AN APPLICATION OF MULTI-FRAME METHODOLOGY AND MEASUREMENT ERROR RESEARCH FOR THE 1976 REGISTRATION AND VOTING SURVEY

Carma R. Henning, Henry F. Woltman and Cary T. Isaki, U.S. Bureau of the Census

I. Background and Research Objectives

The purpose of the 1976 Registration and Voting Survey (RAV) was to provide a count of citizens of voting age by race or color and national origin and the extent to which they were registered to vote and had voted in specified political jurisdictions [1]. A household census was conducted in 28 of the jurisdictions and a sample survey of households in the remaining 62 jurisdictions. The data collection was by personal interview with telephone follow-up. For more detail on background and methodology see [2,8].

In conjunction with the implementation of the jurisdiction sample surveys and censuses, two research projects were undertaken. One project involved the evaluation of a two frame sample design which utilized the individual registration lists in each jurisdiction as one frame and essentially a household frame as the other frame. The ultimate goal of this phase of the research was to obtain estimates of the relevant parameters in order to evaluate the two frame approach vis-a-vis the single frame approach. In addition, several other survey designs were to be evaluated and compared to those previously mentioned.

In the past, collection of voting information by household survey technique has invariably resulted in estimates of the number of voters that were somewhat higher than the official number of votes cast. Hence the other project was directed toward validating the survey responses by using voting and registration lists in each jurisdiction [1,3]. The specific objectives were two-fold. The first was to determine the extent of overreporting of voter participation for the population as a whole (by a record check matching procedure) in each of the 12 jurisdictions in which research was conducted, but more importantly to compare the extent of overreporting among minority and nonminority persons in the same 12 jurisdictions. The other objective was to evaluate the cost efficiency of using a double sample difference estimator to reduce measurement error bias [4]. The research on this latter objective will not be discussed here. In part II we briefly discuss the record check matching procedures used.

II. Description of Record Check Matching Procedures

Prior to the selection of the twelve sample areas to be included in this phase of the research, a questionnaire was administered to the local officials of each of the jurisdictions scheduled for a sample survey to ascertain the nature of their existing voting and registration lists. Such information as the format of the records--computer printout, file cards, etc.--, the demographic information on the records, the sort of the records, etc., were collected.

In most cases, the information, while valuable for for obtaining a general idea of the records that existed in each jurisdiction, was not sufficient to design the matching procedure a priori. Rather, each person(s) assigned to do the record check in a particular jurisdiction found it necessary to essentially design the matching procedures ad hoc using the general guidelines provided by the Washington staff.

III. Results of the Validation Phase

A. Comparison of Reported Versus Record Check Estimates of Voting Participation

Before discussing the results, it is important first to discuss the accuracy of the record check estimates. By the nature of the matching procedures, previously discussed, in the majority of the jurisdictions persons who say they voted but were subsequently declared by the record check as not having voted were classified thus because they were not found on the registration list. That is, if the person was not matched to the registration list, then he/she was assumed to have not voted. In such cases the voting record, if it was separate from the registration list, as was the case in most jurisdictions, was not checked. Thus if many of these nonmatches to the registration list are incorrect the record check voting rate estimates would be biased downward. Our only objective means by which to gauge the accuracy of record check estimates is by comparison of the estimated number of votes cast on the basis of the record check with the actual number of ballots counted as reported by the jurisdiction officials. This comparison is provided in columns (1) and (3) of Table 1. It should be noted that this comparison suffers from some slight definitional differences in that, for example, the survey response in effect relates to whether or not a person filled out a ballot or pulled the lever on a voting machine, whereas the number of ballots counted relates to only those ballots so cast which were handled by the voter in a procedurally correct manner and as a result, were counted. In addition, the ballots counted figure includes absentee ballots. To the extent that these ballots were from persons living permanently in another jurisdiction at election time, the ballots counted figure will overstate the number of persons who voted in and whose usual residence is in the jurisdiction. Such persons represented the target population of voters. In any event, the ratio of ballots counted to estimated votes cast on the basis of the record check given in column (5) is fairly close to one, in four of the jurisdictions--namely, Edgecombe County, North Carolina (0.98); Lee County, North Carolina (0.95); Coconino County, Arizona (1.01); and Pinal County, Arizona (0.99).

