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INTEGRATED HOUSEHOLD LIVING CONDITIONS SURVEY IN MYANMAR

QUANTITATIVE SURVEY TECHNICAL REPORT

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INTEGRATED HOUSEHOLD LIVING CONDITIONS SURVEY IN MYANMAR:

QUANTITATIVE SURVEY TECHNICAL REPORT

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LIST OF ACRONYMS

AEF	Adult Equivalent Food consumption expenditure
AENF	Adult Equivalent Non-food expenditure
CAS	Central Storage Area
CSO	Central Statistical Office
DOP	Department of Population
FERD	Foreign Economic Relations Department
FPL	Food Poverty Line
FSU	First Stage Sampling Unit
IHLCA	Integrated Household Living Conditions Assessment
ITU	IHLCA Technical Unit
KRI	Key Results Indicators
MDG	Millennium Development Goals
MNPED	Ministry of National Planning and Economic Development
PD	Planning Department
PL	Poverty Line
PMIS	Poverty Management Information System
PPES	Probability Proportional to Estimated Size
PPI	Paasche Price Index
OPL	Overall Poverty Line
LSA	Local Storage Area
SC	Shift Coordinator
SD	State/Division
SSU	Second Stage Sampling Units
TOT	Trainings of Trainers
UNDP	United Nations Development Programme

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1. CONTEXT

In order to provide the Government and international funding agencies with a reliable and up to date integrated assessment of all major aspects of household living conditions in the Union of Myanmar, the United Nations Development Programme (UNDP) and the Government of the Union of Myanmar have agreed on the implementation of an Integrated Household Living Conditions Assessment (IHLCA) in 2003-2005[1].

The expected outputs of this project include:

- A nationwide qualitative study on people's perceptions of poverty in Myanmar including 224 focus groups in December 2003. The results of this study were published in July 2004 in four volumes[2];
- A nationwide quantitative survey of 18 660 households with two rounds of data collection (November-December 2004 and May 2005);
- A Poverty Management Information System (PMIS).

The IHLCA involved two phases: (i) the first phase was a qualitative study which aimed at providing information on the perceptions of the people of Myanmar on living conditions to feed into the final selection of indicators to include in the questionnaire of the second quantitative phase of this baseline survey; (ii) this last phase included two rounds of data collection.
The first analysis of IHLCA data led to the preparation of four reports:

- Integrated Household Living Conditions Assessment in Myanmar: Poverty Profile;
- Integrated Household Living Conditions Assessment in Myanmar: Vulnerability–Relevant Information;
- Integrated Household Living Conditions Assessment in Myanmar: MDG-Relevant Information;
- Integrated Household Living Conditions Assessment in Myanmar: Quantitative Survey Technical Report.

This report, the last of four, presents the IHLCA quantitative survey technical report.

[1] The Planning Department (PD) of the Ministry of National Planning and Economic Development (MNPED) is implementing the IHLCA in collaboration with the Central Statistical Office (CSO), with the financial assistance of UNDP and the technical assistance of the IDEA International Institute.
[2] Qualitative study on household living conditions in Myanmar

2. SURVEY OBJECTIVES

In order to provide a holistic assessment of living conditions in Myanmar, drawing on reliable data that are representative of the country's population, the IHLCA was a logical continuation of previous assessments of social and economic conditions and outcomes. On the basis of IHLCA results, it will be possible to better understand the situation of the population in relation to poverty, vulnerability and inequality. The information generated will allow for better planning of policies and programs for improving household living conditions.

The main objectives of the Survey were the following:

- To obtain an accurate and holistic assessment of population well-being by measuring a number of indicators related to living conditions from an integrated perspective;
- To provide reliable and updated data for identifying different levels of poverty in order to help better focus programmatic interventions and prioritize budget allocations;
- To provide quantitative and qualitative data for better understanding the dimensions of well-being and poverty in Myanmar and the endogenous and exogenous factors behind the observed patterns and trends in living conditions;
- To provide baseline information for monitoring progress towards the achievement of the Millennium Development Goals and other national and international targets;
- To develop a rigorous and standardized methodology for establishing a framework for monitoring living conditions and conducting future time-trend analysis.

Given the breadth of information that was to be generated by the integrated survey and the range of stakeholders involved in the project, there were also a number of secondary objectives including:

- The compilation of updated statistics for a series of indicators that were also addressed in previous surveys in Myanmar for comparative time-trend analyses on specific aspects of living conditions where appropriate;
- The compilation of precise statistics on the spatial distribution of poor and non-poor households for poverty mapping;
- For economic and social analysis, improved data for monitoring differentials in living conditions by urban-rural residence, gender and other population sub-groups;
- For policy and programmatic formulation, comprehensive data on the population's perceptions of living conditions, in particular prioritization in terms of their preferences to improve well-being and reduce poverty across regions of the country.

3. BASIC CONCEPTS AND DEFINITIONS

Population: group of units or elements which make whole. That could be all the people in a country or an entity, all housing units, all household, etc.

Sample: a part of population representing the whole population. Sample selection is a subject of statistical methods that take into account characteristics of both whole population and individual members of population.

Direct interview: Procedure by which information on certain person is collected directly from such person. The person giving information on him/ herself is the "direct respondent".

Reference period: Period about which the respondent is asked questions. The survey uses different reference period depending on type of required information, respondent's ability to remember, and objectives of each topic to be analyzed.

Dwelling is a location with walls and roof, which is structurally separated from other housing units by a separate entrance, populated and intended to be populated by one or more persons (households). Even if the structure originally had not been intended for housing, but it is populated, it should be considered a dwelling, irrespectively of material of which it is built and type of construction. A dwelling could be house, apartment, one or more rooms, cottage or any other facility used for accommodation. In buildings there can be often more than one dwelling, it is important that they meet criterion of having separate entrance. Dwellings inhabited by people who use them jointly for different reasons: health, disciplinary, educational, religious, etc, such as hotels, residences, prisons, hospitals, convents, boarding schools, are not included in the IHLCA sample.

Household is a group of one or more related or unrelated persons who normally sleep and eat most of their meals together in the same dwelling unit.

Head of the household is a person mainly responsible for earning the livelihood for the household. There are also cases when any other member of the household is regarded as the head of household irrespective of responsibility for livelihood, such as the most senior household member. If you discover that the person identified as head of household is deceased, please specify to the respondent that the head of household is the person **currently** responsible for the household.

Household members include all living persons, related or unrelated, who normally sleep and eat most of their meals together in the same dwelling unit. For the purposes of this assessment, hired workers, domestic workers and boarders who receive accommodation and meals are treated as part of the household. Temporary visitors as well as lodgers who do not receive meals are not treated as part of the household and will not be asked to participate in the survey. Table 3.1 presents a detailed list of persons to include or exclude as household members.

Table 3.1: Categories of household members and non-members

Members	Non-Members
Household head	Individuals who died during the past 12 months
Infants	
New permanent residents of the household because they were newly demobilized, married, or had a job transfer	People who have lived in the household in the last year, but left due to marriage, etc. and are now part of another household
Students living outside the household but are still supported by their family and are not members of other households	People who have joined the army
Relatives of household head whose work requires them to be outside the household for long periods of time but who consider this household their permanent home and contribute to household budget	Guests and all other people not listed in the definition of household members
Any other persons not related to household head but who normally sleep in the same dwelling, eat most of their meals and share expenses with the household (for example, servants, lodgers or other persons who are not relatives)	Hired workers, servants, lodgers if they are members of other households and do not sleep in the same dwelling, eat most of their meals and share expenses with the household

4. SCOPE AND COVERAGE

Administratively, the Union of Myanmar is divided into 17 States/Divisions. These in turn are subdivided into 61 Districts. Districts are further subdivided into Townships, Wards, Village Tracts and Villages.

The IHLCA Survey covered both the urban and rural areas at the regional and national levels.

The Survey aimed to produce data at the regional level for each of the 17 States/Divisions. No Township estimates were to be provided as this would necessitate too large a sample size.

The sample was large enough to provide good sample estimates of a number of important living conditions characteristics at the national level, and reasonably good sample estimates at the State/Division level.

The following survey questionnaires were used for the IHLCA survey[3]:

1) The household questionnaire, administered at household level, included 9 modules covering different aspects of household living conditions:
Module 1: Household Basic Characteristics;
Module 2: Housing;
Module 3: Education;
Module 4: Health;
Module 5: Consumption Expenditures;
Module 6: Household Assets;
Module 7: Labour and Employment;
Module 8: Business;
Module 9: Finance and Savings.

2) The Community questionnaire, administered to local key informants, which included 4 modules which aimed at providing general information on the village/wards where the survey was being undertaken and at reducing the length of the household interview. The questionnaire was only administered in the first round. Modules included in the Community questionnaire were:
Module 1.1: Village/Ward Infrastructure;
Module 1.2: Population;
Module 1.3: Housing;
Module 1.4: Labour and Employment
Module 1.5: Business Activities;
Module 1.6: Agricultural Activities;
Module 1.7: Finance and Savings;
Module 2: Schools
Module 3: Health facilities
Module 4: Pharmacies and Drug Stores

[3] For IHLCA Survey questionnaires see Appendices 1, 2, 3 and 4 of Technical Report Appendices.

3) The Community Price Questionnaire which aimed at providing information on the prices of specific items in each village/ward surveyed. These prices were collected in case the quality of implicit prices calculated from the household survey was not satisfactory. Since there were no problems with implicit prices, community level prices were not used. The Community Price Questionnaire comprised of only one module.

4) The Township Profile questionnaire aimed at collecting administrative information about the Townships included in the survey. It was not used in the data analysis.

All final questionnaires were translated from English to Myanmar after pilot testing, and then back-translated into English for validation.

The annex of the Technical Report, explains which questionnaires were administered during the different rounds.

5. METHODOLOGY

The quantitative survey was designed to collect reliable and representative information on a number of dimensions of living conditions in Myanmar. Data collection tools included structured questionnaires to be administered to nationally representative samples of the population at different levels (community, household and individual), each divided into several modules for monitoring the different domains of living conditions. Some of the modules were repeated for the same households and individuals at different points in time throughout the year to allow for temporal comparisons, notably with regard to seasonality of food and non-food consumption patterns. The multi-round approach combined with a modular questionnaire design proved a very useful and convenient data collection tool.

5.1 SAMPLING

In order to minimise sampling errors, the careful design of a statistically sound sampling plan was deemed of critical importance. The starting point of such a plan was a sampling frame, or complete listing of communities and households from which a sample can be drawn, and the desired precision level for key indicators, to be used in the determination of the expected sample size. The sampling plan was designed to collect representative information from a stratified multiple-stage random sample of around 18888 households across all regions of the country.

A number of factors had to be addressed in the determination of a survey design, including the sampling plan. Factors to be considered with regard to sampling were:

- The specific objectives of the survey;
- The country's characteristics, in particular its administrative divisions;
- The level of precision desired for the resulting estimates;
- The desired timeframe for availability of results;
- The availability of human and financial resources.

On the one hand, designing a plan to include a very large sample of households would allow for more precise estimates of the selected indicators and enable greater degrees of disaggregation at the sub-national level.

On the other hand, in favor of a sample size that was not too big were the needs of concerned stakeholders to have results available in a timely manner (within a few weeks or months from the end of fieldwork) as well as the workload and budget constraints. Experience has shown that surveys with very large samples: (i) have a high probability of becoming bogged down, creating delays of several years in results publication; (ii) are prone to poor data quality, in particular due to non-sampling errors; and (iii) represent a major disturbing factor for other statistical operations that technical and reporting agencies must conduct. While from an international perspective the financial costs of conducting surveys may be relatively low in Myanmar, the opportunity cost of the time and resources spent on a very large-scale survey and not on other productive activities was taken into account.

Another consideration was the desired level of disaggregation by the IHLCA main data users. It was decided to ensure collection of representative data for the following spatial units:

- National level;
- States/divisions (17);
- Urban/rural areas by state/division.

This breakdown suggested a total of 34 strata (2 area types * 17 states/divisions).

One significant constraint to the design of the sampling plan for the IHLCA quantitative survey was the absence of a reliable updated sampling frame or complete listing of households across the country from which a sample could be drawn. Usually such frames are based on the results of the most recent population census; however there had been no national count in Myanmar since 1983. Updated population estimates were to be obtained from The Department of Population (DOP) of the Ministry of Population. The frame was imperfect. In addition a number of areas were excluded by PD because of inaccessibility for fieldwork implementation due to transportation/communication problems or ongoing security concerns.

The options for selecting households for questionnaire implementation ranged from simple random sampling of households across the country (the most efficient methodology from a purely statistical viewpoint, but one for which fieldwork costs may be prohibitive), to multi-stage random selection based on probability proportional to size (a more commonly used approach given the costs-benefits tradeoffs). However, considering the lack of reliable population numbers at the lowest levels of geographic disaggregation for Myanmar, the sampling plan had to rely on probability proportional to estimated size (PPES) approaches and the measures of size used were the number of households at different geographical levels.

Another issue that was considered in the determination of the sample size was the desired precision level by the IHLCA main data users. The calculation was based on observed variances for key variables in past survey experiences.

5.2 DATA COLLECTION

The design for the quantitative survey entailed a two-round data collection approach for monitoring household living conditions. There were several arguments in favor of conducting two rounds. Predominant was the important seasonal variations in household income, expenditure and consumption patterns. In particular, Myanmar is characterized by: (i) three distinct seasons (cold season from October until January, summer from February through May, and rainy season from June through September); (ii) a high dependence on agriculture for income-generating activities; and (iii) a high food/non-food expenditure ratio in household budgets. Thus it is of critical importance to capture these variations if the survey results are to be meaningful and representative. Two other reasons for improving the quality of the results were the evidence that that a multiple round survey increases the level of confidence between enumerators and respondents, and helps increase respondents' memories thereby reducing recall errors.

Specific factors that were considered in determining the timing of such rounds included:

- The potential difficulties of conducting survey fieldwork during the rainy season in certain areas;
- The need for the results of the qualitative study to be finalised before starting the quantitative survey phase (with the ensuing implication that the tools for the quantitative survey could not be finalised before March 2004);
- The timing of important national holidays and cultural events (notably the Water Festival in April);
- The need for comparability of the IHLCA results with findings from previous surveys (notably the 1997 and 2001 HIES, for which data collection was conducted in October-November).

This led to the plan to conduct data collection activities for the first round of the quantitative survey in May-June 2004 and for the second round in October-November 2004. Unfortunately due to unforeseen circumstances, these dates had to be changed and data collection activities were rescheduled to take place respectively in November 2004 and May 2005.

Depending on the nature of the information to be collected, different types of questions (current status and retrospective) were included in the survey instruments. For instance, current status questions were asked to assess level of education. On the other hand, retrospective questions were also asked to collect information on household consumption expenditures. Thus one important issue was the reference period for specific consumption items. In order to minimise recall errors, different reference periods were used for different types of items. In particular, shorter periods were used for smaller items (such as 7days for frequently bought food items and 30 days for less frequently bought food items and non-food items), and longer periods for larger items (such as six months for bulky non-food items and equipment).

Another issue relevant to the collection of quality data was cultural and gender sensitivity, particularly with regard to questions of a highly personal nature such as reproductive health. Field enumerators were recruited at the local level, in order to ensure that the interviews were conducted in the respondents' own language. Field teams were composed of at least one female and one male enumerator, so that respondents could be interviewed by a person of the same sex. As previously mentioned, strong literacy and mathematical skills were required for all field staff.

With regard to potential non-sampling errors, when collecting information from the respondent it was important to plan for several controls: (i) immediately during the interview by the enumerator; (ii) after the interview during the review of the completed questionnaire by the field supervisor; and (iii) during data processing. For instance, ranges for data on the monetary value of household expenditures were set, such as minimum and maximum acceptable prices for a given quantity of each major food and non-food item (based on independently obtained data of market prices). The appropriate ranges were verified during questionnaire pre-testing, and flagged during manual and automatic data editing. Thus strong literacy skills and qualifications in calculations and statistics were used as a basis for the selection of field enumerators and supervisors, as well as data entry operators (skills generally verified during the recruitment processes by means of written examinations).

Moreover, in order to continually monitor the quality of the information being collected and correct any potential discrepancies as soon as possible, entry and validation of incoming data for the quantitative survey were conducted at the PD states/divisions offices, and then transferred to PD Central Level Office. The raw micro-datasets for all states/divisions were aggregated and processed at the national level by PD staff under the supervision of the Technical Unit at PD Central Level Office in Yangon.

6. DATA ANALYSIS

6.1 DATA CLEANING AND SAMPLING WEIGHTS

6.1.1 Data cleaning

Data cleaning involved mainly:

- Checking and correcting for inconsistencies in the data;
- Identifying and correcting for outliers;
- Recoding of variables when necessary.

Data cleaning procedures are presented in details in the SPSS syntaxes.

6.1.2 Sampling weights used

Sampling weights were applied for the calculation of all poverty measures and KRI indicators. Each household was attributed a sampling weight. The detailed procedure for the determination of sampling weights is presented under the section "Sampling Design and Estimation Procedure" of this report.

6.2 CONSTRUCTION OF THE CONSUMPTION AGGREGATE AND DETERMINATION OF POVERTY LINES

This chapter is divided into three sections. Section 6.2.1 explains the methodology used for the estimation of each component of the consumption aggregate. Section 6.2.2 presents how the consumption aggregate was adjusted to take into account household composition and household size. Section 6.2.3 presents how the consumption aggregate was adjusted for differences in prices across regions. Section 6.2.4 presents how the poverty lines were estimated.

6.2.1 Construction of the consumption aggregate

The consumption expenditures included in the estimation of the consumption aggregate are:

- Food consumption expenditures;
- Non-food consumption expenditures, excluding rent expenditures;
- Rent expenditures.

After estimating health expenditures and durable goods user rates, it was decided not to include these two items in the estimation of the consumption aggregate. This is discussed below in more details.

Consumption expenditures were first calculated for each round separately and then merged for final poverty analysis.

