Profiling the mobile-only population in Australia: insights from the Australian National Health Survey

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Abstract

Background: The Australian population that relies on mobile phones exclusively has increased from 5% in 2005 to 29% in 2014. Failing to include this mobile-only population leads to a potential bias in estimates from landline-based telephone surveys. This paper considers the impacts on selected health prevalence estimates with and without the mobile-only population.

Methods: Using data from the Australian Health Survey – which, for the first time, included a question on telephone status – we examined demographic, geographic and health differences between the landline-accessible and mobile-only population. These groups were also compared to the full population, controlling for the sampling design and differential non-response patterns in the observed sample through weighting and benchmarking.

Results: The landline-accessible population differs from the mobile-only population for selected health measures resulting in biased prevalence estimates for smoking, alcohol risk and private health insurance coverage in the full population. The differences remain even after adjusting for age and gender.

Conclusions: Using landline telephones only for conducting population health surveys will have an impact on prevalence rate estimates of health risk factors due to the differing profiles of the mobile-only population from the landline-accessible population.

Key words: health surveys, landline surveys, mobile phone sampling, non-response bias, coverage bias.

In Australia, 95% of the adult population own a mobile phone and almost 70% have a landline at home.[1,2] There has been an increasing trend for households to discard their landlines and rely solely on mobile phones. The number of individuals living in households without a landline (i.e. mobile-only) has grown substantially from 5% in 2005 to 29% in 2014.[2] The experience internationally is similar: 47% of US households are mobile-only[3] and, in 12 countries in Europe, mobile-only households outnumber those with a landline.[4,5]

As mobile phone use becomes more prevalent in Australia, bias in statistical estimates from telephone surveys conducted using only landline-based sampling frames may arise in two ways. First, there is an increased risk of non-coverage bias due to the exclusion of the mobile-only population and the associated departure from representativeness in the sample. Second, as households progressively use their mobile phones to conduct most of their calls, non-response bias may emerge due to differences in the characteristics and preferences of landline-only and mobile-only users. Sampling of mobile phone numbers is necessary to ensure representation from the growing population of households that use mobile phones extensively and/or exclusively.

In the US, the National Health Interview Survey (NHIS) collects information on health status and health-related behaviours. Since 2003, information on mobile phone use is collected.[3] Studies using these data have found substantial and increasing differences in the health risk factors and health status of adults who could be included in a landline-based survey and those adults who live in a household without a landline telephone but have a mobile telephone (i.e. mobile-only users). In addition, individuals living in mobile-only households are different from landline users: they are more likely to be young, male, of a low socioeconomic status, to speak English as a second language, to have participated in higher education, to live in rented accommodation and to experience poor socioeconomic outcomes.[6-8]

These differences are much greater when examining specific age, gender, and other socioeconomic characteristics.[6] Researchers have found significantly higher rates of heavy drinking, smoking and risky sexual behaviour among the sample of young adults who could be reached on mobile phones compared with a similar landline-based sample.[9] The reported decline in the prevalence rates of binge drinking and smoking among the young adult population in the US found by a landline-based telephone survey, the Behavioural Risk Factor Surveillance System, was attributed to an increasing number of young people living in mobile-only households.[9] These declines were not replicated when compared to household-based surveys, such as the NHIS, implying that the difference in the prevalence rates was due to the exclusion of mobile-only households.[10,11]

These issues have received little attention in Australia until recently. Pennay[12] first studied the differences between landline and mobile-only households in Australia, finding that the mobile-only sample had a higher prevalence of smoking, risky drinking, illegal drug use and problem gambling. Evidence from subsequent larger and nationally representative surveys found similar results with the landline sample reporting much lower prevalence of tobacco use, cannabis

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use and alcohol consumption.[13-15] However, these studies showed that after weighting for age, sex, region and other factors known to be associated with non-response and coverage, these differences in population health prevalence estimates all but disappeared. All these studies used data from dual-frame telephone surveys; using random digit dialing (RDD) to draw samples from a list of landline telephone numbers, and a list of mobile telephone numbers.

