

MEASURING AND REPORTING NONRESPONSE RATES IN AGRICULTURAL SURVEYS

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1-INTRODUCTION

Each year, Statistics Canada conducts many surveys. The survey managers are required to report quality indicators on different aspects of the sampling, collection, and estimation methods used. Included among these quality indicators are the response and nonresponse rates for surveys or censuses which collect data from respondents.

The issue of reporting nonresponse rates has become more prominent in the last few years. To help with this task, Statistics Canada has prepared Standards and Guidelines for reporting response and nonresponse rates in surveys (Statistics Canada, 1993). The Standards and Guidelines were prepared in order to promote a consistent and coherent way of reporting nonresponse for all surveys.

At the same time, in the United States, a subcommittee on non-response was created by the Office of Management and Budget's Federal Committee on Statistical Methodology. The objective of this subcommittee is to investigate the trend of response rates over the last few years and the measures used to report response rates (Gonzalez, Kasprzyk and Scheuren, 1994).

The Statistics Canada Standards and Guidelines apply to all major recurring surveys and censuses which obtain data by direct collection from respondents. The surveys are from both social and economic fields. Each survey manager has the responsibility to document the application of the Standards and Guidelines and report any problems and recommendations encountered through the application of the Policy on Informing Users of Data Quality and Methodology (Statistics Canada, 1992), which governs the reporting of nonresponse.

One agricultural survey is in scope for the Standards and Guidelines: the Farm Financial Survey (FFS). Even though this is essentially a household survey, it has sufficient economic structure to render application of the Standards and Guidelines difficult. Because of some FFS particularities, some response and nonresponse rates defined by the Standards and

Guidelines were not available. The FFS should implement new procedures to report and keep track of the response and nonresponse rates requested by the Standards and Guidelines. This paper presents the contents of the standards, describes the application to the FFS and discusses some of the problems encountered.

2-STANDARDS AND GUIDELINES FOR REPORTING NONRESPONSE RATES

Statistics Canada's 1993 Standards and Guidelines have three main objectives. The first objective responds to the requirement of the Policy on Informing Users of Data Quality and Methodology (1992) to report nonresponse rates. In the future, because of the Standards and Guidelines, this information should be consistent between most of the surveys. The second objective is to evaluate the data collection methodology and the frame coverage of each survey. Some measures included in the Standards and Guidelines are currently not calculated for many surveys. In the coming years, these surveys should be able to obtain such measures. The third objective is to have an overview of the trend over time of the quality of data collection and respondent behaviour and a comparison across all surveys of response and nonresponse rates.

The rates must be reported for either the sampling unit, the collection unit or the unit for which the analysis is done. The rates must also be reported at the national level, as well as provincial levels whenever estimates are published at provincial levels.

The rates must be reported for two phases: the collection phase and the estimation phase. For each phase, the Standards and Guidelines define different components for which the number of corresponding units must be reported. The components are a breakdown of response and nonresponse totals. The definitions of the components are the same for each phase, except for three components that are applicable only to the estimation phase. With the component count, different rates are then calculated. As an example, the In-Scope Rate is the number of units in the In-Scope component divided by the number of units in the Resolved component (see Figure 1). For each of the rates, the

counts can be weighted or unweighted. In the unweighted case, each unit is counted once. The rates are then based on counts observed in each component specified by the Standards and Guidelines. For the weighted counts and rates, there are two options. The first one is to use the sampling weights. The second method is to use the weights based on the sampling weights and the expected value of the variable of interest available for all units on the frame. It may be available through historical data, census or administrative data. This method gives a measure of the proportion of the population total that is missing because of nonresponse, for a variable of interest. This latter method is more appropriate for economic surveys in which skewed populations often generate a few units which account for a large proportion of a variable total. Reporting the proportion of the total that was missed due to nonresponse is thus often more meaningful than simply reporting the number of nonresponding sampling units.

Figure 1 shows the different components specified by the Standards and Guidelines. This structure was developed by Drew and Gray (1991). The component definitions are the same for each survey. It is possible that some components are not available because of the structure of a survey. In that case, the component is not applicable. The figure shows the breakdown of the response/nonresponse components at different levels.

Total Units (1) is the sum of **Resolved Units (2)** and **Unresolved Units (3)**. All units that may be identified as in-scope or out-of-scope for the specified survey are put in the component **Resolved Units**; otherwise, units go in the **Unresolved Units** component. There are two components under **Resolved Units: In-Scope Units (4)** and **Out-of-Scope Units (12)**. Again, **In-Scope Units** are split into two components: the **Responding Units (5)** which include all units that provided data, and **Nonresponding Units (8)** which are known to be in-scope.

