

MINISTRY OF PLANNING AND INVESTMENT
GENERAL STATISTICS OFFICE

THE 1/4/2012 TIME-POINT POPULATION CHANGE
AND FAMILY PLANNING SURVEY:
DESIGN AND IMPLEMENTATION

HANOI, 12 – 2012

I. SURVEY ORGANIZATION

1.1 Objectives and demands of the survey

The 1/4/2012 time-point population change and family planning survey is to collect the basic information on: population size, population change; use of contraceptive methods, menstrual regulation and abortion.

The information presents for each centrally governed province/city, urban/rural areas of regions and the entire country.

1.2 Respondent and enumeration unit

Respondents are all households and usual residents of selected enumeration areas, excluding those who live in dwellings managed by the army and security force, but including army and police households live in civil residences of communes/wards/towns.

The survey collect information on natural changes of population such as: births, deaths and all movements into and out of the enumeration areas in 12 months prior to time-point of 1/4/2012 in selected enumeration areas.

The enumeration units are households. A household comprises either one person living alone or a group of person living in the same dwelling and sharing meals together, without regard to whether they are in a flesh and blood, marital or bringing up relation or not, or whether they share a common incomings and outgoings budget, or the combination of the two.

1.3 Contents of the survey

Besides identification information, survey contents include the following key information (Annex 1 - the Questionnaire):

Part 1: General information on population

For all population: Full names of usual residents; relationship to the head of household; sex; the solar calendar month and year of birth (or age); ethnicity; migration status.

For persons aged 5 years and over: adding information on current school attendance; highest educational level attained.

For persons aged 15 years and over: adding information on marital status, month and year when the current marital status occurred.

Part 2: Information on fertility, family planning and reproductive health of women aged 15-49 years

- Number of children ever born, number of children died and information on the last birth;
- Antenatal status and knowing sex of fetus;
- Contraceptive use, menstrual regulation and induced abortion;
- Complication occurring after menstrual regulation and induced abortion.

Part 3: Information on the household's deaths

- Number of deaths;
- Sex, time and age of deaths;
- Cause of deaths, maternal death.

1.4 Recruitment and train for enumerators

Enumerators are the direct force to implement the survey and play a very important role to the quality of information gained in particular and to the success of the surveys in general. Hence, a compulsory demand is to choose those who are highly responsible, have educational level of higher-secondary school and over (in the difficult areas, lower-secondary school educational level is accepted) and have been trained carefully. Each enumerator takes responsibility of one enumeration area. Birth, death and marriage recorders, population registration or population and family planning specialized officers should not be chosen to be enumerators and in

the best case, enumerators should be females. Provinces/cities need to make use of enumerators who have participated in the recent statistics surveys.

Team leaders are the force that directly controls the daily task of each enumerator, decides the sufficiency and accuracy of the information collected. Each team leader takes responsibility of 02 to 03 enumerators.

Supervisors are Statistical officers who directly participate in this survey and are organized for all three levels of Central, province and district. Supervisors must examine supervision process of team leaders and support them in accomplishing their tasks.

In remote and mountainous areas, guidance who is simultaneously interpreters can be used to support enumerators.

Trainings for the fieldworkers will be conducted in two steps:

- *Step 1:* General Statistics Office organized 01 training course for leaders of provincial statistics offices and provincial teachers from 12 - 14 March of 2012 in Dong Hoi City, Quang Binh province.

- *Step 2:* Provincial Statistical Offices organized a training course for enumerators, team leaders and supervisors (include backup enumerators and team leaders), each course lasts for 4 days in the late March of 2012. In the training courses, practice and questionnaire record was timed.

1.5 Fieldwork and quality control

The fieldwork was conducted for about 20 days, starting from 1/4/2012. As regulated, each enumerator is assigned to enumerate on an average of 6 households per day. In the first 2 days one should not exceed 4 households/day/enumerator in order to help the enumerator correct errors, especially system errors in questionnaire interviewing and recording.

Enumerators conduct interviews and questionnaire recording under strict control and guidance of the team leaders. Apart from the task of checking, rectifying errors in the work of enumerators, team leaders are given the

responsibility to check all questionnaires recorded by assigned enumerators before giving to district statistics offices, to make sure that questions are skipped correctly, logical errors are corrected and identification information is recorded sufficiently and exactly as stipulated in the guidance documents.

