



INDIGENOUS  
HOUSING AUTHORITY  
OF THE NORTHERN TERRITORY

# ENVIRONMENTAL HEALTH SURVEY YEAR 2 EVALUATION

SUPPLEMENTARY REPORT

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*Improving housing outcomes for Indigenous Territorians*



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## EXECUTIVE SUMMARY

This report presents community level comparisons for the first two rounds of the Environmental Health Survey. Data presented include the percentage of dwellings functional for five healthy living practices, and various measures of housing functionality, including the results of a housing functionality index developed to measure housing functionality with reference to the healthy living practices. Results are presented at a community level for a matched dwelling analysis (i.e. only dwellings surveyed in both reference periods) and for all dwellings. Data for communities is only presented if more than ten dwellings were sampled.

The housing functionality index (and other measures) indicated that between the two survey reference periods all ATSI Regions, except Darwin showed significant improvements in housing condition when analysing matched dwellings. All ATSI regions showed improvements when all dwellings were included in the analysis, though Darwin only improved marginally. Between the two survey periods a number of communities have remained disadvantaged with regard to having the physical infrastructure required to achieve a safe and healthy lifestyle (i.e. healthy living practices). There was large variation in housing condition at the community level, between the survey reference periods, and within regions for each survey period.

The large variation that was evident in the housing functionality index (and community rankings), between the first two rounds of the Environmental Health Survey could result from real improvements, systematic differences in the standard of the houses surveyed in each survey, or lack of standardisation of survey methods and lack of quality control in the conduct of the survey. Variation in the housing functionality index between communities, but within survey reference periods may also be attributable to a lack of standardisation in data collection procedures.

This again highlights the importance of the recommendations regarding training of surveyors to ensure standardisation of data collection methods, and the implementation of quality control procedures for the surveys.

The housing functionality index developed in this report has been standardised to range between zero and one hundred. A score of one hundred for a community indicates that 100% of the dwellings were functional in relation to the five healthy living practices, at the time of the survey. The results using the index were consistent with other measures of housing functionality and support its use in future rounds of the Environmental Health Survey.

The housing functionality index provides a measure to monitor changes in housing condition (in relation to the healthy living practices) over time, at the community, regional and Territory geographic levels. It also allows for comparisons of communities within survey periods through comparing either the housing functionality index or the relative ranks of communities in relation to each other. Housing functionality index scores are proportional to each other. That is, if community X scores 90 for the housing functionality index, compared with community Y scoring 45, then community X is, on average, twice as well off with regard to the percentage of houses being functional in relation to the five healthy living practices.

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## 1. INTRODUCTION

This supplementary report has two purposes. Firstly, to present community level comparisons of the data for survey one and survey two of the Environmental Health Survey. Secondly, to present a refinement of the method for assessing the functional status of household infrastructure between regions, between communities, and over time. Because the refined method for assessing functional status of households in communities has been used in the analysis and in presentation of the community level comparisons, the refinement of the method will be reported first. This refined method has also been applied to some of the analysis presented in the main report of the year two survey evaluation, and the results of this analysis are also presented in this supplementary report. Appendix B of this report presents results of the refined method for the first round of the Environmental Health Survey.

## 2. BACKGROUND, RATIONALE AND APPROACH TO THE DEVELOPMENT OF A HOUSING FUNCTIONALITY INDEX

The evaluation of the first round of Environmental Health Survey data reported six healthy living practice indicators and a functionality rating for each community based on these. It was intended that the functionality rating measure the functional status of key living practices to enable planners and policy makers to allocate resources on a needs basis to communities, and to identify communities that have good housing functionality.

*In evaluating the data from the second round of the Environmental Health Survey, it was decided to review the rating scale used previously. Two issues were identified on reviewing the method by which this rating was formulated.*

*These were:*

1. Variables used to make the six health living practices were not mutually exclusive between living practices leading to redundancy of information; and
2. Insensitivity to improvements in the condition of dwellings in communities.

*In reviewing the rating scale, we have considered three main options for a measure of the functional status of household infrastructure at the community level that would allow:*

- improvements in housing condition to be monitored over time;
- housing functionality index scores to be linearly proportional to each other (i.e. an index score of 90 for community X compared with a index score of 45 for community Y indicates that on average community X is twice as well off as community Y with regard to housing functionality); and
- ranking of communities by housing functionality.

*The three options are:*

1. a modification of the 'functionality rating' used in the evaluation of the first round Environmental Health Survey data;
2. an average dwelling functionality based on the mean of the functionality rating for each dwelling in the community (as per the number of healthy living practices that a dwelling has passed); and
3. a housing functionality index derived from a principal component analysis (PCA) of the items used to assess the functional status of the infrastructure required for each of the healthy living practices.

