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## Fetomaternal Outcome in Teenage Pregnancy at Tertiary Care Hospital Quetta

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### ABSTRACT

**Introduction:** Pregnancy in teenage is a major public health problem throughout the world and is globally recognized as high-risk pregnancy, leading to a vicious circle of various physical, social, and medical concerns from which it is very difficult for a girl and her fetus to get escape. It is important to study the implication of the maternal and fetal health in teenage pregnancy. **Objective:** To determine fetomaternal outcomes in teenage pregnancy at tertiary care hospital Quetta. **Material and Methods:** This was a cross-sectional study (descriptive study) conducted at Department of Obstetrics & Gynecology, Bolan Medical Complex Hospital Quetta over a period of six months from 1st May 2023 to 31st October 2023. **Results:** There were 136 patients enrolled in the study. The mean gestational age of babies delivered by teenage pregnant women was found to be  $32.52 \pm 2.966$  weeks. In our study, fetomaternal outcomes were assessed that were analyzed on individual basis initially. In our study relationship between patient's place of residence was assessed with fetomaternal outcomes. There was significant relationship was found between patient's place of residence with maternal anemia, primary postpartum hemorrhage, pre-eclampsia, pregnancy induced hypertension, low birth weight babies, fetal distress and poor APGAR scores respectively. **Conclusion:** Teenage pregnancy significantly impacts on fetomaternal outcomes in our study in the form of maternal anemia, primary postpartum hemorrhage, pre-eclampsia, pregnancy induced hypertension, low birth weight babies, fetal distress and poor APGAR scores. Education of female child, their families regarding delaying marriages, hence delaying childbearing can interrupt vicious circle of complications of teenage pregnancy.

### INTRODUCTION

Pregnancy among teenagers is a global health issue. According to the World Health Organization (WHO), a teen pregnancy occurs when a woman is 10 to 19 years old at the time of her delivery. Approximately 40 million adolescents live in Pakistan, who represents 22.3% of the total population (1). Although the rate of girls aged <15 years getting married has declined, most teens marry before they turn 18 years old. Teenage

pregnancy has decreased from 54.4% in 1990-1991 to 43.7% in 2017-2018, but the pooled rate is 42.5%. The mother's growth must be supported as well as the baby's if pregnancy occurs while she is still in her adolescent years (2). In the end, the outcomes were influenced by biological immaturity, unwanted pregnancies, insufficient prenatal care, poor nutrition for the mother, and psychological stress. Teenagers between the ages



of 13 to 15 are more likely to suffer negative consequences than teenagers between the ages of 16 to 19. Anemia, pre-eclampsia, and eclampsia are just a few of the pregnancy-related disorders that can affect a young woman's health during pregnancy and childbirth, as well as damage to the reproductive system, premature labor, and low birth weight. Because of their poor sexual health, adolescents have difficulty obtaining contraceptive devices (3).

In India incidence of teenage pregnancy is 2 women out of every 1000 pregnancies. Majority of the couples are unaware of contraception, do not use it, there is a high unmet need of contraception. Being a motherhood women should be emotionally strong and physically mature but adolescent girl is not yet mature, so that adolescent pregnancy and childbirth carry more risk than adult's pregnancy (4). In adolescents underdeveloped pelvis makes them prone to have cephalopelvic disproportion (CPD) and end up in cesarean delivery. Growing periods are continuing still in the girls. Baby with low birth weight, inadequate nutrition and anemia are more likely to have in teenage mothers. Prematurity predisposes such children to several infant and childhood disorders increased risk of mortality and morbidity (5). Psychosocial development of the infant can be effected by early motherhood. Adolescent mothers have increased occurrence of developmental disabilities and behavioral issues in born children. Adolescent girls have increased risk of maternal mortality as compared to older women. In unmarried teenage girls pregnancy is not only creates social problem but there is a high risk of unsafe abortion. In low and middle income countries 15% of all unsafe abortions are among adolescent girls aged 15-19 years (6).

Guidelines issued by the World Health Organization in 2011 on reducing adolescent pregnancies, with six major goals: Pregnancy associated complications, which may lead to maternal death, are more frequent among adolescent pregnant females because they are physically immature enough to satisfy the requirements of pregnancy. Moreover, other maternal complications like anemia, pre-eclampsia, eclampsia, preterm delivery, instrumental delivery, fetal distress are also strongly associated in teenage pregnancy.

