

# **GENERAL DATA DISSEMINATION SYSTEM, (GDDS PHASE 2)**

## **SOCIO-DEMOGRAPHIC STATISTICS PROJECT FOR ANGLOPHONE AFRICA: PROVISION OF TECHNICAL ASSISTANCE AS THE EXPERT FOR POPULATION STATISTICS**

### **ZAMBIA MISSION REPORT #1**

October 24 – November 4, 2008

**Harry A. Freedman**  
Consultant  
Census & Survey Capacity Building  
70 Rothwell Dr.  
Ottawa, Canada  
K1J 7G6

*[census.harry@gmail.com](mailto:census.harry@gmail.com)*

Dec 10, 2007

## TABLE OF CONTENTS

|   |    |
|---|----|
| 1. SUMMARY AND MAIN FINDINGS .....                                      | 3  |
| 2. SITUATIONAL ANALYSIS .....   | 4  |
| 3. MISSION AGENDA.....  | 5  |
| 4. DETAILED OBSERVATIONS.....   | 5  |
| 4.1 IMPLEMENTATION MONITORING AND OVERSIGHT .....                       | 5  |
| 4.2 STRENGTHENING GIS AND SEA DEMARCATION (EAD).....                    | 7  |
| 4.3 MATERIEL REQUIREMENTS, PROCUREMENT, DISTRIBUTION, AND CONTROL ..... | 9  |
| 4.4 SUPPORT FROM OTHER GOVERNMENT MINISTRIES AND AGENCIES .....         | 9  |
| 4.5 TRAINING .....  | 10 |
| 4.6 ADVOCACY, PUBLICITY AND PUBLIC AWARENESS .....                      | 11 |
| 4.7 COLLECTION.....   | 12 |
| 4.8 MANUAL EDITING .....  | 12 |
| 4.9 DATA CAPTURE AND EDITING.....                                       | 13 |
| 4.10 VALIDATION.....  | 14 |
| 4.11 DISSEMINATION.....   | 15 |
| 5. ACTIVITIES.....  | 15 |
| 6. DELIVERABLES .....   | 16 |
| 7. DESIGN & CONTENT OF THE MODULE.....                                  | 16 |
| 8. WIDER ISSUES .....   | 17 |
| 9. INTENDED DELIVERABLES OF THE CSO .....                               | 17 |
| 10. PLANS FOR NEXT MISSION .....  | 17 |
| 11. WORKING RELATIONS .....   | 17 |
| 12. PREPARATION ISSUES .....  | 17 |
| 13. RECOMMENDATIONS .....   | 17 |
| 14. OTHER DONORS .....  | 18 |
| APPENDIX 1 PREPARATIONS FOR MISSION .....                               | 19 |
| APPENDIX 2 ORGANISATIONAL STRUCTURE FOR THE 2010 CENSUS.....            | 20 |
| APPENDIX 3 CENSUS PLANNING DOCUMENT.....                                | 21 |
| APPENDIX 4 PERSONS CONSULTED.....                                       | 22 |

# 1. SUMMARY AND MAIN FINDINGS

| Issues Covered  | Outcome  |
|---|--|
| 1. Establish an independent Census Advisory Committee   | Will be considered as part of the advocacy strategy  |
| 2. Establish Census Steering Committee to coordinate census activities                                | Will be created soon.  |
| 3. Monitor schedule performance   | Will consider training someone to use the MS Project software, that is in ITB, for monitoring. |
| 4. EA delineation to try to respect 2000 EA boundaries to facilitate reconciliation for dissemination | ITB Head accepted this as a delineation constraint   |
| 5. Proliferation of GIS software  | CSO to review with GIS consultant  |
| 6. Logistics management and control system  | Operations Branch acknowledges that this is necessary  |
| 7. Data capture strategy  | CSO still to decide whether to use ECZ or do scanning in-house                                 |
| 8. Develop data warehousing dissemination skills  | Will be considered as part of dissemination strategy   |

The CSO of Zambia is well along in its planning for the 2010 Census. During this first mission the consultant reviewed all the changes that had occurred since he was last with the CSO in 2003. The Director of CSO, the Deputy Director, Social Statistics, the Census Manager, and the Head, Information Technology Branch are all new to their posts compared to 2000. The only manager remaining from 2000 Census hierarchy, is the Head, Geographic Information Branch. (although the former Deputy Director, Social Statistics, is still at CSO as Deputy Director, Agriculture and Environment Statistics).

This might be considered a cause for concern, but the Consultant was informed that there was no problem, the CSO had an ample supply of capable staff, and that management of the census process was not an issue.

During the mission the consultant reviewed all the plans for 2010 and provided advice on how CSO might improve its implementation strategy especially as it pertained to the quality of the census as a whole and of each phase.

The main concern expressed by CSO was for the funding of the census. The bulk of census costs are being borne by the government. While the budget has been approved, there is some concern that release of the funds might not be as quick as is needed with a resulting potential delay in census operations. The budget shortfall is to be met by assistance from donors. Donors have not yet committed to cover all the shortfall but CSO is confident that they will do so.

The consultant is not quite certain how his services might best serve to help CSO in its Census preparation. He has agreed to provide ad hoc assistance and advice to the Census Manager and

Deputy Director, Social Statistics, via e-mail and postpone plans for a follow-up mission until such time as CSO has developed more detailed requirements for his services.

## 2. SITUATIONAL ANALYSIS

The consultant is not a stranger to the CSO. He was the resident Chief Census Technical Advisor for Census 2000 from April 2001 until May 2002 and was involved in various capacity building activities until the end of 2003. As a result he has a grasp of the environment within which CSO operates; an awareness of what it was capable of achieving for the 2000 Census; and a knowledge of its strengths and weaknesses at that time. During this mission he will be able to assess how CSO has progressed in the intervening five years and how well it is preparing for 2010.