After the questionnaires had been checked and edited at the field, questionnaires are transferred to the Provincial Statistics Offices, where the questionnaires are checked again, packed and sent to regional General Statistics Office's statistics informatics center as plan to entry and tabulate data.

1.6 Data processing

Data entry and questionnaire edit are carried out at three General Statistics Office's statistical informatics centers, including Statistical Informatics Center No. 1 in Hanoi, Statistical Informatics Center No. 2 in Ho Chi Minh City and Statistical Informatics Center No. 3 in Da Nang. These centers are combined to establish a computer network to process survey data, including a server and a number of personal computers. The networks in Da Nang and Ho Chi Minh City are connected with the Center in Hanoi.

A number of consistency checks are carried out, and followed by data edition. As soon as the data entry was completed, a list of inconsistencies was printed out for verification and correction, and then data files were updated with these corrections.

1.7 Calculation of sampling errors

Estimates from the sample survey were affected by two types of error: (1) non-sampling error, and (2) sampling error. Non-sampling error is the result of errors in implementation of data collection and processing such as visiting the wrong dwelling, interviewing the wrong household, mis-understanding of questions by respondents, other errors on the part of respondents or enumerators and wrong data entry. Although many efforts were made to minimize these errors while implementing the survey, non-sampling errors cannot be completely avoided are difficult to evaluate statistically.

Sampling error can be evaluated statistically. The sample of respondents in the sample survey is only one of many possible samples that could be selected from the same reference population using the same sample design method and required sample size. Each of these possible samples could give different results from the sample actually selected. Sampling error results from variation in results from the many different possible samples. Although it is not possible to know this variation precisely, it can be estimated from the sample survey results.

Sampling error is usually measured using *standard errors* for specific statistical indicators (mean, percentage, etc). The standard error is, in fact, the square root of the variance. Standard errors can be used to calculate confidence intervals which contain the true value for the population. For example, for a given statistical indicator calculated from the sample survey, the true statistical value will fall within the interval plus or minus two times the standard error for that indicator with confidence equal to 95 percentages for all possible samples of the same size and sample design.

If the sampling unit is selected following simple random sampling, then it is possible to use formulas to directly calculate standard errors for the sample. However, the sample of the 1/4/2012 time-point population change and family planning survey was designed with strata, and therefore a more complicated formula must be used. Computer software that could be used to calculate standard errors for stratified samples includes the standard error calculation module of ISSA or STATA. These programs use the Taylor linear expansion method to estimate variance for estimates of means and proportions for sample surveys.

The Taylor linear expansion method considers the mean or proportion as a ratio estimate, $r = y/x$, for which y is the total sample value of variable y , and x is the total number of events in the group or sub-group being studied. The variance of r is calculated using the following formula, where standard errors are the square root of the variance:

$$SE^2(r) = var(r) = \frac{1-f}{x^2} \sum_{h=1}^H \left[\frac{m_h}{m_h - 1} \left(\sum_{i=1}^{m_h} z_{hi}^2 - \frac{z_h^2}{m_h} \right) \right]$$

where:

$$z_{hi} = y_{hi} - rx_{hi}, \text{ and } z_h = y_h - rx_h$$

In which:

h - indicates the strata ranging from 1 to H ,

m_h - is the total number of enumeration areas selected in strata h ,

y_{hi} - is the total of weights of variable y for enumeration area i , in strata h ,

x_{hi} - total number of weighted events in enumeration area i in strata h , and

f - the overall sampling rate, if this value is very small it can be dropped.

Sampling error in the sample survey is calculated for a few selected key indicators. Results are presented in an Annex for estimates at the national, urban and rural, and 6 socio-economic region levels and for 63 provinces/cities. For each variable, the statistical estimate (R), standard error (SE), relative standard error (SE/R) and 95 percentages confidence interval ($R \pm 2SE$) are presented in Annex 2.

