

## Original Article

# Effectiveness of teenage parenthood package on maternal and fetal outcomes: a mixed-method study

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## ABSTRACT

**Introduction:** Teenage pregnancy poses significant maternal and neonatal health risks, often compounded by delayed antenatal care, inadequate nutrition, and limited knowledge. Promoting healthy practices such as regular antenatal attendance, balanced nutrition, hygiene, adequate rest, exercise, and self-care is vital to improving pregnancy outcomes among adolescents. This pilot study evaluated the effectiveness of a Teenage Parenthood Package (TPP) on maternal and fetal outcomes and explored the lived experiences of teenage mothers

**Methods:** A mixed-method design with an explanatory sequential approach was adopted. In Phase I, a quasi-experimental study was conducted among 30 teenage mothers (15 experimental, 15 control) selected through purposive sampling at the Institute of Obstetrics and Gynecology, Chennai. The Teenage Parenthood Package—comprising trimester-based antenatal education, BMI-specific dietary counseling, exercise demonstrations, and psychosocial guidance—was administered to the experimental group. Quantitative data were analyzed using paired and independent t-tests, Pearson's correlation, and chi-square tests. Phase II involved qualitative exploration using in-depth interviews analyzed through Colaizzi's method.

**Results:** The Teenage Parenthood Package significantly improved knowledge, dietary practices, and labor outcomes among teenage mothers. Although maternal–fetal attachment showed no significant difference between groups, qualitative findings revealed challenges including stigma, lack of familial support, and postpartum emotional distress. Integration of both data sets emphasized the value of structured, nurse-led interventions.

**Conclusion:** The Teenage Parenthood Package effectively enhanced maternal knowledge, dietary practices, and labor outcomes, underscoring the importance of comprehensive, adolescent-centered interventions to improve maternal and fetal health outcomes and psychosocial well-being.

**Keywords:** adolescent; attitude to health; fetal outcome; maternal outcome

## INTRODUCTION

Adolescence, the transitional period between childhood and maturity, is marked by rapid physical, psychological, and social changes. Defined by the World Health Organization (WHO) as ages 10 to 19 years, this period is commonly referred to as the “teenage” years (WHO, 2011). India has one of the highest rates of early marriage globally, with NFHS-5 (2019–2020) reporting that 27% of girls marry before the age of 18. Since most pregnancies in India occur within marriage, the country also experiences a high prevalence of teenage mothers, particularly in Tamil Nadu (IIPS, 2021). Research indicates that adolescent mothers are less likely to seek timely prenatal care, often delaying it until the third trimester, if at all (Nam et al., 2022). Evidence further demonstrates a strong correlation between maternal-fetal attachment, healthy pregnancy behaviors, and neonatal outcomes (Aung, 2017).

Several national programmes have been introduced to reduce early marriage and improve adolescent health, including the Prohibition of Child Marriage Act 2006 (Government of India, 2007), Beti Bachao Beti Padhao (MWCD, 2015), Rashtriya Kishor Swasthya Karyakram (MoHFW, 2014b), and the National Adolescent Health Programme (NAHP) (MoHFW, 2014a). While BBBP emphasizes girls' education and gender equality, and RKSK integrates reproductive health counseling and life-skills education through peer educators and Adolescent Friendly Health Clinics (AFHCs), independent evaluations reveal limited impact at the community level due to low awareness, inconsistent implementation, and poor integration with reproductive health services. NFHS-5 shows that 23.3% of women aged 20–24 were married before 18, reflecting only marginal improvement from NFHS-4 (26.8%), highlighting the persistent gaps and the need for context-specific interventions targeting adolescent mothers (Mahalakshmy et al., 2018).

To address this gap, the Teenage Parenthood Package (TPP) was developed as a structured, nurse-led, trimester-based intervention aimed at promoting healthy pregnancy practices among adolescent mothers. Designed through comprehensive literature review, expert consultation, and validation by specialists in obstetrics, neonatology, psychology, and nursing, the package comprises modules on antenatal education, including early registration, nutrition, hygiene, rest, exercise, and recognition of danger signs; individualized BMI-based dietary counseling; demonstrations

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of antenatal and pelvic floor exercises; and guidance on postnatal care, breastfeeding, and emotional well-being.

