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WA Health and Wellbeing Surveillance System

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1 Introduction

The Health and Wellbeing Surveillance System (HWSS) is a continuous data collection system developed to monitor the health and wellbeing of Western Australians. The HWSS began in 2002 and is run on a continual basis, where thousands of people throughout Western Australia (WA) are interviewed each year. The HWSS is managed by the Epidemiology Directorate at the Department of Health WA, with data collected by a contracted research organisation. The survey is primarily conducted as a Computer Assisted Telephone Interview (CATI), with an online completion option introduced in 2021.

Respondents are asked questions on a range of health and wellbeing topics, including chronic health conditions, lifestyle behaviours, biomedical risk factors, health service utilisation, mental health, social characteristics, and demographics. Information from the survey is used to monitor the health status of Western Australians, inform health education programs, evaluate interventions and programs, inform health research, support health policy development, identify and monitor emerging trends and support health service planning and development.

This technical paper describes the development of the HWSS, the objectives of the data collection system and the methods used to collect, analyse, and report on the data from 2021 onwards. Previous versions can be obtained on request from DOH.HWSS@health.wa.gov.au.

1.1 Quick Facts

Health and Wellbeing Surveillance System	
Purpose	Population health monitoring, population health research
Geographic Area	Western Australia
Time Period	2002 – Present
Sample Frame	2002 – 2020: White Pages 2021 – Present: purchased databases
Survey Mode	2002 – 2020: Computer Assisted Telephone Interview (CATI) 2021 – Present: CATI and Online
Age range	All ages, reported by 0-15 years and 16 years and over
Data Linkage	Yes – WA Data Linkage System
Recall Surveys	Yes – Nutrition Monitoring Survey Series and other surveys
Weighting	2002 – 2020: Design weights and post-stratification 2021 – Present: Raked weighting
Research Projects	Yes – with ethical approval
Public Reporting	Yes – Annual Reports and Dashboard
Data Requests	Yes
Survey Data Collection	External Contracted Agency
Information Management	Epidemiology Directorate
Data Custodian	Manager, Analysis; Epidemiology Directorate
Data Steward	Assistant Director General; Public and Aboriginal Health Division

1.2 Objectives

The objectives of the HWSS are to:

- monitor the health and wellbeing of Western Australians using validated and reliable indicators
- identify health status and lifestyle trends over time
- identify emerging and relevant issues in a timely manner
- identify and report on health-enhancing behaviours as well as risk factor behaviours
- ensure that the data collected reflects information needed for a particular demographic group.

1.3 Aims

These broad objectives are further defined into the following aims, which are to provide:

- timely high-quality information to inform policy, planning, purchasing and provision of services
- information at health region level, and smaller areas where possible
- information that is used for population health performance indicators
- information that can be used to evaluate long-term effects of programs and interventions
- information about trends over time as well as seasonal trends
- a robust set of baseline health status and lifestyle information for health service managers
- quality data to researchers and health professionals which can be used to support programs, interventions, and future initiatives.

2 Governance

2.1 Authority to collect health and wellbeing information

Information in the WA health system is collected, accessed, stored, used, and disclosed to support the realisation of WA health system's vision to have a sustainable health system that delivers safe, high quality health care to all Western Australians. The *Public Health Act 2016* enables the collection of information about the incidence and prevalence of diseases and other public health risks. The HWSS operates under the principles outlined in the Department's *Information Access, Use and Disclosure Policy* and *Information Management Policy*.

2.2 Confidentiality

The success and continuation of the HWSS is only possible through the willingness of the WA community to voluntarily respond to the survey in good faith. Ensuring the privacy of survey respondents is an ongoing priority of the HWSS. The following procedures have been put in place to ensure the privacy of HWSS survey respondents:

- Only personally identifiable information to contact respondents (name and address) are provided to the data collection contractor, in the form of mailing lists. No other personally identifiable information is supplied. Mailing lists are supplied to the data collection contactor by secure encrypted file transfer.
- All mailing lists supplied to the data collection contractor are required to be destroyed upon completion of the annual survey reporting cycle. Written confirmation of sample list destruction is supplied to the Department of Health on an annual basis.
- The data collection contracting agency's staff are trained in issues related to ethics and respondent confidentiality. Staff sign a binding confidentiality agreement that is enforceable even after they cease employment with the contractor. New staff sign confidentiality agreements when they start work on the HWSS. Signed confidentiality agreements are supplied to the Department of Health and stored on file.
- All HWSS data and information are held on a secure server with access only to Department of Health staff who work on HWSS.
- No individual level data are included in reports, only summary statistics on aggregated data are reported.
- Request for individual unit level record data for research purposes require ethical approval. Data are de-identified and sent to researchers via secure encrypted file transfer.

