CHAPTER - II
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METHODODOLOGY AND DATA

2.1. INTRODUCTION

Fertility is mainly determined by three factors age at marriage, marriage duration and age specific fertility performance. The shape of fertility schedule changes with the variation in any one of these factors. A number of studies are available which relate the human fertility behaviour with a number of social, economic and cultural factors besides biological factors. Therefore, before going into a detailed analysis of fertility it is desirable to have a synopsis of the previous studies and their findings.

Family planning is associated with the fertility reduction in most of the developing countries, family planning has been a key factor in declining fertility. The acceptance of modern contraceptive methods also depends on various socio-economic and cultural factors. Among them age at marriage, marriage duration, place of women in the society, education, economic level etc. are the factors which have been found significantly associated with the family planning behaviour of the couples. A short review of the various studies conducted by other researchers has been given in the next section.

2.2. REVIEW OF PREVIOUS STUDIES

2.2.1. STUDIES ON FERTILITY BEHAVIOUR

The age at marriage is an important relevant factor in the study of fertility. In his study Jiggindar (1971) has attributed the high fertility of Indian women to their early and universal marriage system. Coale and Tye (1961) have studied fertility performance with respect to age at marriage and found that as the age at marriage rises in the population which have very low age at marriage, there will be an increase in fertility.
Bhargava (1984) observed a negative association between age at marriage and average number of children ever born as well as surviving children. Bhayan and Bhayan (1984) found that there was an inverse relationship between age at marriage and the average number of children born per female. Richard and Joseph (1985) found that reduction of fertility rate was 201.7 in first survey and 166.5 in second survey showing a decrease of 35.2 points. This reduction he attributed to the age at marriage which had been increasing. Audinarayana (1986) has reported positive and inverse relationship between the age at marriage of wife and fertility behaviour.

Abeykoon (1987) in his survey of contraceptive prevalence of 4483 ever married women found that the most important determinant of the children ever born is age at marriage which has strong negative effect on fertility impact on Srilankan Tamils. This indicates the fertility limitation among the Srilankan Tamils operates mostly though delay in the age at marriage.

Sinha P.K. (1987) in his survey of Eastern Rajasthan reported negative association between age at marriage and fertility. It is suggested that age 19 may be a cutoff point in predicting fertility decline due to postponement of girls marriage in eastern Rajasthan. It is notable that an average of 1.3 additional live births or an average of 0.7 additional living children were reported for women who had completed their family size aged (40-49) and who married before age 19 as compared to those who had married later. These finding were supported by estimates from both rural and urban sectors.

Rai (1988) found decrease in fertility with increase in age at marriage of girls. Gandotra, Padhiyar and Dey (1988) had found in rural Gujarat that the female age at effective marriage was positively associated with different level of developments and a negative relationship between the level of development and fertility was observed. Goyal (1989) reported
that rural Haryana and Punjab that early marriage in the lower castes results in early onset of maternity leading to higher fertility level.

Similar observation has been reported by Sarkar (1989), Rao (1989). His data from Andhra Pradesh suggested to have significant fertility reduction. Females should avoid pregnancies before age 20 years. Moni Nag (1989), Ram and Pathak (1989), Deshpandey (1989), have similar observations from their studies.

Pandey (1989) compared the fertility of tribal and non-tribal females of the same area and found that, among the tribal females, there was no considerable effect of age at marriage on total fertility rate.

Mukherjee (1992) estimated that when female marries at 19 years, total fertility declines by about one point. Gupta and Khan (1996) found that the age at marriage and proportion married among teenage girls have a significant impact on fertility. Richard and Rao (1995) observed that age at marriage can be considered at par with family planning for reduction of fertility.

Besides age at marriage, fertility is affected by a number of socio-cultural factors. For example, Kasarda (1971), Mauldin and Berelson (1978), Kapoor (1984), James, Edgar and Suhaspavgi (1988), Natarajan (1989) Rob and Cernold (1992) have found association between work participation of females and low fertility.

Srivastava and Pandey (1979) had reported that higher fertility is observed among women who belong to the nuclear family.

Pandey and Talwar (1987) have reported in (rural Uttar Pradesh) those females who married earlier have higher fertility at younger ages. The total marital fertility rate for age at marriage less than 12 years, 13-14 years, 15-16 years and 17-18 years are same (6.5). Total fertility rate is lesser (0.6) for the age at marriage 19+ years.

