

Chapter XIII

TRENDS AND DIFFERENTIALS IN MORTALITY

INTRODUCTION

Mortality constitutes one of the important components of the growth of human population. The mortality situation in particular infant mortality, indicate, the overall health conditions and the level of socio-economic development of a nation. The study of mortality, thus, helps to identify the mortality conditions; it also pinpoints the particular section of the population which is vulnerable. The identification of the vulnerable group helps to formulate plans and policies aimed at providing them with special services.

This paper aims to present the overall mortality conditions of Nepal with reference to measures such as crude death rate, infant mortality rate, adult mortality and their differentials by demographic and socio-economic factors. An attempt will also be made to outline the causes of death. Finally, life tables based on the censuses of 1952/54, 1961, 1971 and 1981 will be presented.

Data Sources and Limitations

The primary source of mortality study has been the periodic censuses of Nepal which was scientifically conducted for the first time in 1952/54; this was later followed in 1961, 1971 and 1981. Although information on the number of deaths which occurred during the 12 months preceding the census was collected in every census, due to the gross under-reporting of these events, the crude death rates obtained from this data were highly unreliable. However, the sex-age distribution of population from the censuses has been used to estimate the parameters of mortality.

During the 1970s several demographic

sample surveys were launched. Among them mention may be made of the Demographic Sample Surveys (DSS) of 1974/75, 1976 and 1977/78 of the Central Bureau of Statistics; and Nepal Fertility Survey 1976 and Nepal Contraceptive Prevalence Survey 1981 of the FP/MCH Project . The formers (DSS) were longitudinal surveys, which were primarily designed to generate parameters of fertility, mortality and migration, provided detailed estimates of crude death rate, age specific death rate, infant mortality rate and expectation of life at birth; while the latter surveys, although basically planned to provide estimates of family planning use rate and baseline information on fertility, have been used for estimating trends and differentials in infant and child mortality.

It is also to be noted that although Vital Registration System has been officially institutionalized in Nepal since 1977, it has not been extended to the entire kingdom. Even within the limited areas covered by this system, the vital events collected are far from complete. According to one study the coverage of vital events in the various districts within the vital registration system ranges from 10 to 100 per cent, the average being around 60 per cent¹.

Keeping in view the data limitations mentioned above, this paper will make use of data from sample surveys and censuses to present the estimates of mortality parameters and their differentials.

¹ Kantner, A., 1980. *An Analysis of Demographic Information Collected during the First Eighteen Months of Nepal's Vital Registration Programme*, UNDTCD and UNFPA, Kathmandu.

Crude Death Rates 1952/54-1981

The crude death rate (CDR) is one of the simplest and most common measures of mortality and is defined as the ratio of the number of deaths in a year in a given geographical areas to the mid-year population of the same geographical area. This ratio multiplied by 1000 gives the conventional way of calculating the crude death rate per 1000 population.

In a country like Nepal, where the vital registration is not well established and information on death recorded in the national censuses is not well established and information on death recorded in the national censuses is grossly under-reported, there is a dearth of information that can generate crude death rates. Therefore, there is a need for an alternative approach that can provide a reliable estimate of crude

death rates. Fortunately, demographers have devised indirect techniques to estimate the crude death rate based on the age distribution of the population and intercensal rate of population growth. These are readily available in a country where more than one census has been conducted. Since most of the methods for estimating crude death rate are based on the stable population theory, certain conditions need to be met before applying them. For example, when a closed population is subject to a regime of constant fertility and mortality for a sufficiently long period of time, then the population is known to be stable and the age distribution thus generated is also stable. Since the age distribution of the population is the reflection

Table 13.1- Estimates of crude death rates, 1954-1984

| Source | Year | Period of estimation | Crude death rate | | |
|-------------------------------|-------------------|----------------------|------------------|-------|---------|
| | | | Both sexes | Males | Females |
| Vaidyanathan and Gaige, | 1973 ^a | 1954 | 36.7 | | |
| Central Bureau of Statistics, | 1977 ^b | 1953-1961 | 27.0 | 28.0 | 24.8 |
| Gubhaju, | 1975 ^c | 1961 | 22.0 | | |
| Central Bureau of Statistics, | 1977 ^b | 1961-1971 | 21.4 | 21.3 | 22.6 |
| Demographic Sample Survey, | 1976 ^d | 1974-1975 | 19.5 | 18.6 | 20.4 |
| Demographic Sample Survey, | 1977 ^e | 1976 | 22.2 | 21.5 | 22.8 |
| Demographic Sample Survey, | 1978 ^f | 1977-1978 | 17.1 | 17.9 | 16.2 |
| Central Bureau of Statistics, | 1985 ^g | 1971-81 | 13.5 | 12.2 | 14.9 |
| New Era. | 1986 ^h | 1984 | 11.9 | 10.8 | 11.0 |

Source:

^a Vaidyanathan, K.E. and Gaige, F.H., 1973. Estimates of Abridged Life Tables. Corrected Sex-age Distribution and Birth and Death Rates for Nepal 1954, *Demography India*, 2 (2): 278-290.

^b Central Bureau of Statistics, 1977. *The Analysis of Population Statistics of Nepal*, His majesty's Government, National Planning Commission Secretariat, Kathmandu.

^c Gubhaju, B.B., 1975. "Fertility and Mortality in Nepal", *journal of Nepal Medical Association*, 13 (5) & (6): 115-128.

^d Central Bureau of Statistics, 1976. *The Demographic Sample Survey of Nepal, 1974-75, Survey Methods and Findings*, Kathmandu

^e Central Bureau of Statistics, 1977. *The Demographic Sample Survey of Nepal, Second Year Survey, 1976*, Kathmandu.

^f Central Bureau of Statistics, 1978. *The Demographic Sample Survey of Nepal, Third Year Survey, 1977-78*, Kathmandu.

^g Central Bureau of Statistics, 1985. *Intercensal Changes of Some Key Census Variables, Nepal: 1952/54-81*, Kathmandu.

^h New Era, 1986. *Nepal Fertility and Mortality Survey – A Preliminary Report*, submitted to National Commission on Population, Kathmandu.

of the regime of fertility and mortality schedules of the country, the level of fertility and mortality can also be determined from the age distribution; which is the main basis of indirect techniques. In Nepal, fertility has remained high and fairly constant for the past several decades and mortality is declining and the female population can be assumed to be closed to international migration. Hence the indirect techniques of estimating fertility and mortality can be fairly applicable. Several researchers have applied these indirect techniques to the age distribution of female population from the 1952/54, 1961, 1971 and 1981 censuses of Nepal. These estimates are summarised in Table 13.1. This Table also provides estimates of crude death rates based on other national sample surveys.

Vaidyanathan and Gaige (1973), using the 1952/54 and 1961 census data estimated the crude death rate of 36.7 per 1000 for 1954. Central Bureau of Statistics (1977 b) showed the estimated crude death rate of 27 for 1953-1961 and 21.4 for 1961-1971. With the use of several stable and quasi-stable estimation techniques applied to the 1961 census data, Gubhaju (1975) arrived at an estimated crude death rate of 22.

