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Reliability of Age Reporting in Myanmar

(2014)

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Abstract

A change in the size and structure of a current population is closely related to change in socio-economic conditions and other development planning in a country. Reliability of age reporting is very important for government, public sector, private sector and further study of population. After having the age data from population censuses, this reporting data are needed to be reliable. Hence, the Whipple's index, Myers' index and United Nations Age-Sex Accuracy index are used to test the extent of inconsistencies and errors contained in 2014 Census data by sex for Union, Urban, Rural and each state and region. According to the results**,** Whipple's index is approximately accurate to be estimate of age reporting among states and regions. Myers' index and United Nations Age-Sex Accuracy index are more accurate and reliable of Whipple's index for Union, Urban and Rural areas. Generally, the reliability of age reporting in Urban areas is more accurate than Rural areas.

Key words: Whipple's index, Myers' index, United Nations Age-Sex Accuracy index

1. Introduction

In most developing countries the reliability of age reporting is a major problem of census. Age is one of the essential factors of population studies, especially fertility and mortality which strongly depend on age. It is the estimated interval of time between the date of birth and the date of census, expressed in completed years. A change in the size and structure of a population is related to change in variables such as sex, marital status, educational attainment, occupation, etc., which may vary by age. Furthermore, it is an essential for many purposes of demographic, economic and social characteristics.

The age structure of a population in various age groups constitutes an important factor of demographic analysis and development planning. Age structural dynamics includes fertility, mortality and as well as related changes in family planning and social arrangements. The use of age structure goes beyond demographic analysis to other important areas. The data of age composition is to help the government plan and policies for future development of a nation. Public polices aim to improve the welfare of a population and population welfare in turn is determined by the needs of present and future population. Future development of a nation, it is important to obtain the reliable data. It is necessary to examine the reliability and accuracy of age reporting data in Myanmar at the national and sub-national levels. Therefore, the reliability of age reporting is studied in this paper.

1.1 Objectives of the Study

The objectives of the study are

- To investigate the age and sex structure of population in Myanmar.
- To test the reliability and accuracy of age data by state and region.

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1.2 Scope and Limitations of the Study

The required information are collected from 1973 Census, 1983 Census and 2014 Census. The study area is focused in terms of the States and Regions of Myanmar. The main sources of data and information are secondary data derived from the 2014 Myanmar Population and Housing Census, Department of Population, Ministry of Immigration and Population.

1.3 Misreporting of Age

Errors concerning the reported age is a serious problem in every country. These errors occur mainly in countries with high proportion of illiterates, but even in countries with a well educated population or highly developed census system are not completely omitted. The basic forms of age misreporting occur as heaping. Age heaping means that too many people report their age ending with 5 or 0. This error appears mainly of people are asked for their age directly and then do not know their exact age. In censuses age misreporting is universal. The main sources of errors on age recording are:

(i) Proxy reporting.
(ii) Uncertainly in self reporting or document error.
(iii) Use of different calendars.
(iv) Ambiguous or ineffective questionnaire design.
(v) Use of indirect procedures in estimating age.
(vi) Inefficiency of interviewer process.
(vii) Errors in processing.
(viii) Deliberate miss-statement.

1.4 Types of Error

Errors may also occur at the stage of the data collection process. In a population census or demographic sample survey, errors may occur because of lack of adequate preparation and planning, ambiguities in the use of questionnaire, lack of proper training and supervision of the field staff and problems in processing the data. Before proceeding to test the reliability of demographic data, the types of error must be considered. Census data on age are subject to several types of error which vary from country to country. Errors may be divided into two broad categories described as:

(i) coverage errors and
(ii) content errors.

Coverage Errors

Coverage errors are the quantitative errors occurred due to the under or over enumeration of some parts of the area. These errors could be due to (i) failure to enumerate some geographical area or sub-group of population; (ii) omission or duplication of households; (iii) omission or duplication of individuals in the households; and (iv) omission or duplication of homeless persons. These errors are mainly due to under enumeration of the population at the time of enumeration. The under enumeration are due to (i) failure to enumerate the entire geographic area, and (ii) omission of some segments of the population.

Content Errors

Content errors due to inadequate information supplied or mistakes omitted in the reporting information, with reference to the characteristics of individuals (or households) enumerated in a survey or a census are also commonly found in the result of any survey or a census. These errors are errors due to misreporting of age. These are mostly due to (i) ignorance of the respondents of their correct age or their date of birth and (ii) carelessness in age reporting by the respondents and carelessness in recording by the enumerators.

