The study of mortality deals with the effects of death on population. The United Nations and WHO [cited from Bhende and Kanitkar (pp. 163)] have defined death as follows: "Death is the permanent disappearance of all evidence of life at any time after birth has taken place." A death can thus occur only after a live birth.

According to United Nations (pp. 163), "Live birth is the complete expulsion or extraction from its mother of a product of conception, irrespective of the duration of pregnancy, which, after such separation, breaths or shows any other evidence of life, such as beating of the heart, pulsation of the umbilical cord, or definite movement of voluntary muscles, whether or not the umbilical cord has been cut or the placenta is attached; each product of such a birth is considered live-born".

Mortality and fertility, two important demographic variables which are the important measures of the microevolutionary dynamics are of considerable interest to the student of anthropological genetics. Mortality also indicates the loss of certain genotypes in a population. The implications arising out of this broader view have led to the formulation of a distinctive sub-field of population genetics, "Demographic genetics" or "Genetical Demography".
According to David Yankey, "Mortality is one of the three processes that determine the pace of population growth, the others being fertility and migration. Demographers sometimes call them, collectively, the 'components of growth'. The pace of each of these three processes is determined by the frequency of their relevant events".

India is the second most populous country in the world next only to China and about 15.53% of the world's population lives in this sub-continent, whereas it has only 2.4 percent of the world area.

The increase of India's population is not due to sudden outburst in the birth rate but due to decrease in the death rate. Death rate is considered as an index of the well-being of a nation. Countries which are economically advanced and where people enjoy a high standard of living have lower death rates than the countries which are economically backward.

Rale says that the survival and growth of any family or a closed social group depends intrinsically upon the level of fertility in relation to mortality. The economically advanced countries were able to reduce their death rate to less than 10 per thousand largely by providing their people with adequate and wholesome food, pure drinking water, better hospital facilities, better sewage disposal and by taking proper measures to control various
In India though a declining trend in death rate is seen, yet it is much higher in comparison to Western as well as some of its Asian counterparts. The significant growth in India's population in one hand and increasing infant and child mortality on other hand is a matter of serious concern not only for the demographers, social scientists, economists and policy makers but for each and every serious citizen of this country.

According to the theory of Demographic Transition, the reason for the rapid population growth in any developing country is due to significant fall in death rate which is not immediately accompanied by such decline in the birth rate. In India, the birth rate has fallen slightly, whereas the death rate has come down drastically. Until 1921 the death rate of India was very high, increasing from an estimated 41.3 per thousand during 1881-1891 to 47.2 during 1911-1921 except during the period between 1901-1911 when it fell slightly. Since 1921, there has been a progressive decline in crude death rate. The progressive decline in mortality is also reflected in the increases in life expectancy at birth which has become double for the period since 1921-1930. In 1970 the death rate in India, obtained from the SRS data, is 15.7 and in 1979 is 12.8 (Jain6).
The statistics, released by the Population Reference Bureau, a highly respected, non-profit, non-Government agency, Washington-based demographic institution, show India's current population as 835.035 millions, compared with 816.8 millions at last year's tally and that her birth rate remains at 33 per 1,000 persons; but her death rate is now only 11 per 1,000, compared with 13 per 1,000 in the last year i.e., in 1988 (The Statesman). It shows that the overall death rates for recent years have steadily been declining.

In the year 1991 India received the award from "Liguris International Technology for Development" for its Integrated Child Development Services (ICDS) which is a significant development of 1991 in the field of Child Welfare in India. According to the latest, "The State of the World's Children 1992" released by UNICEF, India recorded a notable decline in the under five mortality rate. It has come down from 250 per 1,000 live birth in 1947 to 146 in 1991. There has also been a steady decline in the infant mortality rate (IMR) from 160 in 1947 to about 94 in 1988, but India is still among the high IMR countries of the World. The under five mortality rate is still high compared to the rest of the World (The Shillong Times).

When the United Nations celebrated 1979 as the International Year of the demographers and other
social scientists have started paying more attention to study mortality pattern, particularly infant mortality. Since then quite a good number of studies on mortality in general and infant mortality in particular have been undertaken during 1980's.

