BARRIERS TO THE TAKE-UP OF NEW TECHNOLOGY

Rachel Lloyd and Otto Hellwig

Discussion Paper no. 53

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National Centre for Social and Economic Modelling
• University of Canberra •

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Abstract

Access to and use of the Internet and other telecommunications services are rapidly becoming an increasingly common and critical part of commerce, education and social participation. Groups with little opportunity to participate in the services provided by new telecommunications technology will be increasingly disadvantaged socially and economically.

The concept of a 'digital divide' is being used to describe disparities in the use of the Internet and new telecommunications services across different social groups. In Australia the debate has taken a regional focus because of differences in metropolitan and regional rates of access. Government policies have focused on supply-side issues such as the quality and cost of supply in regional Australia. However, evidence from overseas studies suggests that sociodemographic factors may also influence access to new technology. This study explores the social and economic characteristics of Australians with different levels of access to and use of communications services.

The results show that a large proportion of Australians do not participate in the knowledge economy — not because of where they live, but because of their economic and social circumstances. The most important driver of Internet access is educational qualification, followed by income. After accounting for other factors, region and State of residence by themselves do not explain differences in Internet take-up rates. This result suggests that supply-side policy solutions will not be sufficient to overcome the digital divide.

Author note

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General caveat

NATSEM research findings are generally based on estimated characteristics of the population. Such estimates are usually derived from the application of microsimulation modelling techniques to microdata based on sample surveys.

These estimates may be different from the actual characteristics of the population because of sampling and nonsampling errors in the microdata and because of the assumptions underlying the modelling techniques.

The microdata do not contain any information that enables identification of the individuals or families to which they refer.

Contents

1 Introduction

Access to and use of the Internet and other telecommunications services is rapidly becoming an increasingly common and critical part of commerce, education and social participation. Groups that do not have the opportunity to participate in the services provided by new telecommunications technologies will be increasingly disadvantaged socially and economically. There is concern that society is being divided into the 'information rich' (those who have access to new information sources such as the Internet) and the 'information poor' (those who are disadvantaged because they do not have access). The concept of a 'digital divide' is being used by researchers around the world to describe disparities in the use of the Internet and new telecommunications services across different social groups — see, for example, NTIA (1999, 2000) and OFTEL (2000).

The most recent studies by the US National Telecommunications and Information Administration (NTIA 1999, 2000) found that there has been soaring growth in access to computers and the Internet for people in all demographic groups and locations (51 per cent of US households had computers and 41.5 per cent had Internet access in August 2000), but there are still major disparities in use across different groups. In particular, NTIA found that:

- high income earners make more use of the Internet than do low income earners;
- white Americans and people from Asian / Pacific backgrounds use the Internet more than do African Americans and Hispanic Americans;
- people with higher educational qualifications use the Internet more than do people with lower qualifications; and
- married couples with children under 18 years of age use the Internet more than does any other household type.

NTIA's findings broadly confirm trends pointed out in an earlier study by the Benton Foundation (1998). This study also suggested a range of barriers to closing the gap between low income and high income populations in telecommunications use and participation, including:

- reluctance by the majority of the population to publicly fund access for people with lower incomes;

- ambivalence towards technology from people with low incomes;
- the lack of political clout of low income and minority communities; and
- the fact that minority and poor students had significantly less access to computers in their classes than more affluent children.

Another US study (Sax, Astin, Korn and Mahoney 1998) found that 80 per cent of private college freshman used email regularly, while only 41 per cent of students attending 'black public colleges' did so.

A study commissioned by the British regulator, OFTEL, on the take-up of the Internet in the United Kingdom (cited in OFTEL 2000) found that 18 per cent of telecommunications consumers claimed to have Internet access at home and that Internet usage was still predominant among the higher social grades, younger age groups and larger households with children. Consumers over 55 years of age and the lower social grades are considerably less likely to use the Internet at home or work (though OFTEL argues that this is slowly changing).

In Australia the concern about the digital divide has taken a regional focus because of differences in metropolitan and regional rates of access to new telecommunications services (ABS 1999a). People living in non-metropolitan areas are thought to be digitally disadvantaged because of the relatively high costs and poor quality of service available to them. There have been strong and consistent calls from community leaders for improved telecommunications services in regional areas. In part this should be seen as an element of the broader issue of regional diversity that has become a hot topic in Australia's policy agenda. Cuts in government, banking and telecommunication services, coupled with low commodity prices and high unemployment rates, have prompted an outcry from those living in regional Australia about the growing divide between the cities and the bush. The regional backlash against the Kennett Government in the Victorian state election and the rise of parties such as One Nation have focused both State Governments and the Federal Government on policies to assist regional areas. The full privatisation of Telstra has been opposed by regional members of the Coalition Government because of the perceived negative effects on services in regional areas.

In March 2000 the Commonwealth Government commissioned the Telecommunications Service Inquiry, headed by Tim Besley, to assess the adequacy of telecommunications services in Australia. The inquiry received a large proportion of its submissions from customers in rural and remote Australia, and many expressed concerns about the timely installation, repair and reliability of basic telephone services, the cost of mobile phone services, and the reliability, speed and cost of accessing the Internet in regional areas. The inquiry report recommended that the Government 'continue to provide financial and strategic assistance to ensure that those currently disadvantaged — especially in regional, rural and remote Australia — are able to take their place in an information society' (DCITA 2000). Particular recommendations suggested that government policies, regulation and support aim to improve communication services in rural and remote areas. In response to the inquiry, the Government gave a commitment to develop a plan of action to address the concerns of consumers living in rural and remote areas. It also gave a commitment to not selling the Commonwealth's remaining shareholding in Telstra until the plan of action had been considered and made public (Alston 2000).

While the supply-side issues, such as the quality and cost of services, are real and efforts must be made to improve access in regional areas, other factors will need to be considered and addressed in policy development. As indicated by overseas studies, sociodemographic factors may also influence access to new communications services. For example, it may be that a large proportion of Australians cannot participate in the knowledge economy — not because of where they live but because of their economic or social circumstances. For this reason, this study focuses on demand-side issues, in particular the influence of sociodemographic factors on the take-up of new technologies. The study uses a wide range of survey data on the use of new technologies in Australia to explore the social and economic characteristics of Australians with different levels of access to and usage of communication services. The aim of the study is to contribute to a better understanding of the reasons for the different levels of access and use, and thus to provide information about the kinds of industry and government strategies that might be most effective in encouraging a broader take-up of services.

2 Data sources

Four major data sources were used for this analysis. Data from ABS and KPMG surveys were used to analyse the characteristics of people who have access to the Internet at home and changes over time. Data from the 1993-94 Household Expenditure Survey (HES) were updated by NATSEM and used to analyse factors affecting fixed-line phone expenditure. Data from NATSEM's NetInfo model were used to analyse and map regional concentrations of high and low usage of telecommunications services.

ABS surveys on household use of information technology, 1998 and 1999

For 1998 and 1999 the Australian Bureau of Statistics (ABS) provided custom data from the Household Use of Information Technology Survey (a part of the ABS Population Survey Monitor). The Population Survey Monitor is a quarterly household survey of approximately 3000 households throughout Australia. The survey covers rural and urban areas across all States and Territories of Australia, except sparsely settled and 'indigenous' areas. All persons living in non-private dwellings are excluded. Information is obtained by personal interviews with adult members of selected households.

In the Household Use of Information Technology Survey, questions are asked of a randomly selected person aged 18 years or over (the one with the next birthday) within the selected household. Estimates obtained from the survey are derived using a complex ratio estimation procedure that ensures that the survey estimates conform to an independently estimated distribution of the total population by age, gender and area (ABS 2000c). The survey includes questions on ownership of mobile phones, ownership of a personal computer (PC) and access to the Internet at home, work and other sites. The question about Internet access was: '(Does any member of the household / do you) have access to the Internet at home?' Data from the February 2000 and May 2000 surveys were not available, but published results from these surveys were used in the analysis (ABS 2000a, 2000b).

The sociodemographic variables provided by the ABS, including household income, age, gender, highest educational qualification, State or Territory of residence, region of residence, and the age of the eldest child in the household, were chosen to be consistent over time.

KPMG household survey

For 2000 the data source is the KPMG Centre for Consumer Behaviour's survey of 700 households conducted in March 2000. The survey was conducted by phone and only one adult (randomly selected) per household was interviewed. The survey company reweighted the data to be representative of the Australian population. The survey collected information on whether the interviewee had a mobile phone, the number of phone calls made during the previous week, whether the interviewee had Internet access at home, as well as the sociodemographic characteristics of the person. The question about Internet access was: 'Do you have access to the Internet from home?'

1993-94 ABS Household Expenditure Survey, with expenditure aged to 1999

The Household Expenditure Survey contains weekly household expenditure on telephones. In 1993-94 mobile phone usage was small so the HES values are representative of expenditure on fixed-line phones. Because of dramatic price declines, new products and technologies (for example, mobile phones), expenditure patterns have changed considerably since 1993-94. For example, the telephone expenditure patterns of the young have changed dramatically because of mobile phones. Despite these limitations, the 1993-94 HES provides a useful indication of the impact of income and other factors on phone expenditure. Expenditure has been aged to 1999 values.

NetInfo

The NetInfo model is a synthetic dataset created by NATSEM by combining the 1996 census CDATA with the ABS 1993-94 HES unit record file (aged to 1999) and the KPMG Consumer Behaviour data. The census covers the whole population and provides detailed sociodemographic data on a street block level (Census Collectors District — CCD). The Household Expenditure Survey provides expenditure information and more detailed income information. NetInfo uses 10 sociodemographic variables to merge the HES and the KPMG data. Weights from NATSEM's Marketinfo model are added so that variables can be estimated for any CCD in Australia. Marketinfo uses 64 sociodemographic variables to reweight the original HES data to match the sociodemographic profile of the CCD. The resulting NetInfo micro

dataset contains sociodemographic, income and Internet usage information for each CCD in Australia. For this study NetInfo has been used to estimate the Internet connection rates at a regional level.[1]

Comparability of ABS and KPMG survey data

The ABS and KPMG data are reasonably comparable in scope and method of selection. The age and gender profiles of the surveys are similar. While there was considerable growth in Internet access rates between the two surveys, this accords with growth rates in other ABS surveys showing significant growth in the proportion of households connected (ABS 2000a).

The major difference between the ABS and the KPMG surveys is that the ABS surveys were conducted face to face while the KPMG survey was conducted by phone (Computer Aided Technology Inc methods). In addition, the sampling methods and ways to deal with non-response varied. Another source of variation could result from different interpretation of the Internet access questions. While the ABS survey explicitly asked whether anyone in the household had Internet access, the KPMG survey was less specific. It is likely that some respondents to the KPMG survey interpreted the question to mean that they personally had access — a narrower definition.

A comparison of the sociodemographic profiles of adults with Internet connections at home also indicates a broad comparability of the surveys. While section 3 shows a significant shift in the income and age distribution of adults with access to the Internet, the analysis indicates consistency between the surveys on all variables except gender. The KPMG survey shows that men have a much higher incidence of Internet access than women have, whereas the ABS data show only a marginal difference. It would appear that the survey methodology is affecting the results for gender. Differences in the interpretation of the Internet access question may be responsible for the gender difference between the KPMG and the ABS survey data.

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1 While this modelling is based in part on data obtained under licence from the ABS, this does not imply any endorsement for the new databases on the part of the ABS or the Commonwealth.