The CSO is an autonomous Department within the Ministry of Finance. A great deal of management effort has been expended over the last 3-4 years to make it a separate Ministry, but these efforts have not borne fruit.

The CSO consists of a Head Office (HO) in Lusaka plus 9 Provincial Offices (PO). Planning is carried out in Head Office and operations are executed through the PO with assistance from HO staff. POs are less than adequately resourced so that a significant proportion of the PO function is still being carried out at HO although PO activity is increasing as investments in training and technology are beginning to be felt.

The CSO workplace environment is substandard with staff distributed among one 2-story brick structure and a number of “temporary” buildings. A new 5-story Statistics Building was approved in 2002 when excavation of the site began with the demolition of about half the temporary buildings. Construction progress was slow but now the roof is in the process of being finished. CSO management is confident that the building will be ready for occupancy some time next year, when gearing up for the 2010 Census will begin in earnest.

As part of the 2000 Census Dissemination Programme, CSO created a website: [www.zamstats.gov.zm](http://www.zamstats.gov.zm). It was rapidly expanded to include all information released by CSO. In 2003, CSO introduced a new monthly publication, *The Monthly*, which serves as its major summary release mechanism for all new data and analyses. It is released every month via a public information seminar where CSO staff outline the results, describe the trends and answer user questions. It is also posted on the website although, it appears that, the posting is a couple of months behind. The consultant has attended four of these seminars over the years, including the 55<sup>th</sup> release on October 25, 2007. The presentations were professional and all queries received an appropriate response.

The CSO has much to be proud of and should be well positioned to undertake the 2010 Census process the planning for which is well underway. Although there has been a significant turnover of senior staff since the 2000 Census, CSO management is confident that its replacements, for those who left, are quite capable of meeting the challenge of 2010.

The census project planning document was released in January 2007. It covers every aspect of the census from EA delimitation to dissemination and analysis. The estimated cost for the census over the six year period from 2007 to 2012 is some ZK248 million or approximately U\$50 million. Of this 75% is to be covered by the government of Zambia with the remaining 25% coming from the donor community. CSO is confident that it will receive the needed funding from both government and donors although it is concerned that slippage due to delays in release of funds may compromise the schedule.

The number of EAs is estimated to be increased from 17,000 in 2000 to 21,000 in 2010. The task of delineating them should be made easier with the acquisition of satellite imagery.

### **3. MISSION AGENDA**

Since this is the initial mission with an objective as broad as quality assurance, it is not easy to create a detailed agenda given the barrier of distance and poor communication facilities. The proposed, and accepted, agenda was to review how the situation at CSO has changed since 2003; review census plans and progress; and then develop strategies to ensure that quality measures are built into those plans. This would be achieved by meetings with the Census Manager and the managers of each of the census phases.

### **4. DETAILED OBSERVATIONS**

The CSO has a draft 2010 Census strategy paper entitled: *2010 Zambia Census of Population, Housing and Agriculture: Draft Project Document, June 2007* (See Appendix 2). The document lists the major 2000 Census achievements and, to its credit, also points out the problems including the failure to complete EA Demarcation; the postponement of the Census Date by two months; inadequate transportation logistics; and failure to complete the PES.

The implementation strategy will be reviewed in the sequence presented in the project document. Some of the content will be regrouped to present it in its appropriate place in the census operational cycle.

#### **4.1 IMPLEMENTATION MONITORING AND OVERSIGHT**

A total of six committees are designated to manage the census (See chart in Appendix 1):

1. the **Census Cabinet Committee**
  - to monitor CSO activity and inform the Government on census progress;
  - to expedite passage of the Census Act, authorizing the census and set the Census Day;
  - to expedite financial difficulties.

2. the **National Census Committee** (Committee of all Ministry Permanent Secretaries)
  - to monitor CSO activity and advise their Ministers of Census progress;
  - to expedite cooperation and assistance for Census from all government ministries and agencies.
  
3. **Provincial Census Committees** (Committees of Provincial Permanent Secretaries)
  - to supervise and monitor the conduct of the Census in the provinces
  - to expedite cooperation and assistance for Census from all government ministries and agencies.
  
4. **District Census Committees** (Committees of District Commissioners)
  - to supervise and monitor the conduct of the Census in the District
  
5. **National Census Technical Committees** (Committees of technical experts from government departments and institutions, chaired by CSO Director)
  - to advise on the technical issues related to the conduct of the Census
  
6. **Census Steering Committee** (Committee of CSO technical experts chaired by the Census Manager)
  - to coordinate the day-to-day operations of the census.

The consultant recommended that there be another committee:

7. **Census Advisory Committee** (Committee of senior, respected, census data users)
  - drawn from government, academia, donors, ngos and the private sector
  - users of census data; therefore supporters
  - used for advocacy
  - provides independent (i.e. credible) oversight
  - source of external pressure to facilitate action
  - can be used for independent quality assurance (e.g. South Africa).

that might be easier to schedule regularly than some of the other committees enumerated, above. The mandate of the committee would be to promote CSO's efforts to produce a quality 2010 Census; to act as a champion for the census, to government, business, the public, and the donor community; to provide a quality assurance function of CSO's census activities to assure government, business, the public, and the donor community that they will be getting value and quality for money; to encourage government, business, the public, and the donor community to support census operations where needed.