Food consumption expenditures

Food consumption data was collected using Module 5 of the household questionnaire. More specifically from:

- Section 5.1: Food consumption expenditures in the last 7 days for food items purchased on a regular basis:
  - Pulses, beans, nuts and seeds;
  - Meat, dairy products, eggs;
  - Fish and other seafood;
  - Roots and tubers;
  - Vegetables;
  - Fruits;
  - Spices and condiments;
  - Other food products.
- Section 5.2: Other food consumption expenditures in last 7 days for other food items purchased on a regular basis:
  - Alcoholic beverages;
  - Food and beverages taken outside home.
- Section 5.3: Food consumption expenditures in the last 30 days for food items purchased on a less regular basis:
  - Rice and cereals;
  - Oil and fats;
  - Mild products;
  - Other food items (tea, coffee, sugar, etc.).

For sections 5.1 and 5.3, the following information was collected:

(i) The quantity and the value of each food item purchased in cash;
(ii) The quantity of each food item obtained in kind through barter or received as gifts, loans, wage or payment; and
(iii) The quantity of each food item consumed from home production.

For section 5.2, the following information was collected:

(i) The quantity and the value of each food item purchased in cash;
(ii) The quantity of each food item obtained in kind through barter or received as gifts, loans, wage or payment.

The following steps were involved in the calculation of food consumption expenditures:

a) For food consumption in kind (gifts-barter-loan, home consumption), the quantities of each item acquired were valued using implicit prices derived from:
   (i) Purchase value of the item divided by the quantity purchased by household j for this item if the household purchased this item in cash;

(ii) The median price for this item in the same township area (rural/urban) if this item was not purchased in cash by the household, but has been purchased by at least five households in township area. If less than five households purchased the item in cash in the township area, median price at district area level was used. If there were not enough cases at district level, median price at SD area level was used and so on.

b) Calculating total food consumption expenditures per year:

(i) Calculating total food quantity of each item acquired by each household and in kilogram: In this stage, the local measurement units used in the questionnaire were converted into international unit, kilograms[4].

(ii) Total quantities of each food item were calculated by summing the quantity of each food item purchased in cash, the quantity acquired through barter, gifts and loans, and the quantity consumed from home production.

(iii) Converting total quantity of each item acquired by each household on a yearly basis. This was done by multiplying quantity of each item acquired by 52 in the case of items in Sections 5.1 and 5.2 and by 12 in the case of items in Section 5.3.

(iv) Multiplying total quantity of each item acquired per year by its implicit price to get the total value of each item acquired by each household.

(v) Calculating total food consumption expenditures by summing up the yearly value of all food items acquired by the household.

Non-food consumption expenditures

Non-food consumption expenditures data was collected using Module 5 of the household questionnaire. More specifically from:

- Section 5.4: Non-food consumption expenditures in the last 30 days:
  - Energy for household use;
  - Water;
  - Personal apparel;
  - Medicines/drugs (including traditional medicine);
  - Local transport (daily travel);
  - Other non-food items (telephone services, cigarettes, entertainment, etc.).
- Section 5.5: Non-food consumption expenditures in the last 6 months:
  - Clothing and other apparel;
  - Home equipment;
  - House rent and repair;
  - Health (including traditional medicine);
  - Education;
  - Travel/trips (overnight travel);
  - Other (household worker services, etc.).

For sections 5.4 and 5.5, the following information was collected:

(i) The value of each food item purchased in cash;

(ii) The value of each food item obtained in kind through barter or received as gifts, loans, wage or payment.

The following steps were involved in the calculation of non-food consumption expenditures:

a) Selecting non-food items to be included in the calculation of non-food consumption expenditures. Since rental value was estimated separately, it was decided to drop expenditures on house rent and repair from the calculation of non-food consumption expenditures. Estimation of rental value will be discussed below. Medicines/drugs and other health expenditures were also not included in the calculation of non-food consumption expenditures and will be discussed below. Finally, gold and jewelry were taken out of non-food consumption expenditures since they are mostly savings, not expenditures.

b) Calculating total value of each non-food item acquired by adding the value of each non-food item purchased in cash and the value of each item acquired through barter or received as gift, loan, wage or payment.

c) Converting total value of each item acquired by each household on a yearly basis. This was done by multiplying the value of each item acquired by 12 in the case of items in Sections 5.4 and by 2 in the case of items in Section 5.5.

d) Calculating total non-food consumption expenditures by summing up the yearly value of all food items acquired by the household.

Rental value

The housing expenditures to be considered in total household consumption expenditures are the yearly user costs, best approximated by rental value, which is measured in the following way:

a) Calculating actual rent: The actual monthly rental value could be obtained directly from the housing module (Module 2) of the questionnaire if the household actually paid a rent for the dwelling.

b) Estimating monthly rental value: If the household owned the dwelling or did not own but was not paying rent for the dwelling, the households were asked to estimate the monthly rental value of their dwelling. This estimate could be obtained directly from the questionnaire.

c) Regression estimate of rental value: If the household could not estimate the rental value of the dwelling, regression estimates were derived using housing characteristics, S/D and area (urban/rural) as independent variables[5], and actual rent or estimated rental value as dependent variable from round 1 of the survey[6]: Rental value was estimated using multiple regression analysis. The following steps were involved:

[4] The detailed conversion table is presented in Appendix 5 of the Technical Report Appendices.

[5] Independent variables were: area, building material for outer wall, building material for floor, building material for roof, access to safe drinking water, access to sanitation facility, access to garbage disposal service, access to electricity.

[6] Rental value was estimated using round 1 data since data on dwelling characteristics was only collected in the first round.

- First, multiple linear regressions were run for each S/D using the backward method in order to select significant independent variables to be used for estimation. The model summaries generated in SPSS, together with the degree of significance of coefficients of independent variables were checked to select final independent variables for each S/D to be included in the regression.
- For each S/D, selected independent variables were used to estimate the coefficients of each independent variable using the enter method. The regression model for each S/D was used to estimate the rental value for each household.
- The yearly rental value was estimated by multiplying rental value by 12.

Durable goods user cost

The user cost of durable goods used by the household was calculated using data from Module 6: Household assets. Deriving this user cost was done in several steps:

a) The first step is to calculate δ^{iGj}, the depreciation rate of each consumer durable good i of type G possessed by each household j that owns this good. The subscript "j" is used since not all households h will own each type of durable good G, only households j. Also it is recognized that a household j may have more than one good of type G, and that each of those goods may have a different age and value, hence the use of the subscript "I" for the number of durable goods G owned by a given household j.

(1) $$\delta^{iGj} - \pi = 1 - \left(\frac{p_{t}^{iGj}}{p_{t-T^{iGj}}^{iGj}} \right)^{1/T^{iGj}}$$

with:

δ^{iGj} : Depreciation rate of each consumer durable good i of type G possessed by each household j that owns this good;

π : Real interest rate, i.e. nominal interest rate minus inflation rate, over the period;

p_{t}^{iGj} : Price of consumer durable good I of type G consumed by household j at current time t;

p_{t-T}^{iGj} : Price of consumer durable good I of type G consumed by household j at time of acquisition t;

T^{iGj} : Age of the consumer durable good i of type G consumed by household j.

b) The second step is to calculate δ^{G}, the median depreciation rate of each type of durable good G over all households j possessing any number i of this good.

(2) δ^{G} = formula of the median of all δ^{iGj}

c) The third and final step is to calculate the user cost of each consumer durable good. This is calculated for each durable good I of type G possessed by household j as its purchase price multiplied by the sum of real interest rate plus depreciation rate δ^G.

$$(3) \qquad V^{iGj} = P_t^{iGj} * (\pi + \delta^G)$$

with:

V^{iGj} : Yearly user cost for each consumer durable good i of type G for household j;

p_t^{iGj} : Price of consumer durable good i of type G consumed by household j at current time t;

π : Real rate of interest over the period;

δ^G : Average depreciation rate of consumer durable good G consumed by all households j.

Even though user cost was calculated, it was finally decided not to include it in the non-food consumption expenditures after noticing that an important number of items had a negative depreciation rate, resulting in negative user costs. This is due in part to current import restrictions which result in increasing prices of durable goods in time[7].

Health expenditures

Although data on health expenditures was collected in the non-food consumption sections of Module 5, it was decided not to include health expenditures in the consumption aggregate. Health expenditures are most often a reaction to a shock and do not usually improve household welfare. In fact, many households will have to go into debt to pay for health expenditures[8]. The elasticity of health expenditures being quite low (0.993), it was decided not to include health expenditures in the consumption aggregate[9].

Total non-food consumption expenditures

Total non-food consumption expenditures were calculated by adding non-food consumption expenditures and rent expenditures.

6.2.2 Adjusting for household composition and household size

In order to be able to compare consumption expenditures across households, it is important to correct for household composition and household size (economies of scale). Correction for household composition takes into account that usually children will consume less than adults in a

[7] This can be observed in the value of used cars which can have higher or equal values than new cars.

[8] This is showed by the high proportion of households that borrowed money for health reasons. Health was the reason for borrowing for 8.5% of loans in the first round and 11% of loans in the second round (see Vulnerability Profile).

[9] Deaton, A. and S. Zaidi (2002) *Guidelines for Constructing Consumption Aggregates for Welfare Analysis*, LSMS Working Paper 135, World Bank, Washington, D.C.

household. Children have lower caloric needs, their clothes are usually cheaper and they have more restricted list of items which they consume[10]. This adjustment is done by using adult equivalent scales[11].

Economies of scale come from the fact that some goods and services consumed by the household have a "public goods" aspect to them, whereby consumption by any one member of the household does not necessarily reduce the amount available for consumption by another person within the same household. Housing is an important household public goods, as well as durable items like televisions, or even bicycles or cars, which can be shared by several household members at different times[12].

Calculating household adult equivalent scales

The household adult equivalent scales were calculated for each round separately. Two scales were calculated: one for food consumption expenditures (AEF) and another one for non-food consumption expenditures (AENF).

For food consumption expenditures by adult equivalent, the formula is:

(1) $$AEF_j = \left(MA_j + \alpha_1 FAj + \alpha_2 Cj\right)^{\theta}$$

with:

AEF_j : Number of adult equivalents for food consumption expenditures in household j;

MA_j : Number of male adults (15+ years) in household j;

FA_j : Number of female adults (15+ years) in household j;

C_j : Number of children (0-14 years) in household j;

α_1 : Food cost of a female adult relative to that of a male adult;

α_2 : Food cost of a child relative to that of a male adult;

θ : Elasticity of adult equivalents with respect to effective size (between 0 and 1). $(1 - \theta)$ measures the extent of economies of scale.

Based on nutritional norms and on Deaton and Zaidi's (2002)[13], α_1, α_2 and θ were set to 0.9, 0.7 and 0.9 respectively.

[10] BHAS (2002), Welfare in Bosnia and Herzegovina, 2001 : Measurement and Findings, State Agency Statistics (BHAS), Republika Srpska Institute of Statistics (RSIS), Federation of BiH Institute of Statistics (FIS), World Bank.

[11] A more simplistic approach is to use per capita consumption expenditures where consumption expenditures are simply divided by total household size without regard to household composition.

[12] Deaton, A. and S. Zaidi (2002) *Guidelines for Constructing Consumption Aggregates for Welfare Analysis*, LSMS Working Paper 135, World Bank, Washington, D.C.

[13] Deaton, A. and S. Zaidi (2002) *Guidelines for Constructing Consumption Aggregates for Welfare Analysis*, LSMS Working Paper 135, World Bank, Washington, D.C.

For non-food consumption expenditures by adult equivalent, the formula is:

(2) $$AENF_j = \left(A_j + \alpha Cj\right)^{\theta}$$

with:

$AENF_j$: Number of adult equivalents for non-food expenditures in household j;

A_j : Number of adults (15+ years) in household j;

C_j : Number of children (0-14 years) in household j;

α : Non-Food Cost of a child relative to that of an adult;

θ : Elasticity of adult equivalents with respect to effective size (between 0 and 1). $(1 - \theta)$ measures the extent of economies of scale.

Following Deaton and Zaidi's (2002)[2] recommendation, α: and θ are set to 0.3 and 0.9 respectively.

Calculating nominal food consumption expenditures in adult equivalent per year

Total yearly food consumption expenditures were adjusted by dividing total food consumption expenditures per year by AEF for each household to get aggregated nominal food consumption expenditures in adult equivalent per year.

Calculating nominal non-food consumption expenditures in adult equivalent per year

Total non-food consumption expenditures per year were adjusted by dividing total non-food consumption expenditures per year by AENF for each household to get aggregated nominal non-food consumption expenditures in adult equivalent per year.

Calculating total nominal consumption expenditures in adult equivalent per year

Total nominal consumption expenditures in adult equivalent per year for each household were calculated by adding total nominal food consumption expenditures in adult equivalent per year and total nominal non-food consumption expenditures in adult equivalent per year to get the consumption aggregate or total nominal consumption expenditures in adult equivalent per year.

6.2.3 Adjusting for differences in prices across regions

To be able to compare household consumption expenditures across regions, it is necessary to take into account differences in prices across regions. To convert nominal consumption expenditures per year per adult equivalent into normalized consumption expenditures per year per adult equivalent for each household, it is necessary to deflate nominal household expenditures per year per adult equivalent by a price index called the Paasche price index (PPI).

The PPI reflects both variations in prices and quantities consumed across space and time. A PPI was calculated for each household for both rounds separately.

The PPI is calculated using the following formula:

$$(3) \qquad PPI_j = \frac{p^j * q^j}{p^o * q^j} = \left(\sum_i w_{ij} * \left(P_i^0 / P_i^j \right) \right)^{-1}$$

with:

PPI_j : Paasche's price index for household j;

p^j : Vector of prices paid by household j;

p^o : Vector of prices paid by the reference household (median prices at Union level);

q^j : Vector of quantities consumed by household j.

w_{ij} : budget share of food item i in total food expenditures per adult equivalent per year for household j

P_i^0 : Implicit reference price of item i

P_i^j : Implicit price of item i paid by household j

i : Food item number

The following steps involved in the calculation of PPI:

a. Calculating the budget share of each food item for each household: The budget share of each food item for household j, (w_{ij}) was calculated by dividing the consumption expenditure on food item acquired by the household per year per adult equivalent by total nominal food consumption expenditures of the household per year per adult equivalent.
b. Calculating the reference price of each food item at Union level: The reference price for food item i is the median price at Union level in the first round[14].
c. Calculating the PPI for each household j: According to the formula, first the weighted price of each food item for household j was calculated by multiplying its budget share by the reference price and dividing by the implicit price. Then, the weighted price of each food item for household j was summed up at the household level to get the inverse of the PPI_j. Finally, the PPI for each household j was obtained by reversing the inverse of PPI.

Nominal consumption expenditures per year per adult equivalent were normalized by multiplying total nominal consumption expenditures per year per adult equivalent for each household by its PPI to get total normalized consumption expenditures per year per adult equivalent.

6.2.4 Determination of poverty lines

The general approach followed in this survey is the 'cost of basic needs' method[15]. To provide a more comprehensive perspective on poverty, two poverty lines were calculated:

[14] First round median price at Union level were used for the calculation of PPIs in both rounds so that both rounds would be comparable.

[15] Ravallion, M. (1998) *Poverty Lines in Theory and Practice*, LSMS Working Paper 133, World Bank, Washington, D.C.

1. **Food Poverty Line (FPL**), based on minimum food expenditure. Minimum food expenditure is the amount of Kyats necessary to pay for a consumption basket that will satisfy caloric requirements of household members;
2. **Poverty line (PL**), based on (i) minimum food expenditures to satisfy caloric requirements (ii) plus reasonable non-food expenditure to meet basic needs. The food expenditure component of the PL is the FPL. The non-food expenditure component of the PL is calculated as a proportion of the FPL based on the share of non-food expenditures over food expenditures for those households whose total expenditures are around the poverty line.

Determination of the Food Poverty Line

The Food Poverty Line (FPL) was derived in four (4) steps:

Step 1: Selecting the reference household for each survey round;

Step 2: Calculating the caloric requirements of the representative household (calories per adult equivalent per year) for each survey round;

Step 3: Establishing a food consumption basket that reflects annual caloric requirements and food consumption patterns for the representative household (kilos per adult equivalent per year) for each survey round;

Step 4: Valuating the normative food consumption basket chosen for each survey round (Kyats per adult equivalent per year).

Step 1: Selecting a reference household for each survey round

The reference household was the average of consumption expenditures of households in the second quartile of normalized total consumption expenditures per adult equivalent. The number of male adults, female adults, and children, and total (household size) in the reference household was then calculated.

Step 2: Calculating caloric requirements of the reference household for each survey round

Nutritional caloric norms vary depending on age, gender, and type of activity (the latter being related to location: rural or urban areas).

Table 6.1: Nutritional caloric norms

Calories per day	Rural	Urban
Male adult	2800	2200
Female adult	2450	2050
Child (<15)	1800	1800

Source: National Nutritional Center, Department of Health, Ministry of Health, Union of Myanmar.

Based on the composition by age, gender and location of the reference household, the total caloric needs were then calculated for this reference household by:

- Multiplying the size of each population category (male adults, female adults, and children) by the weighted caloric requirement per day in the table above.

- Summing over all population categories to get household weighted caloric requirements per day.
- Dividing by the reference household size (in adult equivalent) to get the minimum caloric requirement per day, which is estimated at 2304 calories per adult equivalent per day for first round and at 2295 calories for second round.

Step 3: Establishing a reference food consumption basket that reflects annual caloric requirements per adult equivalent and food consumption patterns for the reference household for each survey round

The average quantity of each food item consumed by the reference household (households in the second quartile) in kg per adult equivalent per year was calculated, and then average quantities were multiplied by the caloric content of each food item per kg to get total caloric intake for the reference household by adult equivalent per year[16].

An adjustment factor was calculated by dividing the caloric norm for the reference household by adult equivalent per day divided by the total caloric intake for the reference household.

Quantities of each food item in kg per adult equivalent per year were then multiplied by the adjustment factor to get required quantities of each food item in the reference food basket.

Step 4: Valuation of the reference food consumption basket for each survey round

Each food item in the reference food consumption basket was valued by multiplying the adjusted quantity by the median implicit price at Union level (from round 1).

Values over all food items in the reference food consumption basket were then summed to get the Food Poverty Line (FPL) in Kyats per adult equivalent per year for each round separately[17].

The average FPL of both rounds was then calculated to get the merged FPL.

Table 6.2: Food poverty lines (Kyats per adult equivalent per year as of November 2004)

Round	FPL
Round 1	119 342
Round 2	117 462
Both rounds merged	118 402

[16] See appendix 6 of the Technical Report Appendices.