2.3 Ethics

The HWSS has been approved by the WA Department of Health's Human Research Ethics Committee (HREC) (Committee EC00422, Project PRN RGS0000002698). The program follows the National Health and Medical Research Council's (NHMRC) National Statement on Ethical Conduct in Human Research. There are strict protocols in place regarding access to the HWSS information asset and other information necessary for conducting the survey. Details of all Department of Health staff involved in HWSS are recorded on the project research governance system and addition of new staff to the project are reviewed and approved by the Department of Health HREC.

2.4 Reference Group

In addition to the governance structures outlines above, the HWSS has a reference group that is designed to provide guidance, expertise, and insights to ensure that outputs of the HWSS support and enhance health system goals. The reference group serves as a consultative body that assists in shaping the design of the survey, as well as data collection, survey outputs and statistical methods used.

The primary objectives of the HWSS Reference Group are to enable and provide high-level, cross agency advice and guidance to:

- enhance survey design
- provide contextual expertise
- support dissemination and utilisation
- establish long term engagement from key stakeholders
- advise on priority topics
- advise on health and wellbeing survey implications.

The reference group meets biannually and is chaired by the Manager Analysis, Epidemiology Directorate.

3 Sample Frames

3.1 White Pages (2002–2020)

From 2002 to 2020, the HWSS used the White Pages. The latest version of the White Pages was released in 2013 and is no longer suitable for use, as households move away from landline telephone connections and the use of mobile telephones and internet connected devices increases. The HWSS ceased use of the White Pages sample frame from January 2021 onwards, as raw response rates at the end of 2020 had dropped to below 15%. This low response rate was due to high number of disconnected landline numbers and low representation of mobile telephone numbers in the White Pages sample frame. For more information on the previous sample frame, please contact us at DOH.HWSS@health.wa.gov.au.

3.2 Temporary use of the WA Electoral Roll (2021)

In 2021 the Epidemiology Directorate obtained permission to append information from the WA Electoral Roll with telephone numbers purchased from a commercial third-party database. This permission was granted through a memorandum of understanding between the WA Electoral Commission and the Department of Health Data Linkage System, with ethical approval from the Department of Health's Human Research Ethics Committee.

While this process was taking place, the Epidemiology Directorate also obtained permission and ethical approval for a standalone extract from the WA Electoral Roll. This extract was then used to collect HWSS respondent health and wellbeing information primarily via online completion due to the lack of telephone numbers available to the Department of Health from this extract. Alternatively, respondents were given the option to telephone the data collection agency themselves to complete the interview.

Any individual on the WA Electoral Roll who was not a silent elector was eligible to be included in these sample frame extracts. The extracts supplied included personally identifiable information including name, residential address and mailing address. The Data Linkage System also supplied regular updates of deceased individuals or silent electors who should be removed from the sample frame each month.

The response rate from the WA Electoral Roll extract with no telephone numbers proved unsustainable for long term use as a HWSS sample frame, as the lack of phone numbers and reliance on respondents to complete the survey online resulted in response rates between 3% and 10%. The Epidemiology Directorate sought permission from the Human Research Ethics Committee to use third party commercial databases as needed, and this permission was granted in 2022.

3.3 Current sample frames (2022 onwards)

From 2022 to 2023 the HWSS used several sample frames from multiple sources. The mixture of sample frames varied during this time as records from extracts were depleted and additional records were obtained. In 2024 the HWSS shifted to a single supplier for the sample frame to reduce operational burden and cost.

Sample frames used by the HWSS generally meet the following criteria:

- Each record in the sample frame has a contact name and a valid mailing address, with a connected telephone number.
- The sample frame has good geographic coverage, particularly for Western Australian regional areas such as the Kimberley and the Pilbara.
- The sample frame is a legitimate data source used by other government or research agencies.
- Samples can be purchased by following the Western Australian Procurement Rules and Procurement and Contract Management Practice Guide.
- The sample frame allows for data linkage processes.

Samples purchased from third party commercial databases include personally identifiable information such as name and address and telephone numbers and thus are suitable for conducting telephone interviews as well as capturing online respondents.

Third party commercial databases often have verification processes that reduce the number of disconnected telephone numbers, and many if not all listings are mobile telephone numbers. Respondents are provided with contact information for the relevant third-party commercial database should they wish to be removed from their lists.

The Epidemiology Directorate is unable to use Department of Health statutory data collections (such as hospital admissions) for contacting potential respondents. This is because the HWSS is a population-based survey, and the sample frame needs to be as representative of the entire population as possible. This ensures the prevalence estimates produced by the system are representative of a wide range of WA residents, and not only those who have been in contact with WA health services.

3.4 Sampling frequency and sampling strata

Each month, samples are extracted using stratified random sampling with oversampling in regional and remote areas. Oversampling is an established statistical method to allow for reduced response rates in regional and remote areas and ensures that valid and reliable estimates can be produced for these areas.

Around 80% of the WA population live in metropolitan areas, 17% in regional areas[1] and 3% in remote areas[2]. Similarly, response rates are higher in metropolitan areas and lower in regional and remote areas. To improve the representation of respondents from remote and regional areas of WA, the monthly samples are divided into three strata with oversampling applied to regional and remote areas. The Perth metropolitan area represents 44% of the sample, while regional areas and remote areas represent 39% and 17% respectively.

