Malawi

Third Integrated Household Survey (IHS3)

2010-2011

Basic Information Document

March 2012

National Statistical Office,
P.O Box 333
Zomba
Malawi
www.nso.malawi.net

ACRONYMS

ADD	Agricultural Development Division
ADMARC	Agricultural Development and Marketing Corporation
AISS	Agricultural Input Subsidy Survey
CAFE	Computer Assisted Field Entry
DFID	Department for International Development
EA	Enumeration Area
FAO	Food and Agriculture Organization of the United Nations
GTZ	German Development Corporation
IFAD	International Fund for Agricultural Development
IHS1	First Integrated Household Survey 1997-1998
IHS2	Second Integrated Household Survey 2004-2005
IHS3	Third Integrated Household Survey 2010-2011
LSMS	Living Standards Measurement Study
LSMS-ISA	LSMS–Integrated Surveys on Agriculture
MCC	Millennium Challenge Corporation
MGDS	Malawi Growth and Development Strategy
MDG	Millennium Development Goal
MK	Malawi Kwacha
NACAL	National Census of Agriculture and Livestock
NSO	National Statistics Office of Malawi
PHC	Population and Housing Census
PSU	Primary Sampling Unit
TA	Traditional Authority
WFP	World Food Programme
WMS	Welfare Monitoring Survey
WB	World Bank

TABLE OF CONTENTS

LIST OF TABLES

LIST OF FIGURES

1.00 INTRODUCTION

The Integrated Household Survey is one of the primary instruments implemented by the Government of Malawi through the National Statistical Office[1] (NSO) roughly every 5 years to monitor and evaluate the changing conditions of Malawian households. The IHS data have, among other insights, provided benchmark poverty and vulnerability indicators to foster evidence-based policy formulation and monitor the progress of meeting the Millennium Development Goals (MDGs) as well as the goals listed as part of the Malawi Growth and Development Strategy (MGDS).

The First Integrated Household Survey (IHS1) was designed by the NSO with technical assistance from the International Food Policy Research Institute (IFPRI) and the World Bank (WB) to provide a complete and integrated data set to better understand target groups of households affected by poverty. The IHS1 was conducted in Malawi from November 1997 through October 1998 and provided for a broad set of applications on policy issues regarding households' behavior and welfare, distribution of income, employment, health and education. In 2003, the Government of Malawi decided to conduct the Second Integrated Household Survey (IHS2)[2] in order to compare the current situation with the situation in 1997-98, and to collect more detailed information in specific areas. The IHS2 was implemented from March 2004 through March 2005.

The purpose of this document is to provide a basic overview of the Third Integrated Household Survey (IHS3) which was implemented in the period of March 2010-March 2011. A sub-sample of IHS3 sample enumeration areas (EAs) were randomly selected prior to the start of the field work. These EAs/households were visited twice during the IHS3 to reduce recall associated with different aspects of agricultural data collection, while the rest of the IHS3 sample were visited once, mirroring the). The selected EAs/households will also be tracked and resurveyed in 2013 as part of the IHS3-Panel Subcomponent. *The IHS3 sample as a whole does not have any links to the IHS2 sample. The IHS3 serves as a baseline for the panel subsample follow-up in 2013.*

Throughout the design and implementation of the IHS3, the NSO received technical assistance as part of the World Bank Living Standards Measurement Study – Integrated Surveys on Agriculture (LSMS-ISA) initiative, whose objective is to provide financial and technical support to governments in sub-Saharan Africa in the design and implementation of nationally-representative multi-topic panel household surveys with a strong focus on agriculture. The financial support to the IHS3 was provided by Government of Malawi (GoM), WB LSMS-ISA project, Norway, Department for International Development (DFID), Irish Aid, Millennium Challenge Corporation (MCC), and German Development Corporation (GTZ).

2.00 SURVEY DESIGN

2.10 SAMPLING DESIGN

The IHS3 sampling frame is based on the listing information and cartography from the 2008 Malawi Population and Housing Census (PHC); includes the three major regions of Malawi, namely North, Center and South; and is stratified into rural and urban strata. The urban strata include the four major urban areas: Lilongwe City, Blantyre City, Mzuzu City, and the Municipality of Zomba. All other areas are considered as rural areas, and each of the 27 districts were considered as a separate sub-stratum as part of the main rural stratum. It was decided to exclude the island district of Likoma from the IHS3 sampling frame, since it only represents about 0.1% of the population of Malawi, and the corresponding cost of enumeration would be relatively high. The sampling frame further excludes the

[1] www.nso.malawi.net
[2] http://go.worldbank.org/JABABM36V0

population living in institutions, such as hospitals, prisons and military barracks. Hence, the IHS3 strata are composed of 31 districts in Malawi.

A stratified two-stage sample design was used for the IHS3.

2.11 FIRST STAGE SELECTION

At the first stage, the primary sampling units (PSUs), which were the census EAs defined for the 2008 PHC. Table 1 shows the distribution of the urban and rural EAs and households across districts in accordance with the 2008 PHC. Given the variability in the number of households per EA, the EAs were selected with probability proportional to size (PPS) within each district at the first sampling stage, where the measure of size was based on the number of households in the 2008 Malawi Census frame.

The first level of stratification of the sampling frame of EAs corresponds to the geographic domains of analysis defined for the IHS3, which are the districts of Malawi. It can be seen in Table 1 that some of the districts only have a few urban EAs. For this reason it was not practical to establish separate urban and rural strata within each district. Instead, the EAs within each district were ordered by type of area as well as geographic codes (administrative area and EA codes) in order to provide implicit stratification by urban and rural areas, and to improve the geographic representativeness of the systematic sample of EAs.

The sample size for a household survey such as the IHS3 is determined by the accuracy required for the survey estimates for each domain, as well as by the logistical, timing and resource constraints. The accuracy of the survey results depends on both the sampling error, which can be measured through variance estimation, and the nonsampling error, which results from all other sources of error, including response and measurement errors as well as coding, keying and processing errors. The sampling error is inversely proportional to the square root of the sample size. On the other hand, the nonsampling error may increase with the sample size, since it is more difficult to control the quality of a larger operation. It is therefore important that the overall sample size be manageable for quality and operational control purposes. This is especially important given the challenge of collecting accurate information on household income and expenditures, as well as crop area and production.

The IHS2 data were used for estimating the sampling errors and design effects for key survey indicators and to measure the efficiency of the sample design in order to improve the sampling methodology for the IHS3. In the IHS2, 12 EAs per stratum were selected. Due to the relatively high confidence intervals for some of those strata, it was decided to select a minimum of 24 sample EAs in each district for the IHS3. It was practical to select a multiple of 12 EAs in each stratum in order to distribute the sample evenly across the 12 months. There are only two districts that were allocated 36 sample EAs and the rest of the districts were allocated 24 sample EAs. In the case of Lilongwe City, 36 sample EAs were selected because of the high design effects in the IHS2 results, and the Lilongwe non-city stratum was allocated 36 sample EAs given that it has the highest proportion of households in Malawi (9.3%). This means that a total of 768 EAs were selected for the IHS3 (as opposed to 564 EAs in the case of the IHS2). Table 2 provides the distribution of IHS3 sample EAs and households.

Table 1: Distribution of EAs and Households by District, Urban/Rural Areas as in the 2008 PHC

	Urban		Rural		Total		
Stratum	**No. EAs**	**No. HHs.**	**No. EAs**	**No. HHs.**	**No. EAs**	**No. HHs.**	**% HHs.**
Chitipa	11	2,924	205	34,856	216	37,780	1.30%
Karonga	37	8,574	370	49,234	407	57,808	2.00%
Nkhata Bay	12	2,276	229	39,993	241	42,269	1.40%
Rumphi	12	3,847	156	32,190	168	36,037	1.20%
Mzimba	20	4,203	825	138,777	845	142,980	4.80%
Likoma	2	299	9	1,721	11	2,020	0.10%
Mzuzu City	102	26,858	0	0	102	26,858	0.90%
Kasungu	29	8,964	486	118,301	515	127,265	4.30%
Nkhotakota	16	5,010	177	57,458	193	62,468	2.10%
Ntchisi	6	1,555	204	45,873	210	47,428	1.60%
Dowa	18	4,479	450	117,405	468	121,884	4.10%
Salima	22	6,089	416	71,442	438	77,531	2.60%
Lilongwe, Rural	0	0	1,173	275,194	1,173	275,194	9.30%
Mchinji	12	3,570	374	93,639	386	97,209	3.30%
Dedza	15	4,489	486	141,389	501	145,878	4.90%
Ntcheu	11	3,306	468	110,485	479	113,791	3.80%
Lilongwe City	458	153,717	0	0	458	153,717	5.20%
Mangochi	25	8,473	614	177,442	639	185,915	6.30%
Machinga	19	5,303	436	109,833	455	115,136	3.90%
Zomba, Rural	0	0	584	142,394	584	142,394	4.80%
Chiradzulu	2	592	334	70,968	336	71,560	2.40%
Blantyre, Rural	0	0	381	80,879	381	80,879	2.70%
Mwanza	9	3,445	80	18,573	89	22,018	0.70%
Thyolo	12	2,405	674	139,634	686	142,039	4.80%
Mulanje	17	3,243	658	124,174	675	127,417	4.30%
Phalombe	3	1,117	316	75,562	319	76,679	2.60%
Chikwawa	16	2,830	380	95,205	396	98,035	3.30%
Nsanje	14	4,227	241	48,373	255	52,600	1.80%
Balaka	17	5,037	275	70,619	292	75,656	2.60%
Neno	3	366	157	25,049	160	25,415	0.90%
Zomba City	79	19,041	0	0	79	19,041	0.60%
Blantyre City	418	154,782	0	0	418	154,782	5.20%
TOTAL	1,417	451,021	11,158	2,506,662	12,575	2,957,683	100.00%

Table 2: Distribution of IHS3 Sample EAs and Households by District, Urban/Rural Areas

	Total		Urban		Rural	
District	**EAs**	**Households**	**EAs**	**Households**	**EAs**	**Households**
NORTHERN REGION	96	1534	10	160	86	1374
Chitipa	24	384	2	32	22	352
Karonga	24	384	4	64	20	320
Nkhata Bay	24	382**	1	16	23	366
Rumphi	24	384	3	48	21	336
CENTRAL REGION	312	4985	70	1116	242	3869
Dedza	24	383*	1	16	23	367
Dowa	24	384	1	16	23	368
Kasungu	24	384	1	16	23	368
Lilongwe City	36	572****	36	572	0	0
Lilongwe, non-city	36	574**	0	0	36	574
Mchinji	24	384	1	16	23	368
Mzimba	24	384	0	0	24	384
Mzuzu City	24	384	24	384	0	0
Nkhotakota	24	384	2	32	22	352
Ntcheu	24	384	1	16	23	368
Ntchisi	24	384	1	16	23	368
Salima	24	384	2	32	22	352
SOUTHERN REGION	360	5752	60	957	300	4795
Balaka	24	384	2	32	22	352
Blantyre City	24	383*	24	383	0	0
Blantyre, non-city	24	383*	0	0	24	383
Chikwawa	24	384	0	0	24	384
Chiradzulu	24	384	1	16	23	368
Machinga	24	384	1	16	23	368
Mangochi	24	383*	1	16	23	367
Mulanje	24	384	0	0	24	384
Mwanza	24	384	4	64	20	320
Neno	24	384	0	0	24	384
Nsanje	24	384	2	32	22	352
Phalombe	24	384	1	16	23	368
Thyolo	24	382**	0	0	24	382
Zomba City	24	382**	24	382	0	0
Zomba, non-city	24	383*	0	0	24	383
TOTAL	768	12271	140	2233	628	10038

Note: */**/**** indicate 1, 2 and 4 households, respectively, out of 16 targeted households could not be recovered in visit 2 (after having interviewed households in visit 1, approximately 3 months prior to visit 2). The details are provided in Section 2.30.

At the first sampling stage, the IHS3 sample EAs were selected within each district systematically with PPS from the ordered list of EAs in the sampling frame. The measure of size for each EA was based on the total number of households listed in the 2008 PHC. The sampling frame of census EAs for each district was sorted by urban/rural classification, administrative area and EA code. Using systematic sampling, this ordering of the sample EAs will provide a high level of geographic implicit stratification. Within each district the following first stage sample selection procedures were used:

a) Cumulate the measures of size (number of households) down the ordered list of EAs within the district. The final cumulated measure of size will be the total number of households in the frame for the district (M_h).

b) To obtain the sampling interval for district h (I_h), divide M_h by the total number of EAs to be selected in district h (n_h) specified in Table 4: $I_h = M_h/n_h$.

c) Select a random number (R_h) between 0 and I_h. The sample EAs in district h will be identified by the following selection numbers: $S_{hi} = R_h + [I_h \times (i - 1)]$, rounded up, where i = 1, 2, ..., n_h

d) The i-th selected EA is the one with a cumulated measure of size closest to S_{hi} but not less than S_{hi}.

