



Australian Government

Department of Infrastructure, Transport,
Regional Development, Communications, Sport and the Arts

Digital exclusion in Australia

Evidence from HILDA

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Outline

- **Using HILDA in BITRE/BCARR research:** insights from Australia's leading household panel survey
- **Why digital exclusion matters for policy:** impacts on people, places and services
- **Measuring digital exclusion:** data from HILDA
- **Who is digitally excluded?** evidence from logistic regression modelling
- **Who exits digital exclusion, and how quickly?** Kaplan–Meier survival estimates and Cox proportional hazards modelling
- **Conclusions and implications:** what the evidence tells us, and where to next

HILDA in recent BITRE/BCARR research

Study	Focus	Status
Telecommunications affordability	Household spending on telecommunications relative to income	Published
Commuting patterns in Australia's major cities	Commuting times and distances, and how they change over time	Published
Digital exclusion	Who is at risk of digital exclusion and the speed at which people gain internet access	Published (today's presentation)
Fuel affordability	Fuel costs relative to household income	Under consideration

Why digital exclusion matters: the stakes for people, places and services

The Australian Government is committed to narrowing Australia's digital divide

PEOPLE <i>Build digital capability, affordability and confidence among disadvantaged groups</i>	PLACES <i>Ensure reliable, affordable and resilient connectivity regardless of location</i>	SERVICES <i>Ensure essential government, health, education and community services can be accessed digitally</i>
• Free home broadband under the School Student Broadband Initiative. • Digital Skills for Older Australians. • First Nations Digital Inclusion plan, supported by the First Nations Digital Support Hub and Network of Digital Mentors.	• Boosting mobile coverage and resilience and place-based connectivity solutions under the Better Connectivity Plan for Regional and Rural Australia initiative. • Upgrading NBN fibre-to-the-node connections to full fibre. • Free community Wi-Fi in remote First Nations communities.	Essential services are increasingly delivered online, including Digital Identity (myID), Services Australia digital services, telehealth initiatives and online learning, and so people without internet access risk being excluded.

Our contribution: Identify which groups are digitally excluded and for how long, helping government better target digital inclusion policies.

Data: measuring digital exclusion in HILDA

- **Measure:** home internet access (variable *_lsinthm*)
- **Coverage:** asked annually since 2010, giving [12/13] years of data to Release 22
- **Collection:** self-completion questionnaire in the first year; continuing person questionnaire in later years
- **Definition:** captures access to the internet at home, regardless of connection type or device (e.g. computer, phone or tablet)
- **Digitally excluded:** respondents who report no internet access at home

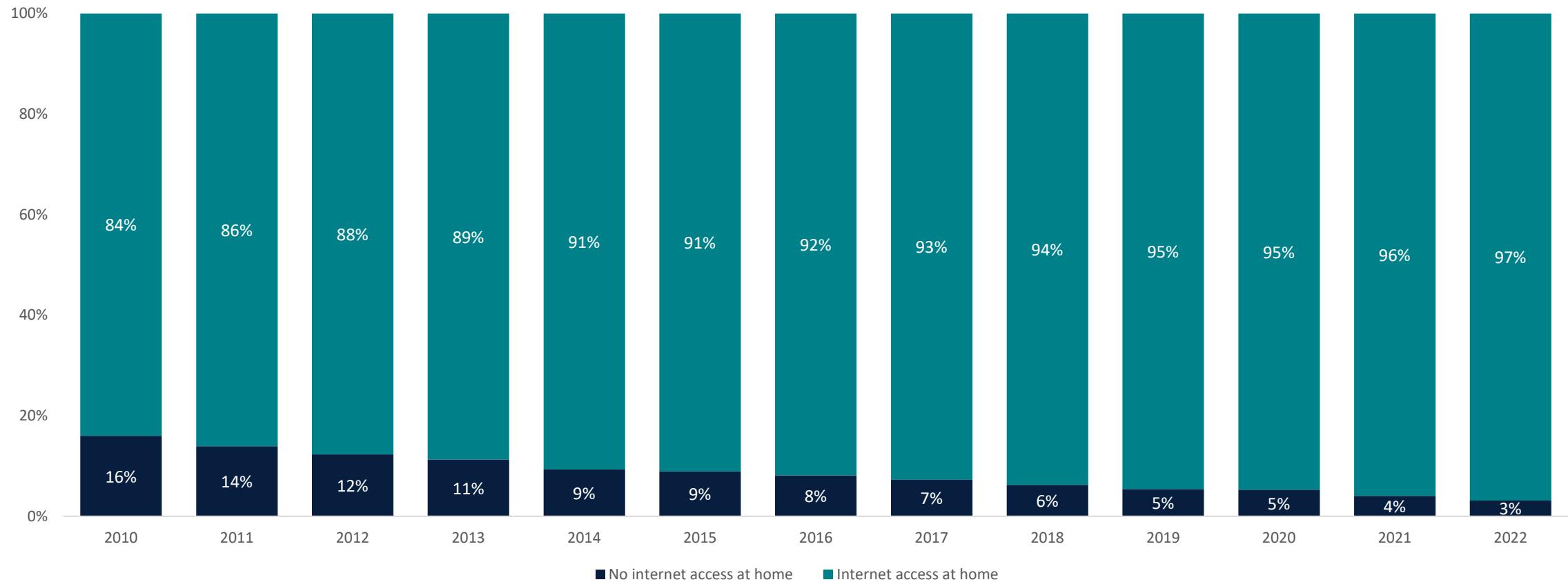
Table 1: Sample size and the number of respondents not having access to the internet