Furthermore, the risk of developing fetal complications like prematurity, low birth weight, still birth, asphyxia, respiratory distress and birth trauma is also very high (8). Good antenatal care by medical professional makes a big difference in outcome of teenage pregnancy, care provider should stress upon good nutrition, and anticipate the risks of medical disorders associated with it and intervene at the earliest. Therefore, the need of conducting this study is to determine the fetomaternal outcome of teenage pregnancy. The findings of this study are anticipated to give obstetricians and gynecologists the fundamental information required for the adoption of preventative measures in the form of emphasizing more focus antenatal care and identify the likelihood of developing complication associated with teenage pregnancy, thus reduce the burden and improve the maternal and fetal outcome (9).

## LITERATURE REVIEW

Adolescent pregnancy, by definition, is pregnancy in girls between the ages of 10 and 19, where the majority is unintended pregnancies. Approximately 15% of women below 18 years gave birth globally in 2015-2020, and 90% or more of such deliveries occur in countries with low and middle income (10). About 5.6 million ended up with abortion, of which 3.9 million are reported as unsafe in the developing regions of the world, hence inclining the global burden more toward developing countries of the world. Sub-Saharan Africa leads the charts of adolescent pregnancies compared to European and North American nations (11).

Early marriage, substance abuse, sexual violence, lack of availability of contraceptives, relatives with a history of adolescent birth, early sexual activity, lack of health services, limited maternal education, poverty, lack of parental support, child of a broken family, religious beliefs, lack of financial autonomy, social media, and pornography are among few of the risk factors for adolescent pregnancy (12). In 1982 the total births to teenagers 15 to 19 represented 47 percent of the total number of pregnancies (abortions plus births plus miscarriages) (13). Since 1980, the abortion rate and ratio have remained level. Birth rates for all women have remained fairly level; rates for those sexually active have declined (14).

The United States also leads in the percent of abortions to teenagers. In spite of the large number of abortions, births to United States teens are also high, relative to other countries (15). Denmark is a good country with which to compare the United States. Levels of sexual activity among teenagers are actually higher in Denmark than in the U.S. Abortion laws were liberalized there about the same time as in the United States the early 1970s. Most important, Denmark has an excellent abortion reporting system. With a unique identifying number for each person and a centralized information gathering system, the data on abortion in Denmark are among the most complete in any nation (16). In 1980 and 1981 are considerably higher than in 1970. Abortion rates in both countries rose. However, while they have leveled off in Denmark, they have continued to rise in the United States (17). Two valuable lessons from these data and from a recent study of five western European nations are that 1) high levels of sexual activity do not necessarily result in high pregnancy rates, given adequate use of contraception, and 2) low birth rates do not necessarily imply high abortion rates; they may simply imply low pregnancy rates. Low abortion rates and low birth rates are compatible (19).

This suggests substantial differences between United States and other countries in choice of resolution for unplanned pregnancies, differences which will be pursued a little later (20). If to the proportion of post marital births are added a proportion of the miscarriages and a small proportion of the abortions, it can be seen that that between 15 and 20 percent of all pregnancies to women under 20 occur to married women. The remainder, 80 to 85 percent, is premarital pregnancies (21).

Earlier, it was pointed out that about 24 percent of sexually active teenagers' age 14 become pregnant each year. However, this does not tell us how many teenagers age 14 become pregnant before they reach 20 or marry. According to 1979 survey data, 16 percent of all metro teenage women 15 to 19 had ever experienced a premarital pregnancy, double that of 1971 (22). The lack of increase among blacks is probably due to underreporting of abortion. Thus premarital pregnancy has increased, but not as much among those sexually active as it appears from the increase

in the population of teenagers (23). Data from the 1982 National Survey of Family Growth show a slight decline in premarital pregnancy among teenagers between 1979 and 1982, although the difference is probably not statistically significant (24). These figures substantially underestimate the true proportion of teenagers who become pregnant before they reach age 20 or marry because abortions are substantially underreported in surveys by as much as 50 percent. Some subgroups report more accurately than other subgroups (25).

