CHAPTER IV

REVIEW OF LITERATURE
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There is substantial evidence to suggest that early childbearing is increasing worldwide therefore health of the adolescents has been on the agenda of health planners & health professionals. Many studies were carried out on various aspects of adolescent health especially adolescent pregnancy or teenage pregnancy.

A youngest mother in the world was the child aged 5 1/2 years who delivered in Peru by cesarean section. Also in Germany a child of 6 1/2 years delivered a baby of 3 kgs. & in Brazil a girl of 7 1/2 years delivered vaginally. Recently a girl of 10 years delivered by cesarean section in Costa Rica (1993). Bender (1969) reported pregnancy in a girl of 13 years & 8 months old, who was delivered by forceps under general anesthesia²⁷.

4.1 : DEFINITION

The World Health Organisation defined the adolescence as -

• Progression from appearance of secondary sex characteristics (puberty) to sexual & reproductive maturity.
• Development of adult mental process & adult maturity.
• Transition from total economic dependence to relative independence²⁸.

WHO defined ‘adolescence’ as one aged between 10 to 19 years, youth as one between 15 to 24 years. Young people was the term that covered both the age groups i.e. those between 10 to 24 years¹⁵.

The phases of adolescence were described as early adolescence 10 to 14 years, middle adolescence as 15 to 17 years & late adolescence as 18 to 19 years. These phases have distinct characteristics as regards to biologic & cognitive development²⁹.
4.2: POPULATION OF THE YOUNG

Young people aged 10 to 19 years number more than 1 billion. They comprise nearly one fifth of the total world population & are growing in number. This growth is more in developing countries\(^30\). In the developing world as a whole, 1995 population of adolescents is estimated at 914 million. Proportion of adolescents varies among regions from a high of 23% in Africa to 19% in Asia\(^31\). As per estimates there were 190 million adolescents in India, this accounted to over one fifth of the population\(^32\).

4.3: ADOLESCENT MARRIAGE & FERTILITY PATTERN

Young people are marrying at relatively older age than their parents did. Thus median age at marriage is rising in nearly all the regions. In some countries of Sub Saharan Africa as many as two thirds of young women are married before the age of 20 years & even high proportion of women are married at even younger ages. In almost all the developing countries women in rural area are more likely to marry before the age 20 years than women in cities. In developed countries women tended to marry in their early to mid 20s\(^30\).

<table>
<thead>
<tr>
<th>Region, country &amp; year of survey.</th>
<th>Median age at marriage</th>
<th>% women married by 20 years</th>
<th>Legal age of marriage</th>
<th>Births/1000 women (15-19) years</th>
</tr>
</thead>
<tbody>
<tr>
<td>Africa, Sub Saharan</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>• Mali (1987)</td>
<td>15.9</td>
<td>93.0</td>
<td>18</td>
<td>201</td>
</tr>
<tr>
<td>• Naiger (1992)</td>
<td>15.1</td>
<td>90.0</td>
<td>16</td>
<td>219</td>
</tr>
<tr>
<td>• Zimbabwe (1988)</td>
<td>19.7</td>
<td>53.0</td>
<td>18</td>
<td>109</td>
</tr>
<tr>
<td>Asia &amp; Pacific</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>• Bangla Desh (1993)</td>
<td>15.3</td>
<td>82.0</td>
<td>18</td>
<td>159</td>
</tr>
<tr>
<td>• India (1992)</td>
<td>17.4</td>
<td>71.0</td>
<td>18</td>
<td>131</td>
</tr>
<tr>
<td>• Indonesia (1991)</td>
<td>19.8</td>
<td>51.0</td>
<td>16</td>
<td>70</td>
</tr>
<tr>
<td>• Shrilanka (1987)</td>
<td>23.2</td>
<td>28.0</td>
<td>21</td>
<td>38</td>
</tr>
<tr>
<td>• Thailand (1987)</td>
<td>21.0</td>
<td>37.0</td>
<td>17</td>
<td>52</td>
</tr>
<tr>
<td>Latin America &amp; Caribbean</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>• Brazil (1991)</td>
<td>20.6</td>
<td>38.0</td>
<td>21</td>
<td>85</td>
</tr>
<tr>
<td>• Guatemala (1987)</td>
<td>18.9</td>
<td>60.0</td>
<td>18</td>
<td>139</td>
</tr>
<tr>
<td>East &amp; North Africa</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>• Egypt (1992)</td>
<td>19.9</td>
<td>41.0</td>
<td>16</td>
<td>69</td>
</tr>
<tr>
<td>• Yemen (1992)</td>
<td>18.1</td>
<td>63.0</td>
<td>16</td>
<td>104</td>
</tr>
</tbody>
</table>
4.3.1: Trends in fertility rate
Fertility rates among the adolescents are one way to gauge the extent of problem. Available information indicates decline in adolescent fertility although rates still remain high in most developing countries. Recent surveys in Africa found that, in 14 countries at least half the women were married before the age of 18 years. In Naiger for example nearly half of all the women were married by the age of 15. Two out of 5 had at least one child by the age of 17 years. Studies in Latin America & Caribbean found that 30-60% of marriages took place during the adolescence. Gravin Arneil observed that in Jamaica the adolescent pregnancy rate per 1000 total births was recorded as 160, in Nicaragua as 110, in Brazil, Chile & Argentina the rate was under 80. In the same study pregnancy percentage at age 13 was 0.4% for Chile & 1.9% for Brazil. By the age of 15 these rates had risen to 21% & 15% respectively. In a WHO study on health of youth, it was observed that proportion of married males & females less than 20 years was 7% & 70% respectively in Bangla Desh, 9% male & 55% females in Ethiopia, 3% males & 15% females in Philippines & 2% & 9% males & females respectively in USA.

4.4: PROBLEM IN INDIA
4.4.1: Profile of adolescents in India
According to 1992 figures the proportion of adolescent population was as follows-

<table>
<thead>
<tr>
<th>Ages</th>
<th>Total</th>
<th>% Males</th>
<th>% Females</th>
</tr>
</thead>
<tbody>
<tr>
<td>10-14</td>
<td>11.1</td>
<td>11.2</td>
<td>11.0</td>
</tr>
<tr>
<td>15-19</td>
<td>10.5</td>
<td>10.9</td>
<td>10.2</td>
</tr>
</tbody>
</table>

4.4.2: Salient features of the Indian situation were as follows
a. Mean age at marriage was less than 15 years prior to 1961, which crossed 18 years in 1991. There were 4.4 million married women aged 10-14 years, which declined to 2.6 million in 1981.
b. However during the same period the number of married women in the age group 15-19 years increased from 12 to 13 million. Thus there were about 13 million married women under the age of 18 years, which was the legal age of marriage.

c. Out of total married women in 15-19 years about 51% were from 4 states i.e. Bihar, Madhya Pradesh, Rajasthan & Uttar Pradesh.

d. These early marriages resulted in high levels of fertility in adolescent age group.

e. There were 2.2 million adolescent mothers in 1961 & their number increased to 3.3 million in 1988 i.e. increase of 50% during the 27 years period.

f. Similarly the share of births occurring to adolescents among all the births also increased from 11% in 1971 to 13% in 1981 & 17% in 1996.

4.5 : INCIDENCE OF TEENAGE PREGNANCY

The incidence rates of teenage pregnancy reported by Krishna was 15.8% in Madras, 14.8% in Calcatta, 2.8% in Delhi & as 10.3% in ICMR study37.

Incidence & age distribution of teenage pregnancy observed in various studies:

<table>
<thead>
<tr>
<th>Author</th>
<th>Place</th>
<th>Incidence</th>
<th>Age distribution</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sarkar et al.39.</td>
<td>Calcutta.</td>
<td>18.7</td>
<td>11.9% ≤ 15 yrs, 88.1% 16-19 years, youngest 14 years.</td>
</tr>
<tr>
<td>Nitwe et al.39.</td>
<td>Bombay.</td>
<td>6.1</td>
<td>90% between 18-19 years.</td>
</tr>
<tr>
<td>Reddi Rani et al.40.</td>
<td>Pondicherry.</td>
<td>11.8</td>
<td>-</td>
</tr>
<tr>
<td>Nayak et al.41.</td>
<td>Bombay.</td>
<td>8.6</td>
<td>1.9% ≤ 16 years, 98.1% 17-19 years.</td>
</tr>
<tr>
<td>Bhadauria et al.42.</td>
<td>Agra.</td>
<td>-</td>
<td>11% ≤ 15 years, 29% 16-17 years, 60% 18-19 years.</td>
</tr>
<tr>
<td>Chhabra43.</td>
<td>Wardha.</td>
<td>-</td>
<td>5% ≤ 15 years, 8% 16-17 years &amp; 87% 18-19 years.</td>
</tr>
<tr>
<td>Pachauri et al.44.</td>
<td>Hyderabad.</td>
<td>5.1</td>
<td>-</td>
</tr>
<tr>
<td>Kushwaha et al.45.</td>
<td>Gorakhpur.</td>
<td>-</td>
<td>7.8% &lt; 15 years 45.5% 15-17 years, 46.7% 17-19 years.</td>
</tr>
<tr>
<td>Leland49.</td>
<td>USA</td>
<td>-</td>
<td>0.4% 10-11 years, 19.4% 12-13 years, 80.2% 14 years.</td>
</tr>
<tr>
<td>Ventura et al.46.</td>
<td>Malta.</td>
<td>3.3</td>
<td>4.9% ≤ 15 years, 21.9% 16-17 years, 73.2% 18-19 yrs.</td>
</tr>
</tbody>
</table>
A study was carried out by Udipi et al. in a slum area of Bombay, where 73% of the families were Muslims & 20% were Hindus. The main observation in that area was that, 9% mothers had their first child before they were 15 years old & 36.8% were between 16-18 years. Only 16.2% of the mothers were above 21 years. Bhattacharya & Chaudhari found incidence of teenage pregnancy as 8.4%, a study in SGH, Pune reported the rate as 16.17%, Mitra found incidence in rural Bengal as 38.6%, Goswami & Goswami observed 21.1% incidence in rural area.

4.6 : RURAL URBAN DISTRIBUTION
A few authors studied residential status of study population as rural / urban. In a DHS of 43 countries a higher proportion of rural & less educated women with child before 20 was observed as compared to urban & better educated women. In almost all Sub Saharan African countries, even among young urban women high proportion had a child before 20 years & in rural areas this proportion was even more than that. In North African & Asian regions urban rural differences tended to be very high. Reddi Rani et al. in a prospective hospital based study observed that, 60% of the young mothers were either from rural area or from urban slums. Sarkar et al. in Medical College Hospital, Calcutta revealed that, out of total 4698 teenage mothers 51.3% were from rural area, 28.4% from semi urban area & remaining from urban area. Similarly Khairandish et al. interviewed 400 married pregnant mothers less than 19 years in Shiraz University Medical College & found that, 52% were from rural area.

4.7 : EDUCATION
A woman who has had some years of schooling is more likely to marry at later age & have a smaller family through modern FP methods. She seeks prenatal care, likely to have a trained birth attendant at childbirth & have healthy children. She has large earning capacity & is less likely to have children who die in early childhood.
In a world health report 1996 it was commented that, whatever the level of development of a country, the number of years of schooling seemed to play a significant role in early pregnancy among women. Although there is a trend towards greater school enrollment & greater equality between sexes, the gap between male & female education within developing countries & between the developing & developed world still remains high. In developed countries 85% of the boys & 87% of the girls were enrolled in the secondary schools whereas in developing countries these figures were 41% & 28% respectively. When the economic condition were poor the boys were given the preference over the girls for school enrollment.

A relationship was found between education of women & proportion of women who had given birth by age of 20-years. In Cameroon, proportion of women who gave birth by 20 years was 81% with education less than 7 years & it was 46% with education 7 years or more. Such relationship was also observed in other countries like Kenya, Nigeria, US, Gautemala etc.55.

As formal education became available in developing countries it became a factor in delayed marriage. Women who completed at least primary education tended to marry later e.g. in every Sub Saharan country, among women 20-24 years, the percentage completing primary schooling was much higher in those who married later. In Latin America women in Brazil, El Salvador, Mexico & Paraguay who delayed marriage until after 20 years were two to three times more likely to have completed seven years of schooling than those who married earlier.30.

Similarly the World Fertility Survey fond that, in 10 out of 14 developing countries women with 7 or more years of schooling tended to marry on an average 3.5 years later than those with none. Areas with lowest female literacy rates frequently corresponded to areas where proportion of married women 15-19 years was more.56.
Fraser et al. while studying in Utah commented that, older teenage mothers were most likely to have an age inappropriate educational level\textsuperscript{57}.

Leland while studying the socio-demographic characteristics of the US adolescent mothers observed that, 23-28\% adolescent mothers had attained lower education, whereas such proportion for higher education attainment was between 0.36 - 0.45\%\textsuperscript{29}.

In a longitudinal study carried out by Polit et al., it was revealed in 4 hospitals from US that, only about half of the teenagers were enrolled in the school. Those completing high school was 29\% & also the proportion of the teenage mothers who dropped out of school was 54.1\%\textsuperscript{58}.

Similarly one study quoted that, adolescents who had children were more likely to experience a shortened education, as there were 50\% adolescent mothers who received high school level education at 18 years of age compared to 97\% who deleted childbearing\textsuperscript{59}. While studying the trends in births to adolescents it was observed that, 8 out of 10 who became mothers at 17 years or younger did not complete high school & 4 of 10 who had a child by the age of 15 did not finish eighth grade\textsuperscript{60}. Lee et al. carried out population based study in Chicago, Illinois about maternal age & various other variables & found that, in adolescent mothers proportion having lower education varied between 20.1 to 44.5\% whereas those having higher education were only between 0.1 - 6.4\%\textsuperscript{61}.

Among Indian studies P.Reddi Rani et al. in a prospective hospital based study on pregnant teenage mothers observed that, only 30\% adolescent mothers were literate. The vital years of girl's development were lost due to discrimination in the area of nutrition, health & also education. She had to spend long hours each day on household work & care of young sibs, she was not sent in school or withdrawn early\textsuperscript{40}. According to 1991 census, literacy rate of India was 52.2 & this rate for females was 39.3\textsuperscript{16}. Asha Bhende carried out a study in slum area of Bombay & observed that proportion of illiterate was 16.5\% in adolescent girls.
The proportion of the girls that dropped out of school after primary school was 18.9\%\textsuperscript{62}. Drop out rate of Maharashtra state (1991) for I to V standard was 38.6\% for girls & 35\% for boys. From I to VIII standard it was 56.8\% for girls & 49.9\% for boys. Whereas the rate was highest from I to X standard i.e. 74.7\% for girls & 68.4\% for boys. All these figures indicated higher drop out rates for girls than for boys\textsuperscript{63}.

Francis et al. in the programme area of RUHSA in a rural background observed that there were total 105 school dropouts. Various reasons given were as follows - in 41.3\% it was academic failure, in 19.6\% marriage was the reason of school drop out, 17.4\% answered that they could not afford the schooling. Whereas the remaining reasons given were transport problem, illness, attaining puberty etc. Alexandra Joshua also studied the problem of school drop out & the reasons brought out were poverty, academic failure, stagnation, household duties, and negative attitude of the parents towards educating the girls. Shukla revealed the reasons for drop out as lack of facilities, undernourishment, frequent illness, economic backwardness, shyness about age etc. Roopa Vohara in her study observed that, the girls were expected to assume responsibility for housework at early age, such as helping the mother in household work, looking after the younger children etc.\textsuperscript{64}. R. Baretto et al. tried to study the adolescent girls from slums of Bombay. They observed that 10\% of the girls were never registered for school, 25\% were dropped out of school. The various reasons given for failure to enter school & drop out were long distance of school from village, economic factors, household responsibilities, parental attitude etc.\textsuperscript{65}. Lal et al. in a study from Rohatak reported the drop out rate of 18\% & proportion of illiterate 8\% in adolescents\textsuperscript{66}.

One such study reported that teenage birth had lead to 50\% reduction in likelihood of finishing high school education compared with not having a teenage birth. Individual heterogeneity accounted for 42\% reduction in the likelihood of finishing the high school among those who had a birth before 17 years.
Similarly 30% reduction has been observed among those who had birth between ages of 17 & 19 years compared with those who did not have a teenage birth\textsuperscript{67}. Many authors observed similar observation of more illiteracy & high school dropout rate among teenage mothers. These findings supported the view that early child bearing restricted the non-maternal role activities in adolescent mothers\textsuperscript{68-77}. T. Kanitkar et al. studied this factor in different direction. Impact of national adult education program on age at marriage in rural Maharashtra showed that, this programme helped to increase the age at marriage of not only girls but also boys & thus this helped to reduce the teenage pregnancy\textsuperscript{78}.

In a contradictory finding by Kleinfeld et al. there was no significant evidence that could support the hypothesis that teens dropped out of school first & then became pregnant\textsuperscript{79}.