Wave	Year	Total respondents (No)	No internet access (No)	No internet Access (%)	Internet access (No)	Internet Access (%)
10	2010	13,526	1,915	16%	9,741	84%
11	2011	17,612	2,604	15%	14,997	85%
12	2012	17,475	2,213	13%	15,254	87%
13	2013	17,500	2,015	12%	15,480	88%
14	2014	17,511	1,746	10%	15,757	90%
15	2015	17,605	1,741	10%	15,860	90%
16	2016	17,693	1,625	9%	16,063	91%
17	2017	17,570	1,434	8%	16,127	92%
18	2018	17,434	1,203	7%	16,225	93%
19	2019	17,462	1,028	6%	16,432	94%
20	2020	17,070	991	6%	16,070	94%
21	2021	16,549	675	4%	15,869	96%
22	2022	15,954	556	3%	15,395	97%
Total		220,961	19,746		199,270	

Source: The HILDA Survey, Release 22; BITRE/BCARR calculations.

Access to internet is improving

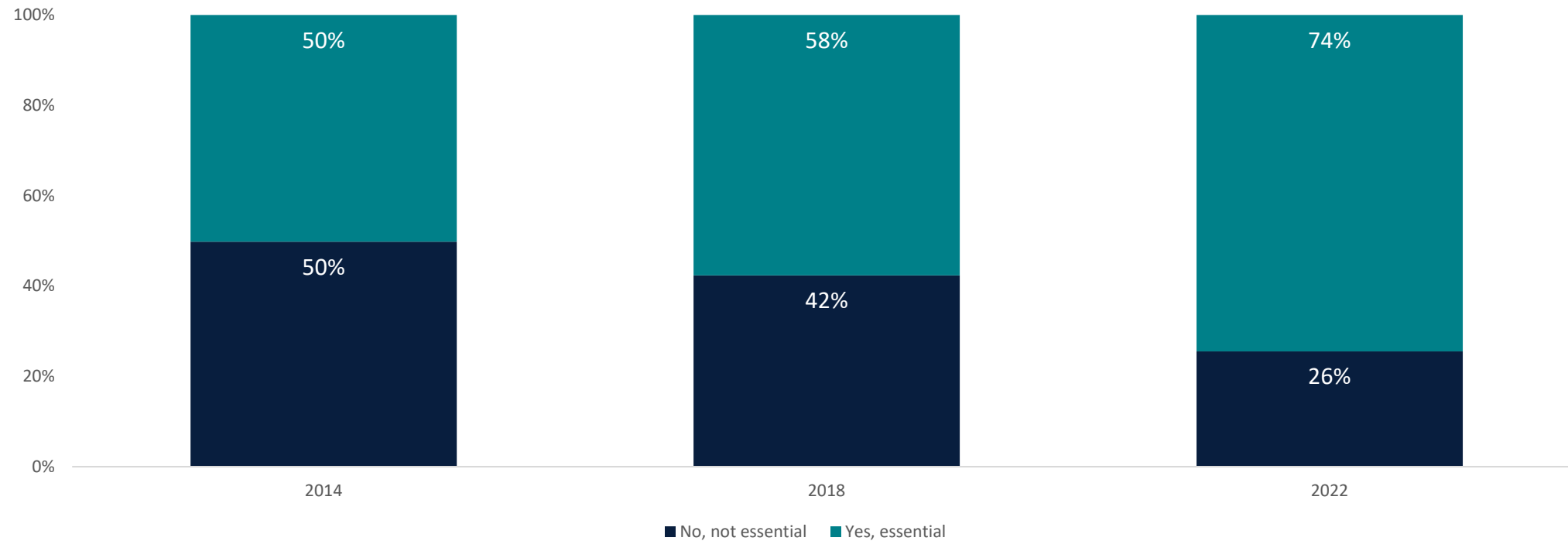
Figure 1: Internet access at home, 2010 to 2022