REVIEW OF LITERATURE

Mortality studies carried out so far in our country were largely based on data generated through Census, Sample Registration Scheme, hospital data and National Sample Surveys (Mahadevan). Most of these studies were carried out using secondary data. These have been reviewed in the literature (Jain, Visaria, Kohli, Kulkarni, Chandrasekhar, Natarajan, Sinha, Krishnan, Fanikar, Nag, Peachem, Jain, Martorell and Sharma, Jain, Vaidyanathan, Jain, Agarwala, Agarwal, Gupta, Singh, Srivastava and Saksena, Chansoria et.al and Rao & Coyaji) from time to time. Though these studies are valuable in many respects they have certain limitations. Jain said, though a system of civil registration has been in existence in the country since 1876, the vital registration data are grossly deficient, both quantitatively and qualitatively. According to Desai, "there have been several official publication based on data by the vital registration system but these do not present any clear picture; in fact,
the blanket category of "other" and the general category of "fever" account for disproportionately high proportions of registered deaths, and it is hazardous to base any conclusion on the data.

However, the pioneering work of Chandrasekhar\textsuperscript{13}, though based on secondary data, covered most of the dimensions of mortality study besides comparing the findings, cross culturally and internationally. One important achievement of this study was the interrelationship established between a wide spectrum of sociocultural, health and nutritional variables and mortality. The study of Jain\textsuperscript{24} based on Bombay and Poona secondary data reported that the major causes of mortality falls under the category of infective and parasitic diseases, respiratory diseases and tetanus. He said that one-sixth of all deaths were due to infective and parasitic diseases, another one-sixth of all deaths were due to the diseases of respiratory system and another one-sixth diseases of the digestive system. The studies of Kulkarni\textsuperscript{12} and Agarwala\textsuperscript{25} focussed mainly in establishing the relationship between infant and childhood mortality and its influence on fertility. Vaidyanathan's\textsuperscript{23} monograph focused on measurement of mortality, impact of changes in mortality life tables and projections. This monograph represented most of all regions of our country and the variables considered was either socio-economic or
demographic in nature. No consideration was given in most of these papers to study health and socialization variables.

Considerable work on different intervening variables like infections and parasitic diseases and socio-economic variables have been carried out in different parts of the world (Foster, Black, Bradley & Keymer, Ware, Schultz, Pebley, Da Vanzo, Gubhaju, Fant, Aly, O'toole & Wright, Jones, Aghajanian and Iran Statistical Centre). While discussing on the causes of death due to four diseases viz. neonatal tetanus, pertussis, measles and acute respiratory tract infection Foster said that, "neonatal tetanus, pertussis, and measles can be prevented through immunization. Such prevention would eliminate 3-4 million deaths annually. Many respiratory deaths can also be prevented through lowest drug therapy. Pebley is of the view that a well educated mother may care for her child differently than a more poorly educated mother, even if both the same economic resources. Higher income or occupational status, better housing conditions, and longer child spacing have also been shown to be related to lower child mortality. DaVanzo found that among the Malaysian the absence of modern toilet sanitation and piped water are strongly associated with mortality for babies who are breastfed little or not at all. However, the presence of these facilities makes no significant difference for the mortality of babies
who are breastfed without supplementation. Presumably, the reason is that babies who are not breastfed usually have other foods mixed with water, which may be contaminated. While examining the relationship between parental education and child mortality in Burundi, C’toole and Wright\(^\text{41}\) found that parental education proves to be a key factor in explaining differences in child mortality, the effect of maternal education being particularly strong compared to paternal education. Aly\(^\text{40}\) stressed on the need to improve housing in urban areas and sewage systems in rural areas in order to reduce infant mortality. Jones\(^\text{96}\) reports that one third to one half of deaths under age five in Latin America were due to faecal related diseases. Aghajanian\(^\text{97}\) studied the effect of child mortality on contraceptive use in rural Iran. The infant mortality rates for urban and rural Iran were 58 and 121, while for the entire it was 102 per thousand livebirths (Iran Statistical Centre\(^\text{98}\)). Gordon et al.\(^\text{99}\) found a ratio of neonatal deaths to post neonatal deaths of 2 : 1 for developed countries compared with 2 : 3 in parts of India and Guatemala.

However, some major studies have been carried out in different parts of India, generating primary data on mortality. For example; Simmons\(^\text{44}\) and Smucker et al.\(^\text{45}\) conducted study in Uttar Pradesh. They focused on the most important cause of death and its associated factors.
Uttar Pradesh has the highest rate of infant mortality (IMR 200/1,000, Simmons\textsuperscript{44}) and the main causes broadly identified were: tetanus neonaturum caused by unscientific birth practices like cutting the umbilical cord using non-sterilised material by indigenous Dais, non-utilisation of health facilities, extremely backward socio-economic status, poor health of the mother, miserable environmental sanitation and early age at conception. The Khanna study (Wyon and Gordon\textsuperscript{47}) found the highest incidence of mortality for the first births followed by the second and third births. Similarly, the first month of life witnessed the highest incidence of mortality.