In another study it was noted that there was likelihood of a high incidence of undetected learning problems & these difficulties had significant relationship to the high school dropout associated with adolescent motherhood\textsuperscript{72}.

4.8: OCCUPATION

Link between occupation & female age at marriage showed that, where the agriculture labor was the occupation of the wife or husband the average female age at marriage was lowest & also consequent proportion of early pregnancy was highest. Female employment was identified as major alternative to marriage. In the critical age group of 15-19 years nearly three fourth constitute non-workers. Large number of unemployed girls in this age group of 15-19 years got married sooner as the only alternative to their low employment status due to lack of education or skill particularly in rural areas. Statewise profile indicated that states with low non-farm employment such as Bihar (8.4% of main workers), M.P. (7.5%), Rajasthan (11.4%), U.P. (12.1%) had more than 60% women currently married in the age group of 15-19 years.
On the other hand Kerala with 47% & Punjab with 43% non-farm employment had only 14% married in the age group of 15-19 years\(^6^0\).

Having the child at a young age severely limits the employment prospects of adolescent mothers. In a study in USA it was found that, women who had the child during the adolescence hold the jobs of lower status than women who delayed childbearing. Similarly in Costa Rica 61% pregnant adolescents gave up the job\(^8^1\).

Polit D.F. while studying early pregnancy among economically disadvantaged teenage mothers observed that only 9.6% adolescent mothers were employed\(^5^8\). Some other studies also found out relation between unemployment or low employment status with adolescent pregnancy\(^7^4,7^8,8^2,8^3\).

### 4.9: AGE, EDUCATION & OCCUPATION OF THE HUSBAND

While studying the distribution, antecedents & consequences of adolescent pregnancy in Barcelona, Valero et al. observed that, in 14.5% of births the age of the father was less than 20 years, 39.1% fathers were having age between 20-24 years\(^8^4\).

Similarly Shrivastava et al. tried to study the fertility differentials in a sample of 1256 mothers in U.P. & observed statistically significant differentials in female age at marriage according to educational level of husband & also occupational status of husband\(^8^5\). In a commentary on adult involvement in teenage child bearing it was commented that, out of total 46511 adolescent mothers, 29% fathers were in the age group 10-18, 71% were adult fathers whose mean age was 22.6 years. Fathers were on an average 5 years older than the mothers\(^8^6\). A study was undertaken by Pratinidhi et al. in some PHCs of Pune, Satara & Ahmad Nagar districts & it was observed that age at marriage increased with increasing education in both males & females. Mean age at marriage was 21.3 years for males & it was 20.5 years for illiterate boys. As the literacy status increased mean age at marriage for boys also increased significantly\(^8^7\). Data on teenage fathers was gathered in a study.
This data indicated that, most adolescent males were ill prepared for the responsibilities of fatherhood.

4.10: SOCIO-ECONOMIC STATUS

It was observed in many studies that there was a good correlation between adolescent pregnancy & low socio-economic status. While studying teenage pregnancy in New York Chelata C.A. commented that, poverty may be associated with higher pregnancy rate among girls under 18 years. It was observed that, mothers aged 16 to 19 years with low-income levels & skills below average considerably outnumbered those with average or above average incomes.

Bremberg S. in an analysis of women aged 17 years or less who delivered at University Hospital, Sweeden observed that, the economic position of adolescent mothers was worse than in a control group of women from 21-29 years age group.

Osbourn et al. studied the case record of adolescent mothers retrospectively for 3 years period who delivered in Duke Street Hospital, Glasgow & found that, there were very few adolescent mothers in social class I & II, whereas about 74% adolescent mothers were from lower social class i.e. class IV & V.

Horan compared primigravid mothers below 16 years with mothers between 20 & 24 years in Pennsylvania. SE status was studied as buying power. It was observed that there were very few adolescent mothers with high buying power, whereas maximum mothers were in the group of medium low & low buying power. Proportion of adolescent mothers with low buying power was 67.2% whereas it was significantly low i.e. 38.6% in control group.

Israel et al. studied 3995 obstetric patients below 20 years from 10 institutions of US, who delivered in 10 hospitals. It was observed that, there was sharp preponderance of prematurity among the infants delivered to non-white adolescent mothers. They explained this on the basis of low SE status. SE classification used for this study purpose was the type of hospital accommodation that was used by the patients - ward or the private.
The incidence of teenage pregnancy was more than double than controls indicating lower SE status of the adolescent mothers as compared to controls. It was also observed in one of the studies that, 40% of the US girls were near or below poverty income levels & this low-income population accounted for six out of seven teenage births. In areas of US with poverty rates as low as those in western Europe, teenage pregnancy rates were similarly low. Riley A.P. studied the determinants of adolescent fertility & its consequences for maternal health, with special reference to Bangla Desh & revealed that, teenage pregnancy or at least teenage births occurred disproportionately among the socially & economically disadvantaged. Grindstaff C.F. had a paper on, ‘adolescent marriage & childbearing - the long-term economic outcome, Canada-1980’. It was stated that, women at age 30 in Canada were in the best economic circumstances when they marry at age of 20 or older or began their childbearing at the age of 25 or older.

In one of the Indian studies P. Reddi Rani et al. observed that, 77% adolescent mothers were from low SE status. Shrivastava et al. collected data from 1256 mothers who delivered in Lucknow & revealed statistically significant differentials in female age at marriage & caste, educational level of husband & wife, occupation of husband & per capita family income.

4.11 : FAMILY BACKGROUND OF YOUNG MOTHERS
Type of family in which girls are grown up also influences the age at marriage & consequent age of childbearing. In a prospective study on some aspects of teenage pregnancy in Nairobi, authors observed that 82.4 % teenage mothers were from joint families & also the parents of these mothers were unemployed.

N.Audinarayana et al. conducted study in Tamil Nadu & observed that, the age at marriage was 19.8 years in joint families & 21.7 years in nuclear families. R.B. Bhagat studied the characteristics of the family & female age at marriage.
He observed that, joint families were significantly negatively related to the singulate mean age at marriage in rural areas ($R = -0.78$)\(^9\).

In causes & consequences of child marriages in rural areas of U.P., Rastogi found that, incidence of child marriage was found to be higher among the respondents belonging to the joint families than among those who live in nuclear families\(^9\). Rao et al. conducted study on determinants of female age at marriage in Tamil Nadu & revealed that, girls residing in nuclear families were having high age at marriage\(^10\). Kalmuss D.S. et al. analyzed data from the national longitudinal survey of youth & revealed that, adolescent mothers with more educated parents were less likely to have a closely spaced second birth\(^11\).

Polit D.F. observed that, in 67% of adolescent mothers their mother was a teenage mother\(^9\). East P.L. et al. critically reviewed & commented that, younger sisters of child bearing teenage mothers were at increased risk for adolescent child bearing & they gave three plausible theoretical explanations like, social modeling, shared parenting influences & shared societal risk\(^12\). In a case control study carried out in Brazil among first time pregnant adolescent girls, it was observed that, two third came from single parent households. It was also seen that, more pregnant adolescents had mothers who became pregnant before the age of 15 years or close family members who were adolescent mothers\(^13\). Bremberg S. tried to study the pregnancy in Swedish teenagers & found that, the economic position of the teenage mothers was worst. He commented that, this disadvantageous situation was considered as the part of the life pattern of an underprivileged group characterised by low occupational status of their own fathers, low educational level & high frequency of teenage pregnancy among their own mothers\(^9\).

In an analysis of health of the girl child in India it was observed that, daughters of young mothers were more likely to become young mothers themselves & so the vicious cycle went on\(^14\). In addition to this, Russel J.K. tried to study social problems among teenage mothers in Edinburgh & observed that, they were more.
Social problems observed in the families of young teenage mothers were separated parents, alcoholism, a history of unmarried motherhood\textsuperscript{105}.

### 4.12: PHYSIOLOGY OF ADOLESCENCE

Menarche is an important indicator of physiological maturity & physiological maturity is associated with an event of menarche. Although the growth spurt occurs prior to the onset of menarche, linear growth as well as maturity process of reproductive organs continues for 4 to 5 years after menarche. Menarche marks a mature stage of uterine development, though does not signify the attainment of complete reproductive functioning\textsuperscript{106}. Onset of menarche varies from population to population & is influenced by climate, SE status, diet, blood group, genetic & racial factors\textsuperscript{107}. Adolescence comprises of nearly half of the growing period in man. It has its beginning by the age of 10 years in girls, however the end of the adolescence is not clearly delineated & varies with the physical, emotional, mental, social or cultural criteria which define the adult. The physiological changes of adolescence are closely related to the growth spurt & to maturation of reproductive organs than to chronologic age. It means that, if the spurt occurs early, the physiological changes also occur early & vice versa.

Adolescent events though complex follow the definite pattern & Malina reported that, the sequence of the adolescent changes in girls as budding of the breasts, initial appearance of the pubic hairs, the height spurt, appearance of the kinky pubic hairs & finally menarche. Thus the menarche marks the end of the adolescent events in girls. Menstruation a unique physiological process among female primates & humans, heralds the sexual maturity & is termed as menarche. It is the important physiological parameter of the female fertility, as the length of fertile period is determined by average ages of menarche & menopause. The timely appearance of menarche gives the assurance that the other less recognisable features of puberty & early adolescence are progressing normally.
In recent years the importance of better nutrition, improved hygiene, water supply, social & sexual stimulation in the form of audio-visual media are being increasingly recognised in influencing or hastening the maturation process\textsuperscript{108}.

It has been postulated that, certain critical body weight irrespective of the age has to be reached before attainment of menarche. Studies from the west indicate that the improvement in the socio-economic status over the last few decades has resulted in better nutritional status & thereby early attainment of menarche. It has been noted that, the menarche is occurring at a rate of approximately four months earlier every 10 years. This has been termed the secular trend in the declining age of menarche\textsuperscript{109}.

The changes that take place during the process of maturation in girls: -

a. A general increase in the growth rate of the skeleton, muscles & viscera.

b. Appearance of the secondary sexual characteristics.

c. The growth & development of the external genitalia.

d. A general re-adjustment of the endocrine balance resulting in establishment of menstruation & ovulation in girls.

e. Close relationship has been observed in age at menarche & peak height velocity(PHV). This PHV is reported to occur one year prior to menarche. A significant increase in weight has been reported following the PHV. Such increase in weight after PHV coincides with the onset of menarche.

f. There are some emotional & personality changes that are manifested by a variety of behavior difficulties, frustration etc.

Menarche the most common indicator of sexual maturity in girls has been studied by many authors in our country & also other countries, either retrospectively or prospectively. Well off Chinese girls in Hongkong had one of the earliest recorded medians (12.5 years) & Japanese in Brazil relatively early (12.8 years). Girls in the Middle East had a late menarche with the exception of the well off girls in Istanbul. Well off girls from Baghdad had medians of 13.6 years & in Tunis 13.4 years.
Review of literature

The populations with late menarche were the Melanesians of New Guinea, having medians ranging from 15.5 to 18.4 years. By & large in most of the European countries the mean age of menarche varied between 13.1 to 13.9 years. The data from Scandinavian countries showed that the figures for Denmark, Norway & Sweden were 13.8, 13.4 & 13.9 years respectively. Eastern European girls had menarcheal age very much near 13 years, excepting in the rural areas where it was mostly between 14.3 &15 years. Mussio studied the record of 86948 obstetric patients in St. Louis, where mean age of menarche was found to be 11.53 years. One patient had menarche at the age of 9 years. Duenhoelter et al. while studying the pregnancy performance of patients under 15 years of age in Parkland Memorial Hospital, Texas observed that, the mean age at menarche was 11.7 +/- 0.08 years in cases & 13.0 +/- 0.14 years in controls. A prospective study was carried out in two major delivery centers in Nairobi by Odongo et al. during 1990 & they found that, the average age at menarche was 14.2 years. The earliest record of age at menarche in India was noted by Susruta (400BC) to be 12 years. Bhargava et al. had a cross sectional one-point study of 357 girls from a public school in Delhi & observed the mean age of menarche as 11.2 years. Menstruation had occurred at the age of 10 years in 12.19% girls, at 15 years 95% girls were menstruating & by 16 years it was observed in all the girls. In the same study age at menarche in Indian girls observed by different authors ranged between 12.5 & 14.8 years. Agarwal et al. studied the event of the menarche in Varanasi (U.P.) & Chittor (A.P.). The girls were followed for a period of 2 & 3 years respectively & it was seen that, maximum frequency was between 12.5 & 14.5 years of age. Mean age of menarche was 12.75 years in Varanasi & 13.25 years in Chittor. Bhalla & Shrivastava carried out a prospective study in 656 girls & retrospective in 252 girls from U.P. Mean menarcheal age was 11.87 yrs. from retrospective study.
Review of literature

They also tried to find out effect of religion & it was observed that, Hindu girls had menarche early\textsuperscript{114}.

Sing selected the sample of 517 girls randomly in the age range of 10 to 16 years from Ludhiana city. A questionnaire method was used to seek the information about age at menarche & it was noted that, 16.5% girls had attained menarche by age of 12 years, in 31% by 13 years & in 92.7% by 15 years & all by 16 years. Mean age at menarche was found to be 14.7 years\textsuperscript{107}. Ghosh et al. carried out study in 557 schoolgirls in Poona & observed mean age at menarche 13.2 years. The minimum age at menarche was 8.2 years & the maximum was 18 years. Only 0.68% girls had their menarche before the age of 10 years & 1.7% after the age of 16 years\textsuperscript{109}. Chatterjee et al. in West Bengal noted mean age at menarche as, 13.01 years\textsuperscript{115}.

ICMR had constituted task force on high-risk pregnancies, maternal nutrition & low birth weight to discuss key issues & make recommendations for improving the outcome of pregnancies. This task force reported mean age at menarche as 13.8 +/- 1.4 years for urban slums & 13.7 +/- 1.02 years for rural areas\textsuperscript{116}. KEM research center Pune tried to assess the growth of pre adolescent & adolescent rural girls & observed that, mean age at menarche was 14.13 years with a range of 12.3 & 15.2 years\textsuperscript{117}. Some studies were carried out by National Institute of Nutrition in 1989-90 & by National Nutrition Monitoring Bureau in 1991 & observed mean age at menarche ranging between 12.4 & 13.4 years\textsuperscript{118,119}.

4.12.1 : Growth of the birth canal in the adolescent girls

M.L.Moerman studied the growth & development of four dimensions of the pelvic birth canal by analysing the longitudinal sample of 90 well-nourished girls aged 8 through 18. Four transverse measurements of the pelvic basin namely diameter of the inlet, interspinous diameter, maximum breadth of the sacral alae & the inferior breadth of the ischial tuberosities were examined by physical measurement. Detailed gynecological history & annual radiography of the pelvis was carried out.
In this study it was noted that, compared with stature, the pelvic basin grew more slowly.
Further it was also observed that, pelvic basin grew continuously through late adolescence. The young teenage girls in this study, did not have adult sized dimensions of the pelvic basin.
Size of the birth canal was smaller during the first three years past menarche than at age 18. It was further noted that, growth in stature rapidly decelerated in the first year succeeding menarche & growth asymptote was reached within 1 or 2 years. There was inverse relationship between skeletal elongation & endocrine maturation.
The maturation of the reproductive system & attainment of the adult size in stature did not indicate completed growth of the pelvic birth canal. These results indicated that, immaturity of the birth canal of the pelvis may have significance for obstetric risks among young teenage primiparous girls.

4.13 : RELATIONSHIP BETWEEN MEAN AGE AT MENARCHE & SE STATUS
It is well known that the age at which the first menstrual period or menarche occurs varies widely from population to population, being influenced by hereditary & environmental factors. Socio-economic status also has the effect on the menarcheal age. It has been shown that children of the higher SE strata tend to attain puberty earlier than those from the lower SE group. Also the nutritional status of the girls, which is in turn related to the SE status has been claimed to play a role in determining the age of menarche.
Bhalla & Shrivastava in a prospective study in Kanpur observed that, with increasing per capita income the mean menarcheal age declined. When the per capita income was Rs. 20, mean age at menarche was 12.43 years, whereas when it was above Rs. 50 it was 11.85 years. Ghosh et al. also found the correlation coefficient of - 0.5, indicating that the age at menarche was earlier in higher income groups.
S. Madhavan carried out the study in both urban & rural areas of Madras & Kerala states & observed that, girls from urban areas matured earlier than from rural areas in both the states showing highly significant difference between rural & urban areas. In Madras city, mean age at menarche was 12.76 years (U) & 14.16 years (R), whereas in Kerala it was 13.24 years (U) & 14.42 years (R) \(^{121}\). Kanani found that age at menarche showed an inverse relationship with SE status. Menarche occurred about one year later in low-income group girls (13-14 years) as compared to high income group girls (12-13 years). Similar age difference was also seen in urban & rural girls \(^{122}\). In an editorial - 'focus on pubertal girls in India', it is commented that, earlier onset & faster tempo of sexual maturation was evident in girls in the high SE groups \(^{123}\). Lakshman M. followed up a cohort of 599 rural & 615 urban girls prospectively & observed that, girls with urban background had a lower mean age at menarche of 12.96 years as compared to 13.2 years for rural counterpart \(^{124}\).

