Empowering Teenagers at Integrated Health Posts (Posyandu) in the Prevention of Early Marriage and Unwanted Pregnancy: A Structural Equation Modeling (SEM) Analysis of Coastal Adolescent Reproductive Health, South Konawe Regency, Southeast Sulawesi Province, Indonesia, 2025

Abstract

Aims: Adolescents in coastal areas face heightened risks of early marriage and unintended pregnancy, attributed to limited access to reproductive health care and enduring socio-cultural norms. In South Konawe Regency, Southeast Sulawesi, Youth Posyandu functions as a community-based initiative for adolescent health; However, its effectiveness in reducing early marriage and unintended pregnancies in coastal regions remains inadequately explored.

Instrument & Methods: This quantitative cross-sectional study involved 210 teenagers selected through proportionate random sampling. Partial Least Squares-Structural Equation Modelling (PLS-SEM) was employed to examine direct effects and the mediating and moderating relationships among knowledge, attitudes, program-supporting and inhibiting factors, Youth Posyandu empowerment, early marriage, and unintended pregnancy.

Findings: Results indicate that factors supporting and inhibiting the program significantly affected unwanted pregnancy ($t=2.881$; $p=0.004$). Knowledge significantly influenced unintended pregnancy ($t=6.644$; $p<0.001$) and the empowerment of Youth Posyandu ($t=6.168$; $p<0.001$). Attitudes significantly affected undesired pregnancy ($t=6.090$; $p<0.001$), whereas they did not have a significant effect on empowerment ($t=0.479$; $p>0.05$). The empowerment of Youth Posyandu notably reduced the incidence of unplanned pregnancies ($t=2.566$; $p=0.010$). The mediation study revealed that empowerment partially mediated the relationship between knowledge and early marriage as well as unplanned pregnancy (coefficient=-0.061; $t=2.112$; $p=0.035$), while attitudes showed no mediating effect. The characteristics of the program did not affect the relationship between empowerment and unintended pregnancy.

Conclusion: Enhancing the understanding of adolescents and empowering Youth Posyandu are critical strategies to prevent early marriage and unplanned pregnancy in coastal communities.

Keywords

Empowering [MeSH Link?];
Integrated Health Post [MeSH Link?];
Teenagers [https://www.ncbi.nlm.nih.gov/mesh/68000293];
Prevention [https://www.ncbi.nlm.nih.gov/mesh/81000517];
Early Marriage [MeSH Link?];
Unwanted Pregnancy [https://www.ncbi.nlm.nih.gov/mesh/68011275];
Coastal [MeSH Link?]

Introduction

Health significantly influences the quality of a nation's human resources and its competitive capacity. Investment in health development, especially for the working-age population and adolescents, is essential for achieving sustainable development. Adolescents, between the ages of 10 and 19, experience a transitional period from childhood to adulthood characterised by physical, psychological, and social changes [1]. Adolescents often face various health challenges during this stage, including nutritional deficiencies, mental health issues, and reproductive health risks. The health of adolescents significantly influences the quality of future generations, as they will assume roles as parents and workers. Caring for the health of teenagers is essential for both their well-being and the overall development of the country.

According to UNICEF, over 12 million girls are married annually worldwide. Approximately 21% of young women globally marry before the age of 18 [2]. Girls who marry at an early age are more likely to lose educational opportunities, experience gender-based violence, and face higher risks of complications during pregnancy and childbirth [3]. Furthermore, WHO emphasized that nearly 90% of adolescent births in developing countries occur within the context of early marriage [4]. Consequently, preventing child marriage has become a strategic global priority within the Sustainable Development Goals (SDGs), particularly Goal 3 (Good Health and Well-Being) and Goal 5 (Gender Equality) [5]. Numerous developing countries, including Indonesia, continue to exhibit elevated rates of early marriage, indicating a significant public health concern [6].

In Indonesia, Statistics Indonesia reported that approximately 8.06% of women aged 20-24 years were married before the age of 18 years, indicating that child marriage remains a serious social and public health issue in the country [7]. Poverty, gender inequality, low parental educational attainment, and sociocultural norms that continue to tolerate early marriage practices are considered the main determinants contributing to the persistently high prevalence of child marriage in Indonesia [3, 7]. Furthermore, many Indonesian adolescents still have limited knowledge regarding contraception, sexually transmitted infections, reproductive health rights, and the risks associated with unsafe sexual behavior [8].

