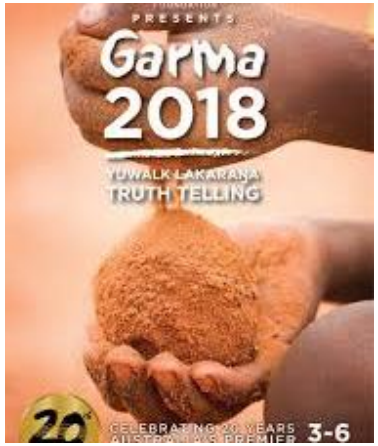
# Health across the lifespan: Indigenous Australian children, youth, young and older adults

- **Redfern Oration**
- **Royal Australian College of Physicians**

May 2019, Auckland

# Garma 2018 Truth Telling



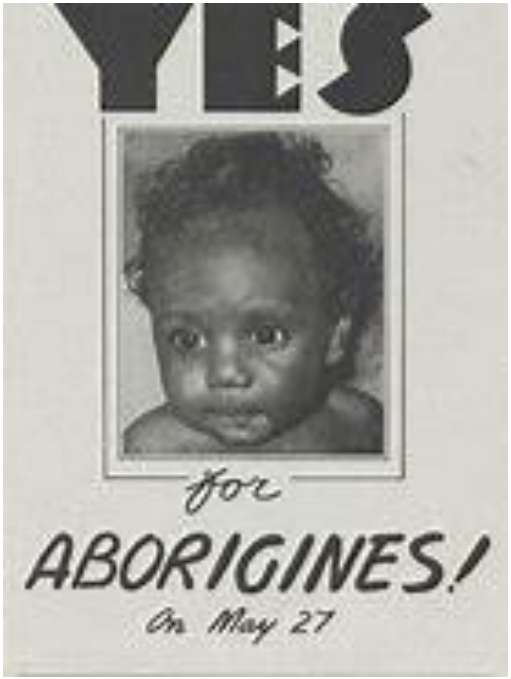


# Acknowledgement

- Jackbam (Mary Ann Farmerly :1845 - ?) half sister of Wandinyil (Tommy King ‘boss Aboriginal’ – petitioned Governor in Albany re compensation for land 1890 at granting of self government to the colony)
- Minnie Knapp (1878-1960 [82]) m Henry Hayward (1884-1958 [74])
- Muriel Williams (Hayward :1906-1975[68] ) m Ivan Williams(1903 – 1966 [62])
- Gwen Eades (Williams: 1938- [79] ) m Stafford Eades (1943 – 1973 [30])
- Sandra Eades

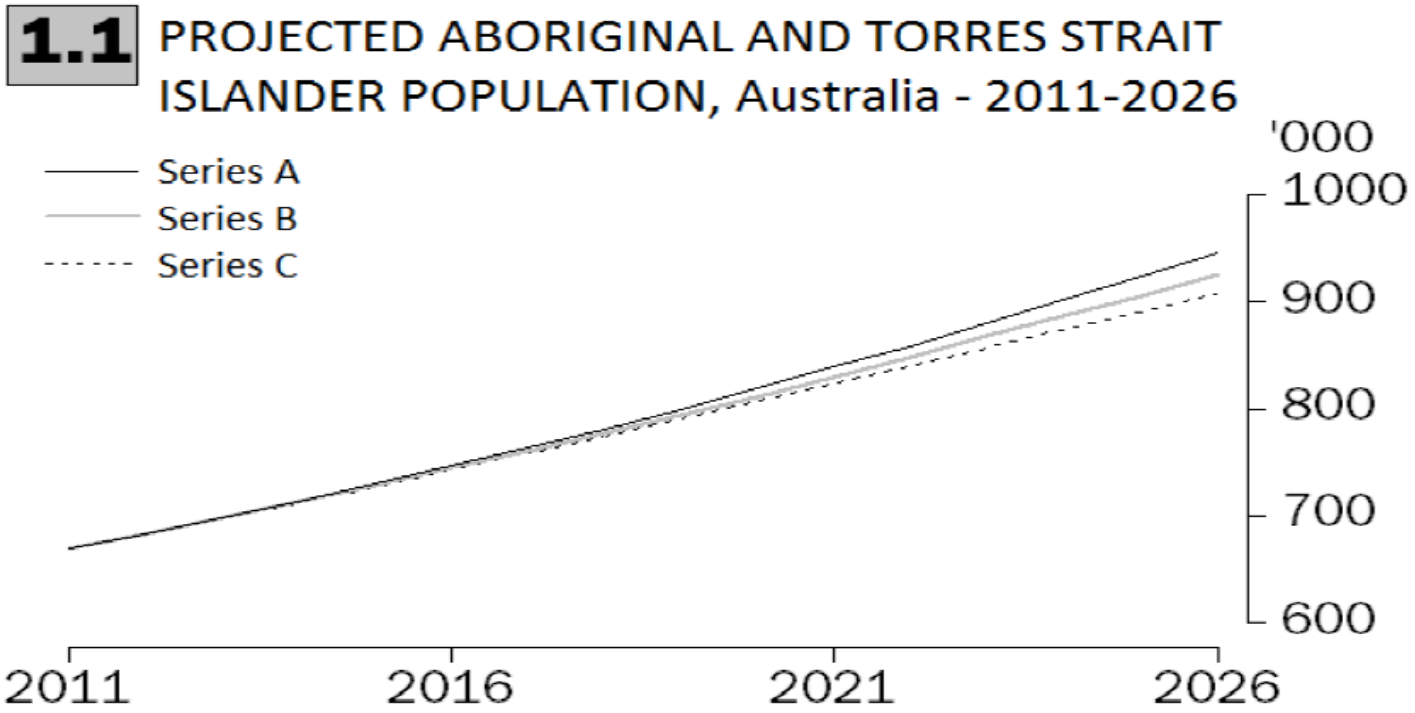
- PhD Thesis Susan Kenworthy University of Western Australia

# Public Health and Constitutional change




A decade long public campaign ended with a referendum on 27 May 1967. Two of the questions put sought approval for laws which would change the sections of the Australian Constitution which mentioned Aborigines. They received a massive 90.77% Yes vote and were passed in all six States.

# One million Indigenous Australians by 2030 – ABS projected Indigenous population



# Aims of our research

1) Partnerships with Aboriginal communities
2) Understand the determinants of health and wellbeing for Australian Aboriginal people across the life course
3) Transitions are key and research that informs positive transitions a major focus of our research
4) Inform and test interventions through experimental and quasi-experimental designed studies

# Improving the health of Aboriginal people across the life-course – tackling vulnerability in the very young and old

Reports *

**WAAIFS**

Defying the Odds

TAPPC – adolescent smoking