Given the systematic selection of EAs with PPS at the first sampling stage, the subsample of EAs for each quarter of the IHS3 data collection were then selected from the full sample systematically with equal probability.

2.12 IHS3–PANEL SUBCOMPONENT

As noted above, a sub-sample of the IHS3 EAs were selected prior to the start of the IHS3 field work, will be resurveyed in 2013 as part of the IHS3–Panel Subcomponent. The Panel Subcomponent consists of 204 IHS3 EAs (3,247 households) and is designed to be representative at national-, regional- and urban/rural-level.

In order to ensure reliable IHS3–Panel Subcomponent results for the urban and rural domains at the national level, the IHS3 sample EAs is post-stratified by urban and rural areas within each region. The allocation of the subsample of EAs and households for the Panel Survey by region takes into account the proportional distribution of the households presented earlier, while ensuring a minimum sample size for each region. 48 sample EAs were allocated to the North Region, representing a higher sampling rate for this smallest region. A higher sampling rate is also used for the urban stratum of each region in order to improve the precision of the panel estimates for the urban domain. Table 3 presents the distribution of the IHS3–Panel Subcomponent sample EAs and households by region, urban and rural strata.

Table 3: Distribution of IHS3 – Panel Subcomponent by Region, Urban/Rural Strata

	Total		**Urban**		**Rural**	
Region	**EAs**	**Households**	**EAs**	**Households**	**EAs**	**Households**
North	48	768	12	192	36	576
Centre	72	1,152	18	288	54	864
South	84	1,344	24	384	60	960
TOTAL	204	3,247	54	864	150	2,400

Given that the same number of EAs was selected for the IHS3 in most districts, the first stage probabilities of selection and corresponding weights for the IHS3 sample vary by district. As the IHS3–Panel Subcomponent is designed to provide reliable estimates at the regional level, the variability in weights by district would increase the design effects and sampling errors within each region. In order the improve the sampling efficiency of the IHS –Panel Subcomponent, the differential first stage probabilities of the IHS3 sample EAs by district was taken into account in determining the subsampling probabilities for selecting the EAs within each region, urban and rural stratum.

In examining the probabilities of selection for the IHS3 households by district within each region, it can be seen that the corresponding weights vary by a factor of M_h/n_h (number of households in the frame for district h divided by the number of EA's selected for district h); that is, the sample households in the larger districts have a higher weight. In order to reduce this variability in the weights for the sample households for the IHS3–Panel Subcomponent within each stratum (region by urban/rural), the subsample of EAs within each stratum was selected with probability proportional to the ratio M_h/n_h. Since the IHS3–Panel Subcomponent is based on a subsample of the IHS3, the probabilities of selection are based on the corresponding probabilities for the IHS3 multiplied by the subsampling rate for the IHS3–Panel Subcomponent. This sampling procedure results in an approximately proportional allocation of the sample to the districts within each zone.

2.20 SECOND STAGE SELECTION

Following the selection of IHS3 sample EAs, a listing of households was conducted in each sample EA to provide the sampling frame for the second stage selection of households. A random systematic sampling was used to select 16 primary households and 5 replacement households from the household listing for each sample EA. While the original sample design implied the total household sample size to be 12,288 (768 EAs with 16 households sampled per EA), the field teams were unable to recover 17 households in visit 2 (after having interviewed households in visit 1, approximately 3 months prior to visit 2), and these households were deleted from the database due to limited information availability. The final sample of 12,271 households is able to provide district-level representativeness and a reasonable level of precision for key socioeconomic and agricultural indicators. It should also be noted that in order to reduce the design effects and increase the sampling efficiency, the number of households selected per sample EA was decreased from 20 in the case of IHS2 to 16 for the IHS3. The sample of households in each EA was selected using the following procedures:

a) All the households are assigned a serial number from 1 to M'_{hi}, the total number of households listed in the EA.

b) To obtain the sampling interval for the selection of households within the sample EA (I_{hi}), divide M'_{hi} by 16, and maintain 2 decimal places.

c) Select a random number (R_{hi}) with 2 decimal places, between 0.01 and I_{hi}. The sample households within the sample EA will be identified by the following selection numbers: $S_{hij} = R_{hi} + [I_{hi} \times (j-1)]$, rounded up to the next integer, where j = 1, 2, 3,..., 16

d) The j-th selected household is the one with a serial number equal to S_{hij}.

In addition, during the course of field work it became necessary to select replacement households. Table 4 shows the reasons for replacement of originally selected households.

Table 4: Reason for Original Household Replacement

DISTRICT	Reason for Original Household Replacement						
	Dwelling found but no HH member could be located	Dwelling found but respondent refused	Dwelling found but appears unoccupied	Dwelling found but not a residential building	Dwelling destroyed	Dwelling not found	Other reason (not specified)
NORTHERN REGION	12	2	28	0	3	6	1
Chitipa	2	1	10	0	0	0	0
Karonga	4	0	9	0	3	0	0
Nkhatabay	3	0	3	0	0	4	1
Rumphi	3	1	6	0	0	2	0
CENTRAL REGION	232	2	53	1	6	57	6
Dedza	66	0	1	0	0	1	1
Dowa	3	0	5	0	1	1	0
Kasungu	7	0	13	0	1	4	0
Lilongwe	20	0	7	0	0	6	0
Lilongwe City	39	0	9	0	3	14	0
Mchinji	7	0	6	0	0	5	0
Mzimba	11	0	3	0	0	3	0
Mzuzu City	6	2	5	0	0	0	0
Nkhota kota	5	0	0	0	0	9	0
Ntcheu	3	0	2	0	1	4	0
Ntchisi	9	0	1	1	0	10	0
Salima	56	0	1	0	0	0	5
SOUTHERN REGION	162	10	59	8	7	39	4
Balaka	2	0	2	0	0	5	0
Blantyre City	35	1	3	2	0	14	0
Blanytyre	14	0	3	0	3	1	1
Chikwawa	2	0	3	0	1	0	0
Chiradzulu	11	1	3	0	1	2	0
Machinga	7	1	5	0	1	4	0
Mangochi	13	1	1	0	0	2	0
Mulanje	2	0	9	0	0	1	0
Mwanza	12	4	6	1	0	1	0
Neno	12	0	5	2	0	1	1
Nsanje	2	0	0	0	0	0	0
Phalombe	5	1	4	0	1	1	0
Thyolo	30	0	4	3	0	7	0
Zomba	8	1	4	0	0	0	1
Zomba City	7	0	7	0	0	0	1
TOTAL	406	14	140	9	16	102	11

2.30 FIELD WORK ORGANIZATION

The IHS3 consists of four questionnaire instruments; the household questionnaire, the agriculture questionnaire, the fishery questionnaire and the community questionnaire. While the details on the structure and scope of the questionnaire instruments will be provided in Section 2.3, they are briefly mentioned here since they are relevant for understanding the field work organization.

During the IHS3 field work, the interview structure for the IHS3-panel subsample was different than the counterpart for the rest of the IHS3 sample, designated as the *cross-sectional* subsample.

Similar to the IHS2 set up, the cross-sectional households were visited only *once* during the IHS3. When they were visited, they received the household questionnaire in full, as well as agriculture and fishery questionnaires, if these were applicable. As part of the agriculture questionnaire, the cross-sectional households reported information on the last completed rainy season and the last completed dimba season. Depending on the timing of their interview, the reference rainy season could have been 2008/09 or 2009/10, while the reference dry season could have been 2009 or 2010.[3]

To collect more accurate information on each of the two agricultural seasons in the country, the panel households were subject to two visits, scheduled during the first six months of the field work, meaning all panel households were found and visited in the first quarter of the IHS3.

Visit 1 was in the first quarter of the field work, corresponding to the post-planting period with respect to the 2009/10 rainy season. In this visit, the IHS3-panel farming households reported information on 2009/10 rainy season pre-harvest related matters, including land area, cultivation and input use. Visit 2 was fielded in the second quarter of the field work, approximately 3 months after visit 1, in the post-harvest period with the respect to the 2009/10 rainy season. In this visit, farming households reported (i) information on 2009/10 rainy season production and post-harvest related matters, and (ii) complete information on the 2010 dry season.[4]

In order to collect consumption data in an evenly spread manner across the 12-month period, the work was organized in a way that approximately 64 EAs were subject to consumption data collection each month. To accomplish this in the context of paying two visits to the panel households in the first six months of the field work, it was decided that when the panel households were visited for the first time during the first quarter of the fieldwork, only half of them (Panel Group A) received the household questionnaire in full, and if applicable, the visit 1 components of the agriculture questionnaire and the fishery questionnaire. The rest of the panel subsample (Panel Group B) were administered only the household roster, the filter module for the agriculture questionnaire, and the visit 1 components of the agriculture questionnaire, if applicable, when they were visited for the first time. In the second quarter of the field work, Panel Group B were administered the remaining parts of

[3] Rainy agricultural season covers two calendar years. The start and end dates for the rains vary spatially, happening throughout the period of November-April. By definition, agricultural season is inclusive of harvest; as such rainy agricultural season generally refers to the period of November-May for majority of the country, although earlier/later harvests are possible, depending on the type of crop, rainfall and other location-specific agronomic and climatic conditions.

[4] The panel households that changed residences between the first and second visits were tracked when they were NOT found at their original location for the visit 2 interview. The documentation (instructions & questionnaire) associated with the within-IHS3 tracking of the panel households are being made available for download as part of the IHS3 data and documentation package. The tracking protocols for within-IHS3 movements of panel households do NOT fully reflect the comprehensive tracking protocols that will be utilized as part of the 2013 IHS3-Panel Subcomponent, whose primary focus will be tracking of baseline "individuals" that changed residence between the baseline and follow-up.

the household questionnaire, and the visit 2 components of the agriculture questionnaire and the fishery questionnaire, if applicable, while Panel Group A only received a household roster update and the visit 2 components of the agriculture questionnaire, if applicable.

Figure 1 presents the overview of the IHS3 sample and table 5 summarizes the timing of the questionnaire instruments across cross-sectional and different panel subsamples. The IHS

Figure 1: Overview of IHS3 Sample

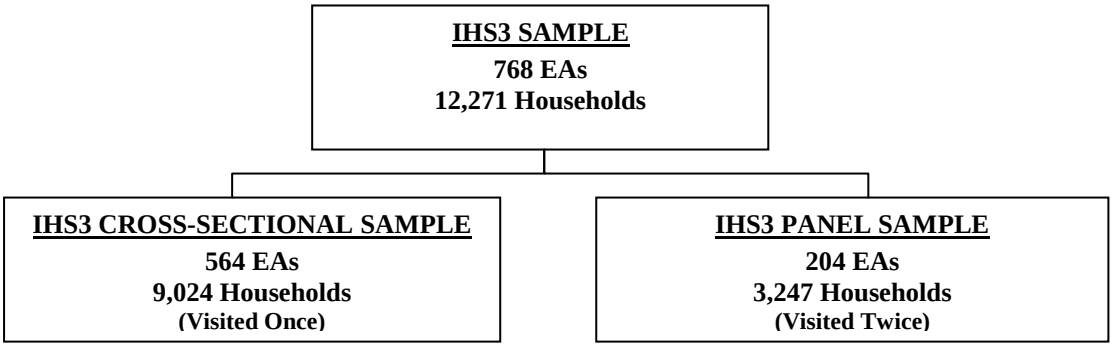


Table 5: Timing of IHS3 Questionnaire Instruments across Cross-Sectional & Panel Subsamples

	Cross-Sectional Sample	**Panel Group A Sample**	**Panel Group B Sample**
VISIT 1 Questionnaires	1.Household Questionnaire "*Full*" 2.*Cross-Sectional Agriculture Questionnaire* 3. Fishery Questionnaire 4. Community Questionnaire	1.Household Questionnaire "*Full*" 2. *Agriculture Questionnaire Visit 1 Portion* 3.Fishery Questionnaire 4.Community Questionnaire	1.Household Roster, Filter Module 2. *Agriculture Questionnaire Visit 1 Portion*
VISIT 2 Questionnaires	NOT APPLICABLE	1.Household Roster Update 2. *Agriculture Questionnaire Visit 2 Portion*	1.Household Questionnaire "*Full*" 2. *Agriculture Questionnaire Visit 2 Portion* 3.Fishery Questionnaire 4.Community Questionnaire

2.40 QUESTIONNAIRE DESIGN

As noted above, the IHS3 consists of four questionnaire instruments; the household questionnaire, the agriculture questionnaire, the fishery questionnaire and the community questionnaire.

The household and community questionnaires are primarily modeled after the IHS2 and earlier IHS1 questionnaires while the agriculture questionnaire has been designed to greatly expand on the content of the IHS2 agricultural modules.