Unmarried black teenage females are the least likely to accurately report their abortions, with unmarried white teenage females only slightly more accurate. Older married white females are the most accurate reporters of their own abortions (26). Unfortunately, the percentage of premaritally sexually active teen women who ever experienced a premarital first pregnancy rose in all contraceptive use statuses 1976-79, except for those who used contraception at first intercourse but not always (27). The authors attribute this increase in pregnancy, particularly among the youngest teens, to sharply increased frequency of intercourse and to decreased reliance on the most effective methods of contraception. Data are not yet available from the 1982 NSFG to see whether pregnancy rates continued to increase among contraceptive users as well as non-users. We suspect they have not, since pregnancy rates have been declining (28). Based on data from the National Survey of Family Growth, the estimated annual number of unrelated adoptions declined to a low in 1976 and has been gradually increasing since then (29). This is just speculation, since there is no research that would allow us to shed light on these changes. Just documenting the changes that have occurred is a difficult task (30).

## OBJECTIVE

To determine fetomaternal outcomes in teenage pregnancy at Tertiary Care Hospital Quetta.

## Operational Definitions

1. **Teenage Pregnancy:** It was defined according to WHO as pregnancy in a female under the age of 19 years. It was also called as adolescent pregnancy.
2. **Fetomaternal Outcomes:** It was assessed on following maternal and fetal components.

### Maternal Outcome

1. **Maternal Anemia:** It was defined as per World Health Organization (WHO) criteria which states that hemoglobin (Hb) levels of less than 11 g/dl during pregnancy was considered as anemia in pregnancy. It was measured by Mindray BC-3200 Auto Hematology Analyzer.
2. **Primary Postpartum Hemorrhage:** Was defined as loss of blood estimated to be  $\geq 500$  ml from the genital tract, within 24 h of delivery, by placing sterile under-buttock pads (before delivery) and measuring assessment of blood loss (after delivery) with the help of weighing the pads on digital weighing machine. Actual blood loss was calculated using the difference between measuring dry pads weight (before delivery) with post-partum (after delivery) soaked pads weight. Estimated blood loss was calculated using size of dry pad piece (30 X 30 cm = 100 ml).
3. **Pre-eclampsia:** Any pregnant woman with previous normal blood pressure readings develops systolic blood pressure of  $\geq 140$  mmHg or diastolic blood pressure of  $\geq 90$  mmHg (measured by sphygmomanometer Yamasu model-600) after 20<sup>th</sup> week of gestation along with proteinuria of  $\geq 1+$  on urine dip stick test (detected by urine dipstick test), was considered as pre-eclampsia.
4. **Pregnancy Induced Hypertension (PIH):** Any pregnant woman who presents with hypertension after 20 weeks of gestational age and during labor with (BP  $\geq 140/90$  mmHg) that is recorded on two separate occasions at least 6 hours apart, without proteinuria (absence of protein on urine dipstick) in previously normotensive non proteinuric woman. Readings of blood pressure were monitored by YAMASU Model 600 mercurial sphygmomanometer.

### Fetal Outcome

1. **Low Birth Weight:** Neonate born with birth weight less than 2.5 kg that was measured on digital weight machine at the time of birth.
2. **Perinatal Death:** Was considered if fetal death that occurred in utero after a gestation

age of 28 weeks (which was diagnosed on ultrasound by the absence of a fetal heart pulsation), as well as infant death that occurred at less than 7 days of age post-delivery (which was confirmed on absent heart sound on auscultation by physician).

3. **Fetal Distress:** An evidence of deceleration of fetal heart rate in Cardiotocography (CTG) that was -pathological as per FIGO guidelines (see annexure-B) and significant enough to deliver before his/her due date.
4. **Poor APGAR scores:** APGAR scores were calculated as per Dr. Virginia Apgar protocol (see annexure-C). Score less than 5 was considered as poor.

### MATERIAL AND METHODS

This cross-sectional descriptive study was conducted in the Department of Obstetrics & Gynecology at Bolan Medical Complex Hospital, Quetta. The sample size was determined using the WHO sample size calculator, with a confidence level of 95%, a precision of 6%, and an estimated frequency of low birth weight in teenage pregnancies of 15%, derived from the parent study. Based on these parameters, the largest calculated sample size was 136 participants.

The inclusion criteria consisted of all teenage pregnant women, irrespective of their socioeconomic background, with no history of medications known to affect pregnancy, such as corticosteroid therapy or teratogenic drugs. Exclusion criteria included women with comorbid conditions like hypertension or diabetes mellitus, multiple pregnancies, or blood disorders such as anemia due to thalassemia trait or hereditary spherocytosis. These exclusion factors were identified as potential effect modifiers, which, if included, could introduce bias into the study results. This rigorous selection process ensured the accuracy and reliability of the findings.