The longitudinal Demographic Sample Surveys carried out in 1974/75, 1976 and 1977/78 obtained crude death rates of 19.5, 22.2 and 17.1 respectively. The crude death rate was also estimated by the Central Bureau of Statistics on the basis of age distribution of 1981 census; the estimated crude death rate was 13.5 for 1971-1981.

The latest estimate of crude death rate of 11.9 referring to the year 1984 was obtained by New Era (1986). This estimate is, however, based on direct information on deaths which occurred during the two years preceding the survey.

While reviewing the past trend of crude death rates it is clearly evident that the rate was very high in the 1960s.

However, there has been a substantial decline in crude death rates during the last three decades (1952-1982). The estimated crude death rate declined by 50 percent from 27.0 per 1000 during 1953-61 to 13.5 during 1971-81. This is undoubtedly an impressive decline in the crude death rate in Nepal.

Infant Mortality Rate

The infant mortality rate has been generally considered to be one of the indicators of socio-economic development and health conditions prevailing in the country. It is conventionally computed as the number of infant deaths (deaths under one year of age) which occur in a given year in a given geographical area divided by the total number of live births occurring in the same year and same geographical area. This ratio multiplied by 1000 gives the infant mortality rate per 1000 live births.

The primary source of obtaining data required for computing infant mortality is the vital registration system and national censuses. Due to the incompleteness of infant deaths recorded by these sources, several researches have applied indirect techniques to estimate infant mortality rates from the census data and national sample surveys. Some national sample surveys-Nepal Fertility Survey 1976 and Demographic Sample Surveys, 1974-75, 1976 and 1977-78 however, provided infant mortality rates based on direct information on infant deaths.

Table 13.2 summarises the estimates of infant mortality in Nepal. The earliest estimate of 260 and 250 infant deaths per 1000 live births for males and females respectively refers to 1954 and was made by Vaidyanathan and Gaige (1973). It was based on the stable population technique applied to the adjusted age-sex distribution of the 1952/54 census of Nepal.

Worth and Shah (1969) estimated infant

Table 13.2 Estimates of infant mortality rates, 1954-1981

| Source | Year | Period of estimation | Crude death rate | | |
|-------------------------------|-------------------|----------------------|------------------|-------|---------|
| | | | Both sexes | Males | Females |
| Vaidyanathan and Gaige, | 1973 ^a | 1954 | 260 | 250 | - |
| Worth and Shah | 1969 ^b | 1965-66 | - | - | 152 |
| Gubhaju, | 1974 ^c | 1961-71 | 200 | 186 | - |
| Central Bureau of Statistics, | 1974 ^d | 1971 | - | - | 172 |
| Demographic Sample Survey, | 1976 ^e | 1974-75 | 141 | 123 | 133 |
| Demographic Sample Survey, | 1977 ^f | 1976 | 128 | 138 | 134 |
| Demographic Sample Survey, | 1978 ^g | 1977-78 | 110 | 98 | 104 |
| Nepal Fertility Survey | 1977 ^h | 1976 | - | - | 152 |
| Gubhaju, | 1984 ⁱ | 1973-74 | - | - | 171 |
| Central Bureau of Statistics, | 1985 ^j | 1978 | 147 | 142 | 144 |
| New Era. | 1986 ^k | 1981 | 136 | 111 | 117 |

Source:

- ^a Vaidyanathan, K.E. and Gaige, F.H., 1973. Estimates of Abridged Life Tables. Corrected Sex-age Distribution and Birth and Death Rates for Nepal 1954, *Demography India*, 2 (2): pp.278-290.
- ^b Worth, R.M. and Shah, N.K. *Nepal Health Survey 1965-66*, University of Hawaii Press, Honolulu.
- ^c Gubhaju, B.B., 1974. An Abridged Life Table Construction for the Period 1961-71, Nepal FP/MCH Project, Kathmandu.
- ^d Central Bureau of Statistics, 1974. *Population Projection for Nepal*, 1971-86, Kathmandu.
- ^e Central Bureau of Statistics, 1976. *The Demographic Sample Survey of Nepal, 1974-75, Survey Methods and Findings*, Kathmandu.
- ^f Central Bureau of Statistics, 1977. *The Demographic Sample Survey of Nepal, Second Year Survey, 1976*, Kathmandu.
- ^g Central Bureau of Statistics, 1978. *The Demographic Sample Survey of Nepal, Third Year Survey, 1977-78*, Kathmandu.
- ^h Nepal FP/MCH Project, 1977. *Nepal Fertility Survey 1976: First Report*, Kathmandu.
- ⁱ Gubhaju, B.B., 1984. *Demographic and Social Correlates of Infant and Child Mortality in Nepal*, Ph.D. Thesis, Australian National University, Canberra.
- ^j Central Bureau of Statistics, 1985. *Intercensal Changes of Some Key Census Variables, Nepal: 1952/54-81*, Kathmandu.
- ^k New Era, 1986. *Nepal Fertility and Mortality Survey – A Preliminary Report*, submitted to National Commission on Population, Kathmandu.

mortality rate of 152 for the period 1965-66, based on data collected by the Nepal Health Survey. This estimate is low in comparison to the other estimates derived for the same period (see Table 13.2). The low level of infant mortality rate in Nepal Health Survey may result from the exclusion of most of the Mountain zones from the survey, which have particularly high infant mortality compared to the other zones, the Hills and Terai.

Gubhaju (1974) using the census

age-sex distribution estimated infant mortality of 200 for males and 186 for females for the period 1961 and 1971.

The Central Bureau of Statistics (1974) estimated an infant mortality rate of 172 for both sexes combined using adjusted age-sex distribution data from the 1971 census.

The Demographic Sample Surveys of 1974/75, 1976 and 1977/78 also estimated infant mortality rates for these periods. These

estimate of 133, 134 and 104 for 1974/75 1976 and 1977/78 respectively are rather low in comparison to the infant mortality rate of 152 estimated from the Nepal Fertility Survey 1976. The rate of 104 for 1977/78 is definitely too low to be realistic. An examination of the sex differentials in infant mortality (see Table 13.2) confirms the doubtful reliability of the Demographic Sample Surveys estimates. While the infant mortality rate was higher for males than females in 1974/75 and 1977/78, the pattern was reversed in 1976.

Some village level studies also provided estimates of infant mortality. Lang and Lang (1971)² estimated an infant mortality rate of 158 per 1000 in Upper Khumbu in the Mountain zone in 1971. *The Fertility, Mortality and Morbidity Survey of 1978* conducted in selected districts of the Hills and Terai revealed infant mortality rates of 138 and 159 and child mortality rates (under five years of age) of 164 and 199 for the Hills and Terai respectively³. Although neither of these surveys is nationally representative, both confirm high levels of infant and child mortality, and suggest a high degree of regional variations in these rates.

The most recent national estimate of infant mortality is derived from the Nepal Fertility Survey (NFS), 1976. The infant mortality rate calculated by adding all the reported infant deaths over a period of three years proceeding the survey and dividing by the total number of live births during the same period, was 152 infant deaths per 1000 live births⁴.