For two--Halifax County, North Carolina, and Collier County, Florida,--the ratio is somewhat greater than one (1.13 and 1.06, respectively), while for the remaining six--Beaufort County, North Carolina; Union County, North Carolina; Monroe County, Florida; Bronx County, New York;

Honolulu County, Hawaii; and Navajo County, Arizona,--they are substantially less than one (0.81, 0.85, 0.89, 0.74, 0.91, and 0.67, respectively). In Monroe and Honolulu Counties, in addition to sampling error, the inclusion of absentee ballots counted, in the "total" figure could, as noted above, be a factor since 1,917 and 8,987 absentee ballots are included in these figures, respectively. From the standpoint of substantially underestimating the "true" voting rate by means of the record check, it appears likely that such is the case for Beaufort County, Union County, Bronx County, and Navajo County. Thus, the estimated difference in the record check versus reported voting rates in these four counties appears to be especially suspect and these counties are excluded in the analysis that follows. Also, note that column (4) of Table 1 shows the estimate of voters using the survey responses and column (6) shows the ratio of this estimate to the ballots counted figure. Except for one jurisdiction, these ratios are somewhat greater than one, again indicating that the survey estimates of voting for all 18+ citizens tend to be overestimates as compared to the official ballots counted figure.

Comparison of the voting rate estimates using the survey responses and the record check results for the eight jurisdictions where the record check appears to be reasonably valid are given in Table 2. As is clearly evident the survey estimates for the most part, substantially overestimate the voting rates in each jurisdiction and in each of the population subgroups considered. The comparisons in Table 2 also indicate that the impact of reporting errors on the voting rate estimates is greater for the specific minority groups of interest than for the nonminority group. That is, the relative overstatement in the voting rates for the minority groups is much greater than that for the nonminority group. The average relative overstatement for the nonminority group is about 12% versus an average of about 36% for the minority groups (see column (5), Table 2).

Another statistic of major interest is the percentage point difference in voting rates for a particular minority group and the nonminority population. Table 3 provides a comparison of such voting rate differences using the survey responses and the results of the record check for the eight jurisdictions. These comparisons show that the survey estimates tend to underestimate the voting rate differential between specific minority groups and the nonminority group [see column (3)].

B. Results of Record Check Follow-up

As a result of the apparent poor quality of the record check in several of the sample jurisdictions, we decided to repeat the record check in Beaufort County, North Carolina, and Navajo County, Arizona, using voting records rather than registration lists for the first step in record checking. For both jurisdictions, the second record check provided somewhat higher estimates of the number of actual voters, suggesting that this second record check procedure was better. Even so, the total number of voters using the second record check results still fell substantially short of the ballots counted figure. The ratios to the official ballots counted figure using the second record check results were 0.86 and 0.82 respectively, up from 0.81 and 0.67 based on the first record check.

IV. Multiple Frame Methodology

A. Introduction

Sampling designs utilizing multiple frames have been applied in surveys of varying types of populations. At the Bureau of the Census two such surveys come to mind. The first is the Current Population Survey [7] which is a monthly household survey that essentially utilizes a frame consisting of dwelling units as of some fixed point in time and another frame consisting of dwelling units erected subsequent to the same fixed point in time or an area frame to cover both types of dwelling units when no other frame is practical. The other survey is the Current Monthly Trade Survey which covers the business sector. In this survey, a frame consisting of businesses with paid employees is supplemented with an area frame to cover those businesses with no paid employees and other businesses not in the first frame. In general, surveys of a recurring nature which are intended to cover changing populations usually resort to a multiple frame technique.

The parent Registration and Voting Survey (RAV) is in itself similar in sample design to the Current Population Survey and hence is a multiple frame survey [2]. What distinguishes the multiple frame methodology to be detailed below and those previously described is that the latter do not utilize the information available from sample units selected from the overlap domain, that is, the set consisting of units common to both frames [4]. In the following description of the multiple frame design, developed as part of the research effort under the parent RAV survey, we speak of only two frames, treating the several frames used in the parent RAV survey as a single frame.