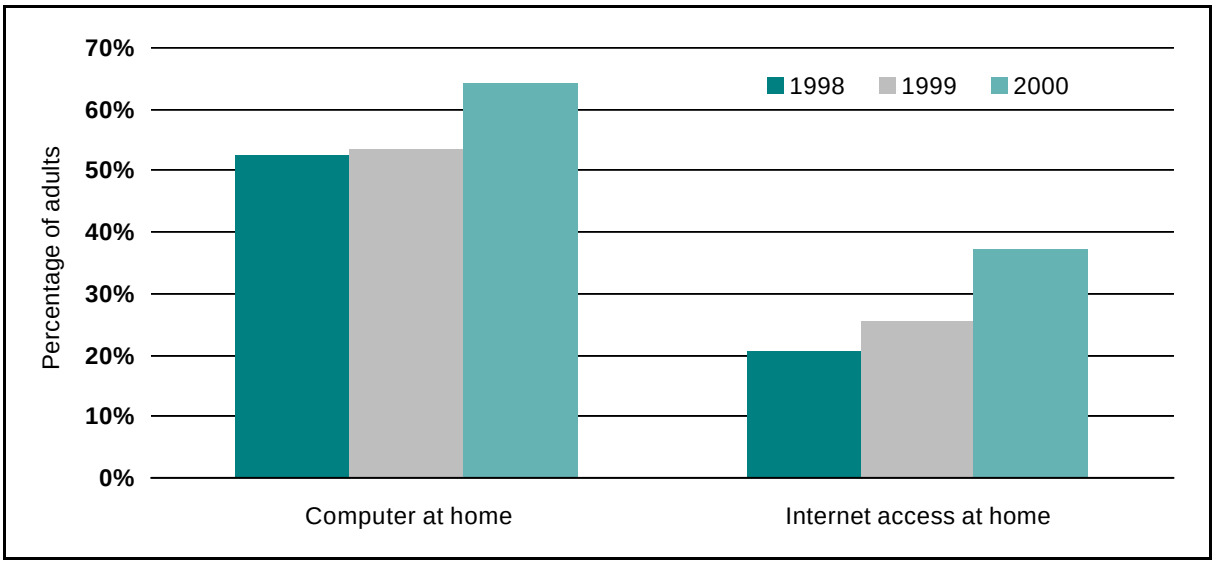
3 Characteristics of adults with home Internet access

In March 2000, 64 per cent of adults had access to a computer at home and 37 per cent of adults had access to the Internet at home (figure 1). Between 1999 and 2000 there was a considerable increase in the proportion of adults with Internet access at home (from 25 per cent to 37 per cent) and a smaller increase in PC access (from 53 to 64 per cent).

In 1998 there was only a small gender gap in the rate of home Internet access, with males having a slightly higher rate than females. The gender gap was largely unchanged in 1999 (figure 2). In contrast, the KPMG data show a much larger gap in 2000. This may be a result of the differences between the ABS and KPMG survey questions rather than a growing gender gap. The figures for Internet use — rather than access — show a wider gender gap in 1999 and 2000 (ABS 1999a, 2000b).

The age profiles are remarkably flat until the age group of 55 years and over. That group has a much lower rate of Internet access at home. For all age groups, home Internet access increased from 1998 to 2000, but the growth was generally strongest for middle-aged and older Australians, causing the distribution of access by age to become more even (figure 3). From 1998 to 1999 growth was strongest for women aged 18–24 (10

Figure 1 **Adults with access to a computer and the Internet at home, 1998 to 2000**

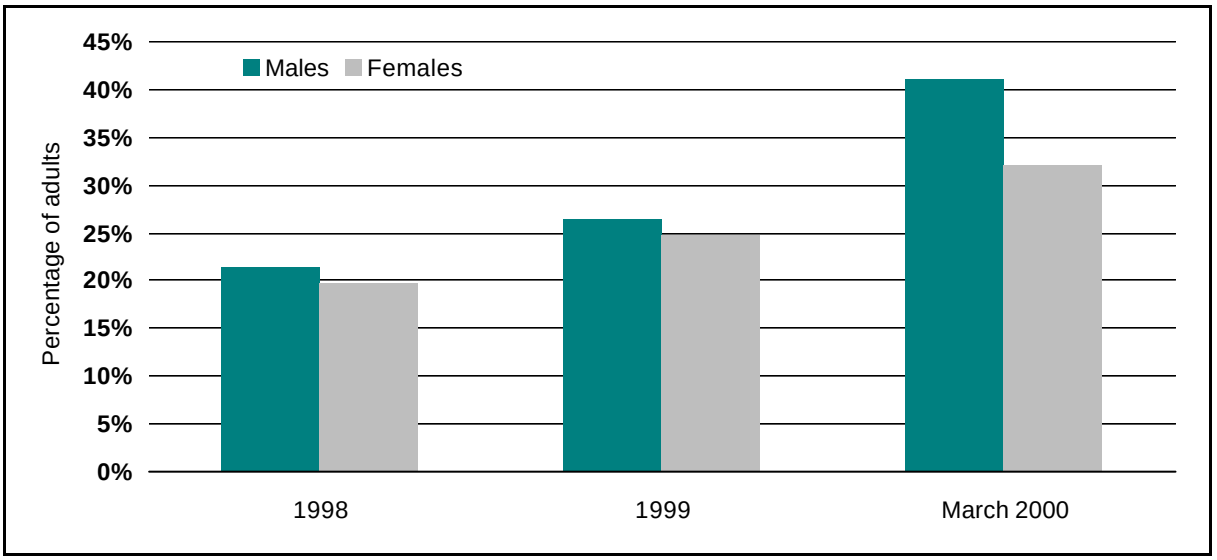


Data sources: Unpublished data from the ABS Household Use of Information Technology Survey (1998 and 1999) and KPMG Household Survey (March 2000).

percentage points) and for men aged 35–54 (8 percentage points) (table 1). The proportion of women aged 55 years and over with Internet access at home almost doubled from 6 per cent in 1998 to 10 per cent in 1999.

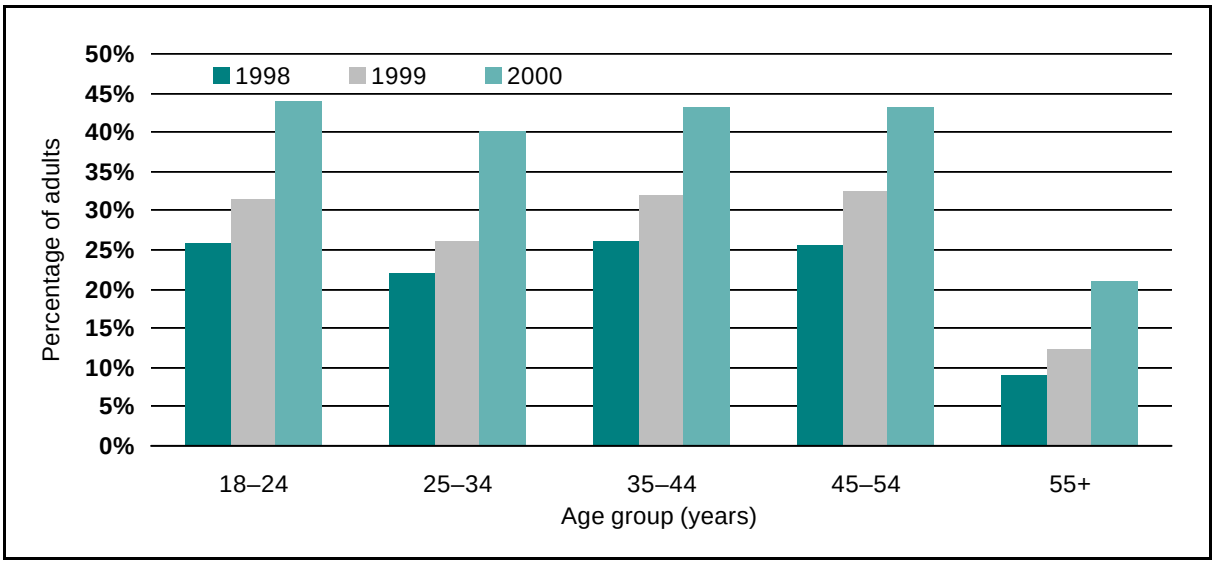
The proportion of adults who have Internet access at home rises strongly with household income (figure 4). In 1999, only 6 per cent of the adults in the lowest income group (less than $19 000 a year) had Internet access at

Figure 2 **Adults with Internet access at home, by gender, 1998 to 2000**



Data sources: Unpublished data from the ABS Household Use of Information Technology Survey (1998 and 1999) and KPMG Household Survey (March 2000).

Figure 3 **Adults with Internet access at home, by age group, 1998 to 2000**



Data sources: Unpublished data from the ABS Household Use of Information Technology Survey (1998 and 1999) and KPMG Household Survey (March 2000).

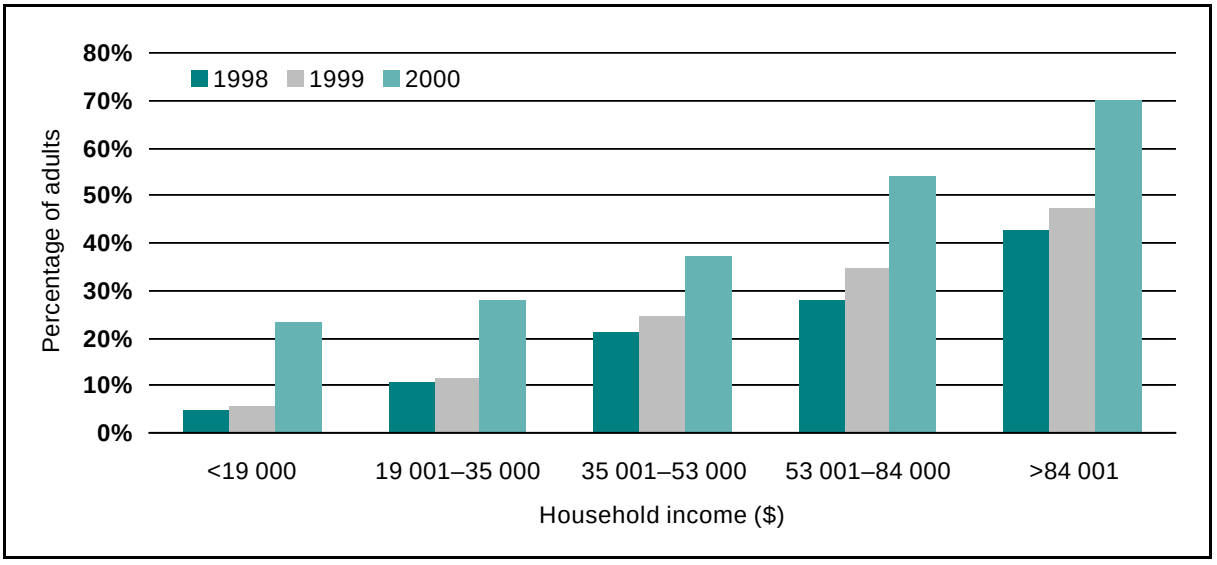
home, while 47 per cent of adults in high income households (more than $84 000 a year) had such access. In other words, the rate of Internet connections at home for the top income group was almost 8 times the rate for the bottom income group.

Table 1 **Percentage of adults with Internet access at home, by age group and gender, 1998 and 1999**

	18–24 years	25–34 years	35–44 years	45–54 years	55+ years	All age groups
	%	%	%	%	%	%
Males						
1998	31	22	25	24	12	21
1999	32	25	33	32	15	26
Percentage point change 1998–99	1	3	8	8	3	5
Females						
1998	21	22	27	27	6	20
1999	31	27	31	33	10	25
Percentage point change 1998–99	10	5	4	6	4	5
All adults						
1998	26	22	26	25	9	21
1999	31	26	32	32	12	25
Percentage point change 1998–99	5	4	6	7	3	5

Source: Unpublished data from the ABS Household Use of Information Technology Survey (1998 and 1999).

Figure 4 **Adults with Internet access at home, by household income, 1998 to 2000**

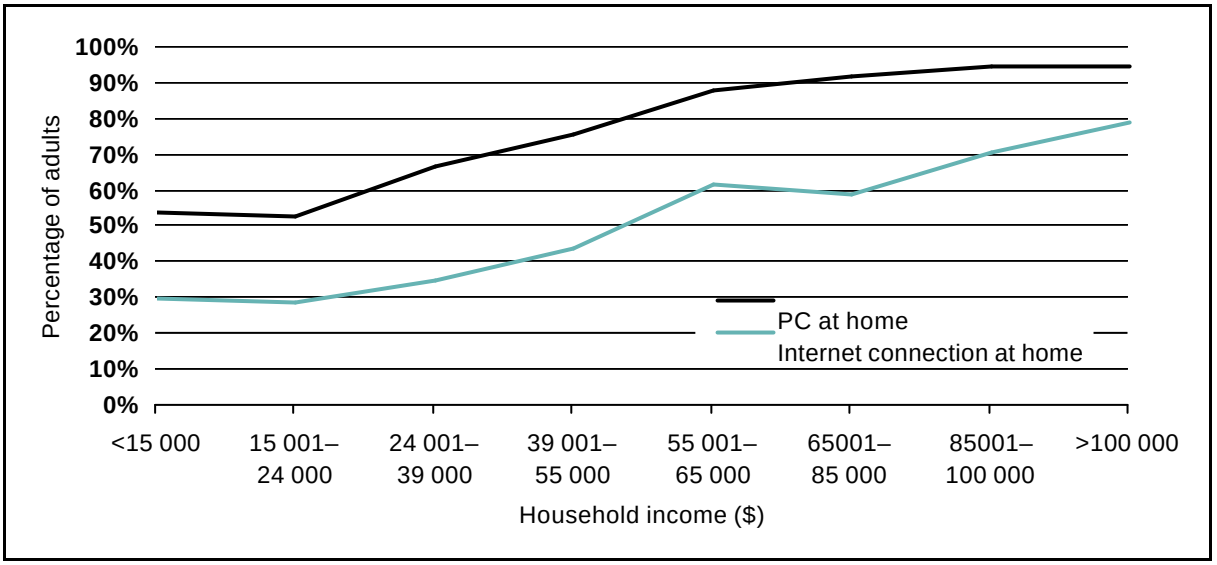


Data sources: Unpublished data from the ABS Household Use of Information Technology Survey (1998 and 1999) and KPMG Household Survey (March 2000).