² Lang, S.D.R and Lang, A., 1971. "The Kunde Hospital and a Demographic Survey of the Upper Khumu, Nepal", *The New Zealand Medical Journal*, 74 (470):1-8.

³ Nepal FP/MCH Project, *Nepal FP/MCH Data Analysis: Final Report*, The Population Council, n.d.

⁴ Nepal FP/MCH Project, 1977. *Nepal Fertility Survey 1976: First Report*, Kathmandu.

Thapa and Retherford (1982)⁵ estimated infant mortality rates from maternity histories of the Nepal Fertility Survey 1976. They computed infant mortality rates by dividing deaths of Children below one year of age among the birth cohort of a given calendar year by the number of the respective live births. Infant mortality rates were thus obtained for the birth cohorts of 1950-54, 1955-59, 1960-64, 1965-69 and 1970-74. These estimates are shown in Table 13.3. The unadjusted rates

Table 13.3- Infant mortality rates, adjusted for heaping and corrected for age truncation, estimated from maternity histories in the 1976 Nepal Fertility Survey (Rates per 1000 live births)

| Period | Unadjusted | Adjusted* | |
|--------|------------|---------------|--------------|
| | | Uncorrected** | Corrected*** |
| 1950-4 | 197 (206) | 206 (215) | 197 (215) |
| 1955-9 | 181 (378) | 188 (393) | 176 (393) |
| 1960-4 | 179 (585) | 187 (611) | 182 (611) |
| 1965-9 | 161 (741) | 168 (771) | 168 (771) |
| 1970-4 | 151 (360) | 156 (890) | 156 (890) |

Note: Figures in parenthesis denote number of infant deaths.

* Adjusted for heaping.

** Adjusted for heaping but uncorrected for age truncation.

*** Adjusted for heaping and also corrected for age truncation.

show a consistent decline in IMR from 197 in 1950-54 to 151 in 1970-74; in contrast, the rates adjusted for heaping and corrected from age truncation, appear to suggest a fluctuation without a marked trend for the 1950-54 to 1960-64 birth cohorts, followed by a steady decline thereafter. The corrected infant mortality rates for the 1950-54 and 1955-59 birth cohorts are lower than that for the 1960-64 birth cohort⁵. This may have been due, per-

⁵ Thapa, S. And Retherford, R., 1982. "Infant Mortality based on the 1976 Nepal Fertility Survey", *Population Studies*, 36 (1): 61-80.

haps, to failure to report the deaths of children who died in infancy during the earlier periods rather than to fluctuation in infant mortality. For the cohort 1970-74 the unadjusted infant mortality rate was 151 and the adjusted rate of 156 was only 5 per 1000 higher. Both these rates do not differ much from the rate reported in the First Country Report of 152 for the period corresponding to the year between 1973/74 and 1975/76.

Based on 1976 Nepal Fertility Survey data, Gubizaju (1984 i) estimated infant mortality indirectly from the proportion dead among children ever born by the age of the mother. The estimate which refer to the year 1973-74 was 171 per 1000 live births. Based on the same indirect technique, Central Bureau of Statistics (1985j) estimated infant mortality rate from the 1981 census of 144 which refers to the year 1978. The latest estimate of infant mortality of 117 referring to the year 1981 is obtained by the New Era (see Table 13.2). This estimate is again based on indirect technique applied to the data from the National Fertility and Mortality Survey of 1984 (New Era, 1986).

These estimates tend to suggest that Nepal has witnessed a considerable decline in infant mortality over the past 30 years (see Table 13.2).

Neonatal and Post-neonatal Mortality

Infant mortality consists of two components: neonatal and post-neonatal mortality; neonatal mortality refers to deaths under four weeks and post-neonatal mortality refers to deaths between four weeks and one year. It is generally observed that deaths occurring during the neonatal period are primarily caused by biological factors, while post-neonatal deaths are most sensitive to socio-economic factors. Therefore, the breakdowns of infant deaths into neonatal and post-neonatal periods indicates the relative importance of biological and socio-economic factors. The 1976 Nepal Fertility Survey data for the

first time provided information on neonatal and post-neonatal mortality. Based on this survey data, the neonatal mortality rate was found to be 75.4 and post-neonatal mortality rate was 66.9 per 1000 live births. In Bangladesh and Pakistan-with a similar level of infant mortality-neonatal mortality rates were 73.7 and 79.9, and post-neonatal mortality rates were 61.3 and 59.0 per 1000 live births respectively (Chidambaram, *et. al.*, 1985)⁶.

Maternal Mortality and Adult Mortality

Although there have been some notable fertility and mortality surveys carried out in the past few decades, there still remains a serious gap in the knowledge of maternal mortality and adult mortality in Nepal. However, the Fertility, Mortality and Morbidity Surveys, 1977-78 carried out in selected districts of Nepal-the rural areas of Kathmandu, Kavre and Rupandehi provided an estimated maternal mortality rate of 85 per 10,000 live births⁷.

Adult mortality of males and females with reference to male and female survivorship probabilities from birth to age 25, 30, .. 55 are estimated by using data on the proportion not widowed from the 1981 census and this is presented in Table 13.4. Also presented are the estimates of the west level mortality corresponding to probability of survivorship from birth. It is evident from this table that from age group 25-29 up to 35-39, the west level mortality for females is lower than that for males; while in the later age-groups, 40-44 to 55-59, females west level mortality is higher than that of males. It is also revealed that the

⁶ Chidambaram, V.C., McDonald J.W. and Bracher, M. D., 1985. "Infant and Child Mortality in the Developing World: Information from the World Fertility Survey, " *International Family Planning Perspective*, 11 (1): 17-25, 1985.

⁷ Nepal FP/MCH Project, *Nepal FP/MCH Data Analysis: Final Report*, The Population Council, n.d.

Table 13.4- Estimation of male and female survivorship probabilities from birth using data on widowhood status*, Nepal, 1981

| Age Group | Age | Proportion not widowed | | Survivorship from birth | | West level mortality | |
|-----------|-----|------------------------|---------------|-------------------------|--------|----------------------|--------|
| | | NW (n) Male | NW (n) Female | Male | Female | Male | Female |
| 25-29 | 25 | .9865 | .9892 | .7645 | .7612 | 14.2 | 13.5 |
| 30-34 | 30 | .9845 | .9821 | .7720 | .7752 | 15.3 | 14.7 |
| 35-39 | 35 | .9817 | .9682 | .7707 | .7845 | 16.0 | 15.8 |
| 40-44 | 40 | .9731 | .9403 | .7597 | .7944 | 16.5 | 16.8 |
| 45-49 | 45 | .9664 | .9100 | .7349 | .7790 | 16.7 | 17.1 |
| 50-54 | 50 | .9528 | .8540 | .7119 | .7682 | 17.1 | 17.6 |
| 55-59 | 55 | .9414 | .8310 | .6706 | .7602 | 17.3 | 18.4 |

* The estimation technique is described in United Nations, 1983. Manual X: Indirect Techniques for Demographic Estimation, New York, pp. 122-126

west level mortality for males falls between 14.2 and 17.3 and that of females falls between 13.5 and 18.4.

