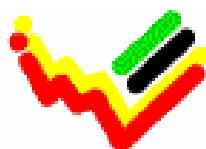**Mission Report**

from a short-term mission on

Practical training in sampling

14-25 February **2005**

TA for the Scandinavian Support Program to Strengthen the Institutional Capacity of the National Statistics, Mozambique

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March 2005

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Ms Irene Tuveng and Firmino Guiliche discussing the training plan

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List of abbreviations

CO   Scanstat Coordination Office in Statistics Denmark

CAE   Classificação de Actividades Económicas (type of economic
                activity)

CEMPRE   Censo de empresas 2002 (Business census 2002)

CNBS   Classificação Nacional de Bens e Serviços (product classification)

Danida   Danish International Development Assistance

DEBA   Department for Statistics on Goods and Environment

DESC   Department for Statistical Services and Business Statistics

DESE   Directorate of Statistics on Enterprises and Sector Economics

DISI   Department of Informatics and Information Systems

DPINE   Provincial delegation of INE

FUE   Ficheiro de unidades estatísticas (software for the business
                register bought from INE-P)

INE   Instituto Nacional de Estatística, Moçambique

INE-P   Instituto Nacional de Estatística, Portugal

Scanstat   Consortium between Statistics Denmark, Statistics Norway and
                Statistics Sweden

SCB   Statistics Sweden

SEN   The national statistical system

SSB   Statistics Norway

1 EXECUTIVE SUMMARY

To develop the practical skills in sampling and calculation of estimates based on samples in the National Statistical Institute (INE), a course of five days duration was held during the last two weeks of February 2005. The course was arranged in a room for computer training in the Portuguese School of Maputo, where the 13 participants of the course were sharing 8 computers. The computers had software in Portuguese, in contrary to INE where the software is in English. All computers were connected to a network, which was used to distribute templates for exercises, proposals for solutions   to the exercises, demonstrations etc.

The course was designed to enable the participants to define a sampling frame, realize the sampling plan and process the survey in a statistically correct way. The main focus was on practical work on translating the statistical tasks to operational data processing routines. Considering the limited experience in using statistical software packages, Microsoft Excel was used for all exercises.

Using a file called FUE_MINI, with the same structure as the business register of Mozambique, the participants made a proper identification of a sample frame, calculated sample size recommendations using optimum allocation, made a sample design and executed the sampling. The exercises were made in Excel, but an Access version of FUE_Mini was also developed and used for demonstrations during the course. Since only few of the participants were familiar with Access it was decided to arrange a small workshop after the course for those who will work with sampling from the business register, which is an Access database.

The main recommendations are that the participants in the course will practice making samples and apply the basic rules for designing stratification plans and defining the sample size and the expected precision of a sample of a certain design and size. People working with sample surveys are advised to carefully consider that different types of non-response should be treated in different ways in the weighting procedure.

To help keep and build competence within sampling in INE, it could also be an idea to establish a working group to meet regularly and discuss issues related to sampling. For example when INE is planning for new surveys, this group should meet and discuss the sampling plan prior to drawing a sample and collecting data, and also to discuss possible non-response problems when data collection is finalized.

A secondary objective of the mission was to give assistance in the routines for updating of the business register (FUE). The consultants made a summary review of the updates after November 2003 and since only 216 new units had been included in the FUE during the past 15 month-period, the recommendation was to make the routines for updating the register operational before replacing the samples for the short-term economic indicators. It was emphasised that the old recommendation to verify that all the largest enterprises are included in the surveys for the short-term indicators was the most important action to take.

Ms Irene Tuveng, who is also coordinator for the project in Statistics Norway, had meeting with INE officials and the long-term advisors to coordinate the project.

2   RESUMO EM PORTUGUÊS

Um curso de cinco dias para treinar um grupo do pessoal do INE na área de amostragem foi realizada durante as últimas duas semanas de fevereiro 2005. O desenho do curso enfocou a dar conhecimento de rotinas práticas para desenhar e elaborar amostras usando o ficheiro de unidades estatísticas (FUE) como fonte. O curso também cobriu as etapas do processamento dum inquérito que são especifícas para um inquérito baseado duma amostra.

Durante o curso elaborou-se demonstrações e exercicios para elaborar amostras dos tipos mais frequentes

- amostra aleatória simples sem e com estratificação
- amostra aleatória simples sistematicamente sem e com estratificação

Aplicou-se as ferramentas para calcular medidas com média, desvio padrão e intervalo de confiança.

Os exercicios foram executados usando Excel mas demonstrou-se também como realizar e resultado correspondente em Access. Para calcular a distribuição optima de amostras estratifadas utilizou-se a formula para "Optimum allocation" assumido que o custo por unidade da amostra é igual.

