EVALUATION PROGRAMME OF THE 1966 CENSUS OF CANADA

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1. INTRODUCTION

1.1 Summary

There are various ways in which methods of measuring errors and evaluating quality of censuses can be arranged. From the point of view of operations and execution, it is convenient to think of four groups:

(i) re-enumeration of a sample;

(ii) matching on a one-to-one basis against some other records;

(iii) comparison with summaries and profiles from other records on a macro basis;

(iv) analytical techniques based on internal consistency and method (iii).

The programme designed for the purposes of evaluating the 1966 Censuses of Canada 1/ has at least one enquiry under each of the four headings. Projects selected for the programme and subject to brief reports in this paper are:

1. Reverse Record Check (RRC); a match of a sample of 1961 Census records, immigration documents, birth certificates and records of persons missed in 1961 with the corresponding 1966 Census records.

2. Match with the Labour Force Survey (LFSM); a one-to-one comparison of the records of the monthly Labour Force Survey (LFS) with 1966 Census records.

3. Agriculture Quality Check (AQC); a sample re-enumeration.

4. Demographic Analysis (DEM); application of the techniques developed and used by Coale, Zelnik, Akers, Bogue and others. 2/

5. Check of Lists of Households (VR-AR); match of 1966 Census Visitation Records (VR's) with available or specially constructed Address Registers (AR).

6. Study of Postal Change-of-Address Cards (C-of-A); a study of households reporting to the Post Office a change of their addresses around the time of census-taking.

The purpose of this paper is to summarize the six parts of the evaluation programme and present such results as may be available at the time of drafting this paper.

1.2 Purposes of the evaluation programme

The different parts of the evaluation programme have been constructed with different purposes, sometimes purposely overlapping, and of uneven importance. The purposes of the programme are:

(a) to provide estimates of coverage errors;

(b) to provide estimates of content errors or subject-matter errors;

(c) to locate areas of weaknesses in Canadian census methodology and, possibly, indicate means of strengthening them.

To recapitulate: three purposes have been stated, four groups of methods have been listed and the six studies of the evaluation programme have been very briefly described. This approach must be viewed from the twin and over-all purpose of assessing the reliability of the 1966 Census and providing evidence and ideas for improving, designing and carrying out of the 1971 Census. The programme can be summarized in tabular form using abbreviations suggested earlier:

METHODS OF EVALUATION	PURPOSES OF EVALUATION		
	(a) Coverage	(b) Content	(c) Operations
(i) re-enumeration	AQC	AQC	-
(ii) matching of records	RRC	-	-
	LFSM	LFSM	-
	VR-AR	-	VR-AR
	C-of-A	-	C-of-A
(iii) macro comparisons	DEM	DEM	-
(iv) analytical techniques	DEM	DEM	-

It will be seen from the summary that the purposes of the evaluation programme were oriented towards evaluation of the results rather than concerned with obtaining operational lessons for 1971. When the six studies have been completed, their results in related aspects will be compared and cross-analyzed.

1.3 Kinds of errors measurable in 1966

The 1966 Censuses of Canada were so-called full-count censuses. The usual problem of sample estimation and the estimation of sampling errors did not therefore arise. However, all other errors did arise. They can be shown schematically as follows with the contribution of the six studies indicated with again the same abbreviations:

Biases:						
(a) coverage biases	RRC	LFSM	AQC	DEM	VR-AR	C-of-A
(b) content biases	-	LFSM	AQC	DEM	-	-
Response variances:						
(a) simple	-	LFSM	-	-	-	-
(b) correlated	-	-	-	-	-	-

The blanks in this summary are due to the fact that the content of the 1966 Census of population was very modest (relation to head, age, sex, marital status) and enquiries into response variances on such limited and standard data would be unprofitable. It has been repeatedly shown, by many studies, including our own 1961 evaluation programme (24), that the four characteristics used in the 1966 Census have exceedingly small correlated response variances. With respect to simple response variance some estimates are likely to be provided by the LFSM.

2. REVERSE RECORD CHECK (RRC)

2.1 Objectives of the RRC

The RRC may be defined as a study which attempts to measure the proportion of persons not enumerated in the 1966 Census, by using a sample of persons selected from independent sources. These estimates are to be obtained for urban and rural areas at national and regional levels and by broad age-sex groups at the national level.