The agriculture questionnaire has been specifically designed to ensuring compliance with international indicators and definitions, and to provide consistency with the National Census of Agriculture and Livestock (NACAL) and other surveys sponsored by the LSMS-ISA project in sub Saharan Africa.[5] Throughout the design of the questionnaire instruments, content and consistency with other relevant surveys in Malawi, including the Welfare Monitoring Survey (WMS), the NACAL, and the Agricultural Input Subsidy Survey (AISS), were considered.

2.41 HOUSEHOLD QUESTIONNAIRE

The Household Questionnaire is a multi-topic survey instrument and is similar to the content and organization of the IHS2. It encompasses economic activities, demographics, welfare and other sectoral information of households and covers a wide range of topics, dealing with the dynamics of poverty (consumption, cash and non-cash income, savings, assets, food security, health and education, vulnerability and social protection). Although the IHS3 household questionnaire covers a wide variety of topics in detail it intentionally excludes in-depth information on topics covered in other surveys that are part of the NSO's statistical plan (such as maternal and child health issues covered at length in the Malawi Demographic and Health Survey).

Table 5 presents a list and description of the IHS3 Household Questionnaire modules. The modules were developed in extensive consultations with a wide set of stakeholders, including the World Bank LSMS Team, Statistics Norway, the UK Department for International Development (DFID), the Food and Agriculture Organization of the United Nations (FAO), the World Food Programme (WFP), the Millennium Challenge Corporation – Malawi Account (MCC-MA), the Department of Forestry, the Department of National Accounts, and the World Fish Center (WFC).

Table 5: Contents of the IHS3 Household Questionnaire

Module	**Description**
Module A:	The survey cover contains the sample weights, information on household location, selected sample group, date of interview and dates of processing. Additionally, this module contains filters for subsequent modules.
Module B: Household Roster	This module contains the roster of individuals living in the household, their gender, age, relationship to the household head, duration away from the household in past 12 months, number of days meals were taken in the household, where born, how long in this community, and information on the location and level of education of parents of every member, including ID's if in the household. For members over 12, information on religious affiliation, marital status and location of spouses is collected and identifies the ID of the spouse/s if a household member.
Module C: Education	The education module is asked of all individuals over 5 years in age and collects information on self-reported reading and writing ability, school attendance, highest class attended and highest qualification achieved, year and age of beginning school. If the individual is presently attending school, information on the type of school, distance, and costs are collected.

[5] www.worldbank.org/lsms-isa

Module	Description
Module D: Health	The health module is administered to all individuals and collects information on: Illness or injury in the past 2 weeks, diagnosis source, and action taken, and disruption to normal activity; Health spending over the past 4 weeks; Hospitalization or stay in a traditional healer's in the last 12 months. For individuals over 5 years in age: Information on chronic difficulties and disruption to normal activities; chronic illness and diagnosis source. For women aged 12 to 49 years of age information on births in the last 24 months, prenatal health clinic visits and where baby born and who assisted at birth for last-born child is collected.
Module E: Time Use and Labour	The module is administered to all individuals 5 years or older. This modules collects information on hours spent yesterday collecting water and wood; hours spent in the last 7 days spent on agriculture and non-agriculture activities; type of primary and secondary work, employers and wages over the last 12 months; participation in unpaid apprenticeships, casual (ganyu) labour, and other unpaid labour over the last 12 months.
Module F: Housing	This module on housing is administered to the household head. It collects information on the characteristics of the dwelling, household fuel use, availability of electricity, telephone and water, toilet and rubbish facilities, and mosquito net use.
Module G: Consumption of food Over past one week	This module collects information on all food consumed by the household in the past 7 days: in total and then classified as purchased (with price), own-production, or gift and other sources. Additionally, this module collects information on number of days aggregated food categories were consumed by the household and number of days and meals taken in the household by children and adults.
Module H: Food Security	This module collects information on number of meals taken by adults and children in the household and restricting food intake in the past 7 days.
Module I: Non-food Expenditures	This module collects expenditures on non-food items over the past week and the past 1 month.
Module J: Non-Food Expenditures (3 months)	This module collects expenditures on non-food items over the past 3 months.
Module K: Non-Food Expenditures (12 months)	This module collects expenditures on non-food items over the past 12 month.
Module L: Durable Goods	This module collects information on ownership, quantity owned, age of items, current preserved market value, purchases of items in the last 12 months, and cost of items in the last 12 months for durable goods.
Module M: Farm Implements, Machinery and Structures	This module collects information on household ownership, quantity owned, age of items, perceived market value, item purchases in last 12 months, quantity purchased in last 12 months, asset value, use, and items rental and rental cost, for farm implements and structures. Additionally, for farm structure information is collected on construction and cost of construction over the past 12 months.

Module	Description
Module N: Household Enterprises	This module collects information on non-agricultural family enterprises or trading business, specifically who manages/owns the enterprise, employees, enterprise operation periods, start-up capital and source, customers, business trends, sales revenue, expenditures, and profits.
Module O: Children Living Elsewhere	This module collects information on the age, sex, education, length away from household, current locations, activity status and occupation of children living outside the household. Additional information is collected on remittances to the household from children living outside the household.
Module P: Other Income	This module collects information on household income from interest, pensions, rentals, or other income over the past 12 months.
Module Q: Gifts Given Out	This module collects information on cash, food, or other in-kind items given by the household, in the past 12 months.
Module R: Social Safety Nets	This module collects information on receipts and value of social safety nets including, cash, food, or other aid from programs. Additionally this module collects information on household member recipients of the aid, decision making for aid received, and number of months aid was received.
Module S: Credit	This module collects information on household credit, specifically where the credit was acquired, who is responsible for the loan, reason credit was obtained, how much was borrowed, timing of loan, and expected pay-off. Additionally this module collect information on attempted credit and reasons for being turned down.
Module T: Subjective Assessment of Well-being	This module collects information on the respondent's assessment of his/her family's situation regarding food consumption, housing, clothing, health care, financial level, and income level. Additionally this module asks the head of household about the number of changes of clothes owned, and bedding type.
Module U: Shocks & Coping Strategies	This module collects information on shocks on the household in the past 12 months such as crop disease, theft of livestock, death of family members. Respondents are asked to rank the 3 most severe shocks and report on the impact of the shock on income, assets, food production, food stocks and food purchases as well as what was done by the household in response to the shock.
Module V: Child Anthropometry	This module collects weight and height/length measurements as well as observed oedema for children of age 6-60 months. Additionally, this module collects information on child participation in nutrition programs and under five clinics.
Module W: Deaths in the Household	This module records information on family members who have died in the past two years and collects information on the type of work previously performed, age at death, and previous illness of deceased household member. It also collects information on the diagnosis source of cause of death and assets lost due to the death.
Module X: Filter Questions for Agriculture & Fishery	This module contains filter questions on the presence of agricultural, livestock and or fisheries in the household.

2.42 AGRICULTURE QUESTIONNAIRE

All IHS3 households that are identified as being involved in agricultural or livestock activities were administered the agriculture questionnaire. The modules are expanding on the agricultural content of the IHS2, AISS, and other regional agricultural surveys, while remaining consistent with the NACAL topical coverage and methodology. The development of the agriculture questionnaire was done with input from the aforementioned stakeholders who provided input on the household questionnaire as well as outside researchers involved in research and policy discussions pertaining to the Malawian agriculture. The agriculture questionnaire allows, among other things, for extensive agricultural productivity analysis through the diligent estimation of land areas, both owned and cultivated, labor and non-labor input use and expenditures, and production figures for main crops, and livestock. Although one of the major foci of the agriculture data collection effort was to produce smallholder production estimates for major crops, it is also possible to disaggregate the data by gender and main geographical regions. Table 6 presents the list of the timing of the IHS3 agriculture questionnaire modules. Table 7 includes the descriptions of the modules. As previously stated, the IHS3-panel households supply information on the 2009/10 rainy season and 2010 dry season (with the exception of a single short module on the 2008/09 rainy season). The IHS3 cross-sectional households supply information the last completed rainy season (2008/2009 or 2009/2010) and the last completed dry season (2009 or 2010) depending on the timing of their interview.

Table 6: Timing of IHS3 Agriculture Questionnaire Modules

Module	Cross-Sectional	Panel Visit* 1	Panel Visit* 2
B. 2008/2009 (Rainy Season)		X	
C. Plot Roster (Rainy Season)	X	X	
D. Plot Details (Rainy Season)	X	/	/
E. Coupon Use (Rainy Season)	X	X	
F. Other Inputs (Rainy Season)	X	X	
G. Crops (Rainy Season)	X	/	/
H. Seeds (Rainy Season)	X	X	
I. Sales/Storage (Rainy Season)	X		X
J. Plot Roster (Dry Season)	X		X
K. Plot Details (Dry Season)	X		X

Module	Cross-Sectional	Panel Visit* 1	Panel Visit* 2
L. Other Inputs (Dry Season)	X		X
M. Crops (Dry Season)	X		X
N. Seeds (Dry Season)	X		X
O. Sales/Storage (Dry Season)	X		X
P. Tree/Permanent Tree Crop Production (Last 12 Mon.)	X		X
Q. Tree/Permanent Tree Crop Sales/Storage (Last 12 Mon.)	X		X
R. Livestock	X	X	
S. Livestock Products	X	X	
T. Access to Extension Services	X		X
Network Roster	X	X	X

*The first set of visits to the panel households was undertaken in the post-planting/pre-harvest period of the 2009/10 agricultural season, starting in late March/April. 2010, over approximately 3 months. The second set of visits to the panel households was undertaken in the post-harvest period of the aforementioned agricultural season, starting in July 2010, again over approximately 3 months.

/ Most questions were administered in visit 1 and select harvest-related questions were administered in visit 2.

Table 7: Contents of the IHS3 Agriculture Questionnaire

Module	**Description**
Module B: 2008/2009 (Rainy Season)	This module is administered only to Panel Households to collect information on any crops planted during the 2008/2009 rainy season and gathers details on the area of plantation, pre-harvest losses, quantity and value of crops harvested/ sold, alternative uses and storage practices. The inclusion of the module is driven by the need to more accurately gauge the extent of post-harvest losses pertaining to the 2008/09 rainy season. The panel households otherwise report information on the 2009/10 rainy season for the remainder of the questionnaire.
Module C: Plot Roster (Rainy Season)	This module contains the information of agriculture plots owned and/or cultivated by household members during the reference rainy season. More specifically, it reports the location and description and area of the plot.
Module D: Plot Details (Rainy Season)	This module collects detailed plot information (ownership status of the land, agricultural practices and plot characteristics, use of organic and inorganic fertilizers, use of pesticides/herbicides, and labor inputs) for the reference rainy season.
Module E: Coupon Use (Rainy Season)	This module collects information about quantity/type of input coupons/vouchers and how they were obtained and used during the reference rainy season.
Module F: Other Inputs (Rainy Season)	This module collects information about the inputs used for cultivation and their costs, specifically pesticides and herbicides, during the reference rainy season. It elicits information on the main sources of the input purchased without coupons/vouchers, any input received for free, any input that was left over from a previous season and own-produced organic fertilizer.
Module G: Crops (Rainy Season)	This module collects information about the crops grown by the household on each plot during the reference rainy season such as the type of crop stand, area of plantation, the amount of seed used and when it was planted, and the details of the harvest.
Module H: Seeds (Rainy Season)	This module collects information about seeds and how they were acquired during the rainy season. More specifically, it elicits information on the main sources of the seed purchased without coupons/vouchers, any seed received for free, and any seed that was left over from a previous season.
Module I: Sales/Storage (Rainy Season)	This module collects information on the quantity and value of crops sold, the main buyers/outlet, alternative uses, post-harvest losses and storage during the reference rainy season.
Module J: Plot Roster (Dry Season)	This module contains the information of agriculture plots owned and/or cultivated by household members during the reference dry (dimba) season. More specifically, it reports the location and description and area of the plot.

Module	Description
Module K: Plot Details (Dry Season)	This module collects detailed plot information (ownership status of the land, agricultural practices and plot characteristics, use of organic and inorganic fertilizers, use of pesticides/herbicides, and labor inputs) for the reference dry (dimba) season.
Module L: Other Inputs (Dry Season)	This module collects information about the inputs used for cultivation and their costs, specifically pesticides and herbicides, during the reference dry (dimba) season. More specifically, it elicits information on the main sources of the input purchased without coupons/vouchers, any input received for free, any input that was left over from a previous season and own-produced organic fertilizer.
Module M: Crops (Dry Season)	This module collects information about the crops grown by the household on each plot during the reference dry (dimba) such as the type of crop stand, area of plantation, the amount of seed used and when it was planted, and the details of the harvest.
Module N: Seeds (Dry Season)	This module collects information about seeds and how they were acquired during the reference dry (dimba) season. More specifically, it elicits information on the main sources of the seed purchased without coupons/vouchers, any seed received for free, and any seed that was left over from a previous season.
Module O: Sales Storage (Dry Season)	This module collects information on the quantity and value of crops sold, the main buyers/outlet, alternative uses, post-harvest losses and storage during the reference dry (dimba) season.
Module P: Tree / Permanent Crop Production (Last 12 Months)	This module collects information on crop-stand, area planted, number of trees owned, pre-harvest losses, and amount harvested.
Module Q: Tree/Permanent Crop Sales/Storage (Last 12 Months)	This module collects information on amount sold (value of sales) / given out / used as input for crop by-product / lost / currently in storage.
Module R: Livestock	This module collects information on number currently owned, owners and responsible individuals in the household, inflow/outflow of livestock through various means in the past twelve months, vaccinations, expenditures in the past twelve months on various items
Module S: Livestock Products	This module collects information on amount produced, sales and expenditures.
Module T: Access to Extension Services	This module collects information on where households receive advice/ information on agriculture and how useful the source has been during the last 12 months.
Network Roster	This module collects information on the characteristics of the networks of households such as friends, relatives, employers, government agencies and private institutions.