### **QC Challenge**

The first 5 committees reflect the Zambian tradition for getting government approval and cooperation. CSO should be aware that these are difficult committees to organize meetings for and there is a serious risk of time slippage. Background work is necessary to ensure that CSO's needs/requests are understood and supported so that meetings can be short and necessary decisions are made.

It is not too early to constitute the **Census Steering Committee**. Work on EA demarcation has begun, and work on a training implementation strategy is needed, to ensure that materials are prepared for training and that skilled trainers are retained to train the top layer of the training pyramid. Attention needs to be given to developing a scanning strategy and identifying what technology to use.

A detailed project planning and control plan needs to be put in place and programme monitoring begun. CSO has a copy of MS Project to facilitate this activity. It should be used.

An external advisory committee is a 2-edged sword. An effective **Census Advisory Committee** will be able to influence government, civil society, and donors, but it will not be willing to do so unless they can see that CSO is conscientiously working at conducting a quality census which will result in quality data. Since CSO is committed to doing this it need not worry that the sword will be directed at it.

## **4.2 STRENGTHENING GIS AND SEA DEMARCATION (EAD)**

Although all the boundaries of the 2000 Census EAs were digitized, very little digitizing of features and landmarks was undertaken. These need to be added in order to allow enumerators to orient themselves in their EAs, identify the boundaries and cover the entirety of the EA without going beyond into neighbouring EAs. This will require a great deal of field work, much of which can be reduced if CSO is able to acquire detailed satellite imagery and train staff in its use.

The 2010 Census EAD will begin with the existing 17,000 2000 Census EAs. A new administrative overlay has been constructed to reflect the administrative changes (District, Ward, Electoral District) legislated in the interval since the last census. Fortunately, none of these new boundaries split 2000 Census EAs. Care should be taken that, as much as possible, 2010 EAs respect 2000 EA boundaries (i.e. modifications are made by splits and mergers preserving as many of the 2000 boundary lines as possible. This will simplify the major task of reconciling 2000 Census data to 2010 data and facilitate comparability. Where this is not possible, procedures should be put in place to allow for quality allocation of 2000 EA data to their 2010 equivalents.

CSO estimates that population growth and settlement expansion will necessitate increasing the total number of EAs from 17,000 to 21,000 which is a 20% increase in workload

The Geographic Information Branch (GIB), the unit responsible for EAD has already begun work on 2010 demarcation with a Feb.-Mar. 2007 Pre-test. From the results of this test GIB estimates that it needs 45 2-person mapping teams (5 per province). It also estimates that, using current procedures, a team can demarcate an EA in 2-3 days (2 days for an urban EA and 3 days for a rural one). It is estimated that there will be about 7,000 urban EAs and 14,000 rural ones.

Thus it will take 1250 days ( $2*7000/45 + 3*14000/45$ ) or 5 years ( $1250/(5*50)$ ). This is obviously not acceptable.

Fortunately, GIB has determined that there would be substantial saving in time if CSO acquired detailed satellite imagery to allow technology and office work to displace fieldwork. It estimates that through the use of these tools, fieldwork would be reduced by half (i.e. 1 day per urban EA; 1 ½ day rural). This would take 625 days ( $7000/45 + 1.5*11000/45$ ) or 2 ½ years. To this must be added training time in the use and interpretation of satellite imagery. This is still too high since it does not allow for unexpected problems which, if they occur (and something unexpected is likely to occur), will mean that EAD will finish just in time for Census Day.

However, as explained to the Head GIB, the EA structure is not just for use by the enumerators. It is the Census Frame and will be needed for planning and logistics for Human Resources (staffing and pay) planning, monitoring and control; for resource distribution (supplies, questionnaires, etc. to and from EAs) planning, monitoring and control; return registration; processing; editing, certification; tabulation, and dissemination. A census without a robust EA frame, available in time for preparatory planning, is destined to be a flawed census. The Head, GIB, is working with this consultant, and the GIS consultant, to refine his implementation strategy.

### **QC Challenge**

The EAD strategy is heavily reliant on the acquisition and use of satellite imagery. There is a risk that CSO may have difficulty in raising the 4 ¼ million dollars for the purchase. Even if successful, there is a likely probability that the imagery will not arrive as early as GIB expects it. There is also the risk that mastering the skill of using the imagery is more difficult than GIB expects. The GIS consultant is in a better position to quantify this risk than I, and should be consulted on the matter.

The staff of GIB has had difficulty in mastering the use of ARCGIS, a powerful suite of GIS software. It is now proposing to acquire a second GIS software package, Geomedia Professional, for which its staff will require training. This consultant does not see how superficial knowledge of two pieces of GIS software is better than a good knowledge of one. The GIS situational analysis report states that ARCGIS is not optimal for data creation. This consultant is not in a position to dispute this statement but he believes that learning one piece of software well is better than learning two not so well. There is also the potential difficulty of transferring data from one to the other to consider. Finally, ITB will need to maintain and support this software when, inevitably, hardware/software problems occur. Has consideration been given on the impact of this acquisition on ITB?

If it is possible to reverse the acquisition decision of acquiring Geomedia Professional, the consultant recommends that the GIS consultant be asked to review this action to see if he agrees with the cancellation. If he does not, perhaps he might provide a more informative rationale for its acquisition.

