



2012 Census-based Re-weighting of Labour Force Survey Estimates *Revised Annual and Quarterly Labour Force Statistics: 2011-2015*

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1. Introduction

The national statistics office in Sri Lanka; the Department of Census and Statistics (DCS) recognized the need of re-weighting Labour Force Survey (LFS) aggregates and micro-data, using rebased mid-year population estimate (MYPE) of 2012 published by the Register General Department (RGO). As practiced in many other countries after a Census of Population & Housing, the process of re-weighting enables the national statistics office to keep LFS estimates in line with the latest population data.

The Census of Population and Housing 2012 (CPH 2012); the country-wide census conducted after 1981 provided wide-ranging information (population distributions, institutional population) to be used to improve LFS weighting scheme and to complete this LFS re-weighting process.

Prior to 2012 a complete Census of Population & Housing was conducted in 1981. Due to prevailed situation of the country a CPH was not conducted in 1991 and also the CPH 2001 did not cover whole country. Unavailability of a complete census over a period of three decades, the uncertainty accumulated in base populations which were used to weight LFS data was high. As stated above CPH 2012 covered the whole country. Therefore DCS decided to re-weight LFS data in order to keep LFS estimates in line with the latest population data.

This is the first time a re-weighting is applied to LFS data in Sri Lanka. This article provides the methodology and the summary of annual and quarterly aggregates of LFS for the period from 2011 onward. Further, the report comprises the reweighted estimates for age 15 years and above household population (the working age population), labour force, employment and unemployment for the study period.

In following sections, the article explains on the background of the re-weighting, rebasing the MYPE, background of the LFS, procedure of the re-weighting, availability of data and a short description on the impact of re-weighting on already published LFS statistics.

2. Background of the re-weighting

The goal of a sample survey is to use sample data to estimate population averages and therefore the data collected at any survey need to be weighted in order to provide population estimates. Usually the survey weights are constructed based on a combination of probability calculations and non-response adjustments. Also to make a national survey results consistent with the current mid-year population estimates a population adjustment is done for any countrywide survey, which is referred to as applying population controls. However, if any revision is done for the already published official MYPE then the survey data must also be re-weighted to be consistent with revised MYPE. This is a general practice in many other countries.

In Sri Lanka DCS conducts several country wide household surveys and follows mainly the above explained weighting procedure to obtain estimates for the population. Since the Labour Force Survey (LFS) is an annual country-wide survey a similar procedure is followed to estimate labour market statistics for the country. However, due to the rebase in MYPE of 2012 and to incorporate some improvements to the survey weighting scheme (using CPH 2012 results), DCS decided to re-weight LFS statistics from 2011 onward. The CPH 2012 results were finalized in 2014 and also the MYPE was adjusted to these finalized population figures. Hence, LFS re-weighting process started in 2014 using the latest MYPEs by district level.

3. Rebasing the MYPE

In Sri Lanka with the results of the CPH 2012 the mid-year population estimates of 2012 (MYPE 2012) published by the RGO were rebased. These provisional MYPE 2012 was again revised in 2014 with finalized population figures of CPH 2012.

Generally, MYPE is calculated using the balancing equation and for this calculation population of the base year, number of births, deaths and net-migration are used. In Sri Lanka RGO publishes provisional MYPE in month of September in every year and finalized MYPE is published in subsequent year when the number of births, deaths and migration are finalized.

The difference between projected population from the previous Census results and the actual results of the next Census is usually known as the intercensal error. Though it is lower, Sri Lanka is having a positive population growth rate. However, with the MYPE rebasing in 2012 it was found that published MYPE 2011 was higher than the rebased MYPE 2012 (based on CPH 2012). The difference or the intercensal error was about 0.44 million. Following may be the reasons for this difference in MYPE,

- The accumulated uncertainty in accuracy of the base-year population which has been used to calculate MYPE was very high, due to unavailability of a countrywide census after 1981 till 2012. This happened due to the unsettled conditions prevailed in the country for about three decades after early 1980s. The population census of 1991 was not conducted and the CPH 2001 could not cover some parts of the country.
- Also the base year population used for MYPEs from 2001 till 2011 series was incomplete as population of 7 districts (Northern and Eastern Provinces) provided by the district local administration may not be accurate for not having a scientific method to estimate.