As part of the research effort connected with the RAV survey, a two-frame methodology which used the parent RAV survey as one frame and the county registration lists as another was implemented in 12 counties that were covered by RAV. For reasons presented earlier results relating to 8 of the counties will be presented here. In addition to the application of the methodology, the main purpose of the research was to estimate population parameters (cost and per unit variances, covariances and level) so that several other potential methodologies could be compared on a cost versus mean square error (MSE) basis. The analysis is yet to be completed, so for the present only a description of the methodology and some preliminary results are provided.

B. Description of the Two Frame Methodology

Planning of the two frame methodological research

began after the questionnaire and interviewing procedures were finalized for the parent RAV survey. Consequently, the two frame methodology developed was adapted to the informational content of the questionnaire and the same interviewing techniques. In the two frame methodology, it would have been helpful to know the survey respondent's voting precinct and the name and address which he expected to appear on the registration list. Also, some savings in cost could have been realized if households lacking the selected sample person had not been interviewed. These cases (to be discussed later) were excluded from analysis.

Denote as frame B the frame used for selecting households in the parent RAV survey. Briefly speaking, frame B consists of at most 4 mutually exclusive frames in terms of coverage. One frame consists of single unit dwellings as of the 1970 Census. The second consists of group quarters (clusters of approximately 3 living quarters) as of the 1970 Census. The third frame consists of clusters of approximately 4 living quarters based on building permits issued since 1970 and the fourth frame consists of area segments of approximately 4 households per segment. For purposes of the research, a subsample of households was selected from the parent sample and used to represent this frame. With the exception of the Japanese headed households in Honolulu and Spanish headed households in Pinal Co. (subsampled at a rate of 1 in 4) all other minority headed households were record checked 100%. Nonminority headed households were subsampled with varying rates. Subsampling was performed on a flow basis as the questionnaires were returned from the field, not necessarily controlling the distribution of record checked households within the sampling strata. Frame A was the county registration list which was located at the county registrar's office. The manner of selecting persons from frame A varied among the counties. For Honolulu, precincts were stratified by minority concentration and used as first stage units. A sample of persons was then selected by simple random sample (SRS) within the selected precincts. In the remaining counties, election precincts were stratified by minority concentration and an SRS of persons was selected over all precincts within each stratum. Frame B is treated as covering 100% of the target population (all persons residing in the county at the time of the survey that are eligible to register) while frame A is treated as covering only a subset.

Increased coverage of frame A could have been realized by following movers within the county but since this would have been costly, the idea was discarded. To avoid following movers and to simplify what otherwise might involve a complex estimation procedure, a household was defined to be linkable if at least one individual was on the registration list with the current (at the time of the survey) name and address. All others were termed nonlinkable. Operationally, a sample of names (sample persons) was selected from the registration list. All other persons on the registration list with the same last name and address as the sample person were also listed along with their voting status, thus reducing the record checking effort. A household interview was conducted and all persons at the address were listed with their reported minority status, voting and registration data. If the sample person was not listed as a member of the household, he was denoted as a sample person moved (SPM) and the household was dropped. Otherwise, each person in the household who had not previously been record checked was record checked. The subsample of households from the parent RAV sample from frame B was record checked and each household in the subsample was assigned a linkability status.

We have two independent estimators over the linkable households and one estimator over the nonlinkable households. Let $\hat{Y}_1$ denote the estimator over the linkable households in frame A and $\hat{Y}_2$ and $\hat{Y}_3$ denote the estimators over the linkable and nonlinkable households, respectively in frame B. Then $\hat{Y}_1$, $\hat{Y}_2$ and $\alpha\hat{Y}_1+(1-\alpha)\hat{Y}_2$, $0<\alpha<1$, represent potential estimators over the linkable household domain and all three will be considered in the analysis. The form of $\hat{Y}_1$ used was

$$\hat{Y}_1 = \sum_{i=1}^{n} W_i y_i / t_i \qquad \text{where}$$

y_i = total characteristic for linkable household i

n = sample number of names selected

W_i = sampling weight of name i

and

t_i = number of individuals in linkable household i whose name and address are on the registration list.

The $\hat{Y}_2$ and $\hat{Y}_3$ to be used are the usual Horvitz-Thompson estimates of total.