Early marriage and teenage pregnancy remain significant issues in Southeast Sulawesi. Mardin's study indicated that over 54% of individuals in South Konawe Regency experienced early marriage, significantly exceeding the national average. The situation is exacerbated by the high incidence of unwanted pregnancies, particularly among adolescents residing in coastal areas. Geographical factors, such as limited access to healthcare providers, inadequate reproductive health education, and persistent cultural norms, have intensified this issue. Coastal adolescents in South Konawe are particularly susceptible to reproductive health issues [9]. Adolescents living in coastal areas tend to have lower levels of reproductive health literacy due to limited access to education and health information [10].

Health issues among adolescents in Southeast Sulawesi Province, especially in rural and coastal areas, are intensified by limited healthcare access, low educational levels, and the strong influence of cultural norms. The South Sulawesi Health Office (2021) reported that 11.2% of marriages involving children occur, exceeding the national average. Teenage pregnancy is also very common in coastal areas, such as South Konawe.

In this context, Youth Integrated Health Posts (*Posyandu Remaja*) have emerged as a strategic community-based approach with substantial potential to improve adolescent reproductive health outcomes [11]. Through participatory and peer-based interventions, Youth Posyandu serves not only as a platform for delivering health services, but also as a mechanism for adolescent empowerment, health education, social support, and reproductive health promotion within the community.

Nevertheless, the implementation of Youth Posyandu across different regions in Indonesia continues to face significant challenges. Low adolescent participation, limited capacity of peer cadres, inadequate family support, suboptimal intersectoral collaboration, and the lack of locally tailored reproductive health education programs have constrained the effectiveness of Youth Posyandu initiatives [12]. These limitations indicate that the existing implementation of Youth Posyandu has not yet fully optimized its role in strengthening adolescents' reproductive health literacy and preventing early marriage and unintended pregnancy, particularly among vulnerable adolescents living in coastal communities.

The Youth Posyandu is increasingly significant in coastal regions. Coastal regions frequently experience health issues due to geographical barriers that hinder access to services, insufficient healthcare personnel, and inadequate infrastructure to support healthcare delivery. Coastal

adolescents are often constrained by cultural norms that advocate for early marriage as a means of addressing family financial issues or as a customary practice. The Youth Posyandu functions as both a health service provider and a platform for empowerment, thereby enhancing the resilience of adolescents in facing socio-cultural and economic challenges [13].

Research on empowering Youth Posyandu in coastal communities is currently limited. Research on the prevention of early marriage and unintended pregnancy primarily occurs in urban or rural non-coastal areas. The socioeconomic characteristics and health concerns in coastal areas are significantly different. This research addresses a gap in the literature and provides evidence-based recommendations for adolescent empowerment strategies in coastal regions.

Instrument and Methods

This research utilises a quantitative approach with a cross-sectional design to investigate the effects of knowledge and attitudes on early marriage and unintended pregnancy. The study was conducted between September and December 2025 in South Konawe Regency, Southeast Sulawesi Province, Indonesia. The research design employed is a cross-sectional study that involves simultaneous data collection.

The Slovin formula is utilised to determine the sample size, ensuring a 95% confidence level with a 5% margin of error. The analysis resulted in a sample size of 210 respondents. The sampling technique employed in this study was a combination of purposive sampling and accidental sampling methods. Purposive sampling was initially used to determine eligible participants based on predefined inclusion criteria, including adolescents aged 10-19 years, residing in coastal areas of South Konawe Regency, and actively participating in Youth Integrated Health Posts activities. Subsequently, accidental sampling was applied by recruiting respondents who met the inclusion criteria and were available at the time of data collection. This approach enabled the researchers to obtain participants who were accessible and willing to participate during the study period.

Data were collected using a structured self-administered questionnaire consisting of five sections: Demographic characteristics, knowledge regarding reproductive health, attitudes toward early marriage, prevention of unintended pregnancy, and participation in Youth Posyandu activities. The knowledge variable consisted of 10 items using dichotomous scoring (1=correct and 0=incorrect), whereas attitude and behavioral variables were measured using a five-point Likert scale ranging from strongly disagree (1) to strongly agree (5). Higher scores indicated better knowledge, more positive attitudes, and stronger preventive behaviors.

The questionnaire was adapted and modified from previously validated studies related to adolescent reproductive health and early marriage prevention. Content validity was assessed by three experts in public health and adolescent reproductive health. Construct validity was evaluated using factor loading analysis, with all indicators showing loading values above 0.70.

