family planning education (Y1) did not yield a significant effect. This was reflected in a Tvalue of 0.050, which did not exceed the threshold of 1.96 for statistical significance. This finding aligned that the number of births did not significantly influence family planning education by usage of the KB Implant among respondents. In contrast, the parity intervention (X1)

was found to have a significant effect on sustainable development (Y2), as evidenced by a Tvalue of 2.192, indicating the importance of parity regulation as part of sustainable development efforts.

The research also showed that Stunting prevention (X2), when carried out through family planning education (Y1), had a considerable impact, demonstrated by a Tvalue of 8.402. This significant effect suggested the effectiveness of family planning interventions in stunting prevention. Moreover, stunting prevention (X2) was found to have a substantial influence on sustainable development (Y2), with a Tvalue of 2.758. This finding emphasized the critical nature of earlylife nutrition in shaping longterm sustainable development outcomes. The research indicated that the family planning education (Y1) had a meaningful but not significant impact on sustainable development (Y2) in Bojonegoro Regency, with a Tvalue of 1.740, which fell slightly below the significance threshold. This result suggested that while family planning education contributes to sustainable development, its direct effect may not be as substantial as other factors.

The study underscored the relevance of family planning educational attainment and knowledge in the utilization of contraceptive method. However, it also identified that certain expected correlations, such as the direct relationship between public service delivery in family planning education by usage contraceptive, as well as between employment and contraceptive use, were not statistically significant. The research findings contributed to a deeper understanding of how interventions in family planning education, and stunting prevention strategies are pivotal factors influencing sustainable development in Bojonegoro Regency. The study conducted with Structural Equation Modeling (SEM) provided a comprehensive framework of the data processing results. The SEM analysis is illustrated in figure 2.

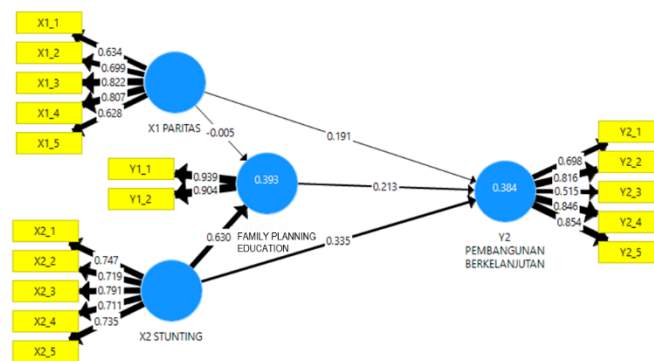


Figure 2. Framework of data processing results Structural Equation Model Smart PLS

The relationship between parity intervention (X1) and family planning education (Y1) was not statistically significant, as indicated by a path coefficient of 0.005 and an RSquare value of 0.393. This result suggested that parity intervention did not substantially influence usage of the contraception implant as a form of family planning education. However, the path from parity intervention (X1) to sustainable development (Y2) showed a positive and significant relationship with a path coefficient of 0.191. This positive path coefficient indicated that parity intervention played a role in fostering sustainable development within the region, explaining 38.4% of the variance in sustainable development.

The stunting prevention (X2) variable had a strong and significant relationship with Family planning education (Y1), as evidenced by a path coefficient of 0.630. This relationship underscored the effectiveness of family planning education in stunting prevention efforts. The path from stunting prevention (X2) to Sustainable development (Y2) also yielded a significant result with a path coefficient of 0.335, suggesting that stunting prevention strategies could positively affect sustainable development outcomes.

The influence of family planning education (Y1) on sustainable development (Y2) was moderate with a path coefficient of 0.213. This relationship indicated that family planning education, while having some influence on sustainable development, may not be the sole driving force. These results collectively demonstrated the nuanced interplay between family planning, stunting prevention, and sustainable development (Boua et al., 2023; Choudhary, 2023; Dietler et al., 2021). The research found that while certain

interventions such as parity intervention and stunting prevention significantly contribute to sustainable development, the direct effects of family planning education warrant further investigation to understand all contributing factors.

The conducted research effectively bridged gaps in the understanding of the interplay between family planning education, parity interventions, and stunting prevention strategies, and their collective impact on sustainable development in the Bojonegoro Regency. The respondents' consensus on the value of these strategies was evident, providing empirical support for the role of education and prevention in achieving sustainability objectives.