Determination of the Poverty Line

The Poverty Line (PL) or General Poverty Line was derived in three (3) steps:

Step 1: Calculating total normalized food and non-food consumption expenditures per year per adult equivalent for both rounds merged, as well as total normalized consumption expenditures per year per adult equivalent. This is done by adding yearly expenditures from round 1 and yearly expenditures from round 2 and by dividing by 2.

Step 2: Estimating the budget shares for food and non food consumption expenditures for the reference household (for both rounds merged);

Step 2: Estimating normative minimum non-food expenditures for the PL (for both rounds merged);

Step 3: Calculating the Poverty line (both rounds merged).

Step 1: Estimating the budget shares for food and non food consumption expenditures for the reference household (both rounds merged)

Food consumption expenditures for the households were computed on a yearly basis and normalized (divided by household adult equivalent). These normalized expenditures were then compared to the food poverty line. If the expenditure was within ± 10% of the poverty line, the average food and non food shares of those households were then calculated.

Step 2: Estimating normative minimum non-food expenditures for the PL (both rounds merged)

The normative minimum non food consumption expenditures per adult equivalent per year were calculated as: Non food expenditures (both rounds merged) = FPL * average non food share (both rounds merged)/average food share (both rounds merged).

Step 3: Calculating the Poverty line (both rounds merged)

The PL per adult equivalent per year is equal to the sum of the Food Poverty Line (FPL) (both rounds merged) and of normative minimum non food consumption expenditures per adult equivalent per year (both rounds merged).

Poverty lines (both rounds merged)

1) A Food Poverty Line was calculated as the average of the first round FPL and the second round FPL. The FPL is normalized, i.e., presented in Kyats per adult equivalent per year as of November 2004.
2) The PL was then calculated by adding the normative minimum non food consumption expenditures per adult equivalent per year.

[17] For the reference food baskets refer to Appendix 7 of the Technical Report Appendices.

Table 6.3: Food, non food and poverty lines (both rounds merged) (Kyats)

	Poverty lines (Kyats)
Food Poverty Line	118 402
Non Food Poverty Line	43 734
Poverty Line	162 136

6.3 MONETARY POVERTY MEASUREMENT

Six (6) monetary poverty indicators were calculated:

1) Food Poverty Headcount Index;
2) Poverty Headcount Index;
3) Poverty Gap Ratio;
4) Squared Poverty Gap Ratio;
5) Share of poorest quintile in consumption
6) Contribution of each S/D to Poverty

6.3.1 Food poverty headcount index

The Food Poverty Headcount Index, H_F, is the proportion of individuals whose normalized consumption expenditures per adult equivalent are lower than the FPL.

Calculation steps:

1. Attribute food poverty status for each household j:

- If household j total consumption expenditures per adult equivalent per year are lower than FPL, then household j classified as food poor.
- If household j total consumption expenditures per adult equivalent per year are higher than FPL, then household j classified as not food poor.

2. Calculate H_F

$$H_F = \frac{\sum_{j=1}^{f} w_j * M_j}{\sum_{j=1}^{k} w_j * M_j}$$

with:

H_F : Food Poverty Headcount Index in the analysis area;

f : Number of food poor individuals (individuals that belong to poor households) in the analysis area;
k : Number of individuals (individuals that belong to all households) in the analysis area;
w_j : Sampling weight of household j in the analysis area;
M_j : Size of household j (number of individuals, not adult equivalents) in the analysis area;

6.3.2 Poverty Headcount Index

The Poverty Headcount Index, P_O, is the proportion of individuals whose normalized consumption expenditures per adult equivalent are lower than the OPL.

Calculation steps:

1. Attribute poverty status for each household j:
   - If household j total consumption expenditures per adult equivalent per year are lower than OPL, then household j is classified as poor.
   - If household j total consumption expenditures per adult equivalent per year are higher than OPL, then household j is classified as non poor.
2. Calculate P_0

$$P_0 = \frac{\sum_{j=1}^{o} w_j * M_j}{\sum_{j=1}^{k} w_j * M_j}$$

with:
P_0 : Poverty Headcount Index in the analysis area;
o : Number of poor individuals (individuals that belong to poor households) in the analysis area;
k : Number of individuals (individuals that belong to all households) in the analysis area;
w_j : Sampling weight of household j in the analysis area;
M_j : Size of household j (number of individuals, not adult equivalents) in the analysis area.

6.3.3 Poverty Gap Ratio

The **Poverty Gap Ratio, P_1,** indicates the depth of poverty.

$$P_1 = \frac{1}{\sum_{j=1}^{k} w_j * M_j} \sum_{j=1}^{o} w_j * M_j * \left(\frac{z_o - y_j}{z_o} \right)$$

with:

P_1 : Poverty Gap Ratio in the analysis area;

k : Number of individuals (individuals that belong to all households) in the analysis area;

w_j : Sampling weight of household j in the analysis area;

M_j : Size of household j (number of individuals, not adult equivalents) in the analysis area.

o : Number of poor individuals (individuals that belong to poor households) in the analysis area;

z_o : OPL per adult equivalent in the analysis area;

y_j : Normalized consumption expenditures per adult equivalent of household j in the analysis area;

6.3.4 Squared Poverty Gap Ratio

The **Squared Poverty Gap Ratio, P_2,** indicates the severity of poverty, giving more weight to the poorest individuals (the ones that are farthest from the poverty line).

$$P_2 = \frac{1}{\sum_{j=1}^{k} w_j * M_j} \sum_{j=1}^{o} w_j * M_j * \left(\frac{z_o - y_j}{z_o} \right)^2$$

with:

P_2 : Squared Poverty Gap Ratio in the analysis area;

k : Number of individuals (individuals that belong to all households) in the analysis area;

w_j : Sampling weight of household j in the analysis area;

M_j : Size of household j (number of individuals, not adult equivalents) in the analysis area.

o : Number of poor individuals (individuals that belong to poor households) in the analysis area;

z_o : OPL per adult equivalent in the analysis area;

y_j : Normalized consumption expenditures per adult equivalent of household j in the analysis area.

6.3.5 Share of poorest quintile in consumption

The **Share of poorest quintile in consumption** indicates the proportion of national consumption expenditures going to the 20% poorest households (the ones that are farthest from the poverty line).

$$S_{20} = \frac{\sum_{j=1}^{q} w_j * TOTEXPN_j}{\sum_{j=1}^{k} w_j * TOTEXPN_j}$$

With:

S_{20} : Share of poorest quintile in consumption in the analysis area;

q : Number of households in the first quintile of normalized consumption expenditures per adult equivalent per year in the analysis area;

k : Number of households in the analysis area;

w_j : Sampling weight of household j in the analysis area;

$TOTEXPN_j$: Total normalized consumption expenditures of household j per adult equivalent per year in the analysis area.

6.3.6 Contribution of each S/D to Union level poverty

The **contribution of each S/D to Union level poverty** is calculated as:

$$C_{SD} = \frac{\sum_{j=1}^{SD} w_j * M_j}{\sum_{j=1}^{U} w_j * M_j} * \frac{P_{0SD}}{P_{0U}}$$

with:

C_{SD} : Contribution of each S/D to Union poverty;

SD : Number of sampled households in S/D;

U : Number of sampled households in Union;

w_j : Sampling weight of household j in the analysis area;

M_j : Size of household j (number of individuals, not adult equivalents) in the analysis area.

P_{0SD} : Poverty Headcount Index in each S/D;

P_{0U} : Poverty Headcount Index in Union

6.4 KEY RESULTS INDICATORS

The indicators presented above enable us to measure monetary poverty based on household expenditures. But poverty is much more than just monetary poverty. It also includes many other aspects such as access to social services like education and health, employment and business opportunities, access to means of production like agricultural equipments, etc. In order to cover all aspects of poverty, a number of key results indicators (KRIs) were also calculated using IHLCA survey data. These KRIs were also used to characterize the poor in Myanmar.

7. MAIN ACTIVITIES

7.1 PREPARATORY ACTIVITIES

To ensure that all objectives of the IHLCA were reached, an institutional set-up was implemented which involved representatives of the various line ministries and other stakeholders for stimulating a sense of "survey ownership" so that the information provided was most useful and meaningful for policy and programmatic purposes, as well as researchers and technical experts so that the data gathered were as reliable and accurate as possible.

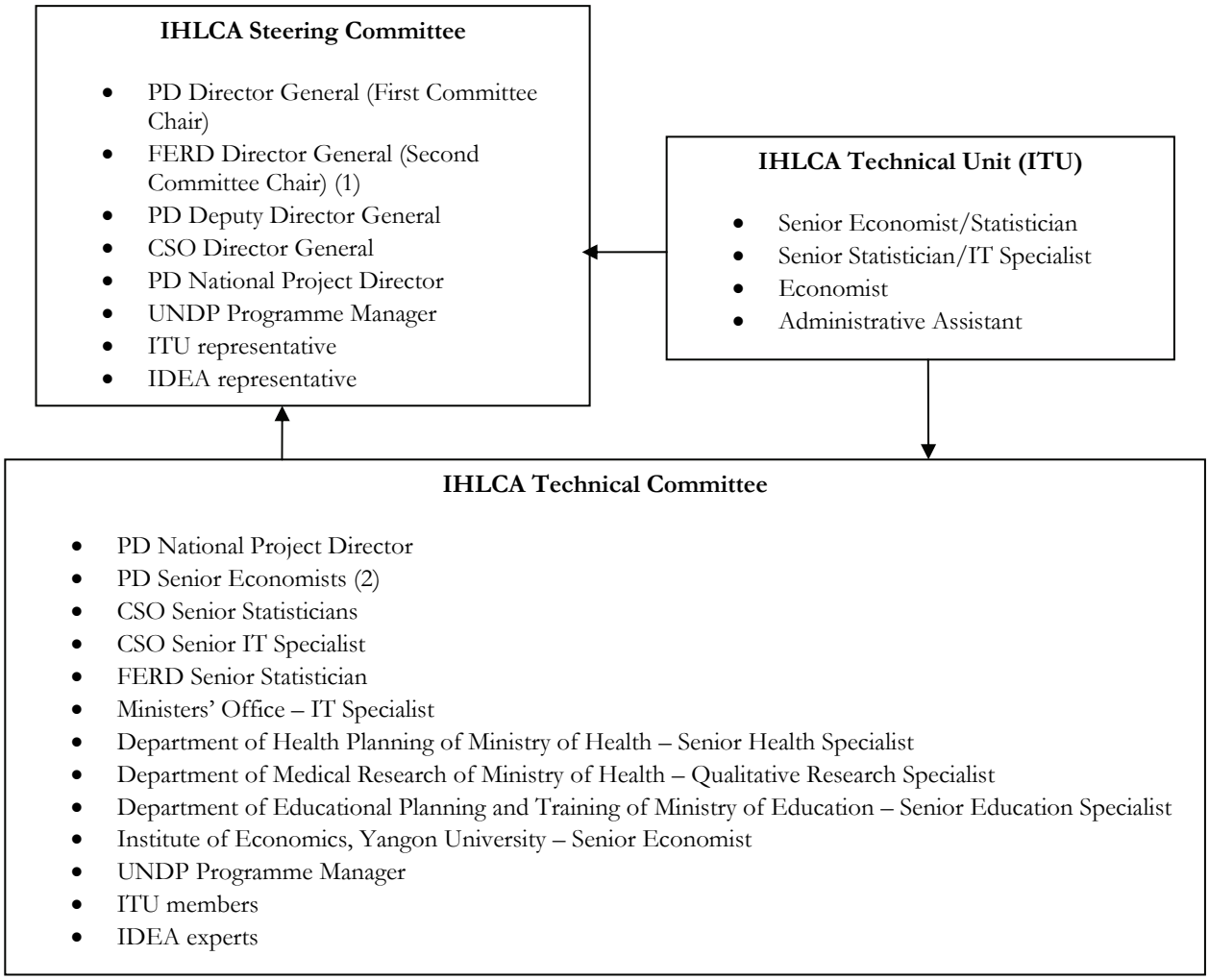
The institutional set-up for developing and implementing the IHLCA was as follows:

- IHLCA Steering Committee – executive committee whose mandate was to ensure that the major information needs of main data users are covered by the project; approve the IHLCA work plan and accompanying budget proposed by the Technical Committee; periodically review the project's development and address any unforeseen problems encountered; make decisions to ensure the smooth progress of the survey rounds; and contribute to a better dissemination and use of the IHLCA results for policy and programme development under the guidance and clearance of the Ministry of National Planning and Economic Development in collaboration with UNDP;

- IHLCA Technical Committee – consultative committee of national and international experts with practical experience in conducting surveys, and whose mandate was to report to the Steering Committee on methodological issues related to the IHLCA and offer recommendations to ensure the timely and cost-efficient production of reliable results.

- IHLCA Technical Unit (ITU) – operations team of national technical and project specialists to be recruited by UNDP and PD, and whose mandate was to implement activities according to the IHLCA work plan, including: administrative and technical support for carrying out day-to-day activities and training processes for survey fieldwork; etc. The ITU was headed by a technical adviser (senior economist/statistician) who helped with substantive technical issues and was reporting as well as answerable to the Technical Committee. As expected the ITU professional staff played an important role in the technical design and implementation of project activities. Recruitment of all ITU members except the Senior Economist/Statistician had taken place in September 2003 during the second IDEA mission.

Figure 7.1: IHLCA institutional set-up



(1) Foreign Economic Relations Department of the Ministry of National Planning and Economic Development.

The overall responsibility of the institutional set up was to plan, design and implement Survey operations with the help of technical advisers from IDEA International.

Preparations for the 2004/2005 IHLCA started in July 2003 with the IDEA International inception mission. The mission made recommendations on a number of central issues including:

- IHLCA institutional set up
- IHLCA methodology
- IHLCA sampling design
- IHLCA scope and coverage
- IHLCA field work organization, and training
- IHLCA Computer equipment and data processing, analysis and dissemination.

- The examination of previous major household surveys for establishing a preliminary assessment of living conditions and providing guidance on the design of the IHLCA questionnaires and sampling plan took place in September 2003;
- The determination of the major information needs for the questionnaires content was completed, and the sampling plan as well as the questionnaire design were undertaking during the period October-November by the IHLCA Steering Committee based on the recommendations of the IHLCA Technical Committee;
- The specifications and procurement of computer equipment, hardware and software was undertaken during the period October 2003 to August 2004 for both the ITU and the Planning Department;
- Piloting of the quantitative survey, including preparation and translation of the survey instruments, recruitment and training of trainers and field staff, pre-testing and preparation of data entry programmes were conducting during the period July-August 2004;
- In particular, the Pilot test involved 203 households in Yangon Division; 80 enumerators divided into 2 groups were used under the overall guidance and supervision by the ITU staff.

The survey instruments that were designed included:

- Three structured questionnaires (Community, Household and Price);
- Training guides for field enumerators and supervisors;
- Compilation grids for monitoring data quality of selected key indicators during fieldwork; manuals for data entry and validation programs; and
- Statistical templates for data processing and analysis.

Additional logistical considerations for successful fieldwork implementation included:

- Contacting the appropriate state/division, township and ward/village authorities for authorization and support for conducting fieldwork;
- Organization of the structure of fieldwork teams and deployment; purchase and distribution of field equipment (such as backpacks for carrying the questionnaires, protective raingear and footwear, equipment for anthropometric measurement, etc.);
- Organization of transportation and remuneration for the field teams;
- Organization of secure storage for the completed questionnaires;
- Organization of transfer and storage of the preliminary micro-datasets from the states/divisions offices to the central offices for processing.

The survey personnel was indeed a very important factor for the success of the IHLCA, since the quality of data collected depended directly on the quality of the work of survey personnel.

At S/D level, survey personnel were divided into two categories:

- The survey management team at S/D level;
- The data collection team.

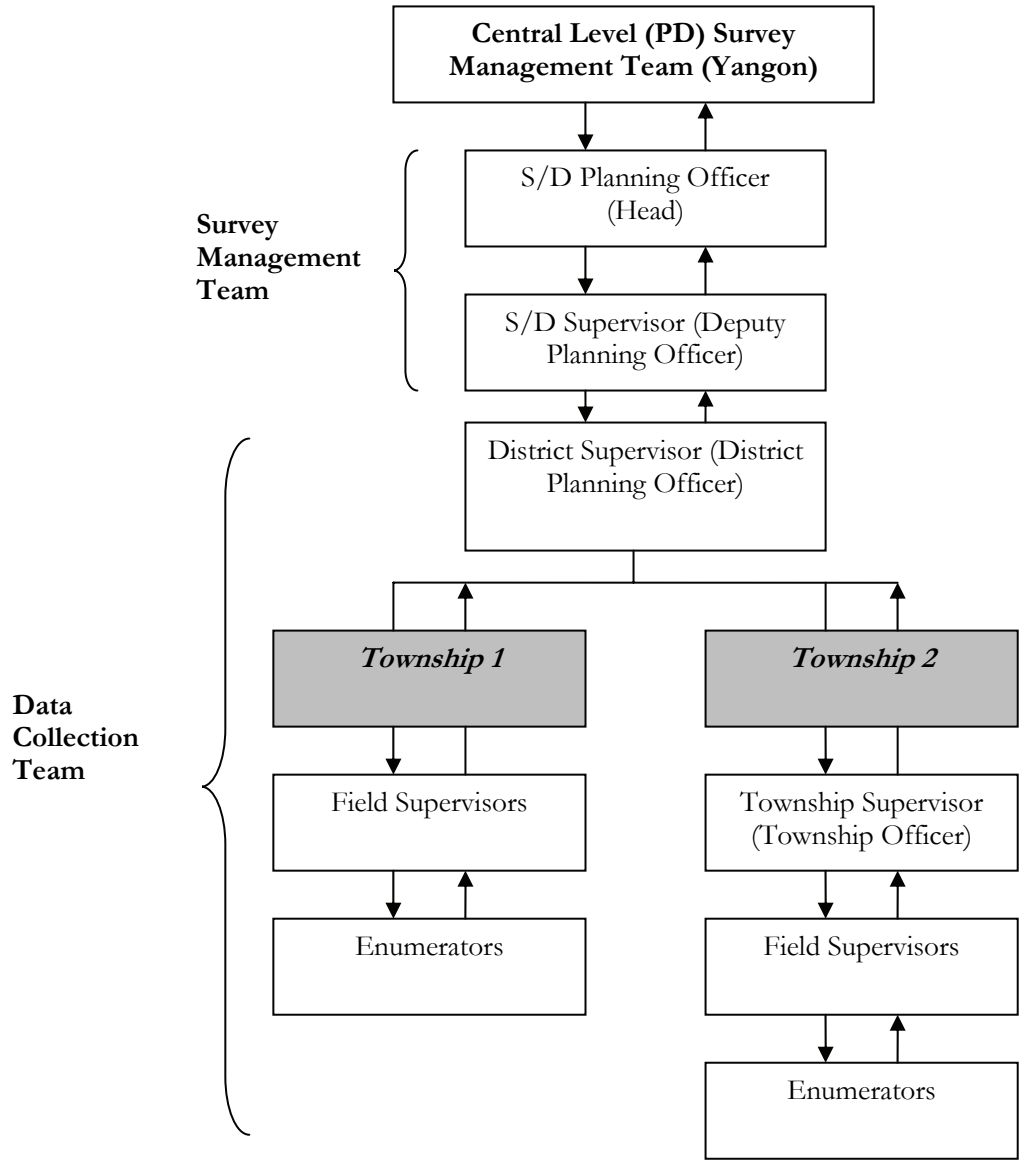
The survey management team was made up of:
The S/D Planning Officer in charge (head);
The S/D Deputy Planning Officer (S/D supervisor).