Prior to data collection, ethical approval was obtained from the relevant ethics committee. The researchers coordinated with the selected health centers to identify eligible respondents. Participants who met the inclusion criteria were informed about the study objectives and signed informed consent forms before participation. Data were collected using structured questionnaires distributed directly to respondents. The completed questionnaires were checked for completeness before data analysis.

Data were analyzed using Structural Equation Modeling-Partial Least Squares (SEM-PLS) with SmartPLS version 4. The analysis consisted of outer model testing to assess validity and reliability, including convergent validity, discriminant validity, composite reliability, and Cronbach's alpha. Furthermore, inner model analysis was conducted to evaluate the relationships between variables and test the research hypotheses. Statistical significance was determined using a p-value<0.05 and t-statistics>1.96.

Ethical consideration

The Health Research Ethics Committee of the Regional Board of the Indonesian Public Health Association (KEPK-IAKMI) granted ethical approval for this study (Approval Number: 264/KEPK-IAKMI/XII/2025). All respondents participated actively and provided written informed consent.

Findings

1. Respondent characteristics

Table 1. Distribution of respondents based on age group of coastal youth posyandu in the prevention of early marriage and

unwanted pregnancy in South Konawe Regency, Southeast Sulawesi, Indonesia (n=210)

Characteristics	Number (%)
Age (years)	
10-12	67 (31.9)
12-14	120 (57.1)
>14	23 (11.0)
Gender	
Man	95 (45.2)
Woman	115 (54.8)
Education	
No school	4 (1.9)
Primary school	35 (16.7)
Junior high school	165 (78.6)
High school	6 (2.9)
Living together	
Biological parents	197 (93.8)
Other families	4 (1.9)
Alone	9 (4.3)
Parent education	
Not finishing primary school	131 (62.4)
Primary school	79 (37.6)
Income	
<1,000,000	174 (82.9)
1.000.000-2.000.000	20 (9.5)
>2,000,000	16 (7.6)
Status	
Student	203 (96.7)
Work	4 (1.9)
Not working	3 (1.4)

Table 1 indicates that the majority of respondents were aged 12 to 14 years, comprising 120 individuals (57.1%), while the minority were over 14 years old, totalling 23 individuals (11%). The sample comprised 115 female responders (54.8%) and 95 male respondents (45.2%). The majority of respondents possessed a junior high school education level (165 respondents, 78.6%), whereas the minority had a high school education level (6 respondents, 2.9%). The majority of respondents, 197 (93.8%), lived with both biological parents, while a minority, 9 (4.3%), resided alone. The majority of respondents whose parents did not complete elementary school numbered 131 (62.4%), while those whose parents did complete elementary school were fewer, totalling 79 (37.6%). Of the respondents, 174 (82.9%) reported that their parents earned less than 1,000,000, whereas 16 (7.6%) indicated that their parents earned more than 2,000,000. In total, 203 respondents (96.7%) identified as students, while a minimum of 3 respondents (1.4%) reported being unemployed.

