

4 Representativeness

4.1 Comparison of BEACH GPs with GP population

The extent to which one can generalise results from a sample depends on how well the sample represents the population from which it is drawn. Random sampling of GPs improves the likelihood that a study will be representative, because each GP has an equal probability of being selected into the study sample. The representativeness of a study can also be improved by calculating sample weights to standardise the sample characteristics against those population characteristics that may influence the final results. If possible, the final study group of GPs should be compared with the population from which the GPs were drawn in order to identify and, if necessary, adjust for any sample bias that may have an impact on the findings of the study.

Comparisons of the characteristics of participants and non-participants were reported in Chapter 3 (Table 3.3). Statistical comparisons, using the chi-square statistic (χ^2), were then made between BEACH participants and all recognised GPs in Australia who claimed 375 or more general practice Medicare item numbers in the last quarter of 2001 (Table 4.1). The GP characteristics data for the BEACH participants have been drawn from the GP profile questionnaire to ensure highest reliability. The GP Branch of the Commonwealth Department of Health and Ageing provided the data for Australia.

Results

No statistical differences were apparent for GP sex and place of graduation. However, as in previous BEACH samples, the BEACH participants were significantly less likely to be under 35 years of age ($\chi^2 = 25.88$, $p < 0.001$). This is likely to be due to the fact that the national GP profile utilises a sample frame that includes GPs who are currently undertaking the RACGP Training Program. These GPs are not required to complete QA activities during training, nor in the QA triennium in which they complete training. This means that the offer of QA points is less likely to attract them. In the majority these GPs would be less than 35 years.

GPs from New South Wales and Victoria were somewhat over-represented in the sample, while Western Australia was significantly under-represented, compared with the national profile of GPs ($\chi^2 = 26.85$, $p < 0.001$). GPs in small rural and remote areas were somewhat under-represented in the sample ($\chi^2 = 15.36$, $p = 0.018$).

Table 4.1: Comparison of BEACH participants and all active recognised GPs in Australia

Variable	BEACH ^{(a)(b)}		Australia ^{(a)(c)(d)}	
	Number	Per cent of GPs	Number	Per cent of GPs
Sex ($\chi^2=4.69$, $p=0.096$)	...	...	...	...
Males	631	64.2	11,839	67.5
Females	352	35.8	5,695	32.5
Age ($\chi^2=25.88$, $p<0.001$)	...	...	...	...
<35	70	7.1	2,123	12.1
35–44	263	26.8	4,762	27.1
45–54	360	36.7	5,613	32.0
55+	289	29.4	5,060	28.8
Place of graduation ($\chi^2=2.57$, $p=0.276$)	...	...	...	...
Australia	748	76.1	12,955	73.8
Overseas	235	23.9	4,603	26.2
State ($\chi^2=26.85$, $p<0.001$)	...	...	...	...
New South Wales	352	35.8	5,932	33.8
Victoria	264	26.9	4,256	24.2
Queensland	178	18.1	3,266	18.6
South Australia	71	7.2	1,512	8.6
Western Australia	69	7.0	1,668	9.5
Tasmania	25	2.5	505	2.9
Australian Capital Territory	13	1.3	281	1.6
Northern Territory	11	1.1	138	0.8
RRMA ($\chi^2=15.36$, $p=0.018$)	...	...	...	...
Capital	681	69.3	11,437	65.1
Other metropolitan	80	8.1	1,309	7.5
Large rural	58	5.9	1,063	6.1
Small rural	48	4.9	1,248	7.1
Other rural	103	10.5	2,097	11.9
Remote centre	5	0.5	174	1.0
Other remote	8	0.8	230	1.3

(a) Missing data removed.

(b) Data drawn from the BEACH GP profile completed by each participating GP.

(c) Data provided by GP Branch, Department of Health and Ageing.

(d) All GPs who claimed at least 375 A1 Medicare items during the most recent 3-month HIC data period.