2.43 FISHERY QUESTIONNAIRE

The design of the IHS3 fishery questionnaire was informed by the design and piloting of a fishery questionnaire by the World Fish Center (WFC), which was supported by the LSMS-ISA project for the purpose of assembling a fishery questionnaire that could be integrated into multi-topic household-surveys. The WFC piloted the draft instrument in November 2009 in the Lower Shire region, and the NSO team considered the revised draft in designing the IHS3 fishery questionnaire. Table 8 presents the list and description of the fishery questionnaire modules.

Table 8: Contents of the IHS3 Fishery Questionnaire

Module	**Description**
Module B: Fisheries Calendar	This module asks the respondent to indicate the status of fishing months for the community as either "high", "low", or "no fishing" months.
Module C & G: Fisheries Labour (Last High Season) (Last Low Season)	This module elicits information on household member's time allocation to fishing. Specifically, this module asks household members to record the number of weeks, days per week, and hours per day that they allocated to full-time fishing, part-time fishing, fish processing and or fish trading during the last high / low season respectively.
Module D & H: Fisheries Input (Last High Season) (Last Low Season)	This module collects information on inputs to fishing, including ownership, purchases, and rentals. Additionally, this module collects information on use of boats and engines, hired labor, and other inputs in high and low fishing season respectively.
Module E & I: Fisheries Output (Last High Season) (Last Low Season)	This module collects output from fishing activities and owned fishing equipment, including: total catch, sales, consumption, and revenue generated from renting fishing equipment out for high and low season respectively.
Module F & J: Fish Trading (Last High Season) (Last Low Season)	This module elicits information on purchases and sales associated with the household's fish trading activities, high and low season respectively, for the 5 main species of fish.

2.44 COMMUNITY QUESTIONNAIRE

The content of the IHS3 Community Questionnaire follows the content of the IHS2 Community Questionnaire and is intended to collect information that is common to all households in a given area. During the survey a "community" was defined as the village or urban location surrounding the enumeration area selected for inclusion in the sample and which most residents recognize as being their community. The questionnaire was administered to a group of several knowledgeable residents such as the village headman, the headmaster of the local school, the agricultural field assistant, religious leaders, local merchants, health workers and long-term knowledgeable residents. The instrument gathers information on a range of community characteristics, including religious and ethnic background, physical infrastructure, access to public services, economic activities, communal resource management, organization and governance, investment projects, and local retail price information for essential goods and services. Table 9 presents the list and description of the community questionnaire modules.

Table 9: Contents of the IHS3 Community Questionnaire

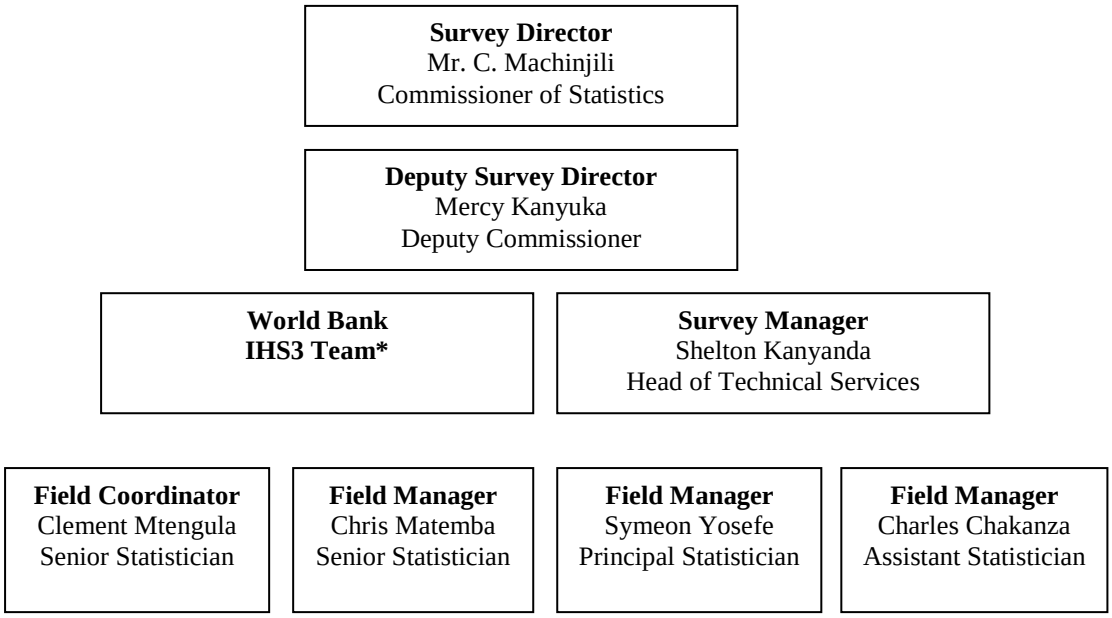
Module	**Description**
Module CB: Roster of Informants	This module lists the group of informants and their age, sex, positions in community, length of residence in the community, education and language spoken.
Module CC: Basic Information	This module collects basic characteristics of the community, including: population, number of households, major religions, languages spoken, common marriage types, land characteristics and use, number of registered voters and ability to address resource priorities.
Module CD: Access to basic Services	This module collects information on the community access to and characteristics of transportation networks, markets, ADMARC market, post office, telephone services, churches, schools, health services, and banking services.
Module CE: Economic Activities	This module collects basic information on the primary work activities of community members.
Module CF: Agriculture	This module collects basic information on the prevalence and type of agricultural activities and agricultural facilities.
Module CG: Changes	This module asks respondents to asses changes in the community over the last 5 years as either: Much Worse, Worse, About the Same, Better, and Much Better, or Not Applicable, for access to certain serves and products, such as: transportation, basic personal care items, electricity, fuel, health care, clean water, disposal facilities, agricultural services, security, and generally: violence, good governance, community and the number of poor households. Additionally, respondent groups are asked to list the major events in the community and whether they made people better or worse off.
Module CH: Community needs, Actions & Achievements	This module asks the respondent group to report on any needs (road and bridge maintenance/construction, school and health center improvement, piped water/boreholes/wells and maize mills construction, orphanage construction, public transportation and law enforcement improvement and the addition of agricultural/fishery/livestock extension services) that community members have expressed during the last 5 years. It then details whether or not the community members took any action to meet these needs and how they went about doing so.
Module CI: Communal Resource Management	This module collects information on communal resources owned by the community and how the rules of access are determined. It further elicits information about how compliance with these rules is enforced among both community members and outsiders.
Module CJ: Communal Organization	This module asks the informed respondent group to report on the presence in the community of listed organizations. It further collects information on the number of specific groups, meeting frequency, size of membership, female and younger adult participation.
Module CK: Prices	The module collects availability and prices as reported by the informants for 51 basic items.

3.00 ORGANIZATION OF THE SURVEY

3.10 SURVEY MANAGEMENT

The IHS3 was executed by the National Statistical Office, under the direction of the Commissioner for Statistics and the IHS3 Management Team. The management team was responsible for questionnaire design, recruitment of personnel, training of personnel, and implementation of the survey. Figure 2 outlines the composition of the IHS3 Management Team.

Figure 2: IHS3 Management Team



Note: * Composed of Ms. Kathleen Beegle, Senior Economist; Mr. Talip Kilic, Research Economist; Mr. Jonathan Kastelic, IHS3 Resident Advisor.

In addition, the IHS3 Technical Working Group (TWG) was established to oversee the technical aspects of the project, including the review of questionnaires following full stakeholder consultations and the sample design. The TWG met three times prior to the start of the field work and then on a quarterly basis throughout the field work. The participants of the IHS3 TWG are representatives from the NSO, Ministry of Economic Planning and Development (MoEPD), the Ministry of Agriculture and Food Security, Ministry of Education, Ministry of Health, Department of Forestry, World Bank, Statistics Norway, DFID, Irish Aid, GTZ, MCC-Malawi Account, International Food Policy Research Institute (IFPRI), and WorldFish Center.

3.20 TRAINING OF FIELD STAFF

Field staff for the IHS3 was selected through a series of exams held throughout the country. Advertisements were placed in the national newspapers advertising posts for enumerators and data entry clerks. Interested candidates took a test to determine their qualifications. Those who passed the test were invited to the training.

Training instruction was given to the field staff by the IHS3 Management Team with help from World Bank LSMS-ISA team members. The training consisted of classroom instruction on the contents of the questionnaire, concepts and definitions, interview techniques and methods, and field practices in performing actual interviews to ensure that Enumerators fully understood the questionnaire. Training instructions are detailed in the Enumerator and Field Supervisor's Manuals.

At the end of the training session, trainees were assessed based on tests given during the training process and evaluations by the supervisory personnel. The 16 best candidates were selected to be Field Supervisors, and 64 candidates were selected to be Field Enumerators. In addition, 16 Data Entry candidates were selected to join the field based mobile teams to process questionnaires on a rolling basis. In addition to the content training, data entry clerks received additional training in IHS3 data entry applications, protocols and data management and data back-ups.

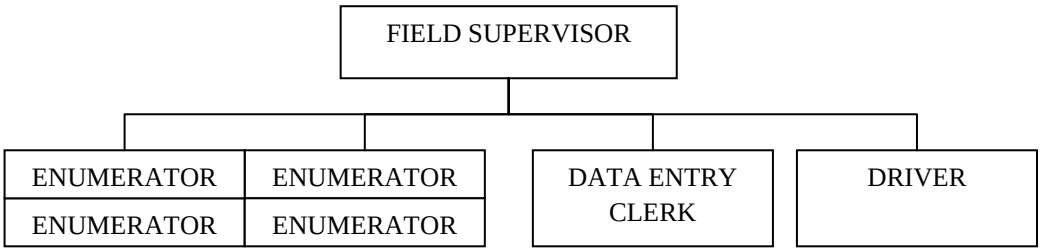
3.30 PRE- ENUMERATION LISTING

Pre-enumeration listings were initiated before the start of each quarter of field work. Mobile listing teams equipped with printed maps of select EAs were used to record all dwellings and heads of households in select EAs. Household counts per each listed enumeration areas were relayed to NSO IHS3 Management and recorded. Where applicable, listing forms and maps were transferred directly to field teams after the completion of district quarterly listing activities.

3.40 FIELD TEAMS

Fieldwork for the IHS3 began in March 2010 and was administered simultaneously throughout the country until March 2011. 16 field-based mobile teams consisting of 1 supervisor, 4 enumerators, 1 data entry clerk and 1 driver were assigned to cover specific districts. Figure 3 outlines the composition of each field team. Each team selected a centrally located base in their respective assigned areas as a base of field operations to be used over the year long field work period.

Figure 3: Composition of an IHS3 Field Team



Each team supervisor received monthly enumeration assignment schedules on a quarterly basis throughout the field work. Monthly enumeration assignments were further accompanied by (1) enumeration area maps, (2) completed listing forms, (3) color coded, adequate set of questionnaire instruments to be administered in accordance with a given EA's cross-sectional vs. Panel A vs. Panel B status, and (4) the list of selected as well as replacement households to be interviewed in each EA.

3.41 FIELD SUPERVISORS

IHS3 field based supervisors were responsible for managing the daily operations of their respective field based mobile team. Primary responsibilities included: (1) liaising with IHS3 management on schedules, field operation status, equipment status and needs, and special issues, (2) planning daily field operation schedules including coverage and transportation, (3) liaise with local authorities before commencing interview activities, (4) reviewing incoming questionnaires for completion and accuracy, (5) managing data entry schedule for completed questionnaires, (6) reviewing computer assisted field entry (CAFE) reports for field entered questionnaires, assigning physical questionnaire reviews, and authorizing review/call back completion, (7) administering community questionnaires within each enumeration area, (8) retrieving completed data files from data entry clerks and regularly transmitting data to the NSO central office in Zomba.