- Also during the unsettled period, the total migrated population may be different from what was reported in official channels due to migrations happened through illegal/unauthorized channels.

4. Background of the Labour Force Survey

LFS is an annual household survey and it has been conducted from 1990. However, due to unsettled conditions prevailed in Sri Lanka for more than three decades in some years the LFS survey could not cover some districts and non-response was very high in certain districts (http://www.statistics.gov.lk/samplesurvey/LFS_Annual%20Report_2014.pdf). However, when the conditions were settled in 2009 and with the completion of resettlement it was possible to conduct surveys covering entire country from 2011.

However, it was found that the estimated aged 15 years and above household population in LFS for 2012 is higher than the rebased age 15 years and above population in MYPE 2012. Such that the estimated working age population in LFS 2012 (published) was 0.8 million higher compared to RGO rebased mid-year figures for 2012. The reasons for the gap may be due to following reasons,

- Population adjustment for LFS depended on available MYPEs and available population growth rates. However, after the CHP 2012 it was found that growth rates used for the survey years before 2012 were significantly different from the rates calculated using the CPH 2012 data due to previously explained intercensal errors.
- Household population could not be estimated accurately due to unavailability of statistics on institutional population derived from a countrywide proper census.
- LFS is a sample survey and subject to have sampling errors.

By observing all above factors DCS decided to reweight labour force statistics, as practiced in many other countries¹. Also it is identified that the MYPE of 2012 based on CPH 2012 is the most suitable base to make this re-weighting to the LFS data.

5. The procedure of the re-weighting

Following steps were taken to reweight the labour force statistics from 2011.

- For this LFS re-weighting, the base population is the district level MYPE of 2012. This mid-year population estimate of 2012 by district level were used to calculate 2012 second quarter population estimate of the LFS.
- To derive the household population from the total population, the institutional population was excluded from the total population. That represents about 2.6% of the total resident population as reported in CPH 2012.
- By using the percentages of institutional population by District level institutional population was calculated for each district. Then the institutional population was deducted to get the household population by district. These calculated district level household population was used for LFS second quarter 2012. Then the annual district level population growth rates acquired from RGO were used to calculate district level household population estimates for

¹<http://www.ons.gov.uk/ons/guide-method/method-quality/specific/labour-market/articles-and-reports/revisions-to-labour-force-survey-estimates.pdf>

other quarters of 2012. Finally, district level household population was calculated for all four quarters if base year 2012.

- The above calculated household population was used to calculate subsequent annual and quarterly household population using latest available population growth rates. Forward calculation is done for the subsequent survey year 2013 and continued the same procedure till 2015. For 2011 only the annual population was adjusted by backward calculation.
- Then published annual and quarterly weights of LFS (from 2011-2015) were adjusted to these newly calculated household population estimates by district level.

6. Availability of data

1. Revised set of LFS statistics are published in this special bulletin and these include,
 - a. Reweighted quarterly and annual estimates for age 15 years and above population, labour force, employment, unemployment, economically inactive population and other main related indicators (Table1).
 - b. Table 02 provides the un-reweighted (published before reweighting process) statistics for the same indicators.
 - c. Table 03 shows the difference occurred due to re-weighting.
2. DCS has already completed the re-weighting LFS aggregates from 2011. Therefore, new factor files for micro-data will be made available to users.

7. The impact of re-weighting on LFS and already published estimates

- I. The LFS statistics published in this article and the statistics in all the relevant reports and bulletin after the reweighting are now consistent with latest MYPEs.
- II. The trends in the main estimates of reweighted series over the period are very similar to those currently published(un-reweighted)
- III. Published LFS rates (un-reweighted), such as labour force participation rate, employment rate and unemployment rate do not show significant changes due to re-weighting.
- IV. The revisions to the levels (numbers) are significant and on average 8% reduction in already published values.