### **4.3 MATERIEL REQUIREMENTS, PROCUREMENT, DISTRIBUTION, AND CONTROL**

CSO recognizes that a census requires meticulous planning to get all the material needed to each enumerator to allow her/him to do the required task. The best way to ensure that everything is under control is to use a database management system that lists requirements, identifies when items are needed; lists quantities; has a distribution network with the ability to track flows from node to node; and a feedback system that reports when things arrive, and raises alarms when they do not. The organizational backbone of this system is the Census frame (an EA identifier starts with a **province** code followed by a **district** code, a ward code, a **census commissioner** code and finally an **EA** code. Those components in bold are part of the distribution hierarchy. In 2001, Stats South Africa used barcodes to track materiel as it was distributed along the census network and the distribution status at any point in time was available on the Logistical DBMS. Similar databases were established for staffing, training, pay and returns.

#### **QC Challenge**

Every seasoned census professional recognizes that acquisition, allocation, distribution and return of census material and documents is the Achilles heel of the census operation. There are so many different items with different quantities required in different areas, that mistakes are almost impossible to avoid. That makes it the more important that the operation be carefully managed and executed as early as possible before Census Day so that any problems can be corrected without a negative impact on enumeration.

As noted, quality execution of this phase requires the census frame, a list of everything that is needed at every node of the census operational structure, and a database management system that stores, traces transfers, and registers receipt/non receipt by the appropriate node, when expected.

The Operations Department should begin working on this system as soon as possible.

### **4.4 SUPPORT FROM OTHER GOVERNMENT MINISTRIES AND AGENCIES**

While the CSO is the main protagonist in the census exercise, it needs other government departments to actively take part in various activities at different stages of the census undertaking. The assistance of key ministries such as the Ministry of Education (MOE) is needed to facilitate the recruitment of teachers and students to work as census supervisors and enumerators respectively. The MOE may also be asked to facilitate the use of facilities at the Examinations Council of Zambia (ECZ) for the scanning of census questionnaires. The Ministry might also be asked to extend the August 2010 school holidays by a week or two to facilitate the successful completion of enumeration. The Ministry of Home Affairs (MHA) and the Ministry of Defence (MOD) through the Zambia Police Service, Immigrations departments, Zambia Army, Zambia Air force, Zambia National Service and other security wings will be asked to ensure that

the census is conducted smoothly and peacefully across the entire country and access is given to census enumeration field staff to all areas of the country for the purpose of census enumeration. The Ministry of Works and Supplies will ensure that government transport and other resources are made available for the purpose of census undertaking in all the districts and provinces of Zambia. The offices of the Provincial Permanent Secretaries and District Commissioners will be expected to coordinate and mobilise the provinces and districts respectively for the purpose of census undertaking. The Ministry of Information and Broadcasting Services will be asked to facilitate the national publicity and awareness campaigns on the 2010 Census of Population, Housing and Agriculture using the wide networks of the public media institutions such as Zambia News and Information Services (ZANIS), Zambia National Broadcasting Corporation (ZNBC), Zambia Daily Mail and the Times of Zambia.

In summary, the assistance of all government ministries and agencies will be needed to provide logistical, material and personnel for the different activities and stages of the census.

### **QC Challenge**

Getting willing (as opposed to grudging) cooperation from other government departments is a difficult task even when senior officials of the departments express their support. The best way to earn willing cooperation is to develop and maintain good relations whenever CSO staff and another ministerial employee interact. This is a long term activity which CSO management should foster. The difficulties that GIB seems to be having with the Surveyor General's Office is a case in point. It might be useful for a senior CSO manager to approach SGO to determine why GIB is having difficulty and what might be done to develop a cooperative relationship.

## **4.5 TRAINING**

For an effective training programme, CSO needs to develop good training materials and train the trainers so that they will be able to transmit the required knowledge to their trainees. Instruction manuals need to be clear, complete and include examples. Trainees should be encouraged to ask questions and they should be tested to ensure that only those with a firm grasp of the material are selected.

Training content must come from CSO, primarily from those professionals involved in questionnaire content, edit specifications and analysis. Organization and presentation of this material so that it is readily understandable by trainees is a specialized skill that one should not expect to be part of the professional statistician's arsenal. In a country like Zambia, with many languages, consideration should be given to translate the material and provide instruction if numbers justify it.

The training strategy involves a pyramid structure with detailed training at the top level and then each lower level of trainees serving as the instructors for the next level until it reaches the bottom at the enumerator level. CSO intends to hire teachers as supervisors and grade 11 students as

enumerators. This combination provided excellent results in 2000 and there is no reason to believe that it will not be the same in 2010.

It is not at all clear that all the costs of training are included in the training estimates.

### **QC Challenge**

Because of the pyramidal nature of the training strategy, if the top layer of the pyramid is inadequately trained, each subsequent layer will be even less-well trained, since no non-professional trainer is likely to be able to transmit everything (s)he managed to learn to trainees. This suggests that it is very important to develop good training material and have professional assistance in developing the delivery of the training.

## **4.6 ADVOCACY, PUBLICITY AND PUBLIC AWARENESS**

To be successful, the census must be accepted as important by the population, as respondents, citizens and taxpayers. They must understand why the government is willing to bear the expense of a census; how Zambia and Zambians benefit from the results; how the information they supply can be used (for research, policy formulation, monitoring change, focusing productive activity, etc) and how it will not be used (privacy concerns respected). Getting the public to listen to the message and believe it, is not a simple matter of making a speech, preparing a brochure or splashing an ad on a billboard. The public tends to discount requests for cooperation that appear to benefit the requestor. Experience has shown that the public is more likely to listen to and believe advocacy material transmitted by reputable and respected third parties. The existence of a Census Advocacy Committee made up of distinguished census users is much more likely to be appreciated than the same message sent out by the CSO.

Another way to promote the census is to attract the interests of students in the idea of a census (see: <http://www.statcan.ca/english/freepub/81-004-XIE/2005005/census.htm>). Their enthusiasm in the project tends to be transmitted to other family members when they discuss what they have learned about a census.