### Data Collection Procedure

After getting approval of synopsis by CPSP and ethical review committee, all pregnant women at Bolan Medical Complex Hospital, Quetta (inpatient) were willing to participate in the study and gave their written consent on it and meeting the inclusion criteria and age confirmed on history

taking were enrolled in the study. Demographics and clinical features including age, weight, parity, gestational age, socioeconomic status, antenatal care attendance, post-term labor, induction of labor were recorded. Vitals of pregnant women were taken in the form of heart rate and blood pressures. Base line work up was done like complete blood count to look for evidence of anemia. Moreover, blood was arranged simultaneously if there is any evidence of significant decrease in hemoglobin levels. Labor data such as; premature rupture of membranes, chorioamnionitis, meconium aspiration, antepartum hemorrhage, malpresentation, mode of delivery, intrapartum or postpartum events, blood transfusion, development of postpartum hemorrhage, maternal ICU admission, and maternal death was also recorded. Neonatal outcome data including body weight (weight at birth of less than 2500 gram was considered LBW), gender, respiratory distress, admission to neonatal intensive care unit (NICU), congenital anomalies, and fetal distress and APGAR scores was also recorded. All the above mentioned information was recorded in a pre-design proforma. Exclusion criteria were strictly followed to control effect modifiers and bias in study results.

### Data Analysis

A data base was developed on SPSS for windows version 26.0. Mean value and standard deviation was calculated for quantitative variables like mother's age, weight and gestational age. Weight was measured by camry analog weighing scale while height was measured by stadiometer. Normality of data was assessed by using shapiro wilk test. Frequencies with percentages were presented for qualitative variables like place of residence (urban/rural) and maternal outcomes as maternal anemia (yes/no), primary postpartum hemorrhage (yes/no), pre-eclampsia (yes/no), pregnancy induced hypertension (yes/no). Moreover, fetal outcome was also be recorded as low birth weight (yes/no), perinatal death (yes/no), fetal distress (yes/no), poor APGAR scores (yes/no). Effect modifiers were controlled through stratification of age, gestational age and place of residence to see the effect of these on outcome variables. Post- stratification chi square/Fisher's exact test (if frequency  $\leq 5$  in any cell) was applied.

P-values of  $\leq 0.05$  was taken as statistically significant.

## RESULTS

There were 136 patients enrolled in the study. The mean age of the patients was **16.08  $\pm$  1.80 years**, while the mean weight and height were **54.75  $\pm$  7.05 kg** and **155.72  $\pm$  7.64 cm**, respectively (Table-1).

**Table 1**  
*Patient Demographics*

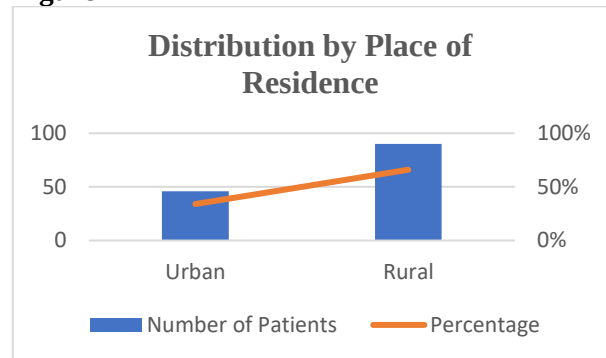
| Parameter   | Mean $\pm$ SD     |
|-------------|-------------------|
| Age (years) | 16.08 $\pm$ 1.80  |
| Weight (kg) | 54.75 $\pm$ 7.05  |
| Height (cm) | 155.72 $\pm$ 7.64 |

The patients were evaluated based on their place of residence. Out of 136 patients, **46 (34%)** were from urban areas, while **90 (66%)** were from rural areas (Table-2).

**Table 2**  
*Distribution by Place of Residence*

| Place of Residence | Number of Patients | Percentage |
|--------------------|--------------------|------------|
| Urban              | 46                 | 34%        |
| Rural              | 90                 | 66%        |

**Figure 1**

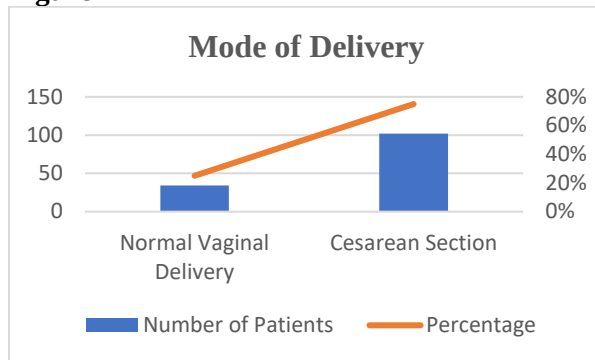


The mode of delivery was assessed, revealing that **34 (25%)** patients had normal vaginal deliveries, while **102 (75%)** underwent cesarean sections (Table-3). The mean gestational age of babies delivered by teenage pregnant women was **32.52  $\pm$  2.966 weeks**.