Sample Surveys Division, Department of Census and Statistics, 2016-07-11

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Table 01: Reweighted Labour Force Status (Current) of the household population aged 15 years and over, 2011-2015

Year	Household Population (Age 15 years & over)	Labour Force		Employed		Unemployed		Not in Labour Force Number
		Number	Labour Force Participation Rate (%)	Number	Employment Rate (% to total Labour Force)	Number	Unemployment Rate (% to total Labour Force)	
2011*	14,975,989	7,926,445	52.9	7,591,591	95.8	334,854	4.2	7,049,544
2012 Q2	14,842,097	7,640,048	51.5	7,339,261	96.1	300,787	3.9	7,202,050
2012 Q3	14,864,818	7,810,505	52.5	7,494,766	96.0	315,739	4.0	7,054,313
2012 Q4	14,865,818	7,944,668	53.4	7,632,083	96.1	312,584	3.9	6,921,151
2012	14,857,578	7,798,407	52.5	7,488,704	96.0	309,703	4.0	7,059,171
2013 Q1	14,987,608	8,101,504	54.1	7,724,607	95.3	376,897	4.7	6,886,104
2013 Q2	14,989,146	8,107,255	54.1	7,747,795	95.6	359,460	4.4	6,881,890
2013 Q3	14,893,696	8,009,429	53.8	7,658,002	95.6	351,427	4.4	6,884,266
2013 Q4	14,965,809	7,917,028	52.9	7,594,710	95.9	322,319	4.1	7,048,780
2013	14,959,065	8,033,804	53.7	7,681,279	95.6	352,526	4.4	6,925,260
2014 Q1	15,060,268	8,042,071	53.4	7,712,703	95.9	329,367	4.1	7,018,197
2014 Q2	15,092,447	8,060,844	53.4	7,693,110	95.4	367,734	4.6	7,031,604
2014 Q3	15,185,609	8,070,770	53.1	7,729,955	95.8	340,815	4.2	7,114,839
2014 Q4	15,199,612	8,021,854	52.8	7,666,190	95.6	355,663	4.4	7,177,758
2014	15,134,484	8,048,884	53.2	7,700,489	95.7	348,395	4.3	7,085,600
2015 Q1	15,289,020	8,183,302	53.5	7,800,070	95.3	383,232	4.7	7,105,718
2015 Q2	15,243,484	8,263,333	54.2	7,887,850	95.5	375,483	4.5	6,980,151
2015 Q3	15,291,901	8,224,693	53.8	7,807,346	94.9	417,347	5.1	7,067,208
2015 Q4	15,303,377	8,186,563	53.5	7,828,639	95.6	357,924	4.4	7,116,813
2015	15,281,945	8,214,473	53.8	7,830,976	95.3	383,496	4.7	7,067,473

* Received sample size from Northern province was not enough to provide quarterly estimates; therefore for 2011 annual estimates are provided including all provinces. Due to Census of Population and Housing – 2012, the survey could not be conducted in 4th quarter 2011 and 1st quarter 2012.

Table 02: Published Labour Force statistics of the household population aged 15 years and over 2011-2015

Year	Household Population (Age 15 years & over)	Labour Force		Employed		Unemployed		Not in Labour Force Number
		Number	Labour Force Participation Rate (%)	Number	Employment Rate (% to total Labour Force)	Number	Unemployment Rate (% to total Labour Force)	
2011*	16,121,616	8,543,776	53.0	8,186,305	95.8	357,471	4.2	7,577,840
2012 Q2	16,022,402	8,254,011	51.5	7,930,276	96.1	323,735	3.9	7,768,390
2012 Q3	15,961,831	8,403,032	52.6	8,059,734	95.9	343,298	4.1	7,558,799
2012 Q4	16,259,623	8,706,049	53.5	8,365,075	96.1	340,974	3.9	7,553,574
2012	16,081,285	8,454,364	52.6	8,118,362	96.0	336,002	4.0	7,626,921
2013 Q1	16,356,181	8,861,919	54.2	8,451,187	95.4	410,733	4.6	7,494,262
2013 Q2	16,357,652	8,866,395	54.2	8,475,419	95.6	390,975	4.4	7,491,257
2013 Q3	16,360,533	8,809,150	53.8	8,424,409	95.6	384,741	4.4	7,551,382
2013 Q4	16,364,677	8,670,987	53.0	8,319,680	95.9	351,307	4.1	7,693,690
2013	16,359,761	8,802,113	53.8	8,417,674	95.6	384,439	4.4	7,557,648
2014 Q1	16,419,548	8,769,538	53.4	8,407,212	95.9	362,326	4.1	7,650,010
2014 Q2	16,454,039	8,811,836	53.6	8,413,171	95.5	398,665	4.5	7,642,203
2014 Q3	16,645,617	8,853,951	53.2	8,479,829	95.8	374,122	4.2	7,791,666
2014 Q4	16,607,868	8,782,867	52.9	8,395,762	95.6	387,104	4.4	7,825,001
2014	16,531,768	8,804,548	53.3	8,423,994	95.7	380,554	4.3	7,727,220
2015 Q1	16,648,811	8,924,716	53.6	8,502,270	95.3	422,446	4.7	7,724,095
2015 Q2	16,596,533	9,009,970	54.3	8,600,629	95.5	409,341	4.5	7,586,563
2015 Q3	16,742,309	9,008,135	53.8	8,554,179	95.0	453,956	5.0	7,734,175
2015 Q4	16,694,379	8,947,493	53.6	8,558,431	95.7	389,062	4.3	7,746,886
2015#	16,670,508	8,972,578	53.8	8,553,877	95.3	418,701	4.7	7,697,930