Mortality Differentials

Substantial inter country variations in mortality have been noted. These variations have been accounted for by the level of socio-economic development and the development of public health and medical care facilities. Within the country also we find mortality differences by demographic and socio-economic characteristics of the population. Age is considered to be one of the main demographic factors affecting crude death rate because the latter is influenced by the age structure of the population. The economic and social factors which affect mortality are many and complex: they include, for example, education, occupation, nutritional level, housing conditions, sanitation, public health services, medical services and general living standards. However, in consideration of the data limitations, differentials in the crude death rate will be focussed on such factors as age, sex and urban rural residence. However, infant mortality differentials will be discussed with respect to

variables such as urban-rural residence, geographical zones, education of mother and father, sex of the child, birth order, maternal age and preceding birth interval.

Age

The risk of death varies with age of an individual. Furthermore, improvement in public health and medical services have been found to affect different age-groups to a different extent. Incidence of death is highest among infants (less than one year) and declines up to the age group 10-14 where it attains a minimum level. There after, risk of death gradually rises with advancement of age. This pattern remains almost the same for males and females. Age specific mortality curve in high mortality countries, therefore, resembles a typical U-shaped distribution. When the general level of mortality improves infant mortality declines much faster than mortality at older ages. The mortality curve then assumes a J-shape⁸.

⁸ United Nations, 1973. *The Determinants and Consequences of Population Trends: New Summary Of Findings on Interaction of Demographic, Economic and Social Factors*, Volume 1, New York.

The data on age specific death rates in Nepal are difficult to obtain. The number of deaths reported in the census are not reliable to estimate age specific death rates. The only source that can provide reasonable estimates of age

specific death rates is the longitudinal Demographic Sample Surveys, 1974-75, 1976 and 1977-78. Adjusted age specific death rates by sex for the period 1974-75, 1976 and 1977-78 are shown in Table 13.5.

Table 13.5 – Adjusted age-specific death rates by sex, 1974-75, 1976 and 1977-78 (rates per 1000)

| Age Group | Males | | | Females | | | Both sexes | | |
|-----------|---------|-------|---------|---------|-------|---------|------------|-------|---------|
| | 1974-75 | 1976 | 1977-78 | 1974-75 | 1976 | 1977-78 | 1974-75 | 1976 | 1977-78 |
| 0 | 141.2 | 128.4 | 109.9 | 123.0 | 137.9 | 97.9 | 132.5 | 133.6 | 104.0 |
| 1-4 | 33.2 | 32.6 | 23.4 | 35.9 | 37.2 | 22.1 | 34.6 | 34.6 | 22.8 |
| 5-14 | 4.8 | 5.2 | 4.7 | 5.6 | 6.1 | 5.2 | 5.2 | 5.6 | 4.9 |
| 15-24 | 5.0 | 6.0 | 4.4 | 7.9 | 6.0 | 4.3 | 6.4 | 3.0 | 4.3 |
| 25-34 | 4.7 | 7.3 | 6.0 | 7.7 | 10.7 | 6.5 | 6.2 | 9.1 | 6.2 |
| 35-44 | 6.7 | 8.0 | 11.9 | 12.6 | 14.8 | 10.2 | 9.6 | 12.4 | 11.0 |
| 45-54 | 11.4 | 20.9 | 20.3 | 17.6 | 16.8 | 16.6 | 14.4 | 18.9 | 18.4 |
| 55-64 | 36.2 | 45.1 | 33.0 | 38.2 | 48.1 | 39.2 | 37.1 | 45.6 | 36.0 |
| 65-74 | 67.6 | 76.3 | 87.8 | 71.8 | 76.5 | 71.5 | 69.6 | 76.4 | 79.6 |
| 75+ | 129.0 | 192.8 | 145.7 | 169.9 | 139.7 | 129.0 | 150.0 | 165.9 | 136.8 |
| All ages | 18.6 | 21.5 | 17.9 | 20.4 | 22.8 | 16.2 | 19.5 | 22.2 | 17.1 |

Sources:

Central Bureau of Statistics, 1976. The Demographic Sample Survey of Nepal, 1974-75, Survey Methods and Findings, Kathmandu;

Central Bureau of Statistics, 1977. The Demographic Sample Survey of Nepal, Second Year Survey 1976, Kathmandu;

Central Bureau of Statistics, 1978. The Demographic Sample Survey of Nepal, Third Year Survey 1977-78, Kathmandu.

It can be seen from this Table and figures 13.1- 13.3 that age specific death rates follow a typical U-shaped distribution as in most other developing countries. The death rate is highest during the period of infancy and attains minimum level in the age group 5-14, and then gradually rises up to age 44. Thereafter, the death rate increases rapidly *with* the advancement of age.

Sex

Nepal has higher female mortality than that of males. It has been noted that higher female than male mortality was also found in

several other Asian and African countries⁹.

The Demographic Sample Surveys of 1974-75, 1976 and 1977-78 provide age specific death rates for males and females (see Table 13.5). Except for infants, female death rates in each age group in 1974-75 were generally higher than that of males. There appears to be a noticeable difference at the childbearing age. The differences are more pronounced at

⁹ United Nations, 1973. *The Determinants and Consequences of Population Trends: New Summary of Finding on Interaction of Demographic, Economic and Social Factors*, Volume I, New York.

