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Dental Statistics & Research Unit AUSTRALIAN RESEARCH CENTRE FOR POPULATION ORAL HEALTH

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Abbreviations

d	deciduous decayed teeth
m	deciduous missing teeth
f	deciduous filled teeth
dmft	deciduous decayed, missing and filled teeth
D	permanent decayed teeth
М	permanent missing teeth
F	permanent filled teeth
DMFT	permanent decayed, missing and filled teeth
SD	standard deviation

Purpose of this report

This report is part of the annual series providing descriptive statistics concerning child dental health in Tasmania. Information listed in the report includes the age and sex of children in the sample, their deciduous and permanent caries experience, frequency of fissure sealants, immediate treatment needs, history of school dental service examinations and regional analyses.

The report also provides selected trends, highlighting differences between the years 1998 and 2002. However, no formal hypothesis tests have been undertaken and descriptions of differences between years are intended as a guide to the reader rather than as a formal statistical evaluation.

Sources of subjects and sampling

The data for this report were collected during the 2002 calendar year from patients of the Tasmania Dental Service by dental therapists and dentists. A random sampling procedure was used to select slightly less than one in two (1:1.9) patients. This was achieved by selecting those children whose birthday fell on the first sixteen days of any month.

Data preparation

Data were collected and hand entered in Tasmania before forwarding to the AIHW Dental Statistics and Research Unit (DSRU) for analysis.

The data were cleaned prior to analyses to correct data recording and data entry errors. In addition to a visual check of a number of cases with erroneous data, a series of linear regressions of age on the number of deciduous, permanent and total teeth revealed numerous outliers with standardised residuals greater than 3 standard deviations from the mean. A visual check allowed many of these cases to be corrected where it was evidently a data recording error. A small number of cases with apparent errors that could not be reconciled were removed from the data set.

Data analysis

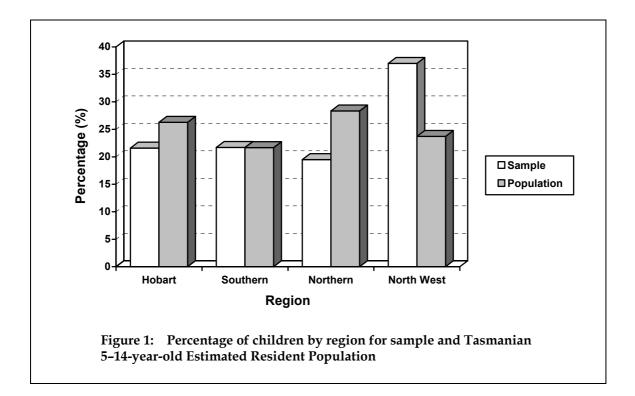
Data were weighted for all analyses to more accurately reflect the child population in Tasmania for 2002. Weights were applied according to region, as used by the Tasmanian Department of Health and Human Services. The Hobart region was taken to comprise the Statistical Local Areas of Hobart Inner, Hobart Remainder, Glenorchy and Clarence and included children from clinics in the Hobart, Glenorchy and Eastern Shore districts as well as several clinics from the Sorrel district.

Children from the Hobart and Northern regions were initially under-represented in the sampling whereas children from the North West region were over-represented relative to actual population distribution (see Figure 1). Weighting was carried out so that the regional contributions for the study were proportional to the distribution of children aged 5–14 years in Tasmania as at 30 June 2002.

All data were also weighted by months since last visit (which was used due to the under-representation of students on longer recall schedules in the sample).

The purpose of the weighting protocol is to produce estimates that are representative of the population covered by the School Dental Service for 2002. However, the estimates in this report cannot be applied to children who are not enrolled in the Tasmanian School Dental Service. Consequently, the results in this report do not represent the complete Tasmanian child population, but only that portion of the population that is enrolled in the Tasmanian School Dental Service.

All indices are calculated from data collected over a 12-month period. Age-specific indices denoted with an asterisk (*) are those in which the relative standard error exceeds 40% and population estimates of these indices may be considered to be statistically unreliable and should be interpreted with due care.



Demographic composition of the sample

There were a total of 6,972 children in the sample for 2002 (see Table 1). There was a relatively even distribution of children aged between 4 and 15 years of age. For all subsequent analyses children up to and including 3 years of age were collapsed into a single group as were children aged 16–18 years.