2. Hypothesis testing

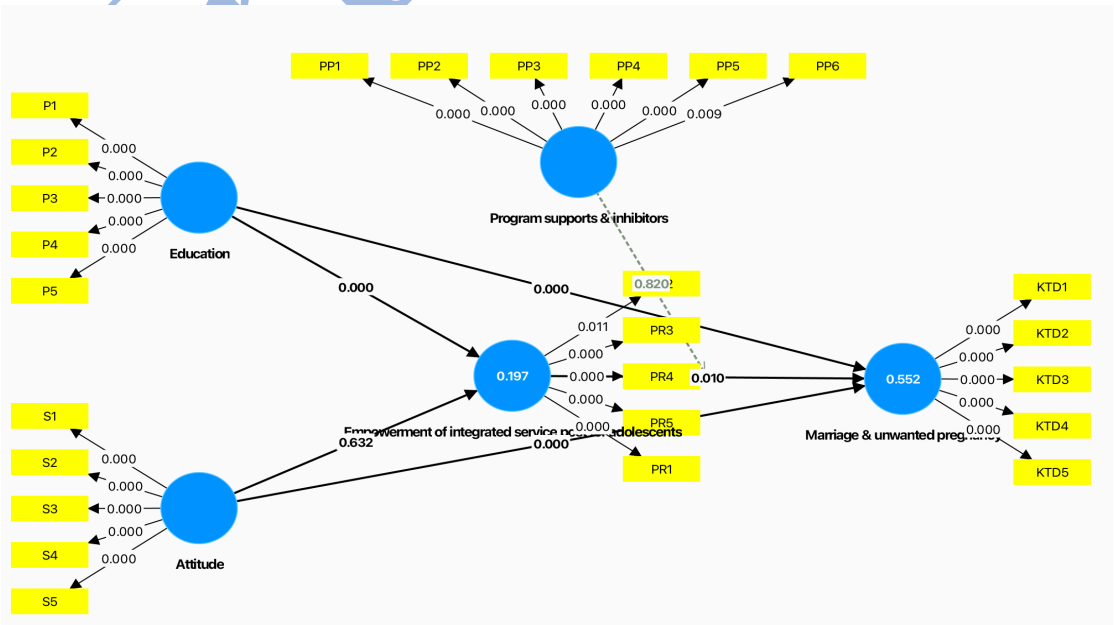

Figure 1. Hypothesis test results with SmartPLS, 2025 **(It's not referenced in the text)**

Table 2. Results of direct effect hypothesis testing **(It's not referenced in the text)**

Variable	Original sample (O)	Sample mean (M)	Standard deviation (STDEV)	T statistics (|O/STDEV|)	ρ-value
Attitude -> Empowerment of integrated service post for adolescents	0.035	0.039	0.074	0.479	0.632
Attitude -> Marriage & unwanted pregnancy	0.421	0.417	0.069	6.090	0.0001
Education -> Empowerment of integrated service post for adolescents	0.430	0.443	0.070	6.168	0.0001
Education -> Marriage & unwanted pregnancy	0.381	0.386	0.057	6.644	0.0001
Empowerment of integrated service post for adolescents -> Marriage & unwanted pregnancy	-0.143	-0.145	0.056	2.566	0.010
Program supports & inhibitors -> Marriage & unwanted pregnancy	0.223	0.236	0.077	2.881	0.004
Program supports & inhibitors x Empowerment of integrated service post for adolescents -> Marriage & unwanted pregnancy	-0.011	-0.010	0.049	0.227	0.820

Source: Data processed -Pls.4 (2025)

The hypothesis test results showed that the program supporters and inhibitors (PP) produced a t-value of 2.881, which is greater than 1.96, and a p-value of 0.004, which is less than 0.05. Thus, H1 is accepted, indicating that program supporters and inhibitors affect unwanted pregnancies. Knowledge (P) attained a statistical t-value of 6.644, exceeding 1.96, and a p-value of 0.0001, which is below 0.05. Thus, H1 was accepted, demonstrating that knowledge has a positive and significant impact on unintended pregnancy. Knowledge (P) attained a statistical t-value of 6.168, surpassing 1.96, and a p-value of 0.0001, which is below 0.05. Thus, H1 was validated, demonstrating that knowledge exerts a positive and significant impact on the empowerment program for young posyandu.

The test results indicated that the attitude exerted a statistically significant negative effect on pregnancy, evidenced by a t-value of 6.090, which exceeds 1.96, and a p-value of 0.001, which is less than 0.05. The statistical analysis yielded a t-value of 0.479, which is less than 1.96, and a p-value of 0.0001, which is less than 0.05. This indicates that the hypothesis H1 is not supported, suggesting that the attitude did not influence the empowerment of youth posyandu.

The hypothesis test results demonstrated that the empowerment of adolescent posyandu produced a statistical t-value of 2.566 (>1.96) and a p-value of 0.010 (<0.05), resulting in the acceptance of H1. This indicates that the empowerment of adolescent posyandu has a positive and significant effect on unwanted pregnancy.

The statistical test results indicated that the supporters and inhibitors of the program exhibited a t-value of 0.227, which is less than 1.96, and a p-value of 0.820, which exceeds 0.05. This indicates that H1 was false, suggesting that the supporters and inhibitors of the program did not alter the impact of adolescent posyandu on unwanted pregnancies.