1.5 Some General Testing Procedures for Common Errors

Methods of testing the accuracy of demographic data usually fall under the headings:

(i) Conducting a post-enumeration quality check
(ii) Checking the internal consistency of the data and
(iii) Comparing the data with some other data to check the plausibility of the data being tested.

To evaluate the census coverage, the following general methods can be applied:

(i) **Re-enumeration**: complete or partial (if the area where errors occurred is known) re-enumeration can reveal the errors.

(ii) **Post Enumeration Survey**: Usually after two weeks(to a month) of census taking a post enumeration survey take place. This is a kind of re-enumeration from some portion of an area. By comparing census and post enumeration survey data, level of coverage and content errors are unveiled by matching records of the persons (or households) in the area.

(iii) **Record Checks**: When other reliable records for the area such as previous census, vital registration or administrative records are available, the census records can be cross checked with one of those records. However, the timing of two records are usually different and cannot be well checked for the whole area.

(iv) **Comparison of Aggregate Counts**: If population registers or partial registers for some particular groups or areas are available, the comparison between aggregates can show the extent of errors.

(v) **Internal Consistency Checks**: These checks include, checking the age-structure with some other standard age pattern such as stable or previous census structure by comparing the household sizes for geographical areas; and comparing age-sex ratios by geographical areas.

(vi) **Comparison Successive Censuses**: Relative under enumeration or completeness can be obtained by using the demographic balancing equation, by computing and comparing cohort survival rates, or by computing intercensal growth rate for each group.

2. Methods

In this paper, age and sex composition of population in Myanmar is presented by population pyramid. Moreover, the Whipple's Index (WI), Myer's Index (MI) and United Nations Age-sex Accuracy Index (UNSI) are used for the reliability of age reporting in 2014, Population Census in Myanmar.

2.1 Age-Sex Composition

Age is defined as the times that pass from the birth to the moment of registration. Age structure is a crucial demographic attribute, because many characteristics and abilities change with age; especially fertility and mortality which strongly depend on age. Many of the social

phenomena depend upon the age. The present age structure of a population is a determinant factor for the future development.

Age-sex composition of the human population is one of the basic demographic characteristics, which is extremely vital for any meaningful demographic analysis. Changes in age-sex composition largely reflect the underlying socio-economic and cultural patterns of a society in different ways. It can be distinct from one country to another. The common three profiles of age-sex composition are

(i) Expansive: Large numbers of people in the younger ages
(ii) Constructive: Small numbers of people in the younger ages.
(iii) Stationary: Roughly equal numbers of people in all ranges, tapering off gradually at the older ages.

The age structure of a population is presented graphically through a population pyramid, showing relative frequencies by sex and age. The pyramid visually provides the fundamental structure of population.

The pyramid of high fertility and mortality countries are illustrated a “bottom heavy” population age structure that is, a very large proportion of children and a very small proportion of elderly persons. This age structure can be seen in developing countries.

Moderately high fertility and mortality countries show age pyramids that is generally triangular shape. These countries are different from high fertility and mortality characterized by a younger age structure which has narrowed down marked. This age structure can be seen in developed countries.

The low fertility and mortality countries are quite different from the above types, with their smaller numbers of young people and rather even distribution of the elderly. These countries are graphically represented by an approximate barrel-shaped pyramid. Countries of this type exhibit steady low fertility and mortality trends with the majority of the middle age groups. This age structure can be seen in developed countries.

2.2 Whipple’s Index (WI)

Different methods have been developed for measuring heaping on individual ages or terminal digits. The simplest and widely used index is the Whipple's Index. This index measures the degree of age heaping on the 0 and 5 combine. In age range 23 to 62, the extent of heaping may be measured by the ratio of the sum of population at the ages in the range ending in "0" or "5" and one-fifth of the total population in the range: It is computed as:

$$\text{WI} = \frac{P_{25} + P_{30} + P_{35} + P_{40} + P_{45} + P_{50} + P_{55} + P_{60}}{\frac{1}{5}\sum_{X=23}^{62} P_X} \times 100$$

where:

P_x = the number of persons reporting their age as x years

WI varies from 0 to 500. A value of 0 indicates that digits ‘0’ and ‘5’ are not reported. If there is no heaping at “0” and “5” the index will have a value of 100. If there is complete heaping, the index will have a value of 500. The age of early childhood and old age are excluded because they are more frequently influenced by other types of errors than digit preference.

The general decision rules are:

(i) If WI <105, the age reporting is highly accurate.
(ii) If 105 <WI <109.9, the age reporting is fairly accurate.
(iii) If 110 <WI <124.9, the data is approximate.
(iv) If 125 <WI <174.9, the data is rough.
(v) If WI $\geq$ 175, the data is very rough.