The proportion of adults with Internet access at home increased between 1998 and 1999 for all income groups (figure 4). However, the increase was greater for adults in high income households, causing the gap in access between high and low income households to grow. For example, the proportion of adults in the lowest income group with Internet access at home increased from 5 per cent to 6 per cent. For adults in the second highest income group, the proportion with Internet access at home increased from 28 per cent to 35 per cent, and for those in the highest income group the proportion increased from 42 per cent to 47 per cent. The KPMG data for 2000 show that, in absolute terms, there was significant growth in Internet access rates for the low and high income groups but less growth for those with incomes in the range from $35 000 to $53 000. In general, the income distribution can be expected to become more even as the rate of access for those with high incomes reaches saturation point and the rate for those with low incomes continues to increase.

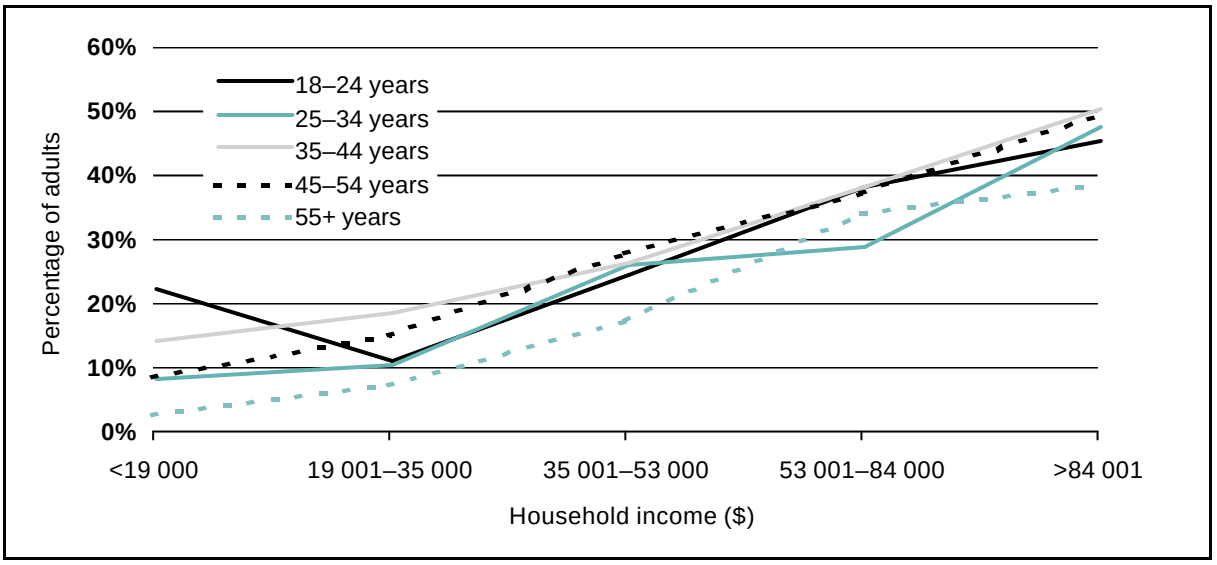
Income is a much stronger predictor of having an Internet connection at home than it is for PC access, as illustrated by the steeper line in figure 5. In March 2000, 89 per cent of adults with a household income of more than $100 000 a year had access to a PC at home. Seventy-three per cent of adults in this income group had access to the Internet at home. PC ownership was close to its maximum at a household income of around $65 000 but the proportion of people with an Internet connection

Figure 5 **Adults with PC and Internet access at home, by household income, 2000**



Data source: KPMG Household Survey (March 2000).

Figure 6 **Adults with Internet access at home, by household income and age group, 1999**



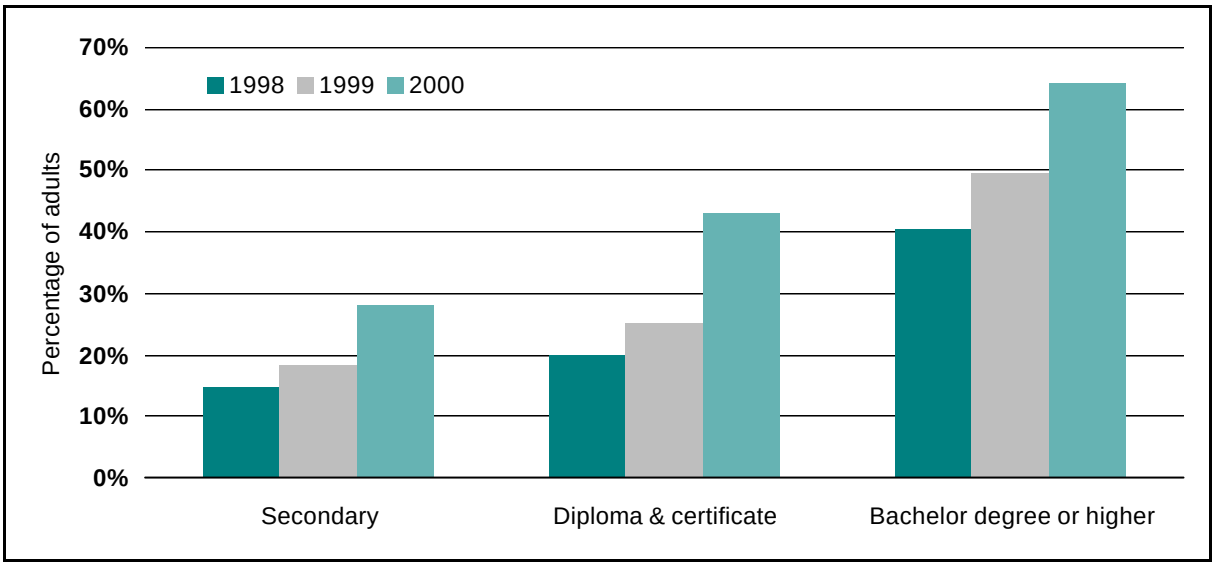
Data source: Unpublished data from the ABS Household Use of Information Technology Survey (1999).

increased with income up to the highest income group (more than $100 000 a year). Almost 50 per cent of adults in the bottom income group (less than $19 000 a year) lived in a household with a PC, but only half of them (24 per cent of adults in this income group) had access to the Internet at home. For the top income group, 82 per cent of the 89 per cent of PC owners had Internet access at home.

Figure 6 shows that the income profiles of adults with Internet access at home are very similar for the various age groups. In other words, there is only a little interaction between income and age as the driver for Internet access at home. The main exceptions are the high access rates for low income people aged 18–24 (the group likely to include students) and the low incidence of persons aged 25–34 in the income group $53 001 to $84 000. This group includes a greater share of single people and couples without children, who are less likely to have Internet access at home.

Educational qualifications also have a strong influence on Internet access (figure 7). The proportion of adults with Internet access increases with level of education. In 2000, 64 per cent of those with a Bachelor degree (or higher) had access to the Internet at home, but just 28 per cent of those with no more than secondary school education had access. However, it appears that the groups with low levels of education have had higher growth rates in recent times. This is consistent with the picture of the diminishing impact of income, as noted earlier.

Figure 7 **Adults with Internet access at home, by educational qualifications, 1998 to 2000**



Data sources: Unpublished data from the ABS Household Use of Information Technology Survey (1998 and 1999) and KPMG Household Survey (March 2000).

Households with children are more likely to have Internet access at home (table 2). In 1999, 40 per cent of adults living in households whose eldest child was aged 15 years or over had Internet access, compared with 21 per cent of adults living in households without children. Children under the age of 10 had little impact on the likelihood of adults living with them having Internet access at home, but children aged 10 or over did. However, income remains a more dominant variable, with high income households with young children or no children having up to three times the access rates of low income households whose eldest child was aged 10 years or over.

Table 2 **Percentage of adults with Internet access at home, by household income and age of the eldest child, 1999**

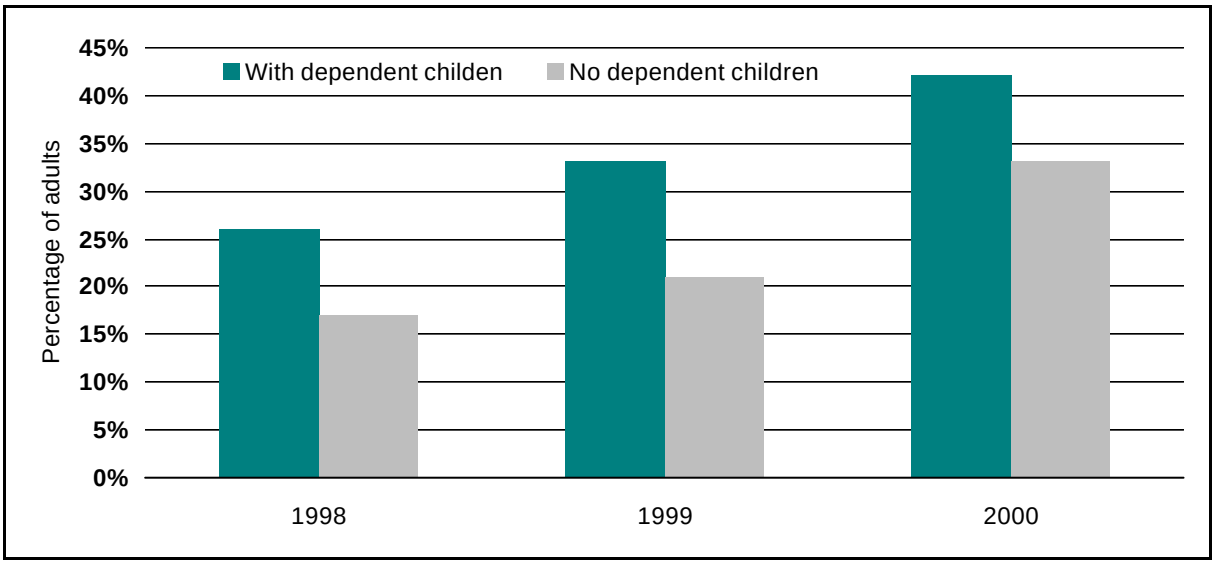
	Household income					
Age of eldest child	<$19 000	$19 001–35 000	$35 001–53 000	$53 001–84 000	>$84 000	All income groups
	%	%	%	%	%	%
No children	4	9	22	30	42	21
0–4 years	8	9	24	35	50	27
5–9 years	7	17	21	32	47	26
10–14 years	16	17	32	40	55	35
15–17 years	18	15	31	48	57	40
All	6	11	24	35	47	25

Source: Unpublished data from the ABS Household Use of Information Technology Survey (1999).

The rate of Internet access at home for adults rose between 1998 and 2000 almost independently of whether children were present (figure 8). While the data from 1999 and 2000 are difficult to compare, there is no indication of dependent children having a major impact on access.

Internet access at home varies only moderately by State or Territory (table 3). South Australia had the lowest incidence and low growth in such access between 1999 and 2000. By way of comparison, the incidence appears to have grown considerably in Tasmania. However, small sample sizes mean that there is some doubt about the reliability of both estimates.

Figure 8 **Adults with Internet access at home in households with and without dependent children, 1998 to 2000**



Data sources: Unpublished data from the ABS Household Use of Information Technology Surveys (1998 and 1999) and KPMG Household Survey (March 2000).

Table 3 **Percentage of adults with Internet access at home, by State or Territory, 1998 to 2000**

	1998	1999	March 2000	Percentage point change, 1999 to 2000
	%	%	%	% point
New South Wales	23	26	39	13
Victoria	18	27	36	9
Queensland	20	23	40	17
South Australia	19	23	25	2
Western Australia	20	27	33	6
Tasmania	15	21	36	15
Northern Territory	20	32	39	7
Australian Capital Territory	33	38	39	1

Sources: Unpublished data from the ABS Household Use of Information Technology Surveys (1998 and 1999) and KPMG Household Survey (March 2000).