In order to evaluate the reliability of samples, sampling errors were calculated for the following variables:

Table 1: Standard error at national level of some key indicators

No	Indicator name	Unit	R	SE	SE/R	R - 2*SE	R + 2*SE
1	Total dependency ratio	%	44.9	0.20	0.004	44.5	45.3
2	Ageing index	%	42.7	0.49	0.011	41.7	43.6
3	Literacy rate of population aged 15 and over	%	94.7	0.13	0.001	94.5	95.0
4	Literacy rate of male population aged 15 and over	%	96.6	0.10	0.001	96.4	96.8
5	Literacy rate of female population aged 15 and over	%	92.9	0.16	0.002	92.6	93.2
6	Gross attendance rate at primary	%	104.2	0.20	0.002	103.8	104.6
7	Net attendance rate at primary	%	96.5	0.12	0.001	96.3	96.8
8	Gross attendance rate at lower-secondary	%	89.8	0.31	0.003	89.2	90.4
9	Net attendance rate at lower-secondary	%	83.9	0.30	0.004	83.3	84.5
10	Gross attendance rate at higher-secondary	%	68.7	0.55	0.008	67.6	69.8
11	Net attendance rate at higher-secondary	%	62.5	0.50	0.008	61.5	63.5

No	Indicator name	Unit	R	SE	SE/R	R - 2*SE	R + 2*SE
12	Any contraceptive prevalence rate	%	76.2	0.25	0.003	75.7	76.7
13	Modern contraceptive prevalence rate	%	66.6	0.31	0.005	66.0	67.2
14	Proportion of women aged 15-49 having the third and higher order births	%	14.2	0.36	0.026	13.5	15.0
15	Rate of women who have known the sex of fetus of the last birth before delivery	%	81.3	0.61	0.007	80.0	82.5
16	Rate of women who have used the ultrasound to know the sex of fetus	%	99.0	0.11	0.001	98.7	99.2

II. SAMPLE DESIGN AND ESTIMATION

2.1 Sample frame

The sample of the 1/4/2012 time-point population change and family planning survey is the stratified sample, representing for provincial level. Each centrally governed province, city constitutes a main stratum with two sub-stratums of urban areas and rural areas. The sample frame are sample enumeration areas of the 2009 Population and Housing Census.

2.2 Determination of sample size and sample allocation

To ensure an obtainment of sample estimates representative for provinces, the sample was allocated inversely to population size. As a result, each province had a sample size of about 60 enumeration areas with an average of 100 households per enumerator area. Hanoi and Ho Chi Minh City are the two most populous and complicated cities, so they had a selection of 74 enumerator areas. Provinces with smaller population size also had a sample size of nearly 60 enumerator areas (Annex 3).

The sample of the survey was a stratified cluster sample, in which each province constituted the main clusters (main 63 strata) with two sub-clusters within each representing “urban” and “rural” areas. The allocation of sample units in each stratum was done using the systematic random sampling method.

2.3 Sample estimation

The general weights can be calculated from the following probabilities/weights:

- 1) Design weights (basic weights): depend on probability;
- 2) Coefficients used to adjust weights due to variations in the number of households or variations in the total number of enumeration areas because of lost but not replaced by other ones;
- 3) Coefficients used to adjust weights according to structure of the population under study (self-weighting).

Notations:

- W_{1hji} - Design weights (basic weights) of j^{th} EA, h^{th} stratum;
- W_{2hji} - Coefficients used to adjust weights due to variations in the number of households (persons);
- W_{3hji} - Coefficients used to adjust weights according to the average number of households in EA of h^{th} stratum;
- W_{4hji} - Coefficients used to adjust weights due to variations in the number of enumeration areas;
- W_{5hji} - Coefficients used to adjust weights according to structure of the universal;
- W_{hji} - Weights for the number of households or male/female population of j^{th} EA, h^{th} stratum.

Determination of basic weights

According to the sample design, the 1/4/2012 time-point population change and family planning survey was conducted on a sample size almost equal throughout all 63 provinces/cities. Each province/city conducted interviews to about 24,000 persons.

Suppose a_h is the number of EAs selected in the h^{th} stratum and N_h is the total number of EAs of h^{th} stratum. Because the sample was selected independently for each stratum according to the systematic random sampling method, so the basic

selection probability is calculated by the formula: $P_{1hji} = \frac{a_h}{N_h}$ and the basic weight (design weight) of the j^{th} EA, h^{th} stratum is the inverse of the selection probability, which was calculated as follows:

$$W_{1hji} = \frac{1}{P_{1hji}} = \frac{N_h}{a_h} \approx \frac{M_h}{\sum m_{hj}}$$

In which, M_h is the total number of households (persons) of h^{th} stratum and $\sum m_{hj}$ is the total number of households (persons) of all selected EAs in the h^{th} stratum.

