Can the accuracy of health behaviour surveys be improved by non-response follow-ups?

Satu Helakorpi1, Pia Mäkelä2, Ansku Holstila3, Antti Uutela1, Erkki Vartiainen4

1 Department of Lifestyle and Participation, National Institute for Health and Welfare (THL)
2 Department of Alcohol, Drugs and Addiction, THL
3 Hjelt Institute, University of Helsinki
4 Division of Welfare and Health Promotion, THL

Correspondence: Satu Helakorpi, National Institute for Health and Welfare (THL), P.O. Box 30, FI-00 271 Helsinki, Finland, Tel: +358 9 4744 8616, Fax: +358 9 4744 8338, e-mail: satu.helakorpi@thl.fi

Background: Prevalence estimates may be biased if the characteristics of respondents differ from those of non-respondents in surveys. In this study, we used a follow-up telephone interview of initial non-respondents to examine the differences—in terms of self-rated health and health behaviours—to initial postal respondents and to assess improvements in prevalence estimates. Methods: Following a postal questionnaire survey using a random sample (n = 5000) of the Finnish working-age population with a response rate of 57% (n = 2826), a follow-up telephone survey was performed based on 1261 non-respondents (response rate 56%, n = 708) in 2010. Prevalence of smoking, alcohol use, body mass index, physical activity, self-rated fitness, dietary habits and self-rated health were calculated for the survey population with and without a telephone interview. Logistic regression models were used to examine differences in health behaviours and health between the initial postal questionnaire respondents and follow-up telephone interview respondents. Results: The total response rate increased from 57% to 71% when the telephone respondents were included. The telephone survey indicated that both male and female telephone respondents were more often smokers, and female telephone respondents were more often heavy episodic drinkers and less often reported poor self-rated fitness than postal respondents. Nonetheless, the prevalence rates of outcome variables did not change significantly when telephone respondents were included. Conclusion: The response rate of surveys can be increased by using a telephone survey in follow-up contacts with non-respondents. As non-respondents differ from respondents, this contributes to an improvement—although small—in internal validity.

Introduction

For the planning of public health policies and chronic disease prevention programmes, information on population health and health behaviour is required, and health and health behaviour surveys are therefore necessary. However, nowadays the number of people who participate in these surveys has decreased and selection bias may threaten the internal validity of these studies.1 Compared to respondents, non-respondents more often tend to be young men, unmarried or single and with a lower level of education.2–4

In some previous studies, differences in health and health behaviour between respondents and non-respondents have been studied, often using a shorter follow-up survey for non-respondents. In general, non-respondents tend to have poorer health,5,6 although this is not always the case2—and to exhibit more unfavourable health behaviours8,9 than respondents. In one previous study, telephone interviews were used to follow up a sample of non-respondents in a survey conducted using postal questionnaires. According to this study, the telephone respondents were more often smokers, less often heavy drinkers and more often physically inactive than postal respondents.8

In another study on alcohol use, the respondent groups were reversed, with the initial respondents being contacted by telephone and non-respondents being followed up with a postal contact. In that study, postal respondents were more often abstainers than telephone respondents, and the drinkers among the postal respondents were more often heavy drinkers and had a slightly higher level of mean consumption.10

In this study, follow-up telephone interviews conducted after an initial contact through a postal survey failed to elicit a response. The aims of the study were: (i) to investigate whether the postal respondents and initial non-respondents (telephone respondents) differ in their health behaviour and health, (ii) to explore improvements in response rates following a follow-up telephone survey on initial non-respondents, overall, and by socio-demographic group and (iii) to evaluate the impact of the follow-up telephone interview on the results of a health behaviour and health survey.

Methods

The National Institute for Health and Welfare (THL) annually monitors health behaviour and health among the Finnish adult population (aged 15–64) through repeated cross-sectional postal surveys.11 In 2010, a random sample (n = 5000) of Finns was drawn from the Population Register. The postal questionnaire was mailed in April and followed up with three postal reminders. The response rate was 57% (n = 2826). A follow-up telephone contact was made with those not responding to the postal survey and three postal reminders; personal telephone numbers were identified (61%, n = 1261) by the Survey Research Unit of Statistics Finland. Non-respondents to the postal survey who had a concealed phone number or whose telephone number was not listed for other reasons were thereby excluded from the interview. The response rate for the telephone interview was 56% (n = 708). The postal questionnaire included 100 questions, 23 of which were included in the telephone interview. The interviews were carried out between the 16th November and the 16th December and lasted 7.5 min on average. The study data are described in table 1.
Outcome variables

Self-rated health was measured based on the question 'How do you rate your general health?' with the options 'Good', 'Rather good', 'Average', 'Rather poor' or 'Poor'. The latter two alternatives were combined in the analyses to represent health which was self-rated as poor.