Table 4 shows the considerable gap in Internet access at home between metropolitan and other areas. The gap increased between 1998 and 1999. The proportion of adults in metropolitan areas with Internet access grew from 23.6 per cent to 29.5 per cent between 1998 and 1999, while in other areas the proportion increased from 14.9 per cent to 17.8 per cent. It seems that the gap narrowed a little between 1999 and 2000. However, the methodological issues and different regional definitions in the two surveys mean that this result is not robust.

The Internet access rates for households with low and medium incomes (up to $35 000 a year) in non-metropolitan areas were stagnant from 1998 to 1999 (table 5). Conversely, in metropolitan areas, the rates of Internet

Table 4 **Percentage of adults with Internet access at home, by region, 1998 to 2000**

	Metropolitan	Non-metropolitan	Difference between metropolitan and non-metropolitan
	%	%	% point
1998	23.6	14.9	8.7
1999	29.5	17.8	11.7
March 2000	40.0	30.0	10.0

Sources: Unpublished data from ABS Household Use of Information Technology Survey (1998 and 1999) and KPMG Household Survey (March 2000).

Table 5 **Percentage of adults with Internet access at home, by region and household income, 1998 and 1999**

	Household income					
Region	<$19 000	$19 001–35 000	$35 001–53 000	$53 001–84 000	>$84 000	All income groups
	%	%	%	%	%	%
Metropolitan						
1998	5	12	21	29	45	24
1999	7	13	28	38	49	29
Percentage point change 1998–99	2	1	7	9	4	5
Non-metropolitan						
1998	4	9	20	25	34	15
1999	4	9	17	27	39	18
Percentage point change 1998–99	0	0	-3	2	5	3

Source: Unpublished data from the ABS Household Use of Information Technology Survey (1998 and 1999).

access increased for all income groups, though more strongly for higher income households. The data do not provide evidence of why take-up has been slower in non-metropolitan areas, but lower levels of marketing, attitude to technology, and access to services may all have an effect. Other NATSEM studies have shown that the proportion of people with post-secondary, and particularly tertiary, education is much lower in non-metropolitan areas (Lloyd, Harding and Hellwig 2000).

The KPMG survey gives a more detailed regional breakdown and showed that in March 2000 metropolitan regions had the highest access rates (40 per cent) and other urban areas the lowest (28 per cent) (table 6). This finding accords with other NATSEM research that found rural areas had higher incomes and higher growth rates of incomes in the 1990s than 'other urban areas' (Lloyd, Harding and Hellwig 2000). This is reflected in the low Internet take-up rates in 'other urban areas'.

Table 6 **Internet access at home, by region, March 2000**

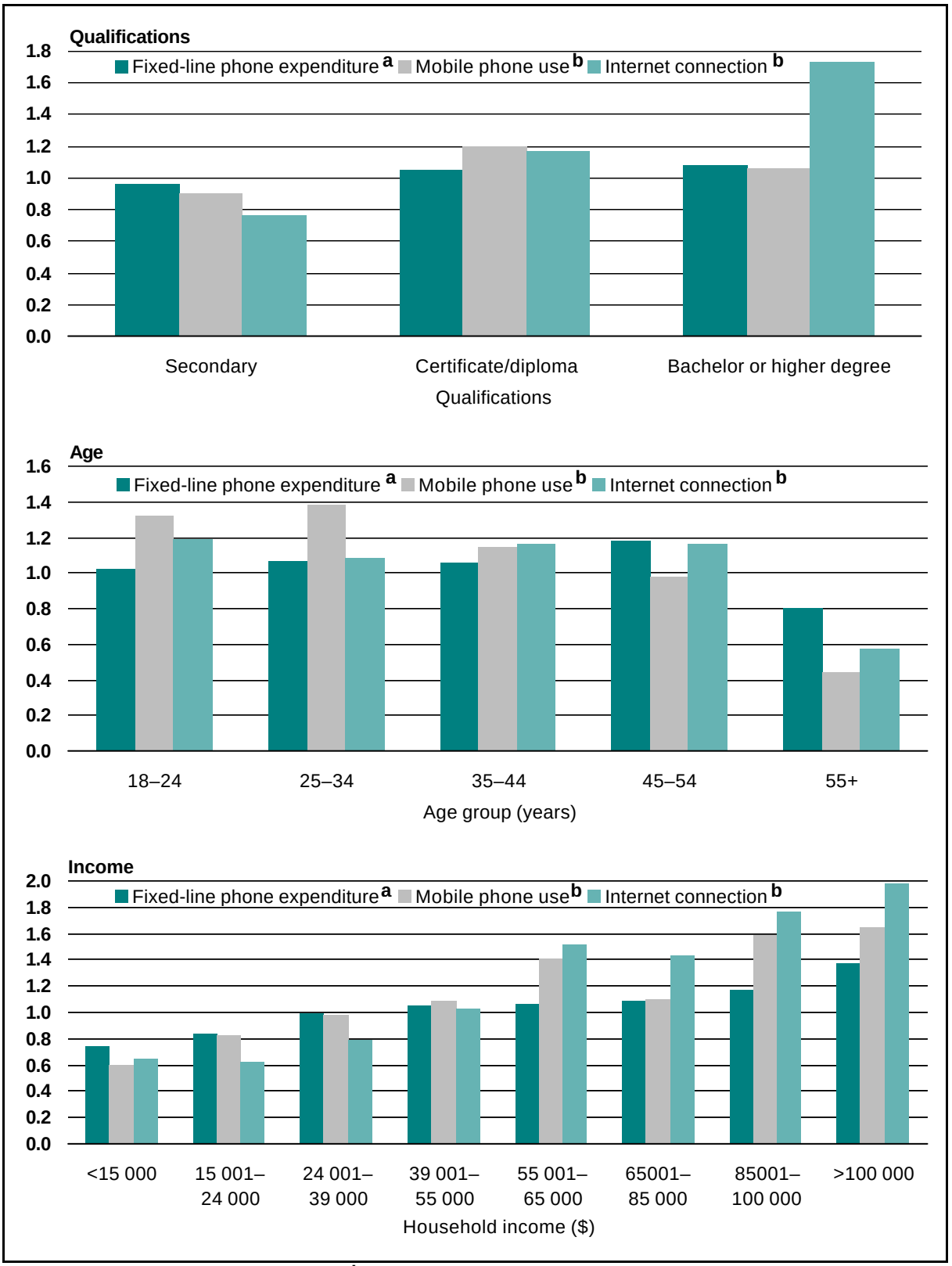
Region	Percentage of adults
	%
Metropolitan areas	40
Other urban areas	28
Rural areas	33

Note: Metropolitan areas are greater Sydney, greater Melbourne etc. Metropolitan areas are defined as Statistical Division 5 of the ABS Australian Standard Geographical Classification (ABS 1999b). Rural areas are rural towns and localities with up to 999 inhabitants.

Source: KPMG Household Survey (March 2000).

Figure 9 enables the distribution of Internet access to be compared with mobile phone use and fixed-line phone expenditure for three key sociodemographic variables — educational qualifications, age and income. Phone expenditure and the use of mobile phones are generally more evenly distributed over the sociodemographic groups than access to the Internet. For example, the use of fixed line and mobile phones varies only a little between high and low education groups, but Internet take-up rises steeply with education.

Figure 9 **Take-up rates (relative to average), by qualifications, age and income**



a Relative to average estimated for 1999. **b** Relative to average estimated for 2000.

Data sources: KPMG Household Survey (March 2000) and ABS 1993-94 Household Expenditure Survey.

4 Multivariate analysis of home Internet access, mobile phone use and fixed-line phone expenditure

In the previous section, the relationship between Internet access and individual sociodemographic characteristics was examined. This section analyses the main sociodemographic drivers of the three types of technology — Internet, mobile phones and fixed-line phones — using multiple regression. Multiple regression estimates the separate effects of particular factors on the dependent variable by holding other factors constant. In other words, multiple regression allows us to identify what drives the use of new technology by controlling for correlation between the various drivers such as income, age and education.

The KPMG data from the March 2000 survey was used to analyse the incidence of Internet access at home and the use of a mobile phone. For the Internet analysis, the dependent variable was a binary variable of whether the person had access to the Internet at home and the explanatory variables were the sociodemographic characteristics of the respondents. Similarly, for the mobile phone analysis, the dependent variable was a binary variable of whether the person used a mobile phone in the previous week. The 1993-94 HES data, with expenditure levels aged to 1999, were used to analyse fixed-line phone expenditure. The expenditure information from the survey was merged onto the records of randomly selected adults (one in each household) in the KPMG data to make the phone expenditure model comparable with the models of Internet access and mobile phone use. Then average weekly household telephone expenditure data were analysed with respect to the sociodemographic profiles (drawn from the KPMG survey) of the randomly selected adults.

The results of the multiple regression analyses for the three technology types are presented in tables A1–A3 in the appendix to this paper. Positive coefficient values indicate positive impacts of the sociodemographic driver on Internet access (compared with the base category) and negative coefficients indicate negative impacts. T-values with an absolute value exceeding 2 mean that the sociodemographic driver is significant at the 5 per cent error level. The tables show a '*' whenever the absolute value of the t-value exceeds 2, indicating that the sociodemographic driver is significant.

The main findings from the base regression model for the percentage of adults with an Internet connection at home (table A1) follow.

- Academic qualifications are a strong driver, with a diploma/certificate adding 11.7 percentage points and tertiary qualifications adding 22.5 percentage points to Internet take-up when all other factors are held constant. This is remarkable, given that the average take-up is only 37 per cent.
- Blue collar workers are less likely to be connected (12.6 percentage points less than grey collar workers) even when the regression model has corrected for income and qualifications. This could be explained by the low percentage of blue collar workers who have been introduced to the Internet through work. Cultural reasons could also have an impact on this finding.
- Adults aged 55–64 years are significantly less likely to have Internet access (10.2 percentage points less than 35–44 year olds) and adults aged 65 years or over have an even smaller connection share (15.9 percentage points less than 35–44 year olds). These differences are net of income and qualifications and therefore can be interpreted as a pure age effect.
- Females are less likely to have Internet access than are males. For example, the take-up rate for single females is 13.5 percentage points less than for married males. Again this is the pure gender effect — after the impact of different incomes and qualifications has been excluded.
- State of residence has no significant impact on Internet connection rates.
- Location is not responsible for the lower take-up rates in rural areas.

The main findings from the base regression model for the percentage of adults using a mobile phone in the previous week (table A2) follow.

- Single people are less likely (16 percentage points less than married people) to have used a mobile phone within the last week.
- Owner occupiers are less likely than renters to have used a mobile phone in the last week.
- Age is a strong driver with usage rates decreasing with age. For example, the take-up rate among adults aged 25–34 years is 9.7 percentage points more than for adults aged 35–44, while the take-up

rate among adults aged 65 or over is 26.3 percentage points less than the base group.

- Mobile phone usage also decreases as academic qualifications increase. Those with a masters or higher degree are 18.9 percentage points less likely to have used a mobile phone than those with no post-secondary school qualifications.
- There is no significant difference between mobile phone use in metropolitan and in non-metropolitan areas.

The base regression model for fixed-line phone expenditure (table A3) shows that people who were born overseas have significantly higher fixed-line phone expenditure than do people born in Australia, and that single males and people aged 65 or over spend significantly less than average.

The effect of income has not been analysed. This is because there are several explanatory variables related to income (own multiple properties, cash investments, household income, square root of household income) and, as these variables are strongly correlated with each other, the t-values do not reliably indicate the impact of the drivers. In this case, none of the t-values for income is significant. However, additional analysis shows that household income in total (represented by the four driver variables listed above) is a strong predictor of Internet access at home.

This analysis is done using restricted models. The total effect of income is determined by subtracting from one the R-square of the restricted regression model when the four income-related variables are omitted divided by the R-square of the full regression model containing all sociodemographic drivers. The predictive power of other sociodemographic factors, such as qualification and region, is determined in the same way. Tables 7, 8 and 9 rank the drivers according to their predictive power and add comments based on the coefficients from the appendix.

The percentages in each table do not add up to 100 per cent because the joint predictive power of sociodemographic drivers is omitted. For example, the 9 per cent predictive power of income for Internet access represents the explanatory power of income that cannot be explained by qualifications and other variables despite the correlation between qualifications and income.