Determination of coefficients used to adjust weights due to variations in the number of households (persons) and the number of EAs

a) Adjustment of weights due to variation in the number of households (persons):

Suppose m_{hj} is the total number of households (persons) at the time that j^{th} EA, h^{th} stratum carried out its listing and m_{hj}^* is the total number of households (persons) at the time that j^{th} EA, h^{th} stratum conducted its enumeration. Because EAs in each stratum is selected with equal probability and were selected from the 2009 Census sample frame, and coefficients used to adjust the weights due to variation in the number of households (persons) will be calculates by formula:

$$W_{2hji} = \frac{1}{P_{2hji}} = \frac{m_{hj}}{m_{hj}^*}$$

As the 2009 Census's enumerator areas were created with unequal size, so it is necessary to determine coefficients used to adjust the size of each of 2009 Census EAs to be equal to the average size of EAs in that stratum. Suppose \bar{m}_{hj} is the average number of households (persons) of EAs in h^{th} stratum, and the coefficients used to adjust the weights due to variation in the number of households (persons) will be calculates by formula:

$$W_{3hji} = \frac{1}{P_{3hji}} = \frac{\bar{m}_{hj}}{m_{hj}}$$

b) Adjustment of weights due to variation in the number of EAs:

It was stipulated in the 1/4/2012 sample survey that if a selected EA was found to be destroyed or cleared away during the update of maps and lists, the it would be replaced by a neighbor to keep the total number of selected EAs in the stratum unchanged, hence :

$$W_{4hji} = \frac{1}{P_{4hji}} = 1$$

Determination of coefficients used to adjust weights by structure of the universal (weights by proportion of the studied population)

The annual population is estimated by urban/rural and sex for each of 63 provinces/cities, so it could be weighed according to proportions of urban and rural population and male/female population. Suppose m_{hji}^* is the total number of households (population by male/female) recorded by enumerators for j^{th} EA, h^{th} stratum; m_{hji}^{**} is the total number of households (population by male/female) adjusted according to proportions of urban/rural population and proportions of male/female population of j^{th} EA, h^{th} stratum, then it is calculated by formula:

$$m_{hji}^{**} = m_{hj}^* \times \frac{M_{hi}^*}{M_h^*}$$

In which:

- m_{hj}^* Total number of households (population by male/female) provided by the sample survey for j^{th} EA, h^{th} stratum;
- M_{hi}^* Total number of households (population by male/female) by urban/rural area estimated as of 1/4/2012 for h^{th} stratum (i = 1 - urban; i = 2 - rural)
- M_h^* Total number of households (persons) estimated as of 1/4/2012 for h^{th} stratum.

Coefficient used to adjust weights according to structure of the population (households) estimated as of 1/4/2012 are determined as follows:

$$W_{5hji} = \frac{1}{P_{5hji}} = \frac{m_{hji}^{**}}{m_{hji}^*} \times \frac{M_h^*}{M_h} = \frac{m_{hj}^*}{m_{hji}^*} \times \frac{M_{hi}^*}{M_h} \times \frac{M_h^*}{M_h} = \frac{m_{hj}^*}{m_{hji}^*} \times \frac{M_{hi}^*}{M_h}$$

As the sample allocation is not proportional to the population, so weights will be calculated to be used in analyzing the results of the 2012 population change and family planning survey to ensure an actual representation of the sample. The weight for each household (or population of type i) of j^{th} EA, h^{th} stratum is the inverse of selection probability:

$$W_{hji} = 1/P_{hji} = W_{1hji} \times W_{2hji} \times W_{3hji} \times W_{4hji} \times W_{5hji}$$

$$W_{hji} = 1/P_{hji} = \frac{M_h}{\sum m_{hj}} \times \frac{m_{hj}}{m_{hj}^*} \times \frac{\bar{m}_{hj}}{m_{hj}} \times \frac{m_{hj}^*}{m_{hji}^*} \times \frac{M_{hi}^*}{M_h} = \frac{\bar{m}_{hj}}{\sum m_{hj}} \times \frac{M_{hi}^*}{m_{hji}^*}$$

The Department of Population and Labour Statistics of the General Statistics Office collaborated closely with the Center of Statistical Informatics No I in programming, concrete calculation and accuracy check for all the above mentioned weights for 3,890 EAs in this survey.