Males and females were represented in approximately equal proportions across the age. Weighting of the data did not produce appreciable differences in the age and sex composition of the sample, although there was a tendency for older children to be weighted up and for younger children to be weighted down in the analysis.

_		Children in	sample		Children in sample (weighted)					
Age	Males	Females	Unknown	Persons	Males	Females	Unknown	Persons		
	n	n	n	n	n	n	n	n		
0	0	2	0	2	0	2	0	2		
1	18	15	1	34	14	14	1	29		
2	47	71	1	119	44	64	1	109		
3	155	163	0	318	135	147	0	282		
4	240	200	2	442	230	178	2	411		
5	294	291	7	592	271	269	6	546		
6	296	264	4	564	282	249	4	535		
7	347	327	7	681	327	316	8	651		
8	326	283	5	614	319	279	6	605		
9	296	281	1	578	291	288	1	580		
10	288	290	3	581	306	299	4	608		
11	266	264	2	532	278	272	2	552		
12	275	242	2	519	283	250	2	536		
13	257	228	0	485	263	251	0	514		
14	178	203	0	381	198	211	0	409		
15	206	180	1	387	214	211	1	426		
16	53	42	0	95	63	47	0	111		
17	19	28	0	47	28	38	0	66		
18	1	0	0	1	1	0	0	1		
Total	3,562	3,374	36	6,972	3,548	3,385	39	6,972		

 Table 1: Demographic composition of the sample

Deciduous teeth

Table 2 shows the age-specific caries experience in deciduous teeth for children up to 12 years of age. The mean number of clinically detectable decayed deciduous teeth increased to 1.23 for 5-year-olds before declining to 0.36 for 12-year-olds. In contrast, the mean number of filled teeth increased with age, from 0.08 for the youngest children to 1.30 for 9-year-olds, before declining to 0.67 for 12-year-olds due to the exfoliation of deciduous teeth. At age 11, children retained on average only about one-third of the deciduous teeth that were present at age 4. Mean dmft increased to 2.16 for 8-year-olds, before declining into the older age groups.

The ratio of untreated decayed teeth to the total count of decayed, missing, and filled teeth serves as an indicator of how well a child's dental needs are being met. This is presented in Table 3 as the mean of individual children's d/dmft index. For those children up to the age of 3, 90.6% of their dmft score could be attributed to untreated decay. This figure declined systematically with increasing age so that by 11 years of age only 30.9% of children's dmft score was attributable to decay. The percentage of children up to the age of 8 with a dmft score of 0 declined with age. Approximately three-quarters of children up to the age of 3 had dmft = 0 while only 42.3% of children aged 9 had no clinically detectable caries experience.

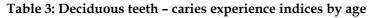
The ratio of untreated decayed teeth to the total count of decayed, missing, and filled teeth can also be expressed as the ratio of total decay in the population to total decayed, missing or filled teeth in the population (d/dmft ratio), and this is presented in Figure 2. Unlike the mean d/dmft index, the d/dmft ratio refers to the proportion of teeth with caries in the population. Thus, the ratio for 6-year-olds indicates that, among 100 teeth with caries experience among 6-year-olds, 48.5% had untreated decay. The d/dmft ratio shows a similar pattern to that of the mean dmft index, with the percentage d/dmft reducing across increasingly older age groups, declining from 90.7% for the youngest children to 28.7% among 11-year-olds. The percentage of dmft accounted for by filled teeth shows the opposite trend, increasing from 9.3% for children aged up to including 3 years old to 69.3% for 11-year-olds.