Gandotra (1989) in Gujarat found that number of married couples 15-44 years in Dangis (tribal population) was 188 per thousand population
as against 168 for Gujarat (Govt. of India).

Basu and Kshatriya (1989) in his study conducted in Muriya, Madia, Gonds, Bhatra and Halba tribal populations reported that overall fertility rate in the combined tribal groups is 5.87 children. The estimated value is higher than those for rural and non-tribal population of Madhya Pradesh and also the India. These also found that tribes of Bastar are highly conservative in their attitude towards modern medicine and family planning resulting high fertility in Bastar.

Pandey (1990) found that Kol women of Satna district (M.P.) take longer time to conceive after marriage as compared to women of other tribes since the mean age at marriage is 13.5 years in tribal. A Kol women takes 3.5 years to have her first delivery after marriage at the age of 18 years while it takes 3.4 years for non-Kol women, 2.06 years for Gond women and 2.3 years for rural women. The difference may be attributed to the variation in socio-cultural characteristics of these population. At younger ages the tribal women of Satna district have almost half the fecundability of Gond women and of rural non-tribal women of Jabalpur district.

Gupta and Khan (1996) found out in Uttar Pradesh that literacy has a very high positive association with age at marriage of girls and an inverse relationship with the proportion of the married couples among teenagers. Besides, female literacy, literacy/education level of husband also have significant association with the fertility level. A number of researchers have contributed their findings to this effect. For example Bhuyan and Bhuyan (1985) have reported a weak but inverse relation between the husband’s education and fertility. On the other hand female education had a relatively more depressing effect upon fertility. Anandan (1985) reported there was a progressive reduction in the average number of children per couple from 3.58 if both husband and wife are illiterate to 2.60 if they are above the matriculated level.
Chaudhary (1977) reported an inverse relationship between female education and fertility measured by children ever born from an urban sample. Birds all (1977) found that increased female education has lowered fertility substantially. Srivastava and Pandey (1979) in his study in a rural area of Uttar Pradesh found that the higher fertility observed among illiterate women. Coldwell (1981) observed that increased female education has lowered fertility substantially. Another interesting finding in the education-fertility relationship is the rise of individual's fertility with a few years of schooling. Bhayan and Bhayan (1984) from their study in Bangladesh concluded that female education has an inverse relationship with fertility. Jain and Nag (1985) reported that increased female education has lowered fertility substantially.

Pandit and Choubey (1986) reported that literacy was the most influential factor for bringing about a change in fertility behaviour. They also suggested free education for Indian females so that the age at marriage goes up lowering the level of fertility. Deshpande (1989) has reported correlation between female literacy and Total fertility rate was highly negative (0.81). Sharma (1989) observed that the high fertility among the poor was a result of the absence of education. The poor know that their children will not get service (other than agriculture). Therefore, the more are the number, of the more will they earn from labour.

Gulati (1989) from his study explained that along with overall improvements in educational standards it is female education which depicts relatively stronger impact on fertility. Ramamani (1990) reported that there is no doubt that female education has a powerful impact on fertility and the education decreases demand of desire for children. Pandey (1988) found among the tribals of Jabalpur that the level of education of husband had inverse relationship with the fertility of his wife. Das and Padhiyaar (1991) pointed out that it was however surprising to note that education of husband and wife had little effect on fertility.
A. K. Ubaidur Rob (1992) found in a study on Bangladesh data that inverse relationship between women's education and fertility is not consistent. The results showed that those women who had primary education tend to bear more children than those who have no education. The same study reports that husband's education seems to be positively associated with the average fertility of their wife's. Mitra (1993) concluded that literate women marry later than the illiterate women which affects their reproductive span and hence the number of children born. Besides female education increases a women's ability to work outside her home land to be involved in household decision making processes, education in general changes perceived economic caste and benefits of children and therefore influences reproductive decisions (Ubaidur 1992).

Srivastava and Pandey (1979) Abey Kuan (1987) and Pandey (1989) found the effect of husband's occupation on fertility of their wives. Those husband who were engaged in non-agricultural activities had lower fertility in their wives.

Das (1984), O.R.G. Baroda Survey in 1970 sample 26054 eligible couples have been reported that a reasonably clear preference in India although such a preference was not to the exclusion of daughters. The fertility behaviour was however not that consistant with the expressed preference for son's and attitudes towards having additional children particularly younger women.

Rao and Muthurathnam (1986) has reported that total fertility rate was 4.74 in rural and 3.85 in urban. The possible causes of rural urban differentials in fertility may be due to differences in social customs as well as in knowledge availability and acceptance of family planning methods.