2.3 Myer's Index (MI)

This index is used for evaluating single-year-age-sex data. It can provide the extent of digit preference for all the digits 0, 1, 2, 3,…,9. It can be used to report errors for all ages 10-99 years. The underlying assumption of the method is that in the absence of systematic irregularities in the reporting of age, the blended sum at each terminal digit should be nearly 10% of the total blended population. If the sum at any given digit exceeds 10% of the total blended population, it indicates over selection of ages ending in that digit (i.e digit preference).

On the other hand, a negative deviation or sum that is less than 10% of the total blended population indicates an under selection of the ages ending in that digit (i.e digit avoidances). If age heaping is non-existent, the index would be approximately zero. The calculation of the Myers' index involves six major steps:

(i) Sum the population ending in each digit over the whole range, starting with the lower limit of the range, that is, find the sums of the ages 10, 20, 30, 40, 50, 60, 70, 80; 11, 21, 31, 41, 51, 61, 71, 81; 12, 22, 32, 42, 52, 62, 72, 82 and 19, 29, 39, 49, 59, 69, 79, 89.
(ii) As certain the sum excluding the first population combined in step (i), that is, find the sum of the ages 10, 20, 30, 40, 50, 60, 70, 80; 11, 21, 31, 41, 51, 61, 71, 81; 12, 22, 32, 42, 52, 62, 72, 82 and 19, 29, 39, 49, 59, 69, 79, 89.
(iii) Weight the sums in step (i) and (ii) and add the results to obtain a blended population. The weight begins with 1 and increases till 10 for the sums in the step (i), and begins with 9 and decreases till 0 for the sums in step (ii). For example, digit 0 will receive weights 1 for the first sum and 9 for the second whilst digit 1 receives weights 2 for the first and 8 for the second sum, and so on.
(iv) Convert the distribution of step (iii) into percentages.
(v) Take the deviation of each percentage from 10.0, the expected value for each digit. These deviations indicate the extent of concentration on or avoidance of a particular digit.
(vi) Compute a summary index defined as the one-half of the sum of all absolute deviation.

The formula is

$$\text{MI} = \frac{\text{Sum of the absolute deviation}}{2}$$

The general decision rules are:

(i) If MI< 20, the age reporting is reliable.
(ii) If 20 <MI < 40, the data is fair.
(iii) If MI > 40, the data is very rough.

2.4 United Nations Age-Sex Accuracy Index (UNSI)

UNSI measures the quality of data rather than the digit preference or heaping only. This index uses both age ratios and sex ratios from 5 years age groups. It is calculated by combining three numbers:

(i) Mean deviation of age-ratios for males from 100,
(ii) Mean deviation of age-ratios for females from 100, and
(iii) Three times the mean of the age to age differences in reported sex ratios. An age-ratio is defined as the ratio of the population in a given age group to one-half the sum of the populations in the preceding and following groups.

The calculation for this index is:

(i) Find the sex ratios, for each age group, that is, $\mathrm{SR} = \frac{\mathrm{M}}{\mathrm{F}} \times 100$

(ii) Find the successive differences of sex ratios, that is $\mathrm{SR}_{(\mathrm{i})} - \mathrm{SR}_{(\mathrm{i}-1)}$

(iii) Compute the age ratios for males $\mathrm{AR} = \frac{{}_5P_X}{\frac{1}{2}\left({}_5P_{X-5} + {}_5P_{X+5}\right)} \times 100$

(iv) Find the deviation of age ratios for males from 100. $\left(AR_{male} - 100\right)$.

(v) Compute step (iii) and (iv) for females $\left(AR_{female} - 100\right)$.

(vi) Compute the mean differences in sex ratios, that is the overage of the absolute values obtained in step (ii)

(vii) The index is constructed by summing three times the mean difference in sex ratios, the mean differences in age ratios for females and males

The formula is

$$\mathrm{UNSI} = 3\left[\begin{matrix}\text{Mean differences} \\ \text{of sex ratios}\end{matrix}\right] + \left[\begin{matrix}\text{Mean deviation of} \\ \text{the age ratio for} \\ \text{males form 100}\end{matrix}\right] + \left[\begin{matrix}\text{Mean deviation of} \\ \text{the age ratio for} \\ \text{females form 100}\end{matrix}\right]$$

$$\text{(iv)} \quad = 3\left[\frac{\sum\left|SR_i - SR_{i-1}\right|}{n}\right] + \left[\frac{\sum\left|AR_m - 100\right|}{n}\right] + \left[\frac{\sum\left|AR_f - 100\right|}{n}\right]$$

The general decision rules are:

(i) If UNSI < 20 the data is accurate.
(ii) If 20 < UNSI < 40, the data is inaccurate.
(iii) If UNSI > 40, the data is too inaccurate to use for further analysis.