Table 5 illustrates the estimated proportion SPM by county with their estimated standard errors. The sample person chosen from the registration list is considered an SPM if

i) the individual does not reside at the address

ii) the individual's usual residence is elsewhere

iii) the individual does reside at the address but his name has changed

iv) the reported address was outside of the locality.

The proportions in the table range from about .21 to .54. Hence a substantial savings in cost could be realized by reducing the number of SPM in the sample. The major reason for such high proportions is the lack of "currentness" of the registration list. It has been proposed that using a voting list could reduce these SPM proportions because of the presumed "currentness" of the voting list address. Incomplete addresses such as "____ County Courthouse" or "Rural Route 5" may remain on the voting list, hence still contributing to the proportion SPM.

Let $\hat{Z}_1$, $\hat{Z}_2$ and $\hat{Z}_3$ represent comparable estimators to $\hat{Y}_1$, $\hat{Y}_2$ and $\hat{Y}_3$ except that they refer to the eligible to vote characteristic. In the following

we restrict ourselves to a discussion of voting rates by county and by minority group based on the record checked data. Two estimators of the voting rate are presented - $\hat{P}_A = [\hat{Y}_1 + \hat{Y}_3]/[\hat{Z}_1 + \hat{Z}_3]$, $\hat{P}_B = [\alpha\hat{Y}_1 + (1-\alpha)\hat{Y}_2 + \hat{Y}_3]/[\beta\hat{Z}_1 + (1-\beta)\hat{Z}_2 + \hat{Z}_3]$ with $\alpha=\beta=1/3$. This arbitrary value of 1/3 represents the proportion of the combined sample falling in frame A.

The calculation of the sampling errors of $\hat{P}_A$ and $\hat{P}_B$ was somewhat involved due to the nature of the record check subsampling procedure and the cluster design of the parent RAV survey. Briefly, the reported voting characteristic was used to estimate intra-class correlations (δ's) which were then applied to the estimated "S^2" of the record checked voting characteristic.

Table 6 presents the estimates and sampling errors of $\hat{P}_A$, $\hat{P}_B$, and the estimated differences between the minority and nonminority voting rates. Table 7 provides the individual components $\hat{Y}_1$, $\hat{Y}_2$, etc., and their estimated sampling errors. Tables 6 and 7 vary from 1 and 2 for two basic reasons: 1) no adjustments to independent population counts nor imputation for noninterviews was done in calculating voting rates in Tables 6 and 7, 2) data used in Tables 6 and 7 went through an additional stringent review. Otherwise, the same file was used for Tables 1-4 and 6,7. In Table 6 the expected values of $\hat{P}_A$ and $\hat{P}_B$ are theoretically equal with nearly all of the rates lying within one standard error of each other. It is the nature of the estimators that $\hat{P}_B$ be more similar to the rates provided in Table 2 than $\hat{P}_A$. On the whole, $\hat{P}_B$ exhibited smaller coefficients of variation (C.V.'s) than $\hat{P}_A$ (this was expected as $\hat{P}_B$ is based on a larger sample size than $\hat{P}_A$).

While the estimators of voting rates $\hat{P}_A$ and $\hat{P}_B$ appear to be reasonable, the individual estimators of total voting linkable via the registration frame ($\hat{Y}_1$) and the other frame ($\hat{Y}_2$) appear suspect in a few cases. When such estimators looked awry, $\hat{Y}_2$ was almost always lower than $\hat{Y}_1$. Of the 22 comparisons made, 14 differences ($\hat{Y}_1 - \hat{Y}_2$) fell outside of the limits of a one σ confidence bound while three differences fell outside of the limits of a two σ bound. When $\hat{Y}_2$ is adjusted by the independent population count 12 differences still remained outside of the one σ limits. It is suspected that the unadjusted $\hat{Y}_2$ estimates are low because frame B households were classified as nonlinkable when addresses differed slightly from the registration list and frame A households were kept as linkable under similar circumstances. Components utilized in the construction of the confidence intervals alluded to in the above can be found in Table 7.