4.2 Sample weights

Most research studies rely on random sampling to reduce the impact of any sampling bias. It is unusual to have information on the underlying population, from which the sample is drawn, with which the sample can be compared. When such information is available it is important to consider the possible effect of any differences between the sample and the population on the generalisability of the findings. The data were only weighted for factors thought to have an important effect on morbidity and management. Although there were

differences between the sample and the Medical Benefits Schedule (MBS) data in terms of the proportion of GPs from each State, it was assumed that the morbidity and management profile of GPs was similar across States and therefore weighting by State was not undertaken. There was also a significant difference between the sample and the MBS data in terms of the distribution across rural, remote and metropolitan area; however, comparisons of metropolitan and rural GPs have not demonstrated substantive differences between the GPs in terms of morbidity and management.⁷

The raw data were, however, assigned sample weights according to GP age (stratified by sex) to adjust for the slight under-representation of younger GPs in the sample, and this age weighting was multiplied by the activity level of the participating GPs.

GP age

We have shown (Table 4.1) that there was a difference in GP age between BEACH GPs and all GPs in Australia and this may influence any national estimates made from unweighted data. Therefore post-stratification weights were calculated for the BEACH GPs to match the age distribution of all GPs in Australia. Simply, the GPs aged less than 35 years were given greater weighting than GPs of other age groups. This increases the contribution of the encounters from these GPs to any national estimate. Weightings for age were stratified by sex, age weights being calculated separately for male and female GPs.

GP activity level

The BEACH process requires that each GP provides details of 100 consecutive encounters. The assumption based on previous research is that 100 encounters provide a reliable sample of the GP's patients and practice style.²⁵ However, there is considerable variation in the number of services provided by different GPs in a given year. This may impact on the reliability of any estimate due to the differences in the sampling fraction for each GP, as a GP who provides 6,000 services in a given year should make a greater contribution to any national estimate than a GP who provides 3,000 services. Therefore it was also necessary to calculate post-stratification weights reflecting the different sampling fractions. This means that the BEACH encounter details from the GP who had claimed 6,000 Medicare services in the previous 12 months should have greater weighting than those encounters from the GP who had claimed 3,000 services, when estimating national activity in general practice. It was therefore possible to calculate sample weighting that reflected the contribution that each GP made to the total number of services for the sample.

The values of the weighted data were a multiplicative function of the raw data values, GP age weighting and GP sampling fraction of services in the previous 12 months. Table 4.2 shows the precision ratio calculated after weighting the data. As can be seen, the fit of the MBS and BEACH age and sex distribution improved somewhat after weighting, especially when encounters paid for by the Department of Veterans' Affairs were excluded from the BEACH distribution.

4.3 Comparison of BEACH consultations with all GP consultations in Australia

The aim of this study is to gain a representative sample of GP-patient encounters. Representativeness of the GP sample is used to weight the encounters, based on the assumption that the characteristics of the patient encounter are related to the characteristics of the GP. It is therefore important to compare the distribution of the sample patient encounters to the population of general practice encounters in Australia, to assess the representativeness of the sample encounters. The GP Branch of the Department of Health and Ageing provided the age-sex distribution of all A1 Medicare general practice items claimed during 2001, against which the age-sex distribution of the BEACH sample of patient encounters was compared.

The BEACH data include patient encounters that are paid by funding sources other than the MBS and include indirect (and some direct) encounters that cannot be or are not (by GP choice) claimed against any funding body. Further, the BEACH program counts only a single Medicare item number for each encounter covered by the MBS. In reality, more than one Medicare claim can result from a single encounter. To make the BEACH encounters equivalent to the Medicare data, only those BEACH encounters where a Medicare A1 item was recorded were included in the age and sex distributions in Table 4.2.

Due to the large size of the data sets used, any statistical comparison (e.g. χ^2) would generate statistical significance for even the most minor differences between the two sources of data. Therefore, it is necessary to consider whether any difference is likely to have a strong influence on the results and whether the precision of any estimate from BEACH complies with statistical standards. In determining whether any estimate is reliable, power calculations use a precision of 0.2 or 20% of the true proportion (or value). For example, if the true value were 15% then it would be desirable that any estimate was in the range of 12% to 18% if it is to be considered to have 20% precision.

