

Australian population norms for paid work productivity index and exploratory estimates for unpaid work productivity index



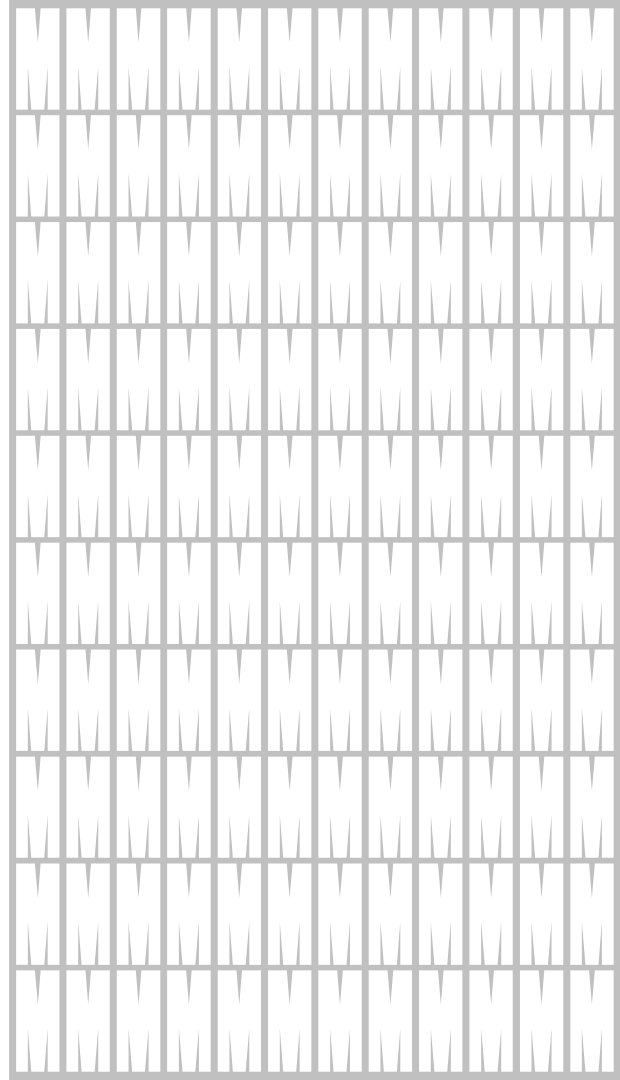
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Health and productivity



- Various health conditions can adversely affect productivity
- People in poor health are likely to be less productive, while healthy workers tend to provide higher returns from work according to human capital theory



- Work-related impacts of health conditions
 - Absenteeism (days of work missed),
 - Presenteeism (reduced performance while at work) or
 - Early exit from the workforce
- A lack of investment in preventive healthcare or effective treatment options can lead to productivity loss, with broader societal and economic consequences.



Productivity-Adjusted Life-Years: A New Metric for Quantifying Disease Burden

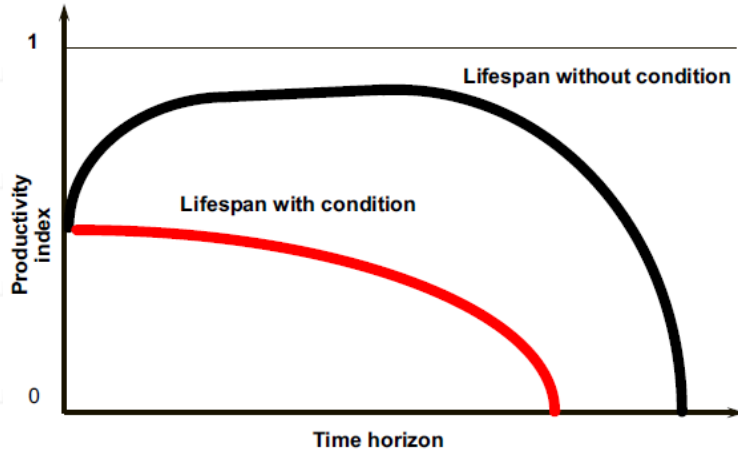
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- **Burden of disease measures** are useful to quantify the magnitude of impact of diseases and injuries on population health
- Health conditions affect participation in paid and unpaid work
- A measure of disease burden to describe **health-related productivity loss**