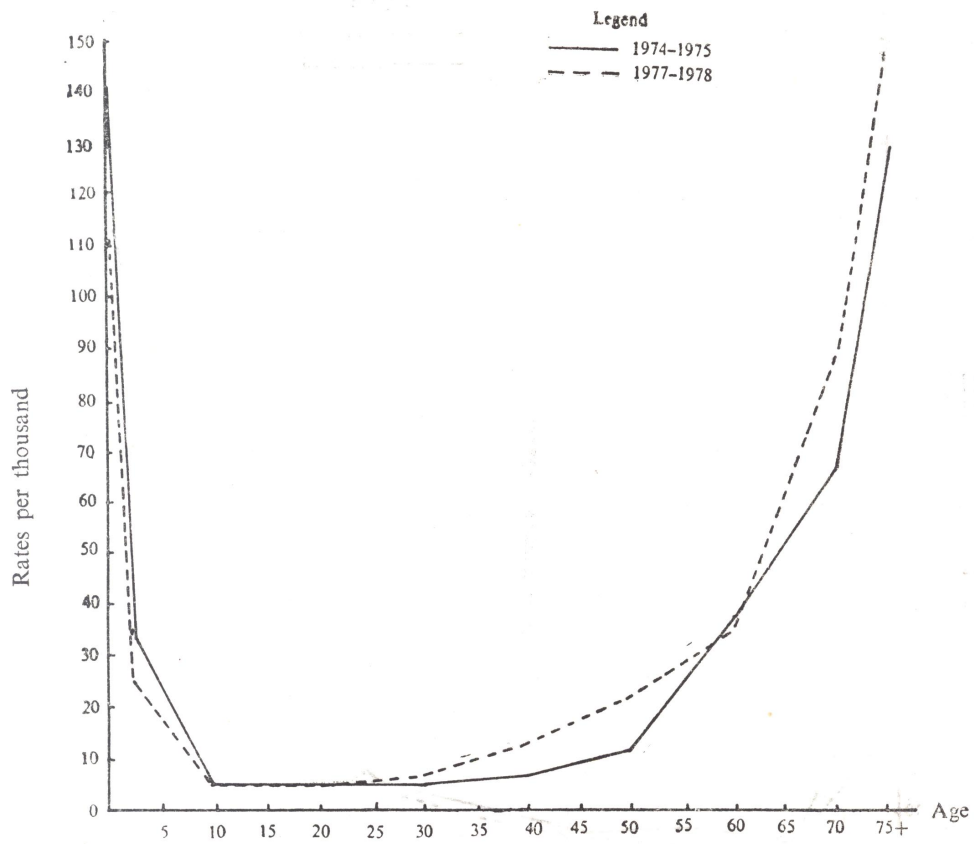


Figure 13.1 Adjusted male age-specific death rates, 1974-1975 and 1977-1978

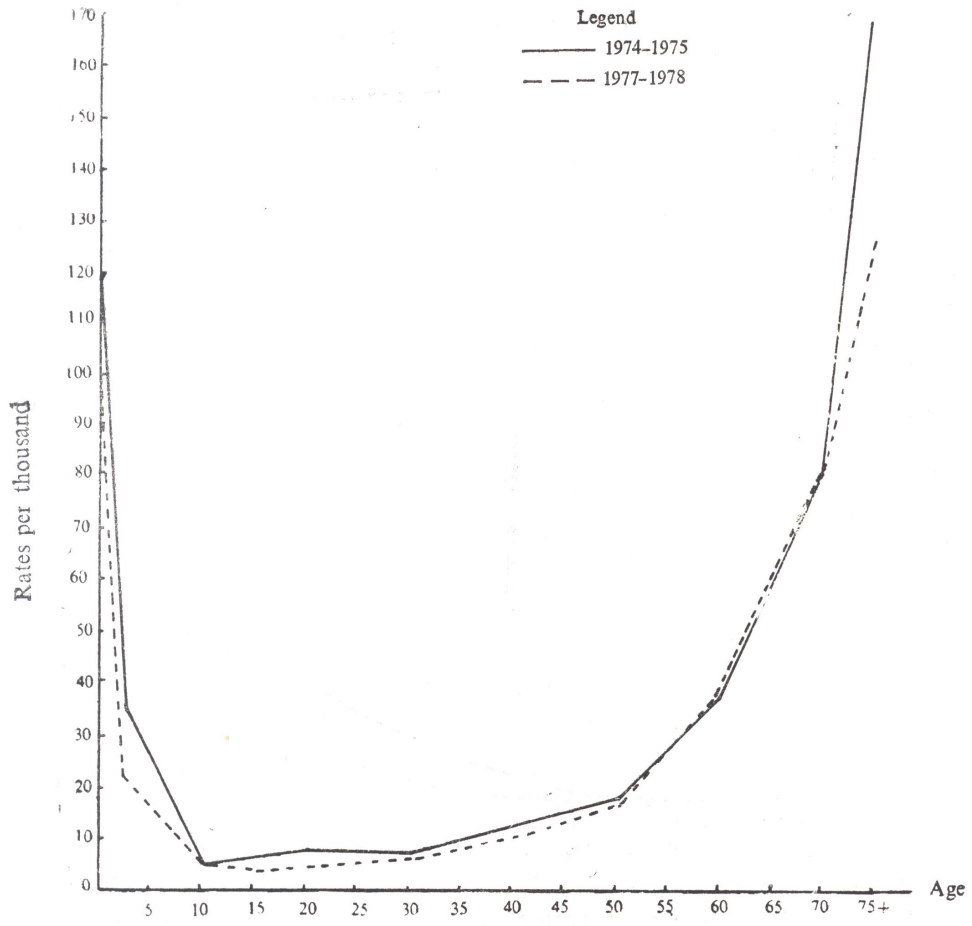


Figure 13.2 Adjusted female age-specific death rates, 1974-1975 and 1977-1978

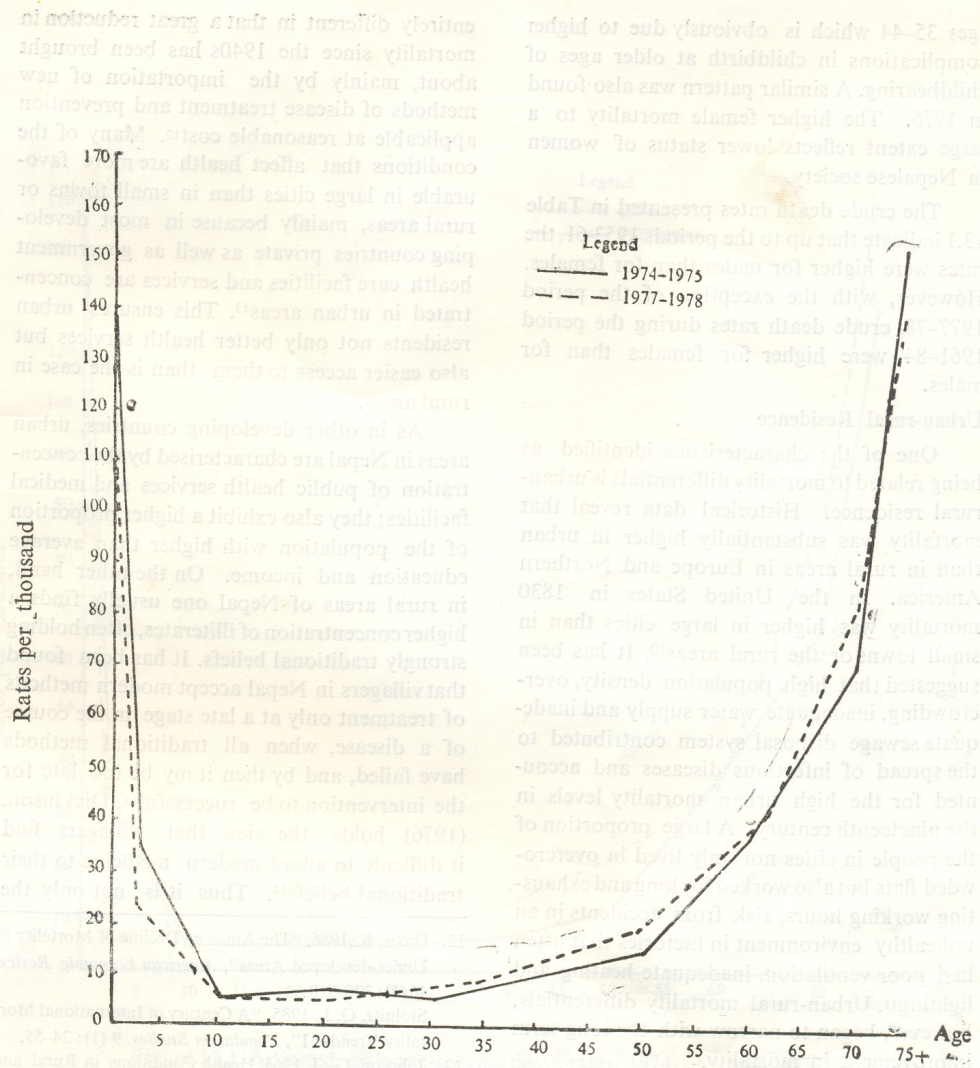


Figure 13.3 Adjusted age-specific death rates, 1974-1975 and 1977-1978

ages 35-44 which is obviously due to higher complications in childbirth at older ages of childbearing. A similar pattern was also found in 1976. The higher female mortality to a large extent reflects lower status of women in Nepalese society.