3. Results and Findings

In this section, age and sex composition of Myanmar for 1973, 1983 and 2014 are studied. In addition, the reliability of age reporting in Myanmar 2014 is calculated by using Whipple's Index, Myer's Index and United Nations Age-Sex Accuracy Index.

3.1 Age Structure

The following table presents the percentage of five year age group by age and sex distribution in Myanmar for 1973, 1983 1nd 2014.

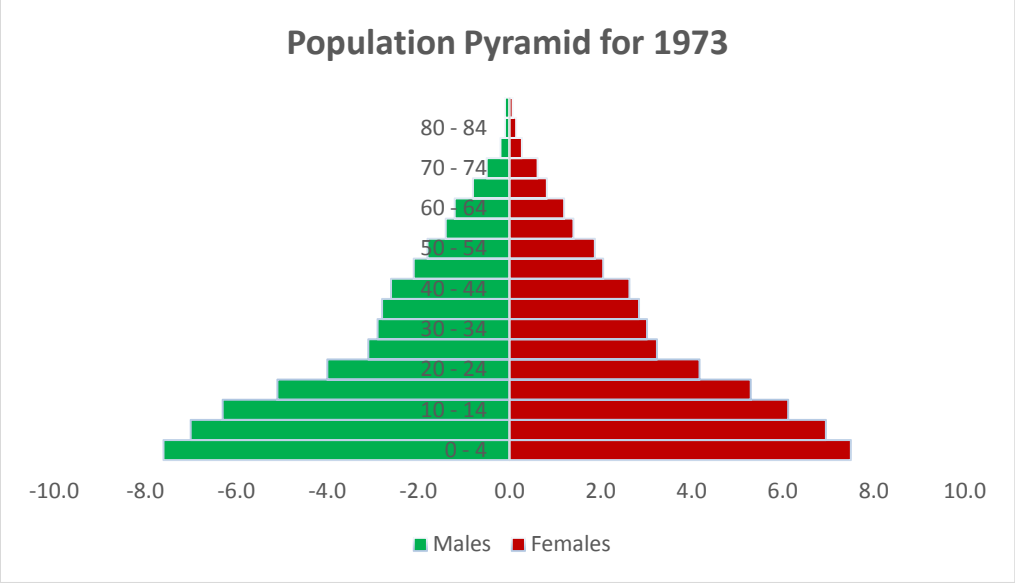
Table (3.1) Percentage of Five-Year Age Group Distribution for 1973, 1983 and 2014

(%)

Age Group	1973		1983		2014	
	Male	Female	Male	Female	Male	Female
0 – 4	7.6	7.5	6.6	6.5	4.5	4.4
5 – 9	7.0	7.0	6.5	6.4	4.8	4.7
10 – 14	6.3	6.1	6.4	6.1	5.2	5.0
15 – 19	5.1	5.3	5.4	5.5	4.6	4.6
20 – 24	4.0	4.2	4.7	4.9	4.1	4.4
25 – 29	3.1	3.2	4.0	4.1	4.0	4.3
30 – 34	2.9	3.0	3.1	3.2	3.7	4.0
35 – 39	2.8	2.8	2.4	2.4	3.4	3.7
40 – 44	2.6	2.6	2.1	2.2	3.1	3.4
45 – 49	2.1	2.1	2.0	2.1	2.7	3.1
50 – 54	1.8	1.9	1.9	1.9	2.4	2.7
55 – 59	1.4	1.4	1.4	1.5	1.9	2.2
60 – 64	1.2	1.2	1.2	1.3	1.4	1.7
65 – 69	0.8	0.8	0.7	0.8	0.9	1.2
70 – 74	0.5	0.6	0.6	0.7	0.6	0.8
75 – 79	0.2	0.3	0.3	0.3	0.5	0.6
80 – 84	0.1	0.1	0.2	0.2	0.3	0.4
85+	0.1	0.1	0.1	0.1	0.2	0.3
Total	49.7	50.3	49.6	50.4	48.3	51.7