[1] Regional areas include: Goldfields, Great Southern, Midwest, South West and Wheatbelt.
[2] Remote areas include: Kimberley and Pilbara.

4 Questionnaire

4.1 Questionnaire types

The HWSS questionnaires are divided into four major age groups including:

- Children aged 0 to 15 years.
- Young adults ages 16 to 24 years.
- Adults aged 25 to 64 years.
- Older adults aged 65 years and over.

Child questionnaires are completed by parents/carers of the child.

Questions in the HWSS are reviewed regularly and stakeholders are asked to provide feedback to ensure that the content of the HWSS is relevant and useful. Changes in the survey topics or questions may be due to changes in health priority areas, changes to national guidelines, changes in conventional language, or are in response to research projects. As a result, the questions and topics in the HWSS questionnaires have changed over time.

A copy of the most recent HWSS questionnaire can be found here: https://www.health.wa.gov.au/Improving-WA-Health/Health-and-Wellbeing-Surveillance-System/Participation-in-HWSS

4.2 Pilot testing

Prior to adding new questions or modules to the HWSS a pilot test is conducted with a recall sample of HWSS respondents to trial the questions before they are formally added to the data collection. This helps ensure that the questions are understood by respondents and are not misleading or ambiguous. After pilot testing, modifications may be made to question design, wording, ordering or interviewer instructions as needed.

4.3 Modules

The HWSS questionnaire is divided into several topics, also known as modules. Most modules included in the HWSS questionnaire are permanent as they provide information about state or national indicators of health and wellbeing, or provide information about areas of health, lifestyle and demography that are not available elsewhere and are necessary to understand the dynamics of healthy behaviours and outcomes.

The HWSS can also include additional modules on a temporary basis or for a specific period to collect information on an emergent or current population health issue (such as the COVID-19 emergency). Please contact us to find out more about the HWSS module system at DOH.HWSS@health.wa.gov.au.

4.4 Mode of administration

4.4.1 CATI

The primary mode of data collection for HWSS is Computer Assisted Telephone Interview (CATI). This type of system has many benefits over other survey techniques, including the traditional telephone interview method. CATI has been used for HWSS since 2002 and is still the primary data collection mode.

The advantages of CATI data collection include:

- Information can be obtained in a timely manner at the point of interview, removing the need for storage and security of paper forms, transcription/data entry into an electronic format and reminder letters for completing online or paper forms.
- CATI systems allow for the management of the timing of calls and call-backs.
- Non-response error can be reduced as the next question is not displayed to the interviewer until a valid response has been recorded for the previous question.
- Respondent error is reduced as responses can be automatically checked against previous questions and seemingly inconsistent responses can be clarified with respondents at the time of interview.
- More detailed and complex information can be collected with appropriate sequencing to define specific populations for questions and to ensure that the questions are appropriate to each respondent's characteristics and prior responses.
- Correct sequencing of questions is possible and, if required, automatic rotation of response categories to minimise response bias.
- Any open-ended responses can also be entered directly and verbatim onto the computer during the interview.

Some important demographic groups may not be covered using CATI methodology, such as households with no landline telephone or mobile phone, people who have difficulty communicating in English, and people living with a disability that precludes their response to a telephone survey. In addition, some Aboriginal Australians may choose not to respond if they don't consider a telephone survey to be culturally appropriate.

4.2.2 Dual CATI/online mode

Upon receipt of the approach letter, respondents have 10 days in which they can complete the survey online, after which they are followed up by CATI. If respondents do not complete the survey by CATI by the end of the sampling month, they are able to complete the online survey until the end of the calendar year. This allows for completed surveys from respondents who are eager to respond to the survey but may have missed the initial 10-day online completion window or did not respond over the telephone during the CATI follow up period. This mode of collection is currently offered to all participants.

4.2.3 Online only mode

Online only mode was used for collecting HWSS information from respondents selected from the WA Electoral Roll where access to phone numbers was not possible during February to June 2021 and in February 2023. Due to extremely low response rates, online only data collection is only used in emergency situations (e.g. emergency sample lists without phone numbers, or where CATI interviewing is not possible).

5 Data Collection

5.1 Data collection agency

A data collection agency is contracted to collect HWSS information on behalf of the WA Department of Health. The data collection agency is responsible for dissemination of the approach letters, conducting the interviews, monitoring call outcomes, and providing a complete dataset back to the Department of Health each month. There is regular communication between the data collection agency and the Department of Health when the survey is in the field.

5.1.2 Interviewers

Interviewers for HWSS are employed by the data collection agency and undergo specific training on collecting HWSS data. All interviewers and supervisory staff have signed confidentiality agreements to conduct the interviews and coordinate the HWSS data collection.