Rana et al. tried to study the effect of SE factors on age at menarche. However they observed that, both early & late maturers were from similar SE background \(^{108}\).

4.14: MARRIAGE

Determining the patterns of marriage in young people is a complex task for following reasons -

a. There is variation in the way in which marriages are classified.

b. Most of the nuptiality & fertility data are classified in five age groups, beginning at age 15, so that marriage & childbirth data below the age of 15 are often lost.

c. Marriages under particular age (e.g. 18 years in India) for females are illegal & so it is likely to be under reported.

Marriage patterns are different between & within different countries. In developed countries only a small proportion of marriages takes place in adolescence.
In northern & Western Europe very few people i.e. 10-15% marry younger than 19 years. In eastern & southern Europe a range of some 12-38% marry at that age. However cohabiting is becoming common especially for adolescents 18 years or older. Only in certain countries a much higher proportion of adolescents marry, especially in Sub Saharan Africa & southern & western Asia.54

4.14.1 : Legal minimum age of marriage
The legal minimum age of marriage is often different for males & females. When it differs it is invariably lower for females than males. In many countries minimum legal age with parental consent is considerably lower than without it. While only 12% of developing countries & 11% of developed countries allowed female marriage without parental consent below the age of 18 years, more than 50 countries allowed marriage at 16 years or below with parental consent. Other data suggested that, the minimum legal age of marriage may be very low, with 7 countries permitting it at age 12 years, 6 at age 14 years & 9 at age 15 years.54

Around the world women marry for the first time at different ages. In developing countries, East Asia & a few Latin American countries, two third or more of women do not marry until after the age of 20 years. In contrast in Indonesia, Bangla Desh, Pakistan & many African & Caribbean countries majority of women marry before 20. In all regions women from urban areas & women with schooling tend to marry later. Women with 6 or fewer years of schooling had much a higher chance of marrying younger than did their counterparts with more than 6 years of schooling. In Sub Saharan Africa percentage married before 20, among women aged 20-24 years was 38.4% when schooling was more than 6 years & 71.4% when schooling was 6 years or less. In Asia the figures were 19.8% & 56% respectively & for Caribbean they were 30% & 62.1% respectively.125. In Japan singulate mean age at marriage (average age at first marriage among all women who marry) was 24 years. In Northern Europe it ranged from 24.2 years in Finland to 27.1 years in Sweden.
In 1982 US survey of marriage & family growth, only one quarter of women with age 20-24 years were married before 20 years.

In Asia all women marry but age at marriage ranged from a low of 16 years in Bangla Desh to a high of 25 years in Srilanka. In South Korea among younger women with age 20-24 only 15% had married before age of 20. Singh & Samara reported a strong & highly significant inverse correlation between median age at marriage & proportion of girls bearing a child before age 20 years. In Islamic countries especially the Sahel states of Mali, Chad, Niger, Mauritania young women traditionally married shortly after menarche.

In nearly all regions young people were marrying at an older ages than their parents did, thus median age at marriage was rising. Surveys found that, in Bangla Desh 25% of 14 years old girls were married & in Nepal 34% of 15 years old girls were married. In South East Africa & Latin America 24% & 44% women under 20 were married respectively.

Pendase et al. studied 400 women of age 15-60 years from Vallabh Nagar in Rajasthan & found that, mean age at marriage was 14 years. Age at marriage below 10 years was found in 12.25%, between 10-14 years in 43.75%, between 15-18 in 40.50% & more than 18 in only 3.5%. Paramjit Kayr & Marwah from suburbs of Varanasi reported mean age at marriage 13.9 years. Verma et al. from U.P. found as 14.5 years, Tamboli et al. from Jaipur observed as 13.18 years & Saxena et al. from M.P. as 14.3 years. Higher age at marriage was reported by Raj et al. from Meerat as 17.5 years, Pandit from Bombay as 19.5 years & by Minekar from Delhi as 21.7 years. A study was carried out to see the indirect effect of age at marriage on child survival. In Kerala, mean age at marriage was highest i.e. 18.9 years, proportion of married below 18 years was 37.9% & IMR was lowest i.e. 27.4. This age was lowest i.e. 15.2 years in M.P., proportion of married below 18 years was 81.5% whereas IMR was highest i.e. 117.6.
Revi ew of literature

Reddi Rani et al. in prospective study in women of age 12-19 years observed 60% married girls by the age of 15 years & there was the history of consanguinity\(^ {40}\).

Smith studied effect of several female status variables on female age at first marriage. Female education, extra domestic employment, socio-economic status of family, female autonomy had positive effect on age at marriage whereas arranged marriages, size of dowry, marriage expenses etc. had negative effect \(^ {130}\).

Nationally there is evidence that, the prevalence of the adolescent marriages is declining. In 1961 as many as 70% of all adolescent females aged 15-19 were currently married. By 1981 this proportion had fallen to 44% & by 1992 to 39%\(^ {5}\). In a recent study carried out by International Institute for Population Sciences, the median age at marriage was found to be 16 years & as many as 40% of all the women aged 15-19 years were already married. In rural areas almost 2 out of three females aged 20-24 years were married by the age of 18 years, one third were married by the time they were 15 & 15% even before they were 13 years.

Following is the table showing the distribution of married women in different age groups in urban & rural area of Maharashtra\(^ {131}\)-

<table>
<thead>
<tr>
<th>Particular</th>
<th>15 - 19 years</th>
<th>20 - 24 years</th>
<th>25 - 49 years</th>
</tr>
</thead>
<tbody>
<tr>
<td>% of women married -</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>• By age 13</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>- Total</td>
<td>6.8</td>
<td>11.8</td>
<td>19.1</td>
</tr>
<tr>
<td>- Rural</td>
<td>8.6</td>
<td>14.9</td>
<td>23.4</td>
</tr>
<tr>
<td>- Urban</td>
<td>1.8</td>
<td>3.9</td>
<td>8.6</td>
</tr>
<tr>
<td>• By age 15</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>- Total</td>
<td>17.0</td>
<td>26.1</td>
<td>36.6</td>
</tr>
<tr>
<td>- Rural</td>
<td>21.3</td>
<td>32.0</td>
<td>43.4</td>
</tr>
<tr>
<td>- Urban</td>
<td>5.5</td>
<td>10.9</td>
<td>20.2</td>
</tr>
<tr>
<td>• By age 18</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>- Total</td>
<td>NA</td>
<td>54.2</td>
<td>68.0</td>
</tr>
<tr>
<td>- Rural</td>
<td>NA</td>
<td>62.8</td>
<td>75.8</td>
</tr>
<tr>
<td>- Urban</td>
<td>NA</td>
<td>32.6</td>
<td>49.0</td>
</tr>
<tr>
<td>• Median age at first marriage</td>
<td>NA</td>
<td>17.4</td>
<td>16.1</td>
</tr>
</tbody>
</table>
Udipi et al. in a study on status of adolescent Muslim girls observed that, almost one third of women in slum area were married before the age of 15 years & another 43.4% were married between 16-18 years. According to Sample Registration System data (SRS 1992), female age at effective marriage in India was 19.3 years, 20.2 years & 19.5 years respectively for rural, urban & combined & for Maharashtra it was 18.5 years, 20.5 years & 19 years respectively. In a study, 'premarital counseling on family planning', Pratinidhi et al. observed that, the mean age at marriage was 17 years & 78.4% girls were married below the age of 18 years, of whom 4.8% were below the age of 15 years.

RUHSA was started as a programmeme of the Christian Medical College & Hospital Vellore. In this programmeme it was seen that, over 3.5% marriages occurred by the age of 15 years & over 15% marriages were before 18 years. In ICMR task force study, mean age at marriage was 13.8 years in rural area which coincided with the age of menarche. In urban area the marriages were performed at a relatively later age (mean 16.15 years) & about 2 & 2.5 years after attaining menarche. Mishra & Govila conducted a study in Hastinapur PHC, district Gwalior by selecting 40 villages by random sampling method. In that PHC area, 94.8% women were married in the age group of 10 to 19 years & average age of marriage was 15.6 years.

While studying causes of early marriage authors commented that, the education tended to be negatively correlated with arranged marriages. These arranged marriages tended to go along with a young female age at marriage. The reasons for this were, desire to protect young women's sexual purity & a desire to ensure the early production of offspring. Khan et al. in a community based study in U.P. tried to find out the reasons for early marriages & the reasons were condemning parents, sexual exploitation, financial burden on parents due to rising cost of living.
Audinarayana selected 360 rural respondents i.e. 240 of caste Hindu & 120 Harijans from two villages from Chittur district, A.P. & these respondents mentioned that, higher ages of marriage created problems.

These problems were, increased pre marital sex relations causing illegitimate pregnancies which demoralised the younger generation. Further society looked down upon the persons who remained unmarried long\(136\).

Audinarayana et al. in another study examined the influence of some cultural factors on the age at marriage in an urban housing unit of Coimbatur city, Tamil Nadu. Religion was an important cultural element of any society. Both Hinduism & Islam encouraged universality of marriage. On the other hand Christianity ordains that, unmarried & single persons may remain single to the extent possible. The mean age at marriage was highest for Christians (23.7 years), lowest for Muslims (17.5 years) & it was 20.8 years for Hindus. In schedule caste & schedule tribes mean age was 18.4 years, whereas for upper castes it was 22.7 years. Culturally among Hindus, marriages with close relatives (Consanguineous marriages) were very common & some times obligatory. Muslims preferred parallel cousin marriages. In same study 34% of the marriages were performed between close relatives & remaining 66% were non-consanguineous. In cases of consanguineous marriages, mean age was 19.62 years where as it was 21.59 years for non-consanguineous marriages\(^7\). Rao & Richard in a prospective study on factors promoting higher female age at marriage found that, the family type was not associated with age at marriage, but it was highly co related with house ownership, husband’s residence & consanguinity\(^137\).

Traditionally parents & close relatives took the decision of marriage without consulting the boy or a girl. They usually arranged the marriage at younger age for number of socio-cultural & family reasons. In a study by Audinarayana et al. 53% wives reported that, the decision regarding their marriage was taken by their parents & in that case the mean age at marriage was quite lower i.e. 19.42 years. 47% wives reported that parents consulted them before finalising their marriage.
In that case mean age at marriage was higher & it was 22.64 years. Many authors proved that the mean age at marriage of the boy & the girl was lower when the parents alone arranged the marriage as opposed to when both the boy & the girl were consulted by their parents.

Attitude of adolescent females & their parents about the marital decision was studied. 84% adolescent females in Lucknow preferred marriage to be arranged by their parents. In one study in Bombay 35% parents were willing to allow the sons to select their own spouses & only 28% were willing to allow to their daughters. Only one in ten parents discussed marriage decision with adolescent children. In a study by Pratinidhi et al. it was revealed that, the decision about the suitability of age at marriage was taken by 83.3% parents.

Shrivastava J.N. in U.P. found mean age at marriage 16.14 years & determinants of early marriage were caste, educational status of husband & wife, occupation of husband & per capita income. Singh R.P. in Tamil Nadu reported, mean age as 18.6 years in rural areas & 19.7 years in urban areas & causes of early marriage were occupation & education of husband & wife & consanguinity. Rao P.S.S. observed that, girls with higher education, occupation, economic status & from nuclear families had higher mean age at marriage. Population Research Centre, Dharwad noted, caste, religion, anxiety of parents & perception of parents that delay in marriage contributes to aging of girls as the major determinants. Similarly in Orissa, cultural values, social pressure & poor level of awareness about reproductive health problems were the main reasons for early marriage. Rajarama K.E.T. in Belgaun found proportion of pre puberty marriages as 7.8%. Reasons were illiterate fathers, lower cast families with either or both the parents not alive, compulsion from elder family members etc.

Rastogi S.R.observed mean age at formal marriage 14.9 years & mean age at effective marriage 17.3 years. Determinants of early marriage were illiteracy, lower castes, lower occupational status, low economic level of parents, joint families.
Bhagat R.B. revealed that, education of girls had positive impact. Similarly in cultivators & in agriculture labourers marriage was earlier & females with better jobs married later\(^{143}\). Rajyalakshmi C. in A.P. & Rajasthan observed, safety, security, chastity of girls & consanguinity as the major reasons for early marriage\(^{144}\).

4.14.2: Marital status

Sexual activity among young adults is increasing worldwide, however there is difference in developed & developing countries. In developing countries most of the sexual activity takes place within marriage & therefore in these countries most of the teenage mothers are married.

Adolescent pregnancy was associated with unmarried mothers varying from 80% in Argentina to 39% in Chile\(^{34}\). Tandu Umba et al. in Zaire observed 93% unmarried adolescent pregnancies\(^{70}\). Leland et al. in US observed proportion of unmarried adolescents as 81.72 in white & 98.75 in black\(^{29}\). Alison M.F in Utah found this proportion 85.2%.\(^{57}\), Osbourn et al. 39%\(^{91}\), T.J. Mussio in St. Lois Hospital, Missouri as 88%\(^{110}\), Ramon Aznar et al. 60% in Negro & 35% in white\(^{145}\), Hollingsworth D.R. et al. in US 54.1%\(^{146}\) & Lee K.S. et al. in Chicago as 19.1%\(^{61}\).

In a few of the Indian studies the same rate was reported as 0.42% by Pratinidhi et al.\(^{147}\), 1.8% in Calcutta by Sarkar et al.\(^{38}\), 6% by P.Reddi Rani et al.\(^{40}\), 20% by Bhadauria in S.N. Medical College, Agra\(^{42}\), Nitwe M.T. reported 0.86% unmarried adolescents in Nowrosjee Wadia Maternity Hospital, Bombay\(^{39}\).

4.15: PARITY & INTER PREGNANCY INTERVAL

Many studies have been carried out about parity & inter pregnancy interval in adolescents. Israel had undertaken a study in 10 institutions from USA about teenage obstetrics & found that, 71.3% of teenagers were nullipara\(^{93}\). Aznar et al. observed 80% patients of 16 years or less pregnant for first time & approximately 20% pregnant for 2nd or 3rd time from University hospital of Cleveland\(^{145}\).
Dwyer J.F. included in his study patients who were between 12 & 16 years when they delivered & found that, 89.6% young mothers were primipara, 9.1% 2nd para & 1.3% 3rd para in a study from New York. Leland also found the proportion of primipara as 98% & 97.48% in white & black adolescent respectively. Kwang sun Lee et al. used computerised birth certificate data for their study & found the proportion of young mothers with no issues, between 7.5% & 34% whereas with more than 2 issues between 0.4% & 1.6%. Ventura C.S. included the deliveries that occurred in St. Luke's Hospital, Malta. These were total 666 deliveries with age less than 19 & out of them, 92.7% were primipara & remaining 7.3% 2nd paras.

Duenhoelter J.H. in his retrospective study of pregnancy performance of young mothers observed the greater number of recurring pregnancies within 18 month of the initial one & commented that, the factor of early repeat pregnancy was the most important problem of teenagers. The likelihood of the very young woman completing another pregnancy within 18 months after the initial one was more than twice than those over 19 years of age.

Various Indian authors also studied the parity in young mothers. Nayak et al. had study of 362 teenage mothers & found that, 78.45% were primiparas, 17.12% were 2nd para & 4.41% were 3rd para. Reddi Rani et al. observed that, majority (80%) were primipara, 16% 2nd & 4% 3rd gravida. Nitwe et al. found 62.77% primipara & remaining significant proportion of multiparous teenagers. Sarkar et al. revealed 76.6%, 21%, 1.7% & 0.7% as the primigravida, primipara, 2nd & 3rd para young mothers respectively in their study. Goswami & Goswami reported 92.32% primiparas, 5.99% 2nd para & 1.43% 3rd para whereas very small proportion of 4th para in young mothers from rural area. Padate et al. had similar results from Goa. Saroj Pachori found in a study of 970 teenagers that, 88.3% had no live births, 10.3%, 1.2% & 0.3% had one, two & three live births respectively. S.P. Sen in Basirhat sub divisional Hospital found that, 83 to 87% cases were primigravida.
Further 12 to 16% second gravida & very few third gravida\textsuperscript{150}. Rauh et al. found that, 79% of the teenage mothers not in teen programme had repeat pregnancy within 2 yrs. compared to 33% of those who attended the teen clinic\textsuperscript{151}. Arthur Elster concluded from his study that the young maternal age was associated with short interpregnancy interval as 78.5% of women aged 15-16 years, 58% of women aged 17-18 years, 47% of women aged 19 years & 21% of women aged 25-29 years had a rapid repeat pregnancy\textsuperscript{152}. Graham noted that adolescent multiparas had a significantly higher percentage of LBW infants than their age matched primiparas, stating that the consecutive pregnancies in adolescents were more likely to be closely spaced than in the adults, perhaps resulting in some biologic compromise\textsuperscript{153}. J.H. Duenhoelter compared the study & control patients in whom the second pregnancy was completed within 18 months of initial pregnancy & found that, 15.9% young mothers completed second pregnancy within 18 month whereas this proportion was significantly lower (7.4%) in controls\textsuperscript{111}. McAnarney et al. also observed that, adolescents who had children were at high risk of becoming pregnant again during their teenage years\textsuperscript{88}. Kalmuss D.S. found from National Longitudinal Survey that, approximately one quarter of teenage mothers had a second child within 24 months of their first birth\textsuperscript{101}. O Sullivan et al. tested the effectiveness of the special programmeme for teenage mothers in Philladelphia & they concluded that, such programmeme helped to reduce the earlier repeat pregnancy rate by more than 50%\textsuperscript{154}.