The modification of the functionality rating primarily involves a reduction (or merging) in the number of healthy living practices from six to five. The reason for this is that one of the six healthy living practices used in the first report was dependent on items of infrastructure that were also required for two other healthy living practices. The healthy living practices were therefore not mutually exclusive in terms of the items of infrastructure items underlying them. The items of infrastructure in question are detailed in the discussion of the development of the housing functionality index below and in table 1). The range of the functionality rating is now 0-5, with 5 representing the highest level of functionality, and indicating that at least 50% of houses have functioning infrastructure for all five of the healthy living practices in that community. This rating is still limited by its inability to distinguish between communities where the percentage of houses with functioning infrastructure is just over 50% and those where the percentage of houses functioning is closer to 100% for the healthy living practices.

The average dwelling functionality is based on the mean functionality rating of dwellings in the community, where the functionality rating is now based on FIVE healthy living practices and on how many of the practices that dwelling meets. Like the functionality rating, it ranges from 0-5, with a average dwelling functionality score of 5 indicating all dwellings in that community are functional with regard to the five healthy living practices. This measure overcomes the main limitation of the functionality rating, as described above, due to it being calculated up from the dwelling level and being a continuous measure. However, the average dwelling functionality is limited by the fact that it is built up from the five healthy living practices, which themselves are composite measures incorporating 17 underlying infrastructure items.

The development of a housing functionality index is intended to overcome the limitations of the functionality score and the average dwelling functionality as summary measures of the functional status of household infrastructure in relation to the healthy living practices.

Stated briefly, the method of development of the housing functionality index follows the principal component analysis approach used by the Australian Bureau of Statistics (ABS) for the development of an index of socio-economic status (ABS 1998). The method is mathematically sound and has been validated. The details of the method used for the development of the housing functionality index are presented in Appendix A of this report. This appendix also details comparative statistics against a number of measures that were used to validate the index, and to provide further information on the condition and functionality of housing in Indigenous communities. Appendix B presents community level results for round one of the Environmental Health Survey for the housing functionality index and the five healthy living practices.

Table 1 shows the 17 infrastructure items underlying the original 6 healthy living practices, and the infrastructure items used in the calculation of the housing functionality index. It is important to note that the infrastructure items of shower drainage and toilet drainage were used more than once in developing the original six healthy living practice indicators. For this reason, the six healthy living practices can not be used in a principal component analysis, as they contain redundant information, which would unduly affect the principal component analysis. Additionally, several of these variables were highly correlated with each other, which leads to redundancy of information. For this reason, several infrastructure items were amalgamated to give new derived variables that were included in the final index calculations.

The results of the application of the housing functionality index to the first and second rounds of the Environmental Health Survey are presented in the next section of this report (see also appendix B). Note that the housing functionality index for ATSI Regions were calculated by applying weights to percentages at the regional level and not by averaging index scores for communities within that region. While not being strictly mathematically correct, this was done to ensure that all available data were used. For example, in the matched dwelling analysis, only 42% (68 from 162) of communities that had matched dwellings between the two survey periods could have a housing functionality index score calculated due to the criteria that the community must have had at least 10 dwellings sampled. Similarly for the all dwellings analysis, only 36% (79 out of 219) and 33% (87 out of 266) of communities received a housing functionality index for survey 2 and 1 respectively.



Table 1. Variables used for original six healthy living practices and variables used in the index of housing functionality.

Variable used in healthy living practices	Healthy living practice	Variables used in calculation of Index of Housing Functionality	Healthy living practice
Shower hot tap Shower cold tap Shower drainage* Bathroom basin Bathroom cold tap Bathroom hot tap	Wash people	Shower taps (hot & cold)  Shower drainage Bathroom taps (hot & cold) and basin	Wash people/remove waste water
Laundry trough Laundry hot tap Laundry cold tap	Wash clothes	Laundry taps (hot & cold) and trough	Wash clothes
Main toilet pan water Main toilet cistern Main toilet water supply Main toilet drainage*	Functioning toilet	Main toilet pan  Main toilet cistern and water supply  Main toilet drainage	Functioning toilet/remove waste
Shower drainage* Main toilet drainage*	Remove waste water	NA	NA
Rubbish bin	Remove waste rubbish	Rubbish bin	Remove waste rubbish
Kitchen cold tap Stove top Stove oven Food storage - dry Kitchen bench	Prepare and store food	Kitchen cold tap Stove top and oven  Food storage - dry Kitchen bench	Prepare and store food Prepare and store food

\* variable listed more than once

The housing functionality index summarises the information used in constructing the healthy living practices and ranges from 0–100, with 100 indicating that 100% of dwellings for a community are functional relative to the five healthy living practices.