Unlike the US and European countries, Australia lacks official statistics on mobile phone penetration as there has been no regular nationally representative household-based survey that collects information on telephone status. The 2011-12 Australian National Health Survey (NHS) was the first household-based survey to ask individuals in Australia about their telephone status, providing telephone use information similar to that available in the US.[15,16] We used these data to investigate whether there are differences between the mobile-only and landline populations in: i) their geographical distribution; and ii) their health and behavioural factors. By doing this we illustrate the extent to which the estimates from landline-based surveys are biased from a survey that specifically includes the mobile-only population. A key difference of this study to the existing literature is that it does not rely on telephone surveys. This is important given the typically low response rates of telephone surveys,[12] and this allows us to properly examine the biases arising from neglecting the mobile-only population.

Methods

Dataset

The NHS is a face-to-face survey conducted by the Australian Bureau of Statistics (ABS), which collects information on health-related issues – including health status, risk factors and socioeconomic circumstances. The 2012 survey was the eighth in a series of surveys conducted since 1977. The survey design relied on a stratified multistage area approach, sampling private dwellings for an accurate representation of the whole population. About 97% of private dwellings were covered by the survey (communal establishments, homeless, very remote areas and discrete Indigenous communities were not covered). A total of 21,108 households were selected for the initial sample, of which 18,355 (87%) were included in the final sample. Of these, 15,565 (85%) adequately responded to the survey. In total, 20,426 persons were interviewed. Data collection was undertaken using trained interviewers who administered the survey via computer assisted personal interviewing (CAPI) with a randomly selected member from a sampled household. More information on the design and administration of the survey is available in the survey manual.[17]

Phone use variables

The 2012 NHS is the first ABS survey that includes a question about telephone usage. At the household level, respondents were asked if they had a landline/fixed phone. We defined this population as being 'landline-accessible', if they answered "Yes" to this question. This enabled us to identify individuals living in households that did not have a landline as being mobile-only – being those who answered "No" to the question. The framing of the question meant that the mobile-only group included the population with no phone access, but we assumed that this was negligible. In Australia, the population that have neither a mobile or landline connection is under 1%.[1] Our focus for this study was on differences between individuals in the landline-accessible and mobile-only populations. Differences in health outcomes and behaviours across these individuals will be examined specifically.

Health variables

We used a range of variables to capture health status and behaviour. We captured current smoking status through a dummy variable taking the value 'one' when individuals reported smoking cigarettes, pipes or other tobacco products. To measure alcohol consumption, data were collected on how recently a person had consumed alcohol, and the frequency and usual quantity of alcohol consumption in the previous 12 months. Respondents were then asked whether they had consumed five or more drinks (referred to as 'risky alcohol consumption') and/or 11 or more drinks ('very risky alcohol consumption') in a day in the previous 12 months, with the references following the NHMRC alcohol guidelines.[18] We constructed a dummy variable measuring 'adequate physical activity' that took the value 'one' if the respondent undertook moderate-to-vigorous physical activity on five separate occasions for a total of (at least) 150 minutes, with a reference period of the previous week, following the physical activity guidelines.[19] Using a survey-collected objective measure of Body Mass Index, we classify individuals as being: i) not overweight or obese (BMI<25); ii) overweight (BMI=25.00-29.99); and iii) obese (BMI>29.99). To capture mental health, we used information from the Kessler Psychological Distress Scale (K10), a measure of non-specific psychological distress derived from 10 questions about people's levels of nervousness, agitation, psychological fatigue and depression in the previous month.[20] K10 scores ranged from 10 to 50. We used two dummy variables to denote individuals with 'high' levels of distress (22–29) and 'very high' levels of distress (30–50). To approximate healthcare access, we created a dummy variable taking the value one if the respondent reported being covered by private health insurance (i.e. additional health cover to that provided under Medicare to reimburse all or part of the cost of hospital and/or ancillary services).