### 4.16: UNINTENDED & UNPLANNED PREGNANCY

Each year 15 million women under age 20 years give birth accounting for upto one fifth of all the births worldwide. In DHS it was found that, in Africa & Sub Saharan region about 14 to 55% currently pregnant mothers under 20 years reported that their pregnancies were mistimed or unwanted.
In Asia & Pacific, this proportion ranged between 31-34%, in Latin America & Caribbean it was 22-58%. In US, 1 million women under age 20 became pregnant each year & 82% of these pregnancies were unintended. In Chile, 35% of young married women between 15 to 20 years reported their first births as unintended & 42% of them conceived premaritally.

Surveys in six African countries reported that, one fourth & one half of first births to married women with ages 15 to 19 years were unintended. Unintended pregnancies were not rare even where early marriages & early childbearing were the norms. For example, in Pakistan 34% of the current pregnancies among ever married young women were unintended & 24% in Egypt. A young woman’s pregnancy was more likely to be unintended if she was unmarried e.g. in Kenya, this proportion of mistimed or unwanted pregnancies was 47% among married women & 74% among unmarried women. In Peru, 51% of the current pregnancies among young married women were unintended compared with 69% among unmarried women. When the pregnancy was unwanted the risk to the mother increased. Because such mothers tended to neglect their health needs. They were, less likely to go for prenatal care & least likely to deliver in hospital or with a trained person. Majority of the pregnancies in Britain were also found to be unintended. In large-scale survey carried out in US it was found that, two thirds of the adolescent pregnancies were unintended including 90% to unmarried adolescents. Among Indian studies, in latest National Family Health Survey it was observed that, as many as 30% of married women aged 15-19 years reported a desire to delay the next birth (28%) or limit childbearing (2%), but were not using a contraceptive.

4.17 : USE OF CONTRACEPTIVES

In much of the developing world contraceptive use was low among married women in age group 15-19 years. Except in Latin America very few young women used contraception between marriage & first pregnancy.
In most countries, about 70% of women who married young had at least one child before the age of 20. After giving birth to one child some women began using contraceptives to space their next birth. In 15 out of 23 countries with available World Fertility Survey data, contraceptive use was markedly higher among young women with one living child than among those with no child.

In general, the percentage of married women with age 15-19 years using contraceptives was about half than for all married women. Contraceptive use among married women with age less than 20 years was found to be between 0 to 5% among adolescents with no living children & between 4 to 6% with one living child in Africa. In Asia & Pacific the same figures were 0-8% & 0-29% respectively. These figures were significantly more for Latin America / Caribbean i.e. between 7-57% & 27-45% respectively. Thus sexually active young people were less likely to use contraception than adult even within marriage\textsuperscript{156}.

Proportion of women of 15-19 years who ever used modern contraceptive method irrespective of whether they had a child or not was between 1-42% in different countries of Africa, between 2-62% in Asia & Pacific & between 7-58% in Latin America & Caribbean\textsuperscript{30}. Studies had shown that African adolescents become sexually active earlier & earlier, yet they did not use contraceptives. The most popular method in African youths was found to be rhythm method, however with poor knowledge of the fertile period especially in unmarried teenagers. Very few adolescent women could correctly identify the fertile period of menstrual cycle according to DHS studies. Nevertheless in several countries adolescent women were using the traditional methods such as withdrawal or periodic abstinence - 15% in Ghana & 38% in Togo. In Bangla Desh, where 68% adolescents were married, only 9% of them used some contraceptive compared with 19.1% married adults. In Egypt where 40% of adult women used contraceptive, comparative figure for the adolescents was only 6\%\textsuperscript{157}. 
There was wide variation in use of contraceptives in developing & developed countries. In developing countries fewer than 30% of married women aged 15-19 years used family planning methods. In some countries, the figure was as low as 2% or 3%. Except in Central & South America, few young women used contraceptives between marriage & first pregnancy. By contrast in developed countries the rates of contraceptive use by married women in age group 15-19 years were higher. They varied from 52% in Spain & 59% in USA to 87% in U.K. There was also wide variation in contraceptive use among adolescents according to marital status.

A new contraceptive clinic in Nottingham provided care for 1500 young people & it was observed that, 25% of the clients were 16 years old & 32% were 15 or younger. In a study on 25 American Indian adolescents it was found that, 15 were not using any contraceptive. A young adult reproductive survey was carried out in 1988 to examine the sexual behavior & contraceptive use among young adults in Chile & in that it was seen that, only 20% females used the contraceptives. In a study by department of OBGY of University of Zimbabwe, Harare it was observed that, in adolescents there were very few contraceptive users. Another study reported 20% contraceptive use rate. One in ten adolescents used some contraceptive measure in another study. Whereas in a prospective study in Kenya only 1% used any known contraceptive method. In US young adolescents felt the risk of pregnancy very small & therefore did not use any contraceptive. Similarly in another study carried out in USA, a review on adolescent contraceptive use was carried out & it was observed that, there was 76% increase in contraceptive use rate as compared to 1960 level. Polit D.F. in a study on early subsequent pregnancy among economically disadvantaged teenage mothers found that 43.8% were using contraceptive. In a large survey carried out by Jonathan Field et al. it was observed that, 26% of the sexually active teenagers had never used contraceptives & about 45% used it occasionally.
As compared to developed countries, in India young adolescent women or their husbands rarely used contraceptives. The 1992-93 National Family Health Survey reported that, nationally no more than 7.1% of married women aged 15-19 years were using any contraceptive, compared to 21% in older women. Nitwe et al. in a hospital based study of 822 deliveries below 20 years of age in Bombay observed, high proportion of teenagers i.e. 53% accepting methods of spacing. Sterilisation was excepted by 3% of teenagers after completing their desired family size.

Salvi et al. analysed 6534 MTPs done at Nowrosjee Wadia Maternity Hospital, Bombay & found that, 38.9% of adolescents accepted the IUCD & 2.5% who completed their childbearing accepted the terminal method i.e. sterilisation. In All India Survey of Family Planning Practices it was observed that only 8.6% of women 15-19 years were using contraceptives. Further majority of them were practicing traditional methods (about 75%), which may not be very effective in protecting them from conception. In a study on newly married adolescent couples carried out by Pratinidhi et al. it was observed that, 28.6% couples were using contraceptives.

### 4.18: HEIGHT

Ventura C.S. in a study of deliveries that occurred in St. Luke's Hospital, Malta during the period 83-86 observed that short stature of adolescent mothers was related to age of mother. As age of mother increased incidence of short maternal height decreased. Incidence of short maternal height was highest in mothers with age less than 16 years i.e. 34.7%. In mothers with age 17 years it was 22.1% & it was lowest in mothers with age more than 18 years i.e. 20.3%. Osbourn & Howat in a study on obstetric outcome of adolescent mothers observed statistically significant difference in height of young & old mothers. Horon et al. observed that, mean maternal height in inches was 63.2 in young adolescent mothers, whereas it was 64.3 inches in non-adolescent mothers. They had also observed that with increase in height MBW also increased but not at the level of significance.
McArney in a study on young maternal age concluded that, short mothers had small infants. Leppert P.L. did not observe any significant difference in heights in young mothers 18 years of age or younger & mothers between 19 to 21 years.

The first Indian report on adolescent growth spurt of boys & girls is from West Bengal. This study reported the data on adolescent growth spurt of height of girls, from urban middle class over a period of 14 years. It was observed that, West Bengal girls were shorter than British girls as young adults.

It was further noted that, most of this deficit in adult height was noticed even before entry into adolescent growth spurt. This was followed by longitudinal study in 200 girls from rural Hyderabad on total growth between 5th & 20th years. Girls at age 5 were classified according to their nutritional status, as with severe, moderate, mild malnutrition & those with normal nutritional status. Growth performance of girls with severe childhood undernutrition was found to be different in characteristics, but the total height gain during the adolescent growth spurt period was found to be equal or slightly greater. This was brought about by longer duration of adolescent growth spurt period & period was found to be greater by 2 years. Undernourished rural girls were compared to British girls. British girls completed height growth by 15.2 years. Whereas undernourished Hyderabad rural girls completed the growth by 17.3 years. This study concluded that, adult height of girls was found to be significantly related to height at age 5. Undernourished girls had experienced reductions of height & most of the deficit in height was occurring in early childhood. This was compensated by delayed entry into growth spurt & longer duration of growth spurt period. Growth was allowed for longer period though at a lower velocity. Because of delayed maturity & late closure of epiphysis, growth in length was permitted for longer duration making up a small part of the childhood deficit. Notwithstanding this, undernourished girls continued to be shorter indicating the after effects of erstwhile malnutrition.
Rao in Pune covering 3000 children from rural, urban & slum communities carried out a longitudinal adolescent growth study. In that study it was observed that, the differences in physical measurements for lowest & highest income class were maximum during adolescent period. This became negligible at the age of 18-years, indicating the catch up phenomenon. Children from poor communities had delayed growth spurt as compared to children from higher SE class\textsuperscript{171}. A study was carried out about nutritional status & energy expenditure pattern of adolescents in Dharwad city by Barigidad et al. Height of adolescent girls with age 13 years was 149.4 +/- 9.43 cm., which increased slowly upto 18 years, & it was 152.2 +/- 6.55 cm. at 18 years\textsuperscript{172}.

Rao S.S. tried to assess the growth of adolescent & pre adolescent rural girls & compared this with the studies carried out by NIN & NNBM. It was seen that, mean height was increasing from 7 years to 16 years. The maximum spurt in height of 8 cms. was seen between 12 & 13 years. After 16 no increase in height was observed. The mean height was stabilised at about 150 cms. Thus it was concluded that, sudden growth spurt in height was usually the first sign of advent of puberty, which started about 2 years before onset of menstruation\textsuperscript{117}. In a qualitative appraisal of health & social aspects of adolescent girls in Ahadabad, Vakharia observed that, height of adolescent girls was lesser as compared to non-adolescent girls. Mean height of adolescent girls in age group 12-14 years was 138 cms., & it was 159 cms in those 19 years or more. It was further observed that, 85.4% & 46.3% adolescent girls in age group 12-14 years & 15-18 years respectively were having their height below the accepted average\textsuperscript{173}. A study compared ICMR & Harvard standards for heights & weights of adolescent girls & boys. It was observed that, the differences in ICMR & Harvard standards were more marked in girls than in boys. Upto the age of 5 years the difference in height in girls is highest & it was ranging between 87.7% & 88.9% of the Harvard standards. After the age of 5 the difference in ICMR & Harvard standards became lesser upto the age of 18 years.
But they did not become equal to Harvard standards. At the age of 18 years girls were having their heights 92.8% of the Harvard standards.\textsuperscript{174}

Vijayraghavan et al. found mean height of girls aged 11 years as 141.2 cms., which increased to 147.2 cms. at age 12 years, indicating highest growth in velocity of 6 cms. between 11-12 years. Thereafter height increased to mean height of 155.5 cms. up to the age of 16 years & remained constant after that age.\textsuperscript{175} In a longitudinal study carried out in Hyderabad, the authors commented that, adult heights reflected the nutritional status during childhood & adolescence, whereas body weight is a reflection of earlier nutrition & the current status. In that study it was observed that, the height of Hyderabad rural girls was lower compared to American girls at all ages. But the total height gain during the adolescence was similar. According to Harvard standards mean height of girls at 5 years was 110.2 cms., at 18th years it was 163.5 cms. & the increment between 5-18 years was found to be 53.3 cms. For rural Hyderabad girls these figures were 103.6 cm., 157.8 cm. & 54.2 cms. respectively. For undernourished girls mean height at 5 years & 18th years was significantly lower i.e. 90.5 cms. & 150 cms. respectively, however the increment was not only comparable but was highest in these girls.\textsuperscript{176}

Another study concluded that, the deficit in the height noted before puberty persisted even when they became adults & the deficit was more marked in undernourished girls. In these groups it was further observed that, adult height was attained by 15.2 years in British girls, whereas it was prolonged & delayed in undernourished girls upto 17.3 years.\textsuperscript{177} Same was observed in another study.\textsuperscript{178} In a study from Kerala it was observed that there were 49-67% girls who were at risk during pregnancy at their 15th years, whereas there were only 19-23% at risk girls at 19th years. The risk was in the form of complication during childbirth, low birth weight, high mortality & poor growth amongst their offspring. It was further noted that, at the age of 14 years 45% mothers were below 145 cms. & this proportion decreased slowly as age increased.\textsuperscript{129}
In a study carried out by Pratinidhi et al. it was seen that, proportion of short stature was 6.3% in mothers 18 years or less & this proportion was significantly lower i.e. 0.8% in old age mothers. In 448 primigravid women delivered at Sassoon General Hospitals, Pune it was observed that, mean height was 142.5 cms. in age group 15 years or less, it increased to 147.5 cms. in mothers between 18-19 years, whereas those above 20 years were having height 152.5 cms.

Sethi et al. commented that, maternal height had an independent effect on birth weight. A cross sectional study was undertaken in Tamil Nadu to assess the status of adolescent girls & it was observed that, there was significant difference in height in different age groups. At age 13, mean height was 139.8cms. & it increased to 152.3 cms. at 18 years. For all ages the height was below Harvard standards.

Sathyavathi et al. studied the adolescents of Chittor district & it was revealed that, height values showed significant progressive increase with age from 135.06 cms. at 11 years to 156.55 cms. at 19 years in urban girls. Corresponding figures for rural girls were 131.44cms. & 157.37 cms. respectively. Maximum increment was during 12-13 years. Another study on growth profile of adolescent girls reported that 39% adolescent girls were having height for age less than 90% of the Harvard standards. Height of adolescent girls from rural south India was found to be between 140 & 151 cms. Increase in mean height with increase in age was observed in few other studies.

4.19 : ANEMIA

Iron deficiency anemia was common among pregnant women & young pregnant women were particularly more likely than older women to be anemic even in developed countries. Analysis of 8 US clinical studies found that pregnant women under age 20 were twice as likely to be anemic as older women. A US study of pregnant teenagers attending prenatal clinic found that 70% lacked enough iron.
Normal menstrual bleeding, a diet lacking absorbable iron & malaria caused most of the anemia in pregnant women\textsuperscript{189}. Osbourn et al. in a study on obstetric outcome of adolescent pregnancy in Duke Street Hospital, Glasgow observed, increase in the incidence of anemia in the teenagers. The incidence of anemia in teenage mothers was 11.1\% as compared to older mothers i.e. 5.2\%\textsuperscript{91}. Israel et al. revealed more proportion of anemic teenage mothers than controls & hemoglobin range was between 7.0 \& 10.9 gms. Further the teenagers were 10.2\% fewer in number than control group at non-anemic level of 11 gm. or more\textsuperscript{93}. Aznar & Bennett for their study considered anemia to be present when hemoglobin level was below 10 gms. Incidence of anemia was 15.6\%. In 20.1\% of adolescents with no antenatal care Hb was less than 10 gms.\textsuperscript{145} Mussio revealed that, nearly one fourth of patients had Hb level below 10 gms. He further noted that, many of these patients did not take nutritional supplements during pregnancy even though it was prescribed\textsuperscript{110}. Coates in a study on very young adolescents from New York commented that, of the young primigravidas 19.7\% had Hb less than 10 gms. & no significant difference was observed in cases & control group\textsuperscript{190}. Arkutu in a clinical study of maternal age & parturition in Tanzanian primipare area observed that, incidence of anemia in all age groups was found to be high ranging between 16.21\% to 29.67\%, however there was no statistically significant difference between the groups\textsuperscript{191}. Contrary to above studies Dwyer observed very low incidence of anemia in teenage mothers\textsuperscript{148}. Prasad V. Compared the group of 104 primigravidae aged 16 & under with control group of age 20-30 years & observed that the 30\% of the women under 16 had anemia as against 17\% of the control group\textsuperscript{192}. Scholl et al. in prenatal care & maternal health during adolescent pregnancy review & meta analysis found that in developed world there was secular decline in maternal anemia whereas in developing world teenagers were at increased risk of maternal anemia\textsuperscript{188}. 
Schneck et al. in a study on low-income pregnant adolescents observed that, there was very high incidence (59%) of anemia\textsuperscript{193}. Similarly another such study from Nigeria reported, 60% anemic young mothers as compared to only 14.8% in non-adolescents\textsuperscript{194}. High rate of anemia in young adolescents was also observed by many other authors\textsuperscript{195,196,82,83,105}. Whereas no higher incidence of anemia was observed by a few\textsuperscript{111,197}.