The research concluded that parity intervention, when operationalized through the use of contraceptive implants, did not significantly affect the uptake of family planning education (Kumar & Mohanty, 2022; Rajia et al., 2019; TorresSlimming et al., 2023). This result filled an existing gap by demonstrating that family planning practices are influenced by factors beyond just parity interventions. The research found that parity intervention significantly affected sustainable development, underscoring the role of family planning in promoting economic growth, reducing poverty, and improving human resources quality (Joseph et al., 2023; Khatooni et al., 2019; Lukman et al., 2022; PérezEscamilla, 2017). The research emphasized the critical importance of maternal education in achieving sustainable development. These insights contribute significantly to the discourse on sustainable development by advocating for educational and economically empowering interventions.

The research revealed a significant connection between stunting prevention and family planning education. This novelty insight suggests that family planning education may serve as a potent instrument for nutritional interventions targeting stunting (Akano et al., 2023; Besnier, 2023; Fitri et al., 2024; James et al., 2023). The significant effect of stunting prevention on sustainable development highlighted the importance of early life nutritional interventions in the broader context of sustainable development, reinforcing the necessity to invest in early childhood development as a strategy for sustainable growth (FloresQuispe et al., 2019; Hangoma et al., 2017; Kundu et al., 2022; Li et al., 2024).

Although the direct impact of family planning education on sustainable development was moderate, it offered a new perspective on development complexities (Ahmed et al., 2023; Haddad et al., 2015; He & Xu, 2022; Komarulzaman et al., 2023; Liu et al., 2022; Moonga et al., 2021; Paul et al., 2021; Rojas et al., 2024). The study suggested that while family planning education is an important component, it should be integrated with broader public health and educational strategies to be effective in driving sustainable development. The research's novelty resided in its in-depth examination of the connections between family planning education, stunting prevention, and sustainable development within a specific regional context. It provided valuable insights that could guide similar initiatives in other regions with comparable challenges, potentially influencing broader policy and program designs in Indonesia and beyond.

The study contributed to the scientific and societal understanding of sustainable development by highlighting the pivotal roles of education and preventative health measures. The findings advocate for the inclusion of these strategies in the planning and implementation of sustainable development programs, reinforcing their importance for policymaking and community development.

CONCLUSION

The study accomplished its objectives by providing a detailed examination of how family planning education, parity intervention, and stunting prevention strategies contribute to sustainable development in Bojonegoro Regency. It concluded that while parity interventions did not significantly influence the uptake of family planning education, such interventions, along with stunting prevention efforts, have a notable impact on sustainable development. These strategies are crucial in advancing economic growth, reducing poverty, and enhancing the overall quality of human resources. The study's findings underscore the need for an integrated approach to public health and education, which can reinforce the progress towards sustainable development goals. For future endeavors, this research signals the importance of incorporating educational components and preventative measures in public health initiatives, highlighting their significant role in shaping policies and programs for sustainable development. The contributions of this research to science lie in its nuanced understanding of the interconnectedness between demographic interventions and sustainable outcomes, offering a valuable model for similar contexts facing challenges in integrating public health strategies with

developmental objectives. Going forward, this suggests a roadmap for policymakers and practitioners to invest in education and prevention as foundational strategies for sustainable growth, which can be adapted and applied to various settings beyond Bojonegoro Regency.

