



INSTITUTO NACIONAL DE ESTATÍSTICA
EM PARCERIA COM O MINISTÉRIO DA AGRICULTURA E DESENVOLVIMENTO RURAL

Draft

Mozambique Census of Agriculture and Livestock 2009 -2011

CENSUS METHODOLOGY

November 2012

3. SAMPLE DESIGN AND ESTIMATION PROCEDURES

3.1. Introduction

One of the major objectives of the 2009/11 Mozambique Census of Agriculture and Livestock (CAP II) was to provide reliable district-level estimates for major crops and livestock. Given the very large budget and resources that would be required to completely enumerate all the agricultural holdings in Mozambique, it was not feasible to use 100% enumeration. Therefore a cost-effective and statistically efficient sample was designed for CAP II to provide as much reliable information as possible for the 148 districts of Mozambique; this still required a relatively large sample size of more than 40,000 farm holdings. Another objective of CAP II was to provide a sampling frame for the annual Integrated Agricultural Surveys to be conducted each year for providing crop forecasts and post-harvest estimates of the total crop and livestock production.

The CAP II was timed to follow the 2007 Mozambique Census of Population and Housing, which provided an effective area sampling frame for CAP II. The census enumeration areas (EAs) were defined as the primary sampling units (PSUs) for the area frame, and a stratified two-stage sample design was used for CAP II.

Given the relative importance of large farms in measuring crop area and production as well as livestock, a list frame of large farms was also developed for CAP II; the definition of large farm is described later in this chapter. All of the large farms in this list frame were enumerated in CAP II, and these farms were removed from the area frame to avoid duplication.

The purpose of this chapter is to provide a comprehensive description of all the different aspects of the sample design for CAP II. This sample design was originally developed by Dr. Arun Srivastava, FAO Sampling Consultant, in collaboration with Statisticians at the Instituto Nacional de Estatística (INE), including Basílio Cubula and Carlos Creva. The CAP II was planned jointly by INE and the Mozambique Ministry of Agriculture (MINAG).

3.2. Sampling Frames

In an Agricultural Census the information is collected for farm holdings, which are identified through the households with agricultural or livestock operations. For the purposes of developing an effective sample design the farm holdings were classified by size in terms of total farmland, cultivated area and number of livestock. Figure 3.1 defines the cut-offs used to classify the farm holdings by size.

Figure 3.1. Classification of Farm Holdings by Size for CAP II

Class of Holding	Land Area	Cultivated Area	Livestock
Large holdings	100 hectares	OR 50 ha. of cultivated land including both annual and permanent crops	OR 100 cattle OR 500 small ruminants and pigs OR 2000 poultry
Medium holdings	25 hectares	OR 10 ha. of cultivated land including both annual crops and organized plantations OR 5 ha. irrigated land with annual crops	OR 10 cattle OR 50 small ruminants and pigs OR 200 poultry
Small holdings	Less than 25 hectares	AND less than 10 ha. annual cultivation AND less than 5 ha. irrigated	AND less than 10 cattle AND less than 50 small ruminants and pigs AND less than 200 poultry

It is important to enumerate all the large farm holdings in CAP II given their relative importance for measuring total agricultural and livestock production. Therefore a special list frame was developed to identify the large farm holdings in each district. A total of 833 large farms were enumerated in Mozambique for CAP II. These farms were excluded from the area frame to avoid duplication.

The INE conducted the 2007 Census of Population and Housing in August 2007. The 2007 Census involved a complete enumeration of all the households in Mozambique. The country is divided administratively into provinces, districts, postos administrativos, localidades, and bairros or aldeias (villages). For the purposes of the census operations each localidade is divided into enumeration areas (EAs), with an average of 97 households each; the urban EAs had an average size of 114 households, and the rural EAs had an average of 92 households. A total of 45,279 EAs were delineated for the census, mostly identified on maps in a geographic information system (GIS). These EAs were used as primary sampling units (PSUs) in the two-stage sample design for the CAP II.

The 2007 Census questionnaire included questions to identify agricultural activities in Section G, which were used for identifying households that operate farms, and to classify the farm holdings by size. Section G of the census questionnaire included the following questions:

- G 1: *Does any member of the household practice agriculture?*
 Yes No

- G2: *Does the household have any tanks for aquaculture?*
 Yes No
 If yes, how many? _____

- G3: *Does any member of the household practice traditional fishing?*
 Yes No

- G4: *Does this household have cashew nut trees?*
 Yes No
 If yes, how many? _____

- G5: *Does this household have coconut trees?*
 Yes No
 If yes, how many? _____

- G6: *Types and numbers of animals on the holding.*
 - G 6.1 *Cattle* _____
 - G 6.2 *Goats* _____
 - G 6.3 *Sheep* _____
 - G 6.4 *Pigs* _____
 - G 6.5 *Chickens* _____
 - G 6.6 *Ducks* _____

In order to have an efficient sample design for the area frame based on the 2007 Census, the information in Section G was used for determining the number of agricultural households in each EA. This was used as the measure of size for selecting the EAs with probability proportional to size (PPS) within each district. First it was necessary to establish the minimum criteria for defining the agricultural households from the information in Section G. The matrix in Figure 3.2 shows alternatives that were considered for determining the minimum cut-off criteria for identifying agricultural households based on the information in Section G of the census questionnaire.

Figure 3.2. Comparison of Scenarios for Minimum Criteria for Defining Agricultural Holdings

Variables Section G	Urban/ Rural	Scenario 1	Scenario 2	Scenario 3	Scenario 4	Scenario 6
Agriculture (G1=1)	U& R	All Households	All Households	All Households	All Households	All Households
Cashew + Coconut	U R	- -	≥ 5 ≥ 5	≥ 5 ≥ 1	≥ 5 ≥ 5	≥ 5 ≥ 1
Cows	U R	≥ 1 ≥ 1	≥ 1 ≥ 1	≥ 1 ≥ 1	≥ 1 ≥ 1	≥ 1 ≥ 1
Goats + Sheep + Pork	U R	≥ 1 ≥ 1	≥ 1 ≥ 1	≥ 3 ≥ 1	≥ 3 ≥ 3	≥ 3 ≥ 1
Chickens + Ducks	U R	≥ 1 ≥ 1	≥ 1 ≥ 1	≥ 5 ≥ 1	≥ 5 ≥ 5	≥ 10 ≥ 1
Agricultural Households		3,592,103	3,691,651	3,659,297	3,433,733	3,611,629
% of Total Households		75.0%	77.0%	76.4%	71.7%	75.4%

After reviewing these different options it was decided to use the criteria in Scenario 6 to count the number of agricultural households in each EA. Both urban and rural EAs are in the sampling frame for CAP II. However, any EAs with less than 15 agricultural households were dropped from the sampling frame; most of these dropped EAs were urban. The total number of EAs in the final sampling frame for CAP II based on the 2007 Census was 44,859: 35,333 rural EAs and 9,526 urban EAs. Table 1 shows the distribution of agricultural households by province, urban and rural strata in the final sampling frame for CAP II. It can be seen in Table 1 that that about 44 percent of the agricultural households are concentrated in the provinces of Nampula and Zambézia. The combination of Maputo Province and Maputo Cidade have less than 5 percent of the agricultural households. Table 1 also shows that the percent of urban agricultural households varies by province from 7.3 percent for Cabo Delgado to 41.4 percent for Maputo Province (and Maputo Cidade is 100 percent urban by definition).

Table 2 shows the distribution of census EAs in the CAP II sampling frame by province, rural and urban strata, as well as the average number of agricultural households per EA in each stratum. As mentioned above, the CAP II sampling frame excludes EAs with less than 15 agricultural households, which are mostly concentrated in the urban areas. The average number of agricultural households per EA is 84 for rural EAs and 57 for urban EAs. Even though the average number of households per EA is larger in the urban areas, the percent of households that have agricultural operations is higher in rural areas, as expected.

Table 1. Distribution of Agricultural Households by Province, Rural and Urban Strata, in CAP II Sampling Frame Based on Mozambique 2007 Census

Province	Total	% National	Rural	Urban	% Urban
Niassa	202,172	5.7%	176,330	25,842	12.8%
Cabo Delgado	316,080	8.9%	292,965	23,115	7.3%
Nampula	782,199	22.1%	655,816	126,383	16.2%
Zambézia	778,312	22.0%	695,247	83,065	10.7%
Tete	326,107	9.2%	302,238	23,869	7.3%
Manica	237,022	6.7%	197,514	39,508	16.7%
Sofala	255,718	7.2%	189,465	66,253	25.9%
Inhambane	258,807	7.3%	218,194	40,613	15.7%
Gaza	208,208	5.9%	179,024	29,184	14.0%
Maputo Province	124,593	3.5%	73,447	51,146	41.1%
Maputo Cidade	45,059	1.3%	0	45,059	100.0%
Mozambique	3,534,277	100.0%	2,980,240	554,037	15.7%

Table 2. Distribution of EAs in CAP II Sampling Frame by Province, Rural and Urban Strata, with Corresponding Average Number of Agricultural Households per EA, Based on Mozambique RGPH 2007

Province	Total		Rural		Urban	
	No. EAs	Avg. Agric. Hhs./EA	No. EAs	Avg. Agric. Hhs./EA	No. EAs	Avg. Agric. Hhs./EA
Niassa	2,560	79	2,166	81	394	66
Cabo Delgado	3,756	84	3,470	84	286	81
Nampula	9,882	79	7,830	84	2,052	62
Zambézia	9,117	85	7,877	88	1,240	67
Tete	3,979	82	3,569	85	410	58
Manica	2,860	83	2,295	86	565	70
Sofala	3,552	72	2,484	76	1,068	62
Inhambane	3,002	86	2,519	87	483	84
Gaza	2,610	80	2,160	83	450	65
Maputo Province	2,094	60	963	76	1,131	45
Maputo Cidade	1,447	31	0	-	1,447	31
Mozambique	44,859	79	35,333	84	9,526	58

Table 3 shows the distribution of EAs in the CAP II sampling frame for different ranges of the number of agricultural households, by rural and urban stratum. It can be seen that most of the EAs are concentrated in the ranges between 25 and 124 agricultural households. The variability in the number of agricultural households by EA, measured by the standard deviation, is similar for the rural and urban areas.