The data collection team was comprised of:

- District Planning Officers (District Supervisors);
- Township supervisor (Planning Officer);
- Field supervisors;
- Enumerators.

The diagram of the field organizational structure is shown in figure 2. This figure is for illustration purposes. In some townships, the District Planning Officer acted as Township Supervisor.

Figure 7.2: Diagram of the field organizational structure



7.2 DATA COLLECTION

Prior to the data collection activities for both rounds, training for both supervisors was conducted. Three sessions for Training of Trainers (TOT) for Round 1 operations took place respectively in March, July, and September 2004. These were followed by training sessions for enumerators in the respective States/Divisions by the already trained trainers. At the end of TOT sessions a test was conducted to assess trainees, especially their understanding of the material taught. Average results of this test can be found in the table below.

Table 7.1: Average results obtained by supervisors at the TOT session test

State/Division	Average marks obtained after R1 TOT training(October)
Kachin	67.1
Kayah	62.0
Kayin	65.8
Chin	61.4
Sagaing	59.1
Tanintharyi	68.9
Bago(E)	72.5
Bago(W)	67.3
Magway	67.5
Mandalay	57.5
Mon	57.9
Rakhine	69.5
Yangon	78.2
Shan(E)	70.2
Shan(S)	70.2
Shan(N)	70.2
Ayeyawady	67.5
Total	66.2

After the test and judgment of the student's capability, the required number of interviewers was appointed. In April and May 2005 another wave of training sessions took place in preparation for Round 2 operations. To help some of the TOTs especially in Chin, Mandalay, Mon and Ayeyawady, one trainee from State or divisional Supervisory committee who had attended the TOT training joined the township level supervisor and enumerator training sessions. The supervisor and enumerator trainings were conducted in one of the two townships in each district. For Round I, the training of field supervisors took place during the period October 18, 2004 to October 25, 2004. The training of the field enumerators took place during the period November 15, 2004 to November 24, 2004. For Round II, training for both field supervisors and enumerators took place during the period April 29, 2005 to may 3, 2005. Enumerators during those sessions were given practical pilot tests.

The exams for trainers of supervisors and enumerators were quite high level, hence the grades obtained.

The table below provides a breakdown of number of trainees by State/Division and training session and round.

Table 7.2: Number of trainees by State/Division, training session and round

State/Division	IHLCA R1 TOT training 2004 March	IHLCA R1 pilot TOT training 20-7-2004 to 28-7-2004	IHLCA R1 TOT training 21-9-2004 to 6-10-2004	IHLCA R2 training 19-4-2005 to 7-5-2005
Kachin	4	4	4	5
Kayah	3	3	3	2
Kayin	4	4	4	4
Chin	3	3	3	3
Sagaing	9	9	9	9
Tanintharyi	4	4	4	4
Bago(E)	4	3	3	3
Bago(W)	3	3	3	3
Magway	6	6	6	6
Mandalay	9	8	8	8
Mon	3	3	3	3
Rakhine	5	5	5	5
Yangon	5	5	5	5
Shan(E)	5	5	5	5
Shan(S)	4	3	4	4
Shan(N)	6	6	6	6
Ayeyawady	6	6	6	6
Total	83	80	81	81

The field work to be carried out by the Planning Department field staff concerning the households consisted of different operations, broken down into two rounds known as Round I and Round II.

During Round I:

- All households in the sampled townships were listed;
- Community and household information were collected.

During Round II:

- The same sampled households as in Round I were re-visited; no new households were added. The main aim was to capture detailed information on seasonal variables.

Field Enumerators (1174 in total) and field supervisors (232 in total) were organized into teams comprising on average 1 supervisor and 5 enumerators, and each team was supposed to have access to at least transportation. A detailed breakdown of number of supervisors and enumerators by State/Division is given in the following table.

Table 7.3: Number of supervisors and enumerators by State/Division

State/Division	Township Supervisors	Supervisors	Enumerators
Kachin	8	8	44
Kayah	2	2	10
Kayin	6	9	46
Chin	4	6	26
Sagaing	16	30	144
Tanintharyi	6	10	42
Bago (E)	4	11	58
Bago (W)	4	8	46
Magwe	10	21	110
Mandalay	16	31	152
Mon	4	10	52
Rakhine	8	16	82
Yangon	9	15	76
Shan (S)	4	7	36
Shan (N)	10	16	80
Shan (E)	8	9	42
Ayeyarwaddy	10	23	128
Total	129	232	1174

The teams were also provided with the relevant set of questionnaires, necessary stationeries and equipment, and field measuring tools (Salter weighting scales).

Enumerators were essentially dealing with the administration of Household questionnaires. A subset of female enumerators were also be involved in the administration of the Community Price survey. Field supervisors were entirely in charge of the Community questionnaire. Finally, the Township Profile information was collected by the Township Officers.

Global supervision of the field work was undertaken by the ITU (4 staff members) and the Planning Department (127 township supervisors[18]). They fielded a number of visits to accessible States/Divisions to check and make sure that the supervisors and their enumerators were performing their tasks according to the instructions given to them. For some areas they also maintained constant telephone contacts that were of great help, when various problems were encountered by the field staff.

A Survey Management team supervised field operations in each SD. Coverage of all SDs at Central Level was limited to some extent due to accessibility. The Technical Unit focused on SDs where trainers had the lowest scores. When SDs where not accessible, supervision at the Central Level was done by means of phone communications and by a reporting system between the ITU and SD supervisors.

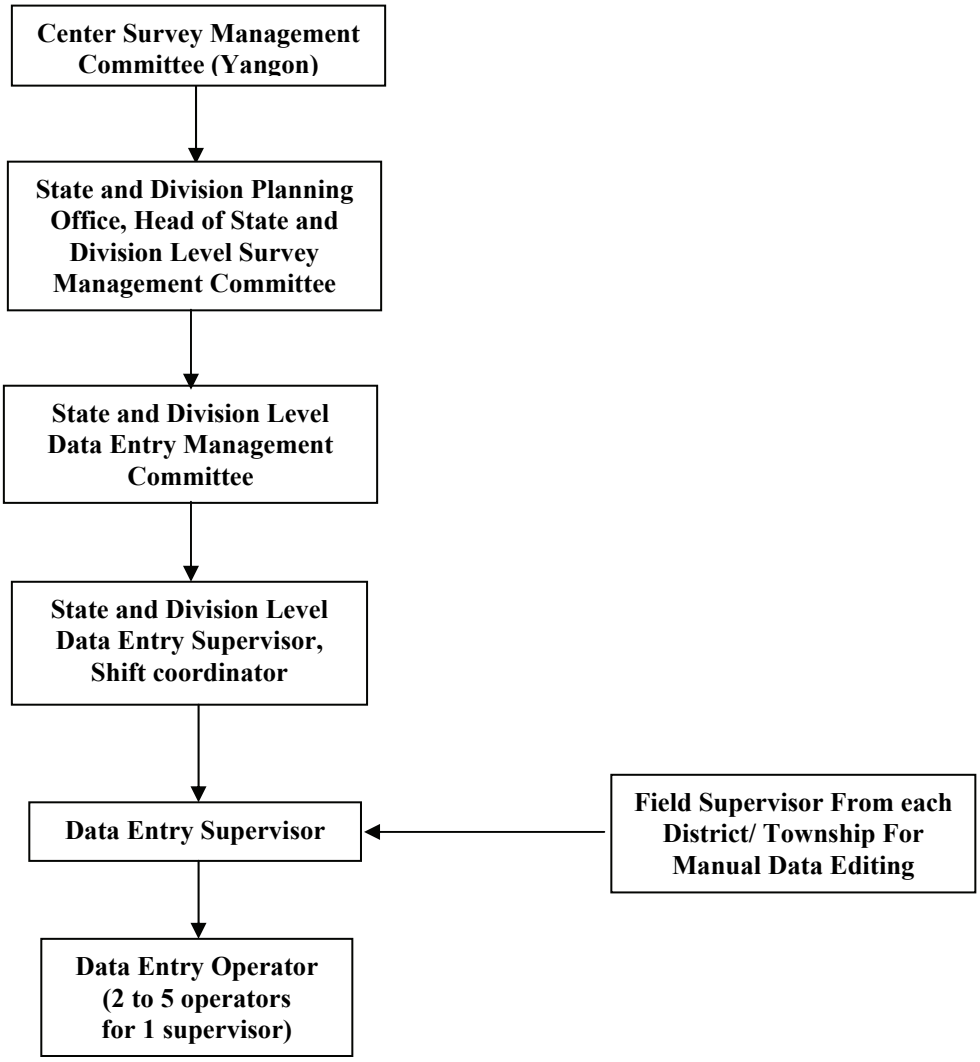
Round I activities started in November 2004 and lasted approximately one month, and Round II in May 2005 for also approximately one month duration.

[18] Two townships were dropped because of accessibility and security issues. Hence the number of township supervisors dropped to 127.

7.3 DATA PROCESSING

For the data processing system, the organizational structure that was adopted is shown below:

Figure 7.3: Organizational structure for data processing



The table below gives the distribution of staff and associated computer equipment by State/Division.

Table 7.4: Distribution of staff and associated computer equipment by State/Division

State/Division	Total Number of Supervisors	Total Number of Operators	Total Number of Computers
Kachin	2	6	6
Kayah	1	2	2
Kayin	2	6	6
Chin	1	4	4
Sagaing	4	17	17
Tanintharyi	2	6	6
Bago(E)	2	8	8
Bago(W)	2	7	7
Magway	3	13	13
Mandalay	5	20	20
Mon	2	6	6
Rakhine	3	10	10
Yangon	3	9	9
Shan(E)	2	6	6
Shan(S)	2	6	6
Shan(N)	3	9	9
Ayeyawady	4	17	17
Total	43	152	152

Prior to data keying and processing activities, training sessions were organized for all data entry and processing staff. The table below provides a breakdown of staff by State/Division and training sessions.

Table 7.5: Staff by State/Division and training sessions for data entry and processing staff

State/Division	IHLCA R1 pilot TOT training 11-08-2004 to 17-08-2004	IHLCA R1 TOT training 22-11-2004 to 29-11-2004	IHLCA R2 TOT training 09-05-2005 to 12-05-2005
Kachin	3	3	3
Kayah	3	3	3
Kayin	3	3	3
Chin	3	3	3
Sagaing	4	4	4
Tanintharyi	3	3	3
Bago(E)	3	3	3
Bago(W)	3	3	3
Magway	3	3	3
Mandalay	5	5	5
Mon	3	3	3
Rakhine	3	3	3
Yangon	3	3	3
Shan(E)	3	3	3
Shan(S)	3	3	3
Shan(N)	3	3	3
Ayeyawady	4	4	4
Yangon Head quarter	5	5	5
Total	60	60	60

At the end of the TOT training of Round I, a test was administered to the trainees to assess their mastering of the material and provide additional training if necessary. The results of those tests are provided in the following table.

Table 7.4 indicates training by staff category, while table 7.5 indicates training of trainers by training session. In a given training session, various categories of staff were trained.

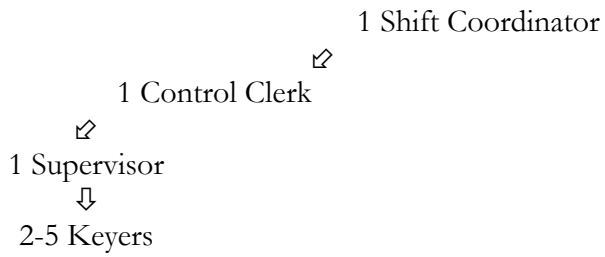
Table 7.6: Average results of the TOT data processing training (round 1)

State/Division	Average marks obtained after R1 TOT training (November)
Kachin	78.0
Kayah	84.0
Kayin	90.0
Chin	54.0
Sagaing	79.5
Tanintharyi	78.0
Bago(E)	80.0
Bago(W)	76.0
Magway	76.0
Mandalay	82.8
Mon	76.0
Rakhine	84.0
Yangon	84.0
Shan(E)	75.0
Shan(S)	66.0
Shan(N)	88.0
Ayeyawady	86.0
Yangon Headquarter	85.2

Overall coding and verification of the questionnaires received from the field was under the responsibility of the State and Division Level Data Entry Management Committee. The essence of the data entry and editing processes went on as described below.

Staff Organization

Each shift of data entry team consisted of 1 Shift Coordinator, 1 team consisting 1 to 5 Supervisor(s) and 1 Control Clerk. One data entry supervisor had to manage 2 to 5 data entry operators. In Sagaing, Mandalay, and Ayeyarwaddy the keying operation had two daily shifts due to lack of computer equipment and trained data processing staff.



On each shift, there was at least one assistant director from the State/Division level responsible for the overall coordination. This person was referred to as the (First or Second) Shift Coordinator (SC). Problems which Supervisors could not resolve were brought to the attention of the SC. Check-out of batches from the Central Storage Area was also done by the SC.

The Supervisors dedicated their time to monitoring the activity of the 2 to 5 Keyers (this includes Verifiers as well) in their team, and answering any questions about the keying process or other substantive procedures. They also established and entered filenames and initial geographic codes for each batch assigned to a Keyer, to ensure their accuracy.

One Control Clerk carried out the administrative functions for the teams. This included assigning batches to a Keyer, tracking error rates, and all other recordkeeping tasks. Due to lack of staff from some State/Division, most of the Shift Coordinator and supervisor shared the responsibility of the Control Clerk's task.

Each Keyer was given a two-digit identification number. All monitoring and record-keeping activity used the Keyer's identification number and **not** the Keyer's name.

Technical Organization

Equipment and Room Considerations

The Keying Operation had the following components:

- One computer for each Keyer
- computers for use by the Control Clerks, Supervisors, or Shift Coordinator;
- 1-2 printers, connected to the above computers
- one copy machine
- Uninterruptible Power Supply for each computer set
- Stand by generator

Software and Data file Considerations

CSPro 2.5 was installed on all computers; however on the computers for use by the Keyers, the CSPro 2.5 icon was removed, as one did not want to give easy access to CSPro 2.5 by the Keyers in the event they attempted to modify the data entry application. Instead, an icon was placed on the desktop, linked to invoke CSEntry with the proper data entry application. The PFF files were suitably set up by the Supervisor.

Once the Keyer had completed their Batch, the Control Clerk copied the Keyer's data and log files. The system placed one copy of the data file in a "safe" directory on the server, one that was used strictly as an archive of work done. A second copy was to be placed on the server in a working directory, where it was be later copied to another Keyer's machine for verification.

CSPro 2.5 Data Entry Options

The following CSPro 2.5 data entry options were reviewed by the ITU to determine which settings to use.

[1] Require the <Enter> key? This determined whether or not the keyer will need to hit the <Enter> key after entering data for each field. It was decided that the <Enter> key **not** be required, as it added to the number of keystrokes an operator must key. During training use of this feature was emphasized.

[2] Can force out-of-range? Whether or not the keyer could force an out-of-range value to be entered. If not all variable definitions were up-to-date in the dictionary, then the Keyer would be allowed to enter the value shown on the questionnaire. Traditionally the most difficult code lists to maintain are location, occupation, and industry codes. Since most code lists were complete, Keyers were not allowed to force a value.

[3] Enter operator ID. If this was selected, the Keyer had to enter a non-blank value as their identification number before the system would allow them to begin entry. This option was to be selected, as its Operator Identification numbers would be assigned, and they should use these during data entry.

Miscellaneous Considerations

In keying estimate, a six-hour shift was envisioned. As entering data was tedious and rather dull, six hours was the maximum shift duration. Keyers were given several breaks during their work day. A half-hour "lunch" break, and two 15-minute breaks before and after this lunch were allowed.

A similar schedule was established for the second shift. To ensure a smooth transition between shifts, the second shift usually started 30 minutes after the first shift ends. This gave first shift Keyers time to wrap up their tasks before second shift Keyers arrive. It also allowed time for the First and Second Shift Coordinators to consult on any problems that have had occurred (hardware, software, etc.).

Control Forms

Several control forms were prepared to facilitate control of the data entry phase. An attempt was made to keep the number of reports to a desirable minimum.

Startup of the Keying Operation

Training

It was agreed that at least a full week of training was needed for the keying staff. Due to attrition, illness, performance rates, etc., the need would arise for personnel to function as both Keyers and Verifying Keyers; therefore, both phases were thoroughly explained and tested to all staff members.

For the training period, copies of some of the actual questionnaires were used and distributed as examples. To ensure a full test of the Keyers' abilities, the ITU chose questionnaires with the following features:

- questionnaires with few questions answered;
- questionnaires with most questions answered;
- questionnaires where coded items had been revised by the Verifying Coder (i.e., both the original Coder's choice is written, as well as the Verifying Coder's response)
- questionnaires with more than 10 people in the household (i.e., 2-3 questionnaires per household)
- questionnaires from special places

In this way the ITU/PD were able to better judge whether the Keyers had learned their duties.

A keying guide was given to each keyer during the training session, which was theirs to keep for the duration of the keying operation. It was a step-by-step guide, showing detailed instructions on how to progress through the questionnaire. Screen snapshots of the data entry system were included where appropriate to facilitate the keyer's understanding of the program.