The intervention is delivered in small groups of 3–5 teenage mothers through interactive sessions, demonstrations, and take-home booklets, with reinforcement at the 3rd, 6th, and 9th months of pregnancy. By integrating cognitive, behavioral, and psychosocial components, the TPP directly addresses gaps left by national programmes, resulting in significant improvements in maternal knowledge, dietary practices, and labor outcomes.

Therefore, this study aimed to assess the effectiveness of the Teenage Parenthood Package on maternal and fetal outcomes and the experience of pregnancy among teenage mothers in a selected hospital in Chennai using a mixed-method approach. The specific objectives were to evaluate the effectiveness of the TPP on maternal and fetal outcomes, associate selected background variables with maternal and fetal outcomes in experimental and control groups, and explore the lived experiences of teenage mothers receiving the intervention. By providing structured education, dietary counseling, and psychosocial support, the TPP represents a context-specific, nurse-led strategy that strengthens national programmes, reduces the prevalence of adolescent pregnancy, and promotes positive maternal and neonatal outcomes.

## METHODS

### Study Design

This study collected and analyzed data using a hybrid strategy that includes an explanatory sequential approach. Pragmatism's tenets and reasoning form the foundation of the mixed-method paradigm. This paradigm holds that a combination of quantitative and qualitative methods leads to a deeper comprehension of the issue. The study's initial part involved gathering the quantitative data. Qualitative data were gathered and analyzed as part of the second step. The effectiveness of the teenage parenthood package and the experiences of young pregnancy were then analyzed using a combination of quantitative and qualitative findings.

### Phase one: Quantitative study

First, among a group of Indian teens, a quasi-experimental study was carried out to assess the impact of a teenage motherhood package on maternal and foetal outcomes.

### Samples and Sampling

The sample size for this pilot study was determined based on established methodological recommendations for pilot trials in health research. Since the primary objective was to evaluate the feasibility, preliminary effects, and practicality of the Teenage Parenthood Package (TPP) rather than to achieve statistical generalization, a total of 30 adolescent mothers (15 in the experimental group and 15 in the control group) was deemed appropriate. This sample size aligns with the guidelines proposed by Julious (2005), who recommended a minimum of 12 participants per group for pilot studies, and with Hertzog (2008) and Whitehead et al. (2016) who suggested that 24–50 participants are sufficient to provide reliable estimates of effect size and variability for future large-scale studies.

Hence, 30 adolescent mothers were selected through purposive sampling, as the study specifically targeted teenage primigravidae meeting the defined inclusion criteria.

For logistical convenience, a day-wise cluster approach was adopted—each antenatal clinic day at the Institute of Obstetrics & Gynecology (IOG), Egmore, Chennai, was treated as a “cluster,” and all eligible teenage mothers attending that day were approached and invited to participate until the desired sample size was achieved. This hybrid approach ensured systematic and feasible recruitment while maintaining purposive selection based on eligibility criteria.

The study was conducted at the Antenatal Outpatient Department of the Institute of Obstetrics & Gynecology (IOG), Egmore, Chennai, Tamil Nadu, India. Data collection took place from October 2022 to December 2022, following approval from the Institutional Ethics Committee. Eligible participants were informed about the study purpose and procedures, and written informed consent was obtained prior to inclusion.

### Inclusion criteria

Teenage primi moms who are married, in the eighth month of their pregnancy, within the WHO age range of 15 to 19 years, and who have registered and planned to give birth at the designated hospital are accompanied by a family member during the visit.

### Exclusion Criteria

Exclusion criteria were applied to ensure a homogeneous sample and minimize confounding factors. Women with medical conditions such as gestational diabetes, hypertension, hypothyroidism, or heart disease, those with significant physical or sensory impairments, and primigravidae with a history of abortion were excluded. These conditions could independently influence maternal and fetal outcomes or limit participation in the intervention, ensuring that observed effects could be attributed primarily to the Teenage Parenthood Package.

### Phase two: Qualitative study

### Samples and Sampling

Extreme cases were identified based on the overall mean scores of maternal and fetal outcomes from the quantitative phase. Specifically, women scoring within the lowest 10% and highest 10% of the total maternal and fetal outcome scores were selected as extreme cases. Research participants were chosen through purposive sampling from these extreme cases, focusing on those who could effectively articulate their experiences with health practices. Additionally, participants who varied from others in certain variables or exhibited unexpected findings were also interviewed.