The crude death rates presented in Table 13.1 indicate that up to the periods 1953-61, the rates were higher for males than for females. However, with the exception of the period 1977-78, crude death rates during the period 1961-84 were higher for females than for males.

Urban-rural Residence

One of the characteristics identified as being related to mortality differentials is urban rural residence. Historical data reveal that mortality was substantially higher in urban than in rural areas in Europe and Northern America. In the United States in 1830 mortality was higher in large cities than in small towns or the rural area¹⁰. It has been suggested that high population density, overcrowding, inadequate water supply and inadequate sewage disposal system contributed to the spread of infectious diseases and accounted for the high urban mortality levels in the nineteenth century. A large proportion of the people in cities not only lived in overcrowded flats but also worked for long and exhausting working hours, risk from accidents in an unhealthy environment in factories that often had poor ventilation, inadequate heating and lighting¹¹. Urban-rural mortality differentials, however, began to narrow with the long-term improvement in mortality.

The situation in developing countries is

entirely different in that a great reduction in mortality since the 1940s has been brought about, mainly by the importation of new methods of disease treatment and prevention applicable at reasonable cost¹². Many of the conditions that affect health are more favourable in large cities than in small towns or rural areas, mainly because in most developing countries private as well as government health care facilities and services are concentrated in urban areas¹³. This ensures urban residents not only better health services but also easier access to them than is the case in rural areas.

As in other developing countries, urban areas in Nepal are characterised by the concentration of public health services and medical facilities; they also exhibit a higher proportion of the population with higher than average education and income. On the other hand, in rural areas of Nepal one usually finds a higher concentration of illiterates, often holding strongly traditional beliefs. It has been found that villagers in Nepal accept modern methods of treatment only at a late stage in the course of a disease, when all traditional methods have failed, and by then it may be too late for the intervention to be successful¹⁴. Dickinson, (1976) holds the view that villagers find it difficult to adapt modern medicine to their traditional beliefs¹⁵. Thus it is not only the

¹⁰ United Nations, 1973. *The Determinants and Consequences of Population Trends: New Summary of Findings on Interaction of Demographic, Economic and Social Factors*, Volume 1, New York.

¹¹ *Ibid.*

¹² Davis, K., 1986. "The Amazing Decline of Mortality in Under-developed Areas", *American Economic Review* 46 (2); 305-318;

Stolnitz, G. J., 1985. "A Century of International Mortality Trends: I", *Population Studies*, 9 (1): 24-55.

¹³ Johnson, G. J., 1964. Health Conditions in Rural and Urban Areas of Developing Countries, *Population Studies*, 17(3): 293-309.

¹⁴ Stone, L., 1976. Concepts of Illness and Curing in a Central Nepal Village, *Contributions to Nepalese Studies*, 3 (Special issues): 55-80.

¹⁵ Dickinson, J., 1976. "Where shall John go"?, *British Medical Journal*, 2 (4): 1364-1366.

inadequacy of health services in the rural areas, but also the persistence of strong beliefs and traditions, that is likely to produce higher mortality in rural than in urban areas. And this has been also supported by data collected by Demographic Sample Surveys (see Table 13.6).

Table 13.6- Crude death rate (CDR) by urban-rural residence, 1974-75, 1976 and 1977-78 (Rates per 1000)

| Year | CDR | | |
|---------|-------|-------|-------|
| | Urban | Rural | Nepal |
| 1974-75 | 9 | 19.8 | 19.5 |
| 1976 | 8.9 | 22.6 | 22.2 |
| 1977-78 | 12 | 18.6 | 17.1 |

Source: Same as are those in Table 13.5

It may be observed from Table 13.6 that the mortality levels in urban areas are considerably lower than in the rural areas. According to the Demographic Sample Surveys 1974-75 and 1976, crude death rates were less than half in the urban areas than in the rural areas. However, in 1977-78 the differentials in urban-rural mortality rates have considerably narrowed (Table 13.6). It can also be seen from this Table that between 1974-75 and 1977-78 there has been a decline in the rural mortality rate while the urban mortality rate has increased. It has, however, been argued that the seeming increase in urban mortality rates, may be due to problems with the quality of data and not to real increase in death rates over the years¹⁶.

Differentials in Infant Mortality Rates by Socio-demographic Factors

Infant mortality differentials by social and demographic factors are

¹⁶ United Nations, 1980. *Population of Nepal*, ESCAP Country Monograph Series No. 6, United Nations, ESCAP, Bangkok.

shown in Table 13.7. These are based on Nepal Fertility Survey 1976.

| Variable | Infant mortality (per 1000) |
|---|-----------------------------|
| Residence | |
| Urban | 127 |
| Rural | 167 |
| Zone | |
| Terai | 184 |
| Hill | 145 |
| Mountain | 190 |
| Education of mother | |
| No education | 166 |
| Some education | 154 |
| Education of father | |
| No education | 170 |
| Some education | 152 |
| Sex of the child | |
| Male | 171 |
| Female | 161 |
| Birth order | |
| First | 185 |
| Second-third | 157 |
| Fourth and higher | 163 |
| Maternal age | |
| Less than 20 | 216 |
| 20-29 | 162 |
| 30+ | 142 |
| Preceding birth interval (in months) | |
| less than 18 | 236 |
| 18-35 | 180 |
| 36+ | 95 |

Source: Gubhaju, B.B., 1985. Trends and Differentials in Infant and Child Mortality in Nepal, In Population Problems and Prospects, National Population year-2041, Nepal, Office of the Central Committee, pp.25-45, Kathmandu

The infant mortality rates presented in Table 13.7 refer to the period between 1962 and 1971. It is evident from Table 13.7 that as in many other developing countries infant mortality is substantially higher in rural than in urban areas of Nepal. The Mountain zone has the highest infant mortality,

followed by the Terai and the Hills. The excessive infant mortality in the mountains may be attributed largely to the lack of health services and low level of socio-economic development. Climatic factors may also play an important role, as may some biological factors such as low birth weight. Infants with low birth weight are known to be at high risk during their infancy¹⁷. Although we have no suitable data to prove it, it has been shown in other studies that children born above 3500 metres exhibited decreased weight¹⁸.