5.1.3 Quality control of interviews

The data collection agency adheres to the NHMRC National Statement on Ethical Conduct in Human Research and is a member of the Market Research Society of Australia. The data collection agency is also an accredited Australian Market and Social Research Standard (ISO 20252) organisation. Ten per cent of each interviewer's work is randomly selected for validation by the agency supervisor.

5.2 Data collection process

5.2.1 Survey schedule

While the HWSS is an ongoing data collection, operationally the survey has monthly samples and data collection periods. The size and duration of monthly samples may vary dependent on staff availability, time of year and budget allocated to the survey.

5.2.2 Approach letter and brochure

An introductory approach letter (Appendix 1), signed by the Director General of the Department of Health, is sent to the selected households. It explains the purpose of the survey and alerts the residents that one person from the household will be asked to participate in the survey either online or over the telephone. The letter provides contact details of the data collection agency and staff at the Department of Health in case they have any concerns or questions about the questionnaire, would like to verify the legitimacy of the survey or wish to opt out. The approach letters also contain a link to a website address and a QR code where respondents can complete their survey using a unique passcode.

A brochure providing background to the survey and the interview process is also included with the letter. The brochure (Appendix 2) contains a website address and QR code so that selected respondents can verify the legitimacy of the letter and survey.

5.2.3 Selection of respondent

The household member next in line to have their birthday is selected for completion of the survey. If this person is aged under 16 years, a parent or guardian is interviewed on the child's behalf. There is no replacement for people who cannot be contacted or who refuse to participate.

5.2.4 CATI recruitment and follow up

A maximum of six telephone calls are made to establish contact to each telephone number selected for the HWSS within each survey month. The calls are scheduled for different times of day and days of the week. Soft appointments may be made where a respondent is not available at the time of follow up but is interested in completing the interview later. If there has been no contact made after the sixth call, a non-contact call result code is assigned to that number. The non-contact call result codes are further broken down (e.g. engaged, no answer, not connected). All other call attempts are coded as completed, partially completed, unable to participate or refused. Partially completed surveys are followed for up to five days after the end of the month. If the respondent selected is unable/unwilling to participate, the call is terminated and coded as refused. No attempt to convert refusals are made. No substitute respondents are interviewed.

Respondents who have been assigned a non-contact call code are able to complete their survey online in subsequent months, if the survey is completed in the same calendar year that the approach letter was sent.

5.2.5 Agreement to recall and data linkage

Each respondent is asked whether they agree to being called again to explore additional health topics. Those that agree are added to a recall list. The use of this recall list is strictly controlled, and priority is given to projects in the following order:

- piloting and data quality (e.g. testing survey questions)
- case control studies in emergency situations (e.g. a food poisoning outbreak)
- recruitment for other population health surveys (e.g. Nutrition Monitoring Survey Series, community attitudes to water fluoridation)
- research projects (these require ethical approval).

Respondents are also asked whether they agree to have their survey information linked with other health data held by the WA Data Linkage System, managed by the WA Department of Health. All interviewers are provided with detailed information for any respondent who wishes to know more about the datasets that will be linked and how the information will be used. Respondents who consent to data linkage are asked to provide their full name, address, and date of birth. More information about the use of HWSS and the Data Linkage System can be found in Section 6.3 and Section 10.2.

5.3 Response rates

The willingness of the people of WA to respond to the HWSS survey is crucial to the validity of the results. As with any survey, high response rates are important in reducing response bias and ensuring the results from the sample are representative of the population being surveyed. The monthly call outcomes for the HWSS are monitored to track community willingness to participate as well as the suitability of sample frames.

5.4 Data transfer

Following the completion of monthly calling period, the HWSS responses are reviewed by the data collection staff and then sent via secure encrypted file transfer to the Department of Health. The data is stored in a secure location and backup copy made before data processing begins.

6 Data processing

Before HWSS data can be analysed, it must be cleaned and processed. Cleaning and processing of HWSS data occurs monthly.

6.1 Address cleaning and geocoding

If respondents agree to supply their address information when responding to the HWSS, this information is compared with the information in the original mailing list. If the addresses differ, e.g., because a respondent has moved house, then the address supplied by the respondent is verified in Google Maps and updated accordingly. If respondents do not agree to supply their address information, then the original mailing address is used. Address information is then used for geocoding in ArcGIS Pro using a Department of Health address locator. Each record is assigned geographical information which assists with analysis and reporting, including local government area, health district, health region, health service, remoteness (using Accessibility/Remoteness Index of Australia Plus (ARIA+)) and socio-economic status (using Socio-Economic Indexes for Areas (SEIFA)). All personally identifiable information is then deleted from the data.

6.2 Variable processing

In this stage, each record is given a unique non-identifiable record identifier. Original variables are processed to produce derived variables that are used for analysis and reporting. Examples of this include scoring the Kessler Psychological Distress Scale, classification of alcohol consumption against guidelines, and derivation of Body Mass Index and weight class based on the respondent's self-reported height and weight.

6.3 Recall and linkage datasets

For each record where the respondent has agreed to be recalled for future surveys or to have their information linked to the WA Data Linkage System, the personally identifiable information including name, address, telephone number and date of birth are exported to a separate secure storage location.