Table 3. Results of indirect effect hypothesis testing **(It's not referenced in the text)**

Variable	Original sample (O)	Sample mean (M)	Standard deviation (STDEV)	T statistics (|O/STDEV|)	p-value
Knowledge -> Empowerment of youth posyandu -> Early marriage & pregnancy is not desired	-0.061	-0.065	0.029	2.112	0.035
Attitude -> Empowerment of youth posyandu -> Early marriage & pregnancy is not desired	-0.005	-0.006	0.012	0.424	0.672

Source: Data processed -Pls.4 (2025)

The analysis of the mediation pathway using the variables of adolescent posyandu empowerment indicated that the knowledge pathway to early marriage and unwanted pregnancy through adolescent posyandu empowerment had a coefficient value of -0.061, a t-statistic of 2.112, and a p-value of 0.035. The t-value exceeds 1.96, and the p-value is below 0.05; Thus, the effect is statistically significant. The findings suggest that knowledge significantly influences the reduction of early marriage rates and unintended pregnancies by empowering teenage posyandu. The negative coefficient indicates that an increase in teenagers' understanding, along with improved youth posyandu empowerment initiatives, is likely to reduce the incidence of early marriage and unintended pregnancy. The attitudes towards early marriage and unintended pregnancy, as influenced by the empowerment of teenage posyandu, resulted in a coefficient value of -0.005, a t-

statistic of 0.424, and a p-value of 0.672. A t-statistic value below 1.96 and a p-value exceeding 0.05 indicate a lack of statistical significance for the effect. Views do not exert a significant indirect effect on early marriage and unplanned pregnancy through the empowerment of adolescent posyandu.

Discussion

The findings revealed that various factors, such as the accessibility of contraceptive services, the quality of counselling, support from partners or family, social stigma, and supply interruptions, significantly influenced the occurrence of unintended pregnancies. The findings corroborate existing data that identifies access to and the quality of family planning services as critical factors influencing contraceptive use, which has implications for decreasing the incidence of unintended pregnancies [14].

The Social Ecological Model (SEM) emphasises that various levels of factors influence human reproductive behaviour. The levels encompass the individual level (knowledge, attitudes), the interpersonal level (influence of spouses and families), the community level (norms and stigma), the service institutions level (access and quality of services), and the public policy level. Failure of family planning programs to engage any of these layers—such as inadequate adolescent-friendly services, cultural barriers, or insufficient contraceptive availability—results in reduced contraceptive use and a rise in unintended pregnancies. Various qualitative and quantitative studies have utilised the SEM framework to clarify the influence of the interaction between supporting and inhibiting factors at different levels on reproductive outcomes [15].

The Health Belief Model (HBM) examines individuals' perceptions of their risk, the severity of potential consequences, the benefits of action, barriers to action, and their self-efficacy in taking action. Barriers to family planning include misinformation regarding side effects, insufficient knowledge, and concealed costs, which contribute to the perception of additional obstacles and subsequently reduce interest in contraceptive use. Conversely, interventions that enhance perceived benefits and self-efficacy are likely to increase contraceptive use and reduce the incidence of unintended pregnancies. Recent intervention studies and surveys support the importance of Health Belief Model factors in predicting contraceptive use behaviour [16].

The main barriers identified include concerns about side effects, societal stigma, lack of partner consent, and disruptions in the availability or accessibility of services [17]. The most significant supporting aspects include youth-friendly services, spousal engagement, effective counselling, and improved access to services such as mobile options or flexible hours. Interventions that incorporate improvements to the supply system, teaching methodologies based on behavioural theory, and active community engagement have shown the most consistent results in reducing the incidence of unintended pregnancies [14].

This study's findings demonstrate that education level has a positive and significant effect on the incidence of unintended pregnancies. A greater understanding of reproductive health and contraception correlates with an increased likelihood of individuals taking measures to prevent unintended pregnancies. Understanding the various types of contraceptives, their mechanisms of action, and their effectiveness can assist individuals in making informed decisions regarding the management of reproductive risk. The findings align with a study demonstrating that adequate reproductive information significantly reduces the occurrence of unintended pregnancies among women of childbearing age in various countries. Additionally, Abewa *et al.* [18] found that a thorough understanding of emergency contraceptive options improves their effective use in preventing unplanned pregnancies.

The correlation between knowledge and reproductive behaviour can be explained through various health behaviour models. The Knowledge-Attitude-Practice (KAP) framework asserts that knowledge underpins the formation of attitudes, which subsequently influence individual behaviour. Individuals who understand the benefits and applications of contraception are likely to have a positive attitude towards its use and are more inclined to utilise it, thereby reducing the incidence of unintended pregnancies [19]. The Health Belief Model (HBM) posits that increased knowledge can enhance an individual's perception of vulnerability and highlight the advantages of preventive measures against illness. Individuals aware of the risks linked to unintended pregnancy and the benefits of contraceptive use demonstrate increased motivation to utilise preventive measures. Rajapakshe *et al.*'s research [20] indicates that HBM-based reproductive education effectively increases awareness and modifies behaviours related to contraception.

