Effects of Uncontrolled Factors at the Collection Stage on the Canadian Community Health Survey on Nutrition

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Abstract

In 2004, Statistics Canada conducted the Canadian Community Health Survey (CCHS Cycle 2.2) on nutrition. The main objective of the survey was to estimate usual dietary intake distributions of Canadians in terms of nutrients and food groups. Estimates were required at national and provincial levels for the following 15 key age/sex domains of interest: less than one year old (at the national level only); 1-3 and 4-8 years of age; 9-13, 14-18, 19-30, 31-50, 51-70 and 71+ years of age crossed by sex.

The usual dietary intake of a person can be described as their average daily intake over an extended period of time. This is difficult to measure directly from a respondent since individuals would find it hard to report what they consume on average. Therefore, the respondents were asked to report daily intakes where the daily intake of a person is their nutritional intake over a 24-hour period (a 24-hour recall). With the aid of a secondary 24-hour recall for some individuals and some sophisticated statistical methodology, an estimate of the population distribution of usual intake can be obtained.

Across all provinces, a sample of 46,000 people (which yielded 35,000 respondents) was selected and a 24-hour dietary recall was collected. Among the respondents, a sub-sample of 10,000 individuals was asked to do a second recall, three to ten days after the first interview.

For various reasons, during collection it was not possible to control for all factors that are known to have an impact on usual intake distribution estimates. These factors include the temporal factors, such as day of the week and month of collection as well as socio-demographic characteristics of the respondents. To minimize the effect that these factors could have on the estimates, weight adjustments were performed. However, those adjustments did not solve every problem related to how the data were collected.

This paper presents the results of an analysis that measured the effects that several uncontrolled factors had on the estimates of usual intake distributions for the Canadian population. The results could serve as a guide for analysts using the nutrition data and could be useful in determining the factors that should be taken into account when doing any analysis using these data.

Key words: cross-sectional, nutrition, provincial survey, daily intake, usual intake, time dependent data collection.

1. The Canadian Community Health Survey on Nutrition

1.1 Sample Design

The Canadian Community Health Survey on nutrition is a multi-frame sample survey with the target population being Canadians of all ages living in private occupied dwellings in the ten provinces. People living on Indian Reserves and Crown lands, residents of institutions, full-time members of the Canadian Forces and residents of some remote areas are excluded from the target population. See Béland, Dufour, MacNabb and Pierre (2003) for more details on the sampling design. In order to estimate the usual intake distributions of interest, it was decided to collect 24-hour recalls of what respondents had eaten during the day preceding the interview. It was determined that a sample of 35,000 first recalls and a sub-sample of about 10,000 secondary recalls would suffice in terms of the precision required in estimating usual intake distributions for key nutrients at the provincial level. It was also decided that the second recall would be collected three to ten days after the first in order to minimise the dependence between the two measures. First recalls were conducted face-to-face while second recalls were completed over the phone. To eliminate possible seasonal effects, interviews were conducted over a period of 12 months during the 2004 calendar year.

1.2 Data Collection Limitations

Many factors were not controlled during collection of the survey. First, the day of the week of the recall was not controlled. Since interviewers usually work on weekdays and only do interviews during the weekend in order to accommodate respondents, there were not many Saturday or Sunday interviews. These interviews correspond to recalls of what respondents had eaten on Fridays and on Saturdays respectively.

Also of interest, the month of the interview was not controlled. The sample was divided into four quarters. Interviewers were required to conduct the interviews within the three months of the quarter with no constraint on the month the data were collected within the quarter. As well, the survey had a slow start in collection in January because the computers required for the interviews were not ready for every interviewer. This resulted in a higher proportion of the interviews being completed in February and March. In addition, collection was finished early in the last quarter resulting in few December recalls.

Finally, almost all socio-demographic characteristics were not controlled during collection because the information about the respondent or the respondent's household was only available during the interview.

1.3 Weighting Limitations

Given that most temporal and socio-demographic factors were not controlled in the sampling or collection steps of the survey, the weighting process was relied upon to correct for any problems with the sample not being representative of the population of interest. However, only the age/sex group of the respondent, his or her province and the temporal factors could be considered here. Other socio-demographic factors were not controlled directly since exact population counts for those factors were not available. Instead, they were considered in the non-response weighting adjustment.