A missão foi feita durante duas semanas em fevereio de 2005 por Irene Tuveng de Statistics Norway (SSB) and Kenny Petersson de Statistics Sweden (SCB). A missão foi feita conforme os termos de referencia (Appendix 2).

As actividades principais foram as aulas do curso e preparação de material e exercicios para o curso. Os consultores também realizaram avaliação da quantidade de actualizações e novas empresas no FUE entre Novembro 2003 e Fevereiro 2005 para discussões sobre actualização das amostras. Considerando que encontrou-se somente 216 novas unidades no FUE foi concluido que a recomendação é melhorar as rotinas para actualização do FUE antes de tirar novas amostras.

Agradeço todo o pessoal de INE, que tivemos a vantagem encontrar e trabalhar junto com durante a estadia no INE, especialmente os participantes do curso e Dr. Firmino Guiliche que assistiu no desenvolvimento do conteúdo do curso e durante o curso.

3   INTRODUCTION

The main objective of the mission was to give a course focusing on giving practical skills in designing and realizing a sampling plan.

In the agreed plan of the course, the objectives were as follows:

- Give a summary of the theory for sample surveys
- Give practical skills in defining a sample frame and designing a stratification plan
- Give practical skills in calculating measures as standard deviation and confidence interval for samples and sample frames.
- Give practical skills in using optimum allocation for optimising the sample distribution between strata.
- Make samples of the most frequent types of sampling methods with main focus on stratified random samples
- Give training in how to present error related to estimates in analysis
- Emphasise on the differences in the treatment of different types of missing data in sample survey and censuses.
- Give practical skills in using Excel for the realizing the most important tasks in the sampling process.

The mission was conducted by Ms Irene Tuveng from Statistics Norway (SSB), former long-term advisor in economic statistics in INE now home coordinator for the project, and Mr Kenny Petersson from Statistics Sweden (SCB) during the period 14-25 February 2005.

The main counterparts were Mr Firmino Guiliche, who participated in the development of the programme for the course and assisted as teacher during the course, and the participants in the course.

This report contains the views of the consultant(s), which do not necessarily correspond to the views of Danida or INE.

4   ACCKNOWLEDGEMENTS

The consultants would like to express many thanks to all the people we have met and had the pleasure to work together with during the stay in Mozambique. We would especially like to thank Mr Firmino Guiliche, who participated in the preparation of the theoretical part of the course and also assisted in the presentation and course evaluation. Thanks also to Ms Leonette Mabjaia (training coordinator at INE) and Ms Isabel Jotamo Novela, who arranged the practical facilities, the participants in the course and Mr Hans-Erik Altvall, team-leader of the Scandinavian project. All the kind support from INE staff has highly facilitated the work and contributed to making the stay very pleasant.

5   THE SAMPLING COURSE

5.1   Background of the participants

The course was aimed at persons with some prior knowledge of sampling theory and statistics, either formal education and/or work experience. It was also expected that the participants would be accustomed to Excel, as all the illustrations and exercises were prepared in Excel.

The actual participants did have some formal background in the theory of sampling, but the general impression of the consultants was that this knowledge was limited and that it was useful to have a review of the basic theory as a backdrop to the practical part of the course.

Few had any background of sampling in practice, and also Excel knowledge was not as extensive as anticipated on beforehand. This resulted in that more time than planed was used on introducing functions in Excel. On the other hand, the participants seemed very interested in expanding their knowledge of "handy" Excel functions. One possibility, if the course is to be repeated in the future, is to include a one-day Excel course before the actual sampling course for those with limited Excel knowledge. Another possibility is to expand the sampling course to give more time to the practical part.

Another observation concerning the participants was that nearly all were selected or appointed by their Directorate to participate on the course. In general, we would suggest that the selection routines include an evaluation of the relevance and motivation for the course. After the course it is useful to discuss possibilities to implement new knowledge in the working routine, and how to spread new knowledge to colleagues.

Initially, 15 participants were signed up to for the course. Two of the participants were from INE-province office (Maputo Province). 13 persons completed the course. One never showed up, and one participated only one day.

5.2   Objectives

The main objective of the course was to give the participants a review of basic sampling theory with focus on methods used in economic surveys, hence when sampling enterprises or establishments. Practical training in how to realize a sample plan (i.e. decide sample size and allocation of samples, draw samples, calculate estimates and measures of deviation) was prioritised, and more or less 2/3 of the total time was used for illustration and exercises in Excel. The course also focused on the problem of non-response in surveys, discussing different causes of non-response and how to account for this in the final calculation

5.3   Facilities

The course was arranged in a room for computer training in the Portuguese School of Maputo, where the 13 participants of the course were sharing 8 computers. The computers had software in Portuguese, in contrary to INE where the software is in English. All computers were connected to a network, which was used to distribute templates for exercises, proposals for solutions to the exercises, demonstrations etc.