Socio-demographic variables

In our analyses we also examined differences in socio-demographic variables between the mobile-only and landline-accessible populations. These included gender (male, female), age group (18–24, 25–34, 35–44, 45–54, 55–64, 65+), state/territory of residence (New South Wales, Victoria, Queensland, South Australia, Western Australia, Tasmania, Northern Territory, Australian Capital Territory), residence in a state/territory capital city (yes/no), country of birth (Australian-born, non-Australian born), educational attainment (Bachelor degree or higher, otherwise), and house tenure (own home, renting home, other). These socio-demographic variables were chosen because they were known to be related with survey response and are used in sample weighting.

Analytic plan

Statistical point estimates and their standard errors were computed using microdata access through the ABS product TableBuilder[21] to identify patterns and significant differences. These results were weighted; first, to account for disproportionate sample selection due to the complex sampling design; and second, to the demographics of the Australian population to adjust for differential non-response.[17] The availability of geographical information in the NHS allowed us to investigate if there were significant differences in the mobile phone population by geography, which is not possible in conventional dual-frame surveys. Differences in health outcomes between people covered in the landline phone frame (landline accessible) and mobile phone frame (mobile-only and dual-users who are accessible by both landlines and mobiles) were investigated to provide evidence of the impact on the overall Australian health prevalence

estimates. The health risk factors (tobacco smoking, alcohol consumption, physical activity, the body mass index, and private healthcare access) were examined through computing crude prevalence estimates of the health risks factors as well as the proportions in each of the geographic and demographic variables, which were used as controls, and comparing across the different phone groups (i.e. landline-accessible and mobile-only). We also examined whether these estimates differed from the national population figures by comparing them to the population distributions from the estimated resident population provided by the Australian Bureau of Statistics.[22]

As described above, the NHS data was available in aggregated form only through the use of TableBuilder. Our analysis was therefore limited to weighted statistical estimates, corresponding standard errors and 95% confidence intervals that were adjusted to account for the complex design of the NHS. In addition, TableBuilder randomly adjusts cell values of tables to ensure confidentiality, and this process introduces an extra source of variability – increasing the risk of giving false positives and invalidating the results of formal tests.[17] As it was not possible to conduct formal hypothesis tests to identify significant differences among population groups, statistical significance was determined through the absence of any overlap in the two confidence intervals corresponding to the two groups. This is a conservative test of statistical significance that provides stronger evidence for a difference when it is detected.[23]

Results

In the results that follow, we firstly compared the landline-accessible population to the mobile-only population to investigate differences in demographic and health characteristics in these two population subgroups. Secondly, we compared the landline-accessible population to the full population, to provide an indication of the biases introduced into the prevalence estimates of failing to include the mobile-only population. The percentage breakdown from the sample identified 81.6% of households as landline-accessible, and 18.4% as mobile-only. This is reasonably close to the estimate of 18.1% of mobile-only users in the adult Australian population reported in 2012.[2] Descriptive statistics for demographic characteristics and health factors were compared for the landline-accessible population and the mobile-only population in Table 1. These statistics revealed substantial population differences. Relative to the mobile-only population, the landline-accessible population was associated with a lower proportion of males and an older age distribution – with a higher proportion of those over the age of 35. In comparison to the mobile-only population, the landline population had a significantly lower proportion of residents from Queensland, Western Australia and the Northern Territory, and a higher proportion of Victorian residents. There were also significantly more home owners and fewer renters in the landline population relative to the mobile-only population. Although there were higher proportions of people who were Australian born and living in rural locations in the landline-accessible population, these differences were not significant.