Source: The HILDA Survey, Release 22; BITRE/BCARR calculations.

Internet access is increasingly seen as essential

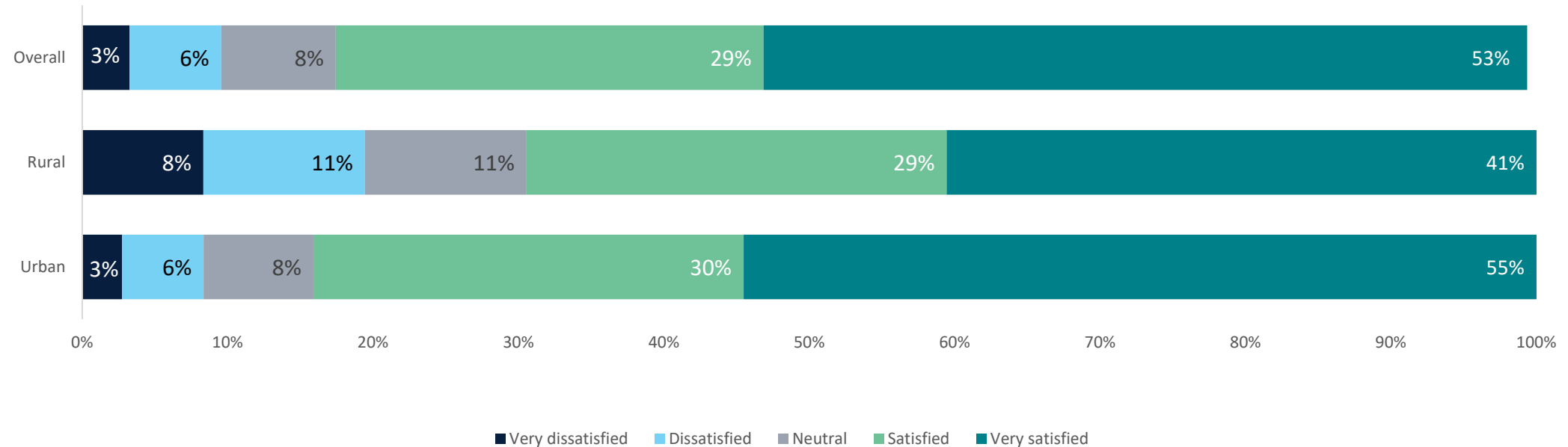
Figure 2: Share of people who considered internet access to be essential, 2014, 2018 and 2022



Source: The HILDA Survey, Release 22; BITRE/BCARR calculations.

Most Australians are satisfied with the quality of their internet connection

Figure 3: Satisfaction with the internet connection at home by location, 2020



Source: The HILDA Survey, Release 22; BITRE/ BCARR calculations.

Notes: The question 'How satisfied are you with the speed and reliability of your internet connection?' was in the form of a 0 to 10-point Likert scale, where a value of 0 was totally dissatisfied and 10 was totally satisfied. Our analysis categorised values 0-2 as very dissatisfied, 3-4 as dissatisfied, 5 as neutral, values 6-7 as satisfied and 8-10 as very satisfied.