Nutritional data are highly dependent on the time they are collected. To account for this, it was decided to make a provincial level weighting adjustment that ensured that respondents whose first recall corresponded to a weekend day (Friday to Sunday) had 3/7 of the total weight, while the other respondents (Monday to Thursday) had 4/7 of the weight. The adjustment was done in conjunction with the seasonal adjustment, which insured that one fourth of the weight was attributed to each quarter. The grouping of days and quarters was motivated by the fact that there were only a small number of recalls corresponding to Fridays, Saturdays and to certain months.

The definitions of the groupings for the days of the week and the quarters were created in such a way that macro nutrient and food group distributions were well represented by the sample. However, these definitions did not ensure that rare nutrients and foods were well represented. For these variables more control would have been required to ensure their quality. The groupings were suggested by nutritional experts and could not be validated with the nutritional data since they were not ready at the time of weighting. The general component of the survey also had to be considered in determining the groups used for the weight adjustments. For the most part, the general component is a lot less dependent on the time the data are collected, compared to the nutrition component. Doing more refined groupings would have generated more extreme weight adjustments, which in turn would have affected the variance of the estimates of the general component in a negative way.

Lastly, a post-stratification adjustment ended the weighting process. Post-strata were formed by the crossing of province and age/sex group of the respondent.

1.4 Factors to Consider during Estimation

Factors that could not be corrected for in the weighting process should be carefully studied in any estimation process. As well, outcomes of analysis should take the effect of those factors into account.

Temporal factors are important factors to consider because people eat differently from one day of the week to another and from one period of the year to another. These factors are day of the week of the recall, season of the recall and month of the recall. One can also study the difference between weekdays and weekend days as defined by the weighting adjustment.

Also, the distribution of respondents with respect to socio-demographic characteristics is always of importance in analyses. Here the problem is amplified because the distributions differ from one time period to another. A good example of such a socio-demographic characteristic is the respondent's job status: people with jobs tend to respond during the weekend. Other important socio-demographic characteristics are: province, age/sex group, highest level of education in the household, highest level of education of the respondent, household income, living arrangement, household size, race and job status.

2. The Study of Usual Intake Distributions when Daily Intake is Collected

The data collected from respondents are daily intakes, which are measurements of what they ate or drank in the 24 hours of the day preceding the interview. Two 24-hour recalls are not sufficient in estimating an individual respondent's usual intake. In fact, certain nutrients would require several hundred measurements of daily intake on an individual in order to estimate his or her usual intake adequately. It would have been too costly for the survey to collect this information. However, the data collected with the survey are adequate in estimating usual intake distributions of the target population. Data collected provide an estimate of the mean intake of every respondent (although the individual estimates have poor precision) simply by calculating the average of their recalls. It is also possible to estimate the intra-individual (or within) variance of respondents who had two recalls. It is possible to estimate the inter-individual (or between) variance in the population studied. Finally, the information can be combined to estimate usual intake distributions of the population by fitting a measurement error model.

The model most commonly fitted is the following:

$$X_{ij} = x_i + u_{ij}, \qquad i = 1,\ldots,n,$$
$$u_{ij} = \sigma_i e_{ij}, \qquad j = 1,\ldots,k_i$$

where i is the respondent indicator, j is the recall indicator and $x_i \sim NI(\mu_x, \sigma_x^2)$, $e_{ij} \sim NI(0,1)$, $\sigma_i^2 \sim (\mu_A, \sigma_A^2)$. In the model, X_{ij} is the jth measure of the daily intake of individual i and x_i is the usual intake of individual i. The parameters the analyst is interested in are μ_x and σ_x^2 because they define the distribution of interest.

The software that is generally used by analysts to fit such a model is the *Software for Intake Distribution Estimation* (*SIDE*) (see Nusser, Carriquiry, Dodd and Fuller (1996) for more details). *SIDE* performs four major steps. It first applies preliminary adjustments to the data. One of these adjustments is to change the mean and variance of the second recalls so that they are equal to those of the first recalls (since the first recall is commonly considered to be more reliable). The average usual intake is also forced to equal the mean daily intake in the process. This results in the final estimated usual intake distribution being centered around the first recall mean. The second step is to transform the data to normality with a semi-parametric transformation. This is done because normality is required in the measurement error model and nutrient intake distributions are usually not normal. The third step is estimating the within and between individual variances of intake by fitting the model. Finally, the usual intake distribution obtained in step three is transformed from the normal scale back to the original scale since this is the scale of interest.