Source: 1973, 1983 & 2014 Censuses

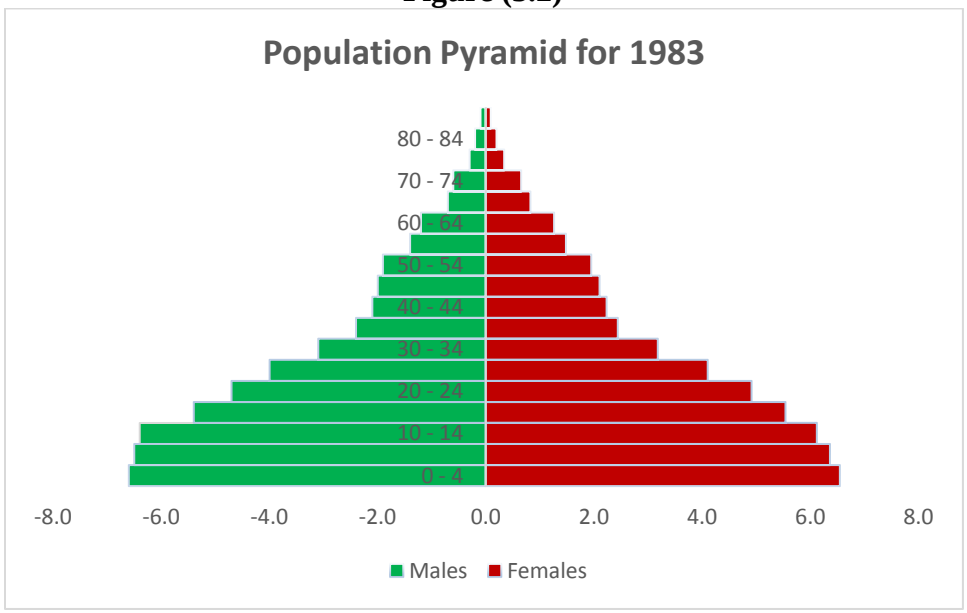
Figure (3.1)



Source: Table (3.1)

The pattern of age and sex population of five year age group is presented in Table (3.1) and Figure (3.1). In 1973, nearly 20% of the population is below the age of 15. It can be found that the age group 0-14, the population is exceeding to the other age group. The population pyramid has an expanding population with a large proportion of younger age group. It has a high fertility and short life expectancy. It might be due to the low level of education and poor health care in Myanmar.

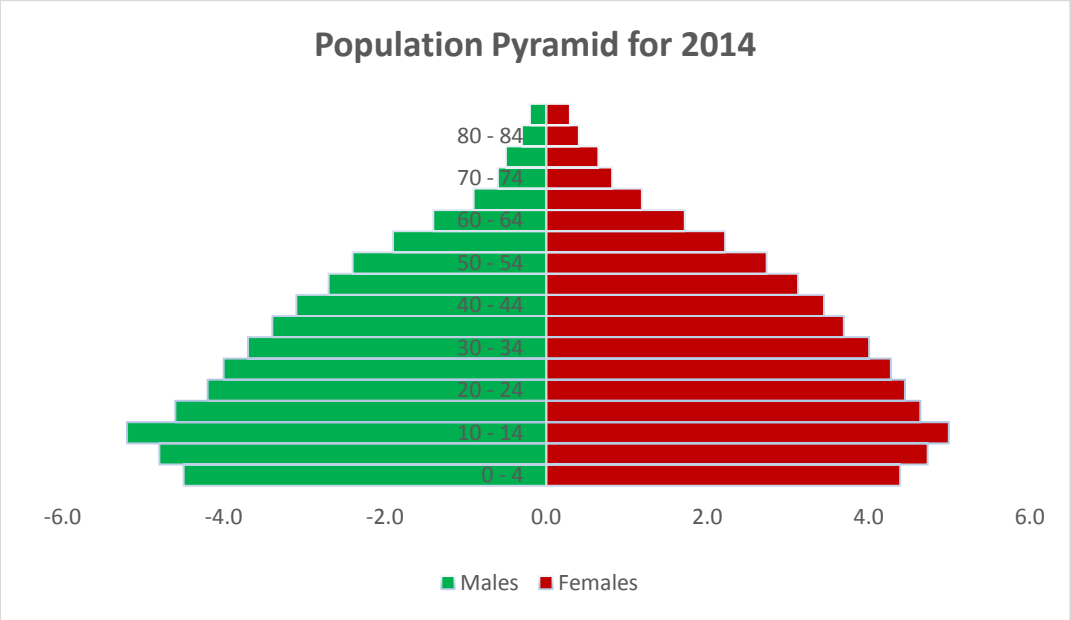
Figure (3.2)



Source : Table (3.1)

The data in above Table (3.1) and Figure (3.2) also shows the changes in age and sex composition of the 1983 census. Census result of 1983 shows that in Myanmar, nearly 7% of the populations are under five years of age. The age structure of Myanmar is found to be made up of a large proportion of children and small proportion of elderly persons. The population pyramid has a wide base and narrow top have high level of fertility. It has an expanding type. It can be observed that nearly the same age structure in 1973 census.