A cross cultural international study carried out on family formation and health (Omran and Standley et al.\textsuperscript{42}) covered mortality as a major component. A part of this study, carried out in Gandhigram, Tamil Nadu, among six thousand eligible couples of different cultural groups revealed cross cultural variations in mortality. Higher incidence of infant mortality was reported among low social status groups and other cohorts. Mahadevan et al.\textsuperscript{9} also carried out a cross cultural study on nutrition and infant and childhood mortality. The study area was Andhra Pradesh. Socio-economic and cultural correlates of infant mortality has been studied by Sandhya\textsuperscript{50} in Andhra Pradesh. Gandotra and Das\textsuperscript{62} studied infant mortality among the recent births in Gujarat.
The factors associated with infant mortality have been examined by Kanitkar and Murthy in Rajasthan and Orissa. Talwar studied infant mortality in Madhya Pradesh. Different studies on mortality were conducted by Bharati in a village of Howrah District, West Bengal. Bhasin and Kshatriya presented the fertility and mortality differentials among different population groups of Sikkim. Rao et al. have studied the mortality pattern among the Car Nicobarese, a pre-agricultural community of India.

Though in North-East India, in comparison to rest of our country very few works have been done on mortality, considerable works on the same are available in Assam. Among the prominent investigators on physical anthropological studies of Assam, Das et al. have done some pioneering work. Das and Das have studied child mortality among several population groups of rural Assam. Das et al. investigated certain biosocial variables among three population groups of Assam, viz., the Hindu, Muslim and Mongoloid. Das et al. also studied biosocial aspects of five Mongoloid populations namely the Ahom, Mishing, Moran, Chutia and Deuri of Assam. Fertility and mortality differentials among the Shyam people of two villages in Sibsagar district, Assam has been studied by Das. Buzarbarua and Phookan have investigated the effects of birth order and mother's age on reproductive wastage of the Mishings of
Assam. Buzarbaruah studied the biodemography of Munda population of Assam. Incidence of child mortality have been investigated by Das & Das in a Kachari village of Assam. Child mortality and morbidity among two caste populations of South Kamrup, Assam has been studied by Das. However, a few studies have been carried out in different parts of Meghalaya also, generating primary data on mortality. Barua investigated certain problems of fertility and mortality among the Khasi women of Meghalaya. Deka studied the reproductive performance and selection among the rural Jaintia of Jaintia Hills. Khongsdier's work focused on selection intensity among the Pnar of Jaintia Hills and the work of Barua focused on biodemographic aspect among the Hajongs of Meghalaya. Jaiswal and Dutta Choudhuri have investigated some demographic aspects of Punjabi Sonars of Shillong.

All these studies have followed different methodologies and focused on mortality related with different variables depending upon the aim of the study and these did not cover several biosocial variables which have great relevance in understanding mortality behaviour in a traditional society like India.

North-East India is the homeland of a large number of schedule tribes and castes who speak different languages, have different cultural set-ups and are of diverse racial
origins. A population group differs from another population group in respect of certain physical characteristics also. In this region of the country very few systematic study on mortality pattern and biosocial proximates have so far been undertaken to understand different biosocial problems of the society related with mortality, largely due to lack of complete, reliable and detailed time series data.

The determinants of infant, child and adult mortality vary between geographical regions, between cultural groups and also between the countries of various economic status. Mosley and Chen have proposed in their analytical framework that all social and economic determinants of child mortality necessarily operate through a common set of biological mechanisms, or proximate variables, to exert an impact on mortality. Among the infants and children the risk of death is very closely related to the environment in which they grow. The deaths occur because of less medical facilities to deal with infections, inadequate food and lack of elementary hygiene (U.Ko.

Generally the death rates in urban areas are substantially lower than those in rural areas. The lower urban rates are often due to relatively better medical and public health facilities, etc. (Rambhadran & Swamy). Mahadevan said that, "as mortality is comparatively high in India and is likely to vary in different social and cultural groups,
within and between States, there is a need for undertaking mortality studies in different parts of the country".