REFERENCES

- AdjeiMantey, K., & Takeuchi, K. (2021). The effect of in utero exposure to household air pollution on child health: Evidence from Ghana. *Health Policy OPEN*, 2, 100029. <https://doi.org/10.1016/j.hpopen.2020.100029>
- Ahmed, K. Y., Ross, A. G., Hussien, S. M., Agho, K. E., Olusanya, B. O., & Ogbo, F. A. (2023). Mapping local variations and the determinants of childhood stunting in Nigeria. *International Journal of Environmental Research and Public Health*, 20(4), 3250. <https://doi.org/10.3390/ijerph20043250>
- Akano, O. I., Oderinde, F. O., & Omotayo, A. O. (2023). Agricultural yield, food nutrition and dietary energy supply in Nigeria: Evidence from nationally representative data. *Journal of Agriculture and Food Research*, 11, 100525. <https://doi.org/10.1016/j.jafr.2023.100525>
- Besnier, E. (2023). Women's political empowerment and child health in the sustainable development era: A global empirical analysis (1990–2016). *Global Public Health*, 18(1), 1849348. <https://doi.org/10.1080/17441692.2020.1849348>
- Bogler, L., Jantos, N., Bärnighausen, T., & Vollmer, S. (2019). Estimating the effect of measles vaccination on child growth using 191 DHS from 65 lowand middleincome countries. *Vaccine*, 37(35), 5073–5088. <https://doi.org/10.1016/j.vaccine.2019.06.054>
- Boua, P. R., Rouamba, T., Bambara, E., Kaboré, S., Compaore, E. W., Ouedraogo, B., & Sorgho, H. (2023). Undernutrition in children aged 0–59 months by region and over time: Secondary analysis of the Burkina Faso 2012–2018 National Nutrition Surveys. *BMJ Open*, 13(9), 066509. <https://doi.org/10.1136/bmjopen2022066509>
- Chen, S., Guo, L., Wang, Z., Mao, W., Ge, Y., Ying, X., & Tang, S. (2019). Current situation and progress toward the 2030 healthrelated sustainable development goals in China: A systematic analysis. *PLoS Medicine*, 16(11), 1002975. <https://doi.org/10.1371/journal.pmed.1002975>
- Choudhary, N. (2023). Critiquing the SDG framework through the lens of goal two: Empirical reflections from two case studies in India. *Forum for Development Studies*, 50(2), 261–281. <https://doi.org/10.1080/08039410.2022.2099459>
- Dietler, D., Farnham, A., Loss, G., Fink, G., & Winkler, M. S. (2021). Impact of mining projects on water and sanitation infrastructures and associated child health outcomes: A multicountry analysis of Demographic and Health Surveys (DHS) in subSaharan Africa. *Globalization and Health*, 17(1), 70. <https://doi.org/10.1186/s12992021007232>
- Fitri, D. J., Djuraidah, A., & Wijayanto, H. (2024). Bayesian conditional negative binomial autoregressive model: A case study of stunting on Java Island in 2021. *Commun. Math. Biol. Neurosci.* <https://doi.org/10.28919/cmbn/8281>
- FloresQuispe, M. D. P., RestrepoMéndez, M. C., Maia, M. F. S., Ferreira, L. Z., & Wehrmeister, F. C. (2019). Trends in socioeconomic inequalities in stunting prevalence in Latin America and the Caribbean countries: Differences between quintiles and deciles. *International Journal for Equity in Health*, 18, 1–10. <https://doi.org/10.1186/s1293901910467>
- Haddad, L., Achadi, E., Bendech, M. A., Ahuja, A., Bhatia, K., Bhutta, Z., & Reddy, K. S. (2015). The Global Nutrition Report 2014: Actions and accountability to accelerate the world's progress on nutrition. *The Journal of Nutrition*, 145(4), 663–671. <https://doi.org/10.3945/jn.114.206078>
- Hangoma, P., Aakvik, A., & Robberstad, B. (2017). Explaining changes in child health inequality in the run up to the 2015 millennium development goals (MDGs): The case of Zambia. *PLoS One*, 12(2), 0170995. <https://doi.org/10.1371/journal.pone.0170995>
- He, Z., & Xu, T. (2022). China's Actions to Achieve Universal Health Coverage for Children. *China CDC Weekly*, 4(36), 802. <https://doi.org/10.46234/ccdcw2022.167>
- Huang, X., Yang, B., Liu, Q., Zhang, R., Tang, S., & Story, M. (2020). Improving maternal and child nutrition in China: An analysis of nutrition policies and programs initiated during the 2000–2015 Millennium Development Goals era and implications for achieving the Sustainable Development Goals. *Journal of Health, Population and Nutrition*, 39, 1–13. <https://doi.org/10.1186/s4104302000221y>