Daily smokers were those who said that they had smoked daily for at least 1 year, and who indicated having smoked on the day that they had completed the questionnaire/answered the phone interview or during the previous day.

Heavy episodic drinking was specified as an intake of six or more portions of any alcoholic beverage on a single occasion. The frequency of heavy episodic drinking was assessed by asking 'How often do you drink six portions of alcohol or more on a single occasion?' and the options were: never, less than once a month, once a month, once a week and daily or nearly daily. Heavy episodic drinking was dichotomized, with the cut-off point set at drinking six or more drinks at least once a week (men) or at least once a month (women).

The volume of alcohol consumption was based on self-reported consumption of different beverage types in the preceding 7 days. One drink (0.33 l of beer or long drink, 2 glasses of cider, 1 glass of wine or one restaurant serving of a strong alcoholic beverage) was estimated to contain 11–13 g of absolute alcohol. The 7-day volume measure was dichotomized to separate light to moderate drinkers from heavy drinkers. The cut-off point was 24 or more portions for men and 12 or more portions for women per week.

Four measurements were used for assessing unhealthy food habits: (i) use mostly butter or a mixture of butter and vegetable oil on bread (sources of saturated fat), (ii) low consumption of fresh vegetables, (iii) low consumption of fruit or berries and (iv) low consumption of both fresh vegetables and fruit or berries. Consumption of vegetables and fruit was defined as low when respondents had eaten them on only 0–2 days during the last week.

Statistical methods

All analyses were carried out separately for men and women, because in previous studies it has been shown that women and men systematically differ from each other in their health behaviours. Prevalences of the above-mentioned outcome variables were calculated with 95% confidence intervals (CIs), and the statistical significance of difference between postal respondents and telephone respondents was tested using the Chi-squared test. Logistic regression models were used to examine differences in terms of health behaviours and health between the postal questionnaire respondents and telephone interview respondents. The results of the logistic models are presented as odds ratios (OR) and their 95% CIs. All analyses were conducted using the PASW (formerly SPSS) for Windows statistical software package version 19 (SPSS Inc., Chicago, IL, USA).

Results

The initial response rate was 57% in the postal survey, 48% among men and 65% among women. The response rate was highest in the group aged 55–64 years and in South-eastern Finland, whereas the youngest group (aged 15–24 years) participated least. When the telephone respondents were added to the postal respondents, the total response rate increased markedly, to 71%; 66% among men and 76% among women. The response rate was highest in the group aged 55–64 years and in South-eastern Finland, whereas the youngest group (aged 15–24 years) participated least. When the telephone respondents were added to the postal respondents, the total response rate increased markedly, to 71%; 66% among men and 76% among women.

The differences in participation between genders and age groups diminished (table 1). The initial response rate was 57% in the postal survey, 48% among men and 65% among women. The response rate was highest in the group aged 55–64 years and in South-eastern Finland, whereas the youngest group (aged 15–24 years) participated least. When the telephone respondents were added to the postal respondents, the total response rate increased markedly, to 71%; 66% among men and 76% among women. The differences in participation between genders and age groups diminished (table 1). The initial non-respondents who took part in the telephone interview had a lower level of education than the postal respondents: the lowest educational tertile made up 39% of the telephone respondents and 30% of the postal respondents among those aged 25 or over (not shown as a table).

There were some statistically significant differences in the prevalences of health and health behaviours between postal respondents and telephone respondents: compared to postal respondents, both male and female telephone respondents were more often smokers,
and female telephone respondents were more often heavy episodic drinkers and less often reported poor self-rated fitness. When the results related to the telephone respondents were added to those derived from the postal respondents, no considerable differences were evident between the total prevalences and prevalences calculated on the basis of the postal survey alone (table 2).

As the telephone respondents were younger than the postal respondents, it would be reasonable to ask to what extent the differences between the groups were due to age differences. Table 3, therefore, shows age-adjusted OR. According to the age-adjusted logistic regression model, it is clear that the telephone respondents were more often smokers and less often reported low consumption of fresh vegetables and fruit, and female telephone respondents less often reported poor self-rated fitness and more often reported binge drinking than postal respondents. No statistically significant differences were found for poor self-rated health, weekly consumption of at least 24 (men) and 12 (women) portions of alcohol, obesity, physical inactivity and the use of butter or a mixture of butter and vegetable oil on bread (table 3).