In Indian studies, department of foods & nutrition, University of Baroda carried out a study on adolescent girls in slum communities & observed the prevalence of anemia as 98\%\textsuperscript{198}. In North Arcot district of Tamil Nadu, Jude et al. found that, mean Hb value was 10.9 gms. & 73.5\% of the subjects were found to have Hb level below 12 gms. The mean Hb value was found to increase with increasing age\textsuperscript{181}. Seventy percent adolescent & 61\% non-adolescents were reported to be anemic by Chhabra in Wardha\textsuperscript{43}. Nayak et al. found this proportion as 12.98\% & 6.58\% respectively\textsuperscript{41}. Nitwe et al. observed 60.46\% young & 50\% control group mothers anemic\textsuperscript{39}. Similarly Sarkar et al.\textsuperscript{38}, Pratinidhi et al.\textsuperscript{147} also revealed higher incidence of anemia in adolescent mothers as compared to non-adolescent mothers. Whereas Kachhawa reported no difference in both the groups from Rajasthan\textsuperscript{199}.

Pawar & Shroti reported decrease in incidence of anemia with increase in age. Incidence was 27.6\% in mothers 15 years or less, 19.2\% in 18-19 years & 17.6\% in control group\textsuperscript{179}. Similarly Padte et al. also reported incidence, 26.92\% in 13-16 years age group, 19.94\% in 17-19 year age group & 11.25\% in control group\textsuperscript{149}. Proportion of severely anemic mothers was 11.2\% & 3.4\% in two studies\textsuperscript{40,200}. Mean Hb in adolescent mothers was found to be 9.6 grams in a study by Aras et al.\textsuperscript{201}. Adequate antenatal care helped to reduce the incidence of anemia in young mothers\textsuperscript{150}. In nutritional status of adolescent girls from six schools situated in urban area of Dharwad, it was observed that, mean Hb level was increasing with SE status & age in adolescent girls\textsuperscript{172}. Two studies reported that mean Hb levels increased with increasing age\textsuperscript{117,119}. 
4.20 : ANTENATAL CARE

Adolescent pregnancy is associated with increased risk of low birth weight, pre term delivery & post neonatal mortality. The increased risk is the result of background characteristics like poverty, lack of education that are more prevalent in young gravidas, which increase the risk of poor pregnancy outcome. Further inadequate antenatal care may increase the risk.

Scoll et al. reported that, according to national natality survey, 9.5% adolescents delayed the initiation of prenatal care until the third trimester of pregnancy or received none at all in New Jersey. This proportion was two to three times higher than the proportion in adults\(^2\). One study had a doubt that whether, the positive effect of prenatal care was due to characteristics of women who receive it or artifact of method analysis\(^3\). Another concluded that, care itself is beneficial\(^4\).

Scholl et al. in their study classed prenatal care as adequate, if the patient entered during the first trimester & made the requisite number of visits for the gestation in which the pregnancy ended. Inadequate care, when the entry in the third trimester or entry in the second trimester with few visits for the gestation as stipulated. Intermediate care, when all other combinations of visits in patients with entry in the first or second trimester. In this study it was observed that, there was high proportion of adolescents with inadequate & intermediate prenatal care i.e. 55.9% & very low proportion of mothers with adequate care i.e.29.1%. Three-fold lower proportion of pre term deliveries was observed among adolescents with adequate care. Similarly the proportion of LBW babies was lowest with adequate care & highest with inadequate care. Higher birth weight of newborns was observed in adolescent mothers with adequate care\(^2\). Khairandish et al. analysed 400 teenaged married pregnancies. 73% had no prenatal care due to lack of information & access, this was attributed to the fact that, 52% lived in remote areas\(^5\). In one study reasons for non-use of antenatal care by adolescents were, poor information by service delivery system, women did not want baby, stressful event etc.\(^6\).
Another study reported the negative attitude towards the available services, confusion about the doctors as the barriers to the prenatal care\(^{206}\). J.B. Coates analysed the information regarding antenatal, intranatal & postnatal care received by young adolescents. It was found that, 51.8% less than 14 years had 3 or less visits to prenatal clinic, whereas this proportion was 44.1% for older age group mothers, although the difference was not significant\(^{190}\). One study reported that, unmarried teenagers were less likely to have good quality antenatal care\(^{73}\).

Aznar & Bennett carried out a study in obstetric patients 16 years & less who received care at metropolitan general hospital & university hospital of Cleveland. Only 5.8% of the young mothers came during the first trimester & 150 or 18.9% were not seen until they came to the hospital in labor. It was further noted that, 58.5% patients had 5 or fewer prenatal visits indicating poor or inadequate antenatal care. There were 205 or 33.6% who had 6 or 9 visits & hence were exposed to good prenatal care. Only 48 or 7.8% had 10 or more visits necessary for excellent care. Relation of anemia to prenatal care was also studied & it was observed that highest incidence (20.1%) was in young mothers with no care & it was lowest i.e. 10.6% in mothers with 10 or more visits\(^{145}\). Another study compared total number of medical examination visits between adolescents & non-adolescents & observed 2.9+/− 2 & 4.7+/− 2.3 respectively\(^{207}\). It was reported in one study that, in 1982 only 32% of the young women less than 15 years compared with 79% of 25 to 29 years entered prenatal care during first trimester\(^{208}\). It was observed that, early & consistent prenatal care was also associated with a lower incidence of LBW among adolescents, particularly in youngest who were at highest risk\(^{208,209}\). Duenhoelter in pregnancy performance of patients under 15 years of age revealed that, 48.8% young mothers & 40.3% old mothers had less than 4 antenatal visits. Lesser proportion of young mothers (24.7%) had more than 6 visits, whereas 31.8% older mothers had less than 6 visits\(^{111}\).
Sweeney compared prenatal visits of both first & second para young mothers. He commented that, 35% young mothers received no prenatal care or initiated the care in the last trimester with their first pregnancy. This proportion was more i.e. 49% in young second para. This indicated that inadequate or no antenatal care was common in young adolescent mothers, however it was more common in young mothers with their subsequent pregnancies. Leland et al. studied young adolescent mothers between 10-14 years from US & found that, only 22.24% white & 20.36% black mothers had adequate antenatal care.

Ventura & Grech studied all the deliveries that occurred in Saint Luke's hospital, Malta during 83-86, out of which 179 were teenagers. Registration status & number of antenatal visits were dependent on patient's age. Statistically greater proportion of teenage mothers did not book with the hospital before the delivery. In 17 years or less 3.9%, in 18-19 years 1.4% & in 20-29 years age group 0.6% were unbooked. Mothers who were booked were found to be poor attendees. Similarly American Indian adolescents were also found to receive intermediate or inadequate care.

One study compared young adolescents with old age mothers & found more young adolescent mothers with no antenatal care (17%) as compared to old mothers (4.7%). However Suratsingh observed higher proportion of young mothers with adequate care. Jonathan Fielding in a review of studies on adolescent pregnancy in US revealed that, as compared to women 20 to 24 years, those with 15 to 19 years of age experienced higher rates of toxemia, anemia, maternal death, complications of puerperium. However some studies indicated that, teenagers with adequate antenatal care do not as a group had greater problems than older childbearing mothers & in general had lower complication rate than women over 40.

National Center for Health Statistics reported that slightly more than 50% of adolescents received no health care during first trimester & 16% had no care in second trimester.
Silva & Cabral in Portugal studied effectiveness of continuity of care by an obstetrician on outcome of pregnancy & in that study it was observed that, there was significant increase in birth weight by 181 gms. & also significant decrease in admission rate to high risk pediatric unit\textsuperscript{211}.

Lee et al. in a study in Chicago on maternal age & incidence of LBW at term revealed that, proportion of young mothers with inadequate care was high ranging between 17.8\% & 11.7\%, whereas it was significantly lower in old age group ranging between 6.71\% & 3.3\%. Proportion of adolescent mothers with adequate care was lesser than non-adolescent mothers. It was ranging between 33.1\% & 50.1\% in adolescents & significantly more i.e. between 67\% & 77.4\% in non-adolescent mothers. In the same study the effect of prenatal care on incidence of LBW babies in young mothers of different age groups was between 4\% & 4.1\%, whereas in higher age group with same inadequate care was lower between 4.1\% & 1.8\%. When the prenatal care was adequate the incidence of LBW reduced significantly to between 2.8\% & 2.3\%. Similarly in higher age group between 1.5\% & 1\%. Odds ratio for the risk of term LBW was highest i.e. 1.69 for inadequate care, 1.32 for intermediate care & 1 for adequate antenatal care, indicating that less than adequate prenatal care was associated with an increased risk for term LBW babies\textsuperscript{61}.

Horon et al. observed that, adolescent mothers started prenatal care in later weeks of gestation. Mean week of initial antepartum visit was 20.9 weeks in mothers 15 years or less & it was significantly early i.e.15.5 weeks in older age group. Mean number of antenatal visits was slightly lower i.e. 7.5 as compared to 8.1 in old age group with no significant difference. Number of antepartum visits were also related to birth weight, as young mothers with lesser antenatal visits had significantly lower birth weight & as the number of visits increased, birth weight also increased\textsuperscript{92}. One study observed that, initiation of prenatal care was late by adolescent mothers & it was found to be ranging between 4.04 months & 4.39 months\textsuperscript{212}.
Slap & Schwartz revealed that 5 or fewer visits accounted for largest proportion of LBW in adolescents\textsuperscript{213}.

Fraser et al. tried to correlate young maternal age with adverse reproductive outcome & studied 170699 infants born in Utah from 1970 to 1990. In the group of adolescent mothers itself, younger adolescents were least likely to have adequate prenatal care as compared to adolescents with higher age. In mothers 17 years or less 8% had inadequate & 52% adequate care whereas in adolescents with age 18-19 years this proportion was 5% & 62% respectively. In non-adolescent mothers only 2% had inadequate care & 76% adequate prenatal care. The incidence of LBW, premature infants & SFGA infants was highest in younger teenage mothers i.e. 7%, 10% & 14% respectively & lowest among mothers who were 20-24 years i.e. 4%, 5% & 10% respectively. In addition to this, inadequate care was strongly related to adverse outcome. Within the age group of adolescent mothers, those who did not have adequate antenatal care, were twice as likely to have LBW babies as compared to those who had adequate care & more than twice as likely to have premature labor. There was also difference in SFGA babies in different age groups according to adequacy of antenatal care but it was not significant\textsuperscript{51}.

The effect of maternal age, parity & prenatal care on perinatal outcome in adolescent mothers was analyzed by Arthur Elster. In that study it was seen that, there was strong correlation between trimester prenatal care begun & incidence of SFGA infants. Young primiparous women who began their prenatal care during first trimester had 6% SFGA infants. Those who began in second trimester it increased to 8% & those started either in third trimester or not at all had highest incidence of 11%. Similar observation was there in multiparous women also, however the risk was more as compared to primiparas\textsuperscript{152}.

Osbourne studied case records of primigravidas & noted, only 36% of the teenagers booked by 20 weeks of gestation compared to 60% of the 20-24 years. 26% of teenagers & 15% of non-adolescents were booked after 20 weeks.
Review of literature

Remaining were unbooked i.e. they did not received any antenatal care. John Dwyer analysed total 231 pregnancies of mothers 12-16 years & found that, majority received prenatal care & most of them were seen in second trimester. Various obstetric complications were observed to be very low in adolescent mothers in contrast to other studies & author concluded that, this lower obstetric complication rate could be because of adequate antenatal care. Comprehensive adolescent maternity programmes considering specific educational, socio-economic & nutritional needs of this age group were arranged for Baltimore adolescent mothers. Incidence of LBW was reduced to 9% compared with 21% for control group due to this programme.

In a community based special programme for adolescents i.e. resource mother programme (RMP), it was observed that, more adolescents availed the prenatal care before the fourth month of gestation & also the proportion of LBW was lower in adolescents under community based lay home programme than traditional clinic based programme.

In another study better health outcome for babies in the form of MBW was found for teens who had case management that included continuous individual counseling. In addition to this co-ordination of health, education, psychological & nutritional services also helped to improve outcome, after controlling other factors like race, sex, parity, age etc. Diejomaoh et al. reported eclampsia higher (35%) in unbooked cases & lower (2%) in booked adolescent mothers. Ojengbede et al. commented that, due to low attendance (5%) for antenatal care incidence of PIH & perinatal mortality was high in young mothers. Rehan N. & Sansis also reported high proportion of eclampsia.

Another study observed that only 54% mothers were known to have antenatal care leading to increased incidence of hypertensive diseases of pregnancy & also fetal distress in 20% & premature labor in 10%. Efiong E.I. & Banjoko M.O. also found higher incidence of eclampsia & LBW babies in no prenatal care group.
Lower incidence of LBW in good antenatal care group (6.3%) as compared to controls (14.7%) was also revealed in another study\textsuperscript{221}. A few studies also reported the similar findings\textsuperscript{222-226}.

Many Indian authors also studied the adequacy of antenatal care & its effect on outcome of delivery in adolescent mothers. Sarkar & Giri in a study on teenage mothers at the obstetric unit of Nilratan Sircar Medical college, Hospital, Calcutta found that antenatal care was nil in 38.3%. Those who attended the antenatal clinic more than thrice comprised 51.4%. 22.6% cases were admitted in antenatal ward prior to onset of labor\textsuperscript{39}. P.Reddi Rani et al. in a short-term prospective study in a hospital at Pondicherry revealed, out of total 90 adolescent mothers, only 20% of the patients sought regular antenatal check up, whereas remaining 80% were admitted in labor or as emergencies\textsuperscript{40}. 360 teenage mothers who delivered in E.Y.L.N. Hospital, Bombay during 1990-91 were studied. It was observed that, 81.76% adolescent mothers were registered, however many of them attended the clinic infrequently or irregularly\textsuperscript{41}. Pawar & Shroti reported that, proportion of adolescent mothers availing antenatal care was observed to be increasing with increasing age, as 45.8% teenagers did not avail any prenatal care as against 29.3% women aged 20 years or more\textsuperscript{179}.

Similarly Padte et al. found 42.66% unbooked cases\textsuperscript{149}, Chhabra revealed 42% of young women who did not receive any care\textsuperscript{43} & Nitwe et al. observed that, regular antenatal care was totally absent in 13.2% of teenage mothers\textsuperscript{39}. In a study carried out by International Institute of Population Sciences, it was found that, about one third adolescent mothers delivered by a trained attendant whereas two third availed some prenatal care\textsuperscript{36}.

Analysis of the data collected in the baseline survey of India Population project III, in the state of Karnataka had different findings. Proportion of antenatal cases registered decreased as the age of women increased. In young mothers less than 20 years, proportion of registered cases was highest than those above 20 years.
However proportion of registered antenatal cases in teenagers was not satisfactory i.e. it was only 30.7%\textsuperscript{227}.

Goswami & Goswami carried out prospective study in a rural sub-divisional hospital, Diamond Harbor on 834 teenage deliveries. They reported that, 62.58% were unbooked cases. Incidence of eclampsia was 9.96% in unbooked cases & 1.92% in booked cases. Premature labor was also significantly higher i.e. 37.54% & 21% in unbooked & booked young mothers respectively. Similarly proportion of stillbirths was 14.71%, neonatal deaths were 6.91% & perinatal deaths 18.86% in unbooked teenagers, whereas the same figures were significantly lower & were 4.4%, 1.8% & 6.2% respectively in booked adolescent mothers\textsuperscript{51}.

Samir Sen studied 799 patients between 10 & 16 years. He observed that, 35.3% had no prenatal care, 23.8% had regular antenatal check up & 40.9% had intermediate care. Pre eclampsia was highest in no care group (29.78%) & lowest in the group with regular antenatal check up (14.7%). Similarly eclampsia was 5.3% & 0.7% respectively in above groups. Proportion of anemic mothers was 19.5% with no antenatal care & only 4% with regular antenatal check up. Premature deliveries were 13.7% & 31% and perinatal deaths were 6.7% & 6.3% in-group with close supervision & without prenatal care respectively\textsuperscript{150}.

4.21 : NUTRITION

Adolescence is a period of growth & development, which is reflected, in increased requirement of calories & nutrients. There is an additional burden if pregnancy is added.