Productivity-adjusted life years (PALYs)



- PALYs are calculated by multiplying a 'productivity index' by the number of years lived
- **Productivity index**
 - Ranges from 0 (completely unproductive) to 1 (completely productive)
- A measure of disease burden to describe **productivity loss at the population level** over the working lifetime

Existing studies and evidence gap

- **Disease-specific:** Productivity measures have been used to quantify burden of a broad range of conditions, including obesity, hypertension, depression, hypercholesterolemia, diabetes, back pain, sleep apnoea, occupational noise, chronic kidney disease, coronary heart disease, knee osteoarthritis, epilepsy, and selected cancers (acute myeloid leukemia, breast, ovarian)
- **Focus:** Most studies focus solely on paid work
- **Evidence gap:** Limited data on population norms capturing both paid and unpaid work productivity

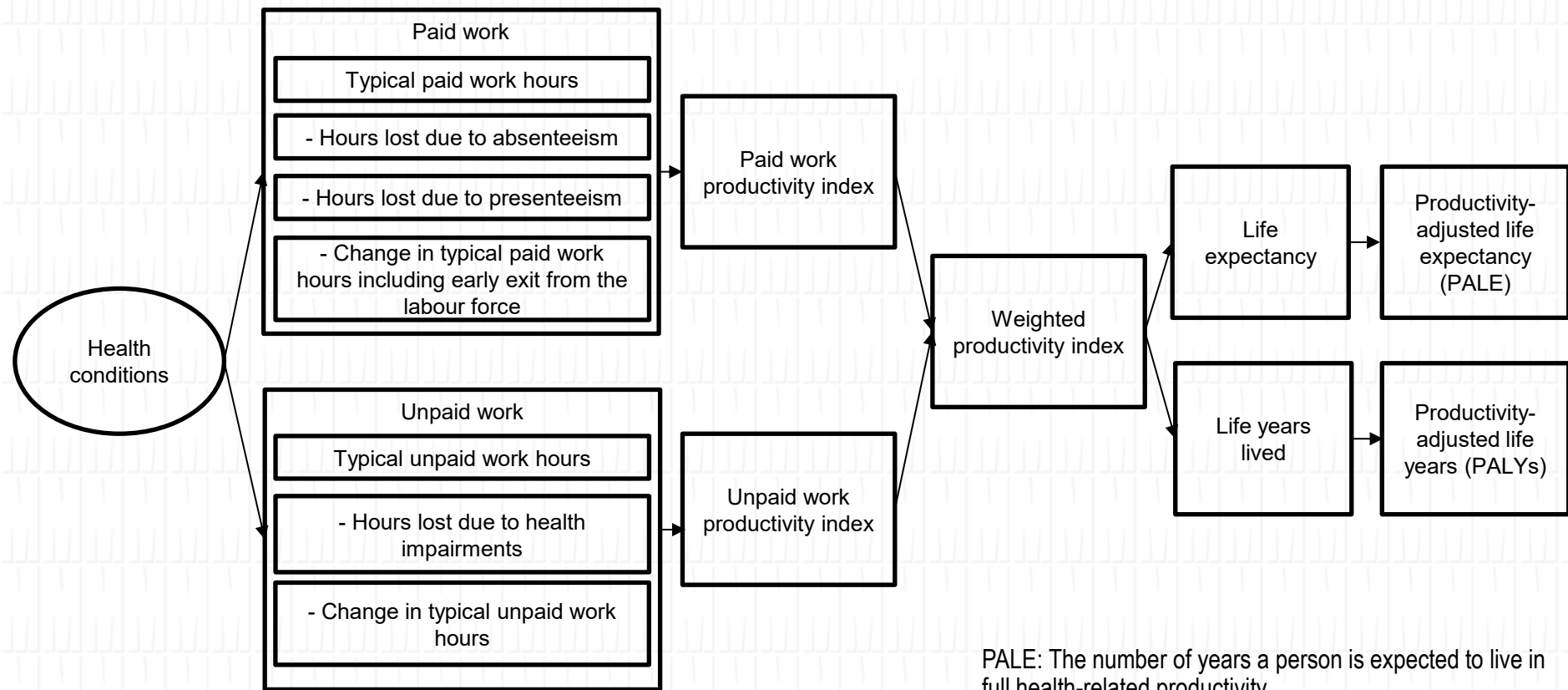
Population norms including unpaid work

- **Population norms**
 - Compare disease burden across health conditions and populations
 - Serve as baseline distributions in health technology assessments
 - Reference values for estimating equity in productivity burden by sociodemographic factors
- **Unpaid work**
 - Economic value and contributes to societal welfare
 - Ignoring unpaid work undervalues healthcare interventions for groups primarily engaged in unpaid work, e.g., women, retirees
 - Including unpaid work provides a more comprehensive and equitable picture of disease burden

Objective



To establish Australian population norms for the paid work productivity index and productivity-adjusted life expectancy (PALE) including exploratory estimates for unpaid work



PALE: The number of years a person is expected to live in full health-related productivity

PALY: The number of life years adjusted for a health-related productivity index

Methods

$$\text{Productivity index} = \frac{\text{Actual number of working hours}}{\text{Typical number of working hours}}$$

Ranging from 0 (completely unproductive) to 1 (completely productive)

Actual number
of paid working
hours

=



Typical number of
paid work hours

—



Hours lost due to
absenteeism

—



Hours lost due to
presenteeism

Actual number
of unpaid
working hours

=



Typical number of
unpaid work hours

—



Hours lost due to health impairments

Methods

- **Household, Income and Labour Dynamics in Australia (HILDA) Survey**
 - Annual panel survey of Australian households, providing large-scale, representative longitudinal data focused on family and household information, income and work
 - Restricted Release Wave 22
 - Data collection: between July 2022 and March 2023
- **Survey respondents** aged 15 years and over and who reported the number of hours spent on paid and unpaid work were included in this study.