THE TOPIC

Thus, among above mentioned various topics and aspects of study, the problem which is related to mortality and various biosocial proximates affecting it, have in the recent years attracted the attention of anthropologists. It is well recognised that biosocial background plays a vital role in mortality performance. This part of anthropological research has gained added importance in view of the intense need in the context of the fast and accelerated population growth and to provide the people with better standard of living. Though a few of anthropological studies in this aspect have been conducted on some population groups of India as well as in North-East India by different investigators at different times, no such investigation has so far been undertaken in an urban centre where some schedule tribe population groups are inhabiting permanently.

Shillong town which is the capital of Meghalaya State happens to be a good place where such study can be undertaken due to two main reasons which are as follows: (i) it is a town where some schedule tribe population groups live permanently, and (ii) fairly accurate and
reliable records on birth, marriage and death are available because most of the tribal population of this town are Christian and the Churches keep such records.

Shillong is a developing cosmopolitan town which is the homeland of the Khasi tribe. Besides Khasi the major tribes of Shillong are the Garo and Mizo. The Khasi and Garo are matrilineal, whereas the Mizo are patrilineal.

In the present study an attempt has been made to deal with the mortality pattern and biosocial proximates among the Khasi, Garo and Mizo population groups of Shillong.

OBJECTIVES

In the light of the above discussion, the objectives of the present study will be:

1. To understand the general demographic feature among the above mentioned tribal populations;
2. To find out the frequencies of different types of diseases causing death;
3. To find out the pattern of mortality;
4. To understand how different biosocial proximates influence child mortality and
5. To discuss the present findings in the light of results obtained by other workers.
STUDY AREA

The present study has been conducted in Shillong town (Map 1 and 2).

Shillong, which is lies at 25°34'N latitudes and 91°53'E longitudes at 1496 metre above sea level is situated in the lap of Shillong hill range. It is a saucer-like undulating plateau surface flanked by hill ranges in all directions except north. The general slope is towards north-west and it is drained by Um Shyrpi and Um Khrah rivers.

Before 1864, Shillong was an unknown nomenclature. Its present area was then covered by deep forest with Laban as a small Khasi village. The town was founded by Col. Henry Hopkinson, Commissioner of Assam in 1864. On March 20, 1874 Shillong was declared as the capital of Assam. Therefore, Shillong is essentially the creation of British administration and its growth depends mainly with the growth of administration.

Shillong had been the capital of Assam since 1874 [with a temporary break from 1905 to 1912, when the Government Secretariat were functioning both from Dacca (now capital of Bangladesh), and Shillong] and since 20th January, 1972 it is the capital of the Meghalaya State.
THE PEOPLE

According to 1981 Census the percentage of tribal population to total population in North-East India is 53.68 (excluding Assam, where in 1981 no census was held). In North-East Indian States the percentage of tribal population varies from 27.30% in Manipur to 93.55% in Mizoram. In case of Meghalaya this percentage is 81.58.

As Shillong was the capital of Assam since 1874 several population groups came to this town for various purposes and started living here. As a result many of them settled permanently in Shillong. In Shillong Municipal area the number of population is increasing very rapidly. Its number in 1971, 1981 and 1991 census are 87,659; 1,07,673 and 1,13,138 respectively. Shillong is also the headquarter of East Khasi Hills District of Meghalaya.

The present study has been conducted among the Khasi, Garo and Mizo population groups of Shillong.

The Khasi:

Ethnically the Khasi belongs to the Mongoloid race like most of the tribes of North-East India. According to Gait, the Khasis which belong to the Mon-Khmer linguistic family were one of those hordes of Mongolian people who entered into North-East India first and
established themselves in their present habitat at a very remote period.

Das said the Khasi tribal group speaks a dialect of the Mon-Khmer linguistic group which form a part of Austro-Asiatic language family, and thus they stand apart from the other tribes of North-East India with regard to language, though they are surrounded by various other tribes.

The Khasi have the matrilineal family structure where the entire affair of the family centres around the mother who is also the head of the family. In fact, descent is along the mother's line. They are the original inhabitants of East and West Khasi Hills District of Meghalaya. Besides Meghalaya few of them are also inhabiting in Assam.

The Garo:

Like the Khasi the Garo also belong to Mongoloid race. They call themselves "Achik-Mande" which literally means - Hill man, 'Achik' means hills and 'Mande' means man (Bordoloi). The Garo believe that their original home was Tibet. Barkakati believes that the Garo might have stayed in Tibet for a long time in course of their migration through the routes from Western China.
The Garo speak a language which belong to Tibeto-Burman family. Like the Khasi the Garo are also matrilineal people.