2.2 Sample design

Assume there was a complete list of all persons in Canada at June 1, 1966, independent of the 1966 Census. A sample could be selected from this list, the addresses of each selected person established, and by matching this sample of persons with the persons enumerated in the 1966 Census it could be ascertained whether each selected person was or was not enumerated in the 1966 Census. Using this sample an unbiased estimate of the number of persons missed in the 1966 Census could be derived.

Unfortunately no such list is available but it is possible to construct a close approximation to one. Taking the list of persons enumerated in the 1961 Census, plus the list of immigrants who arrived during the June 1961 - May 1966 intercensal period, plus the list of registered births for the same intercensal period, and finally the list of persons missed by the 1961 Census but detected by the 1961 Evaluation Programme (25), one would then approximate the Canadian population as of June 1, 1966.3/ It was from these lists that an independent sample of the Canadian population was constructed. This sample excluded the Yukon and the Northwest Territories.

Specifically the sample for the RRC was selected from the following lists:

LIST	Sample size
1. 1961 population enumerated at their usual residence (persons selected at random in two or three stages from non-self-representing units — NSRU,4/ from self-representing units — SRU,4/ from special areas and from Indian Reserves).	20,804
2. 1961 population enumerated away from their usual residence (but not enumerated at their usual residence; about one third of a sample enumerated away from their usual residence).	1,304
3. Births, 1961-1965 (sample selected systematically from microfilm copy of birth registrations for calendar year 1961 through 1965 5/).	2,632
4. Immigrants, 1961-1965 (sample selected systematically from Forms 1000 completed by each immigrant on arrival in Canada).	1,246
5. All missed persons in the 1961 Census according to the 1961 LFS - Census match.	549
	26,535

2.3 Tracing of addresses procedure

The selected persons in the sample will be referred to as "subjects".

The serial numbers, names and addresses of subjects selected from all the sources were transferred to tape and a print-out prepared by province, and within the provinces of Ontario, Quebec and New Brunswick by a French-English separation of addresses.

The second phase aimed at establishing the current address of each subject. A questionnaire with an explanatory letter and return envelope was sent, between June 1 and June 3, 1966, by registered mail to each subject at the last known address.

The questionnaire was either:

(a) answered as requested;

(b) presumably delivered by the Post Office, but not answered;

(c) returned by the Post Office to the DBS undelivered.

A follow-up letter was mailed to all subjects in category (b).

The results of the follow-up mailing were again classified according to the three categories. Over 26,300 letters were sent out on the first mailing of which some 6,800 were returned by the Post Office as non-deliverable. Of addresses apparently reached by the Post Office, 77 per cent replied. Another 20 per cent replied in response to a reminder, a total of 97 per cent. This is quite an extraordinary response rate for a mail operation. Table 1 summarizes the success of the first two mailings. (For Table 1 see end of this text.)

Letters returned by the Post Office as a result of the two mailings were of the following two kinds:

(i) they had an unambiguous street address, or

(ii) the street address was ambiguous.

In all cases under (i) a letter was sent addressed 'to the householder' at that address asking for some information about the subject in the study. A few more subjects were located through this mailing.

Some 3,600 subjects were turned over to the Bureau's Regional Offices for further tracing. As a result of this tracing, slightly more than 2,900 subjects were located or about 80 per cent. Supplementing mailings to subjects who did not respond and for letters returned by the Post Office, a search of some large administrative files was instituted to obtain the current address.

Table 2 gives the success rates for the three mailings and for the regional and administrative methods of searching. It is important to note that positive replies do not indicate that the subject was enumerated in the census. They merely provide addresses which can be used for searching of 1966 Census documents. (For Table 2 see end of this text.)

It will be seen that of the 26,535 subjects only 738 or less than 3 per cent could not be located. It should be understood, however, that the success rate varied substantially from list to list. The next stage was the location of the 1966 Census records of the (26,535 - 738 =) 25,797 whose addresses were found.

2.4 Searching among census records

The searching of the census records for the 97 per cent of subjects whose addresses had been ascertained was very intensive.

First, the enumeration area (EA) containing the given address was located and searched. If this failed, all surrounding EA's were also searched. If the address was not specific enough (such as a rural route), all EA's which might possibly contain the given address and all surrounding EA's were searched.