Paid work time

Unpaid work time

B22 How much time would you spend on each of the following activities in a typical week?

IMPORTANT: • Please do not count any activity twice
• If you do not do an activity, write "0" in the hours box

		Hours per week	Minutes (if applicable)
a	Paid employment		
b	Travelling to and from a place of paid employment		
c	Household errands, such as shopping, banking, paying bills, and keeping financial records (but do not include driving children to school and to other activities)		
d	Housework, such as preparing meals, washing dishes, cleaning house, washing clothes, ironing and sewing		
e	Outdoor tasks, including home maintenance (repairs, improvements, painting, etc.), car maintenance or repairs and gardening		
f	Playing with <u>your</u> children, helping them with personal care, teaching, coaching or actively supervising them, or getting them to child care, school and other activities		
g	Looking after <u>other people's</u> children (aged under 12 years) on a regular, unpaid basis		
h	Volunteer or charity work (for example, canteen work at the local school, unpaid work for a community club or organisation)		
i	Caring for a disabled spouse or disabled adult relative, or caring for elderly parents or parents-in-law		
TOTAL: This <u>cannot</u> exceed 168 hours and typically will not be greater than 120. If it is, please <u>re-think</u> your answers.			Add total hours (whole hours only)

Absenteeism from paid work among the employed

E27a. During the last 12 months, have you taken any **paid sick leave? But please do **not** include any paid time off to care for someone else.**

INTERVIEWER NOTE: *Taking leave to care for a family member is usually covered under Family or Carer's Leave, which we ask about in the next question.*

- | | | |
|----------------------------------|-----|------------|
| ☐ Yes | [1] | [valskany] |
| ☐ No | [2] | |
| ☐ Refused | [8] | |
| ☐ Don't know | [9] | |

IF E27a = 1 go to E27b
ELSE go to E28a

E27b. How many **weeks or **days** did you spend on paid sick leave?**

- | | | | |
|----------------------------------|----------------------|-----|------------------------|
| ☐ Weeks | <input type="text"/> | [1] | [valskha]
[valskwk] |
| OR | | | |
| ☐ Days | <input type="text"/> | [2] | [valskda] |
| ☐ Refused | | [8] | |
| ☐ Don't know | | [9] | |

Presenteeism from paid work among the employed

Australian Workplace Barometer (AWB)
Survey 2014-15

Australian work conditions and their relationships with workplace health and productivity among a representative sample of employees

Health and Work Performance Questionnaire (HPQ)

DD.4 Using the same 0-to-10 scale, where 0 is no affect and 10 is the most affect, during the last 4 weeks (28 days) how much did your health problems affect your productivity at work?