Discussion

In this study, the original response rate in the postal survey was 57%. If the initial non-respondents who responded to the telephone survey were included, the response rate increased to 71%. Thus, there was an improvement of 14 percentage points in the response rate. In addition, the telephone interview succeeded in more effectively reaching people with a lower level of education, who tend to respond to postal surveys less often than others. In addition, the differences in participation rates between genders and age groups were seen to diminish.

Following the telephone contact with initial non-respondents, the response rate was 56%. Compared with some other non-response follow-up studies, this is a rather high proportion. For example, in Swedish non-response surveys concerning public health questionnaires the response rates to follow-ups have varied between 7% and 27%. The small number of questions asked is likely to be a reason for the increased response rate. In this study, 23 questions were included in the telephone interviews compared to 100 questions in the original postal questionnaire.

It has been argued that a survey should have a response rate of at least 70%, even if others argue that the bias due to lower response rates is likely to be modest. In this study, after telephone respondents were added to postal respondents, the response rate increased markedly, to 71%. The response rates in Finnish health behaviour surveys were last at this level at the end of the 1990s, when 70% participated in postal surveys. Even with the telephone respondents added, the non-response rate was still 30% of the original random sample and it is possible that those who did not participate in either the original survey or the follow-up deviated, both in regard to socio-demographic factors and lifestyle, from those who participated. The group of non-respondents included those contacted, in vain, to participate in both surveys, as well as those who were sent the questionnaire but who could not be contacted for a telephone survey owing to their telephone number being unknown. The latter group may previously have consisted of poor people in particular, but nowadays people are conscious of their privacy and a greater role may be being played by attempts to

### Table 2  Certain health behaviours and poor health indicators among initial postal respondents (n = 2826) and initial non-respondents who participated in the telephone interview (n = 708), numbers (n), prevalence (%), 95% CIs and statistical significances (P) by Chi-squared test