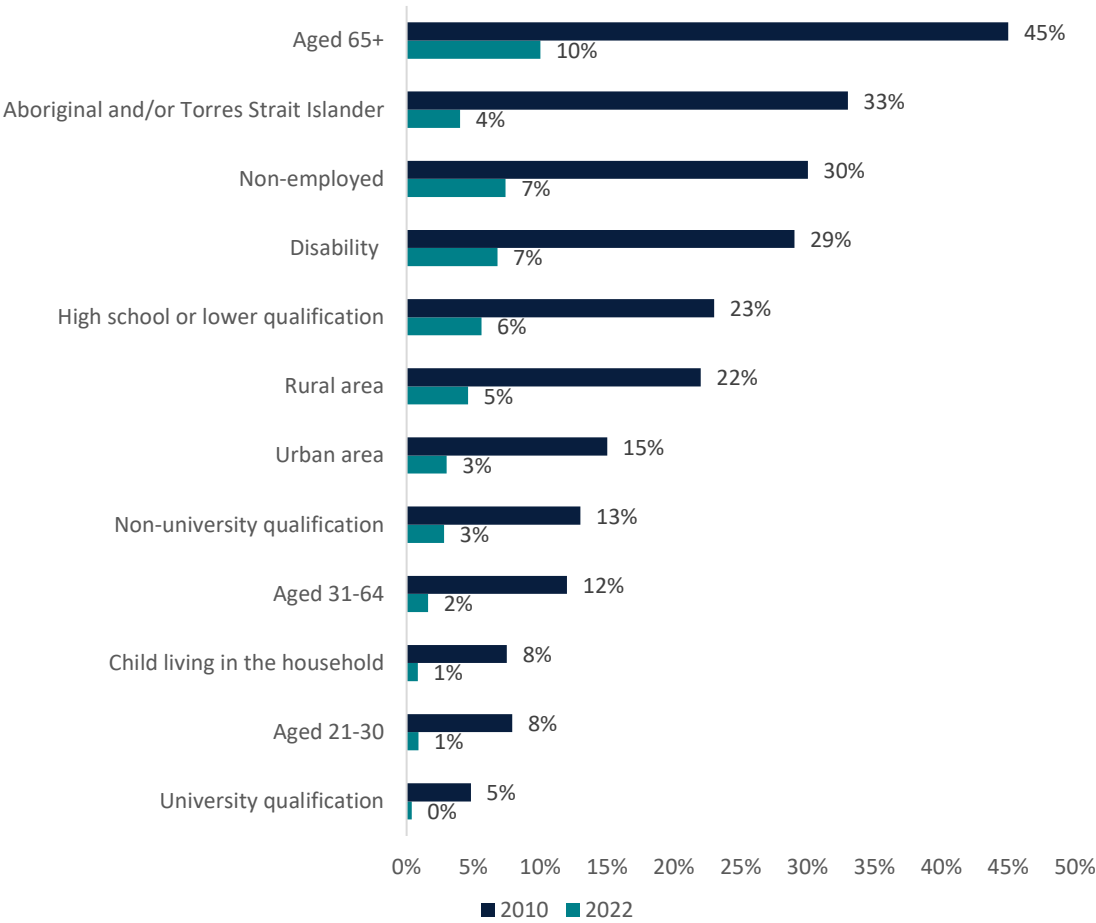
Methodology – Logistic regression modelling

Logistic regression – estimating the probability that respondents displaying a particular characteristic have no internet access, while holding other observed characteristics constant.

Marginal effect - the percentage change in the probability of having internet access if a given variable is changed by one unit of measure, while holding other observed characteristics constant.