3.42 ENUMERATORS

Field based mobile teams consisted of 4 enumerators to field household interviews over the course of the scheduled field work. An Enumerator's major areas of responsibility were to accurately and completely administer the household, agriculture and fishery questionnaires. Enumerators were responsible for: (1) locating selected households, (2) relaying the source and purpose of the survey and obtaining respondent permission to implement the interview, (3) implementing all pertinent questionnaire modules, (4) systematically obtaining anthropometric measures for qualified household members, (5) using GPS technology to mark and record household locations and take agricultural field measurements, and (6) participating in the CAFE review and correction of field entered questionnaires.

3.43 DATA ENTRY CLERKS

Each IHS3 field team was assigned 1 data entry clerk to process completed questionnaires at the teams field based residence. Each data entry clerk was issued a laptop with the CSPro based data entry application, a printer to produce error reports on entered questionnaire, and flash disks for transferring files. The field based data entry clerk's primary responsibilities included: (1) receiving the completed questionnaires following the field supervisor's initial screening, (2) organizing and entering completed questionnaire in a timely manner, (3) generating and printing error reports for supervisor review, (4) modifying data after errors were resolved and authorized by the field supervisor, and (5) managing data files and local data back-ups. The data entry clerk was responsible for beginning initial data entry upon receipt of questionnaires from the field and generating error reports as quickly as possible after interviews were complete in the EA. When long distance travel to an enumeration area by the field team was required and the field team was required to spend multiple days away from their field residence the data entry clerk was required to travel with the team in order to maintain data processing schedules.

3.50 FIELDWORK MONITORING AND EVALUATION

During the IHS3, field operations were regularly monitored through visits to the field based teams by NSO IHS3 Managers, the World Bank IHS3 Resident Advisor and technical missions from the World Bank LSMS-ISA team. In addition, data transmitted from the field was regularly reviewed for completeness and quality by NSO IHS3 Managers with the assistance of the World Bank IHS3 Resident Advisor. Incoming data was organized and regularly checked for completeness and quality at the national, district, team and enumerator level. Issues that were found in instrument implementation, general quality, or other technical issue were reviewed and appropriate corrective action taken by NSO IHS3 Managers and technical support staff either through revised field notes, additional field visits, remote communication directly with field supervisors or general SMS messages relayed to all teams.

After the first quarter of field work, field supervisors were recalled to the NSO Headquarters in Zomba to discuss observations and concerns by field supervisors and to address observed concerns in the retrieved data. In general, field based teams demonstrated extremely high commitment to collecting high quality data and the successful completion of the IHS3 survey with the assistance of the NSO IHS3 Management team. In a few cases, however, failure to alleviate quality concerns through the above mentioned methods and individual coaching efforts lead to the restructuring of select field teams and or the replacement of field based staff.

4.00 DATA ENTRY AND DATA MANAGEMENT

4.10 FIELD BASED DATA ENTRY & CAFE

To better facilitate higher quality data and increase timely availability of data during the data capture process IHS3 utilized computer assisted field entry (CAFE). First data entry was conducted by field based data entry clerks immediately following completion of the team's daily field activities. Each team was equipped with 1 laptop computer for field based data entry using a CSPro-based application. The range and consistency checks built into the CSPro application was informed by the LSMS-ISA experience in Tanzania and Uganda, and the review of the IHS2 data. Prior programming of the data entry application allowed for a wide variety of range and consistency checks to be conducted and reported and potential issues investigated and corrected before closing the assigned enumeration area. Completed data was frequently relayed to the NSO central office in Zomba via email and tracked and processed upon receipt.

4.20 DOUBLE DATA ENTRY

Double data entry was implemented by a team of data entry clerks based at the NSO central office. Electronic data and questionnaires received from the field were cataloged by the Data Manager and electronic data loaded onto a central server to enable data entry verification on networked computers. To increase quality, the Data Entry Manager monitored the data verification staff and conducted quality assessments by randomly selecting processed questionnaires and comparing physical questionnaires to the result of double data entry. Data verification clerks were coached on inconsistencies when required.

4.30 DATA MANAGEMENT

The IHS3 CSPro based data entry application was designed to stream-line the data collection process from the field. Completed data capture for enumerations areas was packaged automatically by the data entry application into a compressed zip file specific to each enumeration area code. These files contained all household level interviews for that enumeration area and were then emailed back to the NSO central office. These files were to be transmitted back on a rolling basis. Although every effort was made to minimize the file size to be transmitted from the field based teams, limited access to internet and file corruption was a notable issue in the IHS3 project.

Once data files were transmitted and received by the NSO central office, enumeration area files were downloaded and cataloged by date received. Data was compiled and exported into Stata files on a regular basis and weekly reports were generated with assistance from the IHS3 World Bank Resident Advisor on the status of data completion. Over-all data collection status reports were relayed to NSO IHS3 Managers on a weekly basis. Overdue or incomplete data files were flagged for immediately follow-up.

IHS3 data files received from the field were also downloaded by the IHS3 Data Manager and uploaded to the data verification server to await second data entry. To perform second data entry, individual computers would retrieve and load the field data for the specific enumeration area. Once data verification was complete, verified enumeration data files were zipped and uploaded automatically to the server. Daily back-up of the server to a local network computer was conducted at the end of every day and back-ups to remote location weekly.

4.40 DATA CLEANING

The data cleaning process was done in several stages over the course of field work and through preliminary analysis. The first stage of data cleaning was conducted in the field by the field based

field teams utilizing error reports produced by the data entry applications. Field supervisors collected reports for each enumeration area and household and in coordination with the enumerators reviewed, investigated, and collected errors. Due to the quick turn-around in error reporting, it was possible to conduct call backs while the team was still operating in the enumeration area when required. Corrections to the data were entered by the field based data entry clerk before transmitting data to the NSO central office.

Upon receipt of the data from the field, module and cross module checks were performed using Stata to identify systematic issues and, where applicable, field teams were asked to investigate, revise and resend data for questionnaires still in their possession. Revised data files were cataloged and then replaced previous version of the data.

After data verification by the headquarters' double data entry team, data from the first data entry and second data entry were compared. Cases that revealed large inconsistencies between the first and second data entry, specifically large amounts of missing case level data in the second data entry relative to the first data entry were completely reentered. Further, variable specific inconsistency reports were generated and investigated and corrected by the double data entry team.

Additional cleaning was performed after the double data entry team cleaning activities where appropriate to resolve systematic errors and organize data modules for consistency and efficient use. Case by case cleaning was also performed during the preliminary analysis specifically pertaining to out of range and outlier variables.

All cleaning activities were conducted in collaboration with the WB staff providing technical assistance to the NSO in the design and implementation of the IHS3.

5.00 USING THE IHS3 DATA

It is strongly recommended that the end user of the IHS3 data familiarize themselves with the questionnaires and manuals while using the IHS3 data. The naming of IHS3 data files follows the instrument name and module lettering as listed in the questionnaires and variable names, whenever possible, reflect question numbers as presented in relative modules. In the SPSS & STATA versions of the data, variable labels, whenever possible, perfectly match the question as asked in the questionnaires. In some cases it was necessary to modify the variable labels and cross-referencing the questionnaires will be necessary for accurate use of the data.

To increase the efficiency with which the survey instruments were administered, the IHS3 instruments make extensive use of skip patterns. End users of the IHS3 data must be aware of these skip patterns to properly interpret the data. Skip patterns are, in most cases, clearly identified by an arrow followed by a number in parentheses (>> 2). The skip codes are explained in detail in the Enumerator Manual.

5.10 FILE STRUCTURE, KEY IDENTIFIERS

The file structure of the IHS3 data directly reflects the modules in the questionnaires. Where modules in the questionnaire contain data with multiple levels of observation, data files have been divided with additional numeric labels. It is recommended that end users of the IHS3 data refer to the questionnaires and manuals when using the data and the index of data files, along with key identifiers relevant for merging data from different modules, are presented in Tables 11-14.

IHS3 data files follow an intuitive naming scheme for easy use by the end user. Each file name gives reference to the instrument component, "HH" (Household), "AG" (Agriculture), "FS" (Fishery) and "COM" (Community) and the specific module as they appear in the questionnaires. For example, file "HH_MOD_B" refers to Household Module B; Household Roster. Similarly, file "AG_MOD_Q", for example, refers to Agriculture Module Q; "Tree / Permanent Crop Production (Over the Last 12

Months)". In modules that contain sub-sections with varying levels of observation, a number has been added to the tail of the file name, "HH_MOD_G1" and "HH_MOD_G2" for example. The numbers are sequential with how the module appears in the questionnaire.

Each IHS3 instrument cover sheet captures information on the location of the observation, district, traditional authority (TA) and the specific EA, as well as other observation level identification, for example, household identification for the household instrument. The variable "**ea_id**" has been created and serves as the lowest common level of aggregation for all IHS3 instruments. The variable "**reside**" identifies urban vs. rural EAs and is included in the data set named HH_MOD_A_FILT.

The ea_id is unique for each EA and is made up of the district, traditional authority, and EA codes. To provide unique district identification at the national level in the IHS3 data, district number is the concatenation of the single digit region code ("1" for Northern Region, "2" for Central Region, "3" for Southern Region) and the two digit district code composed with the respective region. For example, the unique district identification for the administrative district of Dedza is "208"; "2" (Central Region) + "08" (Region District Code). Similarly, the variable "ea_id" provides for the unique identification of sampled EAs. "ea_id" is specifically comprised of the three digit unique district code, the 2 digit TA code, and the 3 digit enumeration area. For example, the unique enumeration identification, "20807055" is the combination of district variable "hh_a01" ("208"), TA variable "hh_a02" ("07") + EA variable "hh_a03" ("055").

The users that have access to 2008 PHC data or the list of 2008 PHC EAs will not be able to match their databases with the IHS3 data on an EA-basis, since the last three digits of IHS3 ea_id has been replaced with a randomly generated three digit code in the construction of the IHS3 database for confidentiality purposes. In addition to the primary location variables, the variable, "Qx_type" has been added to the IHS3 data sets to identify the sub-sample assignment of each sample EA. The enumeration area sub-sample type, "Cross-Section", Panel A" or "Panel B" is identified by the "Qx_type" variable across all IHS3 instruments and datasets.

Moreover, each household questionnaire was assigned a household identification number corresponding to the number of the dwelling recorded on the household listing forms. This four digit number was combined with the unique enumeration area identification to yield the "**case_id**" household unique identification across the IHS3 datasets. For example, "case_id" number "208070550160" is the combination of "ea_id" 20807055" and household number ,"hh_a06", "0160". The variable "case_id" is unique to the household and is repeated in every module of the household, agriculture and fishery data.

For household modules B through E, the level of observation is household member. The variable, "**id_code**" refers to the roster row for the household member and when used in conjunction with "**case_id**" can uniquely identify individuals within the household across household modules of similar level of observation.

Table 10: Structure of the IHS3 Household Database

File Name	Module Name	Level of Analysis	Identification Variable(s)
HH_MOD_A_FILT	Module A: Household Identification	Household	case_id
HH_MOD_B	Module B: Household Roster	Individual	case_id id_code
HH_MOD_C	Module C: Education	Individual	case_id id_code
HH_MOD_D	Module D: Health	Individual	case_id id_code
HH_MOD_E	Module E: Time Use & Labour	Individual	case_id id_code
HH_MOD_F	Module F: Housing	Household	case_id
HH_MOD_G1	Module G: Food Consumption Over Past One Week	Consumption Item	case_id hh_g02
HH_MOD_G2	Module G: Food Consumption Over Past One Week	Food Group	case_id hh_g08a
HH_MOD_G3	Module G: Food Consumption Over Past One Week	Age Group	case_id hh_g10a
HH_MOD_H	Module H: Food Security	Household	case_id
HH_MOD_I1	Module I: Non-Food Expenditures – Over Past One Week & One Month	Consumption Item	case_id hh_i02
HH_MOD_I2	Module I: Non-Food Expenditures – Over Past One Week & One Month	Consumption Item	case_id hh_i05
HH_MOD_J	Module J: Non-Food Expenditures – Over Past Three Months	Consumption Item	case_id hh_j02
HH_MOD_K	Module K: Non-Food Expenditures – Over Past 12 Months	Consumption Item	case_id hh_k02
HH_MOD_L	Module L: Durable Goods	Durable Good	case_id hh_l02
HH_MOD_M	Module M: Farm Implements, Machinery, and Structures	Farm Implement	case_id hh_m0a
HH_MOD_N1	Module N: Household Enterprises	Household	case_id
HH_MOD_N2	Module N: Household Enterprises	Household Enterprise	case_id hh_n09a
HH_MOD_O	Module O: Children Living Elsewhere	Child of Head/Spouse Living Elsewhere	case_id hh_o0a
HH_MOD_P	Module P: Other Income	Income Type	case_id hh_p0a
HH_MOD_Q	Module Q: Gifts Given Out	Gift Type	case_id hh_q0a
HH_MOD_R	Module R: Social Safety Nets	Program	case_id hh_r0a
HH_MOD_S1	Module S: Credit	Loan	case_id hh_s02
HH_MOD_S2	Module S: Credit	Household	case_id
HH_MOD_T	Module T: Subjective Assessment Of Well-Being	Household	case_id
HH_MOD_U	Module U: Shocks & Coping Strategies	Shock	case_id hh_u0a
HH_MOD_V	Module V: Child Anthropometry	Individual	case_id hh_v01
HH_MOD_W	Module W: Deaths In Household	Deceased Individual	case_id hh_w0a
HH_MOD_X	Module X: Filter Questions For Agriculture & Fishery Questionnaires	Household	case_id