- | | | |
|-------------|-------|------------------------|
| 1. 0 | _____ | 0% productivity loss |
| 2. 1 | | |
| 3. 2 | | |
| 4. 3 | | |
| 5. 4 | | |
| 6. 5 | _____ | 50% productivity loss |
| 7. 6 | | |
| 8. 7 | | |
| 9. 8 | | |
| 10. 9 | | |
| 11. 10 | _____ | 100% productivity loss |
| 12. Refused | | |

Unpaid work productivity index



- **Data gap:** Absenteeism and presenteeism only measured for paid work, among the employed
- **Assumptions**
 - Among the employed,
 - The proportion of time missed in unpaid work was assumed to be the same as in paid work
 - e.g. If someone missed 3% of paid work hours → 3% of unpaid work hours also missed
 - Among the non-employed,
 - The proportion of time missed in unpaid work was assumed to be equivalent to that in paid work among the employed, stratified by sex
 - e.g. If 3% of paid work hours missed among employed females → 3% of unpaid work hours missed among the non-employed females
- **Sensitivity analyses**
 - The proportions of time lost in unpaid work were varied by $\pm 30\%$ relative to the corresponding proportions in paid work.

Employed

Paid work productivity index

Unpaid work productivity index

Weighted productivity index

Not employed

Unpaid work productivity index

Productivity index at the population level

Productivity-adjusted life expectancy (PALE)

- The weighted productivity index was combined with the Australian life table to estimate PALE at the population level.
- The Australian life tables for the total population, male, and female by single ages, were obtained from Australian Bureau of Statistics (ABS).
- The sex-specific weighted productivity index by five-year age groups was combined with life expectancies at each age.



Average number of working hours per year, employed

	Total		Male		Female	
	Paid work	Unpaid work	Paid work	Unpaid work	Paid work	Unpaid work
All	1,727	1,021	1,887	850	1,524	1,207
Age group						
15-19	932	271	1,023	240	848	298
20-24	1,564	471	1,628	425	1,498	518
25-29	1,828	740	1,918	671	1,727	816
30-34	1,861	1,120	2,005	849	1,710	1,404
35-39	1,804	1,381	2,036	1,118	1,554	1,664
40-44	1,919	1,513	2,161	1,299	1,653	1,748
45-49	1,875	1,269	2,065	1,065	1,676	1,483
50-54	1,887	1,118	2,063	889	1,697	1,362
55-59	1,837	1,027	2,032	812	1,616	1,272
60-64	1,674	1,074	1,850	900	1,442	1,304
65-69	1,373	1,074	1,517	926	1,196	1,257
70+	927	1,119	847	887	1,060	1,501

Light green to dark green represents the highest value

Average number of unpaid working hours per year, not employed

	Total	Male	Female
All	1,474	1,155	1,732
Age group			
15-19	249	238	263
20-24	807	496	1,216
25-29	1,720	803	2,132
30-34	2,329	1,149	2,907
35-39	2,074	1,285	2,680
40-44	2,316	1,344	2,730
45-49	2,196	1,513	2,539
50-54	1,744	1,264	1,991
55-59	1,659	1,721	1,613
60-64	1,761	1,533	1,918
65-69	1,656	1,404	1,866
70+	1,328	1,222	1,424

Light green to dark green represents the highest value

Average number of paid working hours lost per year, employed

	Total		Male		Female	
	Absenteeism	Presenteeism	Absenteeism	Presenteeism	Absenteeism	Presenteeism
All	29	262	28	263	30	261
Age group						
15-19	5	144	7	144	3	144
20-24	21	240	20	227	23	253
25-29	35	276	32	265	38	289
30-34	33	282	32	277	34	287
35-39	32	272	31	282	33	261
40-44	31	290	28	300	35	278
45-49	33	284	34	286	32	281
50-54	34	285	33	287	35	284
55-59	30	277	28	283	32	271
60-64	31	250	31	257	31	241
65-69	24	210	18	217	32	202
70+	15	149	12	126	21	182