<table>
<thead>
<tr>
<th>Category</th>
<th>Respondents (n) %</th>
<th>Initial non-respondents (n) %</th>
<th>95% CI</th>
<th>Initial non-respondents (n) %</th>
<th>95% CI</th>
<th>Total (n) %</th>
<th>95% CI</th>
<th>P (χ²)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Poor self-rated health</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Men (n)</td>
<td>(221) 7.8</td>
<td>(42) 5.9</td>
<td>(6.8–8.8)</td>
<td>(4.2–7.6)</td>
<td>(263) 7.5</td>
<td>(6.6–8.4)</td>
<td>0.09</td>
<td></td>
</tr>
<tr>
<td>Women (n)</td>
<td>(106) 8.5</td>
<td>(26) 5.7</td>
<td>(6.9–10.1)</td>
<td>(3.6–7.8)</td>
<td>(132) 7.8</td>
<td>(6.5–9.1)</td>
<td>0.05</td>
<td></td>
</tr>
<tr>
<td>Daily smokers (n)</td>
<td>(115) 7.3</td>
<td>(16) 6.3</td>
<td>(6.0–8.6)</td>
<td>(3.3–9.3)</td>
<td>(131) 7.2</td>
<td>(6.0–8.4)</td>
<td>0.59</td>
<td></td>
</tr>
<tr>
<td>Consumption of at least six portions of alcohol on a single occasion (weekly) (men)</td>
<td>(536) 19.0</td>
<td>(209) 29.5</td>
<td>(17.6–20.4)</td>
<td>(26.1–32.9)</td>
<td>(745) 21.1</td>
<td>(19.8–22.4)</td>
<td>&lt;0.001</td>
<td></td>
</tr>
<tr>
<td>Women (n)</td>
<td>(288) 23.2</td>
<td>(143) 31.4</td>
<td>(20.9–25.5)</td>
<td>(27.1–35.7)</td>
<td>(431) 25.3</td>
<td>(23.3–27.5)</td>
<td>0.001</td>
<td></td>
</tr>
<tr>
<td>Consumption of at least six portions of alcohol on a single occasion (weekly) (men)</td>
<td>(248) 15.7</td>
<td>(66) 26.2</td>
<td>(13.9–17.5)</td>
<td>(20.8–31.6)</td>
<td>(314) 17.1</td>
<td>(15.4–18.8)</td>
<td>0.001</td>
<td></td>
</tr>
<tr>
<td>Men (n)</td>
<td>(292) 24.1</td>
<td>(100) 22.0</td>
<td>(21.7–26.5)</td>
<td>(18.2–25.8)</td>
<td>(392) 23.6</td>
<td>(21.6–25.6)</td>
<td>0.37</td>
<td></td>
</tr>
<tr>
<td>Women (n)</td>
<td>(282) 18.2</td>
<td>(64) 25.4</td>
<td>(16.3–20.1)</td>
<td>(20.0–30.8)</td>
<td>(346) 19.2</td>
<td>(17.4–21.0)</td>
<td>0.007</td>
<td></td>
</tr>
<tr>
<td>Use of butter or mixture of butter and vegetable oil on bread (men)</td>
<td>(649) 23.3</td>
<td>(176) 25.2</td>
<td>(21.7–24.9)</td>
<td>(22.0–28.4)</td>
<td>(825) 23.7</td>
<td>(22.3–25.1)</td>
<td>0.30</td>
<td></td>
</tr>
<tr>
<td>Women (n)</td>
<td>(308) 25.2</td>
<td>(115) 25.7</td>
<td>(22.8–27.6)</td>
<td>(21.7–29.7)</td>
<td>(423) 25.3</td>
<td>(23.2–27.4)</td>
<td>0.84</td>
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<tr>
<td>Low consumption of fresh vegetables (men)</td>
<td>(341) 21.8</td>
<td>(61) 24.3</td>
<td>(19.8–23.8)</td>
<td>(19.0–29.6)</td>
<td>(402) 22.1</td>
<td>(20.2–24.0)</td>
<td>0.38</td>
<td></td>
</tr>
<tr>
<td>Women (n)</td>
<td>(387) 32.0</td>
<td>(109) 23.9</td>
<td>(25.4–34.6)</td>
<td>(25.0–30.5)</td>
<td>(823) 23.7</td>
<td>(22.3–25.1)</td>
<td>0.02</td>
<td></td>
</tr>
<tr>
<td>Low consumption of fruits and berries (men)</td>
<td>(291) 18.7</td>
<td>(36) 14.3</td>
<td>(16.8–20.6)</td>
<td>(10.0–18.6)</td>
<td>(327) 18.1</td>
<td>(16.3–19.9)</td>
<td>0.09</td>
<td></td>
</tr>
<tr>
<td>Women (n)</td>
<td>(1110) 40.3</td>
<td>(237) 33.5</td>
<td>(38.5–46.4)</td>
<td>(30.0–37.0)</td>
<td>(1347) 38.9</td>
<td>(37.3–40.5)</td>
<td>0.001</td>
<td></td>
</tr>
<tr>
<td>Use of butter or mixture of butter and vegetable oil on bread (women)</td>
<td>(657) 54.8</td>
<td>(195) 42.8</td>
<td>(52.0–61.1)</td>
<td>(38.3–47.3)</td>
<td>(852) 51.4</td>
<td>(49.0–53.8)</td>
<td>&lt;0.001</td>
<td></td>
</tr>
<tr>
<td>Low consumption of fruits and vegetables (men)</td>
<td>(453) 29.2</td>
<td>(42) 16.7</td>
<td>(26.9–31.5)</td>
<td>(12.1–21.3)</td>
<td>(495) 27.4</td>
<td>(25.3–29.5)</td>
<td>&lt;0.001</td>
<td></td>
</tr>
<tr>
<td>Women (n)</td>
<td>(482) 17.2</td>
<td>(86) 12.1</td>
<td>(15.8–18.6)</td>
<td>(9.7–14.5)</td>
<td>(568) 16.2</td>
<td>(15.0–17.4)</td>
<td>0.001</td>
<td></td>
</tr>
<tr>
<td>Use of butter or mixture of butter and vegetable oil on bread (women)</td>
<td>(302) 24.7</td>
<td>(69) 15.1</td>
<td>(22.3–27.1)</td>
<td>(11.8–18.4)</td>
<td>(371) 22.1</td>
<td>(20.1–24.1)</td>
<td>&lt;0.001</td>
<td></td>
</tr>
<tr>
<td>Low consumption of fruits and vegetables (women)</td>
<td>(180) 11.4</td>
<td>(17) 6.7</td>
<td>(9.8–13.0)</td>
<td>(3.6–9.8)</td>
<td>(197) 10.8</td>
<td>(9.4–12.2)</td>
<td>0.03</td>
<td></td>
</tr>
</tbody>
</table>
avoid telephone marketing. These groups have it in common that they are hard to reach, which makes it difficult to assess the kinds of biases that may be involved. However, the current results suggest that health behaviour trends can be calculated more accurately if the results of a telephone interview follow-up study can be added to those of postal surveys.

**Key points**

- A telephone follow-up interview of initial non-respondents is useful when the response rate of a postal survey needs to be increased.
- Through telephone interviews, it is possible to reach those socio-economic and socio-demographic groups that do not respond to self-administered surveys.
- Reliable health behaviour and health surveys are needed for the planning of public health policies.

**References**