Microsoft PowerPoint was used for the theoretical part of the course.

The exercises in sampling were made in Microsoft Excel with extensive use of projections of screen images for introductory demonstrations and discussions of possible solutions.

5.4 Contents

Because it was expected that many of the participants would have some theoretical knowledge of sampling prior to the course, it was decided that focus should be on putting theory into practice. More or less 2/3 of the course consisted of illustrations and exercises in Excel.

The course had duration of 5 working days, from 8.30 a.m. to 14.00 p.m., with lunch at the end of the day. Each day of the course was normally divided into two parts of theory and two parts of practical training with illustrations and exercises using Excel as working tool. The illustrations and exercises was closely linked to the theoretical parts of the course.
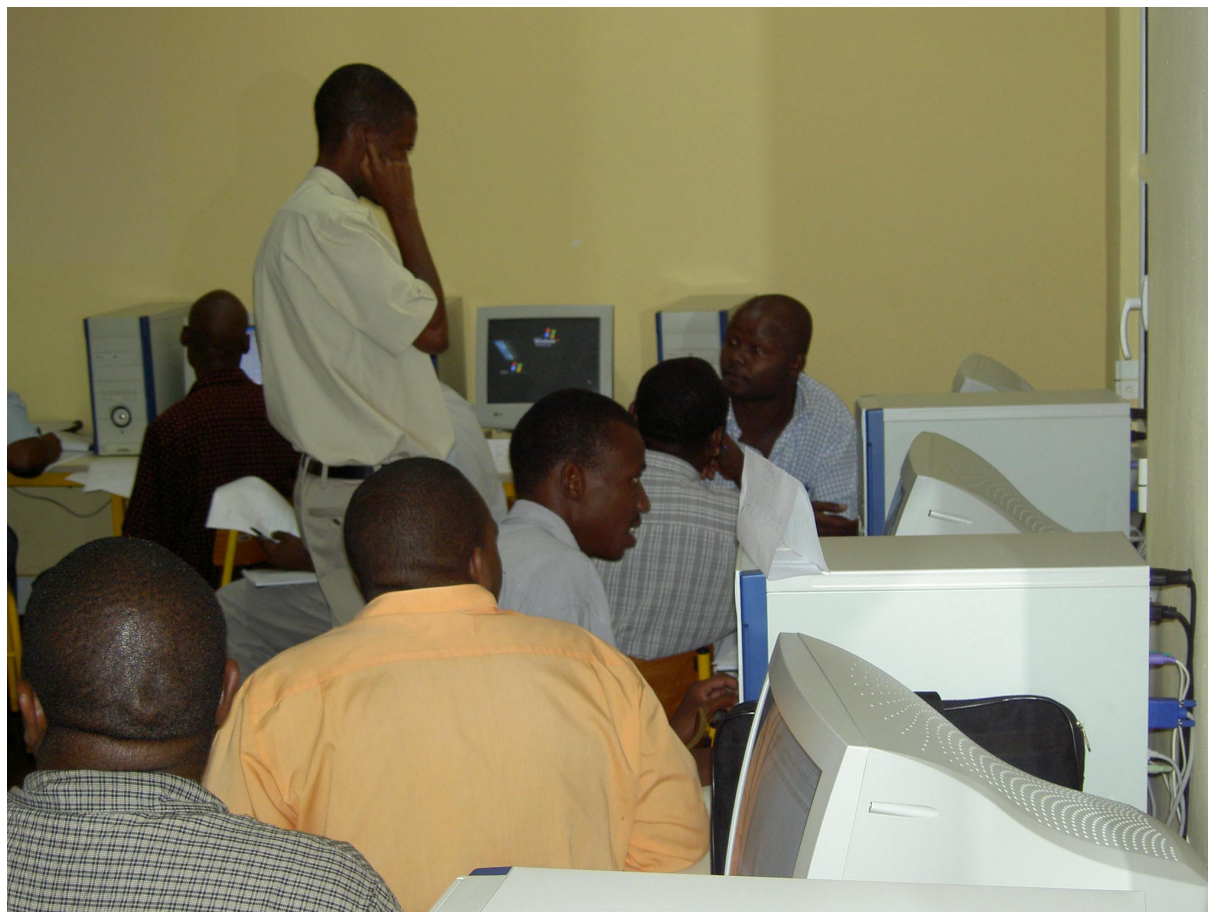
Mr Firmino Guiliche discussing with Mr Adriano Matsimbe during the course

The theoretical part of the course included the following areas:

- A review of the phases in a survey
- Definition and examples of calculating probability
- An introduction to probability samples
- Review of sample methods focusing on;
    - Simple random sampling

- - o Systematic sampling
    - o Stratified sampling
  - Measures of error:
    - o Standard error
    - o Confidence interval
  - Target population vs Frame population
  - Errors
    - o Sampling errors
    - o Coverage errors
    - o Non-sampling errors (with focus on the problem of non-response)
  - Weights

In the practical part of the course the participants learned how to prepare a data file for sampling, identifying and selecting units to be included in the sample frame, review the structure of the frame population, define strata, drawing samples and calculating estimates and measures for variance and confidence intervals. The file that was used for illustrations and exercises had the same structure as the business register (FUE).