**Table 3**  
*Mode of Delivery*

| Mode of Delivery        | Number of Patients | Percentage |
|-------------------------|--------------------|------------|
| Normal Vaginal Delivery | 34                 | 25%        |
| Cesarean Section        | 102                | 75%        |

Figure 2



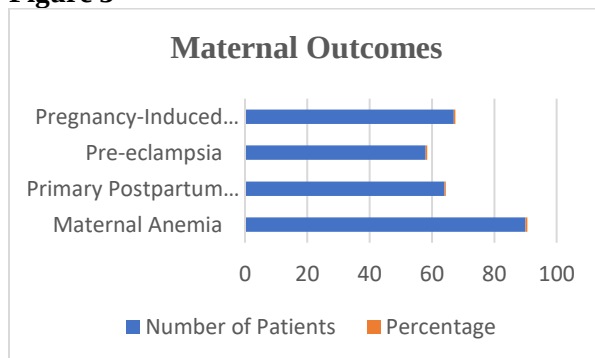
Maternal outcomes were evaluated for anemia, postpartum hemorrhage, pre-eclampsia, and pregnancy-induced hypertension (PIH). **Maternal anemia** was observed in **90 patients (66%)**, while **primary postpartum hemorrhage** was found in **64 patients (47%)**. **Pre-eclampsia** was diagnosed in **58 patients (43%)**, and **PIH** was observed in **67 patients (49%)** (Table-4).

Table 4

*Maternal Outcomes*

| Outcome                        | Number of Patients | Percentage |
|--------------------------------|--------------------|------------|
| Maternal Anemia                | 90                 | 66%        |
| Primary Postpartum Hemorrhage  | 64                 | 47%        |
| Pre-eclampsia                  | 58                 | 43%        |
| Pregnancy-Induced Hypertension | 67                 | 49%        |

Figure 3



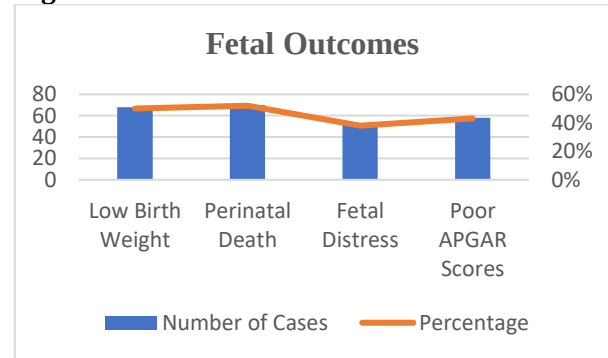
Fetal outcomes included low birth weight, perinatal death, fetal distress, and APGAR scores. **Low birth weight** was recorded in **68 babies (50%)**, while **70 babies (52%)** experienced perinatal death. **Fetal distress** was identified in **38%** of the cases, and **43%** of babies had poor APGAR scores at birth (Table-5).

Table 5

*Fetal Outcomes*

| Outcome           | Number of Cases | Percentage |
|-------------------|-----------------|------------|
| Low Birth Weight  | 68              | 50%        |
| Perinatal Death   | 70              | 52%        |
| Fetal Distress    | 52              | 38%        |
| Poor APGAR Scores | 58              | 43%        |

Figure 4



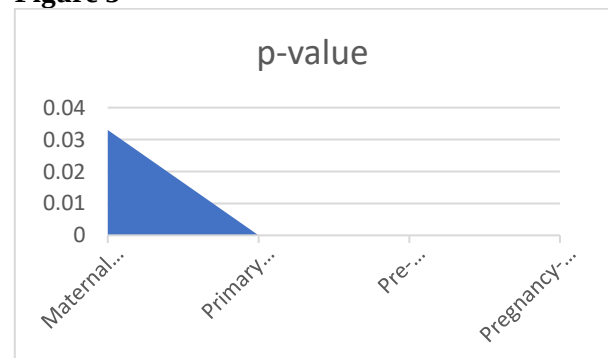
Statistical analysis of maternal outcomes revealed significant relationships with the place of residence. Maternal anemia was significantly associated with urban residence ( $p = 0.033$ , Table-7), while primary postpartum hemorrhage was more common among rural women ( $p < 0.05$ , Table-5). Urban women were also more likely to develop pre-eclampsia ( $p < 0.05$ , Table-6) and PIH ( $p = 0.000$ , Table-6).