For the training operation, ITU paired up the keyers. Each would key their data file, then verify their partner's data file. At no time ITU did not allow a keyer verifying their own work.

File Naming Concepts

As mentioned above, one Batch at a time was to be assigned to a Keyer. Therefore, for each Batch the Keyer created a new file. In an effort to keep the file name meaningful, yet short, the following file naming convention was adopted: MMMSSSPPP.dat
Where:

MMM represented the District number.
SSS represented the Township number.
PPP is the Batch number. Again, the original Batch number will be retained.

If a file was later verified, the filename was appended with the letter 'v' to indicate it is a verified file.

File Locations

As far as the individual operator workstations were concerned, folders were maintained, one for each District. Within each of these District folders, one folder each was created for the first and second shift.

All necessary files (CSPro 2.5 data entry application files, etc) were copied onto each workstation.

To prevent loss of data due to file corruption, accidental deletion, etc, three copies of each file were maintained. Therefore, in addition to file left on the keyer's workstation, two copies should be kept on the server. One file was copied to the "working" directory—files there were further processed through the structure and consistency edits, etc. In addition to the above, nightly backups of the system were to be run.

However, each time a data file was modified (keyed, verified, edited), an original version of the file was maintained.

Separate folders were maintained for each District, as this facilitated further processing of the files.

Procedures

Movement of Batches

To begin the Keying operation, the First-Shift Coordinator retrieved the coded Batches for the first-priority District from the Central Storage Area (CSA).

Once checked out of the CSA, the Batches were brought to the keying area's Local Storage Area (LSA). The LSA was in a central location, easily accessible to all Control Clerks. It was used for the following purposes:

- to store the Batches arriving from the CSA, awaiting selection by the Control Clerks;
- to store keyed Batches awaiting verification by other teams; and
- to store verified Batches that are awaiting transport back to the CSA.

Between the two phases of initial entry and verification, the Batches were not to be physically returned to the CSA. However, as the Storage Clerk was registering Batch assignment, the data could be entered into the Tracking System if desired.

Batch Processing Indicator

To facilitate handling of the Batches through the various stages, it was decided that a mark be made on the Batch box to indicate it had completed a specific stage.

Startup of Operation/Assignment of Batches

For the first week of operation, the Keying Teams concentrated on keying only. The verification operations were not to begin until the two shifts had built up a backlog of at least 10 Batches.

Initially, each Control Clerk would select 5 Batches from the LSA, in sequence, and will assign one Batch to each member of the two keying teams under the Clerk's supervision. When assigning a Batch to a Keyer, the Control Clerk registered the transfer on a general check-out log sheet as well as the individual Keyer's log sheet. Batches were listed sequentially on the Forms to facilitate location of a Batch if ever required.

At the end of the each shift, the Control Clerks returned all completed (i.e., verified or not destined for verification) Batches to the CSA. The Control Clerk also reported the status of work completed to the Shift Coordinator.

Method of Data Entry

Upon Batch assignment to the Keyer, the Supervisor created the file for the Batch, using the naming conventions explained in previous section. The Supervisor also entered the geographic identification codes for the Batch in advance (i.e., State/Division, District, Township, Ward/ Village Tract, Urban/Rural and Ward segment and Village code). After that the Keyer would then assume keying responsibilities.

- A keying instruction guide was given to each Keyer during training. In it, the method for processing was clearly explained.

Beginning the Verification Phase

The Verification process started when a suitable number of Batches had been keyed (approximately after the first week of operation). Three fourth of the keying member were to continue to work on keying and one fourth of the keying member were to begin working on 100% verification.

When a Verifier completed verification of a Batch, the Verifier returned the Batch to the Control Clerk. The Control Clerk then performed the tasks outlined.

As the keying operation progressed, the Shift Coordinators monitored the progress of keying relative to verification. If the backlog of Batches awaiting verification started to decrease, then the Verification Team was switched back to keying, until there was a sufficient number of Batches awaiting verification to occupy an entire Keying Team.

When to Begin Sample Verification

Using the log file statistics, the Supervisor reviewed individual Keyer's statistics to determine when their work would switch to a sample basis. It was generally adopted that a Keyer completed at least two weeks of data processing task with sequential batches below the error rate before allowing their work to be reviewed on a sample basis.

Determining an error rate was difficult, as it depended greatly on the legibility of enumerator and coder responses, the accuracy of the Coder's work (i.e., not assigning an invalid code to a question), and the correctness of the CSPro 2.5 dictionary definitions that have been assigned to each item (i.e., the valid range for each variable).

Method of Verification

If the error rate of a verified batch fell below the acceptable level (2%), then the work of that Keyer was to return to 100% verification until four sequential batches had been entered with an acceptable error rate. If the error rate was especially high or consistently above the desired error rate, the Supervisor was to determine the source of the keying error.

If the higher error rate was attributable to poor handwriting, making reading difficult for the keyer(s), then the higher error rate needed to be accepted for the Batch in question. Further, if the poor penmanship was concentrated primarily with the coders' entries, then this had be brought to the attention of the Coding Supervisor for correction.

On the other hand if the higher keying rate was due to keyer inattention or continued difficulty with their assignment, retraining was necessary.

For all of the SDs 100% verification was done to ensure high quality data.

Determining an Acceptable Error Rate

A reasonable error rate had to be determined. It was recognized that the rate will most likely change, being slightly higher at the beginning of the operation, but lower after the operation has been underway a month or so and the staff has learned their tasks reasonably well.

A good starting number was the lowest error rate encountered during the training operation (2%); hopefully it was found that some keyers had error rates of only 1-2 percent. However, at no time the error rate was not to exceed five percent; a good keying operation should have a 2-2½ percent overall correction rate. If a file's error rate does exceeded five percent, the file was discarded and rekeyed.

The error rate was determined as follows. Suppose Person 1 keyed an entire Batch's data. Person 2 verified it. If Person 2 corrected 3% of Person 1's work, then Person 1 was said to have a 3% error rate.

8. SAMPLE DESIGN

8.1 SAMPLING PROCEDURE

A stratified multi-stage sample design was used for the IHLCA survey with 62 districts as the universes (strata). Given their special importance, Yangon City and Mandalay City which are not Districts were treated as separate strata.[19]

The selection plan in each universe was as follows. Townships across all the districts were used as first stage sampling units (FSU). The sampling frame for the first stage was an official list of townships with their estimated number of households in each district.[20] Two townships were selected with probability proportionate to estimated size with replacement. In other words, if a township was selected twice, the selected township was then assigned two times the sample size. An alternative selection method was to make two substrata, one consisting of all wards in the district and the other consisting of all village tracts in the district and selecting randomly a pre-determined number of wards and village tracts from these district frames. This selection was tried and yielded too many townships which were found impracticable, due to logistics and cost considerations.

Due to frame quality problems and other considerations (transport, security) a number of townships were left out of the sampling frame before the draw.[21] The estimated number of households in the excluded 45 townships and from other wards/village tracts represented an estimated number of 343,130 households with a total estimated population of 1,787,708.

The second stage sampling unit (SSU) was the ward (urban) or village tract (rural) within the selected townships. The sampling frame for the second stage was the list of wards and village tracts in the selected townships along with their estimated numbers of households.

All wards and village tracts in each selected township within a particular district were grouped into urban/rural substrata. A predetermined number of wards/village tracts were then drawn with PPES systematic random selection from those township frames.

[19] The two cities are normally treated as separate strata in household surveys conducted by CSO and there is a special local interest in the social and economic conditions of these cities. 7 townships were selected in Yangon City.

[20] The measure of estimated size to be used for all stages of the sampling procedure was the number of households as reported by the Population Department.

[21] The townships that were excluded were identified by the Planning Department.

Table 8.1: List of Townships, Wards and Village Tracts with number of Households by District

Sr	S/D Code	S/D Name	District Code	District Name	No. of TS	Urban		Rural		Total	
						No. of Wards	No. of HHs	No. of VTs	No. of HHs	No. of W/VTs	No. of HHs
1	01	Kachin	01	Putao	1	7	1,345	15	9,026	22	10,371
2			02	Ban Maw	4	31	9,044	171	38,302	202	47,346
3			03	Myitkyina	2	29	21,808	67	20,288	96	42,096
4			04	Moe Nyin	3	21	12,140	86	39,352	107	51,492
		Kachin Total			**10**	**88**	**44,337**	**339**	**106,968**	**427**	**151,305**
5	02	Kayah	02	Loi Kaw	1	13	6,429	13	8,578	26	15,007
		Kayah Total			**1**	**13**	**6,429**	**13**	**8,578**	**26**	**15,007**
6	03	Kayin	01	Pha An	4	25	16,320	254	136,326	279	152,646
7			02	Kaw Ka Yeik	1	11	6,593	53	25,022	64	31,615
8			03	Myawaddy	1	5	3,202	15	5,034	20	8,236
		Kayin Total			**6**	**41**	**26,115**	**322**	**166,382**	**363**	**192,497**
9	04	Chin	01	Pha Lamm	3	16	6,662	173	21,980	189	28,642
10			02	Min Dat	2	9	2,520	109	12,728	118	15,248
		Chin Total			**5**	**25**	**9,182**	**282**	**34,708**	**307**	**43,890**
11	05	Sagaing	01	Ka Lay	3	11	15,244	138	57,430	149	72,674
12			02	Ka Thar	6	31	13,951	232	84,217	263	98,168
13			03	Kham Tee	2	5	3,276	104	23,732	109	27,008
14			04	Sagaing	3	26	16,458	177	73,767	203	90,225
15			05	Tamu	1	12	7,659	21	6,696	33	14,355
16			06	Mon Ywar	8	48	42,680	360	170,026	408	212,706
17			07	Maw Lite	2	4	2,489	68	18,440	72	20,929
18			08	Shwe Bo	8	35	25,522	492	205,566	527	231,088
		Sagaing Total			**33**	**172**	**127,279**	**1,592**	**639,874**	**1,764**	**767,153**
19	06	Tanintharyi	01	Kaw Thaung	2	18	9,408	37	12,642	55	22,050
20			02	Dawei	4	32	16,816	136	61,677	168	78,493
21			03	Myeik	4	27	21,204	87	65,796	114	87,000
		Tanintharyi Total			**10**	**77**	**47,428**	**260**	**140,115**	**337**	**187,543**
22	07	Bago (E)	01	Bago	8	88	73,447	441	245,916	529	319,363
23			02	Taungoo	6	55	25,712	255	160,247	310	185,959
		Bago (E) Total			**14**	**143**	**99,159**	**696**	**406,163**	**839**	**505,322**
24	08	Bago (W)	01	Pyay	6	36	34,249	285	131,267	321	165,516
25			02	Tharyarwaddy	8	63	33,356	399	185,407	462	218,763
		Bago (W) Total			**14**	**99**	**67,605**	**684**	**316,674**	**783**	**384,279**
26	09	Magwe	01	Gan Gaw	3	7	2,742	207	36,221	214	38,963
27			02	Pakokku	5	33	26,509	327	162,557	360	189,066
28			03	Magwe	6	65	53,058	333	189,999	398	243,057
29			04	Minbu	5	21	10,783	297	101,875	318	112,658
30			05	Thayat	6	33	17,786	378	113,444	411	131,230
		Magwe Total			**25**	**159**	**110,878**	**1,542**	**604,096**	**1,701**	**714,974**
31	10	Mandalay	00	Mandalay city	5	86	154,805			86	154,805
32			01	Kyauk Se	4	23	11,847	277	97,958	300	109,805
33			02	Nyaung U	1	16	7,708	75	34,208	91	41,916
34			03	Pyin Oo Lwin	5	26	35,659	216	92,249	242	127,908
35			04	Myin Chan	5	49	28,491	360	169,536	409	198,027
36			05	MDY other TS	2	10	14,117	100	48,654	110	62,771
37			06	Meik Hti Lar	4	31	29,366	259	116,883	290	146,249
38			07	Ya Me Thin	5	29	28,289	322	180,733	351	209,022
		Mandalay Total			**31**	**270**	**310,282**	**1,609**	**740,221**	**1,879**	**1,050,503**
39	11	Mon	01	Maw La Myaing	6	54	63,571	197	137,168	251	200,739
40			02	Tha Hton	4	19	21,714	183	101,537	202	123,251
		Mon Total			**10**	**73**	**85,285**	**380**	**238,705**	**453**	**323,990**
41	12	Rakhine	01	Kyauk Phyu	4	25	8,324	172	75,971	197	84,295
42			02	Sittwe	8	68	41,112	549	170,815	617	211,927
43			03	Maung Taw	2	18	8,577	175	92,125	193	100,702
44			04	Than Dwe	3	15	8,951	147	50,252	162	59,203
		Rakhine Total			**17**	**126**	**66,964**	**1,043**	**389,163**	**1,169**	**456,127**
45	13	Yangon	00	Yangon city	31	505	650,563	32	25,740	537	676,303
46			09	YGN other TS	13	137	86,870	598	257,937	735	344,807
		Yangon Total			**44**	**642**	**737,433**	**630**	**283,677**	**1,272**	**1,021,110**

Sr	S/D Code	S/D Name	District Code	District Name	No. of TS	Urban		Rural		Total	
						No. of Wards	No. of HHs	No. of VTs	No. of HHs	No. of W/VTs	No. of HHs
47	14	Shan (S)	01	Loi Lin	1	8	6,053	19	12,209	27	18,262
48			02	Taunggyi	10	123	56,785	230	168,767	353	225,552
		Shan (S) Total			**11**	**131**	**62,838**	**249**	**180,976**	**380**	**243,814**
49	15	Shan (N)	01	Larshio	4	29	22,773	175	49,898	204	72,671
50			02	Kyauk Me	6	38	17,623	249	91,333	287	108,956
51			03	Mu Se	3	39	16,013	172	45,469	211	61,482
52			04	Lauk Kai	1	9	1,859	37	8,060	46	9,919
53			05	Kun Lon	1	5	770	25	7,407	30	8,177
		Shan (N) Total			**15**	**120**	**59,038**	**658**	**202,167**	**778**	**261,205**
54	16	Shan (E)	01	Maing Sat	2	14	2,375	37	7,806	51	10,181
55			02	Kyain Ton	3	13	11,578	77	30,416	90	41,994
56			03	Maing Phyat	1	3	732	22	2,525	25	3,257
57			04	Tarchilake	1	13	5,144	13	13,313	26	18,457
		Shan (E) Total			**7**	**43**	**19,829**	**149**	**54,060**	**192**	**73,889**
58	17	Ayeyarwaddy	01	Pathein	7	48	50,971	519	231,853	567	282,824
59			02	Phyarpon	4	36	23,382	298	130,689	334	154,071
60			03	Myaung Mya	5	52	24,164	488	218,819	540	242,983
61			04	Maupin	4	43	20,410	235	145,485	278	165,895
62			05	Hinthada	6	48	38,608	371	221,961	419	260,569
		Ayeyarwaddy Total			**26**	**227**	**157,535**	**1,911**	**948,807**	**2,138**	**1,106,342**
Grand Total					**279**	**2,449**	**2,037,616**	**12,359**	**5,461,334**	**14,808**	**7,498,950**

As some wards and village tracts are quite large (in terms of land size in rural areas and to number of households in rural areas), logistically it would have been difficult to interview the 12 households selected randomly within each ward and village tract.

Therefore, for each selected ward or village tract, a frame consisting of the list of all streets or villages was built. From those lists, one street segment (a street in a ward) or village was selected with PPES systematic selection method.

Finally, the fourth stage involved listing all households in the selected street segment/village and selecting 12 households by circular systematic random selection. The number of households per cluster in the final stage had been fixed at 12 households. The stratification in our case was done on administrative regions (districts) and within regions on urban/rural parts of townships which is a standard stratification for large scale household surveys. Although the primary sampling units were townships, we had taken all the districts in Myanmar as strata in order to achieve a good geographical spread across the country and a number of primary sampling units well over hundred fulfilling a basic requirement[22] for a national level survey to obtain statistically credible estimates.

Listing of households in streets segments in urban ward areas and village tracts in rural areas were made prior to the household survey. Moreover, the survey teams of supervisors drew sketch maps of the street segments in wards and villages prior to the data collection activities and selected the sample households in each community. With the predetermined path in the community on the sketch map and the sampling interval calculated using the total number of households and the fixed sample size, a unique systematic sample could then be drawn conforming to the random selection with a known selection probability.

[22] Hans Petersson (2002), An Analysis of Operating Characteristics of Surveys in Developing and Transition Countries: Survey Costs, Design Effects and Non-sampling Errors, Expert Group Meeting: New York

8.2 DETERMINATION OF SAMPLE SIZES

Since the households were selected in clusters, the effect of clustering on the outcome variables was expected. The plan was to compensate for that by multiplying the sample size by the design effect (deft), which depended upon the intra-class correlation within the cluster and the cluster size. In this survey the deft was taken as 2.6 based on precision and cost factor considerations from previous surveys.

The computations were done as follows. The level of precision at the union level was taken as 2 % of the true value of national household consumption expenditure (based on analysis of results from the *Household Income and Expenditure Survey, CSO)* apart from a chance of 1 in 20 and the design effect was taken as 2.6 The total sample size at the national level was thus initially determined at 18888 households.

This overall sample of households was then allocated to the 62 districts proportionately to the square root of the estimated number of households in the given universe. The square root of number of households was taken as size to prevent allocating large number of sample households to districts where large cities or townships were situated. Lauk Kai township in Lauk Kai district and Maing Ton township in Maing Sat district were found to be inaccessible after the sample had been drawn. Lauk Kai district had only one sample township 'Lauk Kai', so dropping Lauk Kai township reduced the total number of districts from 62 to 61 after sample selection. Hence the final total number of sampled households was 18660.

Two sample townships were selected in each district with PPESWR selection method. The district sample was further allocated into the two sample townships proportionately to the square root of the number of households of the sample townships. The township household sample was allocated to urban sub-stratum and rural sub-stratum in the national ratio 1:3. This gave a fairly good representation of urban and rural households in the selected sample. The number of wards or village tracts to be selected was determined by dividing the allocated number of households by 12.

A sub-sample of 12 households was selected from each selected street segment and from each selected village. Systematic random sampling was used in both cases to draw the households, based on the prior independent listing of all households in each selected street segment and village. The list of selected sample townships with number of selected wards /villages in population and sample are given in the following table.

