



Hazelwood

HEALTH STUDY

Hazelwood Health Study revised project plan for years 6 and 7

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1 Introduction

The Hazelwood Health Study commenced on 1 November 2014 and is currently in its 5th year of a ten-year contract. The researchers have recently completed a Strategic Overview of the first five years of the Hazelwood Health Study, a summary of what the findings mean for the community, lessons learned relevant to future planning and a revised project plan for years 6 to 10. Based on this and as per our contractual requirement, the researchers have now prepared a summary of the project plan for years 6 and 7 that meets the original contractual budgetary framework.

2 Project plan for years 6 and 7

Relative to the project plan which was described in the 2014 tender, the project plan for years 6 and 7 (1 November 2019 to 31 October 2021) has been refined as follows.

Guide for the reader: items labelled “As planned” are consistent with the project plan as described in the 2014 tender, whereas “New” reflects adjustments from the 2014 project plan.

2.1 The Early Life Follow up (ELF)

The ELF Study plans for years 6 and 7 are as follows:

- As planned, analysis of the identified and anonymous linked datasets will continue as they become available from the data custodians.
- As planned, follow up clinical testing of the identified ELF cohort will take place in year 6 of the study, with the testing protocol being as per the first round of data collection. No clinical testing will be done in year 7.
- New, cross-stream collaboration with the Psychological Impacts stream, to build upon previous findings of an association between maternal stress, pre-term birth and low birth weight. This is described in further detail in section 2.2.3.

Subject to leveraging external funding, there is the possibility of adding new measures to the testing protocol. These measures include:

- Central blood pressure measurement to further build upon borderline associations already found between coal mine fire smoke exposure, second hand smoke exposure and cardiovascular development in infants.

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- Addition of breath by breath tracking to the previous Forced Oscillation Technique (FOT) protocol. These measures are more sensitive than those used previously.
- FeNO (a test of exhaled nitric oxide) to help understand the mechanism of identified abnormalities. For example, to help distinguish if FOT abnormalities are more fixed mechanical changes (e.g. relating to reduced lung growth) or inflammatory changes relating to altered immune responses.
- Spirometry. The clinical relevance of this lung function test is well established in older children and useful to communicate with GPs. Allows matching of FOT and other measures with a clinically established test and easier comparison with findings in adults.
- Skin prick testing to identify atopic sensitisation to common allergens. This is in line with emerging evidence on air pollution, immune function and development of allergic diseases, and builds upon results to date which include increased use of antibiotics and changes in blood glucose control. Parents often like getting this helpful information on their children.

2.2 Psychological Impacts Stream

2.2.1 Schools Study

The Schools Study plans for years 6 and 7 are as follows:

- As planned, complete the analysis of already collected Schools Study survey data, including longitudinal analysis of rounds 1 and 2.
- New, discontinuation of further rounds of Schools Study surveys. The previous two rounds of Schools Study surveys have provided substantial information about the development and maintenance of distress associated with the Hazelwood event in school-aged children. Our plan had been to conduct a third survey, however, after discussion with our biostatistician and the HHS Project Steering Committee, it has been agreed that an additional round would add little extra to our understanding of the impacts. Furthermore, a third round of data collection would be challenging to analyse and interpret because of the reducing sample size and potential for survivor bias.
- As planned, complete the analysis of recently received linked 2017 NAPLAN data for Schools Study participants, and integration of findings from the survey and NAPLAN data combined.
- New, analysis of recently received de-identified NAPLAN data to compare educational outcomes for Morwell and the wider Latrobe City area, with schools in surrounding areas with very low or no exposure.

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2.2.2 Adult Psychological Impacts Study

The plans specific to the Adult Psychological Impacts Study in years 6 and 7 are as follows:

- As planned, completion of a brief psychological health follow-up survey of a subset of Adult Survey cohort members. This will involve repetition of core mental health measures from the original Adult Survey as well as additional measures including social isolation, resilience and community wellbeing. Associated data cleaning, analysis and reporting on the findings.
- New, discontinuation of the plan to supplement the Adult Psychological Impacts follow up survey with qualitative interview data collected from a subset of the same Adult Survey cohort. Instead, two new avenues of similar data collection are proposed; as follows:
 - ❖ New, investigation of both the impacts of the Hazelwood event **and** subsequent changes in the community, such as the closure of the mine and power station, on the wellbeing of young adults. This doctoral research program combines analysis of previously collected Adult Survey, follow up Adult Psychological Impacts survey and new qualitative data from interviews conducted with young adults (not limited to Adult Survey participants).
 - ❖ New, cross-stream collaboration with the Community Wellbeing Stream, with the Psychological Impacts survey including measures of community wellbeing and the Community Wellbeing Stream including psychological health questions in their planned interviews and focus groups with residents and stakeholders. This transfers the labour-intensive collection, analysis and interpretation of qualitative interviews to the Community Wellbeing Stream where there is greatest expertise in those areas.
- As planned, cross-stream collaboration with Hazelinks to investigate recently received psychological-related ambulance, emergency presentations and hospital admissions in the consenting Adult Survey cohort (linked identified data).
- New, cross-stream collaboration with the adult Respiratory Stream to add a mental health scale to the clinical assessment in order to assess the potential role of psychological health in respiratory symptoms.
- New, analysis of the Adult Survey data to assess the potential interaction between psychological health and the reporting of respiratory outcomes.
- New, cross-stream collaboration with Hazelinks to complete a paper describing mental-health related ambulance attendances, emergency presentations and hospital admissions based upon already-received anonymous data extractions.