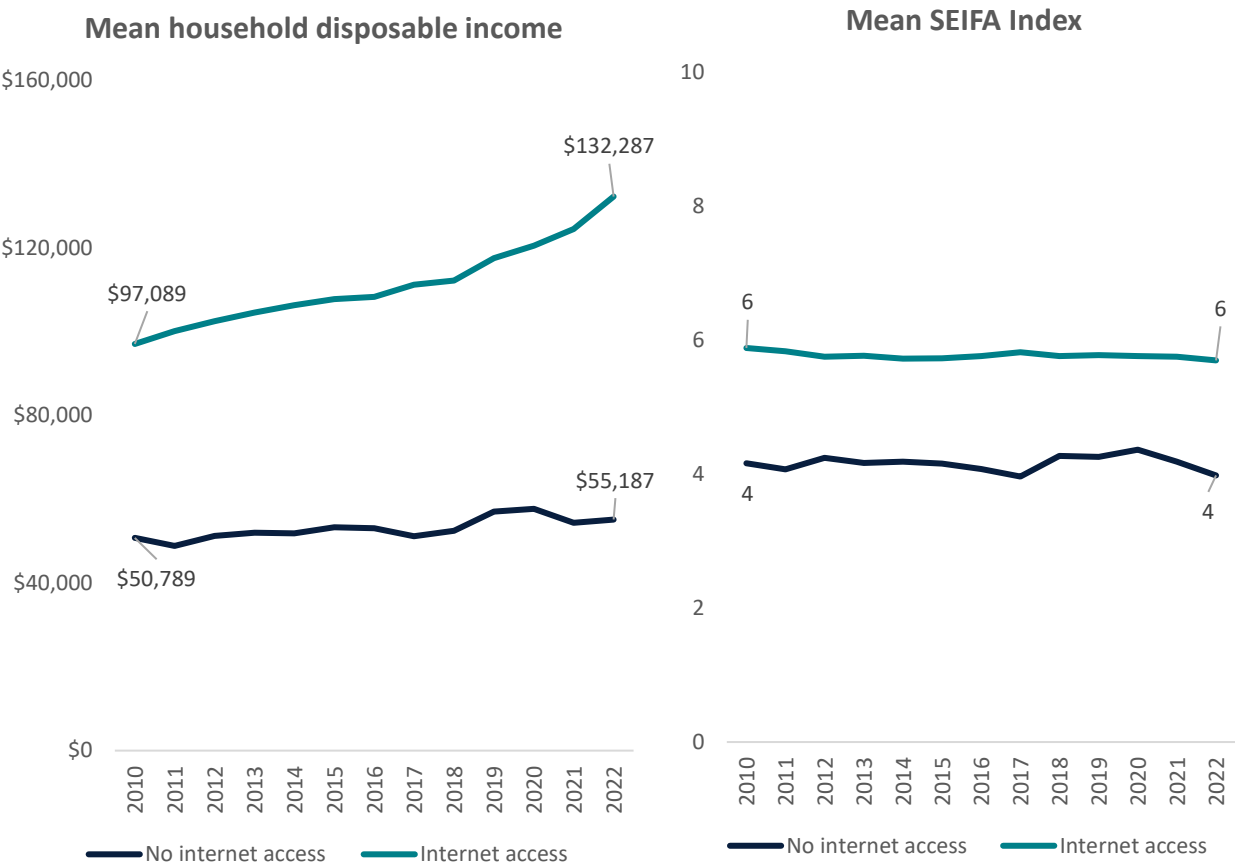
Descriptive statistics

Figure 2: Share of people without access to the internet by characteristic, 2010 and 2022



Source: The HILDA Survey, Release 22; BITRE/BCARR calculations.
Digital exclusion in Australia. Evidence from HILDA.

Figure 3: Mean disposable household income and SEIFA index by access to the internet, 2010 to 2022



Source: The HILDA Survey, Release 22; BITRE/BCARR calculations.