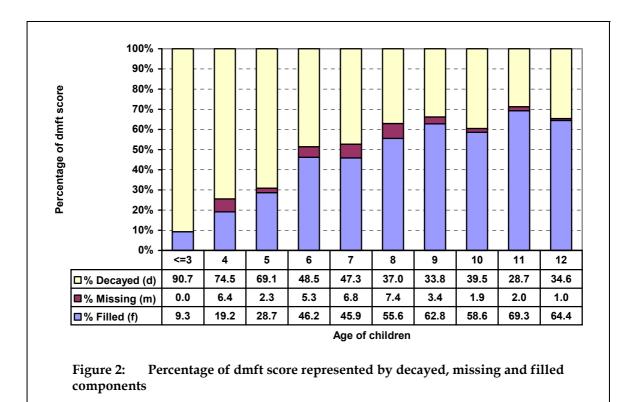
Age	Children	Teeth	Decayed (d)		Missing (m)		Filled (f)		dmft	
	n	mean	mean	SD	mean	SD	mean	SD	mean	SD
≤3	422	19.2	0.79	2.07	_	_	0.08	0.51	0.86	2.17
4	411	19.8	1.05	2.00	0.10*	0.81*	0.27	1.05	1.41	2.72
5	545	19.3	1.23	2.42	0.04*	0.45*	0.51	1.35	1.78	2.98
6	534	17.1	0.83	1.55	0.10	0.63	0.79	1.73	1.71	2.69
7	650	14.2	0.97	1.69	0.15	0.83	0.94	1.66	2.05	2.68
8	597	12.3	0.80	1.39	0.16	0.81	1.20	1.95	2.16	2.68
9	269	11.0	0.70	1.26	0.07	0.43	1.30	1.89	2.07	2.51
10	544	8.8	0.62	1.23	0.03*	0.30*	0.92	1.58	1.57	2.15
11	396	6.4	0.29	0.72	0.02*	0.17*	0.70	1.29	1.01	1.63
12	217	4.8	0.36	0.81	0.01*	0.12*	0.67	1.47	1.04	1.80

Table 2: Deciduous dentition - decayed, missing and filled teeth by age

* relative standard error $\geq 40\%$

Age	Teeth	Mean d/dn	nft index	dmft =	= 0
	mean	n	%	n	%
≤3	19.2	100	90.6	422	76.4
4	19.8	145	82.5	411	64.8
5	19.3	232	68.5	545	57.5
6	17.1	236	56.3	534	55.8
7	14.2	357	50.3	650	45.1
8	12.3	335	42.6	597	44.0
9	11.0	329	38.5	569	42.3
10	8.8	275	42.7	544	49.4
11	6.4	166	30.9	396	58.1
12	4.8	95	40.1	217	56.3





Permanent teeth

The mean number of decayed, filled and DMF teeth all increased in a fairly consistent manner across increasing age groups (see Table 4). The 12-year-old DMFT was 1.22. The percentage of DMFT due to decay (mean D/DMFT index) declined across age groups, reducing to 40.1% for 15-year-olds (see Table 5). The percentage of 'caries free' children (DMFT = 0) declined regularly with increasing age, from 93.9% for the youngest group of children to 52.7% for 12-year-olds, further reducing to 21.2% for children aged 16 years and older.

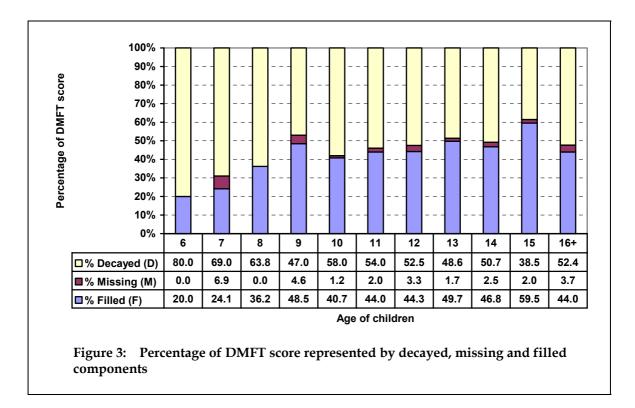
The D/DMFT ratio, which refers to the proportion of teeth in the population with caries experience having untreated decay, showed a similar trend to the mean D/DMFT index, declining from 80.0% for 6-year-olds to 38.5% for children aged 15 years old (Figure 3). Both the D/DMFT and F/DMFT ratios stayed relatively constant between the ages of 9 and 16+.

Age	Children	Teeth	Decay	ed (D)	Missir	ng (M)	Fille	d (F)	DN	IFT
	n	mean	mean	SD	mean	SD	mean	SD	mean	SD
5	153	3.9	0.09	0.44	0.03*	0.47*	_	_	0.12*	0.64*
6	423	5.7	0.12	0.47	0.00	0.03*	0.03*	0.29*	0.15	0.56
7	639	8.5	0.20	0.61	0.01*	0.22*	0.07	0.38	0.29	0.82
8	603	11.1	0.30	0.78	0.00	0.04*	0.17	0.55	0.47	0.99
9	577	12.8	0.31	0.78	0.02*	0.28*	0.32	0.83	0.66	1.20
10	608	16.1	0.47	1.03	0.01*	0.21*	0.33	0.74	0.81	1.29
11	551	20.3	0.54	1.30	0.02*	0.30*	0.44	0.97	1.00	1.70
12	533	24.3	0.64	1.30	0.04	0.33	0.54	1.06	1.22	1.79
13	514	26.3	0.87	1.85	0.02	0.18	0.89	1.41	1.79	2.34
14	408	27.1	1.03	1.70	0.05*	0.43*	0.95	1.61	2.03	2.44
15	421	27.4	0.97	1.68	0.06	0.41	1.50	2.25	2.52	3.02
16+	178	27.6	1.99	2.68	0.14	0.50	1.67	1.96	3.80	3.45