Pandey (1989) reported that tribal women of Madhya Pradesh have lower fecundability, higher incidence of secondary sterility and longer mean contraceptive delay in comparison to non-tribal women due to some
socio-cultural factors, disease patterns and patterns of Breast feeding. Gautam, Kshatriya, Singh and Basu (1993) has reported that among Madia women of Bastar district the total fertility rate is higher (5.4) than national figures. Higher fertility and socio-economic factors are significant towards the observed fertility.

Pandey (1994) reported that tribal females of Jabalpur district have lower fertility. The shape of age specific fertility schedule is lower for the tribal females (5.3) than the non-tribal females (5.9).

Pandey (1988) has reported that the tribals of Jabalpur (Madhya Pradesh) have higher fertility among the wives whose husbands were agriculture labourers. The fertility was least for those wives whose husbands were engaged in services.

2.2.2. STUDIES ON FAMILY PLANNING BEHAVIOUR:

Thus, from the review of studies conducted by various researchers in fertility reveals that factors like age of marriage, education of wife, education of husband, occupation etc. have impact on the fertility behaviour of the couples. Likewise family planning, which is a programme for fertility regulation is directly or indirectly influences by the factors affecting fertility. To make it more clear, a few studies are worth to be cited.

Joshi (1988) observed that couples were less likely to limit their families until they had attained the desired family size especially the desired number of sons also the educated people to consider sons and daughters are equal in order to remove strong son preference. Bhat and Dinesh (1988) have reported that illiterate couples and wage labourers were much concerned about the inadequacy of the incentive amount. In fact by and large female rural acceptors are poor and really need the money as they would loose their wages for many days as a result of adopting sterilization.

Barkat-e-khuda (1988) observed that education is related to the use
of contraception. Thus it is evident that unless education is raised beyond the primary level the impact of education on contraceptive use will not be pronounced. Pandey (1988) reported from his study in tribals of Madhya Pradesh, acceptance of sterilization is lower in tribals than non tribal population, due to differences in socio cultural norms and values. Gandotra (1989) from his study in tribal population of Gujarat found that the mean age of wife who used any terminal method was around 33 years. Since the age at effective marriage of a female is around 15 years, it would have been possible for the couple to have completed their desired family size within this gap of about 18 years before the acceptance of any terminal method.

Kabir and Mosleh (1989) have reported that Bangladesh culture is not favourable to the limitation of family size and the adoption of birth control. Several barriers which are considered cultural characteristics are present in Bangladesh. In addition because of their low socio-economic status, women have no influence over birth control practices and family size. Khan and Rao (1989) reported that couples falling below the poverty line had a slightly higher fertility favoured large family size and a lesser proportion of them were using contraceptive than those who had crossed the poverty line. Tripathi (1989) found that Kols are illiterate and highly traditional in their life style. The knowledge of contraceptive method was found to be very poor among the Kols of the study village. Nearly half of the couples who knew about these methods, did not use them.

Ramamani (1990) in her study stated that there was no doubt that female education had a powerful impact on fertility and contraceptive behaviour, education decreases the demand of desire for children and increases the use of contraception there by reducing the fertility. Singh, Kumar and Goel (1990) reported that number of male children and female literacy were the major determinants affecting family planning adoption.

Bhayan (1991) reported occupation of the women markedly
influenced family planning acceptance. Seventy percent respondents engaged in service had adopted family planning compared to 19 percent and 24 percent those who were housewives and engaged in other economic activities. Pandey (1994) reported from his study conducted in Jabalpur district that the tribal females accepted sterilization at younger ages. The mean age of acceptance of sterilization for tribal and non-tribal females were 38 and 39 years respectively, which was statistically significant. Bhayan (1996) reported that education and other improved socio-economic factors seem to have an effect on fertility and family planning acceptance. These factors help couples to take a decision for following the small family norms.