Table 6

*Maternal Outcomes and Place of Residence*

| Outcome                        | Urban (n=46) | Rural (n=90) | p-value |
|--------------------------------|--------------|--------------|---------|
| Maternal Anemia                | Higher       | Lower        | 0.033   |
| Primary Postpartum Hemorrhage  | Lower        | Higher       | <0.05   |
| Pre-eclampsia                  | Higher       | Lower        | <0.05   |
| Pregnancy-Induced Hypertension | Higher       | Lower        | 0.000   |

Figure 5



Similarly, fetal outcomes demonstrated a significant association between low birth weight and rural residence ( $p = 0.030$ , Table-8). However, the relationship between perinatal death and place of residence was statistically insignificant ( $p > 0.05$ ).

**Table 7**

*Fetal Outcomes and Place of Residence*

| Outcome          | Urban (n=46)  | Rural (n=90)  | p-value |
|------------------|---------------|---------------|---------|
| Low Birth Weight | Lower         | Higher        | 0.030   |
| Perinatal Death  | Insignificant | Insignificant | >0.05   |

## DISCUSSION

Teenage parenthood is a problem with adverse obstetrical and Neonatal outcome being influenced by biological immaturity; unintended pregnancy inadequate perinatal care and poor maternal nutrition and stress. Worldwide 7.3 million girls become pregnant before 18 years. 2.5 million Girls 15 or younger give birth each year every year 3 million girls undergo unsafe abortion.

In developing countries, the birth of girls aged 15-19 is approximately 90% occur within early marriage. Pressure on girls to improve their fertility is often an imbalance of power and no access to contraception. The prevalence of teenage child marriage according to NFHS data provided was 11.9%, followed by rural areas at 14.1%, and urban areas were 6.9%. Married teenagers have given birth to one child, which accounted for 27.3%, and 4.2% have two or more children (112, 113). In many cases, pregnancy supposes the beginning of the mistreatment towards the surrogate. In our study, 66% of mothers had anemia, 43 % had pre-eclampsia, 49 % had pregnancy induced hypertension, 47% had primary postpartum

hemorrhage, 50% had a low birth weight, 52% had perinatal death, 38% had fetal distress and 47% had poor APGAR scores.

Teenage pregnancy has put a huge impact on fetomaternal outcome in our study. 66% of women developed anemia in our study, which may be attributable to poor dietary habits that are widespread among teenagers. One of the most prevalent causes of anemia during pregnancy is iron deficiency anemia, which can be treated with a healthy diet and oral iron supplementation. On the other hand, 50% of babies delivered by teenager pregnant women were found low birth weight that may result from severe anemia. PriankaM et al. have the same percentage of low birth weight babies in adolescent pregnancies (88, 114). Low birth weight is a critical indicator of malnutrition and an important factor in child mortality.

## CONCLUSION

This study was done to evaluate fetomaternal outcome related to teenage pregnancy. Teenage pregnancy significantly impact on fetomaternal outcomes in our study in the form of maternal anemia, primary postpartum hemorrhage, pre-eclampsia, pregnancy induced hypertension, low birth weight babies, fetal distress and poor APGAR scores. The health care provider must consider the adolescent pregnancy as high risk and the teenagers need to be educated for more number of antenatal visits for screening tests so that various complications are assessed at an earlier time for appropriate management. Education of female child, their families regarding delaying marriages, hence delaying childbearing can interrupt vicious circle of complications of teenage pregnancy.