Table 4: Permanent dentition – decayed, missing and filled teeth by age

* relative standard error $\geq 40\%$

Age	Teeth	Mean D/I	DMFT index	DMF	Γ = 0
	mean	n	%	n	%
5	3.9	9	92.6	153	93.9
6	5.7	35	87.6	423	91.7
7	8.5	98	78.0	639	84.6
8	11.1	147	63.1	603	75.5
9	12.8	185	51.7	577	68.0
10	16.1	231	54.2	608	62.0
11	20.3	208	49.9	551	62.2
12	24.3	252	51.7	533	52.7
13	26.3	280	41.4	514	45.5
14	27.1	238	51.3	408	41.6
15	27.4	277	40.1	421	34.2
16+	27.6	140	48.7	178	21.2



All teeth

It can be seen from Table 6 that between 42.5% and 77.8% of children in any age group were free of untreated clinical decay in the combined deciduous and permanent dentitions (d+D = 0). The greatest likelihood of untreated decay occurred for the youngest children. The most extensive levels of untreated clinical decay (d+D = 5 or more) occurred for 5-year-olds (8.7%).

While more than 94% of children in any age group did not have any deciduous or permanent teeth missing due to caries, considerably lower percentages presented without fillings. The percentage of children without fillings decreased to 49.3% for 9-year-olds, increased to 64.1% for 12-year-olds, and then decreased again.

There was a reasonably consistent decline in the percentage of children with no caries experience in either the deciduous or permanent dentition (dmft+DMFT = 0), from 76.3% among the youngest children to 32.4% at age 9. The percentage varied between 34.4% and 44.2% among children aged 10 to 15 years old.

	_	d + D =								duaft i
Age	Children	0	1	2	3	4	5+	m+M = 0	f+F = 0	dmft+ DMFT = 0
	n	%	%	%	%	%	%	%	%	%
≤3	421	77.8	5.8	5.7	2.9	2.5	5.3	100.0	96.5	76.3
4	411	67.7	7.0	9.2	4.9	5.2	6.1	97.9	91.0	64.8
5	544	63.7	10.4	8.3	5.9	3.0	8.7	97.7	81.5	56.5
6	535	63.1	14.0	10.0	4.6	4.1	4.1	96.8	74.6	53.2
7	651	56.4	16.3	9.6	6.9	4.6	6.1	94.4	63.5	41.4
8	603	58.0	15.7	9.7	8.0	2.7	5.9	94.5	57.7	38.5
9	579	56.3	20.6	9.5	5.2	2.8	5.7	94.9	49.3	32.4
10	608	59.5	15.6	11.3	3.4	4.2	6.0	98.2	58.3	39.4
11	552	67.5	13.7	7.0	5.8	2.7	3.2	98.5	61.0	44.2
12	536	63.4	18.5	7.9	4.5	2.0	3.6	97.5	64.1	42.1
13	514	66.2	11.4	8.3	5.7	3.4	4.9	98.2	56.6	42.6
14	409	57.2	16.7	10.9	6.1	1.4	7.7	98.1	62.2	41.0
15	426	60.3	16.7	8.2	6.7	3.3	4.8	97.4	50.9	34.4
16+	178	42.5	12.7	13.2	8.9	10.4	12.3	91.2	40.4	20.5

Table 6: All teeth - age-specific caries experience

Fissure sealants

Data for fissure sealants are presented in Table 7. The mean number of fissure sealants increased with increasing age. In all age groups there was evidence of preferential use of fissure sealants among those with caries experience. For example, 28.2% of 13-year-olds with permanent caries experience (DMFT \geq 1) had fissure sealants, compared with 11.0% among those with DMFT = 0.