- James, S. L., Jorgensen Wells, M. A., Larsen Gibby, A., Njue, J. R., Rarick, T. M., Vogrinec, W., & Rautenbach, J. V. (2023). Contextualizing Maternal Education and Child Health in SubSaharan Africa: The Role of Intimate Partner Violence. *Social Sciences*, 12(6), 324. <https://doi.org/10.3390/socsci12060324>
- Joseph, G., Vidaletti, L. P., & Boston, C. (2023). Socioeconomic inequalities in reproductive, maternal, newborn and child health in Guyana: A time trends analysis. *Journal of Global Health Reports*, 7, 2023053. <https://doi.org/10.29392/001c.84527>
- Khatooni, E., Akbarzadeh, I., Abdalmaleki, E., Abdi, Z., & Ahmadnezhad, E. (2019). Evaluating maternal and child health indicators for the Sustainable Development Goals in 2018: What is Iran's position? *Epidemiology and Health*, 41. <https://doi.org/10.4178/epih.e2019045>
- Komarulzaman, A., Andoyo, R., Anna, Z., Ghina, A. A., Halim, P. R., Napitupulu, H., & Andriani, A. (2023). Achieving zero stunting: A sustainable development goal interlinkage approach at district level. *Sustainability*, 15(11), 8890. <https://doi.org/10.3390/su15118890>
- Kumar, M., & Mohanty, P. (2022). Does maternal overnutrition carry child undernutrition in India? *Plos One*, 17(6), 0265788. <https://doi.org/10.1371/journal.pone.0265788>
- Kundu, R. N., Hossain, M. G., Haque, M. A., Biswas, S., Huq, M. M., Pasa, M. K., & Bharati, P. (2022). Factor associated with anthropometric failure among underfive Bengali children: A comparative study between Bangladesh and India. *Plos One*, 17(8), 0272634. <https://doi.org/10.1371/journal.pone.0272634>
- Kuwornu, J. P., Amoyaw, J., Manyanga, T., Cooper, E. J., Donkoh, E., & Nkrumah, A. (2022). Measuring the overall burden of early childhood malnutrition in Ghana: A comparison of estimates from multiple data sources. *International Journal of Health Policy and Management*, 11(7), 1035. <https://doi.org/10.34172/ijhpm.2020.253>
- Li, S., Nor, N. M., & Kaliappan, S. R. (2024). Social determinants of child malnutrition outcomes: Evidence from CHNS in China. *Heliyon*, 10(1). <https://doi.org/10.1016/j.heliyon.2023.e23887>
- Little, M. T., Roelen, K., Lange, B. C., Steinert, J. I., Yakubovich, A. R., Cluver, L., & Humphreys, D. K. (2021b). Effectiveness of cashplus programmes on early childhood outcomes compared to cash transfers alone: A systematic review and metaanalysis in lowand middleincome countries. *PLoS Medicine*, 18(9), 1003698. <https://doi.org/10.1371/journal.pmed.1003698>
- Liu, X., Kim, R., Zhang, W., Guan, W. W., & Subramanian, S. V. (2022). Spatial variations of villagelevel environmental variables from satellite big data and implications for public health–related sustainable development goals. *Sustainability*, 14(16), 10450. <https://doi.org/10.3390/su141610450>
- Lukman, T. N. E., Anwar, F., Riyadi, H., & Harjomidjojo, H. (2022). Responsive prediction model of stunting in toddlers in Indonesia. *Current Research in Nutrition and Food Science Journal*, 10(1), 302–310. <https://doi.org/10.12944/CRNFSJ.10.1.25>
- Melania, M., Kadir, A., Pamungkas, A. R., & Gupta, S. (2024). Contribution of NonFormal Education to Improve the Quality of Human Resources. *Journal of Nonformal Education*, 10(1). <https://doi.org/10.15294/jone.v10i1.2015>
- Moelyaningrum, A. D., Keman, S., Notobroto, H. B., Melaniani, S., Sulistyorini, L., & Efendi, F. (2023). School sanitation and student health status: A literature review. *Journal of Public Health in Africa*. <https://doi.org/10.4081/jphia.2023.2540>
- Moonga, G., BöseO'Reilly, S., Berger, U., Harttgen, K., Michelo, C., Nowak, D., & Seiler, J. (2021). Modelling chronic malnutrition in Zambia: A Bayesian distributional regression approach. *Plos One*, 16(8), 0255073. <https://doi.org/10.1371/journal.pone.0255073>
- Mugarura, D., Ninsiima, H. I., Kinyi, H., Eze, E. D., Tumwesigire, S., Mbekeeka, P., & Ndamira, A. (2021). High-Prevalence Stunting in Preschool Children (1–5 Years) Attending Selected Health Centers in a Food Rich Area-Bushenyi District Southwestern Uganda. *Journal of Nutrition and Metabolism*, 2021(1), 5736864. <https://doi.org/10.1155/2021/5736864>
- Paul, P., Arra, B., Hakobyan, M., Hovhannisyanyan, M. G., & Kauhanen, J. (2021). The determinants of under5 age children malnutrition and the differences in the distribution of stunting–A study from Armenia. *Plos One*, 16(5), 0249776. <https://doi.org/10.1371/journal.pone.0249776>
- PérezEscamilla, R. (2017). Food security and the 2015–2030 sustainable development goals: From human to planetary health. *Current Developments in Nutrition*, 1(7), 000513. <https://doi.org/10.3945/cdn.117.000513>