Responding Units include two components at collection phase and three components at estimation phase. First, for estimation phase only, **Responding Units** include the component **Responding Units Unusable (5A)**, which corresponds to all units considered as responding at the collection phase, but because these units failed some criteria or conditions, the data collected are not used for estimation. The conditions are defined by each survey and they usually require a certain level of data quality reported by the respondent. All units which fall in this component at

estimation phase are put in the **Other Responding Units (7)** component at collection phase. The component **Refusal Conversions (6)** contains units which initially refused to answer to the survey, but after some efforts by an experienced interviewer, have been converted to responding units. **Other Responding Units (7)** are all responding units that are not refusal conversions at the collection phase or, are usable and are not refusal conversions for the estimation phase.

The **Nonrespondent** category has three components. **Refusals (9)** are contacted units which refused to answer to the survey. **No Contacts (10)** are units which cannot be contacted because occupants of the dwelling are absent, or there is no answer by mail or phone. **Residual Nonrespondents (11)** are units that were not interviewed and no attempt to do so was made. This situation may result from language or geographical problems, or to avoid response burden because of overlap with other surveys. All **Nonrespondents** are known to be in-scope by the interviewers' observations of the dwellings or through information given by neighbours.

The **Out-of-Scope (12)** component is broken down into three different components. The **Non-existent (13)** component consists of units that were found during collection to be non-existent. These include businesses which are no longer operating (out of business), or dwellings that have been demolished. **Temporarily Out-of-Scope (14)** refers to units that are out-of-scope for the reference period but may be in-scope in the future. This may happen for businesses that operate seasonally. **Permanently Out-of-Scope (15)** units are out-of-scope because of a change in classification since the last frame update or improper frame classification.

The **Unresolved (3)** component corresponds to no contact or refusal units for which no follow-up was done to identify whether they were in or out-of-scope. At the estimation phase only, the Standards request an estimated number of **Unresolved Units In-Scope (3A)** and **Out-of-Scope (3B)**. To obtain an estimate, one can use information from other surveys, administrative data, or data from a sub-sample follow-up of the unresolved units. Another method to obtain an estimate is to assume that the same proportion of units are in and out-of-scope for the resolved and unresolved units.

For the collection and estimation phase, the number of units reported for each component should

be the same, except where the components are applicable only to the estimation phase or the unit changes from **Other Respondents** at collection phase to **Responding Unusable** at estimation phase.