Table 11: Structure of the IHS3 Agriculture Database

File Name	Module Name	Level of Analysis	Identification Variable(s)
AG_MOD_A_FILT	Module A: Household Identification	Household	case_id
AG_MOD_B	Ag-Module B: 2008/2009 Rainy Season	Crop	case_id ag_b0c
AG_MOD_C	Ag-Module C: Plot Roster - [Rainy Season]	Plot	case_id ag_c00
AG_MOD_D	Ag-Module D: Plot Details - [Rainy Season]	Plot	case_id ag_d00
AG_MOD_E	Ag-Module E: Coupon Use - [Rainy Season]	Individual-Coupon Type	case_id ag_e0c
AG_MOD_F	Ag-Module F: Other Inputs - [Rainy Season]	Input Type	case_id ag_f0c
AG_MOD_G	Ag-Module G: Crops – [Rainy Season]	Plot-Crop	case_id ag_g0b ag_g0d
AG_MOD_H	Ag-Module H: Seeds – [Rainy Season]	Seed Type	case_id ag_h0b
AG_MOD_I	Ag-Module I: Sales/Storage - [Rainy Season]	Crop	case_id ag_i0b
AG_MOD_J	Ag-Module J: Plot Roster – [Dry (Dimba) Season]	Plot	case_id ag_j00
AG_MOD_K	Ag-Module K: Plot Details - [Dry (Dimba) Season]	Plot	case_id ag_k0a
AG_MOD_L	Ag-Module L: Other Inputs - [Dry (Dimba) Season]	Input Type	case_id ag_l0c
AG_MOD_M	Ag-Module M: Crops – [Dry (Dimba) Season]	Plot-Crop	case_id ag_m0b ag_m0d
AG_MOD_N	Ag-Module N: Seeds – [Dry (Dimba) Season]	Seed Type	case_id ag_n0c
AG_MOD_O	Ag-Module O: Sales/Storage – [Dry (Dimba) Season]	Crop	case_id ag_o0b
AG_MOD_P	Ag-Module P: Tree / Permanent Crop Production Last 12 Months	Plot-Tree Crop	case_id ag_p0b ag_p0d_os
AG_MOD_Q	Ag-Module Q: Tree/Permanent Crop Sales/Storage Last 12 Months	Tree Crop	case_id ag_q0b
AG_MOD_R1	Ag-Module R: Livestock	AnimalType	case_id ag_r0a
AG_MOD_R2	Ag-Module R: Livestock	Household	case_id
AG_MOD_S	Ag-Module S: Livestock Products	By-product	case_id ag_s0a
AG_MOD_T1	Ag-Module T: Access To Extension Services	Extension Source	case_id ag_t0a
AG_MOD_T2	Ag-Module T: Access To Extension Services	Extension Source	case_id ag_t0c
AG_NETWORK	Network Roster	Roster Member	case_id ag_nr00

Table 12: Structure of the IHS3 Fishery Database

File Name	Module Name	Level of Analysis	Identification Variable(s)
FS_MOD_B_FILT	Module B: Fisheries Calendar	Household	case_id
FS_MOD_C	Module C: Fisheries Labour (Last High Season)	Individual	case_id fs_c00
FS_MOD_D1	Module D: Fisheries Input (Last High Season)	Fishing Gear	case_id fs_d0a
FS_MOD_D2	Module D: Fisheries Input (Last High Season)	Boat/Engine	case_id fs_d0c
FS_MOD_D3	Module D: Fisheries Input (Last High Season)	Household	case_id
FS_MOD_E1	Module E: Fisheries Output (Last High Season)	Fish Type	case_id fs_e02
FS_MOD_E2	Module E: Fisheries Output (Last High Season)	Fishing Gear	case_id fs_e0a
FS_MOD_F1	Module F: Fish Trading (Last High Season)	Fish Type	case_id fs_f01
FS_MOD_F2	Module F: Fish Trading (Last High Season)	Cost Item	case_id fs_f0a
FS_MOD_G	Module G: Fisheries Labour (Last Low Season)	Individual	case_id fs_g00
FS_MOD_H1	Module H: Fisheries Input (Last Low Season)	Fishing Gear	case_id fs_h0a
FS_MOD_H2	Module H: Fisheries Input (Last Low Season)	Boat/Engine	case_id fs_h0c
FS_MOD_H3	Module H: Fisheries Input (Last Low Season)	Household	case_id
FS_MOD_I1	Module I: Fisheries Output (Last Low Season)	Fish Type	case_id fs_i02
FS_MOD_I2	Module I: Fisheries Output (Last Low Season)	Fishing Gear	case_id fs_i0a
FS_MOD_J1	Module J: Fish Trading (Last Low Season)	Fish Type	case_id fs_j01
FS_MOD_J2	Module J: Fish Trading (Last Low Season)	Cost Item	case_id fs_j0a

Table 13: Structure of the IHS3 Community Database

File Name	Module Name	Level of Analysis	Identification Variable(s)
COM_CA	Module CA: Community Identification	Community	ea_id com_ca04
COM_CB	Module CB: Roster Of Informants	Informant	ea_id com_cb01
COM_CC	Module CC: Basic Information	Community	ea_id
COM_CD	Module CD: Access To Basic Services	Community	ea_id
COM_CE	Module CE: Economic Activities	Community	ea_id
COM_CF	Module CF: Agriculture	Community	ea_id
COM_CG	Module CG: Changes	Community	ea_id
COM_CG1	Module CG: Changes	Community	ea_id
COM_CG2	Module CG: Changes	Event	ea_id com_cg35a
COM_CH	Module CH: Community Needs, Actions & Achievements	Need	ea_id com_ch0b
COM_CI	Module CI: Communal Resource Management	Natural Resource	ea_id com_ci0b
COM_CJ	Module CJ: Communal Organization	Communal Group Type	ea_id com_cj0b
COM_CK	Section CK: Prices	Item	ea_id com_ck00a

5.20 HOUSEHOLD ROSTER STRUCTURE

As previously noted, that administration of the household questionnaire was broken into 3 distinct formats. For ease of implementation in the field the Cross-Section, Panel A and Panel B instruments where separate physical questionnaires. For ease of use for the end user of the data, these separate components where combined both in the data and into a combined questionnaire designed to provide as an easy guide to the data structure. It is important to note that although most of the modules were administered only once, either in visit 1 or in visit 2, the household roster was administered in both visits for all Panel sub-groups. In the final version of the data the household roster information collected in both visit 1 and visit 2 is collapse to indicate each household member only once. As some information between visits may have changed, the individuals age and status in the household for example, the information presented in the household roster is directly associated with the time of visit of the main sections of the household questionnaire. For the Panel A households, the information presented in the household roster is associated with the first visit and for the Panel B sub-group the information is associated with the timing of the second visit. The status variable of the household member should also be noted here. Members that existed in the first visit of the Panel B sub-group but may not have been present in visit 2 will be indicated in this status.

5.30 CONFIDENTIAL INFORMATION, GEOSPATIAL VARIABLES

To maintain the confidentiality of our respondents, certain parts of the IHS3 database have not been made publicly available. The confidential variables pertain to (i) names of the respondents to the household and community questionnaires, (ii) village and constituency names, (iii) descriptions of

household dwelling and agricultural plot locations, (iv) phone numbers of household members and their reference contacts, (v) GPS-based household and agricultural plot locations, (vi) names of the children of the head/spouse living elsewhere, (vii) names of the deceased household members, (viii) names of individuals listed in the network roster, and (ix) names of field staff.

To increase the use of the IHS3 data, a set of geospatial variables has been provided by using the georeferenced plot and household locations in conjunction with various geospatial databases that were available to the survey team. **Geovariables.Description.pdf** provides the name, type, source, reference period, resolution, description, and source of each variable.

The geovariables are stored in two data files, one at the household-plot-level, the other at the household-level. The plot-level file, named **PlotGeovariables**, contains one geospatial variable measuring plot distance to household and the observations are uniquely identified by the combination of **case_id plot_id**. The observations included in this file are rainy season plots that are owned and/or cultivated by the household and that have been visited for GPS-based land area measurement.

The rest of the geovariables are stored in **HouseholdGeovariables** and the observations are uniquely identified by **case_id.** To partially satisfy the demand for georeferenced household and community locations while preserving the confidentiality of sample household and communities, we have computed the average of household GPS coordinates in each EA, applied a random offset within a specified range to the average EA value (following the MeasureDHS methodology) and provided the off-set EA latitudes and longitudes are part of **HouseholdGeovariables.**

More specifically, the coordinate modification strategy relies on random offset of cluster center-point coordinates (or average of household GPS locations by EA in IHS3) within a specified range determined by an urban/rural classification. For urban areas a range of 0-2 km is used. In rural areas, where communities are more dispersed and risk of disclosure may be higher, a range of 0-5 km offset is used. An additional 0-10 km offset for 1% of rural clusters effectively increases the known range for all rural points to 10 km while introducing only a small amount of noise. Offset points are constrained at the district level, so that they still fall within the correct district for spatial joins, or point-in-polygon overlays. The result is a set of coordinates, representative at the EA level, that fall within known limits of accuracy. Users should take into account the offset range when considering different types of spatial analysis or queries with the data. Analysis of the spatial relationships between locations in close proximity would not be reliable. However, spatial queries using medium or low resolution datasets should be minimally affected by the offsets.

All geospatial variables have been produced by using the unmodified GPS data. These include extensive measures of distance, climatology, soil and terrain and other environmental factors. Time-series on rainfall and vegetation have also been used to describe the survey agricultural season relative to normal conditions. These variables are intended to provide some understanding of how geophysical characteristics vary at the landscape level.

6.00 WEIGHTING

In order to analyze the data and produce accurate representativeness of the population, the sample variables must be weighted using the household sampling weights provided in each file as **hhwght**. As noted above, the IHS3 data are representative at the national, urban/rural, regional and district-level.

The basic weight for each sample household is equal to the inverse of its probability of selection (calculated by multiplying the probabilities at each sampling stage). As indicated in the previous section, the IHS3 sample EAs were selected within each district with PPS from the 2008 PHC frame. At the second stage, 16 sample households were selected with equal probability from the listing for

each sample EA. Therefore, the overall probability of selection for the IHS3 sample households can be expressed as follows:

$$p_{hi} = \frac{n_h \times M_{hi}}{M_h} \times \frac{m_{hi}}{M'_{hi}}, \text{ where:}$$

p_{hi} = overall sampling probability for households selected for the IHS3 in the i-th sample EA in district h,

n_h = number of sample EAs selected in district h for the IHS3,

M_{hi} = total number of households in the i-th sample EA in district h from the 2008 PHC frame,

M_h = total number of households in district h from 2008 PHC frame ,

m_{hi} = 16 = number of sample households selected for the IHS3 in the i-th sample EA in district h, and

M'_{hi} = total number of households in the new listing for the i-th sample EA in district h.

The basic weight for the IHS3 sample households is the inverse of this probability of selection, expressed as follows:

$$W_{hi} = \frac{1}{p_{hi}} = \frac{M_h \times M'_{hi}}{n_h \times M_{hi} \times m_{hi}}, \text{ where:}$$

W_{hi} = basic weight for the IHS3 sample households in the i-th sample EA in district h.

Following the calculation of the basic weight, the total weighted population by district was tabulated from the survey data and compared to corresponding census figures and the population projections. Conceptually, if the listing reflects the overall average growth in the number of households across all the sample EAs, the weighted estimates of the total population would also show a corresponding increase. The design weights depend on the updating of the sampling frame based on the listing, so if the listing for some sample EAs is not complete, this will lead to a lower bias in the weighted population estimates from the survey data. For most districts the weighted survey population estimates were lower than the corresponding projections, indicating potential problems with the listing data for the IHS3. Given the significant differences between the weighted estimates of the total population for some districts and the corresponding population projections, it was decided to adjust the weights based on the population projections. The quality of the listing varied by district, which resulted in inconsistent weighted estimates of the total population. One way to adjust the weights for such deficiencies in the listing is to use population projections at the district level for calculating weight adjustment factors.

The weight adjustment factor based on the projected total population by district can be expressed as follows:

$$A_h = \frac{\hat{P}_{IHS3h}}{\sum_{i \in h} \sum_{j} W'_{hi} \times p_{hij}}, \text{ where:}$$

A_h = adjustment factor for the weights of the IHS3 sample households in district h,

$\hat{P}_{IHS3h}$ = projected total population for district h for the mid-point of the data collection period for the IHS3, based on demographic analysis,

W'_{hi} = basic design weight for the sample households in the i-th sample EA in district h, adjusted for non-interviews, and

p_{hij} = number of persons in the j-th sample household of the i-th sample EA in district h.