Advocacy attempts to make the audience pro-census; someone sees how census benefits her/him, the community, the economy, the nation. Although only a minority may be converted to this view, their enthusiasm tends to be infectious and spreads to others who then lend their support even though they do not understand the benefits. In contrast, publicity is intended to increase public awareness to reduce suspicion and fear of why strangers are coming to ask a lot of questions thereby increasing response co-operation.

Care must be taken when undertaking a publicity programme, if there are plans for paid advertising. Much Census publicity is provided free of charge as public interest stories, but if some media are paid for publicity, the amount of free material may shrink as those media cannot be blamed for also wishing to be paid for their census promotion.

## **QC Challenge**

Satisfied census data users are willing advocates for an upcoming census. They know first hand why it is important. Conversely, unhappy census users are less easy to be persuaded that they should support the effort. Dissemination Branch is an important player in the development of support for a census. It should facilitate user access to data and make every effort to make information as accessible as possible. A case in point is *The Monthly*. The release seminar is one method of promoting data use and good will. When asked about inflation in Zambia, last weekend, the consultant referred the interested party to go to the website and look at the latest release for this information. He was chagrined to learned that the latest *Monthly* release on the website was August 2007. There is no excuse for this.

Another way to garner support for the census is to have a census progress section in upcoming monthlies and on the website. Census content on the website should be reviewed to determine if more data can be placed on it.

## **4.7 COLLECTION**

This is the seminal activity of a census. On Census Day 21,000 enumerators will fan out across the country to collect the socio-demographic, housing and agriculture data. Their ability to go to their designated enumeration area, use the material supplied to elicit the information requested and enter responses accurately and clearly on the questionnaires within the designated 2 week collection period, while ensuring that they have covered their EA completely without trespassing onto a neighbouring EA will be the major performance measure of the sum of the quality of all of the preceding preparatory work.

## **QC Challenge**

The main risk to collection is that CSO will not be ready when the day comes. Good planning, monitoring, and swift resolution of problems, at an early stage, before they become serious, is the best way of mitigating this risk. If there is significant slippage of the schedule such that the date must be moved (as happened in 2000) then adverse weather becomes an additional risk which, if it occurs, will have a negative impact on quality.

## **4.8 MANUAL EDITING**

Once an enumerator has completed her/his assignment, (s)he is expected to review all questionnaires for completeness before returning them to the supervisor. The supervisor reviews all questionnaires for completeness, batches them and, when all EAs from the supervisor area are in and complete, batches them and sends them to the designated collection point. The enumerators and supervisor also prepare a summary sheet of key information which will be used in the preparation of preliminary estimates.

## **QC Challenge**

The main risk for this sub-phase of collection, is that enumerators or supervisors are not adequately trained and/or motivated to do a good job. Such incidence will have a negative impact on data capture and preliminary estimates. Fortunately, using teachers and grade 11 students should minimize this risk unless they are inadequately trained or lose their motivation.

## **4.9 DATA CAPTURE AND EDITING**

The 15-20 million forms that are the end product of census enumeration are not much use until the information they contain is transferred from paper into a machine-readable format. The most effective way of doing so is via scanning. There are 3 different scanning technologies: Optical Mark Recognition (OMR); Optical Character Recognition (OCR); and Intelligent Character Recognition (ICR). OMR senses marks in a specific location on a page and converts the mark into the appropriate code. It requires very precise printing since it converts marks at specific locations into coded responses. OCR and ICR are technologies that identify each written character and convert it into its digital alphanumeric equivalent. The 2000 Census used OMR technology and it is recommended that the same technology be used in 2010. It is easier to use, is less prone to error and tends to produce results more quickly.

The 2000 Census questionnaires were scanned for CSO by the Education Council of Zambia (ECZ) which is a center of scanning expertise in Lusaka. There is some talk of conducting the scanning operation in-house. Since there is no scanning expertise in the Information Technology Branch (ITB) of CSO it would be prudent for CSO to renew its partnership with ECZ. CSO would be better served in building database, web design and dissemination expertise within ITB rather than stretching its resources to include yet another technology that requires a great deal of expertise and is used sporadically.

The Consultant met with Mr. Moses Mwale, Assistant Director, Information Technology, at ECZ. (Mr. Mwale was the ECZ manager for the 2000 Census scanning operation). The ECZ has just recently received two high-end scanners that operate as all 3 of OMR, OCR and ICR. They are about to be used for marking exams. The questionnaires are still mark sense, but the write-ins will be interpreted using ICR technology. In addition the questionnaires will be scanned into memory so that the paper copies need not be kept. Mr. Mwale thought there should be no problem renewing the CSO-ECZ partnership as long as the schedule did not negatively impact examination processing but that negotiations have to be undertaken with ECZ management, not him.

The consultant recommends that a cooperation memorandum between CSO and ECZ should be signed as soon as possible. Part of that cooperation should be the secondment of a CSO IT professional to ECZ to observe the use of these new scanners and to learn what steps need to be

undertaken to produce questionnaires for scanning as well as the process of converting scanned images to usable data.

Once the data are captured they need to be reviewed for consistency. All data are subject to error. The respondent may have answered incorrectly; the enumerator may have misheard or may have marked the wrong box. The right box may have been marked but it was so close to its neighbour that the scanning software attributed the wrong code.