The recall lists may be used to contact respondents for future health surveys, such as the Nutrition Monitoring Survey Series, community attitudes to water fluoridation, or to pilot updates to the HWSS questionnaire.

The linkage dataset is sent by secure encrypted file transfer to the WA Data Linkage System team on an annual basis. Agreement to data linkage is assumed to be ongoing, unless a respondent notifies the Department of Health that they no longer wish to have their data linked in the WA Data Linkage System.

7 Weighting and analysis

7.1 Raked weighting

Weighting ensures that the demographic profile of the respondent sample aligns with that of the total WA population. In raked weighting weights are created and iteratively adjusted so that the proportions of certain demographic characteristics in the respondent sample are equal to the proportions found in the target population. The iterative process is complete when the survey sample margin totals converge with the population margin totals within an acceptable predefined tolerance limit[3]. The weights are then trimmed at an upper limit set as the median plus six times the interquartile range[3]. This avoids the creation of small quantities of very large weights, which can introduce instability into the prevalence estimates. Scaling is then applied, where the balance of all weights above the upper limit value are equally distributed across the entire sample. The weighted HWSS data can then be used to derive representative prevalence estimates for health conditions or risk factors in the WA community.

For further information on raked weighting, please see the *Evaluating Raked Weighting Methods: WA Health and Wellbeing Surveillance System* report[4].

7.1.1 Annual estimated resident populations

The estimated resident population for each year was obtained from the Australian Bureau of Statistics (ABS) and last updated in April 2023. Table 1 displays the ERP for children and adults used for weighting each year of HWSS data.

Table 1: Estimated resident population used for weighting HWSS

HWSS Year	0-15 years	16 years+	HWSS Year	0-15 years	16 years+	HWSS Year	0-15 years	16 years+
2002	431,160	1,475,114	**2012**	483,353	1,870,056	**2022**	563,897	2,185,967
2003	429,819	1,498,693	**2013**	496,364	1,929,143	**2023**	567,274	2,221,874
2004	429,061	1,523,680	**2014**	509,045	1,977,899	**2024**	-	-
2005	429,928	1,549,614	**2015**	516,683	2,000,925	**2025**	-	-
2006	432,085	1,579,122	**2016**	522,307	2,018,365	**2026**	-	-
2007	437,123	1,613,458	**2017**	527,019	2,028,959	**2027**	-	-
2008	445,461	1,660,678	**2018**	534,504	2,053,073	**2028**	-	-
2009	455,873	1,715,827	**2019**	541,954	2,079,098	**2029**	-	-
2010	467,015	1,773,235	**2020**	549,968	2,113,827	**2030**	-	-
2011	474,370	1,816,475	**2021**	558,107	2,160,293	**2031**	-	-

- values will be updated in future as HWSS annual reports are released

[3] Dal Grande E, Chittleborough C, Campostrini S, Tucker G, and Taylor A. 2015. Health Estimates Using Survey Raked-Weighting Techniques in an Australian Population Health Surveillance System. *American Journal of Epidemiology* 182:6, 544-56. https://doi.org/https://doi.org/10.1093/aje/kwv080.

[4] Epidemiology Directorate, 2024. Evaluating raked weighting methods: Western Australia Health and Wellbeing Surveillance System. Department of Health, Western Australia. Available online at https://www.health.wa.gov.au/~/media/Corp/Documents/Reports-and-publications/Population-surveys/Evaluating-raked-weighting-methods-WA-HWSS.pdf

7.1.2 Census proportions

The Census is conducted by the Australian Bureau of Statistics (ABS) every five years, and provides demographic, socioeconomic and housing characteristics of the entire Australian population. For each Census year we obtained the general community profiles based on place of usual residence were used for WA state, the greater Perth area, and the Outback - North (equivalent to the Kimberley and Pilbara regions)[5]. Proportions for adults were based on the total number of persons aged 16 years and over for age, sex, area of residence, country of birth, marital status, education level and employment status as seen in Table 2. Proportions for children were based on the total number of persons aged 0 to 15 years for age, sex, area of residence, and country of birth (Table 3).