Figure (3.3)



Source: Table (3.1)

From Table (3.1) and Figure (3.3) indicates that the natures of age distribution are revealed in the five year age groups. The population pyramid has a narrow bottom. It has a low fertility and long life expectancy. The age structure has a constructive typical pattern. The age group 10-14, the population is in excess to the other age group. Moreover, the older population gradually increased in other age group. Therefore, the government and aid agencies should be prepare job opportunities for working age population and support to need of pensions, social security for older population.

3.2 Sex Composition in Myanmar

Sex composition is defined as the number of males per 100 females in the population. It is an important social indicator to measure the extent of prevailing equity between males and females in a society and influences directly the incidence of marriage, birth, death, migration, economic activities, etc.

Table (3.2) Sex Composition by Five Year Age Group Distribution in Myanmar

Age Group	1973			1983			2014		
	Male '000	Female '000	Sex Ratio	Male '000	Female '000	Sex Ratio	Male '000	Female '000	Sex Ratio
0 – 4	2128	2106.4	101.0	2267.8	2234.1	101.5	2,262.8	2,209.3	102.4
5 – 9	1976	1952.6	101.2	2216.2	2172.7	102.0	2,438.4	2,380.7	102.4
10 – 14	1762.0	1719.2	102.5	2179.0	2089.7	104.3	2,595.7	2,512.6	103.3
15 – 19	1443	1488.1	97.0	1844.4	1891.0	97.5	2,291.0	2,335.0	98.1
20 – 24	1136	1172.9	96.8	1610.1	1676.2	96.1	2,091.5	2,239.5	93.4
25 – 29	884.4	911.1	97.1	1363.8	1399.7	97.4	1,995.5	2,150.7	92.8
30 – 34	815.5	849.3	96.0	1067.2	1085.8	98.3	1,884.5	2,014.3	93.6
35 – 39	794.6	800.1	99.3	835.2	833.5	100.2	1,705.6	1,857.9	91.8
40 – 44	730.8	739.5	98.8	716.6	762.9	93.9	1,548.9	1,734.1	89.3
45 – 49	579.8	579.3	100.1	695.8	717.9	96.9	1,375.0	1,571.1	87.5
50 – 54	517.5	526.2	98.3	634.2	664.9	95.4	1,182.3	1,376.9	85.9
55 – 59	387.1	394.4	98.1	489.8	505.6	96.9	936.0	1,116.0	83.9
60 – 64	323.7	338.2	95.7	398.9	431.4	92.5	712.0	864.8	82.3
65 – 69	214.6	231.5	92.7	254.0	281.5	90.2	466.6	597.9	78.0
70 – 74	153.8	173.4	88.7	192.7	223.5	86.2	301.7	411.5	73.3
75 – 79	68.9	77.9	88.4	99.0	115.8	85.5	228.3	325.0	70.2
80 – 84	33.0	41.8	78.9	52.3	68.2	76.7	130.9	204.7	63.9
85+	14.9	19.8	75.3	22.4	30.8	72.7	81.8	149.2	54.8
Total	13963	14122	98.9	16939	17185	98.6	24229	26051	93.0

Source : 1973, 1983 & 2014 Censuses

Generally, the overall sex ratio of a population is expected to be 100. From the above Table (3.2), the overall sex ratio for union is 98.9 in 1973, 98.6 in 1983, and 93.0 in 2014. A sex ratio above 100 indicates an excess of males and below 100 indicates an excess of females. According to the results, all sex ratio are below 100. It means that more females than males. The patterns of these ratios were nearly the same in year 1973 and 1983. At the younger ages, there are more males than females, resulting in a sex ratio at birth over 100. At the older ages, males tend to die more frequently than females; it is expected sex ratio to be below 100. In these three censuses, the pattern was nearly the same in younger age group. It is declined to less than 100 at other age groups except 45-49 age group in 1973 and 35-39 age group in 1983.

3.3 Reliability of Age Reporting by Using Whipple's Index

The reliability of age reporting is calculated by using Whipple's Index. The calculation of the Whipple's Index is shown in the following Table (3.3).