Subject matter experts establish a set of edit rules that identify inconsistencies (e.g. a male with responses to the fertility questions; a child that is older than its parent, etc). The editing process identifies how many cases of each type of inconsistency appear in the dataset. If there are a significant number of them, an investigation is undertaken to determine if there was a scanning or programming error introduced in the data capture stage. If not, the inconsistencies are sent through the imputation process. This is an algorithm which “corrects” the error either through a series of logic tests or using similar error-free records as donors. The imputed records are then sent through the edit process again to ensure that they are now consistent. If not, the process repeats until all records are “consistent”.

### **QC Challenge**

The major risk for data processing is delay in the decision concerning choice of scanning technology and where the scanning will take place, in-house or at the ECZ. Many other decisions (questionnaire structure, paper, coding flexibility, printing requirements, among others) are dependent on the choice of scanning hardware/software. The lead time for equipment acquisition and training may be long (depending on what is chosen). The same may be true for paper purchase and/or printing.

This risk may be minimized if the partnership between CSO and ECZ is renewed. There may even be no need to purchase equipment if what the ECZ has will suffice and it has the capacity to include the census in its workload. More likely, there will be a need to get additional equipment but it should be less than if CSO went it alone.

It is strongly recommended that CSO begin discussion to re-establish its partnership with ECZ.

## **4.10 VALIDATION**

Once the data are edited, analysts must review test tabulations to determine if there were systematic errors introduced at any of the previous stages that produces results that run counter to what a seasoned researcher would expect. The most common are programmer errors (which can be corrected and the tabulation re-run). Others are respondent bias [respondent’s systematically providing incorrect information (sometimes happens with income questions)]; respondent error [respondents giving a wrong answer because they misunderstood what the question was (e.g. the employed/unemployed question in 2000 when employment in Zambia was as high as 96% because nearly everyone stated that they were working last week)]; enumerator error [enumerator intentionally, or unintentionally, leading respondents to provide the wrong

answer (the second example for respondent error also requires that there be enumerator error)]; data capture error [the machine is programmed incorrectly (this is an unlikely source since test data are used to validate that scanned results will be accurate)]; database management error and programming errors [these are correctable, once discovered].

As discovered, subject matter staff, in consultation with the analyst(s) who discovered the problem, must decide how to correct for the error, or determine that it is not feasible to correct it. If the latter, the decision must be made whether to withhold the dataset or release it. If the latter, the dataset must be flagged, the problem explained and the user interprets the results at her/his own risk.

Once this process is completed, the data is certified as “clean” and released.

### **QC Challenge**

The validation and certification process is an art. Sometimes systematic errors slip through and are not found for years. Others have probably never been found. The best that one can do to mitigate this risk is have the most experienced researchers one can get to perform the validation exercise.

## **4.11 DISSEMINATION**

There is no point in taking a census if it is not made readily available for use. The biggest danger is that, by the time CSO gets to the dissemination stage, there are no funds left with which to disseminate. It is unfortunate that the 2000 Census CSO/Statistics Canada/CIDA capacity building partnership ended without concluding the data warehousing component. This knowledge is more important than ever now that the web has become pervasive and broadband availability appears to be everywhere, even in Zambia.

To minimize the likelihood that there are no funds for data warehousing skills development, it is recommended that CSO attempts to obtain these skills now, at the beginning of the cycle rather than the end. If you have the skills, it will not be costly, or difficult, to distribute your results via the web or via special tabulations distributed over the internet.

## **5. ACTIVITIES**

CSO knows what needs to be done to conduct the 2010 Census and is well on its way to developing its strategy. It is heavily reliant on the acquisition and use of satellite imagery to complete its EA delineation in time for the census. The major risk for the census might be unexpected difficulties in acquiring this imagery and/or learning how to use it effectively soon enough to achieve its goal of completing EA delineation. Since this was the major failure of 2000, CSO management is well advised to monitor this activity carefully.

CSO knows that it will use scanning as its data capture methodology. It has not yet decided whether to renew its partnership with the Education Council of Zambia or whether to undertake scanning in-house. If it decides to do the latter, it needs to develop the considerable skills necessary to manage, operate, and service this highly technical and complex technology.

All the major tasks for the upcoming census have been addressed in CSO's planning documents. The next phase is to break down these tasks into their components and appoint staff to prepare plans for detailed operational execution, including what needs to be done; who will do it; what is needed; and when it will be needed.

If management monitors these activities carefully, they will become aware of difficulties as they occur and will be able to determine how best to deal with them before they become overwhelming.

With careful planning, good management, capable staff and teamwork the 2010 Census should be a success.

The consultant is prepared to assist CSO in this endeavour but it is not clear how he can best do so. Discussion of this topic did not materialize due to the unavoidable cancellation of the meetings that were to have taken place on the last day of the mission.

The consultant has agreed to work with the Census Manager and the Deputy Director via e-mail. A follow-up mission will be placed on hold until such time as CSO is clear about the nature of the assistance required.

## 6. DELIVERABLES

The CSO provided the consultant with their preparatory documents for the upcoming Census and asked the consultant to review them and provide recommendations so that they would be able to produce a quality census. These recommendations are being provided orally by the consultant during the meetings he held with CSO staff and, in written form, in this report.

## 7. DESIGN & CONTENT OF THE MODULE

The first and third country priorities, **planning and preparation on quality control issues** and **monitoring and evaluation** are complementary activities since the latter is the major technique for assuring the quality of the former. Therefore, much of what might have been covered in the third mission has already been introduced in this mission. If the third mission is delayed until late in the census process, it might be used to assess how well monitoring and evaluation activities have been executed.

The second priority, **advocacy and publicity**, is an important one that has only marginally been addressed in this mission. A well structured advocacy and publicity strategy will improve

respondent relations, with a positive impact on timeliness and field costs, and increase support for the census and CSO.