### Data Collection

#### Quantitative

Quantitative data were collected using a structured and validated checklist developed by the researcher after reviewing relevant literature and consulting experts in obstetrics, pediatrics, psychology, nutrition, and nursing. The tool was designed to assess demographic, personal, anthropometric, obstetric, knowledge, dietary, bio-physiological, biochemical, labor, and fetal outcome variables. It consisted of four parts: background information, maternal outcomes, fetal outcomes, and experience of pregnancy. Maternal outcomes included knowledge on teenage pregnancy, assessed through a structured interview schedule where each correct response received one point and was categorized as adequate (>75%), moderately adequate (50–75%), or inadequate (<50%). Dietary practice was measured using a 24-hour recall at the eighth and ninth

months of pregnancy and compared with standard nutritional values. Bio-physiological and biochemical parameters such as weight, blood pressure, hemoglobin, and blood sugar were recorded from antenatal records. Maternal–fetal attachment was assessed at the ninth month using Cranley’s Maternal–Fetal Attachment Scale (22 items), and postnatal depression was assessed at four weeks postpartum using the Edinburgh Postnatal Depression Scale, categorized as normal, mild, moderate, or severe. Fetal outcomes were recorded from hospital data, including gestational age, APGAR score, birth weight, head and chest circumference, congenital anomalies, and NICU admissions.

The tool was validated by ten experts from relevant fields, yielding a Content Validity Index of .92. Reliability was confirmed during the pilot study, showing high consistency (knowledge test  $r = .89$ , dietary recall  $r = .84$ –.90, maternal–fetal attachment  $\alpha = .88$ , postnatal depression  $\alpha = .85$ , and fetal outcomes  $r = .92$ ). The instrument was found to be valid, reliable, and feasible for assessing the effectiveness of the Teenage Parenthood Package. Data were collected through face-to-face interviews and review of medical records after obtaining ethical approval and informed consent from participants.

#### Qualitative

Qualitative data were gathered through in-depth, semi-structured interviews that included open-ended questions. Prior to the qualitative phase, the researcher developed the interview guideline based on findings from the initial phase and relevant factors. The process for obtaining valid data and focusing on research topics was reviewed by the researcher. The interviews began with a key question: *"Can you describe your experience of pregnancy? How did you feel during labor and delivery? What was your experience like after giving birth? What emotions did you experience while caring for your newborn? What factors hindered healthy practices during motherhood? What physical, psychological, and social challenges did you face as a teenage mother?"* Throughout the interviews, the researcher recorded participants' nonverbal cues, such as tone, facial expressions, and posture, on a specific sheet, noting the time and location of each interview. Sampling continued until data saturation was achieved.

## Development and Delivery of the Teenage Parenthood Package

Teenage Parenthood Package was developed systematically through literature review, needs assessment with teenage mothers and healthcare providers, and expert validation from obstetricians, paediatricians, nutritionists, psychologists, and nursing specialists. The content was organized into modules covering teenage pregnancy and its complications, antenatal care, management of minor pregnancy disorders, recognition of danger signs, birth preparedness, postnatal and newborn care, breastfeeding, dietary guidance, antenatal and pelvic floor exercises, and fetal movement monitoring. The draft package was pilot-tested to ensure clarity, acceptability, and feasibility before implementation.

The intervention was delivered by the principal researcher, a registered nurse trained in maternal health education, in small groups of 3–5 teenage mothers. Each session lasted about 45 minutes and included interactive discussions, demonstrations, and counseling using PowerPoint presentations and illustrated booklets that were also given to participants for home reference. The Teenage Parenthood Package was implemented repeatedly at key antenatal milestones — during the eighth and

ninth months of pregnancy — with additional reinforcement seven days after the initial session. This structured, evidence-based, and culturally sensitive approach enhanced learning, reinforced healthy practices, and allowed effective assessment of its impact on maternal and fetal outcomes.

## Data Analysis

In the initial phase, teenage mothers were selected, and background variables were collected. Subsequently, pre-test assessments of knowledge and dietary practices were conducted for both the experimental and control groups. The investigator raised awareness among the teenage mothers in the experimental group using the Teenage Parenthood Package on the same day, while the control group followed standard hospital procedures. After a week, post-test knowledge levels were evaluated using a structured interview schedule, and dietary practices were assessed in the 8th and 9th months of pregnancy through a 24-hour dietary recall. Maternal–fetal attachment was evaluated in the 9th month, labor and fetal outcomes were assessed after delivery, and the Edinburgh Postnatal Depression Scale was administered four weeks postpartum.