Table 3. Distribution of Enumeration Areas in the CAP II Sampling Frame by Number of Agricultural Households, and Rural and Urban Strata

Number of Agricultural Households	Number of EAs		
	Total	Rural	Urban
15 – 24	2,472	874	1,598
25 – 49	8,696	5,565	3,131
50 – 74	10,941	8,903	2,038
75 – 99	10,462	8,988	1,474
100 – 124	6,783	6,006	777
125 – 149	3,306	2,945	361
150 – 174	1,448	1,334	114
175 – 199	600	575	25
200 – 249	131	125	6
250 – 299	14	12	2
300 +	6	6	0
Total	44,859	35,333	9,526
Mean	79	84	58
Minimum	15	15	15
Maximum	332	332	265
Std. Dev.	38.4	37.4	34.8

It should be noted that the sampling frame from the 2007 Mozambique Census of Population and Housing was based on agricultural households as a proxy for counting farm holdings, because the census data were based on households. There is generally a one-to-one correspondence between agricultural households and farm holdings, especially for the small and medium size farms. However, in the listing that was conducted in the sample EAs, the farm holdings are identified as the second stage sampling units, which are classified by size.

A new listing of all the households and farm holdings was conducted in each sample EA selected at the first sampling stage. A census map was produced for each sample EA that identified the EA boundaries, and Global Positioning System (GPS) devices were also used during the listing stage to ensure complete coverage of the households in each EA. The listing sheet included information on the name of the head of household and the address, as well as information on the total cultivated and irrigated area, the number of cashew, coconut and fruit trees, and the number of animals by type. This information was used for a second stage stratification of the farm holdings by size. The last three columns of the listing sheet were used for assigning serial numbers to the farm holdings in each size category.

The units of analysis were the individual farm holdings. All of the farms identified in the listing as medium or large were included in the sample with certainty at the second stage, and a sample of small farms was selected with equal probability. It was

necessary to match the large farm holdings identified in the listing to the list frame of large farms in order to avoid any duplication.

3.3. Stratification

In order to increase the efficiency of the sample design for CAP II, it is important to divide the sampling frame of EAs into strata that are as homogeneous as possible. The first stage sample selection is carried out independently within each explicit stratum. The nature of the stratification depends on the domains of analysis as well as the most important characteristics to be measured in the survey. The strata should be consistent with the geographic domains in the survey tables. It is also desirable to order the PSUs within each stratum geographically, in order to provide further implicit stratification when systematic sampling is used.

Since the geographic domains of analysis for CAP II are the districts, the sampling frame of census EAs was first stratified by district. Given the different characteristics of the rural and urban farm holdings, the sampling frame was further divided into urban and rural explicit strata within each district. Even though the survey results will not be tabulated by urban and rural strata within each district, this lower level of explicit stratification improved the efficiency of the sample design. Within each explicit stratum the EAs were ordered geographically in order to provide implicit stratification given that the sample EAs were selected systematically with PPS.

3.4. Sample Size and Allocation for CAP II

The sample size for a census or survey is determined by the accuracy required for the survey estimates for each domain, as well as by the resource and operational constraints. The accuracy of the survey results depends on both the sampling error, which can be measured through variance estimation, and the nonsampling error from all other sources. 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. The sample size also depends on cost considerations and logistical issues related to the organization of the teams of enumerators and the workload for the data collection. Given that reliable estimates of crop and livestock production are needed at the district level, the overall sample size for CAP II was expected to be large. However there was also an overall budget constraint that limited the total sample size. It was initially planned that the overall sample size would be around 40,000 farm holdings (including about 38,000 small holdings and 2,500 medium-size holdings), so the budget was determined on this basis.

Another important consideration is the number of PSUs to be selected in each stratum and the number of households to be selected in each sample PSU. Based on the experience from CAP I and the annual agricultural surveys, it was decided to select 10 small farm holdings per sample EA for CAP II. This is consistent with the optimum

number of sample households per cluster used for similar agricultural censuses and surveys conducted in other countries.

The total number of sample EAs for CAP II was 3,502 EAs. Different alternatives were considered for allocating the sample districts. Proportional allocation would improve the efficiency of the sample design for national-level estimates, although the sample allocated to the smaller districts may not be sufficient for obtaining reliable estimates. Equal sample allocation would improve the level of precision for the smaller districts, but would be less efficient for estimates at the provincial and national levels. As a compromise it was decided to use power allocation, where the sample is allocated in proportion to x^λ , where λ is a value between 0 and 1. When λ is equal to 0 we have equal allocation, and when λ is equal to 1 the allocation is proportional. In this case a lower value of λ will increase the sample size for the smaller districts. A common type of power allocation is when λ is equal to 1/2, in which case the allocation is proportional to the square root of the total number of farm holdings in each stratum. In order to increase the sample size slightly more for the smallest districts, it was decided to set λ equal to 0.4 for the power allocation used to determine the number of sample EAs to be selected in each district for CAP II. This resulted in a minimum allocation of 10 sample EAs to the smallest districts, and a maximum sample of 46 EAs for the largest district.

The final distribution of the sample EAs and farm holdings is presented in Annex A. There was one sample EA that was not covered in CAP II, so the total number of EAs enumerated was 3,501. It was found that in some sample EAs more than 10 small farm holdings were selected. For this reason the total number of small farm holdings in the CAP II sample was 38,217. The total number of medium size farm holdings in the sample was 2,449. Following the selection of sample EAs, it was found that some of the EAs in the 2007 Census frame had an incorrect urban/rural code, so these codes were updated in the CAP II data. As a result there is a slight difference between the original sample allocation and the final distribution of the sample EAs for some strata.

3.5. Sample Selection Procedures

In the case of the list frame of 833 large farm holdings, all were included in the sample with certainty. These farms were excluded from the area frame. However, if additional large farms were found in the sample EAs that were not in the list frame, they were included with certainty at the second sampling stage, and received the same weights as the medium size farm holdings.

The sample design for the area frame involved two stages of selection. Each stage is described separately in this section.

3.5.1. First Stage Selection of EAs

At the first sampling stage the EAs were selected systematically with probability proportional to size (PPS) within each stratum (district, urban and rural). The measures of size were based on the number of agricultural households in the EA from the 2007

Census frame. Prior to the first sampling stage the EAs in the sampling frame for each stratum were ordered geographically (for example, in a serpentine manner) in order to provide implicit stratification and obtain a sample that is geographically representative within each stratum. The following procedures were used for selecting the sample EAs within each stratum (district, urban/rural) systematically with PPS:

1. Cumulate the measures of size (number of agricultural households) down the ordered list of EAs within the stratum. The final cumulated measure of size will be the total number of agricultural households in the frame for the stratum (M_h).
2. To obtain the sampling interval for stratum h (I_h), divide M_h by the total number of EAs to be selected in stratum h (n_h): $I_h = M_h/n_h$.
3. Select a random number (R_h) between 0 and I_h , and maintain at least two decimal places. The sample PSUs in stratum h will be identified by the following selection numbers:

$$S_{hi} = R_h + [I_h \times (i - 1)], \text{ rounded up,}$$

where $i = 1, 2, \dots, n_h$

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

The INE staff has experience with this procedure for selecting PSUs systematically with PPS for their national household surveys, using an Excel spreadsheet. They use formulas based on cumulating the probabilities rather than the measures of size directly, but the results are equivalent.

3.5.2. Listing of Farm Holdings in Each Sample EA

The second stage sampling frame was based on a listing of all the households and farm holdings in each sample EA. The listing sheet includes information on the name of the head of household, the address, the area of planted in crops and area irrigated, the number of cashew, coconut and fruit trees, and the number of animals by type. This information was used to classify the farm holdings by size category, according to the cut-offs specified in Figure 3.1. Census maps were used for identifying the boundaries of the sample EAs, in order to ensure complete coverage during the listing.

3.5.3. Second Stage Selection of Sample Farm Holdings

The listing sheet includes columns for assigning separate serial numbers for the small, medium and large farm holdings listed in the EA. All of the medium and large farm holdings identified in the listing are included in the sample with certainty at the second sampling stage. A random systematic sample of 10 small farm holdings was selected with equal probability in each sample EA, using the following procedures:

1. All the small farm holdings in the sample EA are assigned a serial number from 1 to M_{hi} , the total number of small farm holdings in the EA.
2. To obtain the sampling interval for the selection of small farm holdings within the EA (I_{hi}), divide M_{hi} by m_{hi} (generally equal to 10), and maintain 2 decimal places.
3. Select a random number (R_{hi}) with 2 decimal places, between 0.01 and I_{hi} . The sample small farm holdings within the sample EA will be identified by the following selection numbers:

$$S_{hij} = R_{hi} + [I_{hi} \times (j-1)], \text{ rounded up,}$$

where $j = 1, 2, 3, \dots, m_{hi}$

The j -th selected small farm holding is the one with a serial number equal to S_{hij} .

At the same time 10 sample small farm holdings were selected in each sample EA, an additional 3 small farm holdings were selected for each sample EA as a reserve to used for possible replacement for small farm holdings that could not be interviewed.

3.6. Estimation Procedures for CAP II

This section describes the procedures used for calculating the weights for the CAP II sample farm holdings, producing weighted estimates from the survey data, and calculating sampling errors.

3.6.1. Weighting Procedures for CAP II Sample Farm Holdings

In order for the sample estimates from CAP II to be representative of the population, it is necessary to multiply the data by a sampling weight. The basic weight for each sample farm holding would be equal to the inverse of its probability of selection (calculated by multiplying the probabilities at each sampling stage). Given that the weights will be different for each farm size (small, medium and large), the calculation of the weights is specified individually for each type of farm holding.

3.6.1.1. Weights for Large Farm Holdings

A list frame of large farm holdings in each district was developed for CAP II. All of these large farms were included in the CAP II sample with a probability of 1; that is, all the large farms are self-representing. Therefore the basic weight for these large farms is equal to 1.

It is important to adjust the weights to take into account the large farm holdings which cannot be interviewed. The final weight ($W_{d(g)}$) for the large farms within each district can be expressed as follows:

$$W_{d(g)} = \frac{M_{d(g)}}{M'_{d(g)}},$$

where:

$W_{d(g)}$ = adjusted weight for the large farm holdings in district d

$M_{d(g)}$ = number of in-scope large farm holdings in the frame for district d

$M'_{d(g)}$ = total number of large farm holdings with completed interviews in district d

In the listing of the sample EAs for CAP II, some farm holdings were identified that met the criteria of large farms but did not appear in the frame of large farm holdings for the district. It is important to distinguish these large farms from those in the original frame of large farm holdings in the district, because the probabilities of selection will be different. In the case of large farms found in the listing of the sample EA (and that do not appear in the frame of large farms for the district), the weight will be the same as that specified next for medium farm holdings.