The major findings from tables 7–9 follow.

- Once other factors are taken into account, region of residence on its own has no significant impact on Internet take-up at home. The observed differences between metropolitan, other urban and rural areas can be fully explained by the sociodemographic characteristics of the population, particularly the lower qualification levels and lower incomes of the non-metropolitan population.
- Qualifications are the strongest driver of Internet connection at home — well ahead of income.
- Households that receive government benefits have a higher rate of Internet connections at home than households that do not receive government benefits. It may be that this is a proxy for the number of children at home, but the variable 'household has no children at home' is not significant.
- Age and occupation are secondary factors for Internet take-up. The aged are likely to be disadvantaged not only due to the age effect but because of lower incomes and lower qualification levels. Similarly gender differences exist because of the lower incomes and qualification levels of women.
- The sociodemographic drivers for mobile phone use are very different from the drivers for Internet access. For example, while the proportion of adults with Internet access at home increases with education, tertiary education decreases the likelihood of using mobile phones (after controlling for income and other factors). Age is the most important driver of mobile phone use. Income is of only minor relevance. The main similarities between the sociodemographic driver patterns for Internet access and mobile phone use are that usage decreases with age and males have a higher take-up than females have.
- Patterns for fixed-line phone expenditure differ significantly from the take-up patterns for Internet and mobile phones. Such expenditure is largely driven by income and age. Qualifications and occupation play only minor roles, in contrast to the cases for the newer technologies of the Internet and mobile phones. Fixed-line phone expenditure is driven by need and capability to pay and there are virtually no regional or sociodemographic access barriers. This is not surprising as phones are common and easy to use, and no knowledge or technological barriers exist.

Table 7 **Major drivers of Internet access at home** Based on predictive power of drivers net of other factors in percentage of total R-square

Driver	Effect	Predictive power
Qualifications	Internet access increases with qualification level	20%
Income	Internet access increases as income increases	9%
Receive govt benefits	Households receiving government benefits are more likely to have Internet access	5%
Gender & marital status	Females are less likely to have Internet access	5%
Age	People over 55 are less likely to have Internet access	4%
Occupation	Blue collar workers are less likely to have Internet access	4%
State/region of residence	No effect	0%

Source: KPMG Household Survey (March 2000).

Table 8 **Major drivers of mobile phone use** Based on predictive power of drivers net of other factors in percentage of total R-square

Driver	Effect	Predictive power
Age	People over 45 are less likely to use mobile phones	14%
Qualifications	People with tertiary education use mobile phones less	6%
Gender & marital status	Married people (especially males) use mobiles more	5%
Income	Mobile phone use increases marginally as income increases	3%
Receive govt benefits	Little effect	1%
Occupation	Little effect	1%
State/region of residence	No effect	0%

Source: KPMG Household Survey (March 2000).

Table 9 **Major drivers of fixed-line phone expenditure** Based on predictive power of drivers net of other factors in percentage of total R-square

Driver	Effect	Predictive power
Income	Phone expenditure increases as income increases	29%
Age	People over 65 have lower phone expenditure	8%
Gender & marital status	Single males spend slightly less	2%
State/region of residence	Some state effects	2%
Occupation	No effect	0%
Receive govt benefits	No effect	0%

Note: Qualifications are not available in the HES data. State/region of residence is coded using driver variables only for the 8 States and Territories and not for metropolitan, other urban and rural areas.

Source: ABS 1993-94 Household Expenditure Survey.

5 Projection of Internet access at home

5.1 Projection methodology

With Internet access increasing very rapidly in the past 12 months, any analysis of Internet access at home is likely to become outdated very quickly. To assess the potential extent and structure of households without Internet access at home, projections were undertaken. Initially it was hoped that data on Internet access from 1996 to 2000 could be used to extrapolate future Internet take-up rates. However, with significant growth in Internet access rates in late 1999 and early 2000 simple extrapolations did not capture the resultant broadening of the sociodemographic profiles of connected households.

Consequently, an alternative way of projecting Internet access at home has been employed in this research. We assume that the following two groups will connect to the Internet at home in the medium term (within three years).

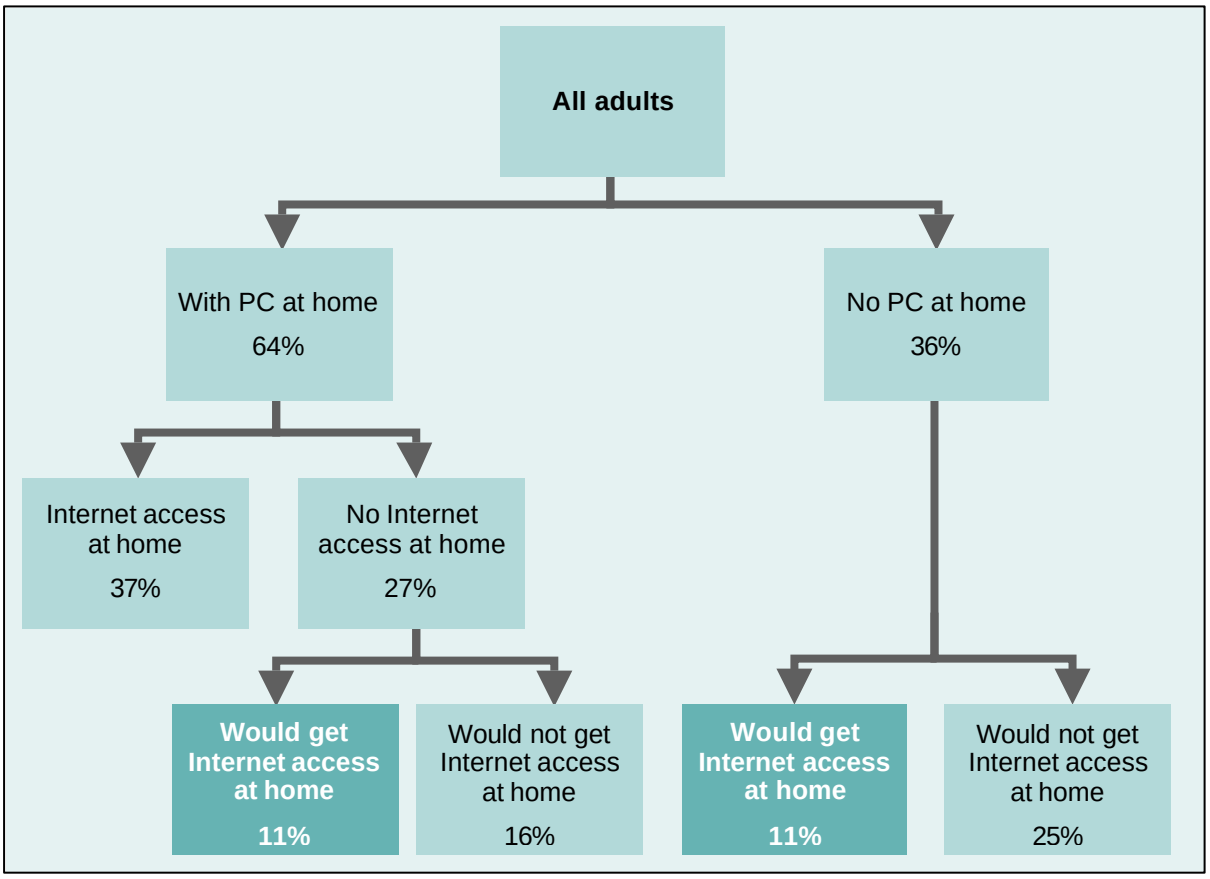
1. Those who would connect if the barriers to purchasing over the Internet were reduced

The KPMG survey contains the following question, which aims to identify adults / households that are likely to get Internet access at home if barriers to buying goods and services using the Internet are reduced.

> Imagine a time when all the current barriers to using the Internet for purchasing were reduced. There would be guaranteed security on financial transactions and guaranteed privacy, delivery issues would be taken care of, access would be cheap and services easy to set up and use. Would you get Internet access?

It is unlikely that the barriers will be removed completely within three years — one reason being that, although prices will continue to decrease, they will not become marginal. However, barriers will be reduced as growth in e-commerce services increases exponentially, security and privacy issues are addressed, and the costs of both connecting to the Internet and purchasing hardware continue to decrease. In addition, this question identifies people who would connect for commercial reasons. There may be others who are not interested in purchasing but may connect to use the Internet for study or communication. Also, as the Internet becomes more popular and new technology provides new ways

Figure 10 **Potential Internet access at home if commercial barriers to the Internet are removed**



Data source: KPMG Household Survey (March 2000).

in which it can be used (for example, TV-based and wireless Internet access), more households will see the benefits of Internet access at home and connect.

On balance, we assume that the positive factors outweigh the factors that would cause the KPMG question to overestimate actual Internet take-up. In the March 2000 survey, 22 per cent of adults said that they would get Internet access at home if the barriers were removed (figure 10). Of these, half (11 per cent of the total) already have a PC at home. Removal of the barriers would result in 41 per cent of adults with a PC at home getting Internet access. Of the adults without a PC at home, a remarkable 31 per cent would get Internet access at home if the barriers as described in the KPMG survey were removed.

2. Those who have Internet access at work or at other sites, but not at home

Figure 11 shows that 25 per cent of adults have access to the Internet at work (compared with 37 per cent with access at home). Sixty-eight per cent of adults with access at work also have access at home. It would be

optimistic to assume that all adults who currently have access at work will get access at home. Similarly it may be a little optimistic to assume that the 4 per cent of adults with access at other sites — probably mostly students — will all get access at home.

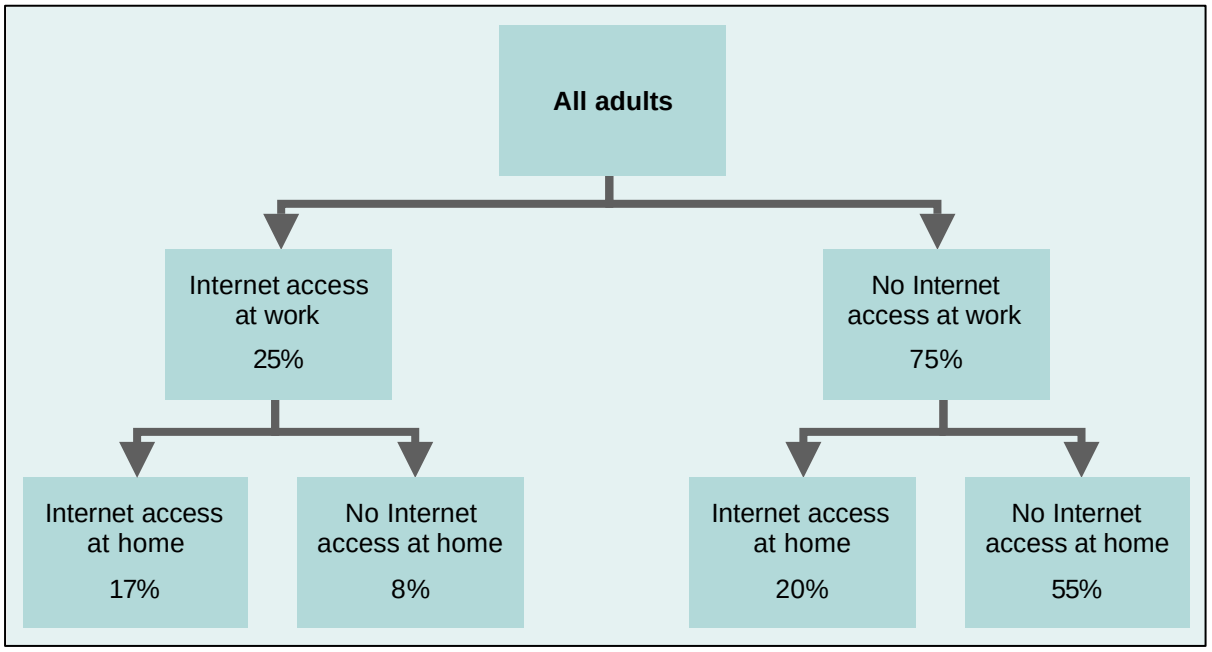
However, it is likely that the proportion of adults with Internet access at work will increase considerably over the next few years. Only 27 per cent of adults without Internet access at work have Internet access at home but, as already noted, 68 per cent of adults with Internet access at work also have access at home. Therefore, an increase in Internet access at work must be expected to considerably increase the number of adults with Internet access at home.