Table (3.3) Reliability of Age Reporting by Using Whipple's Index

States/Regions	Union		Urban		Rural	
	Male	Female	Male	Female	Male	Female
Kachin	124.98	124.52	122.57	123.77	126.25	124.98
Kayah	118.88	120.05	111.92	111.61	121.51	123.35
Kayin	131.28	128.99	120.23	117.67	134.96	132.56
Chin	120.29	128.50	118.64	127.58	120.78	128.78
Sagaing	123.80	122.84	120.16	119.98	124.57	123.46
Tanitharyi	120.39	117.89	114.20	113.20	122.53	119.61
Bago	117.84	117.11	114.90	114.81	118.67	117.82
Magway	119.86	119.24	116.23	117.13	120.50	119.64
Mandalay	122.27	122.04	117.68	117.85	124.85	124.35
Mon	123.07	120.71	117.55	115.99	125.39	122.72
Rakhine	131.06	130.97	123.30	122.75	132.78	132.80
Yangon	112.71	112.04	111.55	111.20	115.51	114.26
Shan	152.42	150.13	121.26	120.87	162.94	160.62
Ayeyawady	119.20	117.35	118.76	116.52	119.27	117.51
Nay Pyi Taw	119.97	118.37	114.49	113.85	122.92	120.82
Total	124.01	122.58	115.99	115.57	127.59	125.84

Source: 2014 Census

For male population, the age data obtained approximate estimate of reporting by all states and regions except Kayin, Rakhine and Shan States in union. This indicates that age heaping by state and region in digit ending in 0 and 5 rather than other digits. For female population, the value of WI approximately heaping can be seen that for all states and regions except Chin, Kayin, Shan and Rakhine States in Union and Rural areas. A general, phenomenon is that the male population is more likely to have digit preference. On the basis of criterion, the age distribution of all states and regions for 2014 census are very likely to be affected by misreporting of age. The age reporting for Rural areas are nearly the same pattern of Union but the age reporting for Urban areas are approximately accurate. Especially, the Urban age reporting are found to be no particular tendency of age heaping except Chin State. Moreover, it can be found that the reliability of reporting ages in Urban areas is better than Rural areas. It might be due to the educational levels of the enumerators as well as the respondents are relatively higher in Urban areas than Rural areas.

3.4 Reliability of Age Reporting by Using Myer's Index

The reliability of age reporting is calculated by using Myer's Index. The calculation of the Myer's Index is observed in the following Table (3.4)

Table (3.4) Reliability of Age Reporting by Using Myer's Index

States/Regions	Union	Urban	Rural
Kachin	5.20	5.01	5.24
Kayah	4.23	3.12	4.66
Kayin	6.56	4.56	11.44
Chin	4.90	4.74	5.08
Sagaing	5.06	4.60	5.16
Tanatharyi	4.69	3.53	5.09
Bago	4.10	3.71	4.28
Magway	3.90	3.62	3.95
Mandalay	4.78	4.12	5.15
Mon	5.08	4.25	5.40
Rakhine	7.51	5.75	7.91
Yangon	3.31	3.09	3.86
Shan	9.36	4.66	11.25
Ayeyawady	3.80	4.16	4.24
Nay Pyi Taw	4.28	3.74	4.64
Total	4.91	3.82	5.44

Source: 2014 Census

Myers' index indicates for each of the ten terminal digits from 0 to 9. This is one of the advantages of Myers' index over Whipple's index. From above Table (3.4), the indexes are found to be quite distinct between Urban and Rural areas. The values of the indexes for the Urban areas are found to be much lower than those for the Rural areas. Hence, the reliability of age reporting in Urban areas is more accurate than Rural areas. According to the results, all of the age reporting data is less than 20. Hence, the age reporting data of the whole country are accurate and reliable. On the basis of the criterion, the age distributions for the Union, Urban, Rural areas are found to have no particular tendency of age heaping.

3.5 Reliability of Age Reporting by Using United Nations Age-Sex Accuracy Index

The reliability of age reporting is calculated by using United Nations Age-Sex Index. The calculation of the United Nations Age-Sex Index is presented in the following Table (3.5).

Table (3.5) Reliability of Age Reporting by Using United Nations Age-Sex Accuracy Index

States/Regions	Union	Urban	Rural
Kachin	34.85	28.74	41.20
Kayah	21.00	24.66	23.77
Kayin	21.30	20.65	23.15
Chin	24.58	24.99	27.12
Sagaing	18.30	21.36	19.40
Tanitharyi	22.76	25.67	22.56
Bago	18.36	16.20	18.88
Magway	20.31	23.43	21.86
Mandalay	18.10	24.02	18.98
Mon	19.21	22.07	19.37
Rakhine	26.15	23.59	28.42
Yangon	19.58	21.51	17.51
Shan	24.64	25.18	26.10
Ayeyawady	19.52	22.07	19.88
Nay Pyi Taw	25.12	28.86	24.49
Total	17.02	20.73	18.11