The last three columns in Table 7 reveal that for the given sample size allocations, s.e.($\hat{Y}_1$) is almost always larger than s.e.($\hat{Y}_2$). $\hat{Y}_3$ contributes only a small amount to the total estimate. The s.e.($\hat{Y}_1$) can possibly be made small in the future by using the voting list as frame A with its presumed currentness of name and address, thus eliminating the large proportion of "zeroes" on the registration list. Examination of the estimated s.e.($\hat{Y}_1$) and s.e.($\hat{Y}_2$) reveal that the s.e.($\hat{P}_B$) could be improved by varying α and β by minority group and county. Further analysis is being conducted at present. In addition, the fact that both reported and record checked information are available as well as the associated cost for each component of the two-frame methodology will enable us to conduct analyses on an MSE/cost basis.

V. Conclusion

Preliminary analysis of the data based on the record checked subsample indicated that 1) overreporting of voting was evident for each minority and nonminority group, 2) false negatives in reported voting tended to be miniscule compared to false positives relative to the record checking procedure used, 3) estimated differences of voting rates (minority vs. nonminority) using record checked data tended to be larger than those using the reported data, 4) improved record checking procedures need to be devised in future surveys if the survey results are to be based on record checked data exclusively, and 5) for the most part the multiframe estimates agree with the estimates obtained via a single frame procedure.

References

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Table 1 --Comparison of Independent Count of Ballots and Estimates of Voters From Twelve 1976 RAV Sample Jurisdictions

Jurisdiction	Ballots Counted 1/		Estimates of Voters in this Jurisdiction		Ratios	
	Total	Absentee	RAV Records Check 2/	RAV Sample Survey 2/	Col. (3) ÷ Col. (1) 3/	Col. (4) ÷ Col. (1) 3/
	(1)	(2)	(3)	(4)	(5)	(6)
Edgecombe Co., N.C.	13,328	165	13,096(790)	15,252(1,197)	0.98 (.06)	1.14 (.09)
Lee Co., N.C.	8,834	61	8,363(305)	10,801(471)	0.95 (.04)	1.22 (.05)
Coconino Co., Ariz.	22,074	1,026	22,318(508)	25,598(857)	1.01 (.02)	1.16 (.04)
Pinal Co., Ariz.	22,541	1,375	22,351(400)	25,098(692)	0.99 (.02)	1.11 (.03)
Collier Co., Fla.	23,967	1,753	25,416(460)	26,798(703)	1.06 (.02)	1.12 (.03)
Halifax Co., N.C.	13,576	NA	15,365(848)	17,381(1,298)	1.13 (.06)	1.28 (.10)
Beaufort Co., N.C.	10,593	159	8,598(510)	11,633(801)	0.81 (.05)	1.10 (.08)
Union Co., N.C.	17,009	318	14,478(590)	19,815(966)	0.85 (.04)	1.16 (.06)
Monroe Co., Fla.	22,146	1,917	19,758(350)	19,858(508)	0.89 (.02)	0.90 (.03)
Bronx Co., N.Y.	351,146	6,146	258,089(13,785)	408,283(22,747)	0.74 (.04)	1.16 (.06)
Honolulu Co., Hi.	234,088	8,989	212,529(4,548)	253,828(6,725)	0.91 (.02)	1.08 (.03)
Navajo Co., Ariz.	15,025	NA	10,106(295)	16,401(563)	0.67 (.02)	1.09 (.04)

1/ Obtained from RAV Form 750--Election Results Questionnaire.

2/ Weighted Estimates. Includes adjustment for noninterviews and adjustment to an independent total population figure. Approximate sampling error shown in parenthesis.

3/ Approximate sampling error on ratio shown in parenthesis.

Table 3.--Percent Point Difference Between Minority-NonMinority Voting Rates Using Survey Responses and Records Check Results for Eight 1976 RAV Sample Jurisdictions