The education of parents appears to have some effect on infant mortality. Children born to mothers with no education have an infant mortality rate of 166 per 1000, compared to 154 among those born to mothers with some education. Likewise, infant mortality was 170 per 1000 among children born to fathers with no education as against 152 among children born to fathers with some education.

Infant mortality was higher for male babies than for female babies; the rates were 171 and 161 per 1000 for males and females respectively. Table 13.7 also reveals that first order births have higher infant mortality compared to second, third, fourth and higher order births. But when the maternal age is controlled, first order births have lower infant mortality. It was, therefore, concluded that the

higher risk of infant deaths pertaining to first order births is mainly due to a high proportion of very young mothers having first births rather than to first order births per se. Table 13.7 also shows that higher order births were at a higher risk of dying during infancy. This may be due to the fact that, in order to reach high parity, the mother needs to reproduce in a rapid succession (short birth interval) which, on the one hand, depletes her health and on the other, makes her incapable of taking proper care of the newborn child while attending to other young children as well.

It is also shown in this Table that the risk of infant death was highest among mothers aged less than 20, declined with the increase in maternal age up to 30-34 years, and showed a negligible increase thereafter. It may be presumed that as the Nepal Fertility Survey excluded mothers past 50 years of age, births that occurred to mothers aged 35 years and over have been disproportionately concentrated in the period 1967-71 the period identified with reduced infant mortality in comparison with previous high levels. Therefore, when the analysis was restricted to the recent birth cohorts, 1967-71, births that occurred to mothers aged 45 years and over did show a higher risk of dying during infancy.

The impact of preceding birth interval on infant mortality has also been studied. It is shown in Table 13.7 that infant mortality was exceedingly high 236 per 1000 among children born within less than 18 months of a preceding birth interval; while infant mortality reduces to 180 per 1000 among children born between 18 and 35 months of preceding births intervals. The infant mortality rate was only 95 per 1000 among children born three years after the preceding birth interval. It is also to be noted that the preceding birth interval is considerably shorter if the preceding child did not survive. Therefore, in order

¹⁷ Wray, J.D., 1971. "Population Pressure on Families: Family Size and Child Spacing", in *Rapid Population Growth: Consequences and Policy Implications*, Johns Hopkins Press, Baltimore, pp. 403-461.

¹⁸ Bangham, C.R.M. and Sacherer, J.M., 1980. "Fertility of Nepalese Sherpas at Moderate Altitudes: Comparison with High-Altitude Data", *Annals of Human Biology*, 7 (4): 323-330;

Pawson, I.G., 1977. "Growth Characteristics of Population of Tibetan Origin in Nepal", *American Journal of Physical Anthropology* 47 (3): 473-482;

Weitz, C.A., Weitz, M. V. Pawson, I.G. Lang S. and Lang, A., 1974. "Fertility in a Highland Nepalese Population" (Summary), *American journal of Physical Anthropology*, 40 (1):156.

to get the true picture of the effect of proceeding birth intervals on infant mortality, the survival status of the preceding child needs to be controlled. It was, however, confirmed that demographic and social factors have significant independent effect on infant mortality over and above the survival status of the preceding child¹⁹.

Infant Mortality Differentials: Rural/Urban and Regional

Rural/Urban

So far infant mortality differentials based on soci-demographic characteristics have been discussed. We now present infant mortality differentials by urban-rural residence, geographical zones and development regions. It is evident from Table 13.8 that the infant mortality

Table 13.8- Differentials in infant mortality by urban-rural residence, 1974-75, 1976 and 1977-78

| Source | Period of estimation | IMR | |
|--|----------------------|-------|-------|
| | | Urban | Rural |
| Demographic Sample Survey, 1976 ^a | 1974-75 | 57.1 | 134.8 |
| Demographic Sample Survey, 1977 ^b | 1976 | 52.8 | 136.1 |
| Demographic Sample Survey, 1978 ^c | 1977-78 | 67.2 | 105.1 |

(a) Central Bureau of Statistics, 1976. *Demographic Sample Survey of Nepal, 1974-75, Survey Methods and Findings*, Kathmandu

(b) Central Bureau of Statistics, 1977. *Demographic Sample Survey of Nepal, Second Year Survey, 1976*, Kathmandu

(c) Central Bureau of Statistics, 1978. *Demographic Sample Survey of Nepal, Third Year Survey, 1977-78*, Kathmandu

¹⁹ Gubhaju, B.B.m 1985. "The Effects of Previous Child Death on Infant and Child Mortality in "Rural Nepal", *Studies in Family Planning*, 16 (4): 231-236;

Gubhaju, B.B., "The Effects of Birth Spacing on Infant and Child Mortality in Rural Nepal". In *Preceding of the IUSSP-NIRA Joint Seminar on Social and Biological Correlates of Mortality*, Tokyo, November 24-27, 1984, Oxford University Press (forth coming).

rates are considerably lower in urban than in rural areas. Between 1974-75 and 1977-78 there appears to have been a considerable narrowing in the difference between urban and rural infant mortality rates. It is also to be noted that between these periods infant mortality rates have considerably declined in rural areas, but in urban areas the infant mortality rates have increased. It is, however, argued that the increase in infant mortality rates in urban areas may be due to better coverage of deaths in urban than in rural areas and not to any real increase in deaths over the years.

Geographic Zones and Development Regions

Table 13.9 presents infant mortality rates by geographic zones and development regions. These rates refer to the year 1978, are based

Table 13.9-Differentials in infant mortality by geographic zone and development regions, 1981

| Geographical zones and development regions | IMR | Period of estimation |
|--|-------|----------------------|
| Geographical zone | | |
| Mountain | 186.2 | 1978.6 |
| Hill | 163.5 | 1978.5 |
| Terai | 122.3 | 1978.1 |
| Development region | | |
| Eastern | 129.7 | 1978.5 |
| Central | 136.8 | 1978.3 |
| Western | 147.0 | 1978.4 |
| Mid-western | 178.0 | 1978.4 |
| Far-western | 164.5 | 1978.0 |

Note: Estimate of IMR (1⁰) is obtained by accepting (2⁰).

Source: Central Bureau of Statistics, 1985. *Intercensal Changes of Some Key Census Variables Nepal, 1952/54-81*, Kathmandu

on the on the proportion of deaths among children ever born by age of mothers from the 1981 census. It is apparent that the infant mortality rate is highest in the Mountain (186 per 1000), followed by the Hills (164 per 1000) and Terai (122 per 1000). Similarly, the infant mortality rate is highest in the Mid-western region

(178 per 1000), followed by Far-western region (165 per 1000), Western region (147 per 1000), Central region (137 per 1000) and Eastern region 130 per 1000).

Causes of Death

Statistics on causes of death are both limited and of questionable quality. A United Nations report indicated that statistics on deaths classified by causes were available for slightly less than one-third of the world's population. The existing data on causes of death are less reliable because the deaths are under-registered; large number of deaths are not medically certified and a high proportion of death are attributed to senility, ill-defined and unknown causes, or a category consisting of "all other causes"²⁰.

