4. Representativeness

4.1 Comparison of BEACH GPs with the national GP population

The generalisability of a study sample is a function of its ability to represent the population from which the sample is drawn. Random sampling of GPs improves the likelihood that a study will be representative, as each GP has an equal probability of being selected into the study sample. The representativeness of a study can also be improved through the calculation of sample weights to better reflect the population characteristics that may influence the final results. Wherever possible there should be a comparison between the final study group of GPs and the population from which the GPs were drawn in order to identify, consider and ameliorate any bias that may 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 (χ^2) were then made between BEACH participants and all recognised general practitioners in Australia who claimed more than 1,500 general practice Medicare item numbers during 1998–99 (Table 4.1). The GP characteristics for both groups were provided by the General Practice Branch of the Commonwealth Department of Health and Aged Care so that the inconsistencies between the BEACH GP profile and the details collected through the HIC (reported in Chapter 3) were eliminated.

No statistical differences were apparent for GP gender or place of practice (RRMA and State). However, BEACH participants were significantly less likely to be under 35 years of age ($\chi^2 = 65.89$; $p < 0.001$) and were significantly more likely to have graduated in Australia ($\chi^2 = 4.44$; $p = 0.035$).

Analysis (not shown) of participating GPs aged less 35 years would suggest a different morbidity and management profile than GPs of other ages. Principally there appeared to be a greater rate of the management of acute conditions and younger patients. Any examination of encounter details (RFEs, problems managed, medications, etc) may provide a lower precision of any national estimate due to the under-enumeration of young GPs. For example, it could be speculated that the management rate of respiratory infections would be lower than expected due to the under-representation of younger GPs. Therefore, post-stratification of the sample of encounters should reflect the age mix of GPs in Australia when determining national estimates of GP encounter activity.

Although Table 4.1 revealed differences in the activity level ($\chi^2 = 6.75$; $p = 0.034$), a comparison of means revealed no differences. It can therefore be concluded that the difference in activity level is a function of the activity groupings.

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

	BEACH		Australia[(a)]	
Variable	Number	% of GPs (N= 984)	Number	% of GPs (N=17,335)
Sex (χ^2= 0.84; p=0.773)	. .	. .	. .	. .
Males	693	70.4	12,279	70.8
Females	291	29.6	5,056	29.2
Age (χ^2= 65.89; p=<0.001)	. .	. .	. .	. .
<35	54	5.8	2,563	14.8
35–44	322	34.7	5,782	33.4
45–54	301	32.5	5,108	29.5
55+	250	27.0	3,882	22.4
Missing	57	. .	. .	. .
Place of graduation (χ^2=4.44; p=0.035)	. .	. .	. .	. .
Australia	759	77.1	12,877	74.3
Overseas	225	22.9	4,458	25.7
RRMA (χ^2=3.16; p=0.789)	. .	. .	. .	. .
Capital	669	68.0	11,843	68.3
Other metropolitan	75	7.6	1,328	7.7
Large rural	60	6.1	1,017	5.9
Small rural	57	5.8	1,043	6.0
Other rural	106	10.8	1,790	10.3
Remote centre	5	0.5	138	0.8
Other remote	6	0.6	176	1.0
State (χ^2=10.54; p=0.160)	. .	. .	. .	. .
New South Wales	364	36.7	6,061	35.0
Victoria	239	24.3	4,255	24.6
Queensland	184	18.7	3,082	17.8
South Australia	74	7.5	1,486	8.6
Western Australia	73	7.4	1,590	9.2
Tasmania	22	2.2	463	2.7
Australian Capital Territory	17	1.7	282	1.6
Northern Territory	11	1.1	116	0.7
Activity level (χ^2=6.75; p=0.034)	. .	. .	. .	. .
1,501–3,000 services in previous year	164	16.7	3,445	19.9
3,001–6,000	418	42.4	7,050	40.7
6,001+	402	40.9	6,840	39.5

(a) Data provided by GP Branch, Department of Health and Aged Care.