Marinoff et al. reported that the rate of prematurity was high for adolescent mothers as compared to general population. Neonatal & infant mortality rates were also high. One of the major factors responsible for this adverse outcome was the nutritional status that affected the weight gain during pregnancy\textsuperscript{228}.
It was observed that, although the adolescents had higher baseline nutritional requirement than older women, many young & disadvantaged adolescents had poor dietary intake\textsuperscript{229,230}. Nutritional supplementation in black underprivileged pregnant adolescents resulted in significant increase in MBW by 157 gms. A significant increase in MBW of 269 gms. was recorded in newborns of adolescents less than 16 years receiving supplementation compared with those who did not receive it\textsuperscript{231}.

Sethi et al. noted that, adolescent mothers belonging to poor SE strata suffered more due to chronic undernutrition that retarded growth & maturation. Chronic malnutrition through early childhood & adolescence resulted in a short statured mother with a low pre pregnancy weight, which was important factor affecting birth weight\textsuperscript{180}. H.M.Wallace reported that relationship of nutrition to teenage pregnancy was significant because of the problem of undernutrition. Studies of nutrition in pregnancy, demonstrated the relationship between diet of expectant mother & birth weight, birth length of the baby. Incidence of prematurity was significant & therefore efforts to improve the nutritional status of adolescents represented an important approach to the prevention of premature birth & its sequelae. However the studies of adolescents had shown that, they had poorest food habits & diet of teenage girls tended to be even poorer than teenage boys\textsuperscript{232}.

There are two aspects of weight gain during pregnancy. First is weight gain representing expansion of maternal tissues (blood volume, protein & fat stores). Second weight gain reflects increase in products of conception (fetus & placenta). The gains attributable to the deposition & expansion of the maternal tissues predominate during first two trimesters of pregnancy particularly the second. Late second & third trimester gains are related to the growth of the fetus, placenta & expansion of the amniotic fluid. Therefore inadequate weight gains (< 4.3 kg. by 24 weeks gestation) were associated with an increased risk of SFGA infants. Late inadequate gains (< 400 gms./week) were associated significantly with preterm delivery, whether or not the total gain was adequate for gestation.
Preterm delivery appeared to be unaffected by early inadequate weight gain but was increased with inadequate weight gain late in pregnancy\textsuperscript{233,234}. Scholl et al. in their study concluded that, relationship between nutrient intake during pregnancy & birth weight may be indirect & moderated by weight gain during pregnancy. They observed that teenagers who went on to develop inadequate total weight gain for gestation had consumed 1878 calories, whereas teenagers with adequate total gain consumed 2232 calories\textsuperscript{235}. Gyepi-Gabarrah while analysing problems involved in adolescent fertility in sub Saharan Africa revealed, low nutritional levels in young adolescents under age 20\textsuperscript{82}. Morse et al. had a very different finding. Adolescents in their study were consuming higher calories, proteins, fats & other nutrients compared to non-adolescent mothers\textsuperscript{236}.

4.22: COMPLICATIONS DURING DELIVERY (HIGH RISK FACTORS)
Throughout the world pregnancy & childbearing are occurring at a younger age than in the past, resulting in adverse health, demographic & social consequences. The hazards of continuing pregnancy in adolescence were not clear, but the investigators reported that, teenage pregnancies suffered an increased incidence of obstetric complications including pre eclampsia, prematurity, cephalo pelvic disproportion, prolonged labor & increased perinatal loss\textsuperscript{46}. Worldwide many studies on maternal & fetal complications of adolescent pregnancy were carried out. Duenhoelter et al. reported pre eclampsia, eclampsia, anemia, CPD more in adolescents. Similarly proportion of preterm deliveries was 10.5% & 5.4% in adolescents & non-adolescents, mid-forceps delivery in 4.2 & 2.1% cases & controls & LSCS in 10.4% & 7% cases & controls respectively. In fetal complications, 19.2% newborns in adolescents & 15.9% in non-adolescents were LBW & there was no difference observed in perinatal mortality\textsuperscript{111}.
Nancy Leland et al. found 9.05% & 28.29% preterm babies of 32-36 gestation weeks in white & black adolescent mothers respectively. 6.33% & 10.87% were very preterm i.e. less than 32 weeks of gestation in white & black mothers respectively. 14.49% & 14.97% were LBW babies & 2.58% & 3.71% were very LBW & 6.78% & 9.74% were SFGA in white & black respectively. Neonatal mortality rate was 14.3 & 17.6 in white & black respectively. Horon et al. revealed incidence of toxemia 4% & 3.8%, CPD 4.3% & 3.1% in adolescent & non-adolescent mothers respectively. Mean length of gestation was 38.8 weeks in adolescent & 39.3 weeks in non-adolescent mothers. LSCS rate was 7.3% & 5.7% in adolescent & non-adolescent mothers respectively. Proportion of preterm births was 13.5% in adolescents & 6.8% in non-adolescent mothers. LBW ratio was 13.3% & 11.8% in young & old mothers respectively.

P.J. Sweney reported MBW as 3051 gms. in newborns of adolescent mothers & 3093 gms. in newborns of non-adolescent mothers. Whereas perinatal mortality rate was 52.4 & 27.2 in 1st & 2nd parity adolescents. Fraser et al. found incidence of preterm delivery 10% in mothers 17 years or less, 8% in 18-19 years age group & 5% in mothers with age 20-24 years. LBW proportion was 7% in mothers 17 years or less, 5% in 18-19 years & 4% in 20-24 years age group. SFGA proportion was 14%, 12%, 10% in above age groups respectively. F.J. Zlatnik & L.F. Burmeister observed prenatal eclampsia more common in adolescent mothers than in non-adolescent mothers in Iowa Hospital. In the same study there were 12% LBW babies in young mothers (13-15 years) & 7% in 16-17 years age group.

Elster found proportion of SFGA highest i.e. 12% in 12-14 years age, which reduced to 6% in non-adolescent mothers. Hollingsworth et al. noted increased prevalence of pre eclampsia & pelvic inlet contraction in young mothers & no difference was observed in LSCS rate. McAnarney found 13.8% LBW infants in adolescent mothers 15 years or less & 5.8% in non-adolescent mothers.
Review of literature

Lee et al. found the same rate 19.8, 9.1 & 7.3 per 1000 in mothers less than 15, 15-19 & all age group mothers respectively\(^6\).

J.B.Coates reported acute toxemia in 14.6% adolescents, 14 years or less & 7.9% in more than 14 years, contracted pelvis in 15.3% & 11.3% in same age groups respectively. There was no difference in LSCS rate, abnormal presentation, prolonged labor & PPH. In addition to this incidence of prematurity was more i.e.19% in young mothers than old mothers i.e.18%. Fetal anomalies were found in 5.8% young adolescents & 2.9% mothers more than 14 years. NMR was reported as 43.8 & 25.6 per 1000 births in mothers 14 years or less & more than 14 years\(^1\). Greater rates of toxemia & statistically significant higher rates of prematurity were noted in young mothers by J.A.Grant & F.P.Heald\(^2\).

J.E.Fielding observed increased incidence of anemia, abnormal bleeding, toxemia, difficult labor & CPD in young mothers. Proportion of LBW was 30% higher in adolescent mothers. There were 6.9, 11.3 & 13.5% LBW infants in all ages, 15-17 years & less than 15 years old mothers respectively. Newborns of mothers less than 15 years were 2 to 4 times more likely to be neurologically abnormal than non adolescent mothers. Perinatal mortality rate was also more in young mothers\(^3\).

McAnarney et al. reported more PIH & CPD in adolescents. Infants of young mothers were more than twice likely to be LBW & three times more likely to die within 28 days\(^8\). Leppert et al. found no higher rate of CPD, APH, pre eclampsia & LSCS in young mothers. But abnormal presentations were more in adolescent mothers. 4% deliveries were preterm in adolescent mothers & 1% in old mothers. MBW was less by 133 gms. in mothers 18 years or less\(^6\). Spellacy et al. reported incidence of abnormal presentation & APH equal or more in adolescent mothers than non-adolescent mothers & CPD was more\(^2\). Satin et al. observed rate of PIH 19%, 17% & 16% in mothers 11-15 years, 16-19 years & 20 years or more respectively & LSCS rate was 14% in adolescent & it was 18% in non-adolescent mothers. No difference was found in eclampsia according to age.
Proportion of VLBW was 4% in adolescents & 2% in non-adolescents & of LBW was 10% & 7% in cases & control respectively. There was no difference in congenital anomalies & neonatal mortality in young & control group. Israel & Woutersz revealed pre eclampsia in 6% teenagers & 2.6% controls. No difference was found in other risk factors. Prematurity was observed in 12.8% cases & 9% control groups & neonatal death rate was 23.5 & 20 per 1000 in cases & controls respectively. LSCS rate was lower between 2.1% & 3.8% in adolescent mothers & between 3.4% & 5.1% in non-adolescent mothers. CPD rate was between 4.5% & 15% in cases & between 3.1% & 7.1% in controls. Toxemia was between 11.1% & 19.1% in cases & 7.6% & 17.1% in controls. Premature births were between 10.7% & 17.9% in young mothers & between 9% & 16.7% in old mothers. No difference was noted in PNMR among cases & controls. Aznar & Bennett found, incidence of toxemia highest in 13-14 years age group as compared to 15-16 years age group. There were 4% more premature births in adolescents. NMR & PNMR were slightly more in adolescent mothers. 2.9% babies had congenital anomalies - anencephaly-2, hydrocephalus, meningocele, diaphragmatic hernia-each 1, talipes, umbilical hernia, inguinal hernia-each 5, polydactyly-3, undescended testes-2, hydrocele, pylorospasm -each 1 & congenital heart disease -3. One such study found incidence of toxemia 28%, LSCS rate 2%, 56% had forceps delivery, 4% PPH cases, incidence of prematurity 8%, congenital anomalies 2% & 4% perinatal mortality. Briggs carried out study in Los Angeles. He had reported proportion of toxemia 3% in cases, abnormal presentation in 1.7% cases & in 1.3% controls. Similarly spontaneous delivery was in 15%, forceps in 78%, LSCS rate 3.5% in adolescent mothers & 9.5%, 79.1% & 6.6% in controls respectively. There were 1.5% PPH cases. Prematurity rate was 7% & 4.7% in young & old mothers respectively. Incidence of PNM was 1.5% & 1% in young & old mothers respectively.
Congenital anomalies like anencephaly, hydrocephalus & cleft palate were observed in 1.5% young mothers whereas no such anomaly was noted in old mothers\textsuperscript{242}. Arkutu commented in his study that, pre eclampsia was more in old age group whereas eclampsia was more common in young mothers. Out of total 36 cases, 26 occurred below 20 years\textsuperscript{191}. In another study, proportion of spontaneous delivery was 90.4% & 91% in adolescent & non-adolescent mothers respectively. LSCS rate was 5.2% & 5.7% in above groups. Incidence of premature labor was 15.5% in adolescents as compared to 12.7% in non-adolescents. Proportion of LBW babies was 24.7% in young & 18% old mothers. Incidence of term LBW declined with increasing age, from 3.2% in 15 years or less to 1.3% in old mothers\textsuperscript{61}.

C.S.Ventura & E.S.Grech observed APH incidence twice in less than 17 years than old mothers. PIH was not higher in adolescents. However breech presentation was more in young mothers. Spontaneous cephalic delivery occurred in 88.3%, 84.2% & 83.5% mothers less than 17, 18-19 & more than 20 years respectively & LSCS rate was 6.7%, 8.4% & 9.8% in above age groups respectively. Proportion of LBW in adolescents was more whereas no higher incidence of congenital anomalies was noted. PNMR was 39.9, 20.5 & 14.4 per 1000 births in mothers with age less than 17, 18-19 & more than 20 years respectively\textsuperscript{46}.

One author from Transkei found, risk of anemia, hemorrhage & pre eclampsia similar in both the groups. LSCS rate was 12% & 15% in young & old mothers respectively. Whereas MBW of both the groups was similar. PNMR was slightly higher in adolescent group. It was 58.2/1000 in adolescent mothers & 40.7/1000 in non-adolescent mothers\textsuperscript{243}. In another study incidence of pre eclampsia was slightly higher in young mothers. LSCS rate was 12% & 15% in study & control group. Proportion of preterm labor & delivery of LBW babies was significantly higher in adolescent mothers\textsuperscript{244}. Although no significant increase in incidence of CPD, PIH & anemia was observed in young mothers, MBW was 2738 gms. in the adolescent mothers & 3054 gms. in the non-adolescent mothers with significant difference.
Fivefold increase in perinatal mortality was reported in young mothers in another study. Adedoyin & Adetoro found toxemia of pregnancy more in young mothers (5%) than old mothers (2.4%). Babies born to adolescent mothers were also having lower birth weight than babies of adult mothers. Incidence of breech presentation, preterm deliveries, forceps deliveries was same in both the groups & pre eclampsia & LSCS rate were markedly less in adolescent mothers than adults in one study. Ojengbede et al. found higher than usual incidence of PIH, foeto pelvic disproportion, perinatal mortality in young mothers. Scholl et al. compared both developed & developing countries data & noted increased risk of preterm delivery associated with young maternal age in both. The risk of LSCS reduced in developed world whereas it increased in developing world. Rate of cesarean delivery was significantly lower in adolescent group, there was no significant difference in MBW in adolescent & non-adolescent group & preterm births were 24.1% in adolescents & 20.3% in old age group in a study by Lubarsky et al. Satin A.J. et al. observed that, LSCS births were significantly less in adolescents than in those more than 20 years. Proportion of VLBW was 4% in adolescents & 2% in non-adolescent mothers. Kondamudi et al. reported that pregnancies in less than 16 years had increased risk of preterm labor & operative delivery. Older adolescents had a higher risk of PIH. Prematurity, SFGA & perinatal mortality were significantly more in younger mothers. Significantly lower rate of LSCS & high risk of prematurity was recorded in mothers less than 17 years by Krahenmann & Bruhwiler. However no significant difference in perinatal mortality & LBW was observed. Slightly higher rate of preterm deliveries, LBW babies & deliveries affected by neural tube defect in teenage mothers were noted by Rosenberg et al. Prematurity was observed to be more in newborns of adolescent mothers (11.8%) than non-adolescent mothers (5.3%) in another study. Ventura revealed greater risk of LBW & preterm births leading to more risk of illness, developmental delays & even death in babies of young mothers.
Kushwaha et al. found incidence of LBW babies very high i.e. 67.3%. Similarly congenital anomalies were found in 8.6% newborns & neonatal mortality was 136.2/1000. No difference was noted by one study. Santelli J.S. & Jacobson M.S reported that mothers under 20 years had high rate of LBW & VLBW infants for 1st & 2nd parity whereas there was no change in MBW between the two pregnancies in Baltimore. With a good prenatal care teenage pregnancy was not found to be a neonatal risk factor by one author. Santelli J.S. & Jacobson M.S reported that mothers under 20 years had high rate of LBW & VLBW infants for 1st & 2nd parity whereas there was no change in MBW between the two pregnancies in Baltimore. With a good prenatal care teenage pregnancy was not found to be a neonatal risk factor by one author.

In one study, out of total cases of eclampsia 40% were found in mothers less than 15 years & out of total CPD cases, 20% were in mothers less than 15 years. Incidence of obstructed labor was 10.3% & 7.4% in cases & controls respectively. Hypertensive diseases were more in young mothers. LBW babies were also more in young mothers (14.3%) than old mothers (7.6%) in a study by Sanghavi et al. Dhutia H.P found higher LSCS rate in young mothers. Incidence of pre-eclampsia was highest (13%) in mothers less than 16 years & it was 10% in more than 25 years. Difficult labor was observed to be more in cases. Another study reported surgical intervention more in young mothers i.e. 95% episiotomies in adolescents & 55% in non-adolescents. LSCS rate was 12.8% in adolescents & 6.8% in non-adolescents. Perinatal mortality was 29% in adolescents & 18% in non-adolescents. More cases of PIH, preeclampsia, eclampsia were observed in a few other studies. Ojengbede et al. observed incidence of PIH 21% in young mothers & 6.6% in all hospital deliveries. Incidence of CPD was also high. Higher perinatal mortality was noted in adolescent mothers. Prasad V. found incidence of preeclampsia 15% in young mothers & 5% in old mothers.
Review of literature

Preterm deliveries were 3 times higher in young mothers (15% as against 5%). Romero et al. revealed that pre eclampsia & eclampsia occurred twice as often in youngest age group than in 18-19 years (12.8% & 6.6% respectively.). Incidence for a whole group was 9.5%. Proportion of CPD was 4.7% in less than 16 years, 3.6% in 17-18 years & 1.9% in 19 years. They further noted more forceps deliveries & cesarean deliveries in youngest age group\textsuperscript{263}. Nestarez et al. found PIH in 24% mothers with age 9-15 years, 21% in 16 years & 38% in 17 years old & eclampsia in 5.7%, 1.4% & 2.8% in above age groups respectively. Incidence of LBW was 28% in mothers less than 15 years, 30% in 16 years & 22% in 17-years old mothers\textsuperscript{264}. Incidence of preeclampsia was low & proportion of premature babies high in young mothers in one such study\textsuperscript{210}. From the review of 200 studies it was concluded that, pregnancy related complications like prolonged, difficult & obstructed labor, CPD, preeclampsia were very high in mothers less than 20 years. Similarly prematurity, stillbirth rate & perinatal mortality were observed to be very high in them\textsuperscript{92}. Similar findings were of another study\textsuperscript{83}.