There was no significant difference in those with a bachelor's degree or higher education between the mobile-only population (24.9%) and the landline-accessible population (24.1%). There was a lower proportion of current tobacco smokers in the landline-accessible population (15.6%) compared to the mobile-only population (29.1%). Furthermore, there was a higher incidence of psychological distress and poorer mental health wellbeing in the mobile-only population (12.6% compared to 10.8%). However, the mobile-only population had a lower prevalence of overweight and obese people (55.6%) compared to the landline-accessible population (65.1%). For physical activity, a higher proportion of people in the mobile-only population met the guidelines of spending more than 150 minutes on physical activity, which aligns with the results for obesity/overweight prevalence. Finally, the proportion of people with private health insurance at the time of interview among the mobile-only population (41.1%) was considerably lower than for those in the landline-accessible population (60.1%).

The demographic characteristics and health behavioural outcomes for the landline accessible population in comparison to the full population of Australian adults aged 18 years and over are also shown in Table 1. There was a small but significant difference in the gender profile with a lower proportion of males in the landline-accessible population (48.2%) compared to 49.4% in the full population. That is, the landline-accessible sample underestimated the proportion of males in the population by 1.2%. There were significant age differences with the average age of the landline-accessible population being 48.3 years, overestimating the average age of the full population by 2.4 years. In contrast, the average age of the mobile-only population was 38.3 years. There were proportionally more people in Victoria, but fewer in Queensland, Western Australia and the Northern Territory in the landline-accessible population compared to the full population. However, the estimated percentages of people who were Australian-born, were reported to live in urban areas, and who had high levels of educational attainment did not differ significantly for the landline-accessible and full populations. The percentage of people owning their own home was significantly over-estimated in the landline-accessible population by almost eight percentage points, and the percentage of renters under-estimated by eight percentage points. As expected, a significant bias in an estimate obtained from the landline-accessible population occurs when the difference from the corresponding estimate for the mobile-phone only population is large. For the health outcomes, there were significant differences in health risk behaviours and access to private health insurance when comparing the landline-accessible population to the full population. Primarily, this population differs from the full population on smoking and alcohol consumption.

Using the landline-accessible population leads to a significant underestimation of the prevalence of smoking in the population (15.6% compared to 17.6%). It also underestimates the prevalence of excessive alcohol consumption, with the landline-accessible population reporting lower levels of risky (41.1% vs. 44.2%) and very risky drinking (18.5% vs. 21.4%). In terms of health care accessibility, a higher percentage of individuals reported having private medical insurance in the landline-accessible population (60.9%) as compared with the full population (57.3%). There were no significant differences in measures of physical activity, body mass index and mental health between the landline-accessible population and the full population. To summarise, Table 1 shows that the exclusion of the mobile-only population produced biased estimates for the prevalence of smoking, alcohol risk and health insurance. It is possible that these differences could be explained by the differing age and gender profiles of the landline-accessible population compared to the mobile-only population. To

Table 1: Estimates (with 95% confidence intervals) of demographic and health characteristics of the landline accessible, mobile-only and full Australian populations.