### 3. RESULTS OF THE APPLICATION OF ALTERNATIVE MEASURES OF HOUSING FUNCTIONALITY TO THE SURVEY DATA

Tables 2 and 3 show all communities included in both survey reference periods, the number of dwellings sampled, average dwelling functionality, functionality ratings, housing functionality index, and the percentages of dwellings functional within the community for five healthy living practices where more than 10 dwellings were sampled. Similar tables are presented for survey 1 data in Appendix B. Table 2 presents second round survey data for communities where more than 10 dwellings could be matched between the two survey rounds, while table 3 presents second round survey data for all dwellings where more than 10 dwellings were surveyed in the community. Communities with less than 10 dwellings surveyed were omitted from this analysis because of the instability of estimates, and the high potential for biased sampling to influence results of comparisons based on small numbers.

The following dot points highlight the main features for tables 2 and 3.

- Alice Springs contains a smaller number of sampled dwellings, which will lower the reliability of figures for this council (and communities within – for example 47 of the 63 dwellings sampled for Alice Springs in survey 2 were located in Amoonguna).
- No data are presented for communities where less than 10 dwellings were sampled, though these dwellings are included in calculations of ATSIC Regional figures.
- There is relatively little variation between the *matched* dwelling and *all* dwellings analysis at the Northern Territory level of aggregation.
- There is large regional variation in the housing functionality index and healthy living practices between ATSIC Regions and within ATSIC Regions for Survey 2. For example:
  - > The housing functionality index ranged from 90 in Alice Springs to 69 in Jabiru, while for the Northern Territory the housing functionality index was 76 (table 2 – matched dwelling analysis).
  - > The percentage of functional dwellings for the healthy living practice ‘wash people’ ranged from 86% in Alice Springs (AS) region to 39% in Papunya (PP) region, compared with 53% for all matched dwellings across the Northern Territory (table 2).
  - > Within Papunya (PP), for communities that sampled more than 10 dwellings, Yuelamu recorded only 16% of dwellings as being functional with regard to ‘wash person’, while Areyonga and Wallace Rockhole recorded 89% and 88% respectively (table 2).
  - > Similarly, for other healthy living practices there is large variation. For example, *prepare and store food* ranged from 73% in Alice Springs to 36% in Papunya (PP) (table 2).
  - > The housing functionality index also reflected the large variation seen in individual living practices within ATSIC Regions. For example, in Garrak Jarru Region (GJ), the housing functionality index ranged from 34 for Amanbidji to 93 for Rockhole, while in Miwatj region (MW), Galiwinku scored 45, while Ramingining scored 96.
  - > There was less variation within the ATSIC Regions of Papunya (PP), Jabiru (JAB), Yilli Rreung (YR) and Yapakurlangu (YP), though some of these regions had fewer communities for which the housing functionality index could be calculated.
- Between ATSIC Regions, there is variation across healthy living practices between the *matched* analysis and the *all* dwelling analysis. For example: All regions, except Jabiru, generally had higher percentages of dwellings as functional across the living practices for the matched dwelling analysis (table 2), compared with the all dwelling analysis (table 3). The housing functionality index also reflected this variation.
- To better understand the variation occurring between matched and unmatched data between surveys, it is recommended that a sampling strategy be adopted where there is consistent overlap in re-sampling of dwellings across all communities. Naturally, this will occur if a high percentage of all dwellings are sampled.
- To facilitate matching of data between surveys, it is of vital importance that data entry personnel enter both the lot number and the *secondary lot number*. This will allow accurate matching of dwellings between surveys. Further insight into the accuracy of data analysis is possible, if numbers of funded houses in communities is also collected.
- Care must be taken when referring to functionality ratings, particularly concerning the rating of ‘5’. The criterion for a community to score a ‘5’ is that across the five healthy living practices, at least 50% of the dwellings must be functional. This rating makes no distinction between a community scoring around 50% for all living practices and another scoring 80% or more for all living practices. For example, Woodykupildiya in Jabiru received a score of 5, yet it did not score above 60% in any particular functional group, compared with Wallace Rockhole, which also scored a 5, but had percentage of functional dwellings ranging from 71% to 100% (with an average of 88%). The housing functionality index is a better measure of housing functionality with reference to the healthy living practices.



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