Source: 2014 Census

According to above Table (3.5), the joint scores of Ayeyawady, Bago, Mandalay, Sagaing, Yangon regions and Mon state are accurate for Union. Generally, the remaining other States and Regions are inaccurate. But all States and Regions are nearly 20, it can be concluded that the reliability of age reporting of 2014 census of Myanmar is quite satisfactory. Compares the Rural and Urban areas on the basis of UNSI, some of the states and regions of Urban areas of age reporting are more accurate than Rural areas and some of the states and regions of Rural areas are more accurate than Urban areas. Among the Rural areas of states and regions, Kachin State was highly inaccurate. In most cases, it could be reasonably accepted by misreporting. The Union, Urban and Rural areas of the whole country are less than or nearly 20. Hence, it could be concluded that the age reporting are acceptable.

3.6 Comparison of Reliability in Age reporting

The following table illustrates the summary of age reporting is compared by three different methods: Whipple's index, Myer's index and United Nations Age-Sex Accuracy index.

Table (3.6) Comparison of Reliability in Age Reporting

	Value of Index	Assessing Degree
Whipple's Index		
Union		
Male	124.01	Approximate
Female	122.58	Approximate
Urban		
Male	115.99	Approximate
Female	115.57	Approximate
Rural		
Male	127.59	Rough
Female	125.84	Rough
Myer's Index		
Union	4.91	Reliable
Urban	3.82	Reliable
Rural	5.44	Reliable
United Nations Age-sex Accuracy Index		
Union	17.02	Accurate
Urban	20.73	Inaccurate
Rural	18.11	Accurate

Source: 2014 Census

Table (3.6) indicates the WI for male and female is 124.01 and 122.58 for union, 115.99 and 115.57 for Urban and 127.59 and 125.84 for Rural areas. According to the results, the value of WI is approximately accurate of reporting for Union and Urban areas. But, it can be found that as a rough reporting in Rural areas. Moreover, the age reporting was more accurate for the females than males in 2014 census.

The extent of terminal digit of '0' to '9' preference or age reporting can be measured by MI. From above table, the MI for Union, Urban and Rural is 4.91, 3.82 and 5.44. According to the results, the value of indexes in Union, Urban and Rural areas are less than 20. Therefore, it can be said that the whole country of age reporting are reliable.

Another way of checking the reliability of age data is measured by UNSI. Based on findings, the age reporting data in Union, Urban and Rural areas is 17.02, 20.73 and 18.11. It can be observed that the joint scores are less than 20 in Union and Rural areas and approximately 20 in Urban areas. Generally, the age reporting data for the whole country as well as for Urban and Rural areas are found to be provided quite acceptable or not highly accurate. It could be suspected that the age reporting are influence of age heaping.

Findings

Nowadays, the reliability of age data is important for developed and developing countries on the world. It is an essential factor of many practical fields. In every country, the reliability of age reporting is very important for many purposes such as labor supply, educational attainment and other demographic, social and economic variables, etc. All these variables are related to age. The pattern of digit preference and the extent of age misreporting are varied from country to

country. Different countries have different social values attached to age and age heaping and digit preference are measured by calculating WI and MI. Moreover, the reliability of age data is measured by using UNSI.

The age structure of population is illustrated the population pyramid. It is a graphical way to show the age and sex composition of a population. From the results, the size of the 0-14 age group has given the pyramid quite a large base in 1973 and 1983 but it has a narrow base in 2014. It is expected to be high level of fertility in 1973, in 1983 and low level of fertility in 2014.

The sex composition of a population refers to the distribution of the people by sex. The calculated sex ratio for the whole country in 1973, 1983 and 2014 censuses are 98.9, 98.6 and 93.0. These all sex composition of population is below 100. It indicates that more females than males in Myanmar.

According to the results, WI is considered to be approximately accurate of age reporting among states and regions. Moreover, MI and UNSI are more accurate and reliable of WI for Union, Urban and Rural areas. Generally, the reliability of age reporting in Urban areas is more accurate than Rural areas.

Suggestions

Based on findings, demographers and researchers should be able

(i) To proper training and supervision of the field staff.
(ii) To adequate preparation of questionnaires and survey methods.
(iii) To compare the results with other records or external checks.
(iv) To recheck the original data going back to the stage up to which access is available.
(v) To test the internal consistency by comparing different combinations of the data available.
(vi) To compare the data of several census of several years to study the trends and check for consistency.

Furthermore, the multi-media should be able to contribute their knowledge and experience for awareness of accurate and reliable of age reporting among the public.

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