SIMILARITIES AND DISSIMILARITIES BETWEEN POPULATION CENSUSES OF SRI LANKA IN 2001&2012 : DEMOGRAPHIC ANALYSIS

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ABSTRACT

The department of census and statistics in Sri Lanka done the first legal census in 1871. That was the first legal census in south Asia. After that there were population censusesin Sri Lanka in 1881, 1891, 1901,1911, 1921, 1931, 1946, 1953, 1963, 1971, 1981, 2001 and 2012. The study aimed to evaluate the population census was in 2001 and 2012. The research targeted to capture the accuracy of signal year age distribution of total population. Because, the amount of whole population is a valuable indicator in Economics and various areas regarding with policy implication of a nation. The methodology of the study is based on quantitative analysis. The study used Whippel's Index, Myer's Index and Sprague multiplier as the estimation techniques. Even though, there were differences in estimation techniques, that has no made an effects on the accuracy of population reporting in 2001 & 2012.

KEYWORDS

De-facto enumeration, De-jore enumeration, Whipple's index, Myer's index, Sprague multiple.

1. INTRODUCTION

Population census is an important event for a country. It compiles with the information typically gender, marital status, income and some other related information about the residents in the country. The information from the population census useful to the government to rule the country and facilitates to the masses. Demography is a subject that compile with the various aspects to study and measure the important factors about vital events. Guillard has defined that Demography is the mathematical knowledge of population, their general movements and their physical civil, intellectual and moral state. United Nations (1998) has cited the importance of demographic data as follow "Information on the size, distribution and characteristics of a country's population is essential for describing and assessing its economic, Social and demographic circumstance and for developing sound policies and programmes (in such fields as education and literacy, employment and manpower, family planning, housing, maternal and child health, rural development, transportation and highway planning, urbanization and welfare) aimed at fostering the welfare of a country and its population".

Population census is a one major source of collecting data about the whole population at one situation suddenly. The importance of the population census can mention as follow. It's useful to business, industry, labor and research and their beyond. As well as these are important in economics planning and development, financial system, medical sector, market, employment opportunities and control, provision of social amenities, income distribution, government revenue, labor availability, education, housing, transport, planning, distribution of natural resource like that.

When consider about the types of population census, typically there are two called de-facto enumeration and de-jure enumeration. In de-factor enumeration, count the population at one time people in everywhere. But, De-jure enumeration count the population at the home.

Sri Lanka has while history in population census. The first census in Sri Lanka has done in 1789 under the Dutch colonialism period. It has only covered the coastal areas in Sri Lanka. In 1871 the department of census and statistics in Sri Lanka has done the first legal census in Asian countries. After that the population censuses done in 1881, 1891, 1901,1911, 1921, 1931, 1946, 1953, 1963, 1971, 1981, 2001 and 2012. Sri Lanka traditionally been "de-factor" enumeration basis. But the censuses in 1971, 1981 and 2001 has done by covering above two types of enumeration system. 2012 census based on de-jure enumeration. There are two basic, common sources of errors in census. Such as coverage errors and content errors. In one way coverage errors can happen with omissions and duplications. In the other way the content errors can happens with non-responses, influence responses such as interview effects, respondent effect etc.
So, it makes clear image of a question in what makes the most outstanding image about Sri Lankan population characteristics. This study attempt to check the accuracy of above two research by using single year age distribution of total population in Sri Lanka in 2001 and 2012 based on demographic evaluation techniques.

1.1 RESEARCH PROBLEM

This study focus on the 2001 population census and 2012 population census in Sri Lanka. Because these two have some significantly different from the enumeration technique and the scope of coverage. 2001 census has totally covered only 18 districts in Sri Lanka. Because of the terrorism war was in north area. 2012 population census has covered all districts in Sri Lanka after 1981. It's one difference between these two. The other one is, 2001 census used de-facto method and 2012 done under the de-jure method. Now it's clear that there are some intelligible differences between these two censuses. Because of these all this study investigated that are there any shortcoming in those two censuses.

1.2 LITERATURE REVIEW

Some research articles have used to make this literature review. By using these papers this study makes the evaluation proses of the study and identified the importance of this study.