Table 8.2: List of selected sample townships with number of wards/Villages in population and sample by district

Sr. No	Identification Particular						Population				Sample					
	S/D Code	S/D Name	District Code	District Name	TS Code	TS Name	No. of Wards	Ward HHs	No. of VTs	VT HHs	No. of Wards	Ward HHs	No. of VTs	VT HHs	Total WVTs	Total HHs
1	01	Kachin	01	Putao	201	Putao - 1	3	574	7	4,329	2	24	4	48	6	72
2					202	Putao - 2	4	771	8	4,697	2	24	5	60	7	84
3			02	Ban Maw	010	Man Si	4	882	40	9,333	2	24	6	72	8	96
4					160	Ban Maw	10	3,855	48	10,741	2	24	7	84	9	108
5			03	Myitkyina	130	Waing Maw	1	2,880	37	11,814	1	12	4	48	5	60
6					180	Myitkyina	28	18,928	30	8,474	2	24	6	72	8	96
7			04	Moe Nyin	090	Moe Kaung	10	4,458	34	11,320	1	12	4	48	5	60
8					150	Moe Nyin	5	4,814	37	20,619	2	24	6	72	8	96
9	02	Kayah	02	Loi Kaw	041	Loikaw - 1	6	3,636	6	3,662	2	24	4	48	6	72
10					042	Loikaw - 2	7	2,793	7	4,916	2	24	5	60	7	84
11	03	Kayin	01	Pha An	040	Thantaung	5	843	58	11,633	2	24	7	84	9	108
12					070	Pha An	8	11,583	91	70,054	6	72	17	204	23	276
13			02	Kaw Ka Yeik	061	Kaw Ka Yeik - 1	7	4,977	27	12,085	2	24	6	72	8	96
14					062	Kaw Ka Yeik - 2	4	1,616	26	12,937	2	24	5	60	7	84
15			03	Myawaddy	011	Myawaddy - 1	3	1,742	7	2,585	2	24	5	60	7	84
16					012	Myawaddy - 2	2	1,460	8	2,449	2	24	4	48	6	72
17	04	Chin	01	Pha Lamm	030	Hakha	6	2,892	30	4,563	2	24	4	48	6	72
18					090	Tee Tain	4	1,800	55	10,200	2	24	6	72	8	96
19			02	Min Dat	050	Ma Tu Pi	5	1,278	63	7,348	2	24	5	60	7	84
20					080	Min Dat	4	1,242	46	5,380	2	24	4	48	6	72
21	05	Sagaing	01	Ka Lay	070	Ka Lay	5	12,519	41	35,235	3	36	10	120	13	156
22					090	Min Kin	3	662	61	14,948	2	24	6	72	8	96
23			02	Ka Thar	240	Kaw Lin	6	3,132	47	18,544	4	48	11	132	15	180
24					360	Wun Tho	4	2,170	38	9,784	3	36	8	96	11	132
25			03	Kham Tee	040	Home Ma Lin	2	1,203	76	20,157	2	24	7	84	9	108
26					300	Khan Tee	3	2,073	28	3,575	1	12	3	36	4	48
27			04	Sagaing	180	Sagaing	18	11,963	81	38,980	4	48	11	132	15	180
28					320	Mayung	4	1,397	48	17,093	2	24	7	84	9	108
29			05	Tamu	081	Tamu - 1	4	5,552	7	1,945	2	24	5	60	7	84
30					082	Tamu - 2	8	2,107	14	4,751	2	24	4	48	6	72
31			06	Mon Ywar	280	Yin Mar Pin	4	983	42	20,612	3	36	10	120	13	156
32					290	Mon Ywar	24	33,275	57	31,105	6	72	17	204	23	276
33			07	Maw Lite	050	Maw Lite	2	1,315	28	5,888	1	12	4	48	5	60
34					160	Paung Pyin	2	1,174	40	12,552	2	24	6	72	8	96
35			08	Shwe Bo	130	Wet Let	3	1,834	69	34,460	5	60	15	180	20	240
36					250	Kant Ba Lu	5	3,079	86	37,753	5	60	14	168	19	228

Sr. No	Identification Particular						Population				Sample					
	S/D Code	S/D Name	District Code	District Name	TS Code	TS Name	No. of Wards	Ward HHs	No. of VTs	VT HHs	No. of Wards	Ward HHs	No. of VTs	VT HHs	Total WVTs	Total HHs
37	06	Tanintharyi	01	Kaw Thaung	030	Kaw Thaung	13	7,621	18	6,357	2	24	6	72	8	96
38					060	Bote Pyin	5	1,787	19	6,285	1	12	4	48	5	60
39			02	Dawei	080	Yay Phyu	8	1,625	34	15,214	3	36	8	96	11	132
40					100	Laung Lon	4	1,057	41	20,687	3	36	9	108	12	144
41			03	Myeik	010	Mayik	12	16,455	22	18,219	3	36	10	120	13	156
42					040	Pa Law	9	3,543	26	17,274	3	36	8	96	11	132
43	07	Bago (E)	01	Bago	060	Nyaung Lay Pin	11	13,112	49	32,099	6	72	17	204	23	276
44					070	Daik Oo	7	3,281	44	36,259	5	60	16	192	21	252
45			02	Taungoo	080	Yay Thar Shay	6	2,315	52	27,884	4	48	11	132	15	180
46					130	Phyu	10	6,157	61	43,311	5	60	14	168	19	228
47	08	Bago (W)	01	Pyay	010	Thegon	4	1,971	49	21,628	4	48	11	132	15	180
48					030	Shwetaung	3	4,334	48	25,838	4	48	13	156	17	204
49			02	Tharyarwaddy	050	Moe Nyo	5	2,104	37	22,262	5	60	14	168	19	228
50					100	Gyo Bin Gauk	10	4,830	49	20,793	5	60	14	168	19	228
51	09	Magwe	01	Gan Gaw	050	Gan Gaw	4	2,212	71	17,850	2	24	7	84	9	108
52					060	Hti Lin	2	759	71	7,651	2	24	5	60	7	84
53			02	Pakokku	140	Pauk	4	1,187	67	24,159	3	36	10	120	13	156
54					200	Pakokku	15	18,283	55	45,140	5	60	16	192	21	252
55			03	Magwe	090	Nat Mauk	7	2,562	73	34,110	4	48	13	156	17	204
56					180	Magwe	14	16,078	61	47,457	6	72	17	204	23	276
57			04	Minbu	150	Pwint Phyu	4	1,029	52	27,542	3	36	9	108	12	144
58					230	Salin	6	1,837	102	36,879	4	48	11	132	15	180
59			05	Thayat	100	Sin Paung We	3	1,431	46	17,903	4	48	12	144	16	192
60					220	Kan Ma	4	1,244	52	13,195	3	36	10	120	13	156
61	10	Mandalay	00	Mandalay city	050	Chan Mya Thar Si	13	31,896			15	180			15	180
62					290	Mahar Aung Myay	18	35,373			16	192			16	192
63			01	Kyauk Se	100	Sint Kai	4	1,384	48	21,297	3	36	10	120	13	156
64					160	Ta Dar Oo	3	2,068	61	23,056	3	36	10	120	13	156
65			02	Nyaung U	091	Nyaung Oo - 1	12	6,246	60	27,924	3	36	8	96	11	132
66					092	Nyaung Oo - 2	4	1,462	15	6,284	1	12	4	48	5	60
67			03	Pyin Oo Lwin	010	Moe Gote	5	16,072	30	15,559	3	36	10	120	13	156
68					280	Matayar	5	3,432	83	33,709	4	48	11	132	15	180
69			04	Myin Chan	030	Myin Chan	19	15,167	66	32,325	4	48	13	156	17	204
70					200	Kyauk Pa Taung	12	7,030	109	45,617	5	60	14	168	19	228
71			05	MDY other TS	060	Patheingyi	1	2,070	58	27,972	2	24	7	84	9	108
72					180	Amara Pura	9	12,047	42	20,682	3	36	8	96	11	132
73			06	Meik Hti Lar	110	Wun Twin	6	4,785	69	30,463	4	48	10	120	14	168
74					240	Meik Hti Lar	14	17,478	58	32,064	4	48	12	144	16	192

Sr. No	Identification Particular						Population				Sample					
	S/D Code	S/D Name	District Code	District Name	TS Code	TS Name	No. of Wards	Ward HHs	No. of VTs	VT HHs	No. of Wards	Ward HHs	No. of VTs	VT HHs	Total WVTs	Total HHs
75			07	Ya Me Thin	070	Le Way	6	4,015	65	36,032	5	60	14	168	19	228
76					260	Pyaw Bwe	8	4,642	75	32,940	5	60	13	156	18	216
77	11	Mon	01	Maw La Myaing	030	Yay	9	4,476	28	36,173	5	60	15	180	20	240
78					100	Thanphyu Zayat	15	8,572	26	16,279	4	48	12	144	16	192
79			02	Tha Hton	020	Bee Lin	4	3,344	49	22,802	3	36	9	108	12	144
80					060	Paung	4	5,028	50	36,624	4	48	12	144	16	192
81	12	Rakhine	01	Kyauk Phyu	010	Yan Bye	6	1,943	51	18,488	3	36	8	96	11	132
82					050	Kyauk Phyu	10	4,244	54	27,296	3	36	10	120	13	156
83			02	Sittwe	090	Sittwe	32	22,620	30	12,658	5	60	15	180	20	240
84					140	Rathetaung	4	1,254	88	19,835	4	48	12	144	16	192
85			03	Maung Taw	040	Maung Taw	11	5,537	97	54,472	3	36	10	120	13	156
86					100	Buthitaung	7	3,040	78	37,653	3	36	9	108	12	144
87			04	Than Dwe	020	Taung Gote	4	4,125	50	19,193	3	36	8	96	11	132
88					080	Gwa	3	1,360	34	11,388	2	24	6	72	8	96
89	13	Yangon	00	Yangon city	110	Pabandan	11	6,509			4	48			4	48
90					180	Lanmadaw	12	7,678			4	48			4	48
91					250	Thingangyune	38	35,988			9	108			9	108
92					310	North Okkalapa	19	78,823			14	168			14	168
93					350	Tharketa	19	47,162			11	132			11	132
94					430	Mingalar Taungnyunt	20	19,003			7	84			7	84
95					440	Dagon Myothit (N)	26	19,843			7	84			7	84
96			09	YGN other TS	080	Than Lyin	17	11,417	28	19,285	5	60	16	192	21	252
97					270	Taik Kyee	20	11,888	73	32,866	6	72	19	228	25	300
98	14	Shan (S)	01	Loi Lin	171	Loi Lin - 1	4	2,884	11	6,698	2	24	5	60	7	84
99					172	Loi Lin - 2	4	3,169	8	5,511	2	24	4	48	6	72
100			02	Taunggyi	050	Pe Kon	7	2,584	12	8,793	3	36	9	108	12	144
101					220	Taunggyi	37	29,502	25	30,816	7	84	20	240	27	324
102	15	Shan (N)	01	Larshio	120	Tan Yann	10	3,890	49	14,976	2	24	7	84	9	108
103					130	Larshio	12	16,572	76	20,426	3	36	9	108	12	144
104			02	Kyauk Me	110	Thi Paw	11	3,565	67	19,510	3	36	10	120	13	156
105					190	Naung Cho	6	2,316	35	16,942	3	36	9	108	12	144
106			03	Mu Se	030	Kut Kaing	16	5,792	69	20,605	3	36	8	96	11	132
107					210	Nam Kam	4	3,501	44	11,861	2	24	6	72	8	96
108			04	Lauk Kai	021	Lauk Kai - 1(*)	6	1,668	27	6,189						
109					022	Lauk Kai - 2(*)	3	191	10	1,871						
110			05	Kun Lon	091	Kun Lon - 1	3	482	11	3,505	2	24	4	48	6	72
111					092	Kun Lon - 2	2	288	14	3,902	2	24	5	60	7	84

Sr. No	Identification Particular						Population				Sample					
	S/D Code	S/D Name	District Code	District Name	TS Code	TS Name	No. of Wards	Ward HHs	No. of VTs	VT HHs	No. of Wards	Ward HHs	No. of VTs	VT HHs	Total WVTs	Total HHs
112	16	Shan (E)	01	Maing Sat	010	Maing Ton(*)	8	1,405	10	2,973						
113					040	Maing Sat	6	970	27	4,833	2	24	5	60	7	84
114			02	Kyain Ton	050	Kyaing Ton	9	11,214	33	19,596	3	36	9	108	12	144
115					070	Maing Kat	2	299	16	4,701	1	12	4	48	5	60
116			03	Maing Phyat	061	Maing Phyat - 1	2	346	11	1,254	2	24	4	48	6	72
117					062	Maing Phyat - 2	1	386	11	1,271	2	24	5	60	7	84
118			04	Tarchilake	021	Tarchilake - 1	6	4,133	7	9,903	2	24	6	72	8	96
119					022	Tarchilake - 2	7	1,011	6	3,410	1	12	4	48	5	60
120	17	Ayeyarwaddy	01	Pathein	090	Pathein	15	28,087	52	25,471	6	72	18	216	24	288
121					120	Kangyidaunt	7	2,690	73	26,249	5	60	13	156	18	216
122			02	Phyarpon	140	Bogalay	9	6,219	75	37,828	4	48	12	144	16	192
123					190	Kyaik Lat	6	6,148	87	32,095	4	48	11	132	15	180
124			03	Myaung Mya	180	Mawlamyaing Gyun	13	5,787	101	40,824	5	60	14	168	19	228
125					250	Laputta	10	5,325	50	47,092	5	60	15	180	20	240
126			04	Maupin	030	Maupin	12	8,560	76	47,653	5	60	14	168	19	228
127					230	Nyaung Don	10	4,294	44	29,103	4	48	11	132	15	180
128			05	Hinthada	170	Hintada	21	22,148	103	61,077	6	72	18	216	24	288
129					260	Zalun	5	5,190	66	35,201	4	48	12	144	16	192
							1,097	**933,913**	**5,508**	**2,475,592**	**462**	**5,544**	**1,093**	**13,116**	**1,555**	**18,660**

(*) : Lauk Kai and Ming Ton townships were found to be inaccessible after the sample had been drawn leading to the final situation whereby Lauk Kai district was dropped all together but Maing Ton district lost one of its two townships.

8.3 SELECTION PROBABILITIES AND ESTIMATION

For the selection of households from each selected street segment, it was imperative that an exhaustive household listing operation be carried out in each community. Therefore two measures of size for the ward street segments and villages were available:

1) The measure of size according to the sample frame as given by Directorate Of Planning; and;
2) The number of households according to the listing operations by the field supervisors.

These two measures of size were of course somewhat different requiring that sampling weights be adjusted on a per-ward street segment/village basis. This meant that the sample design at the district level was not exactly self-weighted. Sampling weights were to be used to compensate for the differences in selection probabilities.

Selection probabilities and estimation procedure

Notation:

i	subscript for i-th district
ij	subscript for ij-th township
ijk	subscript for ijk-th ward or village tract
ijkl	subscript for ijkl-th ward segment or village
ijklm	subscript for ijklm-th household
y	value of the study variable
ND	Number of districts in a particular SD

Selection Probability of Townships within a given District

$$P_{ij} = 2 * NHH_{ij} / NHH_i \quad (1)$$

Where
2 = the number of townships selected in district i
NHH_{ij} = total number of households in township ij as given by DOP frame
NHH_i = total number of households in district i as given by DOP frame

Case I: Selection Probability of household in wards within a given Township

Selection Probability of ward

$$P_{ijk} = n w_{ij} * NWHH_{ijk} / NWHH_{ij} \quad (2)$$

Where
nw_{ij} = the number of wards selected in township ij
$NWHH_{ijk}$ = total number of households in ward *ijk* as given by DOP frame
$NWHH_{ij}$ = total number of households in urban part of the township *ij* as given by DOP frame

Selection probability of street segment in ward *ijk*

$$P_{ijkl} = XWSHHijkl / XWHH_{ijk} \quad (3)$$

Where

$XWSHH_{ijkl}$ = Total number of households in street segment *ijkl* as given by the listing operation in the field

$XWHH_{ijk}$ = Total number of households in ward *ijk* as given by the listing operation in the field.

Selection probability of household within a street segment

$$P_{ijklm} = 12/XWSHH_{ijkl} \quad (4)$$

Where

$XWSHH_{ijkl}$ = Total number of households in street segment *ijkl* as given by the listing operation in the field.

Overall selection probability of an urban household in township

$$\begin{aligned} POverall\ (Urban\ HH) &= Pijk * P_{ijkl} * P_{ijklm} \\ &= nw_{ij} * NWHH_{ijk}/NWHH_{ij} * XWSHH_{ijkl}/XWHH_{ijk} * 12/XWSHH_{ijkl} \\ &= nw_{ij} * NWHH_{ijk} /NWHH_{ij} * 12 /XWHH_{ijk} \quad (5) \end{aligned}$$

$$POverall\ (Urban\ HH) = 12 * nw_{ij} / NWHH_{ij} \quad (6)$$

To the extent that $NWHH_{ijk} = XWHH_{ijk}$ the sample will then be self-weighting within the urban part of the township.

Case II: Selection Probability of household in village tracts within a given Township

Selection Probability of village tract

$$P_{ijk} = nvt_{ij} * NVTHH_{ijk} / NVTHH_{ij} \quad (2a)$$

Where

nvt_{ij} = the number of village tracts selected in township ij

$NVTHH_{ijk}$ = Total number of households in village tract *ijk* as given by DOP frame

$NVTHH_{ij}$ = Total number of households in the rural part of the township *ij* as given by DOP frame

Selection probability of village in village tract *ijk*

$$P_{ijkl} = XVHHijkl / XVTHH_{ijk} \quad (3a)$$

Where

$XVHH_{ijkl}$ = Total number of households in village *ijkl* as given by the listing operation in the field

$XVTHH_{ijk}$ = Total number of households in village tract *ijk* as given by the listing operation in the field

Selection probability of households within a village

$$P_{ijklm} = 12/XVHH_{ijkl} \quad (4a)$$

Where
$XVHH_{ijkl}$ = Total number of households in village *ijkl* as given by the listing operation in the field.