However, improved information by itself does not necessarily result in a reduction in the occurrence

of unintended pregnancies. The Information-Motivation-Behavioral Skills (IMB) Model posits that effective information utilisation requires not only information but also motivation and behavioural skills [17]. The spread of disinformation or myths about contraception in the community can create fear of negative effects or social pressure, leading to a reduction in contraceptive use, even when factual knowledge is relatively high [21]. Educational techniques should enhance learning, increase motivation, improve birth control usage skills, and facilitate access to services.

The study's findings demonstrate a significant positive correlation between knowledge and the success of the Youth Posyandu empowerment program, thereby confirming that knowledge is a critical factor in improving the effectiveness of community-based health initiatives. Improving the knowledge of Youth Posyandu cadres and participants directly enhances their capacity to fulfil the core responsibilities of the Posyandu, which encompass health promotion, early detection of adolescent health concerns, and education on maintaining clean and healthy living practices. The findings correspond with the information-Attitude-Practice (KAP) framework, which suggests that improved information can foster positive attitudes and encourage sustainable health practices [22].

Within the Youth Posyandu framework, awareness of reproductive health, nutrition, personal hygiene, mental health, and the prevention of risky behaviours is essential for promoting behavioural change and improving collective awareness among adolescents. Bandura's (1986) Social Cognitive Theory posits that knowledge serves as a cognitive factor that affects an individual's self-efficacy, or confidence in their ability to perform actions. Individuals with adequate knowledge will demonstrate increased confidence in the dissemination of health information, coordination of activities, and peer education. This theory emphasises the significance of observational learning, wherein older adolescents serve as role models for younger peers in adopting healthy lifestyle practices.

Recent research supports the idea that information is crucial for the effective empowerment of Youth Posyandu. The study by Rasmaniar *et al.* [23] indicates that peer education-focused cadre training significantly improves adolescents' understanding and positive attitudes regarding nutrition and stunting prevention. Similar results were also identified by Rasmaniar *et al.* [23] training and technical guidance contributed significantly to the cadre's learning, which was a crucial factor in the Posyandu program's success in enhancing the resilience and independence of adolescents. Meliyanti (2023) found that increasing awareness of the benefits and functions of Posyandu is associated with higher levels of adolescent participation in health activities. This suggests that information affects individual behaviour and enhances social participation in Posyandu initiatives.

The study by Atmadani *et al.* [24] highlights that information alone cannot ensure the program's effectiveness without adequate environmental support, which includes the availability of facilities, supportive personnel, and policy endorsement from health centers and municipal governments. To empower Youth Posyandu, a comprehensive approach is necessary, incorporating enhanced knowledge, improved communication skills, cadre leadership, and structural support from the health system. This comprehensive technique positions knowledge enhancement as a fundamental resource and a crucial element in enabling adolescents to become agents of change for healthier lifestyles and reduced health issues.

The study's findings demonstrate that attitudes have a positive and significant impact on the incidence of unintended pregnancies, consistent with various health behaviour theories that recognise attitude as a key predictor of individual intentions and behaviours. The Theory of Planned Behaviour (TPB) posits that attitudes towards a behaviour, such as contraceptive use, influence intentions, which in turn govern actual behaviour. Negative perceptions regarding the efficacy of contraceptives, along with fears or misconceptions about potential side effects, can reduce the likelihood of individuals utilising preventive measures, thereby increasing the risk of unintended pregnancies [24].

Multiple quantitative studies and Knowledge-Attitude-Practice (KAP) assessments support these findings, indicating a consistent trend: Individuals or groups with reluctant, negative, or lenient attitudes toward contraceptive use tend to have higher rates of unintended pregnancies. Affirmative attitudes, defined by the belief in the safety, effectiveness, and benefits of contraceptives, are significantly linked to increased use of more reliable and effective contraceptive methods [25].

The analysis of various unwanted pregnancy prevention intervention programs reveals that success at the population level depends on both increased knowledge and the program's ability to foster and maintain positive attitudes through continuous education, individual counselling, and social initiatives. This highlights that changing attitudes is an essential approach for reducing the occurrence of unintended pregnancies [26].