Light pink to dark pink represents the highest value

Exploratory estimate of unpaid working hours lost per year, not employed

	Total	Male	Female
All	257	176	321
Age group			
15-19	42	36	49
20-24	140	76	225
25-29	311	123	395
30-34	419	176	539
35-39	366	196	497
40-44	416	205	506
45-49	391	231	471
50-54	309	193	369
55-59	284	263	299
60-64	306	234	356
65-69	286	215	346
70+	227	187	264

Light pink to dark pink represents the highest value

Population productivity index for both employed and not employed

	Total	Male	Female
All	0.831	0.847	0.815
Age group			
15-19	0.839	0.853	0.824
20-24	0.834	0.850	0.818
25-29	0.829	0.845	0.812
30-34	0.829	0.845	0.813
35-39	0.830	0.846	0.813
40-44	0.830	0.848	0.813
45-49	0.829	0.845	0.814
50-54	0.830	0.846	0.814
55-59	0.831	0.847	0.814
60-64	0.830	0.846	0.814
65-69	0.830	0.848	0.814
70+	0.831	0.848	0.815

Productivity index

Ranging from 0 (completely unproductive)
to 1 (completely productive)

Light green to dark green represents the highest value

Productivity-adjusted life expectancy (PALE)

	Total			Male			Female		
Age	Life expectancy	PALE	PALE (discount 3%)	Life expectancy	PALE	PALE (discount 3%)	Life expectancy	PALE	PALE (discount 3%)
15	68.0	52.1	23.8	66.1	51.2	24.0	70.0	53.0	23.7

Discussion

- Our study estimated health-related productivity using the productivity index, which systematically incorporates data on work time, absenteeism, and presenteeism at the population level.
- Several measurement instruments are available to assess productivity loss in both paid and unpaid work. A systematic review identified 42 instruments with diverse characteristics (Hubens et al., 2021).
 - The number items ranged from 1 to 50
 - Recall periods ranged from 1 day to 2 years
 - Most instruments were self-administered by patients
- While the characteristics of instruments may influence participants' responses, there is limited empirical evidence on the extent to which this affects findings.

Discussion

- Unpaid work was captured with assumptions due to limited data
- Estimates were based on the assumptions that absenteeism and presenteeism are similar across paid and unpaid work. However, the proportion of time missed may differ between paid and unpaid work.
 - e.g. A qualitative study from Australia found that some study participants continued to do the majority of the unpaid domestic labour and childcare after their breast cancer diagnosis, placing children above their own health and wellbeing (Mackenzie, 2014).
- Guidance on how to measure and value unpaid productivity, along with validated instruments for its assessment is needed

Discussion

- Our study focused on productivity related to an individual's own health.
- Productivity can also be affected by other factors, such as caregiving responsibilities.
 - For instance, a U.S. national study found that caregiving led to 8.3% loss of paid work time among employed family caregivers (Keita Fakeye et al., 2023).
 - Caregiving related productivity is beyond the scope of our study but could be addressed in future research.

Conclusions

- This study provides population norms for the productivity index in Australia.
- These estimates offer a baseline for assessing the productivity-related burden of specific diseases and identifying variations across subpopulations.
- These norms can inform health technology assessments and guide healthcare resource allocation by capturing differential impacts on paid and unpaid work productivity, supporting more equitable policies and programs to improve productivity.
- Our methods and findings can be further refined with additional research, especially on how unpaid work productivity is measured and valued.



Australian population norms for paid work productivity and exploratory estimates for unpaid work productivity

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Ethics approval

Ethics approval was not required for this study as it used secondary data. All aspects of the HILDA Survey are reviewed on an annual basis by the University of Melbourne Human Ethics Committee (#1955879). Ethics approval for the AWB project was obtained from the University of South Australian Ethics Committee.

Declaration of competing interest

None.

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THANK YOU

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