During the last two days of the course there was a training exercise covering the whole data processing including

- - identification of the sample frame
- - definition of a stratification plan
- - calculation of sample distribution using "Optimum Allocation"
- - elaboration of a stratified random sample
- - classification of non-response and coverage error
- - weighting and recalculation of weight for non-response compensation

As illustrations to the theory, the solution sheets for the exercises on simple (unstratified) random sample and unstratified simple random systematic sampling contained macros for repeating 1000 samples and showing the distribution as well as the confidence intervals for these samples.

A routine in Access for stratified random sampling was developed during the course, but since few of the participants were familiar with working in Access, the routine was used only for demonstration purpose during the course. At the end of the course there was a separate demonstration of the details of the routine before it was handed over to Mr Adriano Matsimbe, responsible for the business register (FUE).

The participants were encouraged to use graphical presentation of confidence intervals as a contribution to the declaration of the quality of the estimates.

Figure 1. Example of graphical presentation of confidence intervals
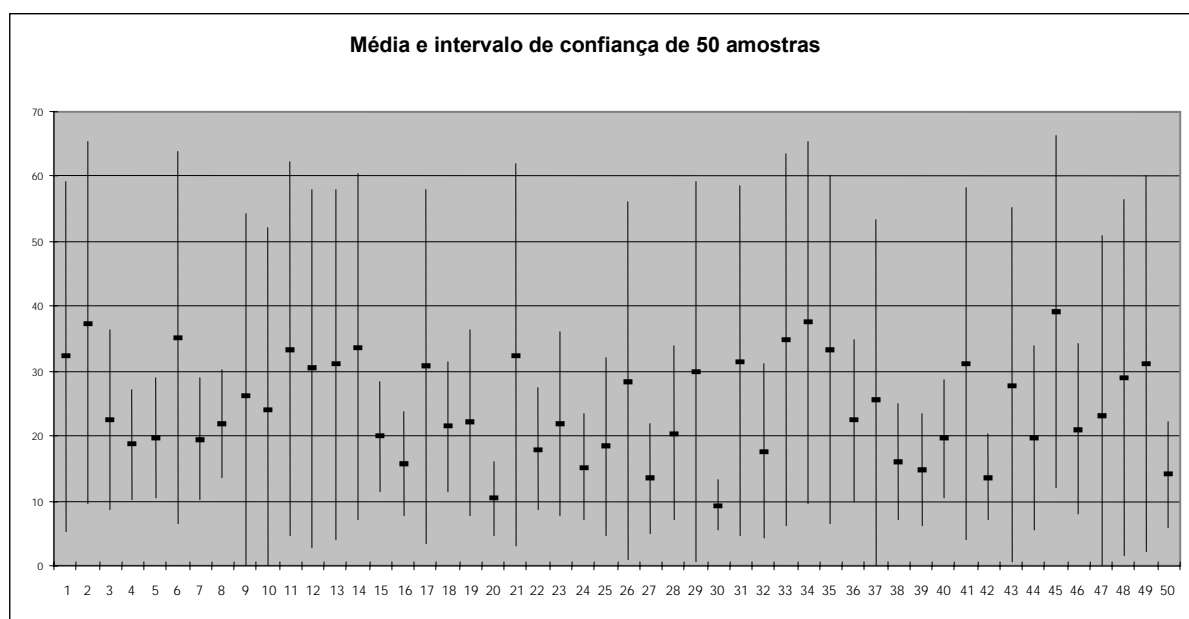
The participants in the course, Ms Irene Tuveng and Mr Firmino Guiliche

The development of the contents of the course was a teamwork of the consultants and Mr Firmino Guiliche, head of the department for consumer prices. Ms Tuveng arranged most of the slideshows and explained the theoretical background together with Mr Firmino Guiliche, while Mr Petersson prepared most of the demonstrations of facilities in Excel and the exercises.

5.5   Documentation

A separate documentation report is prepared in Portuguese - "Documentação do curso de amostragem", containing more information on the actual content of the sampling course, including all PowerPoint slides with the theoretical part of the course and a summary of the contents of the examples and illustrations used in the course.