3.6.1.2. Weights for Medium Farm Holdings

All of the medium farm holdings found in each sample EA were included in the sample for CAP II. Therefore the probability of selection for these medium farm holdings will be equal to the probability of selection for the EA. The EAs were selected with PPS for the CAP II within each district, rural and urban stratum, where the measure of size was based on the number of agricultural households in the sampling frame from the 2007 Mozambique Census of Population and Housing. Based on this sample design, the overall probability of selection for the medium farm holdings can be calculated using the following formula:

$$p_{hi(m)} = \frac{n_h \times M_{hi}}{M_h},$$

where:

$p_{hi(m)}$ = probability of selection for the medium farm holdings in the i-th sample EA in stratum (district, rural/urban) h

n_h = number of EAs selected in stratum h for CAP II

M_{hi} = total number of agricultural households in the CAP II sampling frame (from the 2007 Census frame) for the i-th sample EA in stratum h

M_h = total number of agricultural households in the CAP II sampling frame (from the 2007 Census) for stratum h

The basic weight for the medium farm holdings would be the inverse of this overall probability, calculated as follows:

$$W_{hi(m)} = \frac{M_h}{n_h \times M_{hi}}$$

where:

$W_{hi(m)}$ = basic weight for medium farm holdings in the i-th sample EA in stratum h

It should be noted that any large farm holding identified in the listing for a sample EA that is not included in the frame of large farms would have the same weight as that for the medium farm holdings.

It will be necessary to adjust these basic weights for the medium farm holdings at the EA level to take into account any households that could not be interviewed. The adjusted weight ($W'_{hi(m)}$) for the medium farm holdings can be expressed as follows:

$$W_{hi(m)} = W'_{hi(m)} \times \frac{M_{hi(m)}}{M'_{hi(m)}}$$

where:

$M_{hi(m)}$ = number of medium farm holdings listed in the i-th sample EA in stratum h

$M'_{hi(m)}$ = number of medium farm holdings with completed interviews for CAP II in the i-th sample EA in stratum h

3.6.1.3. Weights for Small Farm Holdings

Given that the small farm holdings are selected at the second sampling stage, it is necessary to multiply the probabilities of the first and second stages. The probability of selection of the EA is the same as the probability for the medium farm holdings described above. Based on the sample design, the probability of selection of a small farm holding for CAP II can be expressed as follows:

$$p_{hi(s)} = \frac{n_h \times M_{hi}}{M_h} \times \frac{m_{hi(s)}}{M'_{hi(s)}}$$

where:

$m_{hi(s)}$ = number of small farm holdings selected in the i-th sample EA in stratum h
(generally $m_{hi(s)} = 10$)

$M'_{hi(s)}$ = number of small farm holdings listed in the i-th sample EA in stratum h

The basic sampling weight is calculated as the inverse of this probability of selection. Based on the formula above for the probability, the basic weight for the small farm holdings can be simplified as follows:

$$W_{hi(s)} = \frac{M_h \times M'_{hi(s)}}{n_h \times M_{hi} \times m_{hi(s)}}$$

where:

$W_{hi(s)}$ = basic weight for the small farm holdings selected in the i-th sample EA in stratum h

As in the case of the medium farm holdings, it is necessary to adjust the weights of the small farm holdings at the EA level to take into account the non-interview households. The adjusted weight ($W'_{hi(s)}$) for the small farm holdings in each sample EA can be calculated as follows:

$$W'_{hi(s)} = W_{hi(s)} \times \frac{m_{hi(s)}}{m'_{hi(s)}}$$

where:

$m'_{hi(s)}$ = number of small farm holdings with completed interviews for CAP II in the i-th sample EA in stratum h

An Excel spreadsheet was developed for calculating the weights for the small and medium farm holdings. Following the listing operation it was necessary to enter in the spreadsheet the total number of farm holdings of each size listed in the sample EAs in order to calculate the basic weights for CAP II. Following the data collection it was also necessary to enter in the spreadsheet the number of farm holdings of each size in the EA with completed interviews. This Excel spreadsheet included formulas for calculating the adjusted weights.

3.6.1.4. Adjustment of Weights Based on Projected Number of Agricultural Households

In order to reduce the effects of the first stage sampling variability on the CAP II estimates of total crop area and production and the total number of livestock, the weights of all sample farm holdings were further adjusted based on the projected total number of agricultural households.

The data from the 1997 and 2007 Mozambique Censuses of Population and Housing on the total number of agricultural households in each district were used to determine the linear annual growth rate of agricultural households by district. This annual growth rate was then multiplied by 3 to estimate the growth rate of agricultural households in the district between the 2007 Census and the CAP II (2010). This 3-year growth rate was then applied to the total number of agricultural households enumerated in the 2007 Census in order to estimate the projected total number of agricultural households in 2010. The basic weights (adjusted for nonresponse) were used to obtain preliminary weighted estimates of the total number of farm holdings in each district. The final weight adjustment factor was then calculated as the ratio of the projected total number of agricultural households to the preliminary CAP II weighted estimate for the district. The final weight adjustment factor can be expressed as follows:

$$F_d = \frac{Y_{d(2010)}^{projected}}{\hat{Y}_{d(CAPII)}} ,$$

where:

F_d = final weight adjustment factor for all CAP II sample farm holdings in district d

$Y_{d(2010)}^{projected}$ = projected total number of agricultural households in district d in 2010, based on the number of agricultural households from the 2007 Mozambique Census and the annual growth rate between the 1997 and 2007 Censuses

$\hat{Y}_{d(CAPII)}$ = preliminary weighted estimate of the total number of farm holdings (small, medium and large) from the CAP II data for district d based on design weights adjusted for response

In this case the projected total number of agricultural households in each district was calculated as follows:

$$Y_{d(2010)}^{projected} = Y_{d(2007)} \times 3 \times \left(1 + \frac{Y_{d(2007)} - Y_{d(1997)}}{Y_{d(1997)} \times 10} \right),$$

where:

$Y_{d(2007)}$ = total number of agricultural households in district d from 2007
Census data

$Y_{d(1997)}$ = total number of agricultural households in district d from 1997
Census data

The average of the adjustment factors F_d for all districts was 1.08583. The factor F_d varied from 0.29987 for Inhaca District in Maputo City to 1.92627 for Cidade de Matola in Maputo Province. This illustrates that the estimation of the total number of farm holdings may be more problematic in urban areas, given that more urban EAs were excluded from the CAP II sampling frame because they had less than 15 farm households. In the case of Inhaca District, there were only 711 agricultural households in the 1997 Census and 892 in the 2007 Census, so this island is the smallest district. The preliminary CAP II weighted estimate of the total number of farm holdings for Inhaca District was 2,823, resulting in a very small adjustment factor. Given the small size of this district it does not have much effect of the CAP II results. There were only 10 sample EAs in the CAP II sample for this district, and part of this difference could be due to sampling variability. However, this could also be an indication that the 2007 Census may not have identified the agricultural households well in some urban areas.

As part of the review of the weights, it is also important to compare the number of farm holdings listed for CAP II in each sample EA to the corresponding number of agricultural households in the EA from the 2007 Census frame. The number of farm holdings listed in CAP II was available in a spreadsheet that was used for calculating the weights for the CAP II sample for the South region, so this comparison was only conducted for the districts in this region. Considerable differences were found between the listing results and the census counts of agricultural households by EA. The differences varied from a sample EA with 82.9% less farm holdings listed compared to the census to an EA with 780% more farm holdings identified in the listing. The overall correlation between the number of agricultural households in the 2007 Census count by EA to the corresponding information from the listing was only 28.4%, which is fairly low.

It is also useful to weight the total number of farm holdings listed in each CAP II sample EA by the weight of the EA in order to obtain a sample estimate of the total number of farm holdings in each district. This estimate can then be compared to a corresponding weighted estimate using the 2007 Census count of agricultural households in the sample EAs. This comparison was done for the districts in the South region. Because of the differences between the 2007 Census data and the listing for sample EAs, there were also considerable differences between the corresponding weighted estimates of

the total number of farm holdings. For the South region, the weighted estimate of the overall total number of farm holdings from the listing was 2.2% higher than the corresponding weighted estimate based on the 2007 Census data for the sample EAs. However, the differences varied considerably by district. The differences appear to be greater for the predominantly urban districts. These discrepancies between the 2007 Census frame and the CAP II listing contributed to the variability in the final weight adjustment factors F_d by district. Given that the final weights for the CAP II data depend on these adjustment factors based on the 2007 Census counts of the number of agricultural households and the estimated annual growth rate, it is important to study the source of the differences between the 2007 Census frame and the listing. For example, it is necessary to determine how well the census was able to identify the agricultural households.

3.6.2.Types of Survey Estimates

The most common survey estimates calculated from the CAP II data are in the form of totals and ratios. The survey estimate of a total can be expressed as follows:

$$\hat{Y} = \sum_{h=1}^L \sum_{i=1}^{n_h} W_{hi} y_{hij} ,$$

where:

L = number of strata

y_{hij} = value of variable y for the j-th sample household within the i-th sample EA in stratum h

This total is simply the sum of the weighted data for all the sample farm holdings in the corresponding strata.

The survey estimate of a ratio is defined as follows:

$$\hat{R} = \frac{\hat{Y}}{\hat{X}} ,$$

where \hat{Y} and \hat{X} are estimates of totals for variables y and x, respectively, calculated as specified previously.

In the case of a stratified two-stage sample such as that for CAP II, means and proportions are special types of ratios. In the case of the mean, the variable x in the denominator of the ratio is defined to equal 1 for each unit of analysis (for example, farm holding) so that the denominator is simply the sum of the weights. For a proportion, the variable x in the denominator is also defined to equal 1 for all elements, and the variable

y in the numerator is binomial and is defined to equal either 0 or 1, depending on the absence or presence, respectively, of a specified characteristic.

3.6.3. Calculation of Sampling Errors

In the publication of the results for CAP II, it is important to include a statement on the accuracy of the survey data. In addition to presenting tables with calculated sampling errors and confidence intervals for the most important survey estimates, the different sources of nonsampling error should be described.

The standard error, or square root of the variance, is used to measure the sampling error, although it may also include a small variable part of the nonsampling error. The variance estimator should take into account the different aspects of the sample design, such as the stratification and clustering. Software packages such as Stata and the Complex Samples module of SPSS use a variance estimator that takes into account the sample design. These programs use a linearized Taylor series type of variance estimator. For each estimate, the tables show the standard error, coefficient of variation (CV), 95 percent confidence interval, the design effect (DEFF) and the number of observations. Since the INE staff have the Complex Samples module of SPSS available, this software was used for tabulating the sampling errors for the CAP II estimates of total crop area and number of livestock.