#### Quantitative

Quantitative data were analyzed using IBM SPSS Statistics version 24. Descriptive statistics such as frequency, percentage, mean, and standard deviation were used to summarize background variables and maternal and fetal outcomes.

For inferential analysis, paired t-tests were used to compare pre- and post-test scores within each group (experimental and control), while independent t-tests were applied to compare post-test scores between the two groups. The Pearson correlation coefficient was used to determine the relationships between maternal outcomes, maternal–fetal attachment, postnatal depression, and fetal outcomes in both groups. Additionally, the chi-square test was employed to assess associations between maternal and fetal outcomes and selected background variables among teenage mothers.

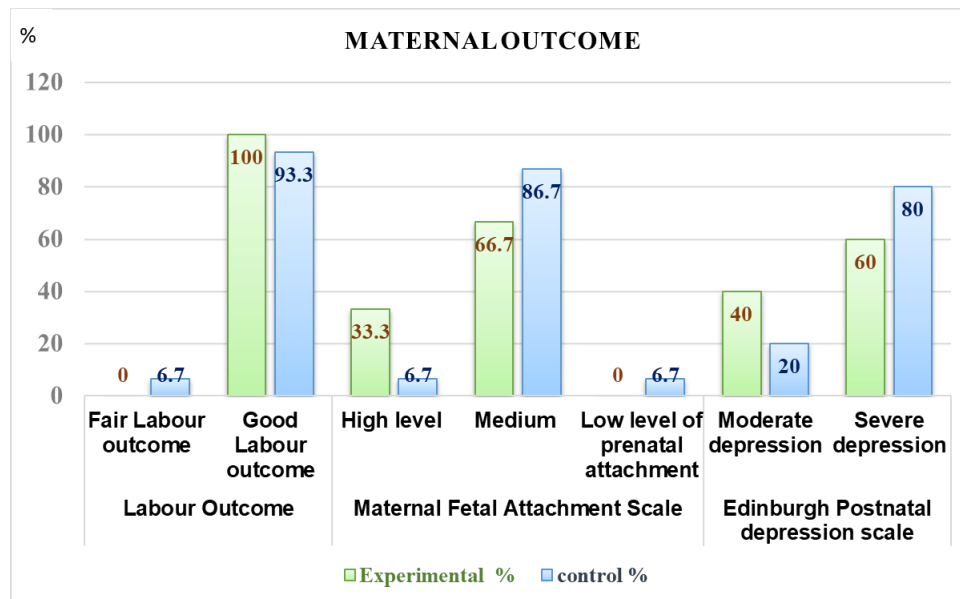
The level of significance ( $\alpha$ ) was set at .05 ( $P$ -value  $< .05$ ) for all statistical tests. Parametric tests were used because the data met the assumptions of normality and homogeneity of variance, as verified through the Shapiro–Wilk test and visual inspection of histograms. The use of parametric tests was justified as the outcome variables were continuous and approximately normally distributed, and the sample size ( $n = 30$ ) was sufficient for preliminary estimation of effect size in a pilot study.

#### Qualitative

The qualitative data were analyzed using thematic analysis based on Colaizzi’s method. After collecting the data, the researcher carefully reviewed it, transcribing the information in Tamil (the regional language) before translating it into English. The researcher also verified the transcriptions with the participants to ensure accuracy. Colaizzi’s method was employed for data analysis, leading to a thematic analysis of the transcribed data. The main themes identified included factors contributing to adolescent pregnancy, the labor and delivery process, newborn care, and healthy practices during motherhood.

## Ethical Clearance

The study received ethical approval from the International Centre for Collaborative Research (ICCR), the ethics review board of Omayal Achi College of Nursing, Chennai, India (Ref. No.: ICCR-IRB/ECA/PHD/38/2019). Permission to conduct the study was also obtained from the Director of the Institute of Obstetrics and Gynaecology (IOG), Egmore, Chennai.



**Figure 1.** Frequency And Percentage Distribution Of Maternal Outcome - Post-Test Level Of Labor Outcome, Maternal Fetal Attachment & Postnatal Depression In The Experimental & Control Group

All participants and their family members were informed about the purpose, procedures, and benefits of the study. Written informed consent was obtained before participation. Participation was voluntary, and participants were told they could withdraw at any time without affecting their medical care.