The objective of a separate documentation report was to give the participants in the course an extensive documentation, and also to facilitate the use of the same material for new courses in the same subject area.

All PowerPoint slides and the files with examples and exercises were copied to two CDs, one for Maputo Province and one for INEs central office.

5.6   Results

5.6.1   Theoretical skills

A major part of the participantes had some knowledge of sampling theory prior to the course, but the impression of the consultants was that this was limited and that a review of basic sampling theory was necessary. Discussions during the course (for example related to advantages and disadvantages to use samples compared with a complete count), and the final test on the theoretical part of the course underlined the fact that some prior knowledge of statistics and sampling theory was necessary to follow the relatively fast review of the theory.

If this course is to be repeated in the future, the consultants recommend that the participants are required to have some former knowledge of the theory of sampling; i.e. trough their formal education, or through internal training courses. The STAC-course could be a good platform for this sampling course.

5.6.2   Practical skills

The course focused on giving the participants training in how to translate the statistical tasks to operational data processing routines. Considering the limited experience in using statistical software packages, Microsoft Excel was used for all exercises. The consultants also considered whether or not to use access in some of the illustrations and exercises, but decided not to after revealing that only 3 of the participants had some knowledge of this software.

At the end of the course the consultants believe that most of the participants had acquired knowledge of how to prepare a data file for sampling, draw different types of samples, calculate estimates and measures of error, using Excel as working tool. Some of the more experienced participants are also expected to have learned how to distribute a sample to strata using Neyman-allocation

The impression of the consultants is that many of the participants discovered many new and useful Excel-functions that they did not know prior to the course that can be useful not only in working with sampling, but in general.

5.6.3 Comments by participants after the course

Main conclusions from the evaluation of the course that was conducted on the last day, was that the participants especially appreciated that the course focused on "Sampling in practice". Many of the participants also agreed that the course was too short, and that they needed more time for the exercises.

The consultants recommend that the participants use some time in the weeks to come to repeat the exercises in Excel that was prepared for the course, and that the training material is shared with colleagues at INE.

6   OTHER ACTIVITIES AND OBSERVATIONS DURING THE MISSION

6.1   Project coordination

Irene Tuveng is home-coordinator for the SCANSTAT-project in Statistics Norway, and more or less two days of the short-term mission was used for coordination work. This time was used on the following subjects:

6.1.1   Status on the work and plans for updating the Business register

Discussions with the Director of DESE Mr. Azarias Nhanzimo revealed that little progress have been made in the work of updating the Business register - FUE. A unit of two persons have been established to work with continues updating work, but no routines for this work have been established, and documentation the work is lacking. Nhanzimo stressed that the Directorate need assistance of a LTA in order to establish good routines for this work.

6.1.2   New LTA within Economic statistics

Mr. Azarias stressed that a new LTA is needed to help DESE administrate the updating work, and that more short-term missions on this area is not a solution. The Portuguese candidate for the job - Julia Cravo is now probably not available since she is not granted leave from INE-P, and hence other candidates should be presented for INE. Before the coordination office in Denmark can continue the work of finding new candidates for the job, the President of INE-M must confirm that Julia Cravo no longer is a candidate for the job.

If it is not possible to find a new LTA, it is necessary to discuss other possibilities for assistance on the urgent task of updating the FUE. One possibility could be to contract a local consultant with one task only - Management of the business register updating work?

6.1.3   Plans for short-term missions in 2005

TL and Tuveng discussed the plans for short-term missions in 2005. Since the TL gives regularly reports on the status for STM, only plans for selected missions are summarised here.

As a follow-up of recommendations from the mission on presentation technique (7/2-18/2) it was suggested that the planned mission/course in analysis (planned for June) should focus on training in basic understanding and interpretation of tables and graphs. Jan Erik Kristiansen is suggested as candidate for this mission.

The mission on environment statistics planned for the beginning of April is still not confirmed by INE. Feedback indicates that INE needs more time to follow-up the recommendations from the previous mission on this area.

The mission on LFS half-year report that is on the plan for April also needs to be specified and confirmed by INE. It is not clear if INE in fact are in need of assistance on this area.

Consultants for the STAC course on the plan for April are still lacking and needs to be specified by the consortium within short time for the time schedule to hold.

6.1.4   "Practical Issues for Experts".

An English version of the document "Practical Issues for Experts" dated 18.2.05 was discussed with the TL, the LTA on Social statistics, the LTA on National Accounts and the project assistance. It was agreed that the project assistant incorporates the agreed comments and return it to the coordination office in Dst.