The search currently continues and to date (early December 1967) a high percentage of the 25,797 subjects have been identified among the 1966 Census records. It is anticipated that by February 1968 the search will be concluded.

3. MATCH WITH LABOUR FORCE SURVEY (LFSM)

3.1 Design of the project

The project consisted of matching one-half or about 17,500 of the LFS households, with the corresponding 1966 Census households. For coverage of households, it was a one-way match, i.e., for each LFS household, the corresponding census household was searched for and either matched or not. However, within the matched households, persons were matched both ways, i.e., census enumerated members of a household were matched with members of an LFS household and vice versa. The match was undertaken for the four 1966 Census characteristics (relationship to head, age, sex, marital status).6/ Any discrepancies between the number of persons enumerated and between the characteristics reported were reconciled by enumerators in the field.

The attempt to find LFS households among the census households was carried out in stages using such characteristics as the street name and house number; the name of head of household, particularly important in small villages and on rural routes; composition of household, and other similarities in households in the EA. Households which could not be located in the given EA were searched for in adjacent EA's.

To reconcile differences, the enumerator was instructed to read the discrepancy aloud to the respondent and record his answer. The reconciliation form was mailed back to the Regional Office where it was checked and coded.

The data obtained from the match and the reconciliation of discrepancies was weighted to obtain estimates of the number of households and persons by various characteristics for each province. The weighting used was, generally speaking, the one employed in the LFS (9).

3.2 Coverage of households

The purpose was to estimate the coverage of households in the census. The data was tabulated by size of households and such characteristics as farm households, non-farm owned households, non-farm rented households and family households, non-family households. Four such tabulations were produced:

(a) all households in the LFS;

(b) LFS households matched with the census completely;7/

(c) LFS households matched with the census partially;8/

(d) LFS households not found in the census.

Separate tabulations were formed for self-representing units (SRU) 4/ and non-self-representing units (NSRU) 4/ of seven regions and Canada. From these tabulations Table 3 with "blown up" values was formed for each region. (For Table 3 see end of this text.)

The value b is not obtainable from the match as households were matched one way only. It has been estimated from (a + b) - a = b where (a + b) equals all households enumerated in the census and a equals all households enumerated in the census and in the LFS.

The value d can be estimated through the Chandra-Deming formula (5) where

$$d = \frac{b\,c}{a}$$

The applicability of this formula involves assumptions, the strength of which depends, among others, on the quality of the field work and the success of the matching operation. This is not only apparent after a moment of perusal, but has also been shown empirically (17, 18) for unimportance of d; (20, 21) for the importance of d.

After forming the (a, b, c, d) table, as explained above, the following measures can be estimated for households

1. rate of under-enumeration in census = $\frac{c + d}{n}$
2. rate of under-enumeration in LFS = $\frac{b + d}{n}$
3. net rate of under-enumeration in census and LFS = $\frac{b - c}{n}$

3.3 Coverage of persons

To estimate coverage of persons in the census and in the LFS, tabulations similar to those produced for households were produced for persons:

a_1 enumerated for both the census and the LFS in completely matched households;

a_2 enumerated for both the census and the LFS in partially matched households;

b enumerated in the census, but not in the LFS;

c enumerated in the LFS, but not in the census.

From these tabulations Table 4 with "blown up" values was formed for each region. (For Table 4 see end of this text.)

Values a, b and c in Table 4 are obtainable from the tabulations described above. Other values from Table 4 can be obtained as follows:

d can be estimated in the same way as in Table 3;

e can be obtained in one of two ways; let H be the average size of household in corresponding region and let B be the value of b in Table 3, then e = BH; alternatively, e = (a + b + e) − (a + b), where (a + b + e) is a census value, a is obtainable from the household value of a in Table 3, b has just been obtained from the tabulations for Table 4;

f can again be obtained in a manner similar to e;

k can be obtained in one of two ways; let D be the value of d in Table 3, then k = DH; alternatively, apply the following approximation to the Chandra-Deming formula (5):

$$k = \frac{(b + e)(c + f)}{a} - d$$

The writers of this paper prefer the alternative ways of estimating e, f and k because the use of average household size to estimate persons omitted in enumeration must be very deceptive.9/

From Table 4 various measures of under-enumeration can be obtained for persons similar to the three measures arising out of Table 3 for households. In addition, measures of under-enumeration can be obtained separately for persons missed (i) within enumerated households and (ii) in entirely missed households.