3. Studying the Impact of Uncontrolled Factors

It is possible to do many different nutritional analyses with the data, given that the number of collected recalls is quite large for a nutrition survey and a great deal of nutritional information is derived from the interviews. It is not feasible for Statistics Canada to provide information on the impact of all uncontrolled factors for every possible analysis. However, a general method to study data quality will be outlined in this section and will be applied in section 4.

The percentiles of the estimated usual intake distribution are usually of much interest to analysts but the quality of this type of estimate is hard to measure. Indeed estimating percentiles requires fitting the complete measurement error model, which in the end masks the effect of all parameters (mean, variances, normality transformations). It is much easier to study the effect of the individual parameters involved in estimating the usual intake distribution. The easiest parameter to study is the average usual intake (which is equal to the mean daily intake when using *SIDE*). In fact, this combined with a study of the weighted distribution of respondents should be sufficient to have a good overview of the quality of the data. Consequently, the weighted distribution of respondents and the average of the first recall will be studied in order to evaluate the effect of uncontrolled factors.

The first natural step to take in studying the impact of the uncontrolled factors was to compare the weighted distribution of respondents for each of those factor listed in sub-section 1.4 with that of a very reliable source (like the Canadian Census or past CCHS cycles if appropriate). This helped to determine if the sample was representative of the population for that characteristic. A chi-square independence test (or a goodness-of-fit test if the variance of the source is near 0) gives a good idea of how well a factor is represented. Note that very large sample sizes might give significant results that do not have a great impact on the final estimates. Also note that some differences might be due to non-sampling errors when comparing the two sources.

In addition, it is of interest to study the weighted distribution of respondents when each temporal factor is crossed with a non-temporal factor. Two-way table chi-square independence tests were done to check if the weighted distribution of respondents was similar with respect to the non-temporal factor from one level of the temporal factor to another. This gives a clue to where problems might happen in analyses.

If all factors were perfectly controlled at the collection stage and at the weighting stage, distributions of respondents would be well distributed for each potentially influent factor. The sample of respondents would then be perfectly representative of the population targeted. If not, there might still be no significant impact on the analysis outcome, but only if the influence of uncontrolled factors is minimal. To verify this, a step was added to the weighting process by post-stratifying with respect to the factors and/or crossing of factors which were significant and it was verified if average intake is greatly affected.

Finally, analyses of the ANOVA type were done to verify which factors are the most important in determining the mean intake of the studied population. This gives a clue to which factors should have been the most important to control for (either at the collection stage or at the weighting stage in a nutrition survey).

The statistical methods described above must be used in a way that takes into account the complex design of the survey. Bootstrap replication is recommended with CCHS data and there exists methods (two-way table chi-square independence tests, goodness-of-fit tests, ANOVA) that are survey sampling corrected versions of the usual tests. Bootstrap replication and those methods were used in the following analyses. A level of significance of 5% was used for all tests.

4. Data Quality at the National Level

In this section, results from a study evaluating the effect of the uncontrolled factors on the estimates for several key nutrients using the process outlined in section 3 are presented. The target population is Canadians of the ten provinces aged 19 years old and over from the survey target population. The nutrients studied are: energy, iron, vitamins A, C and D, cholesterol and calcium. Vitamin A is present in a limited number of foods and should have a usual intake distribution somewhat similar to foods.

In sub-section 4.1, the marginal weighted distribution of the respondents is studied. In the following sub-sections temporal factors are studied one at the time. Sub-section 4.2 deals with the impact of the weekend indicator of the recalls and in 4.3 the weekend is studied deeper with the effect of individual weekend days. Sub-section 4.4 studies the seasonal effects and sub-section 4.5 goes into more details with monthly effects. In the end, it is expected that the temporal weighting adjustment that was made corrects for the effects of weekend indicator and season (sub-sections 4.2 and 4.4). Going into more depth with weekend days and monthly effects (sub-sections 4.3 and 4.5) will show the limits of this adjustment.

4.1 Marginal Weighted Distribution of Respondents

There is no need to look marginally at the weighted distribution of respondents by province and by age/sex group because those two factors were controlled for in the last weighting step (post-stratification). Therefore, the sample is as representative as it can be of the population for these characteristics. For the temporal factors, a uniform distribution is desirable over the days of the week and over the months. For the other non-temporal factors, results from the 2001 Canadian Census were available for comparison except for the job status factor.