6.1.5   Other business

The report and pamphlet on human resource development is nearly completed and will be presented for all the Directors the 8th of March and also at CCAINE

The mid-term review of the project will take place in April. Christian Mikkelsen Institute (CMI) will head the evaluation work, and the consultant team will consist of Jan Isaksen (CMI), Tony Williams (UK) and Ben Kiregyera (Uganda).

The project team in INE is planning a two-day meeting 18th and 19th of March. On the agenda is preparation for the mid-term evaluation and CCAINE.

6.2   The status of the business register (FUE)

INE has not established routines for updating the business register, neither by consulting administrative sources nor by using the interviewers working with the collection of the annual enterprise survey and the monthly survey of establishments for the short-term economic indicators ("conjuntura").

By comparing the version of the business register for November 2003 and the version for February 2005 it was found that 50 establishments existing in 2003 had been excluded until January 2005. The application is designed to allow that enterprises that have ceased to exist are kept in the register and kept as "closed", "inactive", "merger" etc, but still 50 units had "disappeared" from the register. There were 86 establishments that had been recoded from active in November 2003 to inactive ("paralisada") in February 2005.

Table 1. Number of establishments in February 2005 by "Situação_Actual"(STA)

STA	STA_DSG	AntalförEstID
01	AGUARDANDO INÍCIO DE ACTIVIDADE	0
02	EM ACTIVIDADE	48135
03	PARALISADA (ACTIVIDADE SUSPENSA)	90
04	EXTINTA (CESSAÇÃO DEF. P/OUTRAS RAZÕES)	6
05	OUTRA	5

The number of establishments in February 2005 that were not included in register in November 2003 was 216, whereof 99 had not yet been classified by type of economic activity in February 2005.

Table 2. Summary of the new establishments introduced in the FUE from November 2003 to February 2005

SECCAO	Number of establishments	Number of staff members in establishments with information about number of staff members	Number of establishments with information about number of staff members
A	2	171	2
D	32	474	30
F	1	121	1
G	40	490	39
H	28	373	28
I	3	342	2
K	1	108	1
M	1	74	1
N	1	148	1
O	2	5	1
(tom)	105	362	7
Total	216	2668	113

6.3   Review of the surveys for short-term economic indicators

The current system for the monthly surveys was revised 2004, when new samples were based on the business census 2002 were established. New questionnaires with qualitative questions were introduced. It was intended to make a review of the data situation and the data processing routines for these data during the mission, but the data processing routine was still not ready, so the data had not been processed.

Appendix 1. Persons met

National Institute of Statistics

Directorate of Integration, Co-ordination and External Relations (DICRE).
Isabel Jotama Novela	Project assistant
Leonette Mabjaia	Training coordinator
Alda Rocha	International relations
Calado P Fijamo	System development, DISI

Directorate of National Accounts (DCNIG)

Firmino Guiliche	Head of the Department for Consumer Prices

Directorate of Sector Economic Statistics (DESE)
Azarias Nhanzimo	Director
Natércia Macuáco	Head of the Department for Goods and Environment
Cirilo Tembe	Head of the Department for Services and Business register
Adriano Matsimbe	Business register
João Nhabete	Business register

Scandinavian Support programme
Mr Hans-Eric Altvall	Team-Leader
Dag Roll-Hansen	Long term adviser social statistics
Jan Redeby	Long term adviser national accounts
Carsten Bormann	Long term advisor IT

Participants in the sampling course

Adriano Matsimbe	INE-DESE
Alberto Francisco Cossa	INE-DESE
Natércia Macuácua	INE-DESE
Marcelo Caetano Amós	INE-DESE
Sandre Macie	INE- DCNIG
Evaristo Marcos Manhenje	DPINE-Província
Maria Alfeu	INE-DEMOVIS
Jeremias Chirindza	INE-IPC
Zuraida Khan	INE-Demovis
Zenóbio Aramuge	INE-DCI
Jorge Chemane	INE-DESE
Ernesto Hlunguane	INE-DESE
Laura Duarte	INE-DEMVIS

Appendix 2. Terms of Reference

TERMS OF REFERENCE
Within the Scandinavian Support Program

For a short-term mission

on

A SAMPLING COURSE

14/2 – 25/2 2005

Within the Scandinavian Assistance to Strengthen the Institutional Capacity of
INE/Mozambique 2003 – 07

Consultants: Irene Tuveng Norway and Kenny Petersson Sweden

Counterparts: Firmino Guiliche (Content) and Leonette Mabjaia (Training Coordinator)

Background
The overall objective of the ongoing cooperation between INE Mozambique and the three
National Statistical Agencies in Scandinavia is to develop the institutional capacity of INE
through improved production and dissemination of statistical information**.**

The PRODOC for the cooperation defines a number of subprojects with preliminary budgets.
One such subproject is on training. The budget for various training activities amounts to almost
15 % of the total budget for the Scandinavian Programme or about 1.2 mil US Dollar during the
entire project period.