The relationship between attitude and behaviour is complex, influenced by various mediating and moderating factors that determine the extent to which attitudes translate into actions. Attitudes regarding contraceptive use can be influenced by factors such as perceived behavioural control, relationship support, accessibility of contraceptive services, and exposure to misinformation. Recent research highlights the widespread issue of digital misinformation, particularly exaggerated claims about the side effects of birth control pills and the promotion of less effective natural alternatives. This misinformation can diminish positive perceptions and lead to a "nocebo" effect, characterised by reduced confidence in modern methods, which may consequently increase the rate of unintended pregnancies [27].

The findings suggest that strategies to decrease unplanned pregnancies should be designed comprehensively and through multiple approaches. Initially, behavioural interventions focused on modifying attitudes encompass persuasive communication campaigns, evidence-based counselling, and peer education strategies. Secondly, enhancing structural variables is essential, including facilitating access to effective birth control services and methods, as well as ensuring the public is not misled by misinformation online. Evaluating the effectiveness of a program should encompass more than just behavioural outcomes, such as correct and consistent contraceptive usage. It is important to examine changes in attitude, as this serves as a critical indicator of the program's effectiveness in reducing the incidence of unwanted pregnancies.

The study's findings indicated that attitudes did not affect the empowerment of the Youth Posyandu, implying that the respondents' positive perceptions of the program were inadequate to encourage their active participation in the activity. The findings correspond with the Health Belief Model (HBM) and the Theory of Planned Behaviour (TPB), which indicate that although attitudes affect intentions, actual behaviour is often influenced by other elements such as social support, subjective norms, and perceptions of behavioural control. Teens who perceive Posyandu as a significant program may refrain from participation due to feelings of inadequacy, lack of time, or insufficient support from peers and family.

Research by Rasmaniar *et al.* [23] further substantiates this by demonstrating that improving positive perceptions of adolescents' health does not necessarily increase participation in Posyandu activities unless it is accompanied by strong motivation, cadre training, and the availability of supportive facilities and infrastructure.

Community Empowerment Theory posits that the effectiveness of empowerment is shaped by psychological factors, including attitudes, as well as the capacity of individuals and groups to access resources, information, and opportunities for participation in decision-making processes. Within the context of the Youth Posyandu, the support from health providers, educators, and community leaders often surpasses individual biases.

Research by Messman *et al.* [28] indicates that teenagers' participation in public health initiatives is more significantly influenced by their perceptions of program efficacy, the availability of structural support, and concrete opportunities for involvement, rather than solely by positive attitudes towards these activities. Dewi's (2024) study in Pekalongan City indicates that adolescents with a positive attitude towards Posyandu do not necessarily participate actively in its activities without a strong cadre system and initiatives that meet their needs.

In conclusion, empowering Youth Posyandu requires a comprehensive approach that includes the improvement of knowledge, motivation, skills, and the provision of social and institutional support. Programs ought to incorporate participatory methods, such as involving young individuals in the design of activities, providing training in leadership and communication, and ensuring a welcoming environment. An integrative strategy that includes cognitive, affective, social, and structural dimensions will promote the transformation of positive attitudes into proactive behaviours and sustained empowerment within the community.

This study's findings demonstrate that the empowerment of Youth Posyandu significantly contributes to the reduction of unwanted pregnancies. A higher level of empowerment among adolescents involved in Posyandu activities is associated with a reduced likelihood of engaging in risky behaviours that could lead to unplanned pregnancies. The results are consistent with the Empowerment Theory [29], which asserts that empowerment involves both the enhancement of individual capacity and a communal process that allows individuals to exert control over decisions and actions affecting their lives. The Youth Posyandu framework promotes knowledge enhancement, cadre training, communication skills, and active participation in program decision-making, fostering critical, autonomous, and accountable teenagers regarding their reproductive health.

Adolescents engaged in Posyandu activities demonstrate accurate reproductive health knowledge, exhibit confidence in avoiding detrimental behaviours, and possess the ability to independently access health services. Research by Sullivan & Webster [27] supports this by showing that empowerment-oriented interventions and increased reproductive health awareness can reduce the likelihood of unintended pregnancy by up to 40% among teenagers in Africa and Southeast Asia. Research by Sutarto *et al.* [30] conducted in Indonesia supports the notion that the establishment of active Youth Posyandu fosters adolescent participation in health initiatives, improves peer support for healthy behaviours, and develops a sense of social responsibility among youth. This empowerment process enables adolescents to gain knowledge about the risks associated with unintended pregnancy and to utilise counselling and contraceptive methods effectively.