## RESULTS

### Sociodemographic Characteristics

Most teenage mothers in both groups were 19 years old, with 80% in the experimental group and 60% in the control group. Both groups were mostly Hindu, with 86.7% in the experimental group and 80% in the control group. Most had high school education, and all in the experimental group were homemakers with sedentary jobs, compared to 86.7% homemakers in the control group. Family income for most ranged from Rs. 6,175 to Rs. 30,830. More than 70% in both groups came from joint families, and about half had four family members. Both groups had 46.7% living in urban areas.

### Phase one: Quantitative Study

#### Knowledge on Teenage pregnancy among Experimental and Control Group

Table 1 compares pre- and post-test knowledge scores. The experimental group's mean score increased from 8 to 11.93 (mean difference = 3.93,  $P$ -value  $\leq .001$ ), while the control group's score increased slightly from 7.93 to 8.27 (mean difference = .34, not significant).

### Maternal Outcome

**Labor Outcomes:** In the experimental group, 100% had a good labor outcome, while in the control group, 93.3% had a good outcome and 6.7% had a fair outcome.

**Maternal-Fetal Attachment:** 33.3% of the experimental group showed high attachment, 66.7% medium attachment; in the control group, 6.7% were high, 86.7% medium, and 6.7% low. **Postnatal Depression:** On the Edinburgh Postnatal Depression Scale, 60% of the experimental group had severe depression and 40% moderate, while the control group showed 80% severe and 20% moderate depression.

Figure 1 Regarding maternal-fetal attachment, 33.3% of the experimental group had a high level of prenatal attachment, and 66.7% had a medium level, while in the control group, 6.7% had a high level, 86.7% had a medium level, and 6.7% had a low level.

Figure 1 On the Edinburgh Postnatal Depression Scale, 60% of the experimental group had severe depression and 40% had moderate depression, while in the control group, 80% had severe depression and 20% had moderate depression.

### Fetal Outcomes

Table 2 shows maternal-fetal attachment scores: mean = 78.13 in the experimental group, 70.67 in the control group (mean difference = 7.47, not statistically significant).

### Phase two: Qualitative Study

The qualitative phase explored the lived experiences of teenage mothers through in-depth interviews. Data were analyzed using Colaizzi's phenomenological method, and five major themes with corresponding subthemes emerged, reflecting the challenges and perceptions of teenage motherhood.

#### Theme 1: Issues that lead to teenage pregnancy

Participants identified several circumstances contributing to early pregnancy, including loss of family members, poverty, social stigma, discontinuation of education, loss of freedom, and inadequate planning. Many expressed that limited guidance and early marriage were major influences.

"After my father passed away, I had to leave school and got married early. I didn't plan to become a mother so soon." (Participant 3)

**Table 1.** Comparison Of Pre And Post-Test Knowledge Score Among Teenage Mothers In The Experimental & Control Group

| Group              | Knowledge |       |           |       | Mean Difference | Student Paired t-test                       |
|--------------------|-----------|-------|-----------|-------|-----------------|---------------------------------------------|
|                    | Pre-test  |       | Post-test |       |                 |                                             |
|                    | Mean      | SD    | Mean      | SD    |                 |                                             |
| Experimental group | 8         | 4.986 | 11.93     | 3.90  | 3.93            | t = 10.303<br>df=14<br>P-value = .001*<br>S |
| Control group      | 7.93      | 1.534 | 8.27      | 1.589 | 0.34            | t = .495<br>df= 14<br>P-value = .628<br>NS  |

Note: \*Significant at  $P$ -value  $\leq .001$ . S = Significant; NS = Not Significant; SD = Standard Deviation

**Table 2.** Comparison Of Post-Test Fetal Outcome Scores Among Teenage Mothers Between Experimental And Control Group

| Group              | Fetal Outcome |       | Mean Difference | Student Independent t-test       |
|--------------------|---------------|-------|-----------------|----------------------------------|
|                    | Mean          | SD    |                 |                                  |
| Experimental group | 2.00          | 1.604 | .067            | t = -.091<br>df=28               |
| Control group      | 2.07          | 2.344 |                 | P-value = .628<br>N = .928<br>NS |

Note: \*Significant at  $P$ -value  $\leq .001$ . S = Significant; NS = Not Significant

These findings align with studies highlighting socioeconomic hardship, poor education, and early marriage as major risk factors for teenage pregnancy (WHO, 2020).