Jurisdiction/ Minority-Nonminority Group Comparison	Percentage Point Difference in Voting Rates Using 1/		Difference of col.(1)and col. (2) Differences [col.(1)-col.(2)]	Approximate Standard Error on col. (3)
	Survey Responses	Records Check Results		
	(1)	(2)	(3)	(4)
Honolulu Co., Hawaii				
Nonminority vs. Chinese	-13.7	- 9.2	-4.5**	2.6
Nonminority vs. Japanese	-18.5	-10.1	-8.4*	1.8
Nonminority vs. Filipino	- 3.8	+ 3.5	-7.3*	3.3
Coconino Co., Arizona				
Nonminority vs. Span. Origin	5.8	8.7	-2.9	2.5
Nonminority vs. American Ind.	12.5	19.1	-6.6*	2.7
Pinal Co., Arizona				
Nonminority vs. Span. Origin	10.3	11.4	-1.1	1.0
Nonminority vs. American Ind.	29.1	28.4	+0.7	1.3
Collier Co., Florida				
Nonminority vs. Span. Origin	38.0	43.2	-5.2**	3.1
Nonminority vs. Black	37.0	38.7	-1.7	3.0
Monroe Co., Florida				
Nonminority vs. Span. Origin	2.0	9.3	-7.3*	2.4
Nonminority vs. Black	17.6	26.7	-9.1*	3.0
Edgecombe Co., N. Carolina				
Nonminority vs. Black	21.4	25.8	-4.4**	2.6
Halifax Co., N. Carolina				
Nonminority vs. Black	28.3	37.5	-9.2*	2.8
Lee Co., N. Carolina				
Nonminority vs. Black	14.6	19.1	-4.5**	2.3

1/ Differences derived from voting rates given in Table 2

** Indicates statistical significance at the 10% level

* Indicates statistical significance at the 5% level

Table 2.--Comparison of Voting Rates Using Survey Responses and Record Check Status For Matched Persons in Eight 1976 RAV Sample Jurisdictions

Jurisdiction/Minority Group	% of Pop. Eligible to Vote in Juris.[1]		Percentage Point Difference [(1)-(2)]	Approx. S.E. of % Difference	Relative Difference (Percent) [(3)÷(2)]x100
	Reported Voting	Rec. Check Voting			
	(1)	(2)	(3)	(4)	(5)
Honolulu Co., HI.					
Total 18+ Citizens	64.7%	51.8%	12.9	0.8	25%
Chinese	70.9	57.2	13.7	2.4	24
Japanese	75.7	58.1	17.6	1.5	30
Filipino	61.0	44.5	16.5	3.1	37
Nonminority	57.2	48.0	9.2	1.0	19
Coconino Co., AZ.					
Total 18+ Citizens	63.2	55.0	8.2	0.8	15
Spanish Origin	60.3	50.8	9.5	2.3	19
American Indian	53.6	40.4	13.2	2.5	33
Nonminority	66.1	59.5	6.6	0.9	11
Pinal Co., AZ.					
Total 18+ Citizens	49.9	45.0	4.9	0.4	11
Spanish Origin	45.5	39.7	5.8	0.8	15
American Indian	26.7	22.7	4.0	1.2	18
Nonminority	55.8	51.1	4.7	0.5	9
Collier Co., FL.					
Total 18+ Citizens	64.8	58.7	6.1	0.6	10
Spanish Origin	30.2	19.2	11.0	3.0	57
Black	31.2	23.7	7.5	2.9	32
Nonminority	68.2	62.4	5.8	0.6	9
Monroe Co., FL.					
Total 18+ Citizens	67.6	58.2	9.4	0.7	16
Spanish Origin	67.1	51.8	15.3	2.3	30
Black	51.5	34.4	17.1	2.9	50
Nonminority	69.1	61.1	8.0	0.8	13
Edgecombe Co., NC.					
Total 18+ Citizens	45.0	38.0	7.0	1.3	18
Black	33.0	23.5	9.5	2.0	40
Nonminority	54.4	49.3	5.1	1.6	10
Halifax Co., NC.					
Total 18+ Citizens	49.8	43.0	6.7	1.4	16
Black	31.5	18.8	12.7	2.1	68
Nonminority	59.8	56.3	3.5	1.8	6
Lee Co., NC.					
Total 18+ Citizens	48.9	39.3	9.6	0.9	24
Black	36.9	23.6	13.3	2.1	56
Nonminority	51.5	42.7	8.8	1.0	21

[1]The denominator of the voting rates presented in this table is only a proxy for the eligible voting population being in a particular jurisdiction. The denominator used equals the total 18+ citizens minus those reported on the survey questionnaire as voting or registered in another jurisdiction. Both estimates based on the records check subsample.