Age					with sealants		
	Children Sealants		lants	DM	FT = 0	DMFT ≥ 1	
	n	mean	SD	n	%	n	%
6	423	0.06	0.44	388	1.4	35	10.9
7	639	0.16	0.73	541	4.1	98	13.4
8	603	0.46	1.17	455	11.6	147	25.1
9	577	0.48	1.14	392	14.3	185	27.7
10	608	0.62	1.29	377	16.4	231	31.0
11	551	0.55	1.25	343	14.0	208	27.6
12	533	0.61	1.46	281	17.4	252	22.6
13	514	0.59	1.45	234	11.0	280	28.2
14	409	0.53	1.21	170	10.5	238	29.1
15	426	0.77	1.64	144	8.0	277	31.6
16+	178	0.87	1.71	38	7.5	140	34.3

Table 7: Fissure sealants - age-specific experience

School Dental Service examinations

Table 8 describes the percentage of children who were new patients (having had no previous dental examination) in the Tasmanian School Dental Service. The figure was highest for the youngest ages (5 years or less) while no more than 6% of those aged 8 years or more had had no previous examination. This pattern is expected and indicates that most patients are enrolled during their early school years.

Table 9 refers only to children with previous examinations and indicates the time since their last dental examination. Approximately 25–35% of children in most ages received examinations within 7 to 12 months of their previous examination. A re-examination interval of 13–18 months years occurred for the majority of children (between 38.9% and 46.6% of 5–15 year-olds). Re-examination within 6 months was uncommon for all age groups while re-examination after a period of more than 18 months occurred increasingly among older children. Mean time since last examination ranged from 11.5 months for the youngest children to 21.1 months for children aged 16 years and older.

		Previous examination in School Dental Service					
Age	Children examined	Yes	No				
	n	%	%				
≤3	441	26.4	73.6				
4	438	48.0	52.0				
5	584	64.9	35.1				
6	566	82.6	17.4				
7	688	87.1	12.9				
8	618	92.2	7.8				
9	584	94.2	5.8				
10	591	94.6	5.4				
11	536	96.1	3.9				
12	529	96.8	3.2				
13	489	96.3	3.7				
14	382	97.4	2.6				
15	389	96.5	3.5				
16+	135	94.9	5.1				

Table 8: School Dental Service examinations - age-specific distribution

Age		Months since last visit									
	Children	0–6	7–12	13–18	19–24	25+	mean	SD			
	n	%	%	%	%	%					
≤3	116	15.5	51.0	23.9	5.6	4.0	11.52	5.40			
4	210	9.6	42.1	36.0	8.8	3.	12.89	5.21			
5	379	6.5	39.9	39.9	8.4	5.2	13.61	5.59			
6	468	8.9	32.6	40.2	15.5	2.7	14.02	6.36			
7	599	7.2	33.8	41.0	10.9	7.0	14.13	6.10			
8	570	5.1	35.3	38.9	13.1	7.5	15.02	7.13			
9	550	5.0	32.0	41.9	12.8	8.2	15.33	7.65			
10	559	3.1	31.3	40.1	15.4	10.1	16.11	7.80			
11	515	4.7	30.1	41.0	14.7	9.5	16.12	9.53			
12	512	3.6	28.1	44.6	16.2	7.6	15.86	7.71			
13	471	3.6	23.4	46.6	15.7	10.7	16.65	8.94			
14	372	3.3	26.8	42.1	15.3	12.5	17.05	8.69			
15	376	3.4	24.8	45.8	12.1	13.9	17.36	10.23			
16+	128	5.8	19.2	40.2	10.1	24.7	21.14	16.52			

Table 9: School Dental Service examinations - time since last visit

Caries experience by geographical region

Table 10 presents deciduous caries experience data for each of the regions used in this report. Considerable variation can be seen in caries experience for the selected 5-6-year-old age group across geographical areas. Among these children, mean decay scores in the deciduous dentition ranged from 0.72 in Hobart to 1.17 in the Southern region. The mean number of teeth missing due to caries was highest in the Southern region while the mean number of filled teeth was highest in the Northern and North West regions, the lowest being in Hobart. Mean dmft scores in the Southern, North West and Northern regions were approximately 60–80% higher than those in Hobart. Consistent with these findings, the highest percentage of 5-6-year-olds with no recorded caries experience was in Hobart while the lowest was in the Northern region.