To estimate the content error in household or personal characteristics, only households and persons in a of Tables 3 and 4, respectively, can be used. These households and persons depending on their success in reconciliation fell into the various categories of Table 5. (For Table 5 see end of this text.)

From Table 5 the following measures can be obtained (cf., (13, 23)):10/

1. rate of misclassification of characteristic "i" by LFS

   $(b_2 + c_1)/2n$ or b_2/n or c_1/n

2. rate of misclassification of characteristic "i" by census

   $(b_1 + c_2)/2n$ or b_1/n or c_2/n

3. gross misclassification of characteristic "i" by LFS and census

   $(b_1 + b_2 + c_1 + c_2)/2n$

4. net misclassification of characteristic "i" by LFS and census

   $(b_1 + b_2) - (c_1 + c_2)\ /2n$

4. AGRICULTURE QUALITY CHECK (AQC)

4.1 Objectives of the AQC

The objectives of the Agriculture Quality Check were:

(a) national and regional measures of the bias of the Census of Agriculture results for a restricted number of items; these were selected on the basis of their importance and their prevalence in Canadian agriculture;

(b) the study of the characteristics of farm holdings missed by the census;

(c) the study of the magnitude and direction of errors in reporting at the individual farm level.

4.2 Sample design

A full description of the sample design has been provided elsewhere (12). Here a brief summary will suffice. Rural municipalities containing farms according to the 1961 Census of Agriculture were listed in each province within type-of-farming strata. A municipality belonged to a stratum if 70 per cent or more of the commercial farms received 51 per cent or more of the farm income from the given stratum product-type. Within the strata so delineated, a substratification was imposed recognizing the importance of secondary income sources, similarity in the size of the farm enterprises, and geographic contiguity.

Independent selections of area segments were made within each major type-of-farming stratum, the allocation of the sample within a stratum being proportional to the 1961 Census farm count. The sampling ratio was constant for each of the provinces within a region but variable among the four regions recognized for estimation purposes. Table 6 provides a summary of the sample size by region. (For Table 6 see end of this text.)

Two rules were formulated: the open segment rule and the weighted segment rule. Both are described in (12).

4.3 Field and office procedure

The actual field operation began on July 11, 1966 and was completed in all provinces by August 15, 1966. The specially trained AQC enumerator located the boundaries of a segment using a topographical map and the latest available aerial photograph. He identified all agricultural operations carried on in the segment and sketched directly on the photograph all relevant boundaries within the segments.

In order to develop efficient ratio estimates of the net census errors, it was necessary first to compile the census statistics for the sample segments. This was affected by superimposing the segment boundaries onto the appropriate census EA maps. Then an intensive match operation followed to ensure that all related AQC and census schedules were brought together. Where a pronounced difference between the AQC and census questionnaires (according to an arbitrary rule) existed, a reconciliation was conducted by mail with a second mailing for non-response. Any outstanding delinquencies were then followed up by DBS regional personnel.

4.4 Some numerical results

Estimates of the net error in 1966 Census statistics with their sampling errors are shown in Table 7 for a selected group of items in the Maritime Provinces. Data for other provinces will be published as it becomes available. (For Table 7 see end of this text.)

The AQC estimated that there were 25,900 agricultural holdings meeting the census-farm definition compared with the 24,700 holdings actually enumerated in the 1966 Census enumeration of the Maritimes. Therefore, the net error in the census-farm count is estimated to be 1,200 farms, a 4.6 per cent under-enumeration.

The standard deviation of the estimates for eight characteristics are presented in Table 7. Only acreage owned, oats for grain and potatoes have census totals which are not statistically significantly different from the corresponding AQC estimates.

The relatively larger under-enumeration of 7.2 per cent in unimproved land and woodland indicates that there is considerable reporting or content error for this item. The census definitions are vague and require tightening up if more accurate responses are to be obtained by enumerators in future censuses.

It appears that significant under-enumeration arises when the characteristic in question is not readily identifiable, i.e., hayland and cropland. A tendency to omit reporting doubtful cases is evident. A superior enumeration is apparently performed on higher value crops such as potatoes where the acreages are small and less likely to be forgotten by the respondent.