4.2 Comparison of BEACH consultations with all GP consultations in Australia

Another means of testing the extent to which the data are representative of general practice activity is to investigate whether the age–sex distribution of patients at the consultations is similar to the age–sex distribution for patients seen in all general practice Medicare claimed consultations for the same period. It is difficult to track and access in a timely fashion the multiple funding streams of Australian general practice ; however, the Medical Benefit Schedule (MBS) provides funding for most consultation types in Australia. Comparable age–sex data for general practice items of service (A1 services) were requested from the General Practice Branch of the Commonwealth Department of Health and Aged Care and these were compared (Table 4.2).

With the size of the datasets 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 (Australia %/ BEACH %) for the age–sex distribution data contained in Table 4.2 revealed that the precision of the BEACH age–sex distribution was only outside the acceptable range of (0.8–1.2) for males 75 years and older. Simply, BEACH contained proportionally more men 75 years and older than the national distribution. This may be the result of having more older GPs in the BEACH final dataset or the result of some other sampling effect.

Table 4.2: Comparison of age–sex distribution of patients at A1 services from the MBS

	BEACH		Australia[a]		Precision
Variable	Number	%	Number	%	Ratio
Sex	. .	. .	. .	. .	. .
Male	32,628	41.0	37,675,661	41.5	1.01
<1 year	964	1.2	1,163,265	1.3	1.06
1–4 years	2,334	2.9	2,979,604	3.3	1.12
5–14 years	2,897	3.6	3,906,073	4.3	1.18
15–24 years	2,820	3.5	3,484,737	3.8	1.08
25–44 years	7,244	9.1	8,929,883	9.8	1.08
45–64 years	7,935	10.0	9,429,569	10.4	1.04
65–74 years	4,516	5.7	4,669,422	5.1	0.91
75+ years	3,918	4.9	3,113,108	3.4	0.70
Female	47,048	59.1	53,081,968	58.5	0.99
<1 year	942	1.2	1,014,312	1.1	0.95
1–4 years	2,051	2.6	2,640,297	2.9	1.13
5–14 years	3,061	3.8	3,830,020	4.2	1.10
15–24 years	4,895	6.1	5,881,143	6.5	1.05
25–44 years	12,613	15.8	14,706,622	16.2	1.02
45–64 years	11,221	14.1	12,451,675	13.7	0.97
65–74 years	5,841	7.3	5,807,957	6.4	0.87
75+ years	6,424	8.1	6,749,942	7.4	0.92

.(a) Data provided by GP Branch, Department of Health and Aged Care.

Note: A1 services include MBS item numbers: 1, 2, 3, 4, 13, 19, 20, 23, 24, 25, 33, 35, 36, 37, 38, 40, 43, 44, 47, 48, 50, 51, 601, 602; Only encounters with a valid age and sex are included in the comparison

4.3 Sample weights

Most research studies rely on random sampling to reduce the impact of any sampling bias. It is also unusual to know the true population because of the lack of available information. When there is information available it is important to consider the possible effect of any differences on the generalisability of the findings.

4.3.1 GP age

Already 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 estimate of 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 then 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.

4.3.2 GP activity level

The BEACH process requires that each GP provide 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 (Meza et al. 1995). However, there is considerable variation in the number of services that a GP provides 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 makes 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 6,000 services should have greater weighting than those encounters from the GP who provides 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 final sample weights were a multiplicative function of the GP age weighting and GP sampling fraction of services in the previous 12 months.

4.4 The weighted dataset

Following post-stratification the BEACH dataset reduced in size (Table 4.3). The representation of encounters from the older GPs was reduced. The final dataset from the first year of collection contained 96,901 encounters, 141,766 reasons for encounters, 140,824 problems managed and 106,320 medications. The numbers of referrals, imaging and pathology were fewer after post-stratification weighting but to a lesser degree than reasons for encounter and problems managed.

Table 4.3: The BEACH dataset

Variable	Raw	Weighted
GPs	984	984
Encounters	98,400	96,901
Reasons for encounter	145,407	141,766
Problems managed	145,183	140,824
Medications	107,451	106,320
Other treatments	44,076	41,839
Referrals	11,615	10,866
Imaging	7,299	6,844
Pathology	25,727	23,872