Demographics		Landline-accessible	Mobile-only	Australian population‡
Gender	Male	48.2 (47.6-48.8)[a,c]	54.6 (52.3-56.9)[a,b]	49.4 (49.4-49.4)[b,c]
	Female	51.8 (51.6-52.1)[a,c]	45.6 (44.5-47.7)[a,b]	50.7 (50.6-50.7)[b,c]
Age	18-24	10.8 (10.3-11.3)[a,c]	21.8 (20.0-23.7)[a,b]	12.8 (12.8-12.9)[b,c]
	25-34	14.6 (14.0-15.2)[a,c]	37.5 (35.4-39.6[a,b]	18.8 (18.8-18.8)[b,c]
	35-44	18.4 (18.0-18.7)	18.7 (17.3-20.1)	18.4 (18.4-18.4)
	45-54	19.2 (18.9-19.5)[a,c]	11.2 (9.9-12.6)[a,b]	17.7 (17.7-17.8)[b,c]
	55-64	16.8 (16.7-17.1)[a,c]	6.9 (5.8-7.9)[a,b]	15.1 (15.0-15.1)[b,c]
	65+	20.1 (20.1-20.2)[a,c]	3.8 (2.9-4.7[a,b]	17.1 (17.1-17.2)[b,c]
State	NSW	33.0 (32.4-33.6)	30.6 (27.9-33.3	32.6 (32.5-32.6)
	VIC	26.2 (25.6-26.7)[a,c]	21.5 (19.0-24.0)[a,b]	25.3 (25.2-5.4)[b,c]
	QLD	19.3 (18.8-19.8)[a,c]	22.5 (20.5-24.5)[a,b]	19.9 (19.8-19.9[b,c]
	SA	7.3 (7.1-7.4)	8.0 (7.4-8.6)	7.4 (7.4-7.4)
	WA	9.8 (9.5-10.0)[a,c]	12.4 (11.4-13.4)[a,b]	10.3 (10.3-10.3)[b,c]
	TAS	2.3 (2.2-2.3)	2.1 (1.8-2.3)	2.3 (2.2-2.3)
	NT	0.6 (0.6-0.6)[a,c]	1.4 (1.2-1.5)[a,b]	0.7 (0.7-0.7)[b,c]
	ACT	1.6 (1.6-1.7)	1.6 (1.3-1.9)	1.6 (1.6-1.7)
Region	Capital City	66.6 (65.6-67.7)	64.6 (62.0-67.2)	65.8 (65.7-66.9)
Country of birth	Australia	69.6 (68.5-70.6)	71.0 (69.3-72.7)	68.8 (68.7-70.9)
Education	Bachelor or higher	24.9 (23.9-25.9)	24.1 (22.2-26.0)	24.8 (23.8-25.7)
Living situation	Own home	79.1 (78.2–80.0)[a,c]	35.9 (33.5-38.4)[a,b]	71.2 (70.3-72.1)[b,c]
	Renting	19.6 18.7-20.5[a,c]	62.5 (60.1-64.8)[a,b]	27.5 (26.6-28.3)[b,c]
Health factors				
Smoking	Current smoker	15.6 (14.8-16.4)[a,c]	29.1 (26.5-31.7)[a,b]	17.6 (16.8-18.3)[b,c]
Alcohol consumption	5 -10 drinks	41.1 (40.1-42.1)[a,c]	63.0 (60.5-65.6)[a,b]	44.2 (43.3-45.0)[b,c]
	11 or more drinks	18.5 (17.6-19.4)[a,c]	37.5 (35.1-39.8)[a,b]	21.4 (20.6-22.3)[b,c]
Mental wellbeing	High/Very high K10	10.4 (9.6-11.1)[a,c]	12.6 (11.4-13.9)[a,b]	10.8 (10.1-11.5)[b,c]
Physical exercise	Met current guidelines	49.7 (48.4–51.0)[a,c]	55.9 (53.2-58.6)[a,b]	50.9 (49.7-52.0)[b,c]
Body mass index	Overweight/obese	65.1 (63.9-66.3)[a,c]	55.7 (53.2-58.2)[a,b]	63.3 (62.2-64.5)[b,c]
Privately Insured	Has private health insurance	60.9 (59.8-62.1)[a,c]	41.1 (38.3-43.9)[a,b]	57.3 (56.2-58.4)[b,c]

a: Significant difference of estimates between the mobile-only and landline-accessible and populations based on the survey derived 95% confidence interval

b: Significant difference of estimates between the mobile-only and full populations based on the survey derived 95% confidence interval

c: Significant difference of estimates between the landline-accessible and full populations based on the survey derived 95% confidence interval

‡: Figures based on the ABS Estimated Resident Population

further explore whether the effect of gender and age are the reasons for these differences in health outcomes, we examined the impact of telephone status on the significant health risk factors. The results are presented in Table 2.