	Children	Decayed (d) Missing (m		ng (m)	Filled (f)		dmft		dmft = 0	
	n	mean	SD	mean	SD	mean	SD	mean	SD	%
Hobart	246	0.72	1.85	0.02	0.27	0.41	1.21	1.15	2.31	66.3
Southern	251	1.17	2.21	0.19	1.50	0.51	1.31	1.86	3.11	54.2
Northern	220	1.07	1.83	0.09	0.58	0.89	1.85	2.04	2.88	50.5
North West	435	1.06	2.14	0.07	0.46	0.89	1.75	2.01	3.10	54.7

Table 10: Deciduous caries experience for 5-6-year-old children by region

The mean number of clinically detectable decayed teeth in 12-year-olds (see Table 11) was highest in the Southern region, with mean scores lowest in the Hobart region. The mean number of filled teeth was highest in the Northern region (mean = 0.67) and lowest in the Southern region (mean = 0.39). Mean DMFT was highest in the North West (mean = 1.38) and lowest in the Hobart region (mean = 0.99). Approximately 56% of 12-year-olds in the Hobart region had no caries experience in their permanent dentition, while just under 50% of 12-year-old children in the North West region had a DMFT score of zero.

	Children	Decayed (D)		Missing (M)		Filled (F)		DMFT		DMFT = 0	
	n	mean	SD	mean	SD	mean	SD	mean	SD	%	
Hobart	117	0.39	0.85	0.10	0.58	0.50	1.03	0.99	1.55	55.6	
Southern	129	0.75	1.52	0.02	0.18	0.39	0.84	1.16	1.77	53.5	
Northern	103	0.59	1.21	0.04	0.19	0.67	1.16	1.30	1.77	52.4	
North West	170	0.61	1.19	0.02	0.23	0.76	1.37	1.38	1.95	49.4	

Table 11: Permanent caries experience for 12-year-old children by region

Selected trends, 1998–2002

Presented below is a table and a series of figures of selected 5-year trends across the period 1998–2002. Trends are proved for sample size, deciduous and permanent caries experience, fissure sealants and time since last visit and show an increase in both deciduous and permanent caries experience across the period examined.

1998		1999	1999 2		2000		2001		2002	
n	%	n	%	n	%	n	%	n	%	
1,193	20.1	938	16.7	1,688	25.7	2,209	24.7	1,505	21.6	
1,186	20.0	872	15.5	992	15.1	1,804	20.2	1,511	21.7	
1,724	29.1	1,592	28.3	1,439	21.9	2,216	24.8	1,357	19.5	
1,818	30.7	2,220	39.5	2,443	37.2	2,707	30.3	2,583	37.0	
5,921	100.0	5,622	100.0	6,562	100.0	8,936	100.0	6,956	100.0	
	n 1,193 1,186 1,724 1,818	n % 1,193 20.1 1,186 20.0 1,724 29.1 1,818 30.7	n % n 1,193 20.1 938 1,186 20.0 872 1,724 29.1 1,592 1,818 30.7 2,220	n % n % 1,193 20.1 938 16.7 1,186 20.0 872 15.5 1,724 29.1 1,592 28.3 1,818 30.7 2,220 39.5	n % n % n 1,193 20.1 938 16.7 1,688 1,186 20.0 872 15.5 992 1,724 29.1 1,592 28.3 1,439 1,818 30.7 2,220 39.5 2,443	n % n % 1,193 20.1 938 16.7 1,688 25.7 1,186 20.0 872 15.5 992 15.1 1,724 29.1 1,592 28.3 1,439 21.9 1,818 30.7 2,220 39.5 2,443 37.2	n % n % n % n 1,193 20.1 938 16.7 1,688 25.7 2,209 1,186 20.0 872 15.5 992 15.1 1,804 1,724 29.1 1,592 28.3 1,439 21.9 2,216 1,818 30.7 2,220 39.5 2,443 37.2 2,707	n % n % n % 1,193 20.1 938 16.7 1,688 25.7 2,209 24.7 1,186 20.0 872 15.5 992 15.1 1,804 20.2 1,724 29.1 1,592 28.3 1,439 21.9 2,216 24.8 1,818 30.7 2,220 39.5 2,443 37.2 2,707 30.3	n % n % n % n 1,193 20.1 938 16.7 1,688 25.7 2,209 24.7 1,505 1,186 20.0 872 15.5 992 15.1 1,804 20.2 1,511 1,724 29.1 1,592 28.3 1,439 21.9 2,216 24.8 1,357 1,818 30.7 2,220 39.5 2,443 37.2 2,707 30.3 2,583	

Table 12: Sample size and percentage of total sample by region, 1998–2002