Table 4.--Weighted Estimates of Reported Voters-Non Voters in this Jurisdiction by Record Check Voting Status for Eight 1976 PAV Sample Jurisdictions

Jurisdiction/ Minority Group	Reported Voting in this Jurisdiction / Voted on Basis of Record Check	Percent: Yes / Yes	Percent: No / Yes	Percent: Yes / No	Percent: No / No	Number of Sample Persons in Records Check
		(1)	(2)	(3)	(4)	(5)
Honolulu Co., HI.						
Total 18+ Citizens	409,906 1/	51.0%	0.9%	13.8%	34.4%	1336
Chinese	48,292	55.7	1.5	15.2	27.6	471
Japanese	124,105	57.7	0.4	18.0	24.0	305
Filipino	35,107	42.9	1.6	18.1	37.4	354
Nonminority	202,402	47.1	0.9	10.1	41.9	206
Coconino Co., AZ.						
Total 18+ Citizens	40,547	54.1	0.9	9.0	35.9	848
Spanish Origin	4,686	50.1	0.7	10.2	39.0	324
American Indian	7,362	39.8	0.6	13.8	45.8	296
Nonminority	28,499	58.5	1.0	7.6	32.9	228
Pinal Co., AZ.						
Total 18+ Citizens	49,641	44.3	0.7	5.6	49.4	1093
Spanish Origin	11,424	39.3	0.4	6.2	54.1	249
American Indian	6,074	21.9	0.7	4.7	72.6	564
Nonminority	32,143	50.4	0.8	5.5	43.4	280
Collier Co., FL.						
Total 18+ Citizens	43,302	57.7	1.0	7.2	34.1	589
Spanish Origin	1,889	18.9	0.3	11.3	69.5	180
Black	1,996	21.0	2.8	10.3	66.0	198
Nonminority	39,417	61.4	1.0	6.8	30.8	211
Monroe Co., FL.						
Total 18+ Citizens	34,012	57.4	0.7	10.2	31.7	722
Spanish Origin	3,786	51.0	0.8	16.1	32.1	298
Black	2,459	33.9	0.5	17.3	47.9	255
Nonminority	27,767	60.4	0.7	8.7	30.2	169
Edgecombe Co., NC.						
Total 18+ Citizens	34,420	37.2%	0.9%	7.9%	54.1%	909
Black	16,281	22.6	0.9	10.3	66.1	529
Nonminority	18,139	48.5	0.8	5.9	44.8	380
Halifax Co., NC.						
Total 18+ Citizens	35,766	41.4	1.6	8.4	48.6	789
Black	12,745	18.6	0.2	12.9	68.3	472
Nonminority	23,021	53.9	2.4	5.9	37.8	317
Lee Co., NC.						
Total 18+ Citizens	21,298	38.7	0.6	10.3	50.5	984
Black	3,820	23.6	0.0	13.3	63.1	504
Nonminority	17,478	41.9	0.7	9.6	47.7	480

1/ These estimates are based on the records check subsample using all of the normal survey weights, including an adjustment to the independent count of total population, plus an additional subsampling weight where appropriate to account for the within jurisdiction subsampling of questionnaires for the records check.

Table 5.

PROPORTION SAMPLE PERSON MOVED (SPM)

County	Sample Size	Proportion SPM	Standard Error
1. Honolulu	808	.300	.069
2. Coconino	329	.421	.028
3. Pinal	462	.300	.024
4. Collier	451	.213	.023
5. Monroe	435	.318	.023
6. Edgecombe	181	.365	.037
7. Halifax	187	.385	.039
8. Lee	244	.541	.032

Table 6. ESTIMATED VOTING RATES $\hat{P}_A, \hat{P}_B$ AND DIFFERENCES BETWEEN MINORITY AND REST WITH THEIR ESTIMATED STANDARD ERRORS