On balance, the assumption that all adults with Internet access at work or at other sites will also get access at home is probably conservative.

In summary, our projection assumes that within the next three years:

- all adults who were connected in March 2000 will keep their Internet connection at home (37 per cent);
- all adults who indicated that they would get connected at home if the commercial Internet barriers were removed will be connected (22 per cent);

Figure 11 **Relationship between Internet access at home and Internet access at work**



Data source: KPMG Household Survey (March 2000).

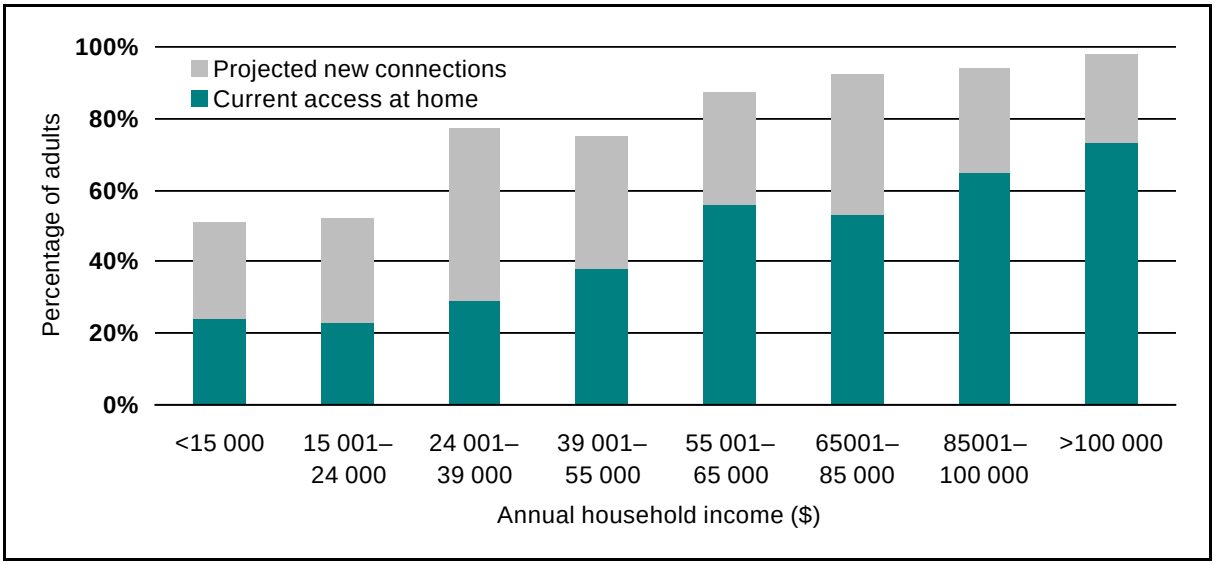
- all adults who were connected at work but not yet at home will be connected at home (8 per cent); and
- all adults who had access to the Internet at other sites but not yet at home will be connected at home (4 per cent).

These assumptions result in 71 per cent of adults being connected at home within the next three years (compared with 37 per cent in March 2000). This projection accords with high growth rates in Internet use and access in early 2000. For example, AC Nielsen data released in August 2000 show that Internet usage grew by 30 per cent in the three months from April to June (*Industry Standard* 2000). Even if growth in Internet access is 10 per cent a year, 71 per cent of the population will be connected within two years. Furthermore, the projection accords with projections for the United States (which currently has a lower connection rate than Australia has). Forrester Research predicts that 70 per cent of the US population will be connected to the Internet by 2004 (*E-Commerce Times* 2000).

5.2 Characteristics of groups projected to be connected

Figure 12 shows projected Internet access by income group. This projected access is comprised of adults currently connected and those projected to get a connection within the next three years. The proportions of adults projected to get connections are fairly evenly

Figure 12 **Current and projected Internet access at home, by household income**

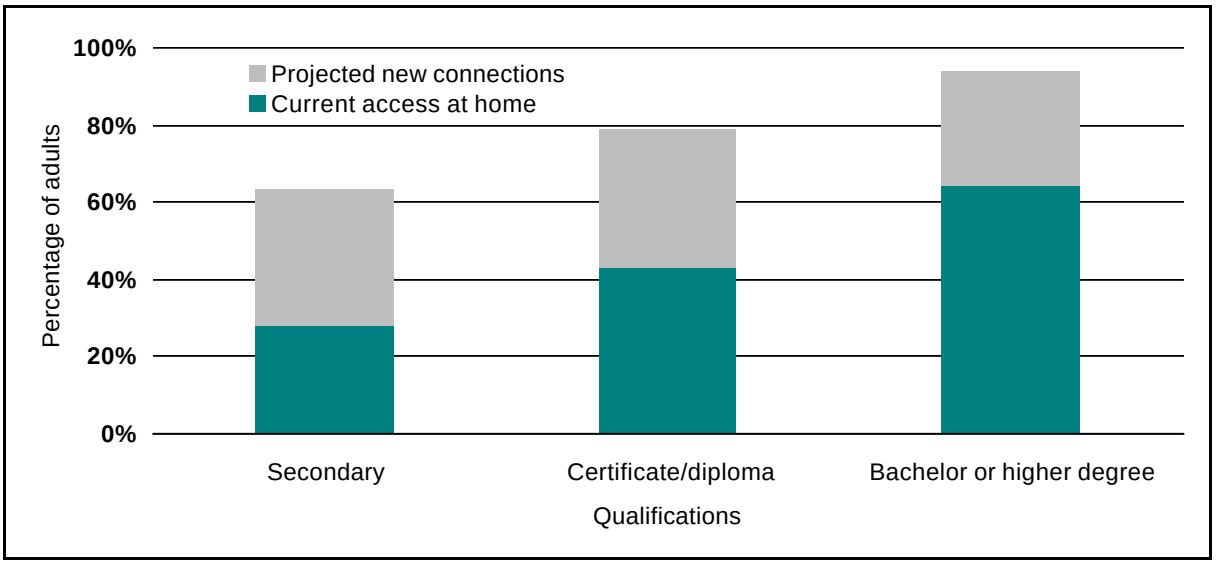


Data sources: KPMG Household Survey (March 2000) and NATSEM calculations.

distributed across income groups. However, projected connection rates are higher for adults with incomes between $24 000 and $55 000 a year, causing the proportions connected to become more even for income groups above $24 000. Projected connection rates for adults in the bottom two income groups are lower than for the middle income groups, causing the gap between the middle and the bottom to increase. The two bottom income groups are projected to have connection rates of only 50–60 per cent. However, the ratio of adults with Internet connections in the top income groups to the bottom income groups decreases. Based on the projections, within three years the effect of income on Internet access rates will not be as strong, though some difference in connection rates will remain.

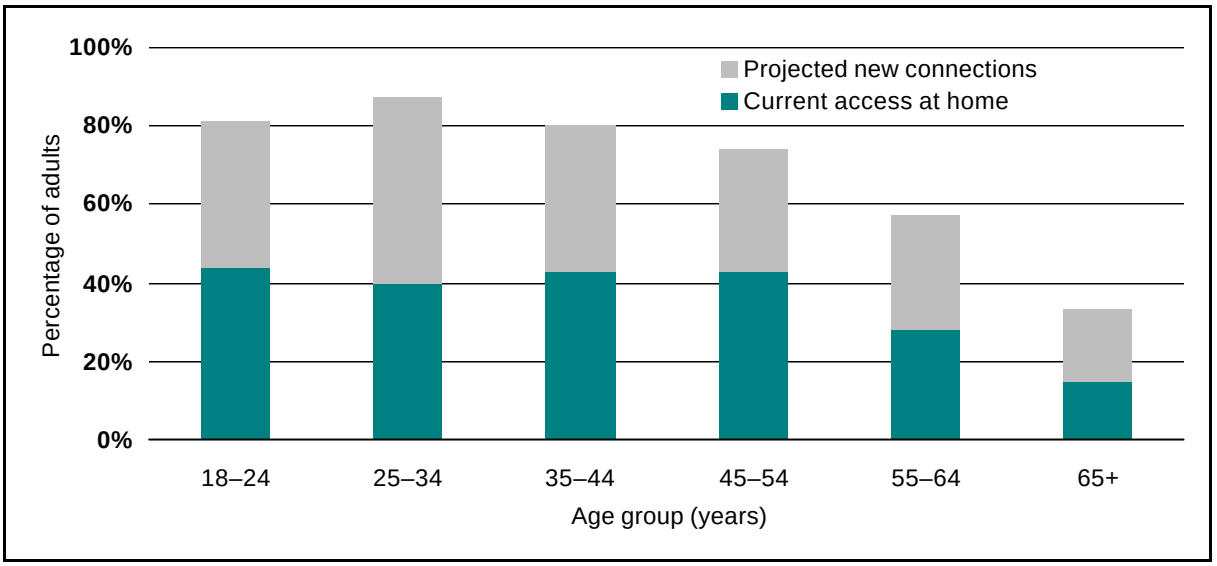
Figures 13 and 14 show that the projected equalisation of access applies not only to income groups but also to groups distinguished by qualifications and age. However, those adults without post-secondary school qualifications and in older age groups (55 years or over, and particularly 65 years or over) are projected to continue to have low connection rates. Projected connection rates are higher in metropolitan areas (figure 15) and this will cause the gap between access rates in metropolitan and non-metropolitan areas to grow.

Figure 13 **Current and projected Internet access at home, by qualifications**



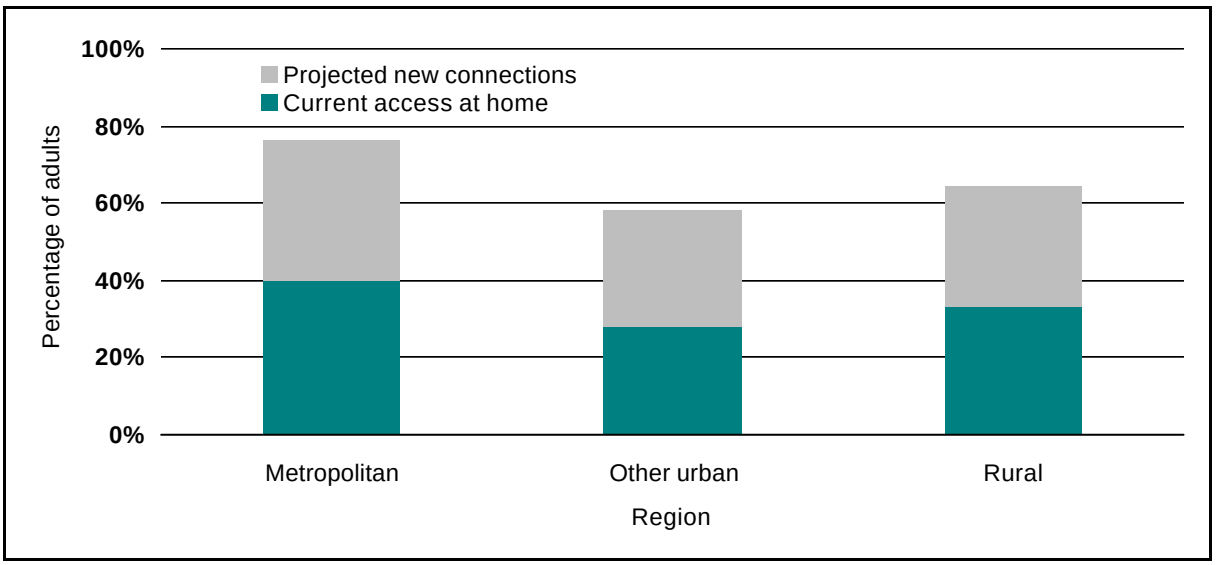
Data sources: KPMG Household Survey (March 2000) and NATSEM calculations.

Figure 14 **Current and projected Internet access at home, by age**



Data sources: KPMG Household Survey (March 2000) and NATSEM calculations.

Figure 15 **Current and projected Internet access at home, by region**



Data sources: KPMG Household Survey (March 2000) and NATSEM calculations.

6 Population groups at risk of remaining digitally disadvantaged

Based on the projected Internet connection rates estimated in section 5, we have identified population groups at risk of remaining without an Internet connection at home within the next three years. These groups (table 10) and their main characteristics are as follows.