Gunasekara (2009) has done her study an evaluation of age-sex data of census of population and housing 2001 Sri Lanka. He mentioned that age-sex structure of the country is one of fundamental characteristic of a country and it reflected the past population changes by fertility, mortality and migration on age-sex structure. As well as age-sex data are the basic inputs to make the population projections. So, it's important to have correct age-sex data in population. Gunasekara mention that census data can be affected from coverage and content errors. He emphasizes that misreporting of sex is generally rare and misreporting of age seriously affected the quality of age data. He compared the 2001 census with the 1981th census. He used single year age data and UN age sex accuracy index to quantify the accuracy of census data. As well as he used the graphical methods such as population pyramid to capture the age sex distribution pattern. According to the results of UN index he conclude that age-sex data in 2001 are very reliable.
United Nations statistical division has presented a study at the United Nations workshop on census data evaluation for English speaking African countries on 12-16 November 2012 at the Kampala, Uganda. They have mentioned that they have used three type of methods to evaluate the age, sex distribution of population such as graphical analysis, age and sex ratios and some

indexes to follow the error in age-sex data, such as Whipple's index and Myer's blended index. They highlighted the importance of the age-sex structure as follow,

- Planning purpose, health services, sales programmes, school, and voting, labor supply.
- Social science, economist, gender studies.
- Studying population dynamics, fertility, mortality and migration.
- Insight on quality of census enumeration.
- Having strong effect on other characteristics of a population.

They also discuss the need of evaluation. And they propose that the evaluation should done often because of the possibility of data error in the age sex structure, including misreporting and coverage errors and the significant discrepancy in age-sex structure due to extraordinary events such as high migration, war, famine, HIV/AIDS epidemic etc. As well as they have used Whipple's index and Myer's index to check the accuracy of age sex data world while. But they have dis-missed Sri Lanka from their considering study. They have identify the importance of this kind of studies that it is not possible to derive separate numerical estimates of the magnitude of coverage and content error on the basis of such analysis alone.It was rare to find the studies relevant to the current study. So, that was the major limitation when it made the literature review. So, this research is important in done.

2. METHODOLOGY

There are three types of popular methods that using demographic evaluations. Graphical methods, Ratios and indexes. This study have use two from above up to graphical methods and indexes. As the graphical methods, population pyramid use to figure the age sex structure. But, in here graphical methods have used to compare the actual and estimated single year age distributions in 2001 and 2012. In the other step indexes have used to measure the reliability of census data. Single year age distribution in 2001 and 2012 in Sri Lanka have used as one component to represent the population census and it has use the indicator to figure the above two population censuses. There are three test to check the accuracy/reliability of single year age distribution like Whipple's index, Myer's index and United Nations joint score index. But here it has only used two the Whipple's index and Myer's index.

Whipple's index is highly sensitive to age heaping on 0 and 5. This index applies to single years of age reporting between ages 23 to 62. It is obtained by summing the number of persons in this age range, and calculating the ratio of reported ages ending in 0 or 5 one-fifth of the total sample. It varies between 100 (indicating no preference for ages ending by 0 and 5) and 500 (indicative of a complete report on ages ending by 0 and 5). Whipple's index can be calculated by using equation no 01,

$$WI = \frac{\sum_{x=0,5}^{62} P_x}{\frac{1}{5}\sum_{xi=23}^{62} P_{xi}} \qquad \text{.....(01)}$$

The UN recommends a standard for measuring the age heaping using Whipple's index as table 01.

Whipple's Index	Quality of Data
< 105	Very accurate
105-110	Relatively accurate
110-125	OK
125-175	Bad
>175	Very bad

Table 01: Key of the Whipple's index

Myer's Blended Index can be applied to find preferences for any terminal digit. His method involves calculating a blended population of final digits in which the expectation is than in the absence of any digital preference about 10% of the population will have reported ages ending digit 0, 10% ages ending in 1 and so on. Any deviation from the expected 10% for each terminal digit are added (irrespective of sign) to arrive at the Myer's index. There are few steps to calculating Myer's index.

1. First Population should blend
2. To do that one has to decide the range over which the extent of digital preference has to be measured.
3. It can be used any range for that, But here used age range of 10-59 years.
4. Then, is should be calculated the Product for the each blend and by using that the blended sum should be calculated.
5. Then it should take the deviation of the values from 10%.
6. Finally should take the total of the modules value of deviation from 10%.
7. Myer's index can have the values from 0 to 180 theoretically. So, the key of the index mention in table no 02.