Table 2: HWSS raked weighting census proportions for adults 16 years and over

	Census Year				
	2001	**2006**	**2011**	**2016**	**2021**
HWSS data collection year	2002-2006	2007-2011	2012-2016	2017-2021	2022-2026
Weighting Domain					
Sex					
Male	0.4940*	0.4940*	0.5001	0.4971	0.4931
Female	0.5060*	0.5060*	0.4999	0.5029	0.5069
Age groups					
16 to 24	0.1653	0.1613	0.1568	0.1425	0.1317
25 to 34	0.1892	0.1704	0.1832	0.1927	0.1755
35 to 44	0.2022	0.1934	0.1855	0.1753	0.1789
45 to 54	0.1825	0.1823	0.1753	0.1702	0.1642
55 to 64	0.1167	0.1390	0.1438	0.1433	0.1477
65 to 74	0.0798	0.0827	0.0862	0.1015	0.1166
75 plus	0.0643	0.0708	0.0691	0.0745	0.0854
Area of residence					
Metro	0.7399	0.7534	0.7868	0.7990	0.7964
Pilbara/Kimberley	0.0348	0.0334	0.0417	0.0369	0.0321
Rest of State	0.2253	0.2131	0.1715	0.1641	0.1716
Country of Birth †					
Australia	0.6289	0.6028	0.5806	0.5509	0.5619
Other	0.3711	0.3972	0.4194	0.4491	0.4381
Marital status † ‡					
Married/living with a partner	0.5087	0.4953	0.6013*	0.6013*	0.4730
Other (widowed, separated, divorced, never married)	0.4913	0.5047	0.3987*	0.3987*	0.5270
Educational level †					
Bachelor's degree or higher	0.1208	0.1444	0.1754	0.2054	0.2421
Other (none to some high school, trade certificate, diploma)	0.8792	0.8556	0.8246	0.7946	0.7579
Employment status †					
Employed	0.5776	0.5991	0.6102	0.5795	0.6389
Not Employed	0.4224	0.4009	0.3898	0.4205	0.3611

* Proportions may appear equal between years due to rounding

† Proportions have been calculated using ABS general community profiles for persons aged 15 years and over for these variables, to enable consistency with 2001 Census publications over time.

‡ The definition of marital status by the ABS changed over time, hence variations in proportions over time

[5] Australian Bureau of Statistics. 2022, Community Profiles, ABS. https://www.abs.gov.au/census/guide-census-data/about-census-tools/community-profiles.

Table 3: HWSS raked weighting census proportions for children 0 to 15 years

	Census Year				
	2001	**2006**	**2011**	**2016**	**2021**
HWSS data collection year	2002-2006	2007-2011	2012-2016	2017-2021	2022-2026
Weighting Domain					
Sex					
Male	0.5144	0.5135	0.5137	0.5135	0.5139
Female	0.4856	0.4865	0.4863	0.4865	0.4861
Age groups					
0 to 4	0.2918	0.2937	0.3220	0.3192	0.3004
5 to 9	0.3151	0.3110	0.3039	0.3240	0.3206
10 to 15	0.3931	0.3953	0.3741	0.3568	0.3790
Area of residence					
Metro	0.7007	0.7133	0.7567	0.7771	0.7932
Pilbara/Kimberley	0.0216	0.0450	0.0447	0.0423	0.0410
Rest of State	0.2778	0.2417	0.1986	0.1806	0.1658
Country of Birth †					
Australia	0.8524	0.8507	0.8253	0.8229	0.8667
Other	0.1476	0.1493	0.1747	0.1771	0.1333

† Proportions have been calculated using Community Profiles for persons aged 0 to 14 years for this variable, to enable consistency with 2001 Census publications over time.

7.2 Data analysis

Data analysis is conducted in SAS Enterprise Guide 8.3[6]. Weighted prevalence estimates for topics such as arthritis or self-reported physical activity level are calculated using **`proc surveyfreq`**. Weighted mean estimates such as number of injuries or serves of vegetables is calculated using **`proc surveymeans`**. The weighting variable is included to allow the calculation of both the sample frequency and population prevalence estimates.

Estimates can be generated for WA state, health service provider, health region, health district or local government area, dependent on respondent sample size. Estimates can also be broken down by age group (16-44 years, 45-64 years, 65 years and over) as well as sex (female, male), dependent on respondent sample size. In the case of small sample sizes, multiple years are combined, which reduces the variability of results and improves the robustness of generated prevalence estimates. Examples of SAS syntax used in HWSS analysis are supplied in Figure 1 below.

```
12 proc surveyfreq data = WORK.HWSS_CURRENTYEAR;
13     where arthrit <997;
14     strata sampleareas;
15     tables  sex*arthrit*agegroup2
16         arthrit*agegroup2
17         arthrit*sex
18         /col cl cv;
19     weight rake_weight_final;
20 run;
31 proc surveymeans data = WORK.HWSS_CURRENTYEAR  nobs mean stderr clm cv ;
32     where injury<998;
33     domain agegroup;
34     var injury;
35     strata sampleareas;
36     weight rake_weight_final;
37 run;
```

Figure 1: examples of SAS syntax to produce HWSS estimates

[6] SAS Institute Inc. 2020. SAS® Enterprise Guide® 8.3: User's Guide. Cary, NC: SAS Institute Inc.

8 Interpretation of results

8.1 Prevalence estimates

Information reported from HWSS are usually referred to as prevalence estimates. Prevalence refers to the number or proportion of individuals in a community who have a demographic characteristic, risk factor, health condition or lifestyle factor of interest, and is usually expressed as a percentage of the population. Because the survey is unable to collect information on all people within the population, the weighted data from the survey sample allows the calculation of an ***estimate*** of the 'true' prevalence in the community.