Despite these limitations, the existing data provide a broad picture of world mortality trends by cause of death. In developed countries, the proportion of deaths attributable to infectious and parasitic diseases has decreased dramatically, while degenerative ailments-cancer, diseases of the heart and circulatory system-account for a high proportion of total deaths. In the developing countries infectious and parasitic diseases are the leading causes of death.

In Nepal, the statistics on causes of death are not available. However, some health surveys have attempted to provide a broad picture of the major health problems in Nepal. It has been documented that infectious diseases followed by diseases of digestive system were reported as the major health problems in around 1955, while around 1975 malnutrition followed by tuberculosis have been reported as being the

major health problems²¹.

According to the WHO, infective and parasitic diseases, diseases of the respiratory system, and other ill-defined symptoms conditions were reported to be the leading causes of inpatient morbidity around 1975 in Nepal: these diseases accounted for 68% of all the inpatient morbidity (WHO,1980)²². Infective and parasitic diseases form the major health problems in the inpatient morbidity pattern presented in the hospital; 36 per cent of all the discharges were attributed to them. Infective and parasitic diseases also constituted the major proportion of the clinical cases presented in the outpatient department²³.

Life Table

One of the indicators of the health status and mortality level of a country is the expectancy of life at birth. It is defined as the average number of years a newborn baby is expected to live if he/she is exposed throughout his/her life to the prevailing pattern of age specific death rates. A common technique of estimating the expectation of life at birth is the life table.

The life table is generally constructed on the basis of the age specific death rate. But due to the gross under-reporting of deaths in Nepalese censuses, the life table constructed on the basis of age specific death rate does not provide a reliable estimate of the expectation of life at birth. Several life tables have

²⁰ United Nations, 1973. *The Determinants and Consequences of Population Trends: New Summary of Findings on Interaction of Demographic, Economic and Social Factors*, Volume I, New York.

²¹ Hansluwka, H. and Ruzicka, L. T., 1982. "The Health Spectrum in South East Asia; An overview", In *Mortality in South and East Asia: A Review of Changing Trends and Patterns, 1950-1975*, WHO, Geneva, PP.49-82.

²² WHO Regional Office for South Asia, *Bulletin of Regional Health Information, New Delhi, 1980*.

²³ United Nations, 1980. *Population of Nepal, ESCAP Monograph Series No. 6*, United Nations, ESCAP, Bangkok.

so far been constructed for Nepal on the basis of the age-sex distribution from the censuses. Abridged life tables constructed for the period between 1952/54 and 1981 are shown in Appendixes 1 to 10; the estimates of expectation of life at birth for males and females obtained by various authors for different periods are summarised in Table 13.10. Vaidyanathan and Gaige (1973)

estimated expectation of life at birth to be 27.1 years for males and 28.5 years of females in the year 1954. For the period 1953-61, the Central Bureau of Statistics (1977a) estimated expectations of life at birth to be 35.2 for males and 37.4 for females. Two sets of life tables have been constructed for the period 1961-71; Gubhaju (1974) estimated expectation of life at birth to be 42.9 for males

Table 13.10- Estimates of expectation of life at birth by sex, 1954-81

| Source | Period of estimation | Expectation of life at birth | |
|--|----------------------|------------------------------|--------|
| | | Male | Female |
| Vaidyanathan and Gaige 1973 | 1954 | 27.1 | 28.5 |
| Central Bureau of Statistics 1977 ^a | 1953-61 | 35.2 | 37.4 |
| Gubhaju 1974 | 1961-71 | 42.9 | 38.9 |
| Central Bureau of Statistics 1977 ^b | 1961-71 | 37.0 | 39.9 |
| Gubhaju 1982 | 1971 | 42.1 | 40.0 |
| Demographic Sample Survey 1976 | 1974-75 | 46.0 | 42.5 |
| Demographic Sample Survey 1977 ^c | 1976 | 43.4 | 41.1 |
| Central Bureau of Statistics 1986 ^a | 1971-81 | 46.3 | 44.3 |
| Central Bureau of Statistics 1986 ^b | 1981 | 50.9 | 48.1 |

Source:

- Vaidyanathan, K.E. and Gaige, F.H. 1973. Estimates of Abridged Life Tables, Corrected Sex-age Distribution and Birth and Death Rates for Nepal, 1954, *Demography India* 2 (2): 278-90.
- Central Bureau of Statistics, 1977a, b. *The Analysis of Population Statistics of Nepal*, His Majesty's Government, National Planning Commission Secretariat, Kathmandu.
- Gubhaju, B.B., 1974. "An Abridged Life Table Construction for the Period 1961-71, Nepal FP/MCH Project, Kathmandu.
- Gubhaju, B.B., 1982. "Estimation of the Level of Mortality in Nepal", *Demography India*, 11 (2); 253-262.
- Central Bureau of Statistics, 1976. The Demographic Sample Survey of Nepal, 1974-75, Survey Methods and Findings, Kathmandu.
- Central Bureau of Statistics, 1977c. The Demographic Sample Survey of Nepal, Second Year Survey, 1976 Kathmandu.
- Central Bureau of Statistics, 1986 a,b. Estimated Life Tables of Nepal 1971-81 and 1981 (Male and Female), , Kathmandu.

and 38.9 for females, while the values estimated by Central Bureau of Statistics (1977 b) were 37 for males and 39.9 for females for the period 1961-71. On the basis of the stable population theory, Gubhaju (1982) estimated expectation of life at birth to be 42.1 years for males and 40.0 years for females from the

age sex distribution of 1971 census. The only life tables that have been constructed so far on the basis of age specific death rates are from the Demographic Sample Surveys of 1974-75 and 1976 (Central Bureau of Statistics, 1976; 1977 c). According to these calculations, the expectation of life at

birth was 46.0 for males and 42.5 for females for the period 1974-75 and 43.4 for males and 41.1 for females for 1976.

The latest life tables were constructed by using the age-sex distribution of the 1971 and 1981 censuses. Two sets of life tables have, however, been prepared : one refers to the period 1971-81 and the other to 1981. The estimated expectation of life at birth was 46.3 for males and 44.3 for females for the period 1971-81; and for the period 1981 the estimate was 50.9 for males and 48.1 for females (Central Bureau of Statistics, 1986).

Various estimates of the expectation of life at birth summarised in Table 13.10 reveal that between 1954 and 1981 there has been a considerable increase in the expectation of life at birth for males and females. During the last 27 years-1954 and 1981-male life

expectancy has increased by about 24 years and that of females by about 20 years.

It is also to be noted that in Nepal female life expectancy is found to be generally lower than that of males; this is certainly contrary to the findings in developed countries. However, it corresponds to the pattern observed in India, Pakistan and Bangladesh. This pattern most likely reflects the impact of complications during pregnancy and childbirth which results in a high incidence of maternal mortality. Another factor that accounts for the lower life expectancy of females than that of males is the differential infant and child mortality for males and females. Although infant mortality in Nepal is found to be higher for males than for females, child mortality (between the ages one and five) is found to be higher for females than for males.