### Theme 2: Feelings about labor and delivery

Teenage mothers described their childbirth experiences as emotionally intense, shaped largely by the presence or absence of familial support.

*"I was scared during labor, but my mother stayed with me and gave me courage."* (Participant 1),

*"I had no one by my side; I felt completely alone."* (Participant 4)

Supportive family involvement was linked to more positive delivery experiences, consistent with literature emphasizing the role of emotional and practical support during labor.

### Theme 3: Experiences after delivery

Post-delivery, many participants reported feelings of helplessness and depressive mood, reflecting emotional instability and lack of preparedness for motherhood.

*"After delivery, I cried often. I didn't know how to handle the baby or myself."* (Participant 5).

This theme underscores the vulnerability of adolescent mothers to postnatal emotional distress, echoing findings from previous studies that associate young maternal age with higher risk of postpartum depression (Rahman et al., 2019).

### Theme 4: Feelings when caring for the newborn

Participants expressed parental incompetence, uncertainty, and anxiety about infant care.

*"I didn't know how to hold or feed my baby; I was afraid I'd hurt her."* (Participant 2 & 3).

This reveals the need for structured education and hands-on training for teenage mothers to build parenting confidence, consistent with the purpose of the Teenage Parenthood Package.

### Theme 5: Factors inhibiting healthy practices during motherhood

Barriers such as lack of encouragement and negative perception of children as a source of burden limited adherence to healthy maternal practices.

*"My husband said caring for the baby is only my job; I felt no one understood me."* (Participant 3 & 5)

In contrast, mothers who viewed their child as a "source of meaning" showed greater motivation to practice healthy behaviors. These results reinforce the importance of psychosocial support and empowerment in improving maternal and newborn health behaviors.

Overall, the qualitative findings complement the quantitative results by explaining how emotional, social, and educational challenges influenced the effectiveness of the Teenage Parenthood Package. The themes highlight that improved knowledge and support can enhance psychological well-being, confidence, and adherence to healthy practices among teenage mothers.

## Integration of Quantitative and Qualitative Data

Integration of quantitative and qualitative data involved conducting a thorough literature review to create strategies aimed at enhancing maternal and fetal outcomes for teenage mothers. This review was supportive in nature and focused on improving relevant practices. Subsequently, the Teenage Parenthood Package was developed to address maternal and fetal outcomes in teenage mothers, incorporating findings from both qualitative and quantitative studies

## DISCUSSION

The findings of this study demonstrated that the Teenage Parenthood Package (TPP) significantly improved the knowledge of teenage mothers in the experimental group. Improved knowledge likely resulted from the structured, interactive nature of the package, which combined visual, verbal, and participatory learning through PowerPoint sessions and illustrated booklets. This multimodal approach enhanced comprehension and retention, enabling participants to apply learned information in daily practices. These results are consistent with studies by Merrill et al. (2018) and Olayemi et al. (2020), who reported that adolescent-focused

educational interventions effectively improve understanding of pregnancy, nutrition, and self-care practices. Enhanced knowledge also appeared to translate into positive behavioral changes, as reflected in improved antenatal attendance, dietary practices, and adherence to safe motherhood behaviors among participants in the experimental group. This aligns with [Shrestha and Khatri \(2019\)](#), who noted that increased maternal knowledge enables early recognition of danger signs and timely health-seeking behaviors, leading to better pregnancy outcomes.

The improvement in maternal outcomes among teenage mothers in the experimental group can be explained by the structured and interactive design of the Teenage Parenthood Package, which promoted both knowledge and behavioral change. The combination of PowerPoint presentations, illustrated booklets, and group discussions improved understanding of antenatal care, nutrition, rest, hygiene, and recognition of danger signs. This increase in knowledge translated into healthier practices such as regular antenatal visits, improved dietary intake, and early help-seeking for complications. The reinforcement sessions and peer interaction also enhanced self-confidence and coping, contributing to better preparation for childbirth and smoother labor experiences. In addition, the counseling component fostered emotional support and bonding, which improved psychological well-being and reduced depressive symptoms. Thus, the Teenage Parenthood Package effectively combined cognitive learning with skill-building and emotional support, resulting in measurable improvements in both maternal and psychological outcomes.