The coefficients of variation of the estimated totals from the sources are either very near 0 or 0 at the national level. Consequently, goodness-of-fit tests were conducted instead of chi-square independence tests. All goodness-of-fit tests gave significant results, mostly because of the large sample size (more than 20,000). This does not necessarily indicate that there is a problem with the sample. An example of this phenomenon is for the weekend indicator. The weight adjustments that were described in section 1.3 ensured that 41.52% of the weighted sample corresponded to the weekend compared to the expected 3/7 = 42.86%. Therefore, although significant, this difference is small and should not affect most analyses.

At the individual weekend days level, the best scenario would have been to have 33.3% of the weight on each day. However, only 13.34% of the weighted sample corresponded to Saturdays whereas 56.98% corresponded to Sundays. The effect of this will be studied in section 4.3.

As for the season, the weighted sample distribution from season to season goes from 24.04% to 25.84% instead of the expected 25% (see Table 1). The season distribution was controlled in the calculation of the weights and is very close to the best possible counts.

Table 1 - National weighted distribution of respondents aged 19 and over by season

Season	CCHS	Expected
Winter	24.04%	25%
Spring	24.39%	25%
Summer	25.84%	25%
Autumn	25.72%	25%

The seasonal weight adjustment did not ensure that the monthly sample weight was evenly distributed throughout the year (see Table 2). Recall that there was no mechanism in place to ensure that collection of the sample was equally distributed by month within a given quarter. This may have an impact on estimates of the usual intake distribution. As well, the under representation of the December-January period in the sample might have an effect.

Table 2 - National weighted distribution of respondents aged 19 and over by month

Month	Weighted Distribution	Expected Distribution
January	0.77%	8.33%
February	8.65%	8.33%
March	14.63%	8.33%
April	3.78%	8.33%
May	11.44%	8.33%
June	9.17%	8.33%
July	13.82%	8.33%
August	8.30%	8.33%
September	3.73%	8.33%
October	13.16%	8.33%
November	9.69%	8.33%
December	2.88%	8.33%

The most significant test among the socio-demographic factors was for education. Table 3 shows that respondents and their households seem to be more educated than the population they were supposed to represent.

Table 3 - National weighted distribution of respondents aged 19 and over by Highest level of education in the household and of the respondent compared to Census counts

	Education	CCHS	Census
Household	Less than secondary	10.44%	24.13%
	Secondary school	11.09%	18.35%
	Post-secondary	78.47%	57.52%
Respondent	Less than secondary	19.23%	29.5%
	Secondary school	17.86%	23.4%
	Post-secondary	62.91%	47.1%

The differences could be due to mode effects. CCHS interviews were mostly conducted in person whereas the Census was conducted by the respondent on a paper form. The differences in counts could also be due to differences in the questions asked. Nevertheless, the counts obtained for this survey were comparable to those of previous cycles of the CCHS. Since the CCHS counts seemed reliable they were used for post-stratification purposes in this analysis instead of the Census counts. As for the other socio-demographic factors, they diverged from the Census distribution by only a small percentage.

4.2 Study of the Weekend Indicator

The first temporal factor studied in this paper is the weekend indicator. This factor was controlled in the weighting adjustments. Therefore, it is expected that most of its effect is attenuated.

The weighted sample distribution varied significantly from weekdays to weekends for variables living arrangement, job status, month and age/sex group. Differences in job status were expected because people with jobs tended to answer more during the weekend. The differences in age/sex distributions were a result of these factors not being controlled by weekend/weekday. In the end, young males tended to respond on the weekend while older females responded on the weekdays.

Changing the post-stratification adjustment to include each of the factors significant in sub-section 4.1 and all combinations of factors with the weekend indicator listed in the last paragraph does not have a large impact on the average intake in energy, iron, vitamin D, cholesterol and calcium (the mean intake varies from less than 1%).

For the other nutrients, reweighting for the month makes vitamin A average go from 698.37 mg to 688.51 mg (-1.4%) and vitamin C from 127.73 mg to 125.92 mg (-1.4%). However, all other post-stratification adjustments considered did not have much of an impact on the mean of those two nutrients. Therefore, only the month (a factor that was not controlled for during weighting) had an impact on the mean of some nutrients. This means that the temporal weighting adjustment did what it was designed for in terms of the weekend indicator.