County	Minority	$\hat{P}_A$	$\hat{P}_B$	$\hat{P}_A-\hat{P}_{AR}$	$\hat{P}_B-\hat{P}_{BR}$	Standard Errors: $(\hat{P}_A)$	$(\hat{P}_B)$	$(\hat{P}_A-\hat{P}_{AR})$	$(\hat{P}_B-\hat{P}_{BR})$
Honolulu	Japanese	.5529	.5643	.0924	.0883	.0213	.0161	.0324	.0217
	Filipino	.4598	.4616	-.0007	-.0144	.0408	.0298	.0475	.0332
	Chinese	.5729	.5562	.1124	.0802	.0342	.0243	.0420	.0283
	Rest	.4605	.4760			.0244	.0146		
Coconino	Spanish	.4056	.4703	-.1735	-.1138	.0662	.0338	.0702	.0380
	Indian	.4926	.4544	-.0865	-.1297	.0517	.0315	.0567	.0359
	Rest	.5791	.5841			.0232	.0172		
Pinal	Spanish	.3712	.3796	-.2114	-.1710	.0328	.0163	.0380	.0200
	Indian	.2058	.2108	-.3768	-.3398	.0348	.0181	.0397	.0216
	Rest	.5826	.5506			.0192	.0116		
Collier	Black	.2506	.2484	-.3200	-.3570	.0297	.0275	.0348	.0296
	Spanish	.3060	.2138	-.2646	-.3916	.0840	.0411	.0860	.0425
	Rest	.5706	.6054			.0181	.0110		
Monroe	Black	.3561	.3485	-.2351	-.2556	.0798	.0374	.0824	.0390
	Spanish	.5669	.5459	-.0243	-.0582	.0447	.0253	.0491	.0274
	Rest	.5912	.6041			.0204	.0108		
Edgecombe	Black	.2001	.2219	-.2460	-.2567	.0241	.0200	.0419	.0334
	Rest	.4461	.4786			.0342	.0267		
Halifax	Black	.2147	.1986	-.2896	-.3474	.0320	.0213	.0507	.0380
	Rest	.5043	.5460			.0394	.0314		
Lee	Black	.2404	.2381	-.2300	-.2019	.0441	.0240	.0489	.0278
	Rest	.4704	.4406			.0209	.0140		

Table 7. Estimated Total Record Checked Voting and Eligible To Register Characteristics by Linkable and Nonlinkable

County 1/		$\hat{Y}_1$	$\hat{Z}_1$	$\hat{Y}_2$	$\hat{Z}_2$	$\hat{Y}_3$	$\hat{Z}_3$	Standard Errors: $\hat{Y}_1$	$\hat{Y}_2$	$\hat{Y}_3$
Honolulu	(J)	64903	87690	64284	82896	2574	34353	5430	3457	784
	(F)	11434	14769	13860	19866	363	10890	1995	1553	187
	(C)	28075	37476	23100	30789	561	12507	3347	2008	230
	(R)	86149	109232	85470	98439	2979	82368	8131	3683	627
Coconino	(S)	1027	1699	1461	2011	172	1257	284	137	50
	(I)	3552	5632	1844	2841	230	2045	553	197	71
	(R)	11029	13997	8905	10076	1851	8243	763	448	228
Pinal	(S)	3222	5237	3319	5180	265	4158	471	191	54
	(I)	934	1666	973	1667	124	3476	217	97	35
	(R)	14223	17619	11067	14159	963	8446	805	352	102
Collier	(B)	297	594	259	464	140	1150	53	49	30
	(S)	562	656	237	375	24	1259	223	48	14
	(R)	20143	27320	18396	20996	2633	12593	842	565	211
Monroe	(B)	758	1694	575	1253	166	901	162	74	36
	(S)	1948	2815	1631	2466	326	1196	304	145	58
	(R)	12996	18615	11886	15927	2708	7946	658	336	179
Edgecombe	(B)	2746	6882	2917	5105	709	10388	444	398	188
	(R)	7783	11364	9077	12177	757	7780	764	659	202
Halifax	(B)	3124	8846	1850	4349	260	6913	585	290	96
	(R)	6987	9717	8887	11246	1611	7332	862	758	349
Lee	(B)	678	1185	732	1465	182	2392	213	102	56
	(R)	5957	8119	5289	8386	2310	9455	508	270	185

1/ Letters is parentheses represent minorities: J=Japanese, F=Filipino, C=Chinese, S=Spanish, I=Indian, B=Black, R=Rest.