The PRODOC includes a strategy for Human Resource Development for 1/7 2003 – 31/12
2007 as appendix 5. The strategy recommends that a sampling course be carried out each of the
first 4 years of the 5-year period. The objective with such courses should be to improve and
spread the basic competence on sampling issues throughout INE.

Such a first course was planned to 2004 but due to such as the delayed start of the program it
had to be postponed to February 2005. Another reason was that another sampling course took
place in September 2004 within the Portuguese summer school at INE.

Objectives of the mission
The main objective for the mission is to carry out a one-week course on sampling for 10 – 15
staff members of INE.

Benefactors of the mission
Operational and survey activities at INE with demand for basic competence on sampling
issues.

Expected results

10 – 15 members of INEs staff will have increased their basic competence on such as various sampling metyhods, sampling design, various errors in a survey, how to treat such as non rsonse and also how to describe sampling errors.

Consultant and Counterpart

The main trainer will be Irene Tuveng from Statistics Norway and Kenny Petterssson from Statristics Swedenj.

Mr Firmino Guilioche and Mr Cirilo Tembe will give advice on the contents of the course. The former will also when time allows assist inte actual training as co~trainer.

INEs trainignm coordinmtarop Ms Leonette Mabjaia will paln for the raining in INEs total training programme. She is also responsible for evaluating the the trainigna cording to what INE is doing on reguklra basis after each training vopurse.

The Project Assistant Ms Isabelle Nobelça will take care of all details in orgasiaing the course.

6.3.1.1.1   Trainees

The following have been listed to attend the course

Ord.	Nome	Instituição/sector	Nível
1	Adriano Matsimbe	INE-DESE	Licenciatura
2	Alberto Francisco Cossa	INE-DESE	Licenciatura
3	Natércia Macuácua	INE-DESE	Licenciatura
4	Marcelo Caetano Amós	INE-DESE	Licenciatura
5	Sandre Macie	INE- DCNIG	Licenciatura
6	Evaristo Marcos Manhenje	DPINE-Província	Médio
7	Milice Luís Muhate	DPINE -Província	Médio
8	Maria Alfeu	INE-DEMOVIS	Licenciatura
9	Jeremias Chirindza	INE-IPC	Licenciatura
10	Cacilda Boa	INE-IPC	Licenciatura
11	Basílio Cubula	INE-DCI	Licenciatura
12	Zenóbio Aramuge	INE-DCI	Mestrado
13	Jorge Chemane	INE-DESE	Licenciatura
14	Ernesto Hlunguane	INE-DESE	Licenciatura
15	Filipe Amaral Amone	INE-IPC	Licenciatura

Timing of the mission

14/2 – 25/2 2005. The course is planned to 17/2 – 23/2.

Report

The consultants will prepare a final report that has been discussed with INE before leaving Maputo. The main text in the report should have as most 15 pages. Statistics Denmark as Lead Party will print the final version within 2 weeks of the end of the mission. The structure of the report should be according to Danida-format.

The Training Coordinator has to ensure that the printed report has a full translation in Portuguese. In case the report is in Portuguese than it is sufficient if the executive summary is translated into English and included in the printed report.

These Terms of Reference were prepared by

Day   /   /   ....

Approved by/in the name of the President of INE

Day /   / ....

Ms Irene Tuveng, Ms Isabel Novela and Ms Leonette Mabjaia

Dato e horas	ASSUNTOS

17 de Fevereiro de 2005
 	
08h30 - 11h00: Curso
 	
11h00 – 11h30: Lanche
 	
11h30 -14h00: Curso
 	
14h00 - 14h40: Almoço
 	
14h40: Transporte INE
	❖ Fases duma sondagem
	❖ Amostra vs recenseamento
	    – Vantagens / Desvantagens
	
	❖ Introdução a amostragem probabilística
	    ◆ Que?/Por que?/Quando?/Como?
	    ◆ Probabilidade
	    ◆ Amostragem Aleatória Simples (SRS)
	      – Estimativas (médio, proporções, totais)
	
	❖ Exemplos e exercicios em excel:
	    – Calculos de probabilidades
	    – Método de amostragem aleatória simples utilizando Excel
	    – Calculos de estimativas (SRS)

18 de Fevereiro de 2005
 	
08h30 - 11h00: Curso
 	
11h00 – 11h30: Lanche
 	
11h30 -14h00: Curso
 	
14h00 - 14h40: Almoço
 	
14h40: Transporte INE
	❖ Distribuições des variáveis aleatórios
	    ◆ A distribuição Normal
	    ◆ A teorema do limite central
	      – Valor esperado $E(X)$, Estimador não enviesado
	