The denominator of the adjustment factor A_h is the estimated total population in district h from the IHS3 data using the basic design weights. The design weights for all the sample households within a district were multiplied by the corresponding adjustment factor for the district to obtain the final adjusted weights, as follows:

$W_{Ahi} = W'_{hi} \times A_h$, where:

W_{Ahi} = final adjusted weight for the sample households in the i-th sample EA in district h.

After the adjustment factors were applied to the weights of each district, the final weighted survey estimates of total population by district were consistent with the corresponding population projections. The NSO produce district-level population projections for each year, based on demographic analysis using the 2008 PHC data and estimates of the different demographic parameters. The approximate reference date for the population projections each year is 1 July. The data collection for the IHS3 was conducted between 22 March 2010 and 26 March 2011, so the mid-point of the data collection period was approximately 22 September 2010. Using the population projections by district for 1 July 2010 and 2011, an interpolation based on exponential growth was used to estimate the population for 22 September 2010, using the following formula:

$\hat{P}_{IHS3h} = P_{10h} \times e^{\ln\left[\left(\frac{P_{11h}}{P_{10h}}\right)\times\left(\frac{t_{IHS3}-t_{10}}{t_{11}-t_{10}}\right)\right]}$, where:

$\hat{P}_{IHS3h}$ = estimated total population for district h on 22 September 2010,

P_{10h} = population projection for district h on 1 July 2010,

P_{11h} = population projection for district h on 1 July 2011,

$t_{IHS3} - t_{10}$ = number of days between 1 July 2010 and 22 September 2010 (that is, 83 days), and

$t_{08} - t_{07}$ = number of days between 1 July 2010 and 1 July 2011 (that is, 365 days).

Table 14 presents the population projections by district for 1 July 2010 and 2011, and the corresponding interpolated population estimates for 22 September 2010. Table 15 shows the population projections for the mid-point of the IHS3 data collection period and the IHS3 weighted estimates of total population by district based on the design weights, and the corresponding weight adjustment factor for the sample household weights in each district.

It can be seen in Table 15 that the weight adjustment factors vary from 0.8346 for Salima District to 1.7606 for Mzuzu City. An adjustment factor less than 1 indicates that the IHS3 data with the original design weights over-estimated the population, and a factor greater than 1 indicates that the original weighted survey estimates under-estimated the population. The weight adjustment factors for 24 of the 31 districts are greater than 1, indicating a potential undercount in the listing of sample EAs for most districts.

Since the population projections were not made separately for the urban and rural areas, the urban/rural distribution of the weighted IHS3 data reflects the distribution of the sampling frame and the listing results for urban and rural EAs. The final weighted urban population using the adjusted weights is 15.3% of the total at the national level, compared to 14.8% based on the design weights.

Table 14: Malawi Population Projections by District, for 2010 and 2011, and Interpolated Population for the Mid-Point of the IHS3 Data Collection Period

District	2007 01-Jul-10	2008 01-Jul-11	IHS-3 22-Sep-10
Chitipa	189,492	194,707	190,673
Karonga	288,433	297,694	290,526
Nkhata Bay	229,728	236,978	231,367
Rumphi	182,110	187,137	183,248
Mzimba	773,009	795,708	778,144
Mzuzu City	156,791	168,928	159,488
Kasungu	680,881	707,862	686,961
Nkhotakota	324,517	334,856	326,854
Ntchisi	241,590	249,914	243,470
Dowa	613,692	641,895	620,032
Salima	360,677	371,938	363,223
Lilongwe, non-city	1,294,496	1,325,010	1,301,414
Mchinji	494,011	511,792	498,023
Dedza	655,979	671,137	659,417
Ntcheu	499,936	513,865	503,089
Lilongwe City	768,012	817,270	779,012
Mangochi	855,663	885,355	862,366
Machinga	522,422	538,345	526,022
Zomba, non-city	603,176	614,268	605,695
Chiradzulu	297,529	301,586	298,452
Blantyre, non-city	356,836	364,708	358,622
Mwanza	96,344	97,883	96,694
Thyolo	593,992	603,129	596,070
Mulanje	536,846	543,745	538,416
Phalombe	330,021	338,219	331,879
Chikwawa	461,705	475,140	464,744
Nsanje	250,159	255,995	251,482
Balaka	338,430	349,121	340,846
Neno	118,542	124,430	119,864
Zomba City	101,083	107,866	102,596
Blantyre City	721,063	751,642	727,947
Malawi	13,937,163	14,378,124	14,036,636

Table 15: Malawi Population Projections and the IHS3 Weighted Estimates of Total Population by District, and Corresponding Weight Adjustment Factors

District	Projected Population 22-Sep-10	Weighted Population IHS-3	Weight Adjustment Factor
Chitipa	190,673	137,932	1.3824
Karonga	290,526	252,728	1.1496
Nkhata Bay	231,367	190,742	1.2130
Rumphi	183,248	148,357	1.2352
Mzimba	778,144	529,384	1.4699
Mzuzu City	159,488	90,585	1.7606
Kasungu	686,961	412,995	1.6634
Nkhotakota	326,854	215,866	1.5142
Ntchisi	243,470	194,489	1.2518
Dowa	620,032	485,786	1.2763
Salima	363,223	435,198	0.8346
Lilongwe, non-city	1,301,414	1,230,372	1.0577
Mchinji	498,023	449,441	1.1081
Dedza	659,417	658,507	1.0014
Ntcheu	503,089	541,615	0.9289
Lilongwe City	779,012	863,018	0.9027
Mangochi	862,366	745,195	1.1572
Machinga	526,022	503,871	1.0440
Zomba, non-city	605,695	543,588	1.1143
Chiradzulu	298,452	318,379	0.9374
Blantyre, non-city	358,622	365,062	0.9824
Mwanza	96,694	87,033	1.1110
Thyolo	596,070	670,597	0.8889
Mulanje	538,416	602,507	0.8936
Phalombe	331,879	309,743	1.0715
Chikwawa	464,744	439,985	1.0563
Nsanje	251,482	240,199	1.0470
Balaka	340,846	265,506	1.2838
Neno	119,864	107,424	1.1158
Zomba City	102,596	72,452	1.4161
Blantyre City	727,947	513,622	1.4173

ANNEX 1: CODES NOT INCLUDED IN THE QUESTIONNAIRE

DISTRICT CODES AND COUNTRY CODES

DISTRICT CODES:

Chitipa.....101
Karonga.....102
Nkhatabay.....103
Rumphi.....104
Mzimba.....105
Mzuzu City.....107
Kasungu.....201
Nkhotakota.....202
Ntchisi.....203
Dowa.....204
Salima.....205
Lilongwe Non-City..206
Mchinji.....207
Dedza.....208
Ntcheu.....209
Lilongwe City.....210
Mangochi.....301
Machinga.....302
Zomba Non-City.....303
Chiradzulu.....304
Blanytyre Non-City...305
Mwanza.....306
Thyolo.....307
Mulanje.....308
Phalombe.....309
Chikwawa.....310
Nsanje.....311
Balaka.....312
Neno.....313
Zomba City.....314
Blantyre City.....315

COUNTRY CODES:

Angola.....501
Australia.....502
Botswana.....503
Canada.....504
China.....505
Lesotho.....506
Mozambique.....507
Namibia.....508
New Zealand.....509
South Africa.....510
Swaziland.....511
Tanzania.....512
United Kingdom (UK)..513
United States of America (USA).....514
Zambia.....515
Zimbabwe.....516
Other Country (Specify).....517

OCCUPATION CODES

MAJOR GROUP 0/1: PROFESSIONAL, TECHNICAL, & RELATED WORKERS	
01	**Physical Scientists and related technicians.** Chemists, Physicists
02	**Architects, Surveyors and related workers.** Architects, Planners, Surveyors, Draughtsmen and related workers
03	**Engineers and related workers.** Civil, Mechanical, Electrical, Mining and Other Engineers; Mining Technicians
04	**Aircraft's and ships' officers.** Pilots, Navigators, deck officers, flight and ships' officers
05	**Life scientists and related technicians**. Agronomists, biologists, zoologists.
06	**Medical, dental and related workers.** Doctors, Dentists, Medical and Dental Assistants, Nurses, X-ray and other medical technicians. (**Excluding traditional healers (which are group 59)**)
07	**Veterinary and related workers.** Veterinarians and related workers not elsewhere classified
08	**Statisticians, mathematicians, systems analysts.** Statisticians, actuaries, systems analysts and related technicians
09	**Economists**
11	**Accountants**, (private or government); (for book-keepers see 33)
12	**Jurists.** Lawyers, Judges
13	**Teachers**. University Lectures and teachers.
14	**Workers in Religion.** Priests, nuns lay brothers etc, and related workers in religion not elsewhere classified
15	**Writers.** Authors, journalists, critics and related writers.
16	**Artists.** Sculptors, painters of pictures, photographers and cameramen.
17	**Composers and Performing artists.** Composers, musicians, singers, dancers, actors, producers, performing artists.
18	**Athletics, sportsmen and related workers.** Athletes, etc.
19	**Professional and technical workers not elsewhere classified**. Librarians, archivists, curators, sociologists, social workers and occupational specialists, translators, interpreters and other professional and technical workers not elsewhere classified.
MAJOR GROUP 2: ADMINISTRATION AND MANAGERIAL WORKERS	
20	**Legislative Officials and government senior administrators.** Legislative officials.
21	**Managers.** General Managers, production managers (except farm managers) and managers not elsewhere classified.
22	**Traditional Leaders.** Village Headmen, Group Village Headmen, Sub-Traditional Authorities, Traditional Authorities, Senior Traditional Authorities/Chiefs, Paramount Chiefs.
MAJOR GROUP 3: CLERICAL AND RELATED WORKER	
30	**Clerical supervisors**
31	**Government administrative/secretarial officials**
32	**Stenographers and related workers.** Stenographers, typists, card and tape punching machine operators.

33	**Book-keepers, cashiers and related workers.** Book-keepers and cashiers.
34	**Computing and machine operators of book-keeping machines, calculators and automatic data processing machines (computers).**
35	**Transport and communication supervisors**. Railway Stations Masters, postmasters, communication supervisors not elsewhere classified stated.
36	**Transport conductors.** Bus conductors
37	**Mail distribution clerks.** Registry clerks
38	**Telephone and telegram operators Including switchboard (PBX) operators.**
39	**Clerical and related workers not elsewhere classified.** Stock Clerk Correspondence clerks, receptionists, and travel agency clerks, Library and filling clerks and other clerks and not elsewhere classified.
MAJOR GROUP 4: SALES WORKERS	
40	**Managers (wholesale & retail trade)**
41	**Working proprietors (wholesale and retail trade)**
42	**Sales supervisors and buyers**
43	**Technical salesmen, commercial travellers, manufactures agency**
44	**Auctioneers and salesmen of insurance, real estate, securities, and business services.**
45	**Salesmen and shop assistants, and related workers** (demonstrators, street vendors, canvassers, news vendors).
49	**Sales workers not elsewhere classified.**
MAJOR GROUP 5: SERVICE WORKERS	
50	**Managers (catering &lodging services)**
51	**Working proprietors (catering & lodging services)**
52	**Housekeeping and related service supervisors (Excluding housewives)**
53	**Cooks, waiters, bartenders and related workers**
54	**Maids and related housekeeping service workers not elsewhere classified, house girls, houseboys, garden boys**
55	**Buildings caretakers, watch guards, charworkers, cleaners and related workers.**
56	**Launderers, dry-cleaners and pressers.**
57	**Hairdressers, barbers, beauticians and related workers.**
58	**Protective service workers.** Fire fighters, policemen and detectives, protective workers not elsewhere classified.
59	**Service workers not elsewhere classified.** Traditional healers, guides, undertakers and embalmers, other service workers.
MAJOR GROUP 6: AGRICULTURAL, ANIMAL HUSBANDRY AND FORESTRY WORKERS, FISHERMEN AND HUNTERS	
60	**Farm managers and supervisors**