5. DEMOGRAPHIC ANALYSIS

This section of the paper gives a preliminary view of errors in the census by age and sex and describes the difficulties of applying in Canada the (standard by now) techniques of measuring such errors:

(i) the components-of-change method;

(ii) Coale's iterative method (6);

(iii) the survivors-of-births method;

(iv) the mortality-rate method.

The work of investigating the 1956 and 1961 distributions has now been almost completed. The analysis of 1966 is slowed down by a delay in the appearance of single years of age distribution. Many of the results or findings parallel those of other countries, but there are distinct Canadian

features to most of them.

The curve of sex ratios, measured here by masculinity ratio by age, which should bend downwards towards the right because of the force of mortality, does so slowly, uncertainly, and in some provinces less than in others; slowly, because of the male immigrants some decades ago who still survive in ages where women would be otherwise predominant; uncertainly, because more recent irregularities could be due to either continuing poor age and sex reporting during census or to continuing importance of immigration and age selective emigration (19). The curve of masculinity ratio in the Prairie Provinces, particularly in the case of Saskatchewan and Alberta, actually rises except for the very oldest ages. These provinces were, of course, in receipt of particularly pronounced in-migration (that is marked relatively to their population size) in the past. One is reluctant to make the usual hypothesis about age and sex selective under- and over-enumeration when various parts of the curves behave unusually.

There seems to have been hardly a lowering in the high censal survival ratio for ages 10-14 and 30-34 reflecting little improvement in the under-enumeration of children and persons aged 20-24 in the previous decennial census. Actually the most severe undercount appears to be among persons aged 18 through 23 (judging by single years of age distribution) (19).

We are spared in Canada the embarrassing (1, 11) balance based on compensating errors of the components-of-change method, because of the great and decisive uncertainty concerning migration. Instead, we have a healthy discrepancy, which can lead to high (15) or low (22) estimates of emigration as well as to interesting discussions in learned publications (3). The method in Canada also suffers from the absence of a correction factor comparable to the USA estimate of under-registration of births.

The reliability of Coale's iterative method is also limited by the lack of such an estimate of birth under-registration. It is further limited in Canada by the fact that Coale's assumptions are particularly strong in Canada. They involve alternatives so different that they qualify the exercise decisively and lead eventually to quite different results. Errors become cumulative as one moves along the age scale.

Until very recently births in Canada were markedly higher than in the USA and as such a more volatile element in estimating the net census undercount than in the USA. We already indicated that immigration and emigration are also proportionately more volatile in Canada. Although this enquiry is not yet completed, it can be reported that there has been no obvious improvement in the apparent net undercount of, say, 2.5 per cent over all ages, which has risen to much higher levels of possibly 15 per cent in some age groups (20-24, male). It is startling to see that these independently arrived estimates are quite close to estimates from a direct re-enumeration exercise, at least in 1961, when such a study was carried out (8, 25).

In view of the difficulties of using the standard techniques with Canadian populations, greater reliance will be laid on hybrid approaches involving both analytical methods and direct measurements.

6. CHECK OF LISTS OF HOUSEHOLDS

6.1 Objectives of the check of lists of households

The lists of households produced by enumerators in the course of their enumeration for the purposes of the 1966 Census in the form of books of Visitation Records (VR's) were checked in three cities of Ontario (Kitchener, Waterloo and London) against several other lists of different kinds available for these three cities for about the same point of time. The other lists were produced for the purposes of testing new methods for the 1971 Census and are described in another paper presented to this session (10).

The purpose of this section of the present paper is to report upon findings of this investigation inasmuch as it casts light on the quality and nature of the 1966 VR's. There is no reason to think that the other lists with which the VR's were compared are in any way inherently superior to the VR's. As is usual with a matching operation there was in each exercise with matching two lists the very large number of households common to both lists and the two other much smaller groups of households contained in one list only.

There was, of course, the fourth category of households missing from both lists, but no estimate is suggested for this fourth category for a number of reasons. There are some slight differences in the timing of the compilation of the lists (26). There are some slight differences in the timing of the postal checks and the burden thrown on them (2, 27). There are doubts about the uniformity of definitions of households used by the various lists. Sometimes all the additions suggested by letter carriers were made, sometimes only after a scrutiny. (Deletions were never made without a scrutiny.)