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2.2.3 Psychological Impacts Stream and the ELF Study

In a new cross-stream collaboration, the Psychological Impacts Stream will survey ELF families late in year 6 or early in year 7, to collect information on parental mental health, parental attachment, family functioning and more detailed socio-demographics than previously collected. This will expand the study's reach in terms of investigating psychological health outcomes in the wider mine fire-affected community (not just Schools Study and Adult Survey participants) and also enable these measures to be incorporated into, and controlled for, in ELF analysis of infant health outcomes.

This assessment is planned to occur approximately 6 months after the ELF clinical follow up assessments in year 6. The advantages of not including the psychosocial measures in the actual clinical assessments are:

- the burden of participation in the clinical assessments, already substantial, is not increased for the infants and their parents;
- the additional follow up serves as an engagement activity, keeping families connected to the study between the clinical assessment rounds;
- the follow up can include all 571 families who completed ELF's baseline survey and not just the smaller cohort who participated in the clinical testing.

2.3 Respiratory Stream

The adult Respiratory Stream plans for years 6 and 7 are as follows:

- As planned, completion of in-depth analysis of round 1 testing data in conjunction with relevant Adult Survey data and, possibly, linked health service data already received for the participating cohort.
- As planned, a further round of clinical testing of adults who participated in round 1 (year 4), will take place in late year 6 or in year 7. Tests to be included are spirometry, gas exchange by transfer factor for carbon monoxide (T_{LCO}) and fraction of exhaled nitric oxide (FeNO), and some questionnaires about symptoms, asthma control and medications. Measures which were included in round 1 but which **will be excluded in round 2 if external funding cannot be obtained**, are respiratory system resistance and reactance by forced oscillation technique (FOT), small airways function via multi breath washout (MBW) and allergen exposure.
- New, cross stream collaboration with the Adult Psychological Impacts Stream to add a mental health scale to the clinical assessments (as referred in section 2.2.2).

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2.4 Community Wellbeing Stream

Now merged with the Older People Stream, the Community Wellbeing stream will continue to draw on the team's strengths in qualitative research methodologies applicable to researching subjective aspects of community wellbeing. The stream also plans to augment with quantitative methodologies to research objective aspects of wellbeing, adding new collaborators and linking with other streams with quantitative expertise. The proposed activities plan for years 6 to 10 are as follows:

- As planned, qualitative data collection will continue in year 6, including interviews, focus groups and media analyses. No data collection in year 7.
- New, development of a "Community Wellbeing Barometer" which brings together existing data to produce an objective, consolidated report on indicators of social wellbeing and social capital. This will utilise data before and after the mine fire to map changes over time. This also provides data in a way that government and other stakeholders can understand and respond to.
- New, cross-stream collaboration with the adult Psychological Impacts Stream. The Psychological Impacts survey is to include measures of community wellbeing whilst the Community Wellbeing Stream interviews are to include psychological health questions.

2.5 Cardiovascular Stream

Other than the finding of a small increase in the dispensing of cardiovascular medications over a lag range of 3-7 days associated with mine fire-related PM_{2.5}, the HHS has not identified adverse cardiovascular effects in adults, as reflected by biomarkers 3.5 years after the event. The adult Cardiovascular Stream plans for years 6 and 7 are as follows:

- New, tracking via Hazelinks of cardiovascular-related ambulance, hospital and mortality outcomes for the Adult Survey cohort via already-collected linked data. This includes major adverse cardiovascular events (MACE), which comprise myocardial infarctions (heart attacks), strokes and cardiovascular-related deaths.
- New, investigation of risk factors already measured in the Cardiovascular Stream, such as CRP, Lipids, HbA_{1c} etc, as predictors of MACE.
- New, discontinuation of further adult cardiovascular testing.

2.6 The Adult Survey including Hazelinks identified linkage

As planned, the Adult Survey data will continue to provide the basis for ongoing and future data analyses, particularly for those cohort members who went on to participate in the Respiratory Stream, Cardiovascular Stream and Adult Psychological Impacts examinations.

As planned, analysis of the first round of Hazelinks identified data (already collected) for consenting Adult Survey participants will be completed and reported. These include linked ambulance, emergency presentations and hospital admissions data.

In year 6 and 7 there will be no further identified data linkages of Adult Survey participants.

As planned, the Psychological Impacts Stream will readminister an expanded version of the psychological health component of the Adult Survey questionnaire to a subset of the Adult Survey participants (refer section 2.2.2).

2.7 Hazelinks de-identified (anonymous) data extractions

Hazelinks has already completed analysis and reporting on anonymous data extracted from ambulance attendance, medical services use (MBS), pharmaceutical dispensing (PBS), hospital emergency presentations, hospital admissions and cancer databases. None of the anonymous data extractions were included in the 2014 project plan. In years 6 and 7 there will be no further anonymous data extractions.

New, in years 6 and 7 Hazelinks will produce a journal paper based upon the Ambulance Victoria data technical report. A paper describing mental health-related ambulance attendances, emergency presentations and hospital admissions will be completed. A technical report describing mortality outcomes will be completed.