For the estimate of a total, the variance is calculated by SPSS Complex Samples and Stata using the following formula:

Variance Estimator of a Total

$$V(\hat{Y}) = \sum_{h=1}^L \left[\frac{n_h}{n_h - 1} \times \sum_{i=1}^{n_h} \left(\hat{Y}_{hi} - \frac{\hat{Y}_h}{n_h} \right)^2 \right],$$

where:

$$\hat{Y}_{hi} = \sum_{j=1}^{m_{hi}} W_{hi} y_{hij}$$

$$\hat{Y}_h = \sum_{i=1}^{n_h} \hat{Y}_{hi}$$

For a ratio estimate, the variance is calculated by SPSS Complex Samples and Stata using the following formula:

Variance Estimator of a Ratio

$$V(\hat{R}) = \frac{1}{\hat{X}^2} \times [V(\hat{Y}) + \hat{R}^2 \times V(\hat{X}) - 2 \times \hat{R} \times COV(\hat{X}, \hat{Y})],$$

where:

$$COV(\hat{X}, \hat{Y}) = \sum_{h=1}^L \left[\frac{n_h}{n_h - 1} \times \sum_{i=1}^{n_h} \left(\hat{X}_{hi} - \frac{\hat{X}_h}{n_h} \right) \left(\hat{Y}_{hi} - \frac{\hat{Y}_h}{n_h} \right) \right]$$

$V(\hat{Y})$ and $V(\hat{X})$ are calculated according to the formula for the variance of a total, specified previously.

In developing the SPSS Complex Samples application for calculating the sampling errors, it was necessary to develop a sample plan specification file (csplan) to identify the variables for the strata, PSUs and weights. It was necessary to generate a stratum variable that uniquely identified each district by urban and rural stratum; this was done by concatenating the district and urban/rural codes. The CAP_ID code uniquely identifies each EA in the CAP II sample, so this variable was used for identifying the PSU or cluster in the sample design.

The SPSS Complex Samples software was used for tabulating the sampling errors of selected estimates for total area cultivated by crop and the total number of animals for different domains from the CAP II data for sample small and medium farm holdings. These results are presented in Annex B in order to illustrate the level of precision for different estimates down to the district level. A relative measure of precision that is useful for comparing the reliability of the estimates for the different crops and animals is the coefficient of variation (CV), which is defined as the standard error divided by the value of the estimate; in Annex B the CVs are presented in the form of percentages. It can be seen in the different tables in Annex B that the CVs generally decrease as the sample size increases.

Table B1 presents the measures of precision for the CAP II estimates of the total number of hectares planted in different crops at the national level. It can be seen in this table that the crop with the highest frequency is corn (37,286 sample farm holdings). The CV for the total area planted in corn at the national level is only 1.7%, which indicates a very good level of precision. However, there are also a few crops with less than 100 sample farm holdings at the national level, with CVs higher than 30%, such as paprika, ginger and wheat. In general, the CV is inversely proportional to the square root of the number of observations, although it also depends on the variability in the area planted for each particular crop, as well the design effect, which generally depends on the clustering effect. The design effect is defined as the ratio of the variance of an estimate based on the actual sample design to the corresponding variance from a simple random sample of the same size; it is a measure of the relative statistical

efficiency of the sample design. The design effect is higher when there is more homogeneity (similarity) of the farm holdings within a cluster.

In the case of provincial and district-level estimates of the total area planted in different crops, the level of precision also varies by crop depending on the number of observations. In the case of crops with less observations at the national level, the estimates are generally not reliable at lower levels of disaggregation. In order to illustrate the level of precision for lower levels of precision, Tables A2 and A3 show the SPSS Complex Samples results for estimates of the total area planted in corn at the provincial and district levels. Since corn is found on most farm holdings throughout Mozambique, the level of precision for the estimates of area planted in corn is good at the provincial level, with CVs below 10% for all provinces except for Maputo City (which only had 564 sample farm holdings with corn). However, it can be seen in Table A3 that the level of precision varies considerably by district. Only 5 of the 148 districts have a CV within 10%, and another 55 districts have a CV between 10% and 15%, which is still considered acceptable. Since most of the other crops have CVs that are higher than those for corn, many of the crop estimates at the district level would not be considered reliable. For this reason the district-level crop estimates should be used with caution, and it is important to consider the confidence intervals in comparing the district-level estimates.

Measures of precision were also tabulated for estimates of the total number of animals by type, shown in Table B4. The level of precision varies considerably by type of animal, mostly based on the number of sample farm holdings that raise the animal. The most frequent category is chickens (with 24,400 sample small and medium farm holdings), with a CV of 2.1% at the national level. The least frequent category is geese, with a CV of 41%, but the CVs are within 15% for the other types of animals at the national level. Table B5 shows the results separately for the urban and rural areas. It can be seen that some of the CVs are fairly high for categories with fewer observations. In the case of the CAP II estimate of the total number of chickens for small and medium farm holdings, the CV is 2.2% for the rural stratum, but 7.5% for the urban stratum.

In order to illustrate the level of precision for the estimates of the total number of animals in small and medium farm holdings at the provincial and district levels, Tables B6 and B7 show the SPSS Complex Samples results for chickens. It can be seen in Table B6 that the CVs for the estimates of the total number of chickens are below 10% for all provinces except for Maputo City and the Province of Maputo, which both have CVs greater than 20% because of the smaller number of sample farm holdings. According to Table B7, only 6 districts have CVs within 10%, and another 60 districts have CVs between 10 and 15%. In the case of the other types of animals that are less frequent, many of the results are not reliable at the district level.

ANNEX A. Final Distribution of Sample EAs and Sample Farm Holdings for CAP II by District, Urban and Rural Strata

District	Total			Urban			Rural		
	Sample EAs	Small Holdings	Medium Holdings	Sample EAs	Small Holdings	Medium Holdings	Sample EAs	Small Holdings	Medium Holdings
CIDADE DE LICHINGA	19	201	5	19	201	5	0	0	0
CUAMBA	27	283	9	8	84	7	19	199	2
LAGO	21	215	6	2	20	0	19	195	6
LICHINGA	22	237	2	0	0	0	22	237	2
MAJUNE	15	152	0	0	0	0	15	152	0
MANDIMBA	26	272	3	2	21	0	24	251	3
MARRUPA	18	183	1	2	22	0	16	161	1
MAUA	18	181	2	0	0	0	18	181	2
MAVAGO	12	123	0	0	0	0	12	123	0
MECANHELAS	28	287	10	2	20	6	26	267	4
MECULA	10	100	0	0	0	0	10	100	0
METARICA	13	137	0	0	0	0	13	137	0
MUEMBE	13	135	2	0	0	0	13	135	2
N'GAUMA	20	208	5	0	0	0	20	208	5
NIPEPE	15	156	0	0	0	0	15	156	0
SANGA	19	198	3	2	20	1	17	178	2
CIDADE DE PEMBA	17	179	8	17	179	8	0	0	0
ANCUABE	25	257	0	0	0	0	25	257	0
BALAMA	27	277	1	0	0	0	27	277	1
CHIURE	34	349	4	4	41	1	30	308	3
IBO	10	100	2	4	40	2	6	60	0
MACOMIA	22	226	0	5	50	0	17	176	0
MECUFI	17	176	2	0	0	0	17	176	2
MELUCO	14	141	0	0	0	0	14	141	0
MOCIMBOA DA PRAIA	22	229	2	7	72	1	15	157	1
MONTEPUEZ	31	325	0	10	107	0	21	218	0
MUEDA	25	270	3	3	32	0	22	238	3
MUIDUMBE	21	211	1	0	0	0	21	211	1
NAMUNO	32	323	0	0	0	0	32	323	0
NANGADE	21	298	15	0	0	0	21	298	15
PALMA	18	197	2	0	0	0	18	197	2
PEMBA - METUGE	20	207	2	0	0	0	20	207	2
QUISSANGA	16	161	0	0	0	0	16	161	0
CIDADE DE NAMPULA	29	302	7	29	302	7	0	0	0

Annex A. Final Distribution of Sample EAs and Sample Farm Holdings for CAP II by District, Urban and Rural Strata (Continued)

District	Total			Urban			Rural		
	Sample EAs	Small Holdings	Medium Holdings	Sample EAs	Small Holdings	Medium Holdings	Sample EAs	Small Holdings	Medium Holdings
ANGOCHE	36	381	4	11	114	1	25	267	3
NAMAPA-ERATI	36	394	4	3	29	1	33	365	3
CIDADE ILHA DE MOCAMBIQUE	14	146	0	14	146	0	0	0	0
LALUA	21	213	1	0	0	0	21	213	1
MALEMA	29	297	0	6	60	0	23	237	0
MECONTA	28	314	5	5	54	0	23	260	5
MECUBURI	29	291	2	0	0	0	29	291	2
MEMBA	34	360	2	0	0	0	34	360	2
MOGINCUAL	28	294	0	0	0	0	28	294	0
MOGOVOLAS	38	391	1	5	51	1	33	340	0
MOMA	39	407	3	2	20	0	37	387	3
MONAPO	37	386	3	4	43	0	33	343	3
MOSSURIL	26	272	0	3	34	0	23	238	0
MUECATE	24	266	2	0	0	0	24	266	2
MURRUPULA	28	295	3	0	0	0	28	295	3
NACALA-PORTO	24	250	2	24	250	2	0	0	0
NACALA-VELHA	24	261	0	4	46	0	20	215	0
NACAROA	25	272	3	0	0	0	25	272	3
NAMPULA	33	349	6	0	0	0	33	349	6
RIBAUE	29	297	0	5	52	0	24	245	0
CIDADE DE QUELIMANE	25	256	8	25	256	8	0	0	0
ALTO MOLOCUE	35	361	2	4	43	0	31	318	2
CHINDE	25	260	2	4	41	0	21	219	2
GILE	29	302	2	0	0	0	29	302	2
GURUE	34	342	1	11	111	0	23	231	1
ILE	36	365	0	0	0	0	36	365	0
INHASSUNGE	24	240	0	0	0	0	24	240	0
LUGELA	27	274	3	0	0	0	27	274	3
MAGANJA DA COSTA	38	405	2	2	20	0	36	385	2
MILANGE	46	466	4	2	21	1	44	445	3
MOCUBA	36	366	1	15	154	1	21	212	0
MOPEIA	25	254	0	0	0	0	25	254	0
MORRUMBALA	40	408	6	2	20	1	38	388	5
NAMACURRA	33	342	1	3	34	0	30	308	1
NAMARROI	26	264	0	0	0	0	26	264	0

Annex A. Final Distribution of Sample EAs and Sample Farm Holdings for CAP II by District, Urban and Rural Strata (Continued)