* Received sample size from Northern province was not enough to provide quarterly estimates; therefore for 2011 annual estimates are provided including all provinces. Due to Census of Population and Housing – 2012, the survey could not be conducted in 4th quarter 2011 and 1st quarter 2012.

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Table 03: Difference between Reweighted & Published Labour Force statistics of the household population aged 15 years and over, 2011-2015

Year	Difference in Household Population (Age 15 years & over)	Difference in Labour Force		Difference in Employed		Difference in Unemployed		Difference in Not in Labour Force Number
		Number	percentage points	Number	percentage points	Number	percentage points	
2011*	-1,145,626	-617,331	-0.07	-594,715	-0.04	-22,616	0.04	-528,295
2012 Q2	-1,180,304	-613,964	-0.04	-591,015	-0.01	-22,948	0.01	-566,341
2012 Q3	-1,097,012	-592,526	-0.10	-564,967	0.04	-27,559	-0.04	-504,486
2012 Q4	-1,393,805	-761,382	-0.10	-732,992	-0.02	-28,390	0.02	-632,423
2012	-1,223,707	-655,957	-0.08	-629,658	0.00	-26,299	0.00	-567,750
2013 Q1	-1,368,573	-760,415	-0.13	-726,579	-0.02	-33,836	0.02	-608,158
2013 Q2	-1,368,506	-759,139	-0.12	-727,624	-0.02	-31,515	0.02	-609,367
2013 Q3	-1,466,837	-799,721	-0.07	-766,407	-0.02	-33,314	0.02	-667,116
2013 Q4	-1,398,869	-753,959	-0.09	-724,971	-0.02	-28,988	0.02	-644,910
2013	-1,400,696	-768,309	-0.10	-736,395	-0.02	-31,913	0.02	-632,388
2014 Q1	-1,359,281	-727,467	-0.01	-694,509	0.04	-32,959	-0.04	-631,813
2014 Q2	-1,361,592	-750,992	-0.14	-720,061	-0.04	-30,931	0.04	-610,599
2014 Q3	-1,460,008	-783,181	-0.04	-749,874	0.00	-33,307	0.00	-676,827
2014 Q4	-1,408,256	-761,013	-0.11	-729,572	-0.03	-31,441	0.03	-647,243
2014	-1,397,284	-755,664	-0.08	-723,504	-0.01	-32,160	0.01	-641,621
2015 Q1	-1,359,791	-741,414	-0.08	-702,200	0.05	-39,214	-0.05	-618,377
2015 Q2	-1,353,049	-746,638	-0.08	-712,779	0.00	-33,859	0.00	-606,411
2015 Q3	-1,450,408	-783,441	-0.02	-746,833	-0.03	-36,609	0.03	-666,967
2015 Q4	-1,391,003	-760,930	-0.10	-729,791	-0.02	-31,138	0.02	-630,073
2015	-1,388,563	-758,106	-0.07	-722,901	0.00	-35,205	0.00	-630,457

* Received sample size from Northern province was not enough to provide quarterly estimates; therefore for 2011 annual estimates are provided including all provinces. Due to Census of Population and Housing – 2012, the survey could not be conducted in 4th quarter 2011 and 1st quarter 2012.