61	**Farmers (general farm owner/operators and specialised farmers)**
62	**Agricultural and animal husbandry workers.** General farm workers and labourers, dairy farm workers and gardeners, farm machine operators, agricultural and animal husbandry workers not elsewhere classified. (Not ganyu farm labourers-ganyu work covered in separate questions)
63	**Forestry workers.** Loggers and other forestry workers not elsewhere classified.
64	**Fishermen, hunters and related workers.**
MAJOR GROUP 7/8/9: PRODUCTION AND RELATED WORKERS, TRANSPORT EQUIPMENT OPERATORS AND LABOURERES NOT ELSEWHERE CLASSIFIED	
70	**General foreman and production supervisors.**
71	**Miners, Quarrymen, well drillers** including mineral and stone treaters, well borers and related workers.
72	**Metal processors**, Including melters and reheaters, casters, moulders and coremakers. Annealers, platers and coaters.
73	**Wood preparation and workers and paper makers.** Wood treaters, sawyers, makers and related wood processing and related workers, paper pulp prepares and paper makers related workers.
74	**Chemical processors and related workers.** Crushers, grinders, mixers, heat treaters, filter and separator operators, still operators, chemical processors and related workers not elsewhere classified.
75	**Spinners, weavers, dyers, fibre preparers.** Spinners, Weaving and Knitting, Machine setters and operators bleachers dyers and textile product finishers; related workers not elsewhere classified.
76	**Tanners, skin preparers and pelt dressers.**
77	**Food and beverage processors.** Grain millers, sugar processors and refiners, butchers and daily product processors, bakers tea and coffee prepares, brewers, beverages makers and other food and beverage processors.
78	**Tobacco preparers and product makers.** Tobacco preparers, cigarette makers and tobacco preparers and tobacco product workers not elsewhere classified.
79	**Tailors, dressmakers, sewers, upholsters.** Tailors dressmakers for tailors, hat makers, cutters, sewers, upholsters and related workers not elsewhere classified.
80	**Shoemakers and leather goods makers.** Shoemaker repairers, shoe cutters, lasters, sewers and related workers; leather goods makers.
81	**Cabinet makers and related wood workers.** Cabinet makers, wood-working machine operators not elsewhere classified.
82	**Stone cutters and carvers.**
83	**Blacksmith, toolmakers & machine tool operators.** Blacksmith, operators, forge-press operators, toolmakers, machine tool setters & operators, metal grinders, polishers, sharpeners.
84	**Machinery fitters, machine assemblers.** Machinery fitters and assemblers, clock makers, motor and precision instrument makers, vehicle machine and aircraft engine mechanics (except electrical)
85	**Electrical fitters and related electrical workers.** Electrical fitters wiremen and linesmen, electrical and electronics workers, electronic equipment assemblers, radio repairmen telephone and telegram installers and related workers not elsewhere classified.
86	**Broadcasting station operators and cinema projectionists.**
87	**Plumbers, welders, sheet metal workers.** Plumbers and pipe fitters, and frame cutters, sheet structural metal prepares, metal workers, structural metal prepares and erectors.

88	**Jewellery and precious metal workers.**
89	**Potters, glass formers and related workers.** Potters, glass formers and cutters ceramic kinsmen, grass engravers ceramic and glass painters and decorators and related workers not elsewhere classified
90	**Rubber and plastic product makers.** Rubber and plastic product makers not elsewhere classified (not footwear), tyre makers, vulcanisers and retreaders.
91	**Paper and paper-board product makers.**
92	**Printers and related workers.** Compositors, typesetters, printing pressmen, printing and photo engravers book binders, photographic darkroom operators and related workers not elsewhere classified.
93	**Painters.** House painters and the like (not artists).
94	**Production and related workers.** Musical instrument makers and tuners, basketry weavers not elsewhere classified and brush makers, other production related workers.
95	**Bricklayers, carpenters and other bricklayers**. stonemasons, tile setters, reinforced construction workers concetors, roof**e**rs, carpenters and joiners, plaster, glaziers and construction workers not elsewhere classified. (Not ganyu labourers - ganyu work covered in separate questions.)
96	**Operators of stationery engines and power generating machines.** Operators and operators of related equipment other stationery engines (i.e. not vehicles tractors etc) and related equipment not elsewhere classified.
97	**Material handling and related equipment operators.** Dockers and handlers, riggers, crane and hoist operators, Dockers and freight handlers/operators, earth moving and related machinery operators and material-handling equipment operators not elsewhere classified.
98	**Transport equipment operators.** Vehicles drivers, railway engine drivers and firemen, ships rating crew, railway breakmen shunters, signalmen and transport equipment operators not elsewhere classified.
99	**Labourers not elsewhere classified.** Workers not reporting occupation, or occupation not adequately describe or not classified. (Not ganyu labourers-ganyu work covered in separate questions.)

INDUSTRY CODES

AGRICULTURE, HUNTING, FORESTRY & FISHING	
11	Mixed farming, Tea growing, Tobacco growing, Sugar growing, Agricultural services, Animal husbandry.
12	Forestry and logging
13	Fishing in Inland waters
MINING AND QUARRYING	
29	Stone quarrying, Gypsum mining
MANUFACTURING	
31	Slaughtering, preparing and preserving meat Manufacture of dairy products (not dairy farming) Canning and preserving of fruit and vegetables Fish canning Grain milling Bakeries Sugar refining Confectionery making Coffee manufacture Tea manufacturing Distilling Beer manufacturing Soft drink manufacturing Tobacco manufacturing
32	Spinning, weaving and finishing textile Manufacture of made-up textiles; except clothing Knitting mills Cord, rope and twine industries Manufacture of wearing apparel; except footwear Manufacture of leather products; except footwear Manufacture of footwear
33	Sawmills, planning and other wood mills Manufacture of wooden and cane containers Handcrafts and curios Furniture and fixture; except primarily of metal
34	Paper and paperboard container Gummed paper, cards; envelopes and stationery Printing and publishing
MANUFACTURING (CONT'D)	
35	Basic industrial chemicals; excluding fertilizers Fertilizers and Pesticides Drugs and Medicines Soaps; perfumes and cosmetics Matches; Tyre and tube industries Rubber footwear industrial and mechanics Manufacture of plastic products not elsewhere classified
36	Bricks tile and pipe manufacturing Cement, lime and plaster manufacturing Concrete, gypsum and plaster products
37	Manufacture of primary iron products from foundries, etc
38	Fabricated metal products; except machinery and equipment Hand tools, cutlery and general hardware

38	Furniture and fixtures primarily of metal Structural and metal products Fabricated metal products not elsewhere classified. Manufacturing, re-building and repair of engines and turbines Manufacturing and repair of agricultural machinery Manufacturing, renovation and repair of office mach. and equipment Radio manufacture Manufacturing of electrical appliances and housekeeping Battery manufacture Manufacturing, assembly and building of complete motor vehicle Manufacturing, assembly and repair of aircraft Manufacturing of animal drawn carts, wheelbarrows
39	Manufacturing of toys, signs, items not elsewhere classified
ELECTRICITY, GAS AND WATER	
41	Electricity generation and supply
42	Water works and supply
CONSTRUCTION	
50	Building Civil engineering
WHOLESALE AND RETAIL TRADE AND RESTAURANT & HOTELS	
61	Wholesale: fuels Wholesale: Agriculture products Wholesale: other
62	Retail: motor vehicles Retail: other (including street/stall retail)
63	Bars and Restaurants Hotels, rooming houses and camps
TRANSPORT, STORAGE & COMMUNICATION	
71	Rail transport Bus transport Taxi operation; car hire with driver Freight transport by road Rental of automobiles and trucks without drivers Inland water transport Air transport carriers Operation of airports, flying control centres Forwarding, packing crafting; arrangement of transport Storage and warehousing
72	Communications
FINANCING, INSURANCE, REAL ESTATE AND BUSINESS SERVICES	
81	Banks having deposits transferable by cheque Savings banks, credit institutions other than banks, investment companies and trusts, micro-finance institutions
82	Insurance
83	Letting and operating real estate Legal services Accounting and bookkeeping services Engineering, architectural and technical services Advertising services Business services not elsewhere classified Machinery and equipment rental and leasing
COMMUNITY, SOCIAL & PERSONNEL SERVICES	
91	Public administration and defence
92	Sanitary and similar services

93	Educational, commercial and driving schools Private schools Government schools Research and scientific institutes Medical, dental and other services Animal care centres Non-governmental organisations Agricultural cooperatives Welfare institutions Business professional and labour associates Religious organisations Political organisations
94	Motion picture distribution and projection Radio broadcasting Concert artists Libraries and museums Amusement and recreational services including clubs
95	Electrical repair shops Repairs of motor vehicles, and motor cycles Watch, clock repairs Bicycles, type writer, camera etc repairs Laundries Barber and beauty Photographic studios Security services Funeral services
96	Private households with employed persons
00	ACTIVITIES NOT ADEQUATELY DEFINED

FOOD-UNIT COMBINATIONS IN THE IHS3 PHOTO AID FOR FOOD CONSUMPTION INFORMATION COLLECTION										
Item Name [Module G]	*Item Code [Module G]*	*Unit in Photo Aid*	*Size*	*Unit Code in Module G*		*Item Name [Module G]*	*Item Code [Module G]*	*Unit in Photo Aid*	*Size*	*Unit Code in Module G*
Maize *ufa mgaiwa* (normal flour)	101	Pail	**Small**	**4a**		Orange sweet potato	204	Heap	**Small**	**10a**
			Medium	**4b**					**Medium**	**10b**
			Large	**4c**					**Large**	**10c**
Maize *ufa* refined (fine flour)	102	Pail	**Small**	**4a**		Bean, brown	302	No.10 Plate	**Flat**	**6a**
			Medium	**4b**					**Heaped**	**6b**
			Large	**4c**						
Maize *ufa madeya* (bran flour)	103	Pail	**Small**	**4a**		Pigeonpea (nandolo)	303	No.10 Plate	**Flat**	**6a**
			Medium	**4b**					**Heaped**	**6b**
			Large	**4c**						
Maize grain (not as *ufa*)	104	Pail	**Small**	**4a**		Groundnut	304	No.10 Plate	**Flat**	**6a**
			Medium	**4b**					**Heaped**	**6b**
			Large	**4c**						
Green maize	105	Piece	**Small**	**9a**		Groundnut flour	305	No.10 Plate	**Flat**	**6a**
			Medium	**9b**					**Heaped**	**6b**
			Large	**9c**						
Cassava tuber	201	Piece	**Small**	**9a**		Onion	401	Piece	**Small**	**9a**
			Medium	**9b**					**Medium**	**9b**
			Large	**9c**					**Large**	**9c**
White sweet potato	203	Piece	**Small**	**9a**		Onion	401	Bunch	**Small**	**8a**
			Medium	**9b**					**Medium**	**8b**
			Large	**9c**					**Large**	**8c**
White sweet potato	203	Heap	**Small**	**10a**		Cabbage	402	Piece	**Small**	**9a**
			Medium	**10b**					**Medium**	**9b**
			Large	**10c**					**Large**	**9c**
Orange sweet potato	204	Piece	**Small**	**9a**		*Tanaposi*	403	Bunch	**Small**	**8a**
			Medium	**9b**					**Medium**	**8b**
			Large	**9c**					**Large**	**8c**

FOOD-UNIT COMBINATIONS IN THE IHS3 PHOTO AID FOR FOOD CONSUMPTION INFORMATION COLLECTION										
Item Name [Module G]	*Item Code [Module G]*	*Unit in Photo Aid*	*Size*	*Unit Code in Module G*		*Item Name [Module G]*	*Item Code [Module G]*	*Unit in Photo Aid*	*Size*	*Unit Code in Module G*
Nkhwani	404	Heap	**Small**	**10a**		Fresh Fish (Large Variety)	503	Piece	**Small**	**9a**
			Medium	**10b**					**Medium**	**9b**
			Large	**10c**					**Large**	**9c**
Tomato	408	Piece	**Small**	**9a**		Fresh Fish (Small Variety)	503	Heap	**Small**	**10a**
			Medium	**9b**					**Medium**	**10b**
			Large	**9c**					**Large**	**10c**
Tomato	408	Heap	**Small**	**10a**		Fresh Fish (Large Variety)	503	Heap	**Small**	**10d**
			Medium	**10b**					**Medium**	**10e**
			Large	**10c**					**Large**	**10f**
Pumpkin	410	Piece	**Small**	**9a**		Mango	601	Piece	**Small**	**9a**
			Medium	**9b**					**Medium**	**9b**
			Large	**9c**					**Large**	**9c**
Okra	411	Piece	**Small**	**9a**		Banana	602	Piece	**Small**	**9a**
			Medium	**9b**					**Medium**	**9b**
			Large	**9c**					**Large**	**9c**
Okra	411	Heap	**Small**	**10a**		Banana	602	Bunch	**Small**	**8a**
			Medium	**10b**					**Medium**	**8b**
			Large	**10c**					**Large**	**8c**
Dried Fish (Large Variety)	502	Piece	**Small**	**9a**		Guava	606	Piece	**Small**	**9a**
			Medium	**9b**					**Medium**	**9b**
			Large	**9c**					**Large**	**9c**
Dried Fish (Large Variety)	502	Heap	**Small**	**10a**		Cooking oil	803	Satchet/Tube	**Small**	**22a**
			Medium	**10b**					**Medium**	**22b**
			Large	**10c**					**Large**	**22c**
Dried Fish (Small Variety)	502	Heap	**Small**	**10d**		Salt	810	No.10 Plate	**Flat**	**6a**
			Medium	**10e**					**Heaped**	**6b**
			Large	**10f**						