Logistic regression: marginal effects

Factors associated with a higher likelihood of internet access

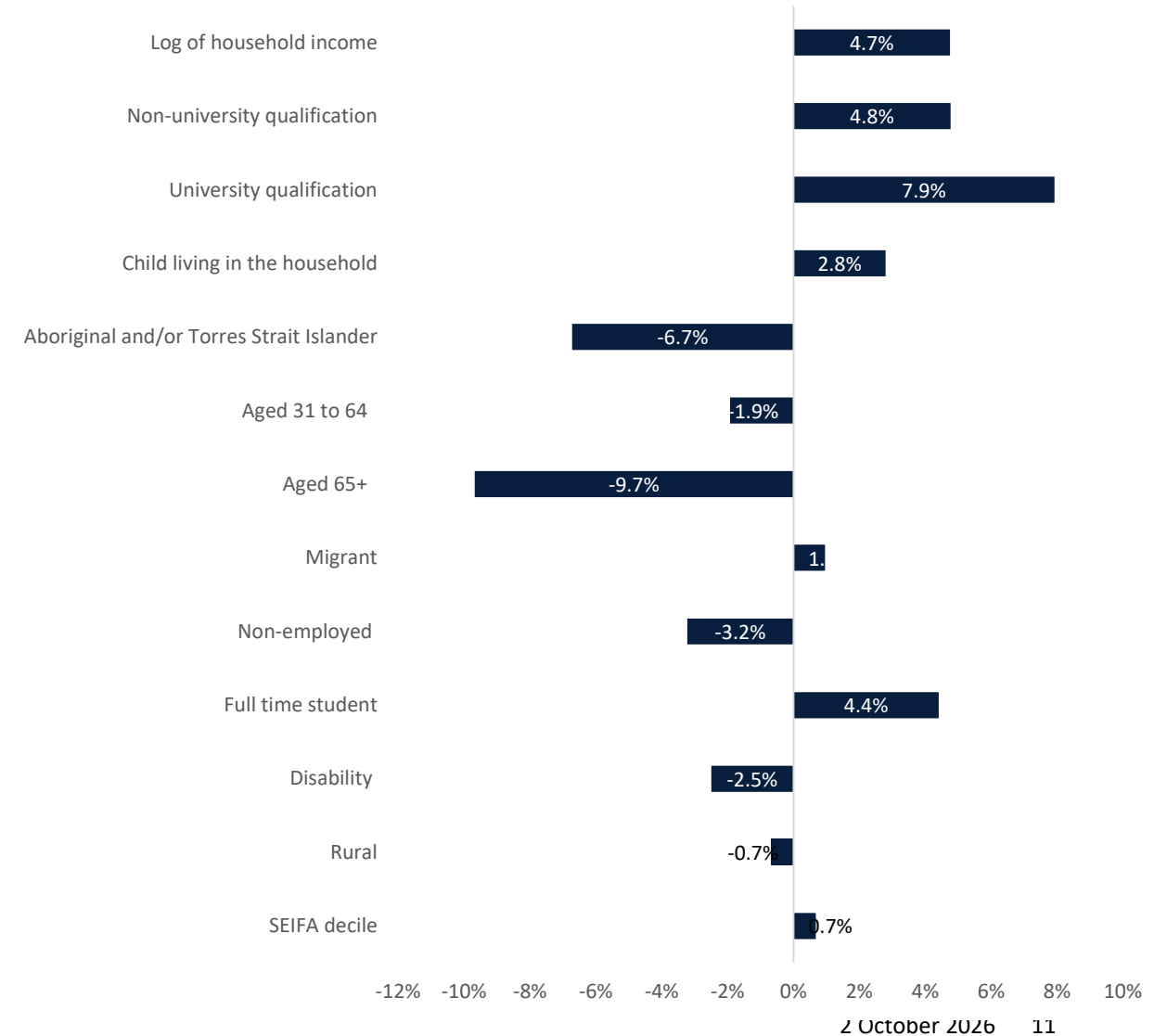
- Higher household income
- Higher educational attainment
- Full-time student status
- Higher SEIFA decile

Factors associated with a lower likelihood of internet access

- Older age
- Aboriginal and/or Torres Strait Islander status
- Not being employed
- Disability

All other observed characteristics are held constant.

Figure 4: Predicted change in internet access probability



Methodology – duration modelling

Duration modelling – examining whether particular characteristics are associated with longer periods without internet access, while holding other observed characteristics constant.

Relative rates of gaining access to the internet for different groups, where lower rates of internet take up indicate more persistent disadvantage