- Retirees are the most disadvantaged group. Sixty-three per cent of them (1.9 million people) are projected to remain without an Internet connection at home.
- The next most disadvantaged group is the unemployed and people not in the labour force. Thirty-one per cent (0.5 million adults) are projected to remain without an Internet connection at home.
- The third most disadvantaged group is the other low income group (adults in households with annual income of less than $24 000) — essentially the working poor. Thirty per cent (0.6 million adults) are projected to remain without an Internet connection at home. The projected non-connection rate for this group is only marginally lower than for the group 'unemployed or not in the labour force'.
- The middle income group (with annual household income of $24 000 to $50 000) is better off than the three most disadvantaged groups but still has 21 per cent of adults not connected.
- Ninety-two per cent of adults in the higher income group (with an annual household income of $50 000 or over) are projected to be connected. This is the least disadvantaged group.

Table 10 **Adults who are likely to remain without an Internet connection at home, by population segment**

Group	Number not connected	Percentage of group not connected
	million	%
Group 1: Retirees[a]	1.9	63
Group 2: Unemployed or not in the labour force[b]	0.5	31
Group 3: Other low income (<$24 000 a year)[c]	0.6	30
Group 4: Middle income ($24 000–50 000 a year)	0.7	21
Group 5: Higher income (>$50 000 a year)	0.3	8
Total not connected	4.0	29

[a] All adults aged 65+ or 55+ and not in the labour force. [b] Excludes all retirees. [c] Excludes adults in groups 1 and 2.

Source: KPMG Household Survey (March 2000) and NATSEM calculations.

- In total, 4 million adults are projected to remain without an Internet connection at home — almost half of these being retirees.
- If the non-connection rate is interpreted as a risk factor, the risk factor for retirees is 7.9 times that for households with higher income (63 per cent compared with 8 per cent).
- The risk factor for groups 2 and 3 is 3.8 times that for higher income households. This ratio is large because such a small percentage of higher income households are at risk.

Table 11 shows the regional distribution of adults projected to remain without an Internet connection at home. The main findings follow.

- Fewer retirees in rural areas (50 per cent) will remain unconnected than in metropolitan areas (61 per cent). However, 72 per cent of retirees in other urban areas are projected to remain unconnected. Much of the difference in non-connection rates between the areas can be attributed to the different sociodemographic characteristics of retirees in the various areas, particularly their qualifications, but also incomes.
- The regional patterns for the unemployed and those not in the labour force are quite different. Only 17 per cent of adults in this group in metropolitan areas are likely to remain unconnected, compared with 72 per cent of rural residents and 52 per cent of adults living in other urban areas.
- There are smaller regional differences for the other low income group. Twenty-six per cent of this group in metropolitan areas are expected to remain unconnected, compared with 41 per cent of low income adults in rural areas.

Table 11 **Percentage of adults projected to remain without an Internet connection at home, by population segment and region**

Group	Metropolitan	Other urban	Rural
	%	%	%
Group 1: Retirees	61	72	50
Group 2: Unemployed or not in the labour force	17	52	72
Group 3: Other low income (<$24 000 a year)	26	34	41
Group 4: Middle income ($24 000–50 000 a year)	15	31	36
Group 5: Higher income (>$50 000 a year)	8	16	3
Total not connected	24	43	41

Sources: KPMG Household Survey (March 2000) and NATSEM calculations.

7 Regional distribution of Internet access

Based on the results of the regression model, NATSEM's NetInfo model was used to estimate the current non-connection rates and the average weekly incomes of adults by postcode for each State, Territory and capital city. In this paper, New South Wales and Sydney (see maps 1–4) are presented as an example of these results (see Hellwig and Lloyd 2000 for results for other States).

As noted in section 3, 37 per cent of adults have access to the Internet at home. In other words, 63 per cent of adults do not have an Internet connection at home. The maps of current non-connection rates (map 1 for New South Wales and map 3 for Sydney) show the percentage of adults without a connection at home by postcode. The postcodes have been ranked by non-connection rate from the highest 20 per cent (most disadvantaged) to the lowest 20 per cent (least disadvantaged) for New South Wales.

In New South Wales, up to 78 per cent of adults in some postcodes currently do not have Internet access at home. In the 20 per cent of postcodes with the lowest connection rates between 64 and 78 per cent of adults do not have a connection. In the 20 per cent of postcodes with the highest connection rates between 41 and 54 per cent of adults are not connected.

Map 1 (NSW estimated current non-connection rates) shows the following.

- The postcodes with the highest estimated non-connection rates (64–78 per cent) are concentrated in the north-east part of the State, particularly a coastal band between East Gresford and Tweed Heads, on the south coast and the far west.
- Postcodes with the highest rates of Internet access (46–59 per cent not connected) are concentrated in the south-east of the State. The regions around Moree close to the Queensland border also have fairly high rates of connection.

Map 3 (Sydney estimated current non-connection rates) shows the following.

- Sydney has only one postcode in the least connected 20 per cent of postcodes and four postcodes in the least connected 40 per cent of postcodes.
- Non-connection rates still vary considerably between the various areas in Sydney. The high non-connection rates (greater than 58 per cent) are clustered in the western parts around Auburn and in the inner city.
- The postcodes with the highest connection rates (46–59 per cent) are concentrated on the north shore, and the eastern and southern suburbs.

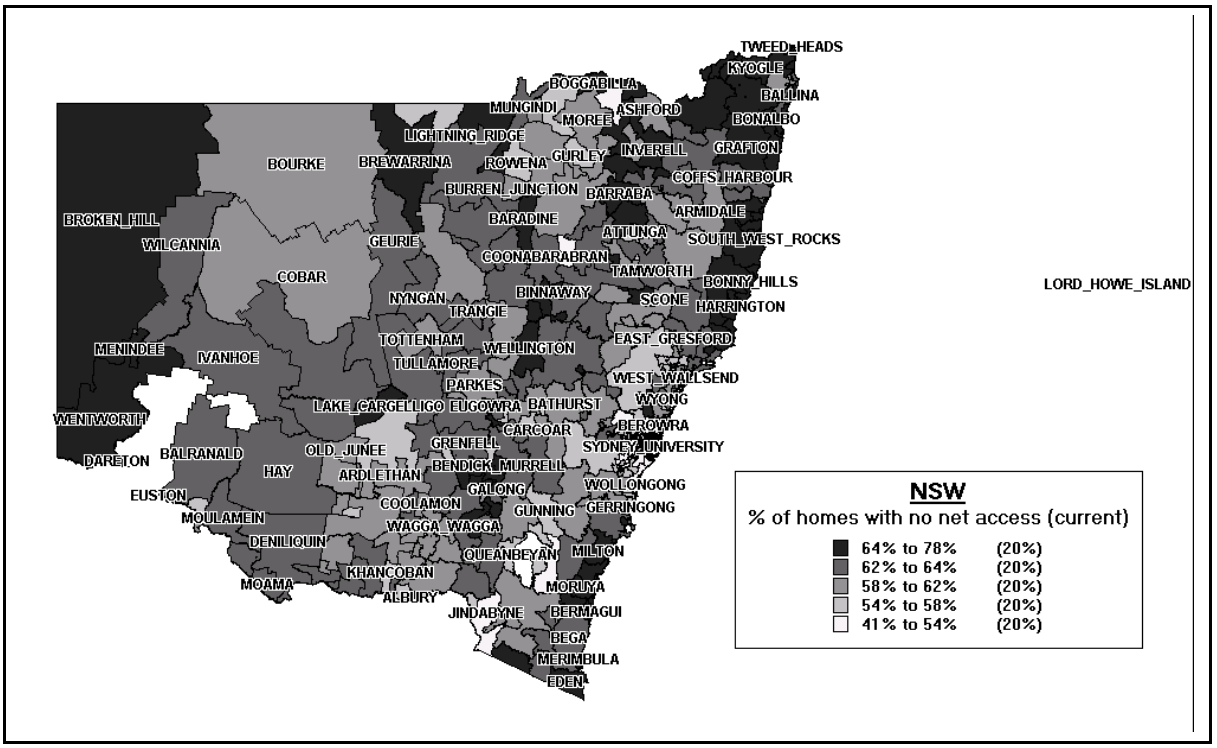
In both metropolitan and non-metropolitan areas, areas with high take-up rates adjoin areas with low take-up rates.

For the income maps, postcodes have been ranked by the average weekly income for NSW adults from the lowest 20 per cent to the highest 20 per cent (quintiles).

When comparing the NSW average weekly adult income (map 2) with estimated current non-connection rates in New South Wales (map 1), the similarity of the two maps is quite striking. Most areas with high non-connection rates have lower incomes. There are only very few postcodes that do not follow this. For example, Ardlethan in the south-west belongs to the bottom income quintile but is projected to have about average non-connection rates. Also, the north coast has more postcodes in the top non-connection quintile than in the bottom income quintile. That is, the north coast appears to be more disadvantaged with respect to projected Internet connections than with respect to income. This could be as a result of a large aged population.

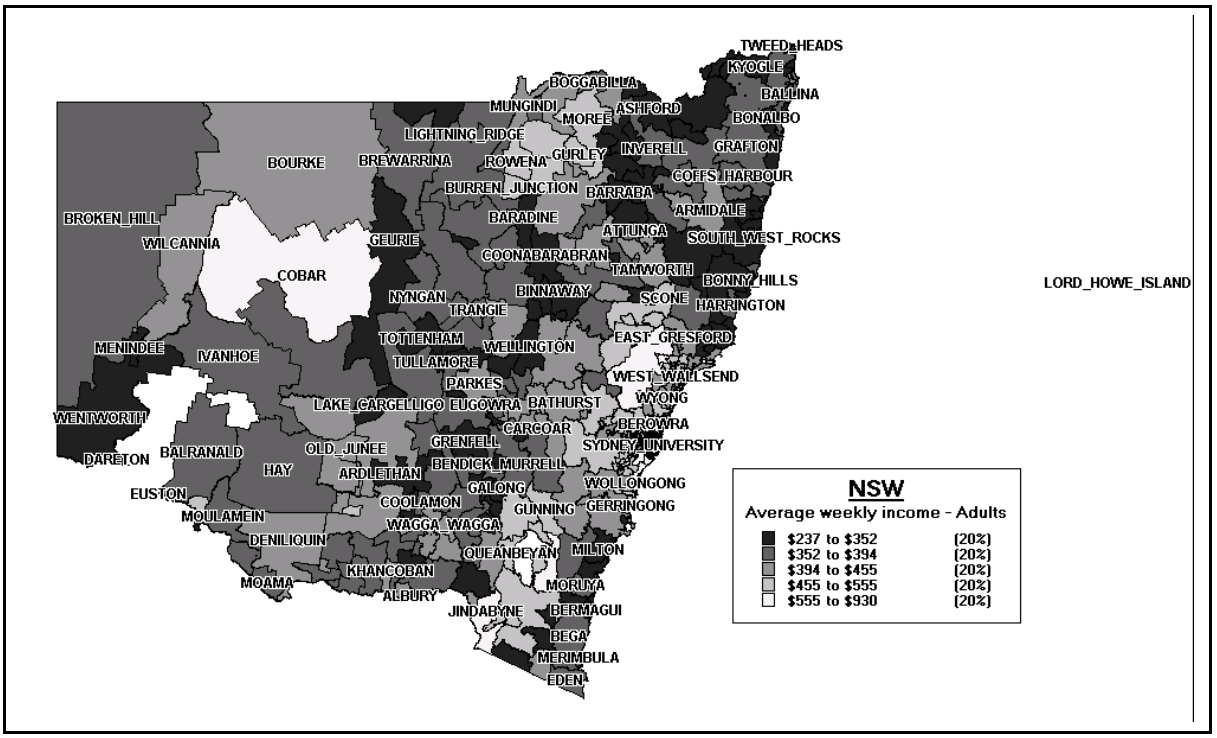
Map 4 (average weekly adult incomes in Sydney) shows that high incomes and low non-connection rates largely overlap in Sydney. However, there are two major exceptions. The area between Fairfield, Concord and Belmore belongs to the second lowest income quintile but to the middle quintile of non-connection rates. That is, these areas have higher connection rates than their average incomes would suggest. A similar outcome is observed for outer suburbs between Liverpool and Mount Druitt.