Bhayan and Bhayan (1984) reported that there was a positive correlation between female age at marriage and family planning practices in those respondents who had married at 17 or later were more inclined to practice family planning. Female education showed a positive relationship with adoption of family planning. Kundamuthan (1985) reported that higher rate of acceptance of family planning is a reflection of the higher educational status. Naik and Sharma (1985) from his study in the tribal women of Sambalpur district of Orissa, found that the change in the mode of production produces a corresponding change in the perception of the population problem and the need for family planning. They also observed that money is the main incentive for adopting sterilization. There is therefore a need to impart proper information, education and motivation and to provide the full range of family planning methods, since, there appears to be good scope for family planning acceptance. Bhayan and Bhayan (1985) reported a positive relation between husband education and family planning practices. On the other hand female education and fertility performance is much correlated with family planning adoption than male education. Studies have revealed that human fertility is affected by occupation of wife and also of the husband.
If the wife is working she intends to have fewer children than a housewife. Again, if husband is engaged in a non-agricultural work, the couple tends to have lower fertility. To illustrate, a few findings are worth to be quoted. Kasarda (1971) found an inverse relationship between the percentage of females employed in non-agricultural activity and fertility. Mauldin and Berelson (1978) found that fertility decreased as relative female participation in a non-agricultural sector increased. Srivastava and Pandey (1979) found that wives of non-workers (excluding students) exhibited higher fertility than those whose husbands were engaged in some occupation. Kapoor (1984) stated that female participation in non-agricultural work is higher in rural Kerala as compared to Uttar Pradesh and India and has resulted in lower fertility rates in Kerala.

Pandey (1988) has reported that the tribals of Jabalpur (Madhya Pradesh) have higher fertility among the females whose husbands were agriculture labourers. The facility was least for those whose husbands were engaged in business, household industry etc. Natrajan (1989) observed that in Uttar Pradesh total fertility rate is highly correlated with female work force participation in age group (15-34) years. Bashir Ahmed (1990) from his study concluded that higher demand for children among farmers may originate from the higher demand for child labour.

The review of studies carried out in the previous section indicated that fertility and family planning behaviour are highly associated with a number of socio-cultural factors. Pandey (1989) has extensively studied family planning behaviour and status of women in India and is of view that unless the status of women which include. Socio-demographic status, legal status cultural status, religious status etc. are improved, the fertility cannot be reduced substantially and likewise, no effective acceptance of family planning can be achieved. The present work is devoted to study some of the factors (which have been discussed above) which affects fertility and family planning acceptance in Gond couples of Jabalpur district.
2.3. THE DATA

Generally census and registration system provide basic data for fertility studies. Analysis of fertility levels, patterns and differentials by socio-economic characteristics such as marital status, marriage duration, age at marriage, education, occupation, industry religion etc. may be obtained from the well designed census. Unfortunately census do not contain adequate information. Response errors are serious, Registration of data are very much deficient. Though the sample registration scheme gives some promising results. But the data are not available below the state level and not for the various social groups like tribals. For drawing valid conclusions about fertility performance and family planning acceptance, sample surveys are conducted which are scientific, time bound and give precise results.

A sample survey of the Gond tribal population of Jabalpur district has been carried out by the Regional Medical Research Centre for Tribals (I.C.M.R.), Jabalpur in 1992-93 in connection with the study "Effect of Health Education and Genetic counselling on Haemoglobin pathies among the Gonds of Jabalpur". The present study is based on the data collected in the baseline survey of the project and it contain information on demographic parameters like household characteristics, age sex composition, nuptiality, fertility and family planning.

2.4. AREA OF THE STUDY

2.4.1 THE STATE:

The state of Madhya Pradesh is one of the states of India. It lies in the centre of India. Therefore it is called the heart of India. Madhya Pradesh is surrounded by 7 other states namely Rajasthan, Uttar Pradesh, Bihar, Orissa, Andhra Pradesh, Maharashtra and Gujarat.

Madhya Pradesh is divided in to 45 districts Jabalpur district is one of these districts.
2.4.2. THE DISTRICT:

The district is situated in the centre of Madhya Pradesh. Jabalpur city was named in memory of a Rishi (Hermit) called Jabali whose hermitage was near this city- So the old name of this city was Jabalipur. Later on it was Jabalpur. Some learned people say that the word Jabal means Rocky or Hilly and because this city is surrounded by Rocks and Hills, therefore, it is called Jabalpur.

Jabalpur district lies in the centre of Madhya Pradesh. From North to South East, the map of this district looks like a butterfly spreading its wings. To the North of Jabalpur district are Panna and Satna districts. Shahdol and Mandla district are in the East. Narsingpur and Seoni districts are in the South and Damoh district is in the West. Jabalpur district have six Tehsils :- 1. Jabalpur 2. Patan 3. Sihora 4. Katni Mudwara 5. Vijayraghaogarh 6. Kundam Tehsil.