As for the ANOVA type of analyses, the province was significant in explaining the mean intake for all studied nutrients. The age/sex group of the respondent was also significant for all nutrients but vitamin C. From a weighting perspective, this means that these two factors should have been a priority in the weighting process as was the case where the last adjustment was a post-stratification adjustment to the totals of the crossing of those two factors. The significance of all factors is listed in Table 4. Note that the indicated cells denote significant factors.

Table 4 - Significant factors in predicting the daily intake in energy (E), iron (I), vitamins A, C and D (A, C and D), cholesterol (CH) and calcium (CA) (when ignoring season and month)

	E	I	A	C	D	CH	CA
Province	X	X	X	X	X	X	X
Age/sex	X	X	X		X	X	X
Weekend	X	X				X	
Weekend* Province		X					
Education-respondent		X				X	X
Education-household						X	X
Weekend* Education-respondent	X	X					
Weekend* Education-household						X	
Race			X		X	X	X
Household Income			X				
Job status	X		X	X	X		
Household Size	X						

4.3 Study of the Weekend Days

It was important not to limit data quality analyses to the weekend indicator level but to go further by comparing the individual weekend days. This part of the study will shed some light on the effect of the lack of control on the weekend day the data was collected.

All factors except for household income and highest level of education of the respondent had a significantly different distribution from one day of the weekend to the other. The most significant differences were seen when weekend days were examined by province (see Table 5).

Table 5 - National weighted distribution of respondents aged 19 and over that have their first recall on the weekend by province and by day

Province	Friday	Saturday	Sunday
Newfoundland	0.45%	0.11%	1.12%
Prince Edward Island	0.12%	0.02%	0.30%
Nova Scotia	0.86%	0.43%	1.64%
New Brunswick	0.52%	0.30%	1.64%
Quebec	6.58%	0.74%	15.02%
Ontario	11.63%	6.32%	21.73%
Manitoba	0.99%	0.65%	2.01%
Saskatchewan	0.92%	0.38%	1.70%
Alberta	3.78%	1.60%	5.09%
British Columbia	3.83%	2.80%	6.73%

By applying weight adjustments to ensure that the uncontrolled factors were properly distributed within each weekend day, it was evident that iron and vitamins C and D were affected with their average intake changing from 1% up to 5% depending on the combination of factors considered. More specifically, the average intake of iron went from 13.99 mg to 14.36 mg (+2.6%) when reweighting for weekend day and province. The average intake of vitamin C was lowered by 2% when reweighting for weekend day with highest level of education in the household, living arrangement and race. This mean was brought up by 3% when reweighting by weekend day and province or by weekend day and season. Finally, the average intake of vitamin D was brought down by around 4.7% for each of the pairs considered. This was because vitamin D intake was much higher on Sundays and the weight on Sundays was always brought down by the additional post-stratification adjustment.

For cholesterol, calcium and vitamin A the reweighting tended to lower the mean when weekend days were crossed with non-geographical factors because of the low number of recalls on Saturdays in certain areas. Otherwise, their mean stayed the same. The means were respectively 303.41 mg, 846.79 mg and 692.5 mg. When a non-geographical factor was considered, cholesterol went down by around 3%, calcium by 1.4% and vitamin A by 2.5%.

Here, the impact of individual weekend days on mean intakes seems to be non-negligible. Therefore, it is important to consider this factor carefully in any analysis. However, the results of the ANOVA in Table 6 illustrate the most important factors to control for within the weekend.

As seen in Table 6, even at the weekend day level, province and age/sex groups were the most important factors to control for (province was always significant and age/sex group always was except for vitamin C intake). The weekend day was an important factor in explaining the daily intake of vitamins A and D and of cholesterol. Differences in vitamin A agreed with the expectations of the experts where the grouping of weekend days would not have a large influence on distributions of macro nutrients but it could affect food distributions (or nutrient distributions that are similar to food distributions such as vitamin A).