Map 1 **New South Wales estimated current non-connection rates**



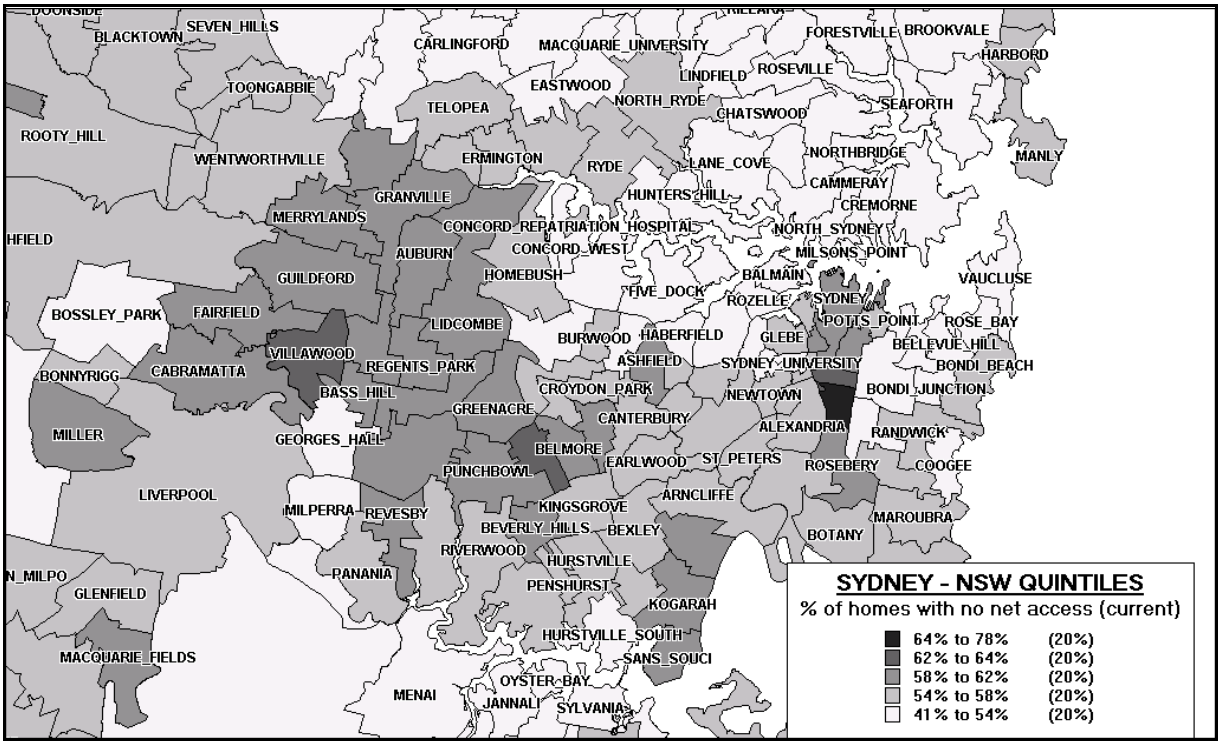
Data source: NetInfo.

Map 2 **New South Wales average weekly adult income**



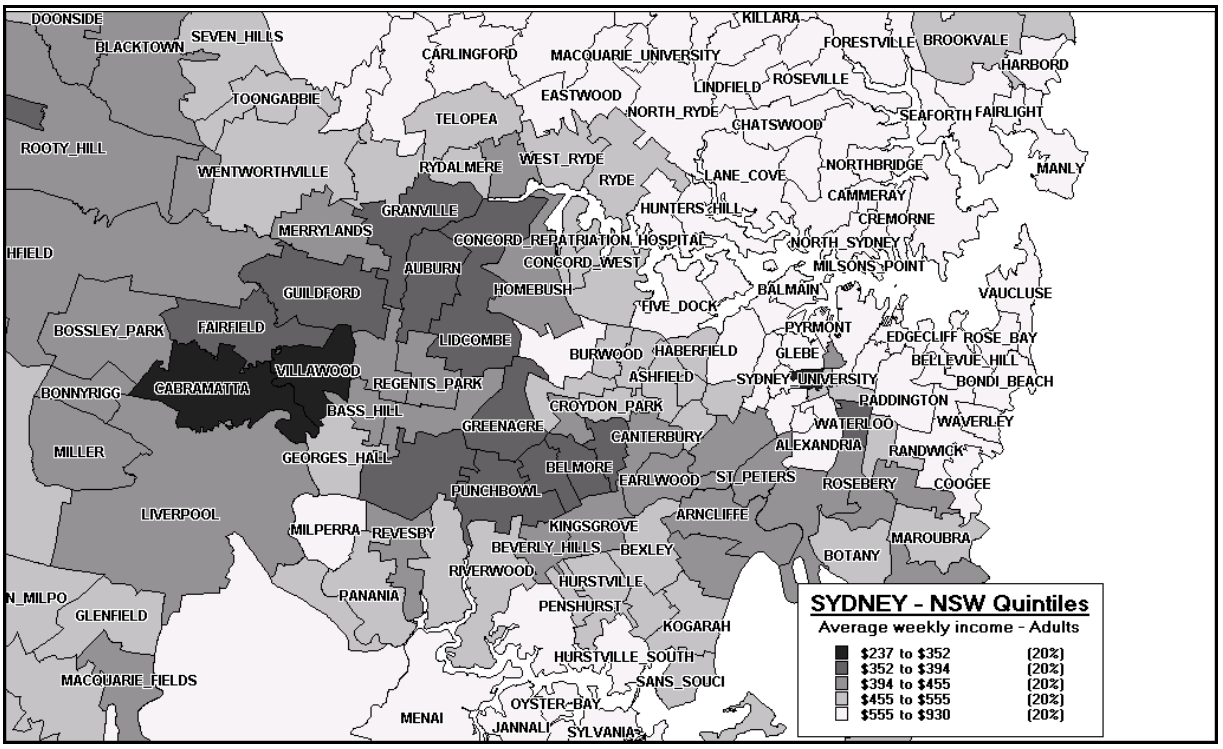
Data source: NetInfo.

Map 3 **Sydney estimated current non-connection rates**



Data source: NetInfo.

Map 4 **Sydney average weekly adult income**



Data source: NetInfo.

8 Summary and conclusions

The primary social objective of key policy measures in Australia in recent years has been to address regional inequities in the availability and affordability of telecommunications services. A major focus has been the supply-side — ensuring that infrastructure is available to deliver new services at increasing data speeds.

Technology take-up is lower in non-metropolitan areas than in the cities. However, this study shows that the regional differences can be explained by the different sociodemographic characteristics of people in metropolitan and non-metropolitan areas. The most important driver of Internet access is educational qualifications, followed by income. Age and qualifications are the strongest drivers of mobile phone use. After accounting for other factors, region and State of residence by themselves do not explain differences in Internet or mobile phone take-up rates.

A large proportion of Australians do not participate in the knowledge economy — not because of where they live, but because of their economic or social circumstances. People who have barriers to participation in the knowledge economy live in metropolitan as well as non-metropolitan areas. For example, while 13 per cent of Australians live in rural regions and 20 per cent live in regional towns, 63 per cent of the total population still have no access to the Internet at home. If just one-quarter of those without access cannot connect for economic reasons, the number of people affected is larger than the whole rural population.

As new technology, and particularly the Internet, becomes increasingly important for economic and social participation in modern society, it is vital that policy makers consider ways to improve access for the most disadvantaged. The results of this study suggest that supply-side policy solutions will not be enough to bridge the digital divide. Improved infrastructure may improve the quality of service in regional areas but will not overcome the disparity in access rates for different social groups. Even in metropolitan areas where infrastructure is well developed, Internet take-up rates for certain social groups — low income earners, the unemployed and the elderly — have been low. A more complex social policy agenda directly targeting digitally disadvantaged communities and families is necessary if Australia is to seriously address the root causes of the digital divide.

Appendix
Results of the multiple regression analyses for the three technology types

Table A1 **Base regression model for percentage of adults with home Internet connection**

Average Y = 0.368 N = 700 R-square = 15.88%

Sociodemographic driver	Coefficient	T-value	Significant
Male single	-0.036	-0.67	
Female single	-0.135	-2.52	*
Female married	-0.097	-2.07	*
Manager/professional	0.076	1.17	
Blue collar	-0.126	-2.17	*
Owner or pay mortgage	0.033	0.76	
Own multiple property	-0.05	-0.79	
Aged <25 years	0.092	1.33	
Aged 25–34 years	-0.035	-0.67	
Aged 45–54 years	0.017	0.32	
Aged 55–64 years	-0.102	-1.46	
Aged 65+ years	-0.159	-2.05	*
Part-time employed	0.042	0.76	
Unemployed	0.104	1	
Not in labour force	0.052	0.91	
Receive government benefits	0.144	2.76	*
No dependants at home	-0.042	-0.96	
Diploma/certificate	0.117	2.54	*
Bachelor degree	0.225	3.82	*
Masters degree or higher	0.326	4.35	*
Overseas born	0.015	0.36	
Cash investments >$1000	0.062	1.64	
Household income	0.003	2	*
√Household income	-0.031	-1.09	
Regional centre	-0.038	-0.84	
Country	-0.037	-0.68	
Victoria	-0.029	-0.61	
Queensland	0.018	0.27	
South Australia	-0.091	-1.32	
Western Australia	-0.042	-0.61	
Tasmania	-0.011	-0.15	
Northern Territory	-0.002	-0.03	
Australian Capital Territory	-0.062	-0.9	
Constant	0.325	2.48	*

Source: KPMG Household Survey (March 2000).

Table A2 **Base regression model for percentage of adults using a mobile phone in the previous week**

Average Y = 0.497 N = 700 R-square = 21.8%

Sociodemographic driver	Coefficient	T-value	Significant
Male single	-0.155	-2.9	*
Female single	-0.16	-2.98	*
Female married	-0.082	-1.75	
Manager/professional	0.115	1.78	
Blue collar	-0.05	-0.85	
Owner or pay mortgage	-0.107	-2.51	*
Own multiple property	-0.066	-1.02	
Aged <25 years	0.082	1.17	
Aged 25–34 years	0.097	1.83	
Aged 45–54 years	-0.066	-1.22	
Aged 55–64 years	-0.237	-3.4	*
Aged 65+ years	-0.263	-3.39	*
Part-time employed	-0.071	-1.28	
Unemployed	0.057	0.55	
Not in labour force	-0.077	-1.34	
Receive government benefits	0.09	1.71	
No dependants at home	0.043	1	
Diploma/certificate	0.102	2.21	*
Bachelor degree	-0.015	-0.26	
Masters degree or higher	-0.189	-2.52	*
Overseas born	0.064	1.55	
Cash investments >$1000	0.026	0.69	
Household income	0.002	1.16	
√Household income	-0.008	-0.28	
Regional centre	-0.036	-0.79	
Country	-0.024	-0.45	
Victoria	0.097	2.04	*
Queensland	0.109	1.68	
South Australia	-0.006	-0.08	
Western Australia	-0.027	-0.39	
Tasmania	-0.108	-1.56	
Northern Territory	-0.226	-3.22	*
Australian Capital Territory	0.001	0.01	
Constant	0.577	4.41	*

Source: KPMG Household Survey (March 2000).

Table A3 **Base regression model for fixed-line phone expenditure (cents per week per household)**

Average Y = 1254.126 N = 8389 R-square = 5.44%

Sociodemographic driver	Coefficient	T-value	Significant
Male single	-126.736	-3.17	*
Female single	-17.24	-0.44	
Female married	-18.451	-0.52	
Manager/professional	-61.324	-1.37	
Blue collar	-15.351	-0.35	
Owner or pay mortgage	-30.227	-0.97	
Own multiple property	45.811	0.89	
Aged <25 years	88.911	1.8	
Aged 25–34 years	86.647	2.18	*
Aged 45–54 years	165.752	3.83	*
Aged 55–64 years	35.077	0.62	
Aged 65+ years	-174.396	-2.86	*
Part-time employed	65.047	1.5	
Unemployed	1.549	0.02	
Not in labour force	29.209	0.63	
Receive government benefits	-30.524	-0.79	
No dependants at home	-41.321	-1.23	
Diploma/certificate	18.737	0.52	
Bachelor degree	52.037	1.26	
Masters degree or higher	12.956	0.25	
Overseas born	142.733	4.79	*
Cash investments >$1000	-133.493	-4.59	*
Household income	-1.006	-0.78	
√Household income	90.593	4.04	*
Regional centre	-1.007	-0.02	
Country	33.506	1.07	
Victoria	15.32	0.44	
Queensland	62.303	1.26	
South Australia	12.963	0.25	
Western Australia	98.158	1.94	
Tasmania	-31.985	-0.64	
Northern Territory	-132.868	-2.59	*
Australian Capital Territory	64.251	1.3	
Constant	787.267	7.16	*

Sources: ABS 1993-94 Household Expenditure Survey and KPMG Household Survey (March 2000).

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