Myer's Index	Quality of the data
Less than 20	Very good
20-40	Good
Greater than 40	Bad

Table 02: Key of the Myer's Index

The accuracy of censuses data in 2001 and 2012 have tested by using Whipple's index and Myer's Index. Then to check the reporting accuracy in the each age Sprague multiple has used as an interpolation technique. Interpolation is a method of constructing new data points within the range of a discrete set of known data points. Calculating a new point between two existing data points is therefore interpolation. There are different interpolation techniques. In here, Sprague multiple is a technique to estimate intermediate values from a given series in total of gives. The

procedure produces a relatively regular (or smooth) series of interpolated data (population in single year). The finding according to this methodology beyond.

3. FINDINGS

The Whipple's index (2001=4.9834-Very good, 2012=9.79- Very good) prove that the population distribution in 2001 and 2012 both are very good, and also Myer's blended index (2001= 20.03158-Very accurate, 2012=20.03158-Very accurate) also continued that the population distribution in 2001 and 2012 very reliably. As well as the graphs figure that the single year age distribution of census data and interpolated data together in 2001 and 2012.

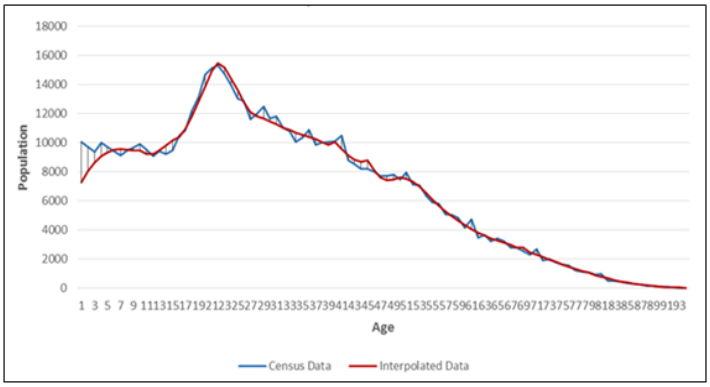

Figure 01- Population 2001

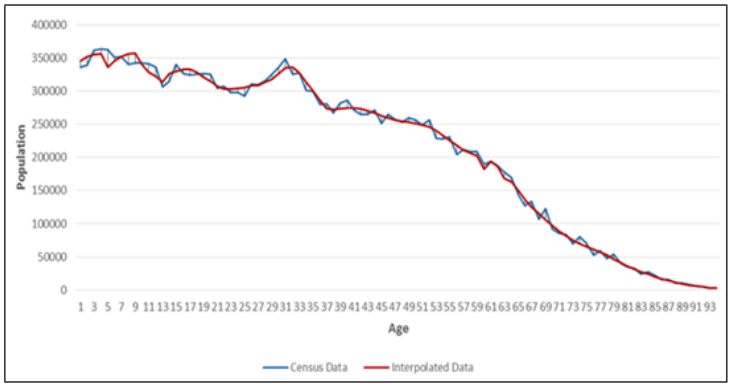

Figure 02- Population 2012

Figure 01 and figure 02 have same behaviour. Both graphs shows that there are no obvious huge differences between the census data and interpolated data. That means even if the methodology and coverage area was changed that has not affected on the reliably of census data.

4. CONCLUSION AND RECOMMENDATION

Finally, the conclusion is that Sri Lanka has done population census in a reliably level. As well as the chances regarding with the census methods in Sri Lanka hadn't made any harm on census

data. Sri Lanka has done the first scientific population in Asia in 1871. So, Sri Lanka has great history in population census. A reliable population census can make number of god bargains for a nation in various aspects such as Planning purpose, health services, sales programmes, school, and voting, labor supply, Social science, economist, gender studies, Studying population dynamics, fertility, mortality and migration, Insight on quality of census enumeration, having strong effect on other characteristics of a population. According to the united Nation's recommendations it's important to do the censuses in Sri Lanka in years end from 0 and 1, because it is make a great platform to comparison with other countries.

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