We considered only those health outcomes that had statistically different prevalence rates for the landline-accessible and mobile-only population: smoking, short-term alcohol risk and health insurance access. We also focused on the population aged 18–44, categorised into three age groups (18–24, 25–34, 35–44), because it is at these ages that there are marked differences in the mobile and landline populations. In particular, roughly 90% of the mobile-only population was within this age group, which is about half the landline-accessible population (44%). This was fairly similar to the full population that had 50% aged between 18–44 years old. The results showed that there were substantial differences in the health outcomes by age and gender groups.

For smoking status, males aged 25–44 and females aged 35–44 were significantly more likely to smoke in the mobile-only population compared to the landline-accessible population. Further, males aged 25–34 and females aged 25–44 had significantly higher short-term alcohol risk (measured in terms of risky drinking behaviour) in the mobile-only population. Moreover, the prevalence of very risky drinking behaviour was higher in females aged 25–44 in the mobile-only population. Additionally, males and females aged 18–24 and 35–44 reported significantly lower levels of private health insurance coverage in the mobile-only population. Similar differences were observed when comparing the mobile-only to the full population. There were significant differences between the mobile-only and full populations for smoking, risky drinking and health insurance access for 35–44 year old males and females in the mobile-only population. These results show that the mobile-only population significantly differed from the landline-accessible population on these health measures, even after age and gender were accounted for in the analysis.

Conclusion

Potential bias due to under coverage remains a significant threat in health surveys, particularly in those that do not include mobile-only households. Data from the National Health Survey is the first population survey in Australia to enable us to accurately assess the bias in prevalence estimates for risky health behaviours – including smoking, short-term alcohol risk and access to health insurance – due to the exclusion of mobile-only phone

Table 2: Prevalence estimates (with 95% confidence intervals) for selected health risk factors adjusted for age and gender by telephone status.

Health factors		Age	Male			Female		
			Mobile-only	Landline-accessible	Australian population‡	Mobile-only	Landline-accessible	Australian population‡
Smoking	Current smoker	18-24	23.3 (16.5-30.1)	21.1 (15.1-27.2)	22.4 (17.6-27.2)	22.1 (16.4-27.8)	15.5 (10.7-20.3)	17.0 (13.5-20.5)
		25-34	33.1 (27.8-38.3)[a]	22.3 (17.9-26.7)[a]	27.0 (23.6-30.3)	24.6 (19.5-29.8)	19.0 (15.8-22.1)	21.1 (18.6-23.7)
		35-44	40.9 (33.1-48.8)[a,b]	19.2 (16.4-21.9)[a]	24.0 (21.4-26.7)[b]	29.5 (22.4-36.6)[a,b]	14.4 (12.0-16.8)[a]	16.8 (14.8-18.8)[b]
Alcohol Consumption	5 -10 drinks	18-24	79.6 (73.7-85.5)	72.1 (65.2-79.0)	74.4 (69.4-79.4)	63.4 (55.6-71.2)	58.3 (51.3-65.2)	59.8 (54.5-65.1)
		25-34	79.5 (77.7-81.2)[a,b]	71.2 (67.8-74.6)[a]	74.3 (71.3-77.3)[b]	62.9 (57.2-68.6)[a,b]	42.4 (38.2-46.5)[a]	49.3 (45.7-52.8)[b]
		35-44	67.2 (60.4-73.9)	67.2 (63.6-70.8)	67.6 (64.8-70.4)	48.2 (40.9-55.5)[a,b]	34.3 (31.1-37.6)[a]	36.4 (33.5-39.2)[b]
	11 or more drinks	18-24	59.4 (49.9-68.9)	54.2 (46.3-62.2)	56.0 (50.9-61.1)	34.3 (28.3-40.4)[a]	26.1 (19.4-32.9)[a]	28.6 (23.3-33.8)
		25-34	60.1 (53.8-66.4)	50.7 (46.4-55.1)	53.8 (50.0-57.6)	28.8 (23.7-33.8)[a,b]	14.9 (11.8-18.0)[a]	19.6 (16.9-22.3)[b]
		35-44	44.3 (37.4-51.1)	40.0 (36.1-43.8)	40.7 (37.5-44.0)	17.1 (12.0-22.1)[a]	9.5 (7.5-11.6)[a]	10.8 (9.0-12.6)
Privately Insured	Has private health insurance	18-24	36.5 (29.1-44.0)[a]	50.9 (44.3-57.4)[a]	45.4 (40.3-50.4)	32.7 (25.5-39.9)[a,b]	57.2 (50.2-64.2)[a]	50.4 (44.8-56.0)[b]
		25-34	44.8 (38.2-51.4)	52.3 (47.3-57.4)	49.1 (45.0-53.1)	51.0 (45.8-56.2)	55.0 (50.0-60.0)	54.0 (50.7-57.2)
		35-44	35.2 (28.3-42.1)[a,b]	61.8 (58.2-65.3)[a]	55.9 (52.8-58.9)[b]	39.6 (34.6-44.5)[a,b]	64.9 (61.6-68.2)[a]	61.2 (58.0-64.3)[b]