## **8. WIDER ISSUES**

The consultant found it difficult to conduct meetings with census activity managers because so many of them were absent for much of the time he was there. While the Deputy Director, Social Statistics, did his best to fill in, he was not able to provide all the necessary details required.

For future missions, CSO should ensure that the manager (or a capable deputy) of each area that will be interacting with the consultant will be available to benefit from the consultant's presence.

## **9. INTENDED DELIVERABLES OF THE CSO**

Unfortunately, there was not sufficient time at the end of the mission to have a meeting to review what had been accomplished and to discuss future missions. It is therefore assumed that follow-up missions will be planned as agreed to during the Mombasa meeting.

## **10. PLANS FOR NEXT MISSION**

There are currently no plans for a follow-up mission (See Section 9).

## **11. WORKING RELATIONS**

The consultant found that management and staff of CSO were friendly and considerate. They gave him ready access to their ideas, practices, worries and written material. He did his best to transfer knowledge and information to help CSO in its goal of improving the quality of the 2010 Census process.

## **12. PREPARATION ISSUES**

CSO management needs to review its practices for preparing to receive consultants so that it is better able to benefit from their presence.

## **13. RECOMMENDATIONS**

1. That a Census Advisory Committee, chaired by a distinguished outside user, be

established to provide a credible external voice for the CSO's census efforts;

2. That the Census Steering Committee be established to coordinate census work by the various branches and report progress to census management.
3. That CSO enter the details of its implementation strategy on a project planning, control, and monitoring software such as MS Project so that management is aware of progress and gets early warning of risks when activities fall behind schedule.
4. That 2010 EA boundaries respect 2000 EA boundaries as much as possible to facilitate the reconciliation of 2010 and 2000 data at as low a level as possible.
5. That CSO reverse its decision to acquire Geomedia Professional software.
6. That CSO identify a staff member to be trained to have the skills to develop, populate, maintain and administer a Materiel Data Base Management System.
7. That CSO begin discussions with ECZ on the scanning of 2010 questionnaires.
8. That CSO gives priority to acquiring data warehousing expertise for web and special tabulation dissemination

## **14. OTHER DONORS**

None

**15-18** no comments

## APPENDIX 1 PREPARATIONS FOR MISSION

### Consultant

In preparation for this mission the consultant read all the material sent to him over the three or four days after a contract agreement was reached. He also found the GDSS website and reviewed the material there.

He read the Zambian country report and country workplan from the Mombasa Workshop as well as the reports he had prepared on his previous missions to Zambia, and began reviewing the material he had in his archives on the subject of statistical operation quality assurance. Among the material found he selected the following which he thought might be of value for the Zambian mission to bring along with him:

*Quality Guidelines* Senior Author: Harry Freedman, Statistics Canada, 1987

*Quality Improvement Tools*, Juran Institute, 1989

“Quality Control and Quality Assurance,” Appendix B, pp. 305-312 in

*Zambia Survey Skills Manual*, First Edition, Statistics Canada, November 2003.

*2001 Census Handbook*, Statistics Canada, February 2003, Cat. #92-379-XIE

*Census Management Guide to the 2001 Census*, Statistics Canada, February 1999

*2006 Census Management Guide*, Statistics Canada, December 2004

*Census of Population and Housing, Data Quality – Undercount* Australian Bureau of Statistics, February 2003, Cat. #2940.0

**Report on The Assessment of The 2000 Round of Population and Housing Censuses And Proposed Strategy for The 2010 Round of Population and Housing Censuses In the CARICOM Region**, CARICOM Secretariat, May 2007

and

“The Use Of Optical Mark Reading (OMR) For Census Data Collection”, Kevin Orchard, **18<sup>th</sup> Population Census Conference**, Program on Population, East-West Center, Honolulu,. Aug. 26-9, 1998

He also had 35 years of experience in Statistics Canada (including several as the agency’s quality assurance expert) plus 5 years of international work, including two with Zambia upon which he could draw.

### Client

The CSO prepared the following material to allow the consultant to become familiar with the agency and where it was in the census planning process:

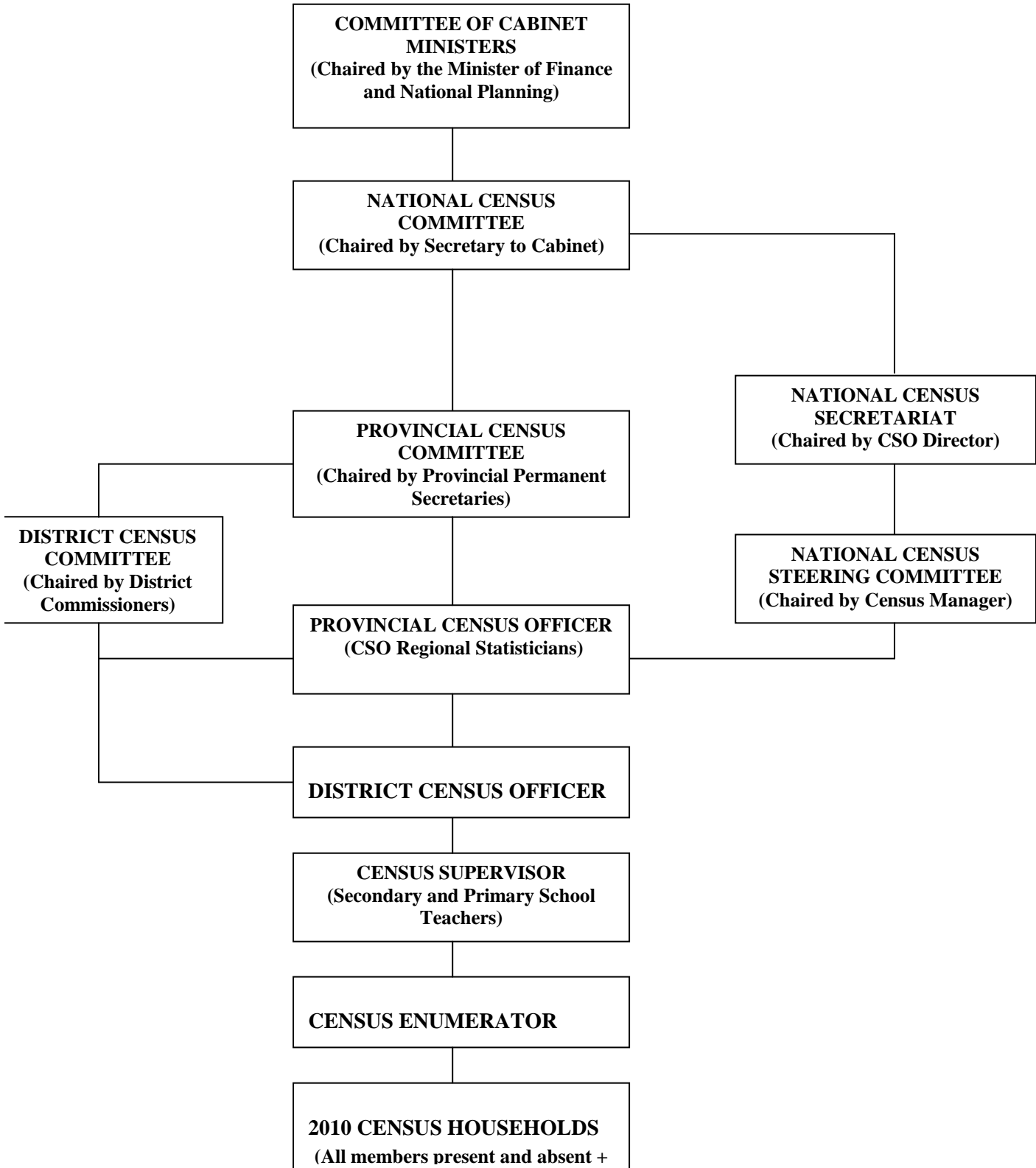
“2010 Zambia Census Of Population, Housing And Agriculture, Draft Project Document,” June 2007

“Data Quality Control and Assurance Strategies: 2010 Census of Population and Housing,” Oct. 2007

Census Cabinet Memorandum

“Advocacy Note for Resource Mobilisation for the 2010 Census of Population and Housing,” May 2007

# APPENDIX 2 ORGANISATIONAL STRUCTURE FOR THE 2010 CENSUS



# **APPENDIX 3 CENSUS PLANNING DOCUMENT**

{ cover page only, available as separate attachment }



REPUBLIC OF ZAMBIA

## **CENTRAL STATISTICAL OFFICE**

**2010 ZAMBIA CENSUS OF POPULATION, HOUSING AND AGRICULTURE**

**DRAFT PROJECT DOCUMENT**

Central Statistical Office  
P.O.Box 31908  
LUSAKA

June 2007

## APPENDIX 4 PERSONS CONSULTED

| NAME                 | TITLE                                    | E-MAIL   | TELEPHONE    |
|----------------------|--|--|--------------|
| <b>CSO</b>           |  |  |              |
| Efreda Chulu         | Director                                 | <a href="mailto:Echulu@zamstats.gov.zm">Echulu@zamstats.gov.zm</a>                               | 097 779 9632 |
| William Mayaka       | Deputy Director, Social Statistics       | <a href="mailto:WCMayaka@zamstats.gov.zm">WCMayaka@zamstats.gov.zm</a>                           |              |
| John Kalumbi         | Dep. Dir, Informatics, Research & Diss.  | <a href="mailto:ikalumbi@zamstats.gov.zm">ikalumbi@zamstats.gov.zm</a>                           |              |
| Richard Banda        | Census Manager                           | <a href="mailto:RichardBanda@zamstats.gov.zm">RichardBanda@zamstats.gov.zm</a>                   | 097 771 6960 |
| Margaret Mwanamwenge | Deputy Census Manager                    | <a href="mailto:Mmwanamwenge@zamstats.gov.zm">Mmwanamwenge@zamstats.gov.zm</a>                   |              |
| Ivan Sikanyiti       | Head, Geo. Info. Branch                  | <a href="mailto:Isikanyiti@zamstats.gov.zm">Isikanyiti@zamstats.gov.zm</a>                       |              |
| Frank Kakungu        | Head, Info. Tech. Branch                 | <a href="mailto:fkakungu@zamstats.gov.zm">fkakungu@zamstats.gov.zm</a>                           | 097 732 1214 |
|                      |  |  |              |
|                      |  |  |              |
|                      |  |  |              |
| <b>Outside CSO</b>   |  |  |              |
| Pierre-Paul Perron   | Acting High Commissioner of Canada       | <a href="mailto:pierre-paulperron@international.gc.ca">pierre-paulperron@international.gc.ca</a> | 260 1 250833 |
| Kenna Kelly          | Principal, Kelly & Kelly GIS Consultancy | <a href="mailto:kenna@kellyandkelly.co.zm">kenna@kellyandkelly.co.zm</a>                         | 260 1 212479 |
| Moses Mwale          | Asst. Dir., Info. Tech., ECZ             | <a href="mailto:mamwale@moe.gov.zm">mamwale@moe.gov.zm</a>                                       | 260 1 252544 |