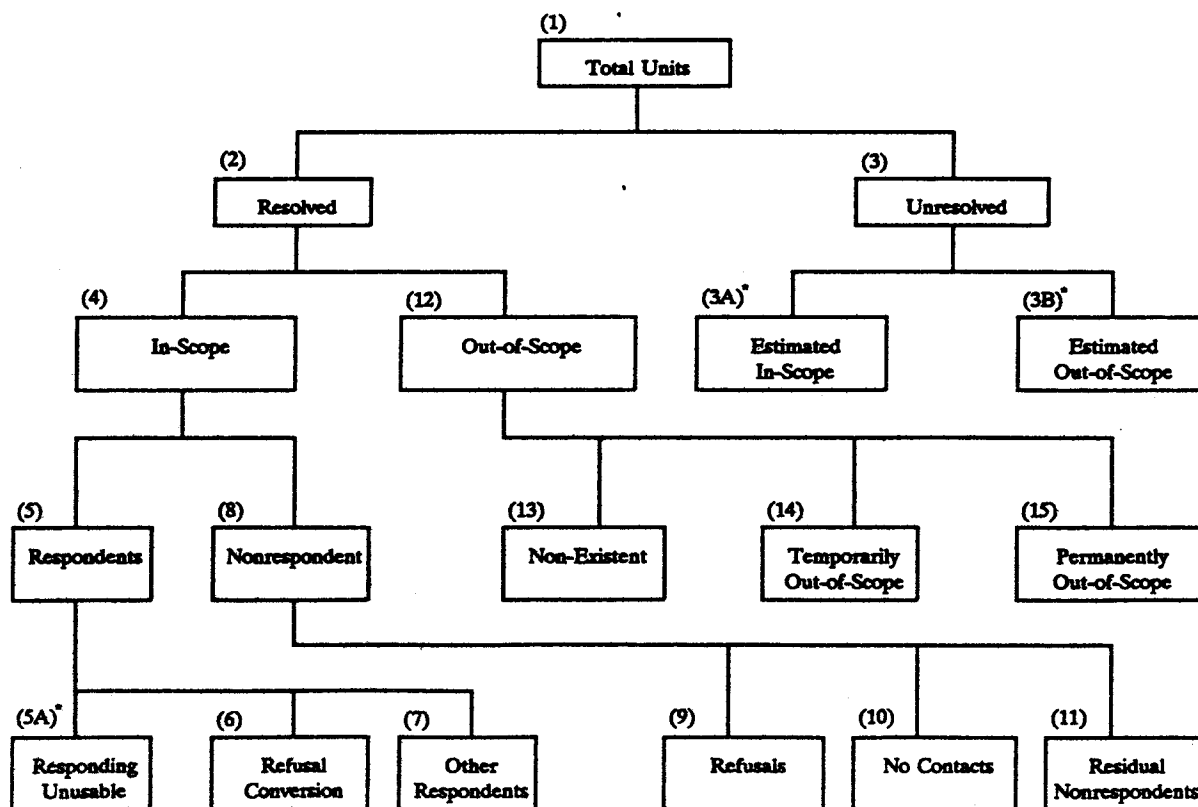
3-FARM FINANCIAL SURVEY

Beginning with reference year 1993, the Farm Financial Survey (FFS) must report response and nonresponse rates according to the Standards and Guidelines. The FFS is conducted annually by Statistics Canada. It collects information on agricultural operations for all provinces. Information given by the farm operator relates to physical characteristics, assets, debts, revenues and expenses of the operation. The sample size is approximately 12,000 farms from a population of 280,000 farms. As an exception, in 1993 the survey was conducted only in the four Western provinces, with a sample size of

about 6,400 farms. The information for the FFS is collected mainly by means of a personal interview.

The survey uses two frames to sample farms. The first is the list frame. It is based on data from the 1991 Census of Agriculture. The Census collects information for all Canadian agricultural operations. For 1993, the sample size from the list frame was approximately 5,600 farms. The list frame is stratified based on province, type of farm and farm assets. The second frame is the area frame. The area frame consists of segments of land throughout Canadian provinces. The Area Farm Survey (AFS) samples segments from this frame and surveys all farms in the sampled segments. All sampled farms from the AFS that do not overlap with the list frame and that meet the conditions to be surveyed by the FFS are interviewed for the FFS. These farms represent new

Figure 1. Respondent/Nonrespondent components at collection and estimation phases¹ (* indicates the component is requested only at the estimation phase)



¹A framework reproduced from Hidioglou, Drew and Gray (1993)

farms since the 1991 Census and farms missed by the 1991 Census. This portion of the sample is called the area sample and about 800 farms came from this sample.

To be in the FFS sample, a farm must be designated as active by the frame at the time of sample selection and it must have declared at least \$2,000 in agricultural sales in the last reference period covered by the 1991 Census for the list sample or the last AFS for the area sample.

During collection time, each interviewer must ask the farm operator(s) questions to detect any change in the operation structure. The type of change (sale of farm, out of business, etc.) may affect the current status of the farm. At estimation time, the updated status, if any, of every farm is used to decide if the farm is still in-scope or out-of-scope.

Any farm which declares less than \$2,000 in sales for the FFS 1993 reference period is put out-of-scope for estimation, but may be selected for the next FFS. Only 1991 Census sales or AFS sales are used to decide which farms are in or out-of-scope for sample selection.

Agriculture Canada is the sponsor of the survey and Statistics Canada performs the data collection and the estimation. Statistics Canada provides Agriculture Canada with not only the estimates but also the micro data without farm operator names and addresses. The Canadian Statistics Act specifies that if the micro data are to be shared with someone other than Statistics Canada, the respondent must be asked if he/she agrees to do so. As a special requirement, after each interview, the interviewers asked the respondents if they were willing to share the information (data) with Agriculture Canada. If a "No" was encountered, then the data were not shared and, in order to maintain consistency, were not used for estimation by Statistics Canada.

4-APPLICATION OF THE STANDARDS AND GUIDELINES

This section describes, for each component, which units from the FFS are included. Most of the units are classified into the components using the current status of the farm which, after data collection, is maintained by the list and area frames.

The **Resolved Units** component is the sum of **In-Scope Units** and **Out-of-Scope Units**. To be in-

scope, a unit (1) must be currently active, (2) must have declared on the FFS questionnaire at least \$2,000 in sales of agricultural products during the last reference year (1992) and (3) must not be considered as an institutional farm, a community pasture, or be located on an Indian Reserve, or form a multi-holding company. An active unit is a farm which has the potential to produce some agricultural products. The **Out-of-Scope Units** are the ones which are not active, the active farms which have declared less than \$2,000 in agricultural sales, or the ones identified as part of a multi-holding company, community pasture, institutional farm or ones located on an Indian Reserve. Only the active, in-scope farms are selected in the sample, but if between the last contact and the collection time, a farm is sold, went out of business, or was amalgamated with another farm, it is then considered, upon a few conditions, not active and out-of-scope for estimation.