The Garo are the original inhabitant of East and West Garo Hills District of Meghalaya. Besides Meghalaya they are also inhabiting in the Karbi Anglong and North Cachar Hills District of Assam.

The Mizo:

Ethnically the Mizo also belong to Mongoloid race like the Khasi and Garo. The term "Mizo" means a hill man (Mi - man, Zo - hill). They speak a dialect of Tibeto-Burman group (Das 110).

Unlike the Khasi and Garo the Mizo are patriarchal people. Their homeland is Mizoram. Besides Mizoram a sizeable number of Mizo families are inhabiting in Shillong and other parts of North-East India.

(N.B. The terms Khasi, Garo and Mizo have been used in plural sense throughout the thesis).

MATERIALS AND METHODS

The materials for the present study on the Khasi, Garo and Mizo population groups were collected during the
year 1990 to 1992. The data collection was made by the investigator himself and occasionally help of interpreter was also been taken. It is noteworthy to mention here that only the Christian Khasi, Garo and Mizo populations were taken into consideration for the present study. Because most of the tribal populations of Shillong are Christian by faith and the Churches maintain the death registers. The methods followed for different chapters have been described below separately.

A. General Demography:

For the purpose of data collection on general demography a schedule was specially designed to record the demographic composition of the families.

The households were selected at random without following any specific sampling technique, but care was taken that each of them contained at least one ever-married individual. Detail information were collected by visiting the families. The informants were mainly female. The data in this connection were collected during the year 1990 - 1991. To obtain the age in some cases retrospective method depending on recall has been applied and it was approximately correct upto month but not day.

Sample: Altogether 636 households were covered in the survey to obtain adequate demographic data relevant
to the study. The sample consists of 359 Khasi, 136 Garo and 141 Mizo households.

B. Causes of death:

A Manual on International classification of diseases, injuries and causes of death has been prepared by the World Health Organization. One thousand groups of diseases have been identified in this manual and these have been regrouped in an intermediate list of 150 causes. And these have again been regrouped in an abbreviated list of 50 causes. For computing deaths and death rates on the basis of causes of death this last list of 50 groups is used in general by the workers in this field. Again, from this last list, various diseases have been categorised on the basis of their response. For the present study the last list has been used.

The study includes the data of the last decade i.e. from 1980 - 1989. Besides, three other causes of death viz. cancer, prematurity and old age have also been included separately in the list because of their higher rate of occurrence. Thus, altogether there are 9 groups. However, in addition to these 9 groups, two more had to be made, one being 'causes not known' and the other being 'others'. The data were collected during the year 1990 - 1991.
Sources of data: The crude data on causes of death for the Khasi, Garo and Mizo population groups were collected from different death registers of Shillong Churches. Besides, the death registers of Shillong Municipality and different hospitals have also been consulted.

Sample: The sample consists of 1227 cases of death among the Khasi. In case of the Garo and Mizo this number is 304 and 314 respectively. The number of infant/early childhood deaths among the Khasi, Garo and Mizo are 371, 151 and 138 respectively.

In the chapter on causes of death the infant deaths have been studied following the Bourgeois-Pichat model.

Bourgeois-Pichat model: Bourgeois-Pichat had highlighted the differences in the relative importance of "endogenous" and "exogenous" causes of infant mortality in different countries. Exogenous causes of infant mortality relate mainly to the environment and include deaths due to infections, parasitic or respiratory diseases. Endogenous causes, on the other hand, form a 'hard core' and include deaths due to congenital malformations, circumstances of prenatal life and the birth process. Exogenous causes predominate in the post-neonatal phase,
whereas most deaths in the early neonatal period up to four weeks after birth are mainly the result of endogenous causes.

C. Mortality pattern:

To collect the data on mortality pattern a schedule was specially designed to cover the information on conception, pregnancy wastage and fertility. The data were collected during the year 1991 - 1992.

Sample: For mortality pattern 389 Khasi, 141 Garo and 148 Mizo ever married women were studied.

In course of investigation the following mortalities were considered.

I) Infant mortality: deaths between birth to one year. It is divided into two categories viz.

   a) neo-natal mortality: deaths from birth to one month and

   b) post neo-natal mortality: deaths from one month to one year.

II) Child mortality: deaths between 1 to 14 years of age. It is also divided into two categories, viz.

   a) toddler mortality: deaths between 1 to 4 years and
b) **juvenile mortality**: deaths between 5 to 14 years.