District	Total			Urban			Rural		
	Sample EAs	Small Holdings	Medium Holdings	Sample EAs	Small Holdings	Medium Holdings	Sample EAs	Small Holdings	Medium Holdings
NICOADALA	35	371	0	0	0	0	35	371	0
PEBANE	31	326	2	2	20	0	29	306	2
CIDADE DE TETE	20	208	63	20	208	63	0	0	0
ANGONIA	38	381	32	2	20	2	36	361	30
CAHORA-BASSA	21	209	63	5	50	11	16	159	52
CHANGARA	28	282	153	0	0	0	28	282	153
CHIFUNDE	23	234	18	0	0	0	23	234	18
CHIUTA	21	211	42	0	0	0	21	211	42
MACANGA	25	251	17	0	0	0	25	251	17
MAGOE	20	202	85	0	0	0	20	202	85
MARAVIA	21	214	113	0	0	0	21	214	113
MOATIZE	30	306	62	3	30	11	27	276	51
MUTARARA	30	301	48	3	30	6	27	271	42
TSANGANO	29	290	24	0	0	0	29	290	24
ZUMBO	18	180	4	0	0	0	18	180	4
CIDADE DE CHIMOIO	25	278	23	25	278	23	0	0	0
BARUE	25	257	24	4	42	3	21	215	21
GONDOLA	34	409	18	4	44	1	30	365	17
GURO	19	192	37	0	0	0	19	192	37
MACHAZE	23	252	11	0	0	0	23	252	11
MACOSSA	13	133	4	0	0	0	13	133	4
MANICA	29	297	50	6	59	7	23	238	43
MOSSURIZE	30	310	23	0	0	0	30	310	23
SUSSUNDENGA	25	255	21	0	0	0	25	255	21
TAMBARA	16	163	16	0	0	0	16	163	16
CIDADE DA BEIRA	32	323	11	32	323	11	0	0	0
BUZI	28	306	25	2	22	2	26	284	23
CAIA	23	237	4	3	29	1	20	208	3
CHEMBA	17	173	14	0	0	0	17	173	14
CHERINGOMA	14	140	0	3	30	0	11	110	0
CHIBABAVA	23	255	20	0	0	0	23	255	20
DONDO	25	254	4	11	112	2	14	142	2
GORONGOSA	24	248	7	3	31	1	21	217	6
MACHANGA	18	183	29	0	0	0	18	183	29
MARINGUE	20	201	12	0	0	0	20	201	12

Annex A. Final Distribution of Sample EAs and Sample Farm Holdings for CAP II by District, Urban and Rural Strata (Continued)

District	Total			Urban			Rural		
	Sample EAs	Small Holdings	Medium Holdings	Sample EAs	Small Holdings	Medium Holdings	Sample EAs	Small Holdings	Medium Holdings
MARROMEU	24	246	1	6	62	0	18	184	1
MUANZA	12	124	2	0	0	0	12	124	2
NHAMATANDA	31	323	12	3	31	1	28	292	11
CIDADE DE INHAMBANE	18	285	8	18	285	8	0	0	0
FUNHALOURO	16	194	36	0	0	0	16	194	36
GOVURO	17	190	21	2	25	3	15	165	18
HOMOINE	26	348	16	2	25	1	24	323	15
INHARRIME	24	452	23	2	24	1	22	428	22
INHASSORO	18	199	2	3	33	0	15	166	2
JANGAMO	24	580	20	0	0	0	24	580	20
MABOTE	16	188	64	0	0	0	16	188	64
MASSINGA	31	479	14	2	26	0	29	453	14
CIDADE DE MAXIXE	21	330	4	21	330	4	0	0	0
MORRUMBENE	27	449	22	2	21	1	25	428	21
PANDA	18	229	23	0	0	0	18	229	23
VILANKULO	27	340	7	5	56	2	22	284	5
ZAVALA	27	613	17	2	44	0	25	569	17
CIDADE DE XAI-XAI	20	215	17	20	215	17	0	0	0
BILENE	26	272	20	6	63	4	20	209	16
CHIBUTO	30	323	70	8	90	15	22	233	55
CHICUALACUALA	14	150	59	3	32	22	11	118	37
CHIGUBO	11	111	22	0	0	0	11	111	22
CHOKWE	26	294	59	7	69	15	19	225	44
GUIJA	20	211	50	1	11	6	19	200	44
MABALANE	13	132	91	0	0	0	13	132	91
MANDLACAZE	31	345	16	2	23	2	29	322	14
MASSANGENA	11	120	24	0	0	0	11	120	24
MASSINGIR	12	120	74	0	0	0	12	120	74
XAI-XAI	32	340	58	0	0	0	32	340	58
CIDADE DE MATOLA	28	285	10	28	285	10	0	0	0
BOANE	22	249	13	4	46	1	18	203	12
MAGUDE	17	187	112	3	35	9	14	152	103
MANHIÇA	27	300	20	10	113	1	17	187	19
MARRACUENE	21	236	5	4	43	1	17	193	4

Annex A. Final Distribution of Sample EAs and Sample Farm Holdings for CAP II by District, Urban and Rural Strata (Continued)

District	Total			Urban			Rural		
	Sample EAs	Small Holdings	Medium Holdings	Sample EAs	Small Holdings	Medium Holdings	Sample EAs	Small Holdings	Medium Holdings
MATUTUINE	17	183	26	1	10	2	16	173	24
MOAMBA	18	203	91	5	56	14	13	147	77
NAMAACHA	16	177	22	3	35	1	13	142	21
DISTRITO URBANO 1	13	111	22	13	111	22	0	0	0
DISTRITO URBANO 2	13	129	5	13	129	5	0	0	0
DISTRITO URBANO 3	15	146	2	15	146	2	0	0	0
DISTRITO URBANO 4	19	200	9	19	200	9	0	0	0
DISTRITO URBANO 5	20	201	4	20	201	4	0	0	0
DISTRITO DE CATEMBE	11	113	7	11	113	7	0	0	0
INHACA	10	126	0	10	126	0	0	0	0
MOZAMBIQUE	3,501	38,217	2,449	672	7,252	388	2,829	30,965	2,061

ANNEX B. Selected Estimates from CAP II Data for Small and Medium Farm Holdings, with Corresponding Standard Errors, Coefficients of Variation, 95% Confidence Intervals, Design Effects and Number of Sample Farm Holdings

Table B1. Total Area Planted by Crop for Mozambique

Crop	Estimate	SE	CV (%)	95% Confidence Interval		DEFF	No. Sample Farm Holdings
				Lower	Upper		
Milho	1,411,453	23,670	1.7%	1,365,044	1,457,863	5.4	37,286
Arroz	280,112	9,577	3.4%	261,334	298,890	4.4	6,249
Mapira	309,556	8,452	2.7%	292,984	326,129	4.9	11,874
Mexoeira	45,403	3,505	7.7%	38,532	52,275	5.4	2,316
Amendoim Grande	97,931	3,475	3.5%	91,118	104,745	3.3	4,588
Amendoim Pequeno	277,747	6,118	2.2%	265,753	289,742	3.3	13,476
Feijão Manteiga	90,255	4,557	5.0%	81,321	99,190	4.6	3,621
Feijão Nhemba	359,443	6,767	1.9%	346,175	372,711	4.1	24,260
Feijão Jugo	78,489	2,631	3.4%	73,331	83,646	3.3	5,709
Feijão Boer	269,206	8,138	3.0%	253,250	285,162	7.0	10,113
Batata Reno	18,029	2,868	15.9%	12,405	23,653	10.4	681
Mandioca	1,053,866	17,903	1.7%	1,018,763	1,088,969	6.0	32,186
Batata doce P.A.	28,436	1,265	4.4%	25,955	30,917	2.2	2,166
Batata doce P.N .A.	100,513	3,944	3.9%	92,779	108,246	5.2	6,732
Feijão Verde	5,927	670	11.3%	4,613	7,242	2.7	364
Algodão	62,045	5,541	8.9%	51,182	72,909	4.7	952
Tabaco	74,365	5,082	6.8%	64,402	84,328	2.9	1,090
Girassol	9,632	1,216	12.6%	7,247	12,016	3.3	424
Gergelim	101,858	4,882	4.8%	92,286	111,429	3.9	3,439
Soja	10,615	1,457	13.7%	7,758	13,472	3.0	277
Paprica	67	39	58.3%	-10	143	1.2	6
Gengibre	367	127	34.6%	118	616	0.8	28
Trigo	2,029	1,083	53.4%	-93	4,152	12.3	58
Abóbora	129,674	3,053	2.4%	123,688	135,661	3.5	13,039
Alface	4,653	531	11.4%	3,611	5,695	2.7	586
Alho	2,284	261	11.4%	1,771	2,796	1.5	318
Beringela	726	148	20.3%	436	1,015	1.0	77
Cebola	14,786	1,209	8.2%	12,414	17,157	2.2	1,383
Cenoura	1,352	249	18.4%	864	1,840	1.7	164
Couve	21,890	1,231	5.6%	19,477	24,302	2.9	2,012
Ervilha	11,572	950	8.2%	9,709	13,436	2.9	622

Table B1. Total Area Planted by Crop for Mozambique (Continued)

Crop	Estimate	SE	CV (%)	95% Confidence Interval		DEFF	No. Sample Farm Holdings
				Lower	Upper		
Melância	31,059	1,253	4.0%	28,603	33,515	2.7	4,448
Pepino	41,166	1,417	3.4%	38,387	43,945	2.8	5,135
Pimenta	606	122	20.1%	367	845	0.5	83
Piri-piri	3,244	353	10.9%	2,552	3,936	2.8	393
Quiabo	33,373	1,367	4.1%	30,693	36,053	2.8	3,812
Repolho	5,107	545	10.7%	4,039	6,174	1.6	476
Tomate	44,137	2,213	5.0%	39,798	48,477	3.7	3,875
Inhame	6,589	787	11.9%	5,045	8,133	3.7	409
Outros Feijões	17,836	1,420	8.0%	15,051	20,621	4.0	1,039
Outras Leguminosas	1,080	180	16.7%	727	1,434	2.0	145
Outras Culturas	30,112	2,396	8.0%	25,415	34,810	3.2	1,521

Table B2. Total Area Planted in Corn at National Level, Urban and Rural Domains, and by Province

Crop	Estimate	SE	CV (%)	95% Confidence Interval		DEFF	No. Sample Farm Holdings
				Lower	Upper		
Mozambique	1,411,453	23,566	1.7%	1,365,248	1,457,659	9.6	37,286
Residence							
Urban	156,892	6,248	4.0%	144,641	169,143	3.0	4,608
Rural	1,254,561	22,722	1.8%	1,210,010	1,299,113	9.3	32,678
Province							
Niassa	148,555	7,672	5.2%	133,513	163,596	4.0	3,279
Cabo Delgado	97,596	4,563	4.7%	88,649	106,542	4.3	3,230
Nampula	129,501	5,750	4.4%	118,227	140,775	5.4	3,525
Zambézia	193,905	9,813	5.1%	174,664	213,146	10.0	3,867
Tete	236,431	9,770	4.1%	217,275	255,588	4.6	4,620
Manica	208,273	11,790	5.7%	185,155	231,390	7.4	3,366
Sofala	141,921	5,405	3.8%	131,323	152,518	2.8	3,676
Inhambane	85,153	4,587	5.4%	76,160	94,147	4.0	4,268
Gaza	115,172	6,836	5.9%	101,768	128,576	5.9	4,414
Maputo provincia	47,660	3,774	7.9%	40,260	55,059	2.8	2,477
Maputo Cidade	7,287	782	10.7%	5,754	8,820	1.1	564