## REFERENCES

1. Ali, A., Khaliq, A., Lokeesan, L., Meherali, S., & Lassi, Z. S. (2021). Prevalence and predictors of teenage pregnancy in Pakistan: a trend analysis from Pakistan Demographic and Health Survey datasets from 1990 to 2018. *International Health*, 14(2), 176–182. <https://doi.org/10.1093/inthealth/ihab025>
2. Boonstra, H. D. (2014). What is behind the declines in teen pregnancy rates?.
3. Guttmacher Policy Review, 17(3).15-21. <https://citeseerx.ist.psu.edu/document?repid=rep1&type=pdf&doi=4334a0a1725b13b9962f09ddfc81f112d9b884e7>
3. Chen, X.-K. ., Wen, S. W., Fleming, N., Demissie, K., Rhoads, G. G., & Walker, M. (2007). Teenage pregnancy and adverse birth outcomes: a large population based retrospective cohort study. *International Journal of Epidemiology*, 36(2), 368–373. <https://doi.org/10.1093/ije/dyl284>

4. Singh, I., Shukla, A., Thulaseedharan, J. V., & Singh, G. (2021). Contraception for married adolescents (15–19 years) in India: insights from the National Family Health Survey-4 (NFHS-4). *Reproductive Health*, 18(1), 1–10. <https://doi.org/10.1186/s12978-021-01310-9>
5. Kawakita, T., Wilson, K., Grantz, K. L., Landy, H. J., Huang, C.-C., & Gomez-Lobo, V. (2016). Adverse Maternal and Neonatal Outcomes in Adolescent Pregnancy. *Journal of Pediatric and Adolescent Gynecology*, 29(2), 130–136. <https://doi.org/10.1016/j.jpog.2015.08.006>
6. Wall-Wieler E, Roos LL, Nickel NC. Teenage pregnancy: the impact of maternal adolescent childbearing and older sister's teenage pregnancy on a younger sister. *BMC pregnancy and childbirth*. 2016;16(1):1-12.
7. Chandra-Mouli, V., Camacho, A. V., & Michaud, P.-A. (2013). WHO Guidelines on Preventing Early Pregnancy and Poor Reproductive Outcomes Among Adolescents in Developing Countries. *Journal of Adolescent Health*, 52(5), 517–522. <https://doi.org/10.1016/j.jadohealth.2013.03.002>
8. Ursache, A., Lozaneanu, L., Bujor, I., Cristofor, A., Popescu, I., Gireada, R., Mandici, C. E., Găină, M. A., Grigore, M., & Matasariu, D. R. (2023). Epidemiology of Adverse Outcomes in Teenage Pregnancy—A Northeastern Romanian Tertiary Referral Center. *International Journal of Environmental Research and Public Health*, 20(2), 1226. <https://doi.org/10.3390/ijerph20021226>
9. Raatikainen, K., Heiskanen, N., Verkasalo, P. K., & Heinonen, S. (2005). Good outcome of teenage pregnancies in high-quality maternity care. *European Journal of Public Health*, 16(2), 157–161. <https://doi.org/10.1093/eurpub/cki158>
10. Mutea, L., Were, V., Ontiri, S., Michielsen, K., & Gichangi, P. (2022). Trends and determinants of adolescent pregnancy: Results from Kenya demographic health surveys 2003–2014. *BMC Women's Health*, 22(1). <https://doi.org/10.1186/s12905-022-01986-6>
11. Boutayeb, A. (2023). Social determinants of health and adolescent childbearing in WHO Eastern Mediterranean countries. *International Journal for Equity in Health*, 22(1). <https://doi.org/10.1186/s12939-023-01861-2>
12. Yakubu, I., & Salisu, W. J. (2019). Determinants of adolescent pregnancy in sub-Saharan Africa: a systematic review. *Reproductive Health*, 15(1), 1–11. <https://doi.org/10.1186/s12978-018-0460-4>
13. Brahmabhatt, H., Kågesten, A., Emerson, M., Decker, M. R., Olumide, A. O., Ojengbede, O., Lou, C., Sonenstein, F. L., Blum, R. W., & Delany-Moretlwe, S. (2014). Prevalence and Determinants of Adolescent Pregnancy in Urban Disadvantaged Settings Across Five Cities. *Journal of Adolescent Health*, 55(6), S48–S57. <https://doi.org/10.1016/j.jadohealth.2014.07.023>
14. Jaén-Sánchez, N., González-Azpeitia, G., Saavedra-Santana, P., Saavedra-Sanjuán, E., Manguiza, A.-A., Manwere, N., Carranza-Rodriguez, C., Pérez-Arellano, J. L., & Serra-Majem, L. (2020). Adolescent motherhood in Mozambique. Consequences for pregnant women and newborns. *PLOS ONE*, 15(6), e0233985. <https://doi.org/10.1371/journal.pone.0233985>
15. Jokela, S., Lilja, E., Kinnunen, T. I., Gissler, M., Castaneda, A. E., & Koponen, P. (2018). Births and induced abortions among women of Russian, Somali and Kurdish origin, and the general population in Finland –comparison of self-reported and register data. *BMC Pregnancy and Childbirth*, 18(1). <https://doi.org/10.1186/s12884-018-1931-x>
16. Hognert, H., Skjeldestad, F. E., Gemzell-Danielsson, K., Heikinheimo, O., Milsom,