Duration modelling: Kaplan–Meier survival rates

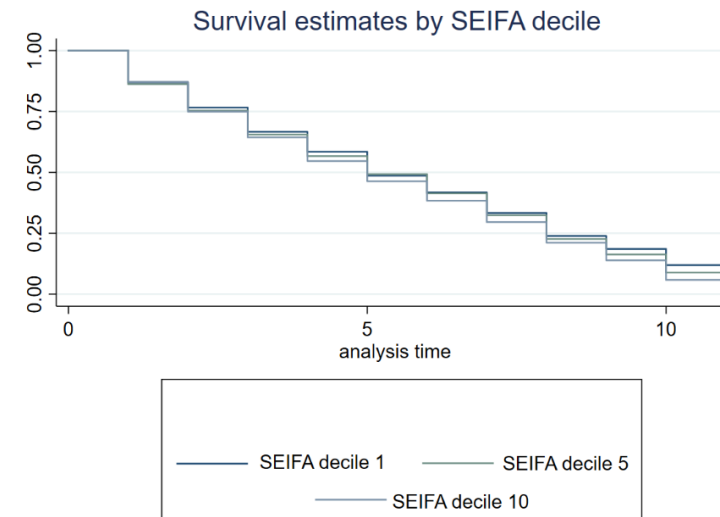
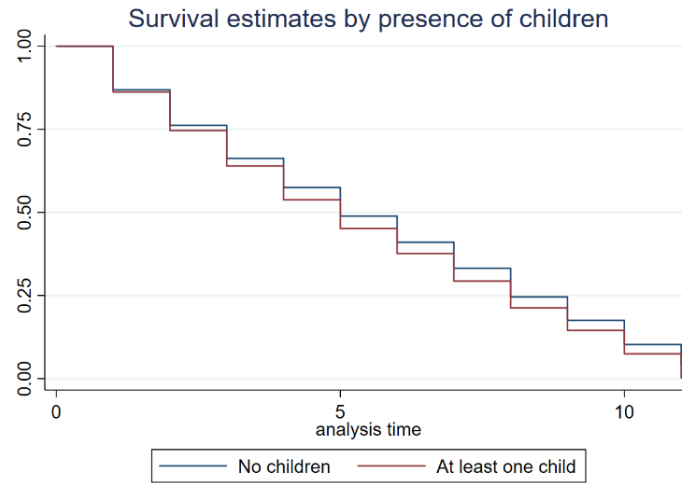
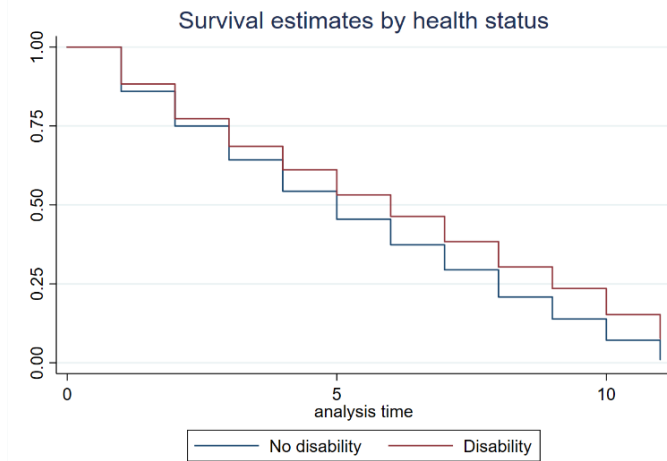
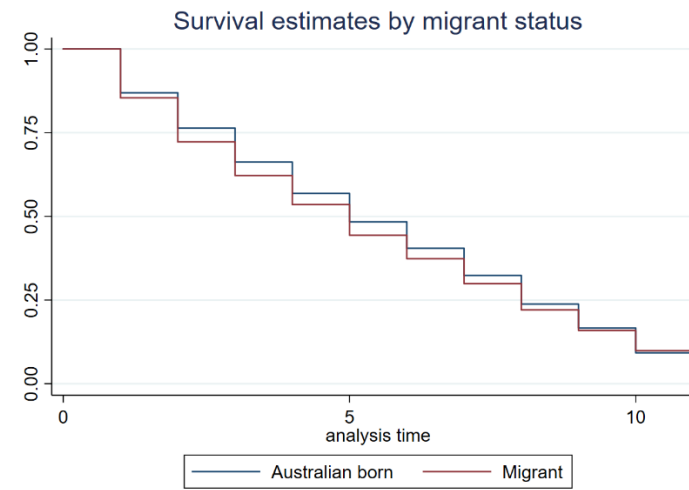
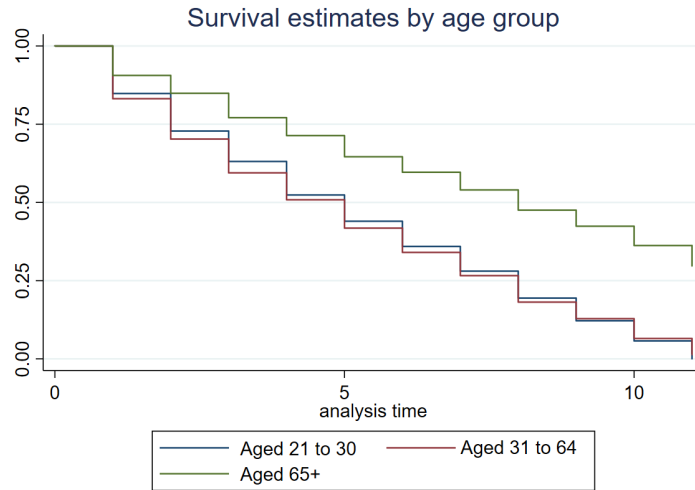
- Kaplan-Meier estimates are used to measure the fraction of respondents who remain without internet access over time.
- We model the time from entry in wave 11 until first gaining home internet access.
- Of 11,071 respondents in wave 11, 1,478 gained internet access, or ‘failed’, in the first year.
- In Table 2, ‘Net Lost’ is the difference between respondents without internet access who were censored and those entering the analysis the following year.
- The ‘survivor function’ is the Kaplan–Meier probability of remaining without internet access at a given time.