The three cities from Ontario will be supplemented by further investigations, including field work outside Ontario which will afford an opportunity to enquire into the 1966 Census listings of households in other provinces.

6.2 Some numerical results

The results of the first match show rather high rates of omissions of households in the 1966 Census. The omissions from the address register (AR) based mainly on MAR all apparently lower, but those from a listing conducted for the purposes of a recent text are even higher. The omissions of households from the census, particularly when they involve whole structures, will be investigated in the field in January 1968. Disaggregated, the omissions in the suburbs appear

to be lowest in the VR's, highest in the MAR's, while our own field listing falls in between. For the centres of the towns the order appears to be reversed.

The comparison is made difficult by a number of reasons described, but particularly by the advisability of not taking seriously postal advice about deletions as a safety measure against losing "true" addresses. This safety measure is sensible with any one list. It avoids losing a true address at the cost of the unimportant inconvenience of keeping in the list some non-existing addresses. It is, however, disastrous, even if only in an apparent way, for any other list with which the comparison is being made and which shows as misses in the other list the non-existing addresses from the first list.

The purpose of Table 8 is to show the differential impact of postal checks. (For Table 8 see end of this text.) From other experimental work we know that the postal checks are about two-thirds effective (2, 4, 27). In row 2 (iii) of Table 8 one half of one per cent additions were made which suggest three quarters of a per cent for all omissions. From other studies we are conditioned to expect postal corrections of the order of two per cent. Four alternatives arise. The postal check during a census is less effective than during a census test for some inherent reasons not yet understood. Or VR's, have genuinely a better coverage. Or, judging from row 4 of Table 8, the postal suggestions of additions arising during a census test are taken literally and too seriously. That is to say, during a test, the census check which is being applied to postal advice is less effective. Consequently, the weeding out in rows 2 (i), 2 (ii) and 2 (iii) of Table 8 is not available to tests resulting presumably in padding with non-deliverable addresses. Fourthly, there is under-enumeration during a traditional census due to reluctance to accept postal advice. Field work now carried out should throw light on these questions in the near future.

7. STUDY OF POSTAL CHANGE-OF-ADDRESS CARDS

7.1 Summary of the study

When a household moves from one location to another it is expected that a Change-of-Address Card will be completed by some member of that household. The card indicates both the old and new addresses and the expected date of change of residence. When the card is deposited with the Post Office the information on it is used in the transfer of mail from the old to the new address.

The purpose of this study is to find the extent to which the coverage among households that moved during a period, which included the census enumeration date, was different from the rate among all other households in the population and to study whether in future censuses the coverage of these households could be improved.

Change-of-Address Cards covering the Ottawa-Hull metropolitan area were obtained from the Post Office for the period May 15, 1966 to June 15, 1966. These cards were then matched with the census population documents to ascertain whether the relevant households were enumerated in the 1966 Census.

Of the 2,443 cards obtained, 170 were either duplicates or contained addresses in a form which could not be searched for in the census records, for example, business addresses.

7.2 Results of the study

The under-enumeration rate among movers was more than five times greater than for the population as a whole, and although the over-enumeration rate among movers was also greater than for the population it was approximately one-sixth the magnitude of the under-enumeration rate (cf., 14). The net error in counting movers is, therefore, highly biased in the direction of under coverage. (For Table 9 see end of this text.)

For the 363 movers who were not enumerated by the census at either address, a study of the effective date of change of address revealed that 171 of them should have been enumerated at the old address and 192 at the new address. Approximately 59 per cent of the dwellings at the old addresses were enumerated as occupied but not by the mover, while 80 per cent of the dwellings at the new addresses were so enumerated. In the remaining dwellings which were mostly classified as vacant, the chance of the mover being included in the census at either address was, of course, low.

To measure the timing accuracy of the census enumeration of movers a check was carried out to determine how many movers were enumerated but at the wrong address.

A study of the effective date of change of address indicated that eleven movers who moved before the census date were enumerated at their old addresses, although they should have been enumerated at their new address, and 487 movers who moved after the census date were included at their new addresses although they should have been enumerated at their old addresses. (For Table 10 see end of this text.)

As the census enumeration begins on June 1 and continues for approximately three weeks it must be assumed from a reading of Table 10 that persons who move after June 1 are frequently enumerated at the address at which they were residing at the time of interview whether or not this was their usual place of residence at June 1. The conclusion suggests itself that enumerators do not enquire of respondents where they were residing on June 1 but assume that the current address was also the address where they were residing on the census date.