The intervention also led to better maternal outcomes, with all experimental group participants experiencing favorable labor results. This improvement may be attributed to the TPP's focus on antenatal exercises, dietary counseling, and preparation for childbirth, which enhanced both physical readiness and confidence. Similar findings were reported by [Chandra et al. \(2017\)](#) and [Rahman et al. \(2019\)](#), who found that targeted antenatal education reduces pregnancy-related complications such as prolonged labor and low birth weight ([Fleming et al., 2012](#)).

Enhanced maternal–fetal attachment in the experimental group suggests that the package promoted emotional bonding through activities such as fetal movement monitoring and guided antenatal reflection. This finding corresponds with [Condon and Corkindale \(2019\)](#), who emphasized that prenatal education fosters maternal–fetal bonding and reduces antenatal anxiety ([Kaur et al., 2017](#)).

Although postnatal depression persisted in 60% of the experimental group, the overall reduction compared with controls indicates that the counseling and peer support elements of the TPP helped strengthen emotional coping and social connection. This is consistent with studies by [Dennis et al. \(2017\)](#) and [Field \(2018\)](#), which showed that antenatal psychoeducational programs can reduce postpartum depressive symptoms by enhancing self-efficacy and problem-solving ability ([Jitmanowan et al., 2018](#)).

There were no significant differences in fetal outcomes between the two groups, in line with [Smith et al. \(2018\)](#) and [Abebe et al. \(2020\)](#), who found that fetal health outcomes are influenced by multiple interrelated factors such as maternal nutrition, socioeconomic conditions, and quality of antenatal care. Despite the lack of statistical difference, improved maternal behaviors and emotional well-being in the experimental group suggest potential for long-term benefits in larger-scale studies.

The qualitative findings supported and enriched the quantitative results by explaining how teenage mothers' experiences influenced the observed outcomes. Participants shared that lack of family support, poverty, and early marriage led to stress and poor self-care, explaining their low baseline knowledge and emotional difficulties. After receiving the Teenage Parenthood Package, they described feeling more confident, informed, and connected with their babies, which supports the quantitative improvements in knowledge, maternal outcomes, and maternal–fetal attachment. Some mothers still expressed fear and helplessness, reflecting the ongoing need for emotional and social support. Together, these findings show that the intervention not only improved measurable outcomes but also promoted positive behavioral and emotional changes among teenage mothers.

Overall, the Teenage Parenthood Package effectively integrated knowledge transfer, skills training, and psychosocial support, resulting in improved maternal outcomes, self-confidence, and psychological well-being. These findings highlight the importance of comprehensive, culturally appropriate educational interventions for adolescent mothers and support the feasibility of incorporating such programs into regular antenatal care services.

The study's strength is its mixed-method design and culturally adapted intervention, which provided both quantitative and qualitative insights. Its limitations include a small sample size, purposive sampling, and short follow-up, which limit generalization of the findings.

## CONCLUSION

Teenage pregnancy and childbirth are associated with adverse obstetric, maternal, and neonatal outcomes. The findings of this study indicate that Teenage Parenthood Packages positively impact maternal knowledge, health practices, and maternal and neonatal outcomes, highlighting the importance of implementing such interventions during pregnancy. Assessing the current status of these practices is therefore essential to guide effective health promotion strategies.

This study provides valuable insights into knowledge regarding teenage pregnancy, dietary habits, maternal and fetal outcomes, and related influencing factors among Indian teenage mothers. The use of a mixed-method approach, integrating both quantitative and qualitative data, enhances understanding by capturing diverse perspectives and offering a comprehensive view of teenage pregnancy and its outcomes. The strategies identified in this research can inform interventions aimed at improving health practices among teenage mothers, ultimately enhancing pregnancy and childbirth outcomes. With the global adolescent population expected to grow and adolescent pregnancies projected to rise by 2030, developing and implementing structured Teenage Parenthood Packages is critical to support healthy pregnancies and promote positive maternal and neonatal outcomes.

## Declaration of Interest

There are no conflicts of interest.

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None.

## Clinical Trial Registry

CTRI registration ID - CTRI/2022/10/046743.

## Data Availability

The datasets generated during and/or analyzed during the current study are available from the corresponding author on reasonable request.

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