Table B3. Total Area Planted in Corn by District

District	Estimate	SE	CV (%)	95% Confidence Interval		DEFF	No. Sample Farm Holdings
				Lower	Upper		
CIDADE DE							
LICHINGA	8,364	1,857	22.2%	4,724	12,004	2.8	161
CUAMBA	17,669	3,009	17.0%	11,769	23,569	5.8	321
LAGO	7,611	1,452	19.1%	4,765	10,458	4.4	206
LICHINGA	14,765	3,432	23.2%	8,036	21,494	7.8	242
MAJUNE	3,497	683	19.5%	2,159	4,836	2.0	154
MANDIMBA	24,937	3,644	14.6%	17,793	32,081	3.6	294
MARRUPA	5,921	1,329	22.4%	3,316	8,527	4.2	180
MAUA	5,478	1,070	19.5%	3,380	7,577	3.2	191
MAVAGO	3,470	1,045	30.1%	1,422	5,519	3.1	131
MECANHELAS	21,848	2,276	10.4%	17,385	26,311	2.9	391
MECULA	1,646	220	13.3%	1,215	2,076	0.4	106
METARICA	2,807	521	18.6%	1,785	3,830	1.6	147
MUEMBE	3,518	690	19.6%	2,164	4,871	1.6	145
N'GAUMA	18,515	2,780	15.0%	13,064	23,966	3.1	232
NIPEPE	2,988	636	21.3%	1,740	4,235	2.4	167
SANGA	5,519	780	14.1%	3,991	7,048	1.5	211
CIDADE DE PEMBA	1,571	558	35.5%	476	2,665	2.3	34
ANCUABE	7,098	1,015	14.3%	5,107	9,089	3.3	256
BALAMA	11,312	1,728	15.3%	7,924	14,699	4.0	284
CHIURE	14,094	2,780	19.7%	8,643	19,545	12.1	344
IBO	131	17	12.9%	97	164	0.1	54
MACOMIA	4,773	1,007	21.1%	2,798	6,748	4.4	155
MECUFI	1,372	263	19.2%	857	1,887	1.5	115
MELUCO	1,702	238	14.0%	1,235	2,169	0.7	124
MOCIMBOA DA							
PRAIA	2,187	366	16.7%	1,469	2,905	1.8	106
MONTEPUEZ	12,218	1,820	14.9%	8,650	15,785	4.6	312
MUEDA	8,770	878	10.0%	7,049	10,492	1.9	265
MUIDUMBE	7,022	525	7.5%	5,992	8,053	0.8	221
NAMUNO	10,436	1,138	10.9%	8,205	12,667	2.4	280
NANGADE	5,335	700	13.1%	3,963	6,707	1.6	242
PALMA	1,933	646	33.4%	667	3,198	4.5	93

Table B3. Total Area Planted in Corn by District (Continued)

District	Estimate	SE	CV (%)	95% Confidence Interval		DEFF	No. Sample Farm Holdings
				Lower	Upper		
PEMBA - METUGE	5,246	826	15.8%	3,626	6,866	2.7	218
QUISSANGA	2,398	495	20.6%	1,427	3,368	2.3	127
CIDADE DE NAMPULA	2,421	664	27.4%	1,119	3,724	2.4	69
ANGOCHE	5,486	1,124	20.5%	3,282	7,690	5.2	146
NAMAPA-ERATI	9,746	1,306	13.4%	7,186	12,306	3.9	222
CIDADE ILHA DE MOCAMBIQUE	410	158	38.5%	100	720	1.4	39
LALAU	5,046	917	18.2%	3,249	6,844	2.8	190
MALEMA	10,596	1,268	12.0%	8,110	13,082	3.1	239
MECONTA	5,332	1,065	20.0%	3,245	7,419	4.0	156
MECUBURI	9,059	1,149	12.7%	6,807	11,312	3.1	209
MEMBA	10,909	2,529	23.2%	5,950	15,869	11.8	247
MOGINCUAL	4,559	670	14.7%	3,246	5,872	2.1	150
MOGOVOLAS	4,891	505	10.3%	3,901	5,881	1.6	128
MOMA	5,115	584	11.4%	3,969	6,260	1.6	147
MONAPO	21,432	3,577	16.7%	14,420	28,445	10.2	331
MOSSURIL	4,416	935	21.2%	2,582	6,250	3.4	164
MUECATE	3,552	509	14.3%	2,554	4,549	1.7	177
MURRUPULA	3,129	954	30.5%	1,259	4,999	5.8	96
NACALA-PORTO	3,120	615	19.7%	1,914	4,326	3.0	140
NACALA-VELHA	3,094	435	14.1%	2,242	3,947	1.8	173
NACAROA	3,710	615	16.6%	2,504	4,915	1.0	153
NAMPULA	4,123	697	16.9%	2,756	5,490	2.9	125
RIBAUE	9,353	1,008	10.8%	7,377	11,330	2.3	224
CIDADE DE QUELIMANE	764	226	29.6%	320	1,208	0.4	24
ALTO MOLOCUE	13,108	1,320	10.1%	10,519	15,697	2.5	299
CHINDE	6,684	1,659	24.8%	3,430	9,937	7.4	191
GILE	6,094	1,260	20.7%	3,624	8,564	4.9	164
GURUE	19,087	2,188	11.5%	14,797	23,376	4.2	367
ILE	7,679	929	12.1%	5,858	9,500	3.0	213
INHASSUNGE	943	146	15.5%	657	1,228	1.2	79
LUGELA	7,622	1,856	24.4%	3,982	11,262	8.3	254

Table B3. Total Area Planted in Corn by District (Continued)

District	Estimate	SE	CV (%)	95% Confidence Interval		DEFF	No. Sample Farm Holdings
				Lower	Upper		
MAGANJA DA COSTA	5,368	1,679	31.3%	2,076	8,659	18.0	123
MILANGE	50,890	6,711	13.2%	37,731	64,048	16.9	598
MOCUBA	13,451	2,898	21.5%	7,768	19,134	9.3	248
MOPEIA	9,455	1,279	13.5%	6,947	11,962	2.8	283
MORRUMBALA	33,586	3,410	10.2%	26,900	40,272	6.3	520
NAMACURRA	1,804	449	24.9%	924	2,685	3.0	57
NAMARROI	6,533	1,020	15.6%	4,533	8,532	3.3	223
NICOADALA	6,185	2,766	44.7%	762	11,607	18.5	111
PEBANE	4,654	1,624	34.9%	1,470	7,838	19.2	113
CIDADE DE TETE	4,593	944	20.6%	2,742	6,444	1.6	170
ANGONIA	49,233	5,538	11.2%	38,375	60,091	7.7	635
CAHORA-BASSA	7,029	835	11.9%	5,390	8,667	2.0	288
CHANGARA	8,942	1,571	17.6%	5,861	12,024	4.6	351
CHIFUNDE	26,294	3,909	14.9%	18,629	33,958	4.5	344
CHIUTA	10,010	1,742	17.4%	6,595	13,424	4.0	287
MACANGA	29,331	2,987	10.2%	23,474	35,188	2.5	326
MAGOE	8,513	1,373	16.1%	5,822	11,205	2.4	284
MARAVIA	21,323	2,593	12.2%	16,239	26,408	1.7	411
MOATIZE	24,869	3,162	12.7%	18,669	31,068	6.2	453
MUTARARA	16,982	2,540	15.0%	12,001	21,962	7.2	429
TSANGANO	23,011	2,520	11.0%	18,070	27,951	4.6	446
ZUMBO	6,302	1,446	22.9%	3,467	9,137	4.2	196
CIDADE DE CHIMOIO	21,261	2,106	9.9%	17,132	25,391	1.8	310
BARUE	26,163	4,706	18.0%	16,936	35,390	8.9	358
GONDOLA	45,552	6,437	14.1%	32,932	58,172	9.8	579
GURO	6,250	805	12.9%	4,672	7,828	1.6	275
MACHAZE	9,675	1,296	13.4%	7,133	12,217	2.7	268
MACOSSA	5,473	810	14.8%	3,885	7,060	1.1	161
MANICA	31,766	5,399	17.0%	21,180	42,352	8.7	438
MOSSURIZE	33,818	5,297	15.7%	23,433	44,203	9.1	376
SUSSUNDENGA	22,529	3,232	14.3%	16,191	28,867	4.9	358

Table B3. Total Area Planted in Corn by District (Continued)

District	Estimate	SE	CV (%)	95% Confidence Interval		DEFF	No. Sample Farm Holdings
				Lower	Upper		
TAMBARA	5,785	601	10.4%	4,606	6,964	0.8	243
CIDADE DA BEIRA	5,365	1,337	24.9%	2,745	7,986	2.7	61
BUZI	16,528	2,094	12.7%	12,423	20,633	3.3	360
CAIA	9,906	1,365	13.8%	7,229	12,583	3.6	342
CHEMBA	5,739	896	15.6%	3,982	7,497	1.8	250
CHERINGOMA	2,523	304	12.1%	1,926	3,120	0.5	182
CHIBABAVA	16,708	1,282	7.7%	14,195	19,221	1.3	435
DONDO	8,068	1,279	15.9%	5,560	10,576	1.6	150
GORONGOSA	12,722	1,549	12.2%	9,684	15,759	2.5	355
MACHANGA	4,628	1,469	31.7%	1,747	7,509	6.6	257
MARINGUE	10,864	1,799	16.6%	7,338	14,391	4.2	309
MARROMEU	14,766	1,931	13.1%	10,980	18,552	4.3	337
MUANZA	2,088	818	39.2%	483	3,693	3.5	115
NHAMATANDA	32,014	2,194	6.9%	27,713	36,315	2.1	523
CIDADE DE INHAMBANE	127	70	55.7%	-12	265	0.6	17
FUNHALOURO	5,987	896	15.0%	4,231	7,742	1.5	370
GOVURO	4,329	1,012	23.4%	2,345	6,314	2.7	267
HOMOINE	8,789	1,097	12.5%	6,638	10,939	3.5	435
INHARRIME	2,215	427	19.3%	1,379	3,052	2.7	243
INHASSORO	5,284	650	12.3%	4,010	6,559	1.3	319
JANGAMO	555	135	24.3%	291	818	0.7	90
MABOTE	6,056	1,051	17.4%	3,995	8,117	1.9	359
MASSINGA	19,128	2,831	14.8%	13,577	24,680	6.3	560
CIDADE DE MAXIXE	556	210	37.7%	145	968	2.5	83
MORRUMBENE	7,864	1,715	21.8%	4,502	11,226	6.0	448
PANDA	5,511	1,324	24.0%	2,915	8,107	3.7	292
VILANKULO	15,112	1,796	11.9%	11,590	18,635	4.5	498
ZAVALA	3,640	543	14.9%	2,575	4,705	1.8	287
CIDADE DE XAI-XAI	3,325	852	25.6%	1,654	4,996	5.1	260
BILENE	11,222	1,831	16.3%	7,633	14,812	4.8	357
CHIBUTO	17,442	2,100	12.0%	13,325	21,560	3.5	573