Prevalence differs from incidence, which is a measure of the number of new cases of a condition or characteristic. Prevalence is concerned with all individuals with a given condition or characteristic regardless of when it began. Incidence refers only to new cases of a condition or characteristic during a specified time interval. Surveys generally do not collect or report on incidence of disease.

There are three main types of prevalence that are typically reported by HWSS:

- Lifetime prevalence represents the proportion of the population that have ever exhibited a given condition or characteristic.
- Period prevalence represents the proportion of the population who have exhibited a condition or characteristic within a specified period, for example 12 months.
- Point prevalence represents the proportion of the population who exhibited a condition or characteristic at the time of the survey.

In some cases, such as with asthma, both lifetime and point prevalence are reported. This is because a person may have had asthma at some point in their life but not have it currently.

8.2 Confidence intervals

Survey results are estimates of 'true' population values and will always contain some error because they are based on samples and not the entire population. Therefore, information reported by HWSS is usually presented as a prevalence estimate with a 95 per cent confidence interval for a given condition or characteristic. The 95 per cent confidence interval is the range within which the true estimate would lie 95 out of 100 times. The wider the confidence interval is around an estimate, the less precise the estimate is, and the more caution that should be applied with using it.

One way to compare two prevalence estimates is to assess whether the difference between them is statistically significant. Statistical significance is a statement about the likelihood of a finding being due to chance. Confidence intervals can be used to determine statistical significance. Overlapping confidence intervals indicate that there is probably no meaningful difference in the estimates being compared. If the confidence intervals do not overlap, then the estimates are considered significantly different. Along with helping to determine statistically significant differences, confidence intervals can also be used as a measure of the level of stability around an estimate. Narrow confidence intervals indicate stable estimates whereas wide confidence intervals indicate unstable estimates.

8.3 Relative standard error

The level of stability around an estimate can also be guided by the relative standard error (RSE). The RSE is a measure of the extent to which the survey estimate is likely to be different from the actual population result. The smaller the RSE, the more likely it is that the estimate is an accurate reflection of the population.

Wide confidence intervals and high RSEs can be present for younger age groups for certain chronic health conditions such as stroke, because they are less likely to be present and detectable at younger ages. It is also possible to see wide confidence intervals and high RSEs for some variables that have 4 or more response options such as self-reported level of physical activity and number of serves of vegetables per day.

Estimates with RSEs less than 25% are considered accurate, and reliable for most purposes. Estimates with RSEs between 25% and 50% are less accurate, meaning there is a higher chance that the survey estimate is different from the actual population result. Estimates with RSEs between 25% and 50% are indicated with an asterisk (*) and should be interpreted with caution. Estimates with RSEs greater than 50% are not very accurate and there is a high chance that the survey estimate is different from the actual population results. Estimates with RSEs greater than 50% are usually suppressed.

9 Reports

9.1 Annual reports

The Epidemiology Directorate reports on the information collected by the HWSS on an annual basis. The reports are usually released in the year following the completion of annual data collection and provide a snapshot of the health and wellbeing of the WA population.

The HWSS reports can be found at the following website:
http://ww2.health.wa.gov.au/Reports-and-publications/Population-surveys

9.2 Online portal

An online portal for access to aggregated HWSS data and trends is currently in development.

9.3 Public health plans

Data form the HWSS can be provided for local governments to help with their public health planning. For more information, contact the Epidemiology Directorate at: EPI@health.wa.gov.au.

9.4 Performance indicators

The Epidemiology Directorate provides population prevalence estimates on several key health and wellbeing topics for the Department of Health Annual Report.

The Epidemiology Directorate also provides annual performance indicators to the Mental Health Commission on the prevalence of the WA adult population who: 1) have high/very high psychological distress, 2) exceed the 2020 Guidelines on alcohol consumption, and 3) have used an illicit drug in the past 12 months.

9.5 Data requests

The Epidemiology Directorate can provide prevalence estimates for a range of HWSS topics, reportable by demographics and geographic location. To complete a data request form please go to: https://datalibrary-rc.health.wa.gov.au/surveys/?s=3XDP78MXXK

10 Research

The HWSS is a valuable tool for discovering more about the interplay between health behaviours and health outcomes through research. Applications for research using de-identified HWSS unit record level data are welcomed and should follow the process below.

10.1 Contact the data custodian

If you are thinking of using HWSS data for a research project, including for a Masters or PhD, you must contact the data custodian to discuss your project. Discussions with the data custodian are the first step in ensuring that the HWSS data collection is a suitable information source for your project, and that the information is available for the time period and any population subgroups you are interested in.

10.2 Complete applications for data

After discussion with the data custodian, follow the steps outlined by Data Linkage Services and the Research Governance Service (RGS). You must complete:

- an application for data form
- a data management plan
- an extraction/case group form
- a variable list for each subgroup of HWSS you wish to obtain information for (adults and/or children)
- any other additional information requested in the application process (eg candidacy application).