	❖ Incerteza associada com a estimativa de uma amostra:
	    ◆ Desvio padrão
	    ◆ Intervalo de confiaça
	
	❖ Exemplos e exercicios em excel:
	    ◆ Ilustração de amostragem repetida e distribuição normal dos resultados
	    ◆ Calculos de desvio padrão e intervalo de confiança para estimadores de SRS
	
	❖ Amostragem aleatória sistemática
	
	❖ Amostragem aleatória Estratificada
	
	❖ Exemplos e exercicios em excel:
	    ◆ Como tirar amostras aleatória sistemática e estratificada utilizando Excel?
	    ◆ Calculos de desvio padrão e intervalo de confiança para estimadores de diferentes métodos de amostragem

21 de Fevereiro de 2005	❖ Probabilidade proporcional ao tamanho (pps) ❖ Amostragem multi-etapas

08h30 - 11h00: Curso
 	
11h00 – 11h30: Lanche
 	
11h30 -14h00: Curso
 	
14h00 - 14h40: Almoço
 	
14h40: Transporte INE
	❖ Amostragem por *"clusters" (conglomeradores)*
	
	❖ Exemplos e exercicios em excel:
	   ◆ Repetição des métodos de tirar amostras e calculos de estimativas e medidas de erro utilizando um "mini-FUE"
	   ◆ Preparação da população-grelha para amostragem (fazer codigos por estratos etc.)
	
	❖ População-alvo - População-grelha (sample frame)
	   ◆ Erro de cobertura
	   ◆ Preparação da população-grelha
	
	❖ Determinação do tamanho da amostra
	❖ Distribuição da amostra por estratos
	
	❖ Exemplos e exercicios em Excel:
	   ◆ "Neyman-allocation" por estratos utilizando número de pessoal

22 de Fevereiro de 2005
 	
08h30 - 11h00: Curso
 	
11h00 – 11h30: Lanche
 	
11h30 -14h00: Curso
 	
14h00 - 14h40: Almoço
 	
14h40: Transporte INE
	❖ Exemplos e exercicios em Excel cont.
	   ◆ "Neyman-allocation" por estratos utilizando número de pessoal. (Cont.)
	   ◆ Demonstração em Access
	
	❖ Erros duma sondagem:
	   ◆ Erros de amostragem
	   ◆ Erros não-amostrais
	
	❖ Poderadores e estimação

23 de Fevereiro de 2005 08h30 - 12h00: Curso 12h30 – 11h30: Almoço na "Costa de Sol"	❖ Resumo do curso ❖ Teste e avaliação do curso

INSTITUTO NACIONAL DE ESTATÍSTICA

Curso de Amostragem, 17 a 23 de fevereiro de 2005
Avaliação Final

Formadores: Irene Tuveng e Kenny Petersson

1. Quais as vantagens e desvantagens que oferece um levantamento de dados por amostragem.

2. Quando é que afirmamos que estamos perante uma amostragem probabilística?

3. O Relatório final do IAF indica para o Niassa uma estimativa da despesa média diária por agregado agregado familiar na ordem dos 53.146 MT com um desvio padrão 8,00 MT e um limite de confiança ente 44.590 MT e 61.702 MT.
O mesmo relatório aponta que para Cabo Delgado foi apurada uma despesa média de 43.739 MT, com um desvio padrão de 28,20 MT e um limite de confiança entre 19.052 MT e 68.427 MT.

   a) Faça uma interpretação separada dos resultados apurados para cada província;
   b) Compare os resultados, procurando tirar conclusões aplicando os conhecimentos adquiridos no curso.

4. Quais são as principais fontes de amostragem que conhece no INE?

5. Que critérios devemos tomar em conta para a determinação do tamanho da amostra e porquê?

6. Mencione os erros não amostrais que podem ocorrer num inquérito por amostragem.

7. Que tipo não respostas podem ocorrer num inquérito e que tratamento dar?

APPENDIX 5. Questionnaire used for evaluation of the course

INSTITUTO NACIONAL DE ESTATÍSTICA

Programa Escandinavo
Curso de Amostragem,
Avaliação Final

Formadores: Kenny Petersson, Estatística da Suésia e Irene Tuveng, Estatística da Noruega

Maputo, 17 a 23 de fevereiro de 2005

1. Quantos anos/mêses tem trabalhado no INE?

2. Como foi selecçionado para este curso?

3. Antes deste curso, teve qualquer conhecimento de teoria de amostragem? Se sim, descreve como teve este conhecimento?

4. O que mais apreciou no curso?

5. O que pode ser melhorado?

6. Como pensa que pode aplicar no seu trabalho diário, as experiências adquiridas durante o curso?