Overall selection probability of a rural household in township

$$\begin{aligned} POverall\ (Rural\ HH) &= P_{ijk} * P_{ijkl} * P_{ijklm} \\ &= nvt_{ij} * NVTHH_{ijk}/NVTHH_{ij} * XVHH_{ijkl}/XVTHH_{ijk} * 12/XVHH_{ijkl} \\ &= nvt_{ij} * NVTHH_{ijk} /NVTHHij * 12 /XVTHH_{ijk} \quad (5a) \end{aligned}$$

$$POverall\ (Rural\ HH) = 12 * nvt_{ij} / NVTHH_{ij} \quad (6a)$$

To the extent that $NVTHH_{ijk} = XVTHH_{ijk}$ the sample will then be self-weighting within the rural part of the township. The weight for any given household is simply the inverse of POverall (Urban HH) for urban households and POverall (Rural HH) for the rural households. The urban estimate and rural estimate as given by using (5) and (5a) can be combined to give the township estimate which can be inflated using (1) to get the estimate for the district (strata) total. The urban/rural breakdown at the stratum (district) level can be obtained by post stratification technique. The strata estimates can be combined to get the estimate for the state/division total and national total.

9. ESTIMATION PROCESS

9.1 TOTALS, AVERAGES AND PROPORTIONS

A *total* could be estimated from the sample by the following estimator:

$$\hat{Y} = \sum_{i=1}^{ND} \sum_{j=1}^{nts_i} \sum_{k=1}^{nwvt_{ij}} \sum_{m=1}^{nhh_{ijkl}} w_{ijklm} * y_{ijklm} \quad \text{.....} \quad (7)$$

Where

nts_i = The number of townships selected in district i

$nwvt_{ij}$ = The number of selected wards or village tracts in township ij

nhh_{ijkl} = The number of selected and interviewed households in ijklth ward /segment or village

w_{ijklm} = sample weight for selected and interviewed ijklmth household

y_{ijklm} = value of the study variable for ijklmth household

And for an urban household final weight

$$W_{ijklm} = \frac{NHH_i}{nts_i * NHH_{ij}} * \frac{NWHH_{ij}}{nw_{ij} * NWHH_{ijk}} * \frac{XWHH_{ijk}}{nhh_{ijkl}} \quad \text{.....} \quad (8a)$$

And for a rural household final weight

$$W_{ijklm} = \frac{NHH_i}{nts_i * NHH_{ij}} * \frac{NVTHH_{ij}}{nvt_{ij} * NVTHH_{ijk}} * \frac{XVTHH_{ijk}}{nhh_{ijkl}} \quad \text{.....} \quad (8b)$$

A *ratio* is estimated by

$$\hat{R} = \frac{\hat{Y}}{\hat{X}} \quad \text{.....} \quad (9)$$

Where $\hat{X}$ is estimated in the same way as $\hat{Y}$.

An *average* is in effect a ratio of two estimates, an estimate of the total $\hat{Y}$ and an estimate of the total number of units (households, individuals etc). An average can thus be estimated in the same way as a ratio, where the variable x takes the value '1' for all units.

A *proportion* can also be estimated as a ratio. In this case the variable y takes value '1' it the unit belongs to the specific group and the value '0' if it doesn't belong to the group. The variable x takes the value '1' for all units.

9.2 SAMPLING VARIANCES

An estimate of the variance of a ratio is:

$$Var\left(\hat{R}\right)=\frac{1}{\hat{X}^2}\sum_{i}^{ND}\left[\text{var}\left(\hat{Y}_i\right)+\hat{R}^2\sum_{j=1}^{nts_i}\text{var}\left(\hat{X}_i\right)-2\hat{R}\sum\text{cov}\left(\hat{Y}_i,\hat{X}_i\right)\right] \quad \text{.....} \qquad (10)$$

Where

$$y'_{ij}=\sum_{k=1}^{nwvtij}\sum_{m=1}^{nhh_{ijkl}}w_{ijklm}\,y_{ijklm}=\sum_{k=1}^{nwvtij}y'_{ijk}$$

$$x'_{ij}=\sum_{k=1}^{nwvtij}\sum_{m=1}^{nhh_{ijkl}}w_{ijklm}\,x_{ijklm}=\sum_{k=1}^{nwvtij}x'_{ijk}$$

$$y'_i=\sum_{j=1}^{nvsti}y'_{ij}$$

$$x'_i=\sum_{j=1}^{nvsti}x'_{ij}$$

$$\text{var}\left(\hat{Y}\right)=\frac{1-f_i}{nts_i-1}\left[nts_i\sum_{j=1}^{nts_i}y'^{\,2}_{ij}-y'^{2}_i\right]$$

$$\text{var}\left(\hat{X}_i\right)=\frac{1-f_i}{nts_i-1}\left[nts_i\sum_{j=1}^{nts_i}x'^{\,2}_{ij}-x'^{2}_i\right]$$

$$\text{cov}\left(\hat{Y}_i,\hat{X}_i\right)=\frac{1-f_i}{nts_i-1}\left[nts_i\sum_{j=1}^{nts_i}y'_{ij}x'_{ij}-y'_ix'_i\right]$$

The above formulae are for estimating totals, averages, proportions and their sampling variances for a particular state/division. The formulae for estimating union parameters are the same by adding all districts viz. adding up to TD instead of ND.

10. QUALITY ANALYSIS

All survey data are subject to errors arising from a number of sources. However, they can be classified into two broad categories which are: errors in measurements and errors in estimation.

10.1 ERRORS IN MEASUREMENTS

These errors arise from the fact that what is being measured on the units under investigation during the survey can differ from the actual (true) values for those units. They centre on the basic content of the survey: definition of the survey objectives and questions; ability and willingness of the respondent to provide the information requested; the quality of data collection, coding editing, and processing.

10.2 ERRORS IN ESTIMATION

They occur in the process of extrapolation from the particular units enumerated to the entire study population for which estimates or inferences are required. These centre on the process of sample design and implementation, and include errors of coverage, sample selection, sample implementation and non-response, as well as sampling errors and estimation bias.

More specifically, types of errors may be classified as:

A. Errors in measurement

1. Conceptual errors:
   - errors in basic concepts, definitions, and classification;
   - errors in putting them into practice (questionnaire design, interviewers training and instructions);

2. Response errors:
   - response bias;
   - simple response variance
   - correlated response variance

3. Processing errors:
   - editing errors
   - coding errors
   - data entry errors
   - programming errors

B. Errors in estimation

4. Coverage and related errors:
   - omissions
   - incorrect boundaries
   - outdated lists
   - sample selection errors

5. Non-response:
   - refusals
   - inaccessible
   - not-at-homes

6. Sampling errors:
   - sampling variance
   - estimation bias

Moreover, error types 1 to 5 are more commonly known as Non-sampling errors, in contrast to error types 6, Sampling errors.

Errors were found during the IHLCA Survey pertaining to the various types mentioned above and were dealt with appropriately. The most important errors encountered are described in the following sections.

10.3 NON-SAMPLING ERRORS IN THE 2004/2005 IHLCA

As with any household survey, it must be acknowledged that the IHLCA quantitative survey was not immune to potential non-sampling errors, including those due to recall bias such as memory lapses and event omission or displacement.

During the training, some of the supervisors did not grasp well the concept of consumption from home production. As a consequence a number of households reported their total production instead of the quantity of food item consumed from home production, resulting in very high levels of consumption. This aspect was taken into account when correcting for outliers.

Another problem noted is that a number of households stock food products such as cereals (especially rice), edible oil and pulses. When converted in yearly quantities, this resulted in very high quantities of food acquired, especially for these last food items. To verify this problem questions were added to the household questionnaire for round 2 to collect information on the actual household consumption of rice, pulses and beans and edible oils per month. After doing sensitivity analysis, it was decided that correction of outliers permitted to rectify this problem.
Even though units to be used were specified in the household consumption expenditures module (Module 5), answers were given in local units in few townships. This was especially true for Maize in the first round in Chin State where some enumerators used the local unit (Pyis) instead of the unit specified (tickles). This was corrected during data cleaning for the first round. During the training for second round, special attention was given to this issue and no such problem was

identified. Also, the measure unit was modified in second round to Pyi after the enumerators specified that it was the usual unit used by households for maize.
The Module 9 dealing specifically with Finance and Savings included questions on household finance and savings which can be perceived as rather sensitive personal information by some households. Naturally some household respondents were a bit reluctant to answer. Information obtained through Module 9 is still pertinent and most households answered the questions included in the module. As for any household survey, we rely on respondent's answers and cannot judge whether or not the respondent told the truth.

In general, during these survey operations, transport/communication problems might have had an impact on non-sampling errors which cannot be estimated precisely. However the extent of those errors was limited by several field visits of Technical Unit as well as by the Survey Management Team at the field level.

We are confident, even though there might be some non-sampling errors, that results for these SDs are quite reasonable.

10.4 COVERAGE AND RELATED ERRORS

One very important aspect during the listing of the households living in remote isolated and hardly accessible villages was the identification of the proper boundaries. It was noticed that some of the maps and the other available cartographic material, did not convey enough reliable information to allow the supervisors and enumerators to precisely identify and list the households. In some hilly regions of the country, experience has proven the extreme difficulty to access different villages scattered over wide open spaces. Consequently, a number of households and or localities might have been omitted during the listing exercises. This partly explains the differences observed in terms of number of households as given by the IHLCA supervisors and the listing provided by PD.

In addition, the frame that was provided to the survey planning team had some imperfections; a number of wards/village tracts had no households and population numbers and the PD also decided to exclude a number of townships for security and accessibility reasons[23]. The list of those townships and their location are given below. Table 10.1 gives a detailed breakdown of total estimated number of households left out of the survey.

[23] One must thus be careful when interpreting results at SD level for the SDs where townships were excluded.

Table 10.1: Excluded townships with Number of Households and Population (PD)

SDName_E	Stratum_Name	Township	Number of Households	Population
Kachin	Putao	Kaung Lan Phu	2,549	16,808
Kachin	Putao	Machanbaw	1,442	18,129
Kachin	Putao	Naung Mon	1,079	9,985
Kachin	Putao	Swanprabun	632	6,210
Kachin	Myitkyina	Chi Phway	1,879	11,962
Kachin	Myitkyina	Ingyanyan	4,410	24,016
Kachin	Myitkyina	Saw Law	854	7,944
Kachin	Myitkyina	Ta Naing	2,544	16,520
Kayah	Baw La Ke	Baw La Ke	1,072	7,248
Kayah	Baw La Ke	Mae Sal	680	2,908
Kayah	Baw La Ke	Pha Saung	3,314	34,288
Kayah	Loi Kaw	Demawso	10,557	72,164
Kayah	Loi Kaw	Phruso	4,629	27,558
Kayah	Loi Kaw	Shar Daw	713	3,693
Kayin	Kaw Ka Yeik	Kyar Inn Seik Kyee	37,512	241,423
Chin	Pha Lamm	Htantalan	8,508	52,392
Chin	Pha Lamm	Tunzan	4,842	32,031
Chin	Min Dat	Kan Pat Let	2,957	15,540
Chin	Min Dat	Pa Lat Wa	13,775	84,915
Sagaing	Ka Thar	Pinle Bu	16,691	117,486
Sagaing	Kham Tee	Lahe	6,495	48,087
Sagaing	Kham Tee	Lay Shee	2,453	17,957
Sagaing	Kham Tee	Nan Yunn	6,997	40,011
Yangon	Yangon other TS	Kokokyune	159	697
Shan (S)	Loi Lin	Kun Hein	9,494	63,761
Shan (S)	Loi Lin	Kyay Thee	9,326	89,340
Shan (S)	Loi Lin	Le Char	8,294	53,275
Shan (S)	Loi Lin	Maing Kaing	13,474	124,886
Shan (S)	Loi Lin	Maing Shu	7,966	55,596
Shan (S)	Loi Lin	Nam San (S)	12,178	80,453
Shan (S)	Lin Khay	Lin Khay	5,715	37,715
Shan (S)	Lin Khay	Maing Pan	5,473	37,689
Shan (S)	Lin Khay	Mauk Me	3,747	25,542
Shan (S)	Lin Khay	Moe Ne	6,003	35,649
Shan (N)	Larshio	Maing Maw(*)		
Shan (N)	Larshio	Nar Phan(*)		
Shan (N)	Larshio	Pan San (Pan Khan)(*)		
Shan (N)	Larshio	Pan Waing(*)		
Shan (N)	Kyauk Me	Mabain	4,987	31,362
Shan (N)	Kyauk Me	Man Ton	4,947	33,883
Shan (N)	Lauk Kai	Kon Kyan	6,542	41,461
Shan (N)	Kun Lon	Hopan	7,288	39,725
Shan (E)	Maing Sat	Maing Pyin	9,070	49,012
Shan (E)	Kyain Ton	Maing Yann	15,042	76,288
Shan (E)	Maing Phyat	Maing Yaung	5,172	26,386

(*): The number of households and populations for these townships are missing the framr supplied by DOP.

Figure 10.1: Map of Excluded and inaccessible Townships during IHLCA Survey Operations

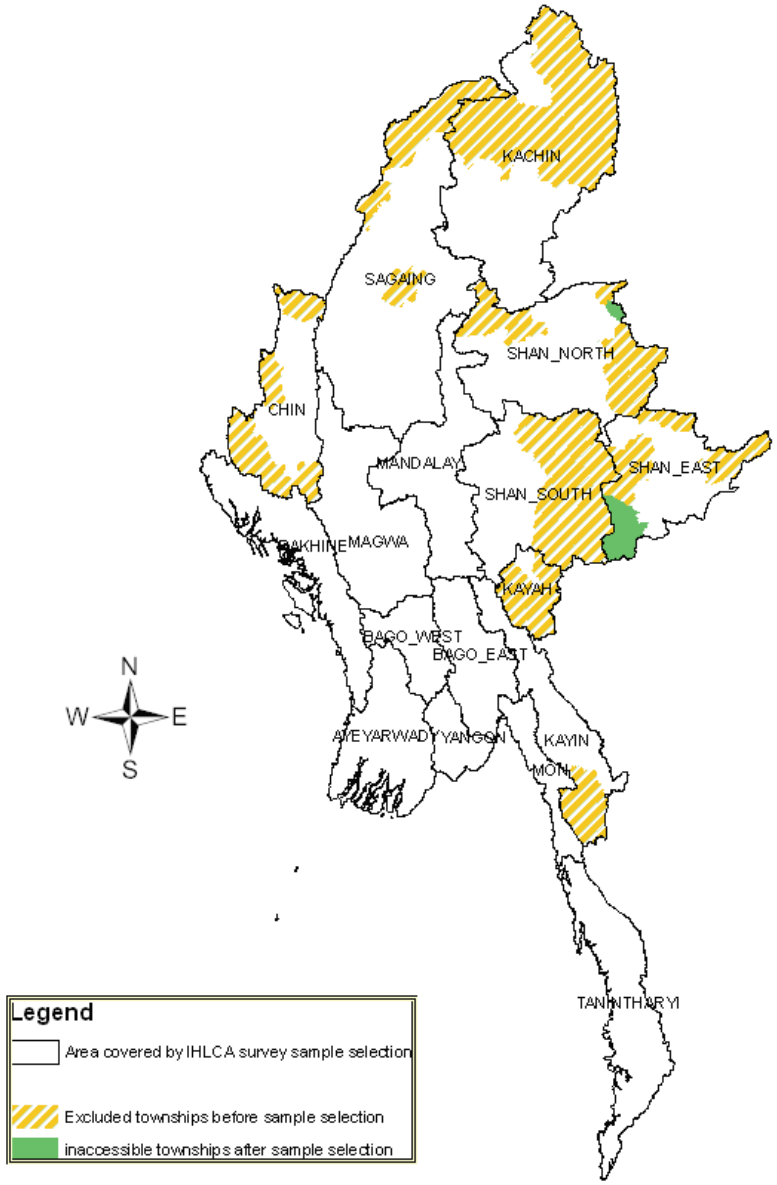


Table 10.2: Estimated Population and Number of Households Left out of the Survey

State/Division	Number Of Households in Excluded Townships	Estimated Population By IHLCA Survey in Excluded Townships	Number Of Households missing from the frame	Estimated Population missing from the frame By IHLCA Survey
Kachin	15,389	80,177	10,578	55,110
Kayah	20,965	109,228		
Kayin	37,512	195,438	4,242	22,103
Chin	30,082	156,727	143	745
Sagaing	32,636	170,034	180	939
Tanintharyi			557	2,899
Bago (E)			3,011	15,690
Bago (W)				
Magwe			1,681	8,760
Mandalay			559	2,913
Mon				
Rakhine				
Yangon	159	828	28,899	150,566
Shan (S)	81,670	425,501	2,269	11,824
Shan (N)	23,764	123,810	18,656	97,197
Shan (E)	29,284	152,570	375	1,956
Ayeyarwaddy			517	2,696
Union	**271,461**	**1,414,312**	**71,669**	**373,396**

The number of households in the excluded townships refer to the number of households in the 45 townships dropped by the Planning department for security and accessibility reasons. The wards and village tracts for which no household or population figures were available were dropped.

Altogether the estimated number of households in the excluded 45 townships and from other wards/village tracts represented an estimated number of 343,130 households with a total estimated population of 1,787,708 that was left out of the survey.

10.5 NON-RESPONSE

It is in this category that one finds all kinds of inaccessible, not-at-home and refusals.

Out of 129 sampled townships originally selected for the sample, 3 had to be dropped for security reasons; those 3 were the two Lauk Kai townships and the one Maing Ton township that we mentioned earlier.

In Round II, 25 households that were interviewed during Round I had moved and therefore were no longer available (out of a total of 18660 households in Round I).

The problem was dealt with in the analysis step by adjusting the weights of the remaining households of the strata to which they belonged for both rounds.

10.6 SAMPLING ERRORS IN THE 2004/2005 IHLCA

The particular households which happened to be selected into the 2004/2005 IHLCA sample depended on chance, the possible outcomes being determined by the procedures specified in the sample design. Consequently, even if the required information on every selected unit is obtained without error, the results from the sample are still subject to a degree of uncertainty due to these chance factors affecting the selection of units. Sampling variance is precisely a measure of this uncertainty.

Information on sampling variance is of crucial importance in proper interpretation of the survey results, and in rational design of future sample surveys.