Table B3. Total Area Planted in Corn by District (Continued)

District	Estimate	SE	CV (%)	95% Confidence Interval		DEFF	No. Sample Farm Holdings
				Lower	Upper		
CHICUALACUALA	4,470	902	20.2%	2,702	6,238	1.8	258
CHIGUBO	2,602	441	17.0%	1,736	3,467	1.0	178
CHOKWE	15,470	2,761	17.8%	10,056	20,884	5.6	445
GUIJA	8,924	940	10.5%	7,080	10,767	1.1	375
MABALANE	3,983	815	20.5%	2,384	5,582	1.9	377
MANDLACAZE	18,029	2,837	15.7%	12,466	23,591	8.4	464
MASSANGENA	1,158	246	21.2%	675	1,640	0.9	152
MASSINGIR	3,732	625	16.8%	2,506	4,958	1.1	339
XAI-XAI	24,816	4,424	17.8%	16,143	33,489	11.9	636
CIDADE DE MATOLA	7,030	1,405	20.0%	4,276	9,784	5.1	228
BOANE	10,312	2,226	21.6%	5,948	14,676	5.2	331
MAGUDE	6,775	1,290	19.0%	4,246	9,304	1.3	434
MANHIÇA	10,790	1,981	18.4%	6,905	14,674	6.0	408
MARRACUENE	1,558	239	15.4%	1,089	2,027	1.4	184
MATUTUINE	1,869	384	20.5%	1,116	2,622	1.5	225
MOAMBA	5,950	1,152	19.4%	3,691	8,210	2.1	418
NAMAACHA	3,374	440	13.0%	2,511	4,237	0.2	249
DISTRITO URBANO 1	972	179	18.4%	622	1,323	0.3	69
DISTRITO URBANO 2	1,083	170	15.7%	751	1,416	0.3	71
DISTRITO URBANO 3	1,050	155	14.8%	746	1,354	0.4	85
DISTRITO URBANO 4	2,471	515	20.8%	1,461	3,481	1.3	133
DISTRITO URBANO 5	1,234	504	40.8%	247	2,222	3.3	58
DISTRITO DE							
CATEMBE	433	87	20.0%	263	603	0.6	106
INHACA	43	18	41.4%	8	78	0.2	42

Table B4. Total Number of Animals by Type for Mozambique

Type of Animal	Estimate	SE	CV (%)	95% Confidence Interval		DEFF	No. Sample Farm Holdings
				Lower	Upper		
Bovinos	1,127,243	38,085	3.4%	1,052,570	1,201,915	2.1	4,494
Caprinos	3,879,877	86,247	2.2%	3,710,773	4,048,981	3.5	9,915
Ovinos	202,869	16,194	8.0%	171,116	234,621	2.1	717
Suinos	1,333,173	39,337	3.0%	1,256,046	1,410,301	1.9	5,409
Burros	18,058	2,438	13.5%	13,277	22,839	0.5	209
Galinhas	22,870,937	482,698	2.1%	21,924,518	23,817,356	55.3	24,400
Coelhos	109,711	15,525	14.2%	79,270	140,151	3.5	221
Patos	1,876,749	92,414	4.9%	1,695,555	2,057,943	7.7	3,925
Gansos	14,953	6,127	41.0%	2,940	26,966	4.0	50
Perús	112,202	14,443	12.9%	83,883	140,520	3.0	350
Galinha do mato	765,993	39,951	5.2%	687,661	844,324	3.4	1,482

Table B5. Total Number of Animals by Residence and Type of Animal

Residence by Type of Animal	Estimate	SE	CV (%)	95% Confidence Interval		DEFF	No. Sample Farm Holdings
				Lower	Upper		
Urban							
Bovinos	175,034	16,294	9.3%	143,086	206,982	0.9	544
Caprinos	374,703	23,644	6.3%	328,345	421,062	1.0	974
Ovinos	32,735	7,410	22.6%	18,207	47,264	1.3	95
Suinos	148,023	12,432	8.4%	123,648	172,397	1.5	683
Burros	1,070	510	47.6%	71	2,070	1.4	12
Galinhas	2,870,677	216,364	7.5%	2,446,454	3,294,900	0.6	3,051
Coelhos	16,723	4,468	26.7%	7,963	25,483	1.2	34
Patos	691,863	43,747	6.3%	606,089	777,638	2.1	1,162
Gansos	4,040	1,525	37.8%	1,049	7,030	1.3	28
Perús	25,752	4,987	19.4%	15,973	35,530	1.0	91
Galinha do mato	146,256	16,905	11.6%	113,111	179,401	1.1	243
Rural							
Bovinos	952,209	34,423	3.6%	884,716	1,019,702	1.1	3,971
Caprinos	3,505,174	82,943	2.4%	3,342,548	3,667,800	2.2	9,056
Ovinos	170,133	14,400	8.5%	141,900	198,367	1.4	642
Suinos	1,185,151	37,321	3.1%	1,111,976	1,258,326	2.4	4,866
Burros	16,987	2,384	14.0%	12,312	21,663	1.4	204
Galinhas	20,000,260	431,490	2.2%	19,154,243	20,846,277	2.8	21,710
Coelhos	92,987	14,869	16.0%	63,835	122,140	2.5	199
Patos	1,184,886	81,403	6.9%	1,025,279	1,344,492	3.2	2,873
Gansos	10,913	5,934	54.4%	-722	22,548	2.1	28
Perús	86,450	13,555	15.7%	59,873	113,026	2.6	278
Galinha do mato	619,737	36,198	5.8%	548,763	690,710	2.1	1,278

Table B6. Total Number of Chickens by Province

Province	Estimate	SE	CV (%)	95% Confidence Interval		DEFF	No. Sample Farm Holdings
				Lower	Upper		
Niassa	1,222,145	1,381,796	6.7%	81,426	1,062,494	2.5	1,715
Cabo Delgado	1,630,666	1,763,871	4.2%	67,937	1,497,462	1.5	2,232
Nampula	3,418,052	3,667,852	3.7%	127,404	3,168,252	2.8	3,198
Zambézia	4,106,895	4,432,261	4.0%	165,944	3,781,529	5.2	3,617
Tete	2,040,545	2,217,401	4.4%	90,201	1,863,690	0.5	2,578
Manica	2,916,149	3,317,137	7.0%	204,513	2,515,162	2.1	2,050
Sofala	2,456,718	2,703,959	5.1%	126,099	2,209,477	2.7	2,268
Inhambane	2,394,191	2,607,124	4.5%	108,601	2,181,257	2.6	3,827
Gaza	1,279,501	1,413,954	5.4%	68,574	1,145,047	2.5	2,027
Maputo Província	1,161,065	1,753,106	26.0%	301,955	569,023	1.1	970
Maputo Cidade	245,010	367,111	25.4%	62,274	122,910	0.2	279

Table B7. Total Number of Chickens by District

District	Estimate	SE	CV (%)	95% Confidence Interval		DEFF	No. Sample Farm Holdings
				Lower	Upper		
CIDADE DE							
LICHINGA	28,371	43,483	27.2%	7,708	13,258	0.8	37
CUAMBA	178,140	266,911	25.4%	45,275	89,369	6.8	157
LAGO	65,118	95,689	23.9%	15,592	34,547	2.4	104
LICHINGA	78,692	113,032	22.3%	17,515	44,351	1.1	92
MAJUNE	36,109	47,538	16.1%	5,829	24,679	0.4	86
MANDIMBA	182,049	268,167	24.1%	43,922	95,930	2.5	142
MARRUPA	80,625	107,137	16.8%	13,522	54,113	1.4	126
MAUA	74,048	104,005	20.6%	15,279	44,090	2.4	142
MAVAGO	10,145	14,245	20.6%	2,091	6,045	0.3	50
MECANHELAS	273,790	342,778	12.9%	35,186	204,802	2.4	219
MECULA	17,603	24,879	21.1%	3,711	10,328	0.5	63
METARICA	36,114	55,607	27.5%	9,942	16,621	1.3	98
MUEMBE	16,751	23,242	19.8%	3,311	10,260	0.5	74
N'GAUMA	77,695	101,780	15.8%	12,284	53,610	1.1	123
NIPEPE	41,266	55,251	17.3%	7,133	27,280	0.9	113
SANGA	25,631	35,193	19.0%	4,877	16,070	1.0	89
CIDADE DE PEMBA	46,084	67,833	24.1%	11,092	24,335	1.8	73
ANCUABE	158,160	205,653	15.3%	24,222	110,668	2.2	162
BALAMA	130,219	170,563	15.8%	20,577	89,874	2.3	160
CHIURE	205,544	264,707	14.7%	30,175	146,381	1.0	171
IBO	7,450	10,964	24.1%	1,792	3,937	0.2	45
MACOMIA	78,437	98,707	13.2%	10,338	58,166	0.8	118
MECUFI	32,195	50,529	29.0%	9,350	13,862	1.1	72
MELUCO	29,183	37,642	14.8%	4,314	20,725	0.3	73
MOCIMBOA DA							
PRAIA	95,789	115,089	10.3%	9,843	76,490	0.8	153
MONTEPUEZ	101,483	123,656	11.1%	11,309	79,309	1.2	164
MUEDA	147,355	187,179	13.8%	20,311	107,531	1.6	181
MUIDUMBE	115,495	139,409	10.6%	12,197	91,580	0.8	148
NAMUNO	156,522	190,858	11.2%	17,512	122,187	1.7	199
NANGADE	129,711	178,236	19.1%	24,749	81,186	2.4	227
PALMA	53,459	77,080	22.5%	12,047	29,838	2.1	103

Table B7. Total Number of Chickens by District (Continued)