10.3 Ethical approval and research governance approval

Your application will be reviewed by the RGS team, data custodians, and Human Research Ethics Committee. You may be asked for further information to help each of these understand your project. Once your project has been approved by the HREC and RGS, your information can be extracted by the HWSS team.

10.4 Data dictionary

Data dictionaries are available for the adult and child data collections, for original survey items as well as derived variables. Please contact DOH.HWSS@health.wa.gov.au for more information.

11 Collaboration and contact

The HWSS team welcomes opportunities to collaborate with entities within the WA health system, charitable organisations, and research institutions. This may include research projects, business improvement or population health evaluations. Please contact us for more information.

For any queries about the Health and Wellbeing Surveillance System, please contact the HWSS team, Epidemiology Directorate, WA Department of Health at DOH.HWSS@health.wa.gov.au.

Appendix 1 – Approach letter

Ref: Dual

QR-code

Dear [NAME]

The WA Health and Wellbeing Survey

I am writing to ask you to take part in an important Department of Health initiative, the WA Health and Wellbeing Survey. Your participation will ensure that we have up-to-date information to plan, develop and make decisions about health services. Responses help us form a picture about the health of your community and so health services can respond to local needs.

We have randomly selected your household to take part in the survey. Participation in the survey is voluntary and all personal information collected will remain confidential. All responses to the survey are combined and no individual responses can be identified. The Edith Cowan University (ECU) Survey Research Centre conducts the survey on our behalf. There is additional information about the survey in the enclosed brochure.

The person in your household who is next in line to have their birthday is asked to take part. If this household member is younger than 16 years old, a parent or guardian needs to answer the survey on their behalf. You can complete your survey online by scanning the QR code at the top of this letter or entering the following link in your internet browser:

Survey Link: [xxxxxxx]

Now enter your **Survey Access Code: [xxxxx]**

The survey will be open to online responses for 10 days, after which an interviewer from ECU Survey Research Centre may call you to complete the survey over the phone if you have not already completed it online.

If you have any queries about the survey, please call Eugené Abrahams or the supervisor on duty at ECU Survey Research Centre and they will be happy to assist. Dial **(08) 6304 2100** if you are calling from Perth or **1800 993 310** if you are calling from outside Perth. If you want to speak to someone at the Department of Health, please call (08) 6373 3821 and ask for the Manager of the Health and Wellbeing Survey.

I would like to thank you in advance for your support and participation in this important initiative.

Yours sincerely

Dr Shirley Bowen
DIRECTOR GENERAL

Why your participation matters

WA's HWSS is one of the longest running and most successful population health surveys in Australia and that is thanks largely to Western Australians' longstanding willingness to participate.

In striving to provide the best possible health services for all Western Australians we need to build an accurate picture of the health needs of our population. Your participation in this survey will help build this picture.

While there is no obligation on you to take part in the HWSS, if you are invited to do so, we would be most grateful if you could make time to be involved in this important WA program.

Further information

For more information about the survey visit: ww2.health.wa.gov.au/Reports-and-publications/Population-surveys or call Department of Health on 9222 4222 and ask for the Epidemiology Directorate.

Further information about linking health records can be found on the internet site: www.datalinkage-wa.org or call the Department of Health on 9222 4222 and ask for the Data Linkage Branch.

This project has been approved by the Department of Health Human Research Ethics Committee.

This document can be made available in alternative formats.

Produced by the Epidemiology Directorate

ESP-003455 NOV'23

health.wa.gov.au

Government of **Western Australia**
Department of **Health**

Western Australian Health and Wellbeing Surveillance System

health.wa.gov.au

Why WA needs a Health and Wellbeing Surveillance System

In 2002, a Health and Wellbeing Surveillance System (HWSS) began monitoring the health status of all Western Australians.

Every month more than 550 people of all ages are invited to take part in the survey and answer questions about their health and way of life.

Information from the HWSS is important for identifying the health needs of Western Australians across the State.

How information from the survey is used

Information from the HWSS is used to:

- monitor the health status of all Western Australians
- identify important relationships between lifestyle choices and health
- identify groups who are at risk of developing health problems
- plan and develop health services to ensure the provision of effective, safe and high-quality health care
- inform health education programs
- evaluate current healthcare activity
- inform health policy development.

What the survey will cover

Question topics in the survey include:

- health status
- smoking
- physical activity
- nutrition
- alcohol consumption
- use of health services
- sociodemographic information such as age, sex and geographic location.

Other possible uses of information collected in the survey

At the end of the survey, we will ask you if you would be willing to take part in other important health studies. You do not have to participate in the future even if you say yes at this time.

We will also seek your consent to have the information you provide on the survey linked to other health-related data collections, such as hospitalisation or cancer registry data. Research using linked data helps us to identify emerging health issues and plan our services more effectively and efficiently.

All research projects are approved by a qualified ethics committee. Only information that is not individually identifiable is used and reported on.

You may request a brochure about data linkage if you would like more information.

This document can be made available in alternative formats on request for a person with disability.