- Rahmadania, D., Retnowati, E., Sasmita, K., & Fitriyani, H. (2024). Evaluating Reproductive and Sexual Health Training for Red Cross Youth: The Kirkpatrick Model. *Journal of Nonformal Education*, 10(1), 179-194. <https://doi.org/10.15294/jone.v10i1.1803>
- Raiten, D. J., Steiber, A. L., Dary, O., & Bremer, A. A. (2024). The Value of an Ecological Approach to Improve the Precision of Nutritional Assessment: Addressing Contributors and Implications of the “Multiple Burdens of Malnutrition.” *Nutrients*, 16(3), 421. <https://doi.org/10.3390/nu16030421>
- Rajia, S., Sabiruzzaman, M., Islam, M. K., Hossain, M. G., & Lestrel, P. E. (2019). Trends and future of maternal and child health in Bangladesh. *PloS One*, 14(3), 0211875. <https://doi.org/10.1371/journal.pone.0211875>
- Rojas, D. C. G., Appelt, J. L., Epprecht, M., Kounnavong, S., Elbers, C., Lanjouw, P. F., & Vliet, J. (2024). Interactions between sustainable development goals at the district level in Lao PDR. *World Development*, 178, 106564. <https://doi.org/10.1016/j.worlddev.2024.106564>
- Sahiledengle, B., Mwanri, L., Blumenberg, C., & Agho, K. E. (2023). Genderspecific disaggregated analysis of childhood undernutrition in Ethiopia: Evidence from 2000–2016 nationwide survey. *BMC Public Health*, 23(1). <https://doi.org/10.1186/s1288902316907x>
- Sahiledengle, B., Mwanri, L., Petručka, P., Kumie, A., Beressa, G., Atlaw, D., & Agho, K. E. (2022). Determinants of undernutrition among young children in Ethiopia. *Scientific Reports*, 12(1), 20945. <https://doi.org/10.1038/s4159802225160y>
- Seiler, J., Harttgen, K., Kneib, T., & Lang, S. (2021). Modelling children’s anthropometric status using Bayesian distributional regression merging socioeconomic and remote sensed data from South Asia and subSaharan Africa. *Economics & Human Biology*, 40, 100950. <https://doi.org/10.1016/j.ehb.2020.100950>
- Terfa, Z. G., Ahmed, S., Khan, J., Niessen, L. W., & Consortium, I. (2022). Household microenvironment and underfives health outcomes in Uganda: Focusing on multidimensional energy poverty and women empowerment indices. *International Journal of Environmental Research and Public Health*, 19(11), 6684. <https://doi.org/10.3390/ijerph19116684>
- Tong, H., Kemp, C. G., & Walker, N. (2022). Estimating additional schooling and lifetime earning obtained from improved linear growth in lowand middleincome countries using the Lives Saved Tool (LiST). *Journal of Global Health*, 12. <https://doi.org/10.7189/JOGH.12.08004>
- TorresSlimming, P. A., Carcamo, C. P., Wright, C. J., Lancha, G., ZavaletaCortijo, C., King, N., & Harper, S. L. (2023). Diarrheal disease and associations with water access and sanitation in Indigenous Shawi children along the Armanayacu River basin in Peru. *Rural and Remote Health*, 23(3), 1–11. <https://doi.org/10.22605/RRH719>