In a review of more than 800 studies by Liskin L, health consequences like preeclampsia & CPD were more in young mothers. Adverse effect observed on child were LBW, prematurity & mortality\textsuperscript{156}. Risks of adolescent pregnancy in a study from Latin America increased with decrease in age of the mother, particularly hypertension, CPD, prolonged labor as reported by PAHO\textsuperscript{265}. Bremberg had observed, no increased incidence of obstetric complications & no difference in perinatal mortality. However incidence of preterm deliveries was 3 fold higher in adolescent mothers\textsuperscript{90}. MBW was observed to be 264 gms. less in young adolescent mothers by Haiek & Lederman\textsuperscript{266}. Combes & Reynaud noted that 30% babies were LBW in adolescent mothers & 21% in older age group mothers\textsuperscript{267}.

Proportion of premature labor & LBW babies was much higher in adolescent mothers in a study by Arkutu\textsuperscript{196}. Hardy J.B. et al. observed highest proportion of LBW in mothers 16 years or less\textsuperscript{258}.
Kramer M.S had very different observation. Author found that, maternal age had no significant independent effect on LBW. Very young age may exert indirect effects by influencing height, weight, nutrition, smoking, alcohol, drug abuse & no direct causal effect could be demonstrated. MacAnarney revealed proportion of LBW babies higher in adolescent mothers than non-adolescent mothers. Authors also noted that, mother's age & her pubertal development were not nearly as important as her size, her pre pregnant weight, weight gain during pregnancy & height. Anemia was the only complication that was significantly increased in a study by Osbourn et al.

Different Indian authors also carried out studies about maternal & fetal complications of adolescent pregnancy. In a study by S.P.Sen, pre eclampsia was the major complication ranging between 19-30%. Highest incidence was in young mothers less than 16 years & it was 5 times higher than in mothers more than 16 years. Eclampsia ranged between 0.7% & 5.3% & was highest with no prenatal care. LSCS rate was between 1 to 1.2%, forceps between 3 to 3.7%. Proportion of premature deliveries ranged between 13.7% to 31% & it was highest with no care. PPH was 2 to 2.2%. Perinatal deaths were 6%.

Padte et al. found PIH in 13.05% adolescent mothers & 7% non-adolescent mothers. LSCS rate was 12.1% & 14% in young & old mothers respectively. Proportion of preterm deliveries was 31.65% in young mothers. LBW babies were 35.9% in adolescent & 29.9% in non-adolescent mothers. PNMR was 72.3/1000 & 50.8/1000 in cases & controls respectively. Goswami & Goswami observed eclampsia in 6.95% adolescents & 4.54% non-adolescent mothers. There was high proportion of abnormal presentation in young mothers. LSCS rate was 4.07% in cases & 5.5% in controls. Proportion of preterm deliveries was 31.65% in adolescents. Perinatal mortality was 14.15% in adolescents & 11% in non-adolescents.

Saroj Pachauri found hypertensive disorders in 7.3% adolescents & 3.7% non-adolescent mothers. No difference was noted in both groups for incidence of APH.
Mean gestation was significantly lower i.e. 37.5 weeks in young mothers than old mothers i.e. 38.4 weeks. 11% delivered before 35 weeks, 19% between 36-37 weeks & 69.9% at 38+ weeks in adolescent mothers. Prolonged labor was more in adolescents. Incidence of PPH & congenital anomalies was similar in both the groups. PNMR was 64.9/1000 in adolescents & 50/1000 in non-adolescents. MBW was found to be 2908 gms. in teenage mothers & 3019 gms. in non teenagers in another study.

In a study by Sarkar et al. eclampsia & pre eclampsia were found to be significantly more in adolescent mothers as compared to non-adolescent mothers. LSCS rate was 13.2% in adolescents & 14.6% in non-adolescents. Proportion of vaginal deliveries was 85.5% & 84.5% in cases & controls respectively. 1.8% cases & 0.6% controls had PPH. Incidence of LBW babies was 30% in young mothers & 20.3% in old mothers. Newborns of 0.5% cases had congenital malformations. Total neonatal deaths were found to be 14.3%. One study reported pre eclampsia incidence as 35.7% in teenagers & 22.5% in non-teenagers. 8.33% had eclampsia in adolescents & 0.81% in non-adolescents. Abnormal presentations were more in young mothers. In adolescents, 82% had normal vaginal delivery, 25.64% had forceps application & 4.6% delivered by LSCS. Preterm deliveries occurred in 14.28% young mothers. Incidence of PPH was 1.19%, but it was not higher than control group. Perinatal mortality was 8.33% in young mothers & 5.4% in old mothers.

D.C.Datta found that proportion of APH, malpresentation, multiple pregnancies was not high in adolescent mothers. But there was increase in proportion with increase in age. LSCS rate was between 6.6 & 7%, forceps deliveries between 6.7% & 10.9% & both increased with age. Premature babies were 22.7% in mothers 17 years or less, 22.4% in 18-19 years & 19.4% in mothers 20 years or more. Perinatal mortality was 21% in mothers 17 years or less, 19% in 18-19 years & 15.8% in 20-24 years.
Gupta & Mirchandani observed in New Delhi that, unclassified hypertension was found in 16.8% adolescent mothers & 13.5% non-adolescent mothers, but not at the level of significance. Eclampsia occurred in 2.5% & 1.1% young & old mothers. APH was not significant. LSCS rate was lowest in teenage mothers i.e. 3.5% & it increased with age. Deliveries before 37 weeks of gestation occurred in 19.1% young & 16.9% old mothers. MBW was 2361 gms. in 15-19 years & 2515 gms. in 20-24 years mothers.

Nitwe et al. observed pre eclampsia, abnormal presentation & CPD more in teenage mothers. 87.9% young mothers had spontaneous vaginal delivery, 4.98% had forceps delivery & 3.61% had LSCS. LSCS rate was 7% in old mothers. Incidence of VLBW was 5.12%, LBW 41.37% & normal birth weight was 53.44% in young mothers. The same figures for non-adolescent mothers were 2.84%, 28.69% & 68.47% respectively. There was no difference in congenital anomalies in both groups. Stillbirths were 2.17% in young mothers & 1.78% in old mothers & neonatal deaths 6.75% & 1.9% in young & old mothers respectively. One study reported PIH in 31.9%, eclampsia in 3.3% & obstructed labor in 5.5% cases. Proportion of spontaneous deliveries was 54.5%, forceps 13.2% & LSCS rate 18% in young mothers. 29% teenage mothers had preterm labor, 68.8% babies were LBW & perinatal mortality rate was 33/1000.

Nayak et al. found PIH in 11.32% cases & 7.05% controls. Normal delivery in 86.2%, vacuum & forceps in 5.67% & LSCS in 7.56% cases, but not at the level of significance. Preterm labor was in 19.88% adolescent mothers & 8.47% non-adolescent mothers. Proportion of LBW babies was 50.53% & out of these 9.18% were VLBW in adolescent mothers, whereas the same proportion was 38.92% & 2.56% in controls. Perinatal mortality was 7.83% in teenage mothers & 3.96% in old mothers. Pawar & Shrotri had a study in Sassoon General Hospitals, Pune & observed no difference in toxemia in both the groups however eclampsia was more common in young mothers than old mothers i.e.25.3% & 5.3% respectively.
Proportion of spontaneous vaginal deliveries was more in young mothers. LSCS rate was 10.4% for teenagers & 14.9% for control group. Incidence of preterm deliveries was 20.7% in mothers less than 15 years, 25.5% in 16-17 years, 10.7% in 18-19 years & 9.5% in 20-25 years mothers. MBW was 2400 gms. in adolescent mothers. It was about 200 gms. more in old mothers. Proportion of LBW babies was 49% in mothers less than 17 years & 33.2% in more than 18 years mothers\textsuperscript{179}. Another study reported no difference in congenital anomalies in both the groups. PNMR was 172.4/1000 in age group less than 15 years which reduced to 95.5/1000 in 18-19 years & it was 86.6/1000 in mothers more than 20 years. Preeclampsia (23.7%), eclampsia (8.7%), CPD (6.25%), obstructed labor (3.7%) & APH (2.5%) were more common in adolescent mothers. There were 65% normal deliveries, 21.3% forceps deliveries & 13.7% LSCS deliveries in young mothers. Incidence of premature labor was 30% in the same study\textsuperscript{42}. In a study by Chhabra incidence of toxemia was 14% in young mothers & 8% in old mothers. LSCS rate was 21% & 19.5%, normal deliveries 72% & 74%, forceps deliveries 5.75% & 3.75% respectively in adolescent & non-adolescent mothers. 14% & 13% adolescent & non-adolescent mothers respectively had preterm labor. 11% adolescent mothers had babies less than 2000 gms., as compared to 7% in control group. Perinatal loss was 77.5/1000 & 57.5/1000 in cases & controls respectively\textsuperscript{43}. Prolonged labor & short stature were observed as risk factors by Pratinidhi et al. which were significantly more in adolescent mothers. Proportion of preterm labor was 5.9% & 3.5% in young & old mothers respectively. LBW babies were 24.8% in mothers less than 18 years & 14.6% in others. Stillbirths & late neonatal deaths were significantly more in young mothers\textsuperscript{147}. As per ICMR study proportion of LBW was between 50.5% & 57.9% in mothers 20 years or less & it was highest in Delhi, Chandigarh & Hyderabad. Relative risk of LBW babies in young mothers was 1.38 & 1.36 for urban & rural areas respectively.
PNMR was higher in young mothers than old mothers & ranged between 37.2/1000 & 100/1000 in different parts of the country.

### 4.23 : APGAR SCORE

Apgar score is a method of rapidly assessing general state of baby immediately after birth. Virginia Apgar introduced the evaluation of the Apgar score in 1952. Apgar score is related to the status of oxygenation of the fetus at or immediately after birth. The scoring is done in a newborn at 1 min., 5 min. & 10 min. after birth. The important signs that are monitored are appearance or color, pulse or heart rate, grimaces or reflexes, activity or muscle tone & respiration. A score of 0 to 2 is assigned to each of these five individual parameters. Thus total score is ranging between 0 to 10. When total score is between 7-10 there is no depression, between 4-6 there is mild depression & between 0-3 there is severe depression. This method provides grossly quantitative expression of the infant’s condition at birth. The 5 min. score correlates more closely with the neurological status at 1 years of age than does the score at 1 min.

C.S. Ventura & E.S. Grech in a study on risk in pregnant teenagers observed, increased incidence of lower Apgar score in infants of young mothers aged less than 17 years. 2.8% newborns of young mothers less than 17 years, 0.4% of mothers 18-19 years & 1.3% of non-adolescent mothers were having Apgar score ranging between 1-3. Jacono et al. tried to study pregnancy & birth problems in teenage mothers & noted that, babies born to young mothers had low Apgar score at 5 min. after birth than babies of non-adolescent mothers.

Similarly John Dwyer also found low Apgar score in newborns of young mothers. M.O. Silva et al. had reported effectiveness of the continuity of antenatal care by an obstetrician during antenatal period & found that Apgar score of less than 7 was observed in not a single young mother who received adequate antenatal care.
Adedoyin & Adetora compared outcome in adolescent & adult mothers from Nigeria & reported no significant difference in Apgar score among two groups\(^{194}\).

4.24 : GYNAECOLOGIC AGE
Gynecologic age relates adolescent growth potential to a standard event menarche. Gynecologic age was defined as the age in years at conception or delivery minus the age of menarche. These definitions were based on theoretical premise that closer the young women to their menarche more likely they would bear small infants\(^{168}\).

Zlantik & Burmeister carried out a study about, ‘low gynecologic age - an obstetric risk factor’, on 1005 young adolescent mothers with 17 years of age or younger. For this study gynecologic age was determined by subtracting her age at menarche from her chronologic age at delivery. Authors observed, statistically significant increase in LBW infants at younger age. In mothers with gynecologic age 1 & 2 there was significantly higher proportion of LBW babies. Proportion of LBW babies in mothers 15 years or less & gynecologic age more than 2 was 9.1% & in mothers more than 15 years & gynecologic age 2 or less this proportion was 9.3%. Further with chronologic age of 15 years, when gynecologic age was 2 or less proportion of LBW babies was significantly more i.e. 17% & when gynecologic age was more than 2 with same chronologic age, this proportion was 9%. Thus the study concluded that, low gynecologic age increased the risk of LBW babies in adolescent mothers. The reasons given were as follows - low gynecologic age may predispose to premature emptying of uterus, since the uterus would have had fewer cycles of exposure to ovarian hormones prior to pregnancy. Thus the uterus might somehow be structurally or functionally less able to carry a fetus to term. It is also possible that the uterine vasculature may be less well developed in those young women conceiving close to menarche than it is in those with a higher gynecologic age.
Therefore there may be differences in the degree to which uterine or placental blood flow increases in pregnancy.

Another important factor involved may be nutritional factor. Growth spurt usually occurs prior to menarche. Linear growth is not completed until 4 years after menarche. Therefore a pregnant woman with a low gynecologic age must satisfy the nutritional requirements for her own growth as well as those of her fetus. Failure to meet these nutritional requirements may result in IUGR & perhaps in premature labor\textsuperscript{237}.

Other study also reported that biologic immaturity expressed as low gynecologic age (defined as conception within two years of menarche) had a role in increasing the risk of adverse outcomes. This was further explained as, immaturity of the uterine or cervical blood supply may predispose teenage mothers to subclinical infection, an increase in prostaglandin level & consequent increase in the incidence of premature delivery\textsuperscript{274}. Erkam et al. had also thrown light on this aspect. In a study of 261 adolescent mothers they observed that, prematurity was closely related to the interval between menarche & conception than to simple chronologic age\textsuperscript{275}. In a statement on teenage pregnancy by committee on adolescence of American Academy of Pediatrics, it was commented that, data from different centers using gynecologic age rather than chronologic age as a basis of comparison, confirmed higher rate of LBW infants among young teenagers irrespective of social class. Committee reported further that, some investigators had found a higher incidence of LBW associated with gynecologic age of 2 years or less\textsuperscript{14}.

In a study by Scholl et al. low gynecologic age was defined as conception within 2 completed years of menarche. Low gynecologic age was associated with double the risk of premature delivery & also with LBW. Authors concluded that, low gynecologic age may be an important addition to assessment systems to detect women at high risk of preterm labor & delivery\textsuperscript{274}. Another study noted that low gynecologic age contributed disproportionately to the risk of preterm delivery in adolescent mothers.
Risk decreased with each age from menarche. One study reported association of low gynecologic age with poor pregnancy outcome even in cases of late menarche (16-17 years). Authors commented that, this was due to less development of uterine vasculature & inadequate placental or uterine blood flow. However other researchers were not in agreement with these findings. As they could not show strong relationship between low gynecologic age & poor pregnancy outcome.

4.25: REPEAT PREGNANCY IN ADOLESCENTS

Recently attention has focused on the problem of repeat pregnancy in adolescence. P.J.Sweeney carried out study to examine the effect of parity on pregnancy outcome in young teenagers, in which first births to 407 teenagers were compared to second births to the same 407 teenagers. It was observed that, 35% of the patients received no prenatal care or initiated care in last trimester with their first pregnancy, compared to 49% who received late or no care with 2nd pregnancy. MBW of all first births was significantly lower than MBW of all 2nd births. Similarly PNMR was 52.4/1000 for first births & it was significantly lower i.e. 27.2/1000 for 2nd births.

A study was published by Jekel et al. in which, risk of LBW & PNMR was markedly greater for 2nd & 3rd pregnancies than initial pregnancy. Incidence of LBW for subsequent births was more than double than first births (27% vs 10.7%) & perinatal mortality was 9 times for subsequent births than index infants. McAnarney also commented that, multiparous adolescents were more likely to have small infants than primiparous adolescents & adults. In one study NMR was 13.9/1000 live births for multiparous adolescents & 9.9/1000 births for primiparous young mothers. Blankson et al. in a study about health behavior & outcome on sequential pregnancies of adolescents found that, there was decrease in prevalence of IUGR & increase in MBW & prematurity rate in second pregnancy.
It was further quoted that, adolescents with poor outcome in their first pregnancy had at least three-fold risk of repeating that poor outcome in their second pregnancy. Mean number of visits was 10.6 in first pregnancy & 8.5 in second pregnancy. MBW increased by 91 gms. between 1st & 2nd pregnancy. Preterm delivery rate increased from approximately 15% in first pregnancy to 19% in second. Proportion of perinatal deaths was 1.2% during 1st & 1.4% in 2nd births\(^{280}\). In one of the editorial it was reported that, risk of LBW babies for 2nd child was two times more\(^{281}\).