FOOTNOTES

1/ The census date was June 1, 1966 and the censuses of population, housing and agriculture were conducted simultaneously. As explained later the population procedure was limited to a few basic characteristics only.

2/ While the best known work here has been done in the USA, it will be recalled that quite startling results were obtained for India (e.g., 7) and Pakistan (e.g., 16).

3/ Such a list, of course, included emigrants and persons who died during the intercensal period. In subsequent matching "emigration" and "death" were sufficient explanations for non-matches.

4/ SRU's are towns with 1961 population of 15,000 and over and NSRU's are areas other than SRU's.

5/ The documents for the first five months of 1966 were not available. The first five months of 1961 received double coverage.

6/ Minor differences in age groups were ignored. Marital status reconciliation was limited to single — all other.

7/ Completely matched households are defined as households which contain identical persons.

8/ Partially matched households are defined as households which do not contain equal numbers of persons nor are all the persons reported necessarily the same.

9/ On the other hand, a bias may have been introduced due to the correlation between weighting in the LFS and the characteristics estimated.

10/ In the estimation procedure, it was assumed that when reconciliation was not possible, the LFS was correct, i.e., in each case c_2 should be interpreted as $c_2 + c_3$ and b_1 as $b_1 + b_3$. The actual figures involved were quite small.

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TABLE 1. Success of the First and Second Registered Mailings

	No.	%
Response to first letter	14,473	76.6
No response to first letter	5,021	
Response to second letter	3,696	19.6
No response to second letter	691	3.7
Sub-total of subjects apparently reached by letter	18,860	100.0
Letters returned by Post Office in any of the two mailings	7,467	
Total	26,327	

TABLE 2. Results of Tracing by Method Used, Canada, 1966

	Total addresses mailed or searched for	No. of replies rec'd	Per cent of total sample located
	(1)	(2)	(3)
First mailing	26,327 a/	14,473	54.6
Second mailing	5,021	3,696	13.9
Householder letter	2,714	261	1.0
Regional Office	3,637	2,918	11.0
Administrative files b/	8,796	4,449	16.8
Unable to locate	738		2.7
Total sample	26,535		100.0

a/ Less subjects imputed by the 1961 Census and illegitimate births for which no mailing was attempted.

b/ Subjects were searched for simultaneously in several administrative files. The numbers in column(1) therefore contain some duplicates.

TABLE 3. Coverage of Households
(No. of households)

LFS / Census	Enumerated in LFS	Not enumerated in LFS	Total
Enumerated in census	a	b	a+b
Not enumerated in census	c_1 (c)	d	c+d
Not enumerated in census - Reconciliation not possible	c_2 (c)		
Total	a+c	b+d	n=a+b+c+d

TABLE 4. Coverage of Persons
(No. of persons)

Census \ LFS		Within enumerated households: Enumerated in LFS	Within enumerated households: Not enumerated in LFS	Not enumerated in LFS due to missed hhld.	Total
Within enumerated households	Enumerated in census	a	b	e	a+b+e
	Not enumerated in census	c	d		c+d
Not enumerated in census due to missed hhld.		f		k	f+k
Total		a+c+f	b+d	e+k	n

TABLE 5. Content Error in Household or Personal Characteristics

Census \ LFS		Enumerated with characteristic "i"	Enumerated with characteristic other than "i": LFS is correct	Enumerated with characteristic other than "i": LFS is wrong	Enumerated with characteristic other than "i": Reconciliation not possible	Total
Enumerated with characteristic other than "i"		a	b_1	b_2	b_3	a+b
Enumerated with characteristic other than "i"	Census is correct	c_1	b			c+d
	Census is wrong	c_2	c	d		
	Reconciliation not possible	c_3				
Total		a+c	b+d			n= a+b+c+d

TABLE 6. Population and Sample Sizes Relating to the 1966 AQC

Region	1961 Census-farms	1961 large census-farms a/	AQC sampling rate (%)	Number sample segments	Number 1966 sample farms	Number 1966 sample farms per segment	1966 Census-farms
Maritimes	31,639	333	4.13	218	908	4.2	24,684
P.Q. - Ont. ...	217,110	1,539	0.60	325	1,390	4.3	190,181
Prairies	210,442	1,579	0.60	323	1,427	4.4	194,844
B.C.	19,934	384	0.54	18	88	4.9	19,085
Canada	479,125	3,835	—	884	3,813	—	428,794

a/ Because the listing of large census-farms was given special attention by 1966 enumerators it was assumed they made no contribution for coverage and content errors.