Table 2: Kaplan-Meier estimator of survivor function

Time (in years)	Total	Failed	Net Lost	Survivor Function	Std Error	95%	Conf. Int
1	11,071	1,478	155	0.867	0.003	0.860	0.873
2	9,438	1,196	120	0.757	0.004	0.749	0.765
3	8,122	1,089	97	0.655	0.005	0.646	0.664
4	6,936	979	84	0.563	0.005	0.553	0.572
5	5,873	898	91	0.477	0.005	0.467	0.486
6	4,884	795	93	0.399	0.005	0.390	0.408
7	3,996	798	59	0.319	0.005	0.311	0.328
8	3,139	831	70	0.235	0.004	0.227	0.243
9	2,238	665	54	0.165	0.004	0.158	0.172
10	1,519	663	48	0.093	0.003	0.087	0.099
11	808	576	232	0.027	0.002	0.024	0.030

Source: The HILDA Survey, Release 22; BITRE/BCARR calculations.

Selected survival rates estimates



Source: The HILDA Survey, Release 22; BITRE/ BCARR calculations.
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Cox proportional hazards regression estimates

Lower rates of gaining internet access:

- People aged 65+ years had a 55% lower rate of gaining internet access than those aged 21 to 30 (HR 0.45).
- People with disability had a 12% lower rate than those without disability (HR 0.88).

Higher rates of gaining internet access:

- People in households with children had an 18% higher rate than those in households without children (HR 1.18).
- Migrants had an 8% higher rate than Australian-born respondents (HR 1.08).
- Each one-decile increase in SEIFA was associated with an approximately 1% higher rate (HR 1.01).

Table 3: Cox proportional hazard regression (HR) estimates

Variable	Hazard ratio	Robust standard errors
Log of household disposable income		
Log of household income	0.937***	0.018
Highest educational level (relative to high-school or lower qualification)		
Non-university qualification	1.014	0.028
University qualification	1.011	0.032
Presence of children in a household (relative to households with no children)		
Child living in the household	1.179***	0.033
Aboriginal status (relative to non-Aboriginal and/or Torres Strait Islander)		
Aboriginal and/or Torres Strait Islander	0.953	0.047
Age (relative to those aged 21–30)		
Aged 31–64	1.000	0.024
Aged 65+	0.453***	0.022
Immigrant status (relative to Australian-born)		
Migrant	1.076***	0.030
Employment status (relative to employed or in the labour force)		
Non-employed or not in the labour force	0.97	0.028
Student status (relative to non-student)		
Full-time student	0.952	0.037
Health status (relative to no disability)		
Disability	0.883***	0.023
Urban/ rural status (relative to urban)		
Rural	1.022	0.043
SEIFA decile		
SEIFA decile	1.012***	0.004
Number of observations	14525	
Log (Pseudo) likelihood	-49228	
AIC	98481	
BIC	98580	

Conclusions

The share of Australians without home internet fell significantly, from 16% in 2010 to 3% in 2022, according to HILDA data.

However, barriers to digital inclusion remain for some groups, including:

- people aged 65 years and over, who are less likely to have internet access and tend to remain without it for longer than younger people
- people with disability, who have a 12% lower rate of gaining internet access than people without disability, after accounting for other observed characteristics
- Aboriginal and Torres Strait Islander peoples
- non-employed people
- rural Australians
- low income households
- people living in areas of socioeconomic disadvantage
- Australians with lower educational attainment.