2.4.3. THE BLOCK

The block Kundam is one of the 13 development blocks of Jabalpur district and is located in its South-Eastern region. The population of the block was 92260 (1991 census) and is predominently tribal dominated. The population of the block is consisted of 71.2 percent tribals of which majority of them are Gonds. The block has 197 villages. The percentage of tribals in the villages ranged from 0 to 100 percent.

2.4.4. THE TRIBE

The Gonds are the native of this district. Once upon a time the Gond kings were ruling over this district. Their capital was Garha, a place part of the Jabalpur city. Near Garha, Madan Mahal was built on the hill by a Gond King Madan Shah. Now the Gonds live in the South-eastern part of Kundam Tehsil in large number. The tribal people usually depend on Farming. They collect Mahua, Fruits, Flowers, barks and wood from the forests and sell them weekly 'hat' market called. They do not much care and attention to farms. Therefore they are poor.
2.5. SAMPLING DESIGN

A list of villages along with the population in 1991 census was prepared for the study. The list was also supplemented with the percentage of tribal population in the villages. Since the tribals inhabited in very difficult terrain including hilly and forest areas, to survey there is time consuming and very costly so it was decided to have a random sample of only those villages where village population was at least 50 percent.

In all 34 villages were selected of these distribution were as follows:-

<table>
<thead>
<tr>
<th>Percent of tribals in the villages</th>
<th>Studied No. of villages</th>
</tr>
</thead>
<tbody>
<tr>
<td>95-100</td>
<td>10</td>
</tr>
<tr>
<td>90-94</td>
<td>7</td>
</tr>
<tr>
<td>75-89</td>
<td>12</td>
</tr>
<tr>
<td>50-74</td>
<td>5</td>
</tr>
<tr>
<td><strong>Total villages</strong></td>
<td><strong>34</strong></td>
</tr>
</tbody>
</table>

The sample of predominantly tribal villages were intentionally taken to avoid acculturations/assimilation of the tribals with the other social groups.

Thus the present study has been conducted in 34 predominantly Gond villages of Kundam block. The second stage sampling unit was households. In this study, House hold was defined as a group of persons who normally stayed together, taking food from a common kitchen, married daughter and their children present at the time of survey were treated as visitors. In all 2623 tribal households were surveyed covering a total population of 13236 persons including 6587 males and 6649 females.
2.6. DATA COLLECTED

For each selected household the information of household structure and facilities, migration morbidity and mortality was obtained. Information on marriage was collected from each married person. If one was married more than once the data on previous marriages were also noted. The total number of children born and alive, sex wise was obtained for each married couple. The information on birth record in detail was obtained for all eligible couples in the household (A couple was defined eligible of both the partners are alive, living together, wife's age was less than 50 years at the time of survey and were not using any contraceptive). The information was not taken in detail for widows, widowers, divorced persons and couples with females age more than 50 years, because it was assumed that the information from these persons might not be reliable and might create some times undesirable scenes at the time of interview. For them, the information on the total number of children born and alive was obtained.

The information on pregnancy record (within last seven years) was obtained for each eligible couple in the household by contacting the female partners by the female investigators. The period was limited only upto seven years, keeping in view the memory bias and other errors.

The information on knowledge, attitude and practice of family planning methods was obtained from both the partners of eligible couples in the household if the respondents were available and cooperative. Generally, in the name of family planning sterilization operations had been conducted. Reliable data on other methods was not available, it was not very difficult to have information on sterilized couples.

2.7. METHOD OF INTERVIEWING

The data was collected by the personal interview method. The investigators worked in batches. A batch consisted of two male and one female investigator, firstly the male investigator contacted the head of the
household and collected information on household structure, household facilities, migration, morbidity and mortality. He also contacted the male partner of each couple to get information on marriage, birth and attitude towards family planning for only eligible couples. Then the female investigator contacted the female partner of each couple and the information previously taken by the male investigator was verified by her. She also obtained detailed information on pregnancies within the last seven years. The scheduled of survey was so devised that each direct statement on age could be checked and verified from some other direct and also indirect estimate of age. Age of each individual was noted in complete years for persons aged 10 years and over, and for children below 10 years the ages were recorded in complete years and months. For persons aged over 50 years ages were recorded as stated by them or by the respondent and a greater emphasis were given to record their age correctly in five yearly age groups. For example, a person stating his/her age as 55 was asked whether he or she belonged to the age group 50-54 or 55-59.

However, generally the respondents were cooperative but required assistance from the investigators in answering the question of age three techniques were used to assist them.