a: Significant difference of estimates between the mobile-only and landline-accessible populations based on the survey derived 95% confidence interval

b: Significant difference of estimates between the mobile-only and full populations based on the survey derived 95% confidence interval

‡: Figures based on the ABS Estimated Resident Population

users in telephone surveys. Our research has shown that there are significant differences in health outcomes and other characteristics when comparing populations of individuals with and without access to a landline connection. When examining the overall prevalence estimates, the results presented here show that using information from only those individuals accessible via landlines generally leads to underestimation of the prevalence of risky behaviours.

The results also show remarkable differences in the demographic, socioeconomic and geographical characteristics between the mobile-only and landline-accessible populations. Relying on landline telephones to measure health outcomes and behaviour will lead to an underestimation of the prevalence of smoking and risky alcohol consumption. It will also lead to a statistically significant difference in the over-estimation of private health care access, with proportionally fewer people in the mobile-only population with access to private health insurance. These differences remain even after taking account of age-gender differences and weighting for differential non-response and coverage. These results differ from the previous studies that found that the significant differences in socio-demographic characteristics, health outcomes and risk behaviours largely disappeared after correcting for non-response through post-stratification weights to benchmark to the population distribution.[12-14,24] We believe that this difference is due to the modality of data collection: telephone surveys are subject to different sources of bias compared with face-to-face household surveys such as the NHS. Our results may be a reflection of the relatively high response rate of 85%[16] achieved in the NHS when compared with telephone surveys. In contrast, the Eurobarometer surveys have lower responses ranging from 70% in Germany to 40% in the UK and Ireland.[4,5] Furthermore, the post-stratification relies on accurate telephone status information that is currently unavailable for research in Australia, and this has been shown to have an impact on population estimates.[25] The lack of unit-level microdata, limited our ability to explore the impact of phone status on health outcomes in more depth.

This study supports the growing body of evidence that concludes that coverage bias from surveys that use only landline-based surveys will significantly affect health prevalence statistics, as a result of the increasing population that are primarily contactable via mobiles only. Our study is the first in Australia to show that there are significant differences in health outcomes between the landline-accessible and mobile-only populations at the national level, based on micro-data access of the NHS using TableBuilder. Samples based on landlines are becoming progressively less representative of the population, and this has a detrimental effect on the accurate estimation of health risk factors and outcomes. The prevalence of mobile-phone only households will only continue to increase in Australia at an exponential rate so it is important to ensure that mobile phone numbers are included in the sampling frames for all telephone surveys so that health prevalence estimates are not severely biased. Continued reliance on health prevalence statistics based on landline sampling frames will progressively cover less and less of the population, and this will consequently have an additional impact on future trends and time series of health indicators.

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