- I., Lidegaard, Ø., & Lindh, I. (2018). Ecological study on the use of hormonal contraception, abortions and births among teenagers in the Nordic countries. *BMJ Open*, 8(10), e022473. <https://doi.org/10.1136/bmjopen-2018-022473>
17. Miller, S., Wherry, L. R., & Foster, D. G. (2023). The Economic Consequences of Being Denied an Abortion. *American Economic Journal: Economic Policy*, 15(1), 394–437. <https://doi.org/10.1257/pol.20210159>
18. Vandenbroucke, G., & Zhu, H. (2018). Evolution of the Teen Abortion Rate in the United States. *Economic Synopses*, 2018(8). <https://doi.org/10.20955/es.2018.8>
19. Jonas, K., Crutzen, R., van den Borne, B., Sewpaul, R., & Reddy, P. (2016). Teenage pregnancy rates and associations with other health risk behaviours: a three-wave cross-sectional study among South African school-going adolescents. *Reproductive Health*, 13(1). <https://doi.org/10.1186/s12978-016-0170-8>
20. Biggs, M. A., Gould, H., & Foster, D. G. (2013). Understanding why women seek abortions in the U.S. *BMC Women's Health*, 13(1). National Library of Medicine. <https://doi.org/10.1186/1472-6874-13-29>
21. Habib, M. A., Raynes-Greenow, C., Nausheen, S., Soofi, S. B., Sajid, M., Bhutta, Z. A., & Black, K. I. (2017). Prevalence and determinants of unintended pregnancies amongst women attending antenatal clinics in Pakistan. *BMC Pregnancy and Childbirth*, 17(1). <https://doi.org/10.1186/s12884-017-1339-z>
22. Zabin, L. S., Kantner, J. F., & Zelnik, M. (1979). The Risk of Adolescent Pregnancy In the First Months of Intercourse. *Family Planning Perspectives*, 11(4), 215. <https://doi.org/10.2307/2134252>
23. Flick, L. H. (1986). Paths to adolescent parenthood: implications for prevention. *PubMed*, 101(2), 132–147.
24. Hofferth, S. L., Kahn, J. R., & Baldwin, W. (1987). Premarital Sexual Activity Among U.S. Teenage Women Over the Past Three Decades. *Family Planning Perspectives*, 19(2), 46–53. <https://doi.org/10.2307/2135048>
25. Lindberg, L., Kost, K., Maddow-Zimet, I., Desai, S., & Zolna, M. (2020). Abortion Reporting in the United States: An Assessment of Three National Fertility Surveys. *Demography*, 57(3), 899–925. <https://doi.org/10.1007/s13524-020-00886-4>
26. Jagannathan, R. (2001). Relying on Surveys to Understand Abortion Behavior: Some Cautionary Evidence. *American Journal of Public Health*, 91(11), 1825–1831. <https://doi.org/10.2105/ajph.91.11.1825>
27. Wolff, J. M., & Crockett, L. J. (2011). The Role of Deliberative Decision Making, Parenting, and Friends in Adolescent Risk Behaviors. *Journal of Youth and Adolescence*, 40(12), 1607–1622. <https://doi.org/10.1007/s10964-011-9644-8>
28. Furstenberg, F., F. Lincoln, R., & Menken, J., A. (1981). *Teenage sexuality, pregnancy, and childbearing*. University of Pennsylvania Press Philadelphia.
29. Barton, F. (2000). *Salem Teen Mother Program : a follow-up study*. <https://doi.org/10.15760/etd.5346>
30. Johnson-Mallard, V., Kostas-Polston, E. A., Woods, N. F., Simmonds, K. E., Alexander, I. M., & Taylor, D. (2017). Unintended pregnancy: a framework for prevention and options for midlife women in the US. *Women's Midlife Health*, 3(1). <https://doi.org/10.1186/s40695-017-0027-5>