The component **Responding Units** includes units that were considered completed at collection time. Under **Responding Units**, the component **Responding Unit Unusable**, which is applicable only at estimation phase, includes all units that were considered completed but met one of the following three conditions: the respondent refused to share his/her data with Agriculture Canada, the respondent refused to answer the assets section of the questionnaire, or the respondent refused to answer the debts/liabilities section. Since the FFS is a financial survey, the sections on assets and debts/liabilities are the most important. To have a usable questionnaire, these two sections must have been at least partially completed. If not, such units are considered as refusals for estimation.

The **Refusal Conversions** component is not available from the FFS. Such a situation may happen during collection, but with the current questionnaire, sufficient information is not collected. For future surveys, the questionnaire should be designed to have a cell that indicates this situation.

Other Responding Units is the component that includes all units with a completed questionnaire. All sampled units for which the collected data are used for estimation are included in this component.

The **Nonresponding** component includes three different components. None of them is available given the actual procedures of the FFS. The FFS conducts no follow-up of refusals or no-contacts to ascertain which are in or out-of-scope. The current

status of these units may have changed since the last survey or census contact (e.g., farm was sold or was amalgamated), or their annual sales may have fallen below \$2,000 since the last census. Therefore, to follow the **Unresolved Units** component definition, these cases are included in this component. In the future, with resources permitting, some special procedures and rules using the last updated frame should identify, for a proportion of such units, which are in and out-of-scope. The information on the **Residual Nonresponding** component is not available from the FFS. In future, the interviewers should be able to indicate if a no-contact was due to inaccessibility, language problem, or any special conditions.

There are three components under **Out-of-Scope Units**. The **Non-existent Units** include units which have gone out of business between the last time they were contacted and the end of the reference period (December 31, 1992 for the 1993 FFS). Also included are farms which became inactive because they were amalgamated with other farms or they were found to be a duplicate of another farm on the frame. When amalgamation and duplicate situations are encountered, depending on certain conditions, one farm is considered active and the other inactive. The active one, if sampled, is included in the **In-Scope Units** component. Amalgamated and duplicate farms may have completed the questionnaire, but they are considered **Non-existent** since they are represented by other farms and their farm names which were represented by unique identification numbers no longer exist and cannot be surveyed again.

The **Temporarily Out-of-Scope** units are those which have declared themselves to be out-of-business for a certain period. The respondent must specify that he/she wants to operate his/her farm in the future and give an approximate date as to when he/she will resume his/her activities. It also includes farms which declared less than \$2,000 in agricultural sales. These farms are temporarily out-of-scope because they may be selected for the next FFS survey.

The **Permanently Out-of-Scope** component includes two situations. The first consists of all sampled units which were identified as single agricultural operations on the frame but were found to be part of a multi-holding company at collection. The second situation includes all sampled units which were found, at collection time, to be institutional farms, community pastures or to be located on an Indian Reserve. The situation of misclassification

cannot happen since the FFS surveys all types of farms. The amalgamated and duplicate farms are not included in this component because these units cannot be surveyed by any survey and they are not considered to be involved in any type of agricultural activities.

All farms which cannot be determined to be in or out-of-scope are put in the **Unresolved** component. This includes farms that were not located by the interviewers in the field, refusals, and no contacts. It also includes a few cases of units which did not respond to the question on agricultural sales for the reference period. It may happen during collection that some units refuse to answer the question on agricultural sales. During data processing, these units have a sales value imputed. The imputed value is then used to decide whether each unit is in or out-of-scope. All units that met one of the three conditions for **Unusable Units** are not processed through imputation. In this situation, any farm which refuses to answer the agricultural sales question did not have a value imputed for this cell. It is then impossible to figure out which farms are in or out-of-scope. All farms in this situation are included in the component **Unresolved Units**. In future surveys, to avoid this situation, all units that are **Unusable** should be processed through the imputation module, and the value of agricultural sales (imputed or not) should be used to decide whether they are in or out-of-scope.

Two other components under **Unresolved Units** are required for the estimation phase only: the component **Estimated In-Scope Units** and the component **Estimated Out-of-Scope Units**. For the FFS, there are four groups of unresolved units: the untraceable units, the units with a missing value for agricultural sales after imputation and all the refusals and no-contacts. For the 1993 FFS, these estimated numbers were calculated using the proportion of in-scope and out-of-scope units in the **Resolved Units** component. This was done assuming the distribution of in-scope/out-of-scope units is the same between FFS resolved units and unresolved units.