Creating precision ratios (HIC %/BEACH %) for the age-sex distribution data contained in Table 4.2 revealed that the precision of the BEACH age-sex distribution was within the acceptable range of 0.8-1.2 except for men aged 75 years and older. Simply, BEACH A1 item encounters contained proportionally more encounters with men aged 75 years and older than did the national MBS A1 item data. It is possible that this was the result of having a greater proportion of older GPs in BEACH than for the national MBS GP data. However, it may also be influenced by the inclusion in BEACH but not in the MBS data of encounters not covered by the MBS (e.g. Department of Veterans' Affairs). To investigate the effect of including A1 item encounters claimed through the Department of Veterans' Affairs on the comparison of BEACH A1 item encounters with MBS A1 item encounters, the distributions were compared both with and without BEACH Veterans' Affairs' encounters. The precision ratios are reported for both comparisons in Table 4.2. After removing the encounters payable by the Department of Veterans' Affairs, the precision ratio for men aged 75 years and over improved to within the 20% precision range, suggesting that the inclusion of Veterans' Affairs encounters affected the distribution of encounters.

The precision ratios indicate that the BEACH sample of encounters is a good representation of Australian general practice patient encounters.

4.4 The weighted data set

The final unweighted data set from the fourth year of collection contained 983,000 encounters, 147,691 reasons for encounters, 144,372 problems managed and 102,352 medications. The apparent number of encounters, reasons for encounter, problems managed, medications, the numbers of referrals, imaging and pathology all decreased after weighting (Table 4.3).

Table 4.2: Comparison of BEACH with age–sex distribution of patients at MBS A1 services

Variable	BEACH ^(a)		Australia ^(b)	Precision ratios		
	Number	Per cent	Per cent	Raw ^(a)	Weighted ^(c)	No Vet Affairs ^(d)
Male	3,3038	40.4	41.7	1.03	0.98	0.99
<1 year	891	1.1	1.2	1.07	1.10	1.08
1–4 years	2,052	2.5	3.0	1.20	1.12	1.10
5–14 years	2,579	3.2	3.9	1.23	1.14	1.12
15–24 years	2,670	3.3	3.7	1.13	1.04	1.03
25–44 years	7,452	9.1	9.6	1.05	0.99	0.97
45–64 years	8,696	10.6	11.2	1.05	0.99	0.99
65–74 years	4,457	5.5	5.5	1.02	0.98	0.98
75+ years	4,241	5.2	3.6	0.70	0.72	0.84
Female	48,799	59.6	57.7	0.98	1.01	1.00
<1 year	848	1.0	1.0	0.97	0.98	0.96
1–4 years	1,934	2.4	2.5	1.13	1.05	1.03
5–14 years	2,646	3.2	3.4	1.15	1.10	1.08
15–24 years	4,939	6.0	6.0	1.03	1.03	1.02
25–44 years	13,024	15.9	15.5	0.99	1.01	0.99
45–64 years	12,729	15.6	14.7	0.95	1.01	0.99
65–74 years	5,790	7.1	6.8	0.91	0.95	0.95
75+ years	6,886	8.4	7.6	0.91	1.01	1.05

(a) Unweighted data, A1 items only.

(b) Data provided by GP Branch, DoHA.

(c) Calculated from BEACH weighted data, *including* encounters claimable from the Department of Veterans' Affairs.

(d) Calculated from BEACH weighted data, *excluding* encounters claimable from the Department of Veterans' Affairs.

Note: A1 Medicare services—see Glossary; only encounters with a valid age and sex are included in the comparison.

Table 4.3: The BEACH data set

Variable	Raw	Weighted
GPs	983	983
Encounters	98,300	96,973
Reasons for encounter	147,691	144,654
Problems managed	144,372	139,092
Medications	102,352	101,350
Other treatments	54,040	51,130
Referrals	8,207	7,761
Imaging	33,025	30,086
Pathology	11,850	10,943