TABLE 7. Comparison of Census and 1966 AQC Estimates

Maritime Provinces

Item		AQC estimate	Census estimate	Net error		Sampling error	
				Amount	% of AQC	Amount ± 1S	% of AQC
Farms	No.	25,900	24,700	1,200	4.6	410	1.6
Total acreage	ac.	4,778,200	4,590,600	187,600	3.9	89,300	1.9
Acreage owned	"	4,522,900	4,295,900	227,000	5.0	115,400	2.6
Cropland	"	1,197,000	1,140,300	56,700	4.7	19,400	1.6
Oats for grain	"	187,200	184,200	3,000	1.6	5,300	2.8
Hayland	"	703,700	650,000	53,700	7.6	16,000	2.3
Potatoes	"	123,900	123,300	600	0.5	2,000	1.6
Unimproved and woodland	"	3,122,300	2,896,300	226,000	7.2	98,200	3.1

TABLE 8. The Impact of the Postal Check on the 1966 Census Lists of Households and Other Lists in Three Towns of Ontario

	Kitchener	Waterloo	London
1. Households in 1966 VR's	26,696	8,689	59,902
2. "Missed" cards made out by letter carriers (i + ii + iii)	358	86	685
(i) Households found to have been included in enumeration	161	27	351
(ii) Non-residential	71	28	206
(iii) Genuine finds ...	126	31	128
3. (iii) as a % of 1	0.5%	0.4%	0.2%
4. 2 as a % of 1	1.3%	1.0%	1.1%
5. Households in AR a/ before postal check ...	31,466	9,522	57,703 b/
6. Postal deletions	3,117	664	603
7. Postal additions	512	228	2,859
8. Households in AR after postal changes (5-6+ 7)	28,841	9,086	59,959
9. 7 as a % of 8	1.8%	2.5%	4.8%

a/ In Kitchener and Waterloo the AR's were based mainly on MAR's. In London they were field listings by test enumerators.

b/ The large difference between row 5 and row 1 is due to non-mail delivery areas having been excluded from row 5 (some 1,200 addresses).

TABLE 9. Enumeration Status of Persons Who Completed a Change-of-Address Card for the Period May 15, 1966 to June 15, 1966, for the Ottawa-Hull Metropolitan Area by Two-day Intervals

1966 Census status	Total		Date of reported change of address by two-day intervals																	
			May									June								
	No.	%	15,16	17,18	19,20	21,22	23,24	25,26	27,28	29,30	31	1	2,3	4,5	6,7	8,9	10,11	12,13	14,15	No date
All movers	2,273	100.0	164	86	134	71	84	106	223	311	152	525	94	67	109	46	50	16	20	2
Not enumerated at either address	363	16.0	26	17	25	13	13	19	22	26	21	81	23	21	27	9	6	2	2	
Enumerated at one address only	1,618	71.1	122	59	98	54	61	117	169	236	115	385	46	33	57	25	36	12	11	2
Enumerated at both addresses	56	2.5	1	1	3		2	1	3	6	2	10	6	4	8		6		3	
One address not in a form to be searched a/	236	10.4	15	10	8	4	8	7	19	23	14	49	19	9	17	12	12	2	6	

a/ 178 movers were not enumerated at the good address and 58 movers were enumerated at the good address. In the 236 cases one address was not in a form which could be searched.

TABLE 10. Movers Enumerated at Wrong Address. Status of Dwellings at which they should have been Enumerated

Census status		Enumerated at wrong address	Correct dwelling enumerated as		Not determined a/
			Occupied	Vacant	
Incorrectly enumerated at:					
old address	No.	11	6	5	
	%	2.2	1.2	1.0	
new address	No.	487	262	184	41
	%	97.8	52.7	36.9	8.2
Total	No.	498	268	189	41
	%	100.0	53.8	38.0	8.2

a/ Unable to locate apartment or room number or address not found in census.