Empowering adolescents within Posyandu has significant long-term implications for the prevention of unplanned pregnancies. Posyandu Remaja is a community-oriented youth health promotion initiative that combines education, health promotion, and community-based counselling, aligning with local beliefs and cultural practices. Empowerment-focused programs demonstrate greater effectiveness than traditional one-way counselling by actively engaging adolescents in the design, implementation, and evaluation of events.

Empowering the Youth Posyandu enhances their knowledge and fosters positive attitudes, contributing to their social and mental resilience, thereby enabling them to make healthy, responsible, and empowered choices for their future.

This study's findings suggest that the supporting and inhibiting variables of the program do not influence the impact of Youth Posyandu empowerment on the incidence of undesired pregnancies. This suggests that neither the level of support nor the barriers to program implementation affects the nature or strength of the relationship between empowerment and efforts to prevent unwanted pregnancies. This can be explained theoretically through the moderation paradigm in social behaviour, as outlined by Baron & Kenny [31], which asserts that moderator factors must demonstrate adequate variation to affect the relationship between independent and dependent variables. The impact of Youth Posyandu empowerment is stable and consistent, primarily dependent on adolescents' internal factors, including improved knowledge, confidence, and positive attitudes, rather than external support or administrative and structural barriers [32].

The findings correspond with Community Empowerment Theory [29], which asserts that the effectiveness of community empowerment depends on both external support and the extent to which individuals or groups can internalise the ability and importance of exercising control over their own lives. Youth Posyandu effectively develops the skills of its cadres and adolescents despite inadequate facilities, limited funding, and insufficient technical oversight. This suggests that strong psychological and socially embedded empowerment can result in positive behavioural changes, such as the prevention of unintended pregnancies, with limited reliance on external factors.

Research by Putri *et al.* [33] indicates that the success rate of adolescent health programs remains relatively consistent across different locations, despite variations in institutional support. The program's success is contingent upon the dedication and consistency of the cadres in performing their duties. Nasution & Rahayu (2023) conducted research in North Sumatra, demonstrating that the effectiveness of the Youth Posyandu program in reducing risky behaviours was primarily influenced by the active participation and engagement of adolescents, rather than by administrative support or regional policies. This suggests that supporting and inhibiting variables often do not function as significant moderators, as they operate at the systemic level rather than at the psychological level of the individual central to empowerment.

From the viewpoint of Implementation Science, the minimal moderation effect may result from limited variance among units regarding supporting and inhibitory factors. If nearly all sites display similar conditions, the ability of these variables to influence correlations decreases [32].

The results indicate that the empowerment of Youth Posyandu has a direct capacity to influence behaviours that prevent unplanned pregnancies. Capacity-building initiatives, such as peer cadre training, reproductive health education, and community counselling, have proven effective in improving adolescents' comprehension, accountability, and self-regulation regarding their reproductive health [34]. While external factors remain crucial for the program's sustained success, the primary focus is on transforming teenagers' behaviours and knowledge by granting them significant autonomy.

These discoveries have significant implications for policy formulation and further research. The Youth Posyandu empowerment program should focus on strengthening the internal capacities of

cadres and participants, while external support should emphasise sustainability and resource allocation, rather than serving as the primary factor. From a research perspective, it is recommended to explore the possibility of supportive and inhibiting factors acting as mediators instead of moderators, thus clarifying the mechanisms through which empowerment affects outcomes [35]. A longitudinal study utilising a multilevel framework can provide a deeper understanding of the relationships between social environments, empowering processes, and adolescent reproductive behaviours over time.

Conclusion

This study illustrates that the knowledge and empowerment of Youth Posyandu significantly affect the reduction of early marriage and unintended pregnancy among coastal adolescents in South Konawe Regency. Conversely, attitudes do not influence empowerment, and the program's supporting and inhibiting factors do not alter the relationship between empowerment, early marriage, and unwanted pregnancy. Knowledge influences the empowerment of adolescents in posyandu regarding early marriage and pregnancy, which is undesirable. The results highlight the importance of integrating teenage empowerment into public health initiatives through the enhancement of the Youth Posyandu's role. The local government and health clinics should establish the Youth Posyandu as a strategic platform for reproductive health education, the promotion of healthy living skills, and the development of independent adolescent cadres. For programs to enhance their effectiveness within the community, they require policy support that includes long-term funding, training for personnel, oversight of health workers, and intersectoral collaboration among educational, social, and religious sectors.