Figure 2 shows the unweighted counts and the weighted counts (in parentheses) for each component at the Canada level (four provinces). The weighted counts are based on sampling weights of the sampled units from the list frame and sampling weights of sampled segments from the area frame.

5- CONCLUSIONS

Because of the Standards and Guidelines

definitions and the FFS collection procedures, some components are not applicable or available and separate counts of FFS refusals and no-contacts are not available because these situations are all included in the same component. Because of this, some rates defined by the Standards and Guidelines are not available (e.g., Refusal Rate = Refusal Units over In-Scope Units). Some resources have to be made available to be able to keep track of all required components. The next FFS will be redesigned; some collection and data processing adjustments should be made to resolve a proportion of unresolved units.

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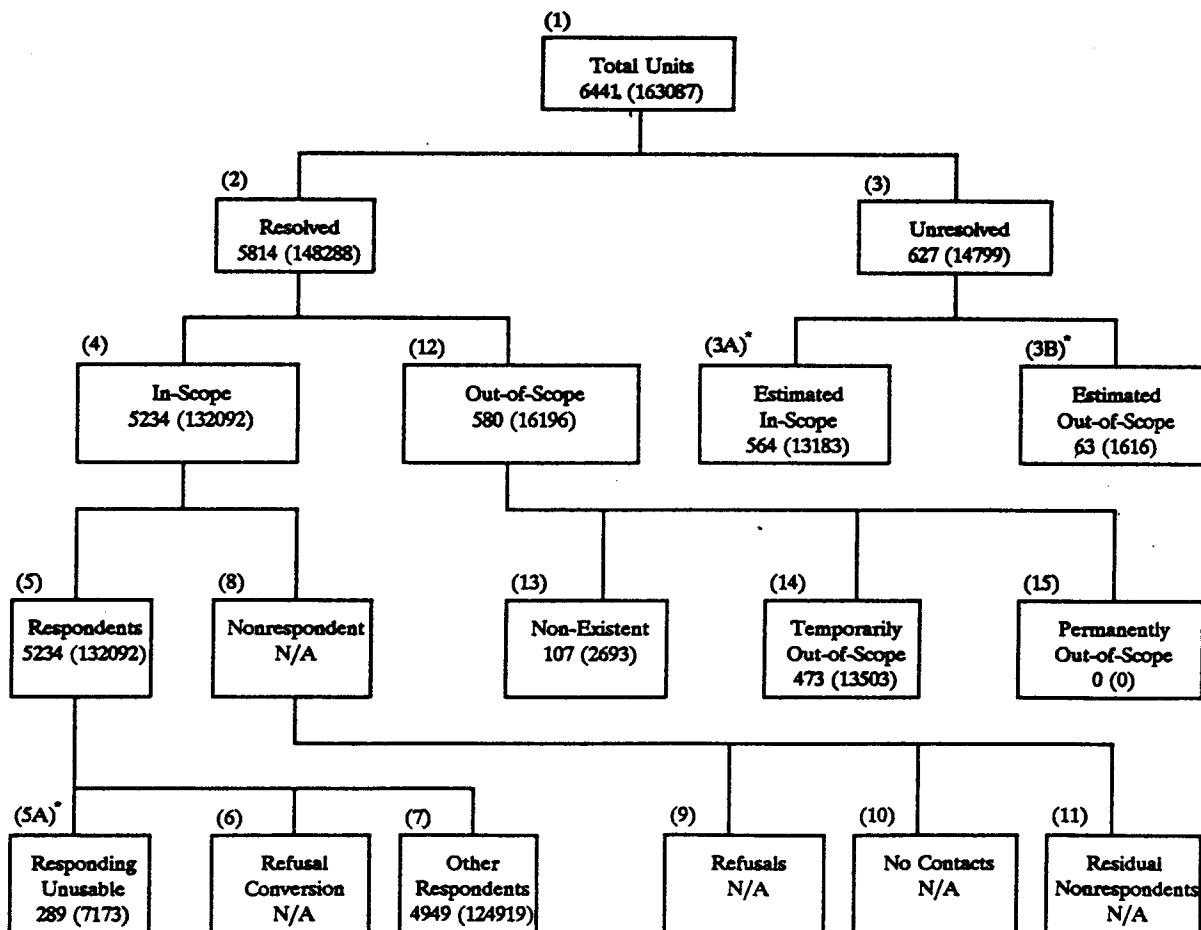
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Figure 2 - FFS 1993 : Unweighted counts and weighted counts (in parentheses) for response/nonresponse components (* indicates the component is requested only at the estimation phase)



N/A : Not available from the FFS