District	Estimate	SE	CV (%)	95% Confidence Interval		DEFF	No. Sample Farm Holdings
				Lower	Upper		
PEMBA - METUGE	99,042	137,589	19.9%	19,660	60,494	1.4	108
QUISSANGA	44,538	65,905	24.5%	10,898	23,171	1.3	75
CIDADE DE NAMPULA	87,369	132,972	26.6%	23,259	41,766	0.9	59
ANGOCHE	197,409	260,228	16.2%	32,039	134,590	3.5	146
NAMAPA-ERATI	251,812	304,315	10.6%	26,778	199,309	2.0	206
CIDADE ILHA DE MOCAMBIQUE	17,729	24,825	20.4%	3,619	10,634	0.7	66
LALAU	83,808	114,563	18.7%	15,686	53,052	2.2	145
MALEMA	128,117	157,030	11.5%	14,747	99,203	1.6	152
MECONTA	181,000	228,314	13.3%	24,131	133,686	1.4	158
MECUBURI	131,346	175,979	17.3%	22,764	86,712	2.7	146
MEMBA	223,724	282,802	13.5%	30,131	164,645	2.8	177
MOGINCUAL	134,661	164,216	11.2%	15,073	105,107	1.3	141
MOGOVOLAS	290,622	370,739	14.1%	40,862	210,504	2.0	200
MOMA	320,406	447,010	20.2%	64,571	193,802	6.8	200
MONAPO	289,728	353,215	11.2%	32,380	226,241	2.7	216
MOSSURIL	121,206	155,737	14.5%	17,612	86,675	1.4	138
MUECATE	142,367	176,508	12.2%	17,413	108,226	1.0	179
MURRUPULA	124,044	169,145	18.5%	23,003	78,942	3.1	156
NACALA-PORTO	63,738	93,886	24.1%	15,376	33,590	2.3	84
NACALA-VELHA	109,097	132,410	10.9%	11,890	85,785	0.9	152
NACAROA	187,235	255,101	18.5%	34,613	119,368	2.8	164
NAMPULA	159,030	201,209	13.5%	21,513	116,850	2.2	154
RIBAUE	173,605	240,563	19.7%	34,151	106,646	4.3	159
CIDADE DE QUELIMANE	71,209	95,359	17.3%	12,317	47,058	1.6	101
ALTO MOLOCUE	359,301	417,794	8.3%	29,833	300,809	1.8	260
CHINDE	143,074	191,763	17.4%	24,833	94,384	2.6	183
GILE	164,319	218,504	16.8%	27,636	110,134	2.7	165
GURUE	260,990	332,486	14.0%	36,464	189,495	2.8	212
ILE	307,390	399,798	15.3%	47,130	214,982	5.8	261
INHASSUNGE	88,809	110,087	12.2%	10,852	67,532	1.5	162
LUGELA	179,829	208,354	8.1%	14,548	151,304	0.9	213

Table B7. Total Number of Chickens by District (Continued)

District	Estimate	SE	CV (%)	95% Confidence Interval		DEFF	No. Sample Farm Holdings
				Lower	Upper		
MAGANJA DA COSTA	274,977	362,407	16.2%	44,591	187,548	4.5	224
MILANGE	550,574	666,140	10.7%	58,941	435,008	4.9	323
MOCUBA	318,185	397,125	12.7%	40,261	239,245	3.1	263
MOPEIA	141,641	182,094	14.6%	20,632	101,188	2.0	157
MORRUMBALA	514,487	639,722	12.4%	63,872	389,253	5.8	299
NAMACURRA	149,288	175,331	8.9%	13,283	123,245	1.4	199
NAMARROI	110,538	139,402	13.3%	14,722	81,673	1.8	187
NICOADALA	225,648	320,836	21.5%	48,548	130,460	5.9	216
PEBANE	246,635	409,458	33.7%	83,044	83,812	17.8	192
CIDADE DE TETE	96,411	182,566	45.6%	43,941	10,257	0.1	95
ANGONIA	327,463	388,250	9.5%	31,002	266,677	2.3	284
CAHORA-BASSA	69,843	90,164	14.8%	10,364	49,521	1.3	156
CHANGARA	105,433	126,506	10.2%	10,748	84,360	0.9	246
CHIFUNDE	156,369	200,725	14.5%	22,623	112,012	2.4	180
CHIUTA	112,287	149,955	17.1%	19,212	74,619	2.2	186
MACANGA	208,968	261,719	12.9%	26,904	156,217	2.6	193
MAGOE	127,010	157,903	12.4%	15,756	96,117	1.3	216
MARAVIA	119,719	170,664	21.7%	25,983	68,774	1.7	226
MOATIZE	254,824	320,518	13.1%	33,506	189,130	2.7	244
MUTARARA	196,212	248,856	13.7%	26,850	143,567	2.7	232
TSANGANO	186,980	221,746	9.5%	17,732	152,213	1.4	218
ZUMBO	79,027	114,923	23.2%	18,308	43,130	1.8	102
CIDADE DE CHIMOIO	142,963	187,960	16.1%	22,949	97,966	1.5	128
BARUE	451,193	711,595	29.4%	132,811	190,790	1.8	221
GONDOLA	673,346	889,852	16.4%	110,423	456,840	2.2	351
GURO	107,735	135,589	13.2%	14,206	79,880	0.8	166
MACHAZE	318,633	418,667	16.0%	51,020	218,600	2.3	224
MACOSSA	78,025	106,064	18.3%	14,300	49,987	0.8	109
MANICA	356,816	467,392	15.8%	56,396	246,241	4.0	261
MOSSURIZE	463,805	588,930	13.8%	63,817	338,679	3.8	268
SUSSUNDENGA	281,521	347,833	12.0%	33,821	215,208	1.7	214

Table B7. Total Number of Chickens by District (Continued)

District	Estimate	SE	CV (%)	95% Confidence Interval		DEFF	No. Sample Farm Holdings
				Lower	Upper		
TAMBARA	42,113	57,362	18.5%	7,777	26,865	1.1	108
CIDADE DA BEIRA	155,897	201,441	14.9%	23,228	110,354	2.0	127
BUZI	345,151	423,714	11.6%	40,069	266,589	2.0	268
CAIA	95,148	125,395	16.2%	15,427	64,901	1.6	156
CHEMBA	87,465	131,015	25.4%	22,212	43,915	2.7	142
CHERINGOMA	40,392	55,135	18.6%	7,519	25,649	0.5	105
CHIBABAVA	330,097	389,858	9.2%	30,480	270,335	1.2	248
DONDO	169,830	234,853	19.5%	33,163	104,808	2.8	138
GORONGOSA	210,610	269,603	14.3%	30,088	151,617	1.8	206
MACHANGA	91,449	134,675	24.1%	22,047	48,222	3.2	165
MARINGUE	158,204	201,367	13.9%	22,014	115,040	1.5	180
MARROMEU	147,356	186,641	13.6%	20,036	108,071	1.9	168
MUANZA	33,022	44,122	17.1%	5,662	21,921	0.6	97
NHAMATANDA	592,097	774,238	15.7%	92,896	409,957	4.2	268
CIDADE DE							
INHAMBANE	29,872	40,033	17.3%	5,182	19,711	0.8	131
FUNHALOURO	111,514	144,663	15.2%	16,907	78,365	0.7	191
GOVURO	44,523	54,090	11.0%	4,879	34,956	0.4	137
HOMOINE	241,534	292,140	10.7%	25,810	190,928	1.3	289
INHARRIME	202,757	245,472	10.7%	21,785	160,043	1.3	362
INHASSORO	86,316	104,859	11.0%	9,457	67,773	0.5	145
JANGAMO	131,488	158,426	10.4%	13,739	104,549	1.1	445
MABOTE	49,027	63,845	15.4%	7,557	34,209	0.6	147
MASSINGA	438,611	567,399	15.0%	65,685	309,823	4.5	412
CIDADE DE MAXIXE	70,688	88,771	13.0%	9,223	52,605	0.9	217
MORRUMBENE	220,691	285,012	14.9%	32,805	156,370	3.0	374
PANDA	58,750	73,750	13.0%	7,650	43,750	0.7	164
VILANKULO	326,527	420,607	14.7%	47,983	232,446	3.3	268
ZAVALA	381,893	472,700	12.1%	46,314	291,086	2.6	545
CIDADE DE XAI-XAI	54,287	82,436	26.4%	14,357	26,138	2.8	101
BILENE	139,095	174,411	12.9%	18,012	103,779	1.9	182
CHIBUTO	206,365	255,657	12.2%	25,140	157,074	2.1	273

Table B7. Total Number of Chickens by District (Continued)

District	Estimate	SE	CV (%)	95% Confidence Interval		DEFF	No. Sample Farm Holdings
				Lower	Upper		
CHICUALACUALA	53,632	76,640	21.9%	11,734	30,624	1.1	144
CHIGUBO	43,628	60,638	19.9%	8,675	26,618	0.7	105
CHOKWE	114,226	151,803	16.8%	19,165	76,649	2.3	191
GUIJA	53,540	70,116	15.8%	8,454	36,964	0.9	145
MABALANE	22,929	27,602	10.4%	2,383	18,255	0.2	142
MANDLACAZE	282,331	354,092	13.0%	36,600	210,570	3.0	265
MASSANGENA	19,459	25,004	14.5%	2,828	13,913	0.3	94
MASSINGIR	24,047	33,229	19.5%	4,683	14,866	0.5	117
XAI-XAI	265,962	342,227	14.6%	38,897	189,696	3.9	268
CIDADE DE MATOLA	292,260	540,412	43.3%	126,563	44,108	0.5	88
BOANE	98,126	135,877	19.6%	19,254	60,375	2.1	99
MAGUDE	67,703	91,977	18.3%	12,381	43,428	0.3	197
MANHIÇA	275,459	565,014	53.6%	147,680	-14,096	1.1	142
MARRACUENE	283,892	732,978	80.7%	229,044	-165,193	1.8	78
MATUTUINE	43,584	62,458	22.1%	9,626	24,710	1.5	112
MOAMBA	61,918	92,492	25.2%	15,594	31,344	1.2	148
NAMAACHA	38,122	48,532	13.9%	5,309	27,712	0.5	106
DISTRITO URBANO 1	45,152	88,434	48.9%	22,075	1,870	0.2	39
DISTRITO URBANO 2	63,340	152,854	72.1%	45,654	-26,174	0.1	38
DISTRITO URBANO 3	6,839	11,197	32.5%	2,223	2,482	0.9	19
DISTRITO URBANO 4	49,812	65,259	15.8%	7,879	34,364	0.3	57
DISTRITO URBANO 5	56,098	123,565	61.3%	34,410	-11,369	0.7	30
DISTRITO DE							
CATEMBE	19,764	33,689	35.9%	7,102	5,839	0.3	56
INHACA	4,006	8,385	55.8%	2,234	-374	0.4	40