Table 6 - Significant factors in predicting the daily intake in energy (E), iron (I), vitamins A, C and D (A, C and D), cholesterol (CH) and calcium (CA) during the weekend

	E	I	A	C	D	CH	CA
Province	X	X	X	X	X	X	X
Age/sex	X	X	X		X	X	X
Weekend days			Greater on Saturdays		Greater on Sundays	Greater on Sundays	
Season				X		X	
Month			X				
Education-respondent		X					
Race		X	X		X		X
Household Income		X	X				
Household size	X						
Job status	X		X				X

4.4 Study of the Season Factor

A complete data quality study must measure the effect of time over the week but must also measure the effect of seasonality. The season factor was controlled with weight adjustments and it was expected that this factor would not have a large impact on the estimates.

The weighted sample distribution varied significantly from one season to another for variables: highest level of education of the respondent, household income, living arrangement, job status and age/sex group. Modifying the last weight adjustment to include the season and "interactions" involving season did not have a large effect on the mean since the seasons were almost perfectly distributed as shown in section 4.1.

In more detail, Table 7 shows that the season factor is important to control for almost all nutrient studied except vitamin C and cholesterol. This shows that controlling for this factor at the weighting stage was a good strategy.

Table 7 - Significant seasonal factors in predicting the daily intake in energy (E), iron (I), vitamins A, C and D (A, C and D), cholesterol (CH) and calcium (CA)

	E	I	A	C	D	CH	CA
Season	X	X	X		X		X
Season*race	X	X			X		
Season*age/sex	X	X					
Season*household income	X	X					X
Season*job status					X		
Season*Province							X
Season*Education-respondent			X		X		

4.5 Study of the Month Factor

Although control was put on the season factor, it would have been desirable to have more control on the month of collection. The study was expanded to the month factor to measure the impact of the lack of control on this factor in the survey.

The variables highest level of education in the household and of the respondent, household size, household income, living arrangement, province and age/sex group had a significantly different weighted sample distribution from one month to the other. The average intake dropped by around 1% when reweighting for vitamin C (for month by highest level of education of the respondent, household income, job status and age/sex group), for cholesterol (for month by province) and for calcium (for month by living arrangement, household size and highest level of education of the respondent). Of more significance, the average intake of vitamin A dropped by 2% to 3% for all combinations of factors. The changes for vitamins A and C agree with those observed in sub-section 4.2 and were all mainly caused by reweighting marginally for the month.

The month of collection is definitely a major factor to control for during collection and later on in the weighting process (if controlling for it yields reasonable adjustments – see Table 8). Indeed month was significant for many combinations of factors and nutrients. In particular, month by province and month by age/sex group gave significant results for most nutrients.

Table 8 - Significant monthly factors in predicting the daily intake in energy (E), iron (I), vitamins A, C and D (A, C and D), cholesterol (CH) and calcium (CA)

	E	I	A	C	D	CH	CA
Month*province		X	X		X	X	X
Month*age/sex group	X	X	X			X	
Month*Household income	X	X		X			X
Month*household size	X						X
Month*Education-respondent			X				
Month*Education-household		X					
Month*job status					X		
Month*living arrangement					X		X

4.6 Summary

The study of the impact of the uncontrolled factors shows that the weight adjustments that were applied control weekend vs. weekdays and season (as well as interaction with other factors) well at the national level. Unfortunately, the month and weekend days were not controlled as much as they should have been during collection and there is some impact on the centrality parameter of the nutrients studied at the national level.

From the significant factors tables, it is seen that it was important to take into account the factors used for post-stratification. It was also shown that having more control on the month and on the day of the week of the recall would have been ideal.

5. Conclusion

Nutritional data in a survey context is highly dependent on the time they are collected especially when 24-hour recalls are measured. Most household surveys have questions that have reference periods much larger such as ‘the last year’ or ‘the life of the respondent’ and are less prone to having problems with the moment the data are collected. It is evident that more control than usual is needed on the collection of nutrition surveys done with 24-hour recalls.

It is important to study quality of the nutritional data in terms of the moment they were collected and in terms of the patterns observed in the socio-demographic characteristics. This is true no matter what the weight adjustments are because there are always factors that are impossible to control for during collection.

The next occurrence of the survey should have more control on the month and the day of the week when the data are collected. Having more control on the month of collection is somewhat easy in the present context because the actual infrastructure can handle monthly samples. Having more control on the day of the week is more difficult because of the flexibility of the schedules of the interviewers and of the respondents. In the end, a little more control during collection makes more room for better weight adjustments.

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