Santelli & Jacobson investigated the outcome for repeat teenage pregnancy & found that, both primi & second parity young mothers had high but identical rates of LBW (17.5%), high rates of VLBW babies & no change in MBW between the two pregnancies\(^{252}\). Simon et al. observed a decrease in MBW & increased incidence of LBW births with parity among adolescent mothers indicating adverse outcome in 2nd para as compared to first\(^{282}\).

Hardy et al. had a study in women who had their first pregnancy in adolescence. In such women newborns of subsequent pregnancies were at considerably higher risk of dying than the newborns of women without pregnancy in adolescence\(^{268}\). Phipps Y.S. reviewed 250 articles in medical, public health & social work journals & found that, second pregnancies to women who first delivered prior to age 20 were associated with higher rates of prematurity & perinatal mortality than were first pregnancies\(^{223}\). Gravin Arneil commented that, prevention of second adolescent pregnancy was important because LBW & prematurity were more common in 2nd & 3rd adolescent pregnancy. In same study of adolescent mothers, preterm delivery occurred in 11% of 1st babies, 21% of 2nd babies & 43% of 3rd babies\(^{34}\). Two studies also found that second birth were at a greater risk for a poor outcome than the first birth\(^{283,152}\).
4.26 : KNOWLEDGE OF MOTHERS ABOUT SOME ASPECTS OF HEALTH

4.26.1 : Age at marriage

Few studies were carried out to know how far the people were aware of minimum legal age at marriage. However studies among adolescent mothers are negligible. Shrinivasa et al. had study on knowledge & perception of adolescents regarding factors affecting family formation & one of them was age at marriage. They observed that, 53% of the girls considered 18-19 years as the right age for girls to marry. Negligible proportion (2-3%) felt that, females should marry before 18 years.284

One study was carried out in adolescents of some villages & 112 adolescents were interviewed for some of the aspects. All the adolescents were of the opinion that, no one should marry before 18 years of age irrespective of sex. In addition to this, majority of girls preferred the age of 20 years or more at first child birth.285 In an analysis of pre pubertal marriages in Belgaon district, when parents of such girls were interviewed it was noted that, only about 19% had some knowledge of legal minimum age at marriage.142

4.26.2 : Family Planning methods awareness

The key to arouse people’s sustained involvement & participation in family welfare programme is awareness about importance & use of different family planning methods. However different studies had shown universal unawareness about FP methods in community & particularly in adolescents.

Prospective study of 200 teenage mothers 16 years or less & 200 controls over 20 years was conducted in Harare. It was observed that, significant number of adolescents had very little knowledge about services & it was also observed that, either they appeared uninformed or misinformed of the risks associated with use of contraceptives.162 Similar case control study among first time pregnant adolescent girls in a squatter community in Brazil showed that, there was striking lack of knowledge concerning conception & contraceptives in young mothers.103
In another study of knowledge & utilisation of contraceptives by adolescents carried out in Brazil, it was found that, 61.5% had some knowledge of contraceptive methods & remaining were totally unaware\textsuperscript{164}. Prospective study was conducted in 2 main delivery centers in Nairobi & it was revealed that, upto 60% had no knowledge about contraceptives\textsuperscript{74}. However in Haver town of eastern Ethiopia, 54% of the students spontaneously mentioned a modern contraceptive method when they were asked. But large number of students did not know the answers to the specific questions about prevention of pregnancy\textsuperscript{286}.

In DHS of 37 countries, knowledge of adolescent women about contraceptive methods was assessed. It was found that, in Sub Saharan Africa, it was lowest i.e. 39.7% in Niger & highest i.e. 94.7% in Rwanda. Similarly in Asia, this was 66.8% & 99.5% for Pakistan & Bangla Desh respectively. In Latin America, Bolivia had lowest proportion of 73.7% & Dominica Republic had highest i.e. 99.4\%\textsuperscript{4}.

Among Indian studies, Pratinidhi et al. undertook study to find out KAP of newly married adolescent couples & noted that, 32% girls were totally unaware of any method of family planning. The most known method was CuT by 58.4% adolescent wives, followed by oral contraceptive pills by 42% & condoms by 21.6% & very few knew about terminal methods\textsuperscript{87}. International Institute of Population Sciences observed that, although about 90% of ever married adolescents knew at least one method of contraception, this method was mostly sterilisation, which was most unsuitable for large number of adolescents. In the national survey of fertility & FP practices in India (ORG1990), it was observed that, 89% of adolescents compared with 95% of entire sample were aware of female sterilisation. 59% of adolescents & 66% of entire sample was aware of condoms. 49% & 60% respectively knew oral contraceptives & 39% & 55% respectively knew about IUCDs. However accurate knowledge about method was lacking\textsuperscript{287}. 
Review of literature

A few other studies also reported that, adolescents were unaware about correct use of the various contraceptives\textsuperscript{288,289}. Bhalerao et al. interviewed 200 pregnant women at Nowrosjee Wadia maternity hospital, Bombay. In this group, proportion of adolescents was high. It was observed that, 8.5\% had no knowledge about FP methods & did not know that spacing methods could prevent pregnancy. Remaining had some knowledge & only 2 procedures i.e. MTP & female sterilisation were most known to them\textsuperscript{290}. One such study also reported that, awareness about MTP was as good as other methods of FP\textsuperscript{291}. In addition to this, one study among teenage girls from Maharashtra\textsuperscript{292}, findings of National Family Health Survey\textsuperscript{131} also revealed less awareness about FP methods.

4.26.3 : Infant feeding

The oldest Indian reference giving information about care & nutrition of the newborn was Charak sanhita, published at the beginning of the Buddha era. The value of human milk was clearly shown in this book. Susruta recommended that, cholostrum should be thrown away in the first 4 days after birth, that the newborn should be fed honey & butter with gold ash to facilitate the discharge of meconium & that the breast feeding should be started on the 5th day.

The paramount importance of breast milk had been recognised by western physicians as long back as medical history goes. Hippocrates (B.C. 460-370) said, fetus learns to suckle in uterus & this accounted for passage of meconium & the presence of suckling reflex at birth. In Kashyap sanhita it was recommended to offer fruits by six months, semisolid cereal preparation at 10 months & solids by 12th month of age. However Susruta advised use of cereals after 6 months of age. The historical evidences in Europe recommended the introduction of the semisolids at the end of 1st years\textsuperscript{293}.

Various studies were carried out to assess the knowledge, attitude & practices of mothers about infant feeding, in many parts of India. But most of them were in all age group mothers or schoolgirls & not specifically in adolescent mothers.
Review of literature

Knowledge & attitude amongst well to do adolescent schoolgirls towards breastfeeding were studied by Kapil et al. It was observed that, 76% girls knew that breast-feeding should be started immediately after birth. 61% were aware of appropriate age for administration of semisolids as 4 to 5 months. 16% girls were aware that bottle-feeding should be totally avoided. G.A. Joseph et al. found that, only 23.1% of adolescent girls had correct & adequate knowledge about breast feeding. Verma et al. in a study on, attitudes of future mothers regarding infant feeding noted that, all girls had negative attitudes towards infant feeding especially breast feeding.

Impact of maternal knowledge & practices on the nutritional status of infants was assessed by Bhat et al. Awareness about breast-feeding was excellent in 6.5% mothers, 17.07% had well, 32.52% had fair & 43.9% had poor knowledge. Knowledge was correlated with nutritional status of their infants. In mothers with excellent awareness, proportion of nutritionally normal infants was highest i.e.75% & with poor awareness, this proportion was lowest i.e.5.55%. 2.43% mothers had excellent awareness about infant weaning, 16.26% had well, 30.08% had fair & 57.2% had poor knowledge. In this group proportion of nutritionally normal infants decreased accordingly from 100% to 19.04% in excellent to poor category.

4.26.4 : Immunisation awareness

Immunisation is an important cost effective strategy for child survival. This lead to initiation of Expanded Programme on Immunisation in 1978, Universal Immunisation Programme in 1985 & Child Survival & Safe Motherhood programme in 1992 in India. Now immunisation services are provided under Reproductive & Child Health Programme.

Parents have a right to specific information regarding information, but in India a great proportion of even educated parents were observed to be unaware of protective value of immunisation. Vishvanathan & Jon E Rode studied the effect of maternal knowledge & attitudes on immunisation coverage.
Review of literature

Sampling procedure was designed to compare vaccinated & unvaccinated population. Mothers of fully immunised children were better informed about the benefits of vaccination, were able to mention on an average of 3.5 out of 6 diseases & had a higher awareness about protection offered by immunisation. Joseph carried out study in Kaniyambadi block of North Arcot district of Tamil Nadu in adolescent girls & it was observed that, only 28.1% adolescent girls had adequate knowledge about immunisation.

In a multicentre project of ICMR, immunisation coverage & KAP of mothers about immunisation was assessed. It was observed that, the proportion of population having knowledge of BCG ranged between 11.9 & 31.2%, of DPT between 15.8 & 25.8%. Awareness about poliomyelitis was highest ranging between 57.3 & 59.6%. Whereas measles awareness was observed to be between 30.3 & 33.8%. Tetanus toxoid awareness was also better.

4.26.5: Knowledge about management of diarrhea

Diarrhea remains a major public health problem. Mothers are often ignorant about the appropriate management of diarrhea. A few studies were carried out among adolescent girls & there is paucity of studies among adolescent mothers. Adolescent schoolgirls were having very poor knowledge about breast-feeding during diarrhea. Majority answered that, breast feeding should be stopped during diarrhea. In another such study from adolescent schoolgirls, 21.72 answered that, antibiotics were required for treatment & 35.53% said that, foods should not be given during diarrhea.

4.26.6: HIV / AIDS awareness

With very fast spread of HIV / AIDS pandemic, it has become necessary to assess the knowledge about the HIV / AIDS in various groups. In India most of the studies about HIV/AIDS awareness were among school or college going adolescents & a few among general population. Asha Bhende had a study on sexuality of adolescent girls from underprivileged groups in Bombay.
She reported that, 25% adolescent girls had heard about AIDS. Sexual transmission was the only correct mode of transmission that respondents were aware of. Some of the misconceptions about AIDS were that, it could be transmitted through air, coughing, touching, sharing food / clothing / toothbrush, talking. Only about 17% adolescents told that, it was preventable & about equal proportion said that, it was fatal. The marketing & business associates conducted study for UNISEX & observed that, female youths were less aware of AIDS than males. Knowledge about the sexual transmission was high, about lack of cure was not well established & misconception about transmission were present. Francis et al. had such study among senior secondary students in Delhi & found that, 94% were aware that AIDS could be acquired by having sex with infected person. 36% thought that it could be cured if detected early, whereas 61% knew that there was no cure. 

In a study on general reproductive health of adolescent girls in rural south India, Joseph et al. found that, only 45.2% had adequate knowledge about AIDS. In another study of students it was noted that, 51.3% knew that, the disease was fatal & there was no cure. 93% knew that, it was preventable & 58% had wrong concepts about mode of transmission.

In a review of the evidence from India, about the adolescent sexual & reproductive behavior, it was reported that, awareness about STDs & AIDS was particularly limited among all groups - young & poorly educated adolescents in urban slums, urban college students in Bombay & Solapur. Even among urban college students, AIDS awareness was not universal. It was 66% in Solapur & 95% in Bombay. Knowledge about mode of transmission & role of condoms in safer sex were poorly understood by all irrespective of their age & educational status. Modes were particularly poorly understood by females. Fewer than 5% of college students were aware that, it could be transmitted through infected blood.
Fewer than 11% mentioned that, sexual relations with sex workers could be a mode of transmission & as many as 13-19% thought that, AIDS could be cured.

4.27 : ADOLESCENTS & MTP
Various studies were carried out regarding MTP in adolescents. In US, data describing induced abortion in adolescents was distressing. Approximately 39% of all adolescent pregnancies were terminated by induced abortion & approximately one third of all abortions were performed on women 20 years or less. However in a statement on teenage pregnancy by a committee on adolescence it was stated that, teenagers were not really promiscuous according to recent studies. The younger the teenager the more sporadic & generally infrequent was the level of sexual activity. Adolescents confined their sexual relations to a single partner in a monogamous relationship that may last longer.

In a study carried out in Zambia on 200 women applying for legal abortion, 26% were adolescents & 5% were less than 15 years. Adolescents were ignorant about recognising the symptoms of pregnancy, about where to seek advises & help. Another study from Uganda reported, proportion of adolescent women seeking abortion as 40% of all women & most of them were school girls. Similarly a study in Britain revealed that, younger adolescents appeared for MTP late than older adolescents. Aggarwal et al. from Nairobi analysed 610 women & found 44% were women aged 19 & under, 79% were unmarried & 60% of them were schoolgirls & unemployed.

In a review from India, on adolescent sexual & reproductive behavior it was reported that, information on adolescent abortion seekers was limited. Because studies describing abortion situation in India were limited & majority were hospital based, urban & refer to only small proportion of abortion seekers. In addition, although few surveys were carried out, they underestimated the prevalence, as investigators rarely probed about abortion & they focused on married rather than all women.
In a hospital-based study, adolescents constituted 30% of the total abortions\textsuperscript{308}. Large proportions of adolescents were unmarried in both urban & rural areas in two studies\textsuperscript{309,310}. In another study, half of the unmarried women seeking abortion were adolescents & significant number was below 15\textsuperscript{311}. Unmarried adolescents were more likely than older women to delay seeking abortion services & it was due to lack of awareness of pregnancy, ignorance of services & fear of social stigmatisation. Acute health consequences of abortion & vulnerability to repeat abortions were particularly noted for adolescents\textsuperscript{36}.

Chowdhery & Mukherjee analysed 66 pregnancies randomly in MTP clinic, Eden Hospital, Calcutta. Mean age of the girls undergoing MTP was 19.41 years. Maximum number of cases occurred in high school educated girls, followed by illiterates. In 77.3% girls coital relationship was willingly, in 10.6% unwillingly & in same by force. In approximately one in five cases, girls' father was dead. Maximum number of cases sought medical help late & the reasons were ignorance, shyness, deliberate concealment of facts & fear of punishment\textsuperscript{312}.

In a study of 500 unmarried pregnant girls who sought an abortion at the K.E.M. Hospital Bombay, majority were in the age group 14-18 years, 23% girls were illiterate, 47.2% were at home doing nothing. When the family background was studied it was observed that, in many cases father was too ill physically & sometime mentally, in 25% of the cases he was alcoholic. Of the pregnancies 32.4% were conceived through casual acquaintance & 27% through boy friends. Reasons observed for such relationship were, promise of marriage (42.8%), insisted on by the man (20%), received gifts or money (12%), to please the man (14%) etc. In addition to this 9.2% did not have any knowledge about sex. In 47.6% of the cases, it was the mother who decided about termination & in 20% the decision was taken by father\textsuperscript{313}. Handa et al. had the retrospective analysis of the unmarried subjects who underwent MTP in Chandigarh, during the period of 10 years & compared this with the controls i.e. married abortion seekers.
Unmarried subjects were of significantly younger age group i.e. nearly one third were less than 18 years. Similarly proportion of illiterates was also significantly more in unmarried cases. Datta et al. studied 64 out of 129 unmarried women attending MTP clinic. It was revealed that, 59.4% were between 16-20 years & the youngest was 12 years. Socio-economic status was poor in most of them, illiteracy was higher and both parents were alive in 81.2% cases. 89% of the cases did not have sex education. There was history of frequent intercourse in majority of the cases & also it was performed with full consent. Minor girls were brought to clinic by parents or guardians.

Randomised & prospective study was carried out in 80 cases of unmarried teenage pregnancy by Behera et al. Maximum number of girls was from poor socio-economic background, none had sex education & 98.5% were either ignorant or indifferent towards contraception. Salvi et al. had a study of MTP amongst adolescents. There were 6534 MTPs performed over a period of 5 years & out of these, 14.3% were in adolescent age group & 48.8% adolescents were unmarried. Behara & Padte carried out a study on 200 cases of unwanted adolescent pregnancies. They found that high incidence was in late adolescents, in under matriculate & in lower socio-economic group. Out of wedlock pregnancies were 25%, sex education was inadequate in 82% cases, whereas knowledge, attitude & practice of contraception was adequate in 15.5% cases.

Chhabra interviewed 100 unwed mainly rural girls, who came for MTP to MGIMS, Sevagram & found that, 88% girls did not know the effects of the sexual relationship & 90% did not know anything about contraception. In a study by Asha Bhende on sexuality of adolescent boys & girls in Bombay, it was found that, only about 16% of the girls reported that a woman becomes pregnant after sexual intercourse.