**III) Pregnancy wastage**: includes abortion and still birth

a) **abortion**: any expulsion of the foetus, either spontaneous or induced, which occurs before the foetus becomes viable, that is capable of independent existence outside its mother, is known as an abortion.

b) **still birth**: birth of a dead child.

**IV) Perinatal mortality**: A close relationship is often observed between foetal and neo-natal deaths, the two are sometimes combined to make perinatal mortality (Misra 116 (pp. 142-143)). The exact definition of perinatal mortality varies from country to country. In the present discussion the foetal and neo-natal deaths are combined to obtain perinatal mortality.

**Limitation**: (a) For the study of abortion only the spontaneous abortions have been taken into consideration.

(b) The deaths occurred after 14 years of age have been excluded from the study.
D. **Biosocial proximates**:

To collect data on biosocial proximates a schedule was specially designed to cover the information on different biosocial proximates. The data were collected during the year 1991 - 1992. The informants were mainly female.

**Sample**: It may be noted that in order to find out the effects of biosocial proximates on child mortality only the last child births have been taken into consideration. The reason for considering the last child births is that complete information, regarding that particular delivery, is fully available. But, if all births are considered, firstly such information will not be available, and secondly there could be many recall lapses. So, for the sake of accuracy of data, observations have been restricted on last child births. It have been restricted again for these births which occurred at any time during the last decade i.e. 1980 - 1989. In this context a subsample has been drawn which consists of 262 Khasi, 114 Garo and 73 Mizo live births. From this subsample two categories have been made on the basis of the incidences of child deaths and no deaths respectively following the method followed by Mahadevan. These are: 1) Experimental group - the families where child deaths occurred in case of last birth during the decade, 1980 - 1989, and 2) Control group -
the families where there was no child death in case of last birth during the same decade. Experimental group consists of 68 Khasi, 40 Garo and 16 Mizo child deaths and control group consists of 194 Khasi, 74 Garo and 57 Mizo live births.

Limitation: For shake of biosocial observations on child mortality only the total child mortality (i.e. infant mortality, toddler mortality and juvenile mortality together) has been taken into consideration, instead of going by the mortality classification.

STATISTICAL CONSIDERATION

The researcher must sincerely admit that there are ample scopes for analysing the materials by applying sophisticated statistical techniques with the help of computer. Unfortunately, because of non-availability of such facilities and also because of researcher's limited knowledge of statistics, he has no way out but to take recourse to simpler statistical methods for analysis and interpretation of his data.

In order to interpret the data adequately the following statistical measure are incorporated.

A. Mean: Mean is the central value of a distribution. It is calculated by the following formula:
Mean: \( \bar{X} = \frac{\sum x}{n} \), where \( \bar{X} \) = Mean value
\( \sum x \) = total of all values and
\( n \) = total number of observation

B. Standard Deviation (S.D.): Standard deviation is a measure of the extent to which the individual items vary. It is calculated by the formula.

\[
\text{Standard deviation (S.D.)} = \sigma = \sqrt{\frac{\sum (X - \bar{X})^2}{n}}
\]

where \( \bar{X} \) is the mean, 'X' is the individual observation and 'n' is the total number of observation.

C. Test of significance:

I) Chi-square \((X^2)\) test: This test of significance is found useful in computing the difference in regard to non-metric data. It is defined as:

\[
X^2 = \frac{(O - E)^2}{E}
\]
where \( O \) = observed frequencies and 
\( E \) = expected frequencies.

II) t-test: For the purpose of comparison among the various divisions the 't'-test of significance have been applied. This test is usually found convenient in examining the metric data.

Formula used for t-test is:
\[ t = \frac{M_1 - M_2}{\sqrt{d_1^2 + d_2^2}} \], where \( M_1 \) and \( M_2 \) stand for mean values of the two samples and \( d_1 \) and \( d_2 \) stand for the standard error of the two mean values respectively.

D. Binomial test of equality of proportion: This formula used as:

<table>
<thead>
<tr>
<th>Sample size</th>
<th>Proportion</th>
</tr>
</thead>
<tbody>
<tr>
<td>( N_1 )</td>
<td>( n_1 )</td>
</tr>
<tr>
<td>( N_2 )</td>
<td>( n_2 )</td>
</tr>
</tbody>
</table>

\[ p = \frac{p_1 N_1 + p_2 N_2}{N_1 + N_2} \]

\[ q = 1 - p \]

\[ T_2 = \sqrt{pq \left( \frac{N_1 + N_2}{N_1 N_2} \right)} \]

If the \( T_1 \) is greater than twice \( T_2 \), then the difference is significant.