(1) Each investigator had a calendar of important events of the area which had occurred in the past.

(2) The respondents were asked to be assisted by the other persons of the household or community who were well acquainted with their life history.

(3) The respondents were also asked to estimate the age stated by them by comparing the same with the age of a person whose age was known.

These three techniques were found to be rather more applicable to man than women because the experience of man was more frequently associated with public events than the same of women's lives, and because
the women had often passed their early ages in other villages.

The present age of currently married with ages with 50 years has been correlated with the help of data on age at marriage and marriage duration. The procedure adopted for estimating the present age is to add actual or estimated marriage duration to age at marriage. It was done for each married female below age 50 years. The marriage duration was estimated by considering the inter pregnancy intervals. The estimation of the present age with the help of age at marriage was considered because of the special significance of marriage in the life of a person who is likely to remember the age at which he/she was married/more actually that his/her present age. Thus when the age of female was corrected, the age of her male partner was also corrected on the basis of the difference in age at the time of marriage.

The ages of unmarried children below 10 years were checked by taking into account the inter pregnancy intervals given by his/her mother in her fertility schedule. For widows, widowers and persons above 50, the data collected were only on the basis of the births and therefore for them the reported ages were recorded and checked with the help of the one of the techniques discussed above. The same procedure was followed at the case of married persons of older ages.

Though every efforts were made to get correct and reliable data on age, household characteristics, population characteristics, fertility record of each couple etc it may not be claimed that the data are completely true from biases and errors. Of course they have been minimized up to a large extent.

2.8 SOME CHARACTERISTICS OF POPULATION STUDIED

1. No. of villages studied 34
   (ii) No. of Household studied 2623
   (iii) Average household size 5.05
(iv) Total population 13236
    Males 6587
    Females 6649
(v) Sex Ratio 1009.41
(vi) Literacy rate (7+) 32.3
(vii) Persons engaged in agriculture 56.2
(viii) No. of eligible couples (15-50) 2019
(ix) Total fertility rate 4.80
(x) Percent of eligible couple Sterilized 31.3

2.9 INDICES USED

(i) Mean number of children born which provides level of fertility in the population and can be calculated as: -

\[
\text{Mean No. of children born} = \frac{\text{Total No. of children born to the eligible couples at the time of survey}}{\text{No. of eligible couples at the time of survey}} \\
\text{per eligible couple}
\]

(ii) Total Marital Fertility Rate (TMFR)-
Which provides number of children born to a couple if she leads uninterrupted married life from the beginning of reproductive period (Say 15 years) to the end of the reproductive period (Say 50 years)

(iii) Cumulated Marital Fertility Rate (CMFR)- It provides cumulated fertility of a married at age x from the starting of her reproductive life.

(iv) Percentage Couples Sterilized (PCS)- It provides number of sterilized eligible couples per 100 eligible couples in the study population.
(v) Mean Age at Sterilization (MAS)- It provides mean age at which couples (husbands/wifes), have adopted sterilization it may be computed as :-

\[
\frac{\sum n_i a_i}{\sum n_i}
\]

Where \( n_i = \) no. of eligible couples in the age group sterilized
\( a_i = \) mid value of the age ith age intervals i.e. 15-19, 20-24, 25-29, 30-34, 35-39, 40-44 and 45-49

2.10. STATISTICAL TEST

Z Test statistic: when the values of certain characteristics parameters of any population are not known, they are usually estimated with the help of sample data if there are two populations (X and Y) and their means are \( M_1 \) and \( M_2 \), we want to test the hypothesis,

\( H : M_1 = M_2 \) against \( M_1 \neq M_2 \), the normal test can be used and the test statistic \( Z \) is given by

\[
Z = \frac{m_1 - m_2}{\sqrt{\frac{S_1^2}{n_1} + \frac{S_2^2}{n_2}}}
\]

Where \( m_1, V(X), S_1, n_1 \) and \( m_2, V(Y), S_2, n_2 \) are respectively the mean, variance standard deviation and number of observations for the (X) and (Y) variables which are independent. If the value of \( Z \) is more than 1.96, the hypothesis of the equality of \( m_1 \) and \( m_2 \) is rejected at 5 percent level of significance if it is more than 2.58 the hypothesis is rejected at one percent level of significance. If the hypothesis is examined against the alternative hypothesis, \( m_1 > m_2 \) the corresponding tabulated reaches at 5 and 1 percent levels are 1.65 and 2.34 respectively.