Of course, sampling variance is just one component of the total error in survey estimates, and not always the most important component. However, it can be easily estimated and is the lower bound of the total error; a survey will be of no use if this component alone becomes too large for the survey results to add useful information with any degree of confidence to what is already known prior to the survey. In addition, survey estimates are typically required not only for the whole population but also separately for many subgroups in the population. In The Union of Myanmar, the basic demands on the sample design of the 2004/2005 IHLCA were to provide good quality estimates for the main survey variables at the national level. Estimates of lower quality were to be provided for the 17 States/Divisions comprising of the country. It has been observed as a general trend that the relative amplitude of sampling error in comparison with other types of survey errors increases as we move from estimates for the total population (the nation) to estimates for individual subgroups (the States/Divisions).

Information on the amplitude of sampling errors is hence essential in deciding the degree of detail with which the survey data may be meaningfully tabulated and analyzed.
Sampling error information is also needed for sample design and evaluation of future surveys. While the design is also determined by a number of other relevant considerations (such as costs, availability of sampling frame, need to control measurement errors, etc.), rational decisions on the choice of sample size, allocation, clustering, stratification, and estimation procedures, can only be made on the basis of detailed knowledge of their effect on the magnitude of sampling errors of statistics obtained from the survey.

In the particular situation of The Union of Myanmar, the computed variances of the 2004/2005 IHLCA, will be used in the planning of future similar undertakings.

Various practical procedures and computer software for computing sampling errors have been devised making it very easy to incorporate information on sampling errors on the presentation of survey results.

The 2004/2005 IHLCA used a two-stage stratified cluster sample design. All estimates produced are therefore subject to sampling errors.

The method used to compute sampling errors in the 2004/2005 IHLCA, is based on the comparison among estimates for independent primary selections within each stratum. The basic assumptions made were:

- The sample selection is independent between strata;
- These primary selections are drawn at random, independently and with replacement.

The term 'primary selection' refers to a PSU and stratum refers to either the rural/small-urban distinction or a region.

Given independent with replacement sampling of clusters, sampling theory can used to estimate the variance of stratum totals, means, and ratios for survey variables.

The formula used in the computation of sampling errors for the 2004/2005 IHLCA are detailed in Chapter 8: Estimation process.

Those formulae were then easily coded into Microsoft Excel worksheet to compute variances for a selected number of variables at both the national and regional levels. Standard errors, coefficients of variation, precision, and confidence intervals were derived.

Standard errors (SE) by definition are obtained by taking the square root of the variances; coefficients of variation (CV) express the standard error as a percentage of the estimate. Precision is simply 1.96 multiplied by the CV.

To illustrate these concepts, the total number of households in The Union of Myanmar for both urban and rural areas had been estimated as 7,455,075. The standard error on this estimate had been computed as 199,586. Then the following statement holds:

- We can be about 95 percent confident that the actual (unknown) number of households is in the range 7,455,075 ± 1.96 X 191,373; i.e. between 7,079,983 and 7,830,167.
- The precision of the estimate of total number of households is around 3 percent.

Coefficients of variation and precision are a convenient way of comparing sampling errors for different estimates. The smaller the precision, the more reliable is the estimate.

In general, the precision levels achieved at the National level are good and acceptable, quite in line with the expectations of the survey planning team. In relation with standard errors, both rounds are quite similar in terms of quality. The same is true for survey results which are quite consistent between the two rounds.

Results of the computations of sampling errors are given in the following Table 10.3(a) to Table 10.3(c) at the national level and Table 10.4(a) to table 10.4(c) at sub national (State/Division) level.

Table 10.3(a): Accuracy of survey Items used in calculating Poverty Profile Key indicators (Round 1 and Round 2 combined) (Survey item values are in adult equivalent, normalized and for a year)(Union)

Item name	Unit	R	SE(R)	CV(R) (%)	95% confidence limits	
					Lower	Upper
Household total expenditure	Kyat	220910.16	6093.62	2.76	208967	232854
Household total food expenditure	Kyat	161347.26	4763.64	2.95	152011	170684
Household non-food expenditure	Kyat	59562.90	2060.31	3.46	55525	63601
Household Rent expenditure	Kyat	17052.79	1668.71	9.79	13782	20323
Household health expenditure	Kyat	11593.54	809.03	7.34	10008	13179
Household education expenditure	Kyat	6269.78	262.33	4.16	5756	6784
Household size	Number	5.21	0.04	0.80	5.13	5.29
Total number of households	Number	7,455,075	191373.39	2.57	7079983	7830167
Total Population	Number	38,815,923	873718.45	2.25	37103435	40528411

Table 10.3(b): Accuracy of survey Items used in calculating Poverty Profile Key indicators (Round 1) (Survey item values are in adult equivalent ,normalized and for a year)(Union)

Item name	Unit	R	SE(R)	CV(R) (%)	95% confidence limits	
					Lower	Upper
Household total expenditure	Kyat	218072.59	5973.90	2.74	206364	229781
Household total food expenditure	Kyat	155399.13	4523.43	2.91	146533	164265
Household non-food expenditure	Kyat	62673.46	2124.47	3.39	58509	66837
Household Rent expenditure	Kyat	17553.43	2124.47	12.10	13389	21717
Household health expenditure	Kyat	13305.10	1457.54	10.95	10448	16162
Household education expenditure	Kyat	9353.91	389.83	4.17	8590	10118
Household size	Number	5.21	0.04	0.81	5.12	5.29
Total number of households	Number	7455075	191373.39	2.57	7079983	7830167
Total Population	Number	38816178	871094.12	2.24	37108834	40523523

Table 10.3(c):Accuracy of survey Items used in calculating Poverty Profile Key indicators (Round 2) (Survey item values are in adult equivalent, normalized and for a year)(Union)

Item name	Unit	R	SE(R)	CV(R) (%)	95% confidence limits	
					Lower	Upper
Household total expenditure	Kyat	223747.73	6366.04	2.85	211270	236225
Household total food expenditure	Kyat	167295.39	5152.58	3.08	157196	177394
Household non-food expenditure	Kyat	56452.35	2015.39	3.57	52502	60403
Household Rent expenditure	Kyat	16552.16	1587.99	9.59	13440	19665
Household health expenditure	Kyat	9881.98	595.38	6.02	8715	11049
Household education expenditure	Kyat	3185.65	190.13	5.97	2813	3558
Household size	Number	5.21	0.04	0.79	5.13	5.29
Total number of households	Number	7455075	191373.39	2.57	7079983	7830167
Total Population	Number	38815668	876785.64	2.26	37097168	40534168

Table 10.4(a): Standard Errors at State/Division level (round 1 and round 2 combined)

SD Name	Household total expenditure		Household total food expenditure		Household non-food expenditure		Household size		Total number of Households		Total Population	
	R	CV(R) (%)	R	CV(R) (%)	R	CV(R) (%)	R	CV(R) (%)	X	CV(X) (%)	Y	CV(Y) (%)
Kachin	197164.65	4.64	138862.47	5.43	58302.19	5.20	5.97	3.07	152179	2.56	908921	4.18
Kayah	201392.49	4.44	149553.52	3.46	51838.97	7.27	5.46	4.67	17448	0.67	95271	4.00
Kayin	248685.00	5.10	196452.80	5.73	52232.20	3.24	5.55	1.26	166740	12.63	925889	13.51
Chin	155987.63	13.81	128888.04	18.71	27099.59	10.43	5.95	4.28	47345	1.23	281546	4.34
Sagaing	217249.46	3.22	170594.28	4.51	46655.18	5.60	5.53	0.97	746637	3.58	4132122	2.94
Tanintharyi	223219.34	7.61	155706.05	6.28	67513.28	11.42	5.81	4.15	184727	4.73	1072583	1.47
Bago(E)	209507.74	5.50	158570.19	5.36	50937.56	5.98	5.20	3.14	436696	7.28	2271403	4.84
Bago(W)	207775.80	4.65	163106.30	4.99	44669.49	8.05	4.16	2.97	413699	3.95	1721608	4.81
Magwe	192722.48	6.22	150051.11	5.45	42671.37	9.74	4.97	1.97	688547	5.78	3419537	7.41
Mandalay	202552.88	4.25	148855.34	3.68	53697.54	6.73	5.25	1.69	1086947	1.50	5706224	2.33
Mon	226402.58	6.78	170977.54	8.29	55425.03	3.64	5.31	2.65	317762	4.96	1687151	3.92
Rakhine	198154.56	4.13	140401.13	4.86	57753.43	3.46	6.00	3.11	466523	6.30	2796909	3.65
Yangon	299902.18	11.65	198081.18	14.40	101820.99	7.23	4.73	1.84	1050076	7.45	4968312	6.86
Shan(S)	206734.57	12.74	144429.04	11.00	62305.53	16.78	5.55	9.71	258206	7.17	1433885	16.88
Shan(N)	183439.75	6.59	140437.98	5.94	43001.78	8.77	5.46	3.46	249197	4.29	1361394	5.07
Shan(E)	181799.35	10.66	134193.54	8.29	47605.81	17.75	5.54	5.51	74,737	2.72	414,348	8.06
Ayeyarwady	217559.38	2.39	156824.92	2.12	60734.46	5.38	5.12	0.77	1097608	1.85	5618821	1.84
Union	220910.16	2.76	161347.26	2.95	59562.90	3.46	5.21	0.80	7,455,075	2.57	38,815,923	2.25

Table 10.4(b): Standard Errors at State/Division level (round 1)

SD Name	Household total expenditure		Household total food expenditure		Household non-food expenditure		Household size		Total number of Households		Total Population	
	R	CV(R) (%)	R	CV(R) (%)	R	CV(R) (%)	R	CV(R) (%)	X	CV(X) (%)	Y	CV(Y) (%)
Kachin	191722.37	3.73	132207.34	4.98	59515.04	4.75	5.99	3.14	152179	2.56	912201	4.36
Kayah	189125.58	5.68	135462.54	3.58	53663.04	10.99	5.45	4.11	17448	0.67	95010	3.44
Kayin	235872.32	9.57	180613.35	11.91	55258.97	2.90	5.55	1.31	166740	12.63	925835	13.65
Chin	158593.61	4.45	128727.32	9.28	29866.28	16.93	5.84	3.23	47345	1.23	276554	3.37
Sagaing	217010.36	3.16	169324.37	4.75	47685.99	5.07	5.55	1.01	746637	3.58	4142429	2.93
Tanintharyi	216588.06	7.48	145696.01	6.03	70892.04	11.69	5.81	4.36	184727	4.73	1073545	1.42
Bago(E)	191059.34	4.99	138888.83	4.51	52170.51	6.33	5.18	3.36	436696	7.28	2261526	4.72
Bago(W)	182997.32	3.11	138072.13	1.63	44925.18	8.36	4.17	3.09	413699	3.95	1723809	4.71
Magwe	186732.78	6.42	141954.52	5.82	44778.26	9.86	4.96	1.90	688547	5.78	3414834	7.35
Mandalay	208421.78	4.39	151060.23	4.08	57361.55	6.08	5.25	1.71	1086947	1.50	5710161	2.32
Mon	208869.62	5.13	154054.89	6.62	54814.73	2.19	5.32	2.30	317762	4.96	1690907	3.70
Rakhine	195177.91	5.41	131004.77	7.05	64173.14	2.99	5.97	3.23	466523	6.30	2786599	3.62
Yangon	306331.73	10.93	199000.83	13.34	107330.89	7.35	4.73	1.80	1050076	7.45	4969315	6.90
Shan(S)	201222.69	14.15	133431.18	13.41	67791.51	15.62	5.54	9.89	258206	7.17	1430344	17.06
Shan(N)	194201.27	8.22	146983.63	8.11	47217.65	9.34	5.45	3.28	249197	4.29	1358143	4.84
Shan(E)	188683.77	10.36	138394.47	7.38	50289.30	18.77	5.54	5.35	74737.20	2.72	413723.61	7.90
Ayeyarwady	215547.76	2.40	151522.84	2.35	64024.92	4.65	5.13	0.87	1097608	1.85	5631242	1.78
Union	218072.59	2.74	155399.128	2.91	62673.46	3.39	5.21	0.81	7455075	2.57	38816178	2.25

Table 10.4(c): Standard Errors at State/Division level (round 2)

SD Name	Household total expenditure		Household total food expenditure		Household non-food expenditure		Household size		Total number of Households		Total Population	
	R	CV(R) (%)	R	CV(R) (%)	R	CV(R) (%)	R	CV(R) (%)	X	CV(X) (%)	Y	CV(Y) (%)
Kachin	202606.94	6.06	145517.60	6.87	57089.34	5.84	5.95	3.04	152179	2.56	905641	4.02
Kayah	213659.40	3.35	163644.49	3.36	50014.91	3.28	5.48	5.22	17448	0.67	95532	4.55
Kayin	261497.68	1.37	212292.24	0.95	49205.43	3.74	5.55	1.23	166740	12.63	925943	13.37
Chin	153381.65	24.50	4585.16	6.27	24332.90	4.40	6.05	5.30	47345	1.23	286538	5.31
Sagaing	217488.57	3.50	171864.20	4.42	45624.37	6.48	5.52	0.95	746637	3.58	4121814	2.95
Tanintharyi	229850.62	7.77	165716.09	6.61	64134.52	11.19	5.80	3.96	184727	4.73	1071620	1.56
Bago(E)	227956.15	5.94	7797.35	2.90	49704.61	5.66	5.22	2.92	436696	7.28	2281280	4.97
Bago(W)	232554.28	7.01	188140.48	7.90	44413.80	7.99	4.16	2.86	413699	3.95	1719407	4.92
Magwe	198712.18	6.26	158147.70	5.41	40564.48	9.98	4.97	2.04	688547	5.78	3424241	7.47
Mandalay	196683.98	4.37	146650.45	3.73	50033.54	7.68	5.25	1.67	1086947	1.50	5702286	2.34
Mon	180970.88	9.93	180970.88	9.93	56035.33	5.06	5.30	3.02	317762	4.96	1683395	4.19
Rakhine	201131.21	2.95	149797.49	3.09	51333.71	4.45	6.02	2.99	466523	6.30	2807219	3.68
Yangon	293472.62	12.48	197161.53	15.55	96311.09	7.14	4.73	1.89	1050076	7.45	4967308	6.82
Shan(S)	212246.45	11.40	155426.89	8.94	56819.56	18.16	5.57	9.54	258206	7.17	1437426	16.71
Shan(N)	172678.23	5.78	133892.32	5.25	38785.91	8.33	5.48	3.66	249197	4.29	1364646	5.31
Shan(E)	174914.93	11.05	129992.61	9.33	44922.32	16.85	5.55	5.68	74,737	2.72	414,973	8.23
Ayeyarwady	219571.00	2.44	162127.00	2.03	57444.00	6.22	5.11	0.71	1097608	1.85	5606399	1.91
Union	223747.73	2.84	167295.40	3.08	56452.35	3.57	5.21	0.79	7455075	2.57	38815668	2.26

10.7 COMPARISONS OF 2004/2005 IHLCA RESULTS WITH OTHER SOURCES

In practice any particular type of the above mentioned errors may be decomposed into two components: (I) variable component of error, and (ii) bias. The variable component of an error arises from chance factors affecting different samples of the survey differently; biases arise from shortcomings in the basic survey design and procedures;

In general, biases are hard to measure and can be assessed only on the basis of comparison with more reliable sources outside the normal survey, or with information obtained by using improved procedures.

The aim in this section is therefore to make some possible comparisons between some items in the 2004/2005 IHLCA and the Myanmar 2003 Census of Agriculture conducted by the Directorate of Agriculture within the Ministry of Agriculture with technical assistance from the Food and Agriculture Organization of the United Nations.

In doing this comparison the following factors should be borne in mind:

- The enumeration of the holdings during the Myanmar 2003 Census took place in 2003;
- The definitions of households and holdings used by both operations were quite similar.

- The definitions of plots used by both operations were different. In the Myanmar Census 2003, a plot was allowed to have more than one crop in the area of the plot. In the IHLCA survey if the plot houses more than one crop at a time, the plot was divided according to the area for each crop.[24].

Once these preliminaries are out of the way, the following tables can be constructed. It is based on the results of the Myanmar 2003 Census and the tables produced from the IHLCA data set.

Table 10.5a: Comparison between IHLCA 2004-2005 and Myanmar 2003 Agricultural Census

	Total Area(acres)	Number of Plots	Number of Agricultural Households	Population of Agricultural Households
IHLCA 2004-2005 Survey	22,576,753	6,876,590	3,259,421	18,227,357
Myanmar 2003 Census of Agriculture	21,550,113	3,453,850	3,453,850	17,464,398

Table 10.5b: Comparison between IHLCA 2004-2005 and Myanmar 2003 Agricultural Census

State/Division	IHLCA 2004-2005		Myanmar 2003 Agricultural Census	
	Area(acres)	Agricultural Households	Area(acres)	Agricultural Households
Kachin	471,667	86,059	385,595	89,424
Kayah	53,512	10,656	56,847	17,123
Kayin	455,671	108,567	97,365	33,095
Chin	39,379	26,686	195,433	65,753
Sagaing	4,118,991	471,084	3,407,925	488,275
Tanintharyi	461,377	79,602	348,832	81,563
Bago (E)	1,615,561	167,040	1,258,427	160,079
Bago (W)	997,021	203,827	1,356,896	248,233
Magwe	2,056,106	378,115	2,450,611	417,345
Mandalay	2,697,381	480,186	3,100,820	466,851
Mon	694,942	113,383	780,825	109,504
Rakhine	679,077	165,597	928,250	241,698
Yangon	783,469	95,585	1,158,172	119,185
Shan (S)	800,589	175,177	507,902	135,598
Shan (N)	625,906	172,013	691,459	174,768
Shan (E)	138,145	50,281	56,354	22,926
Ayeyarwaddy	5,887,959	475,563	4,768,400	582,430
Union	22,576,753	3,259,421	21,550,113	3,453,850

In terms of Holdings areas, number of holdings and population of holdings, the two operations are quite consistent with each other within sampling errors and other variations. The Myanmar 2003 Census of Agriculture has for instance excluded many more households from their operation than the IHLCA 2004-2005 survey. The main differences reside in the number of plots; this was expected because as already pointed out, the definitions of plots used were substantially different and essentially explained the differences observed.

[24] If two crops were produced on one plot at the same time, then the respondent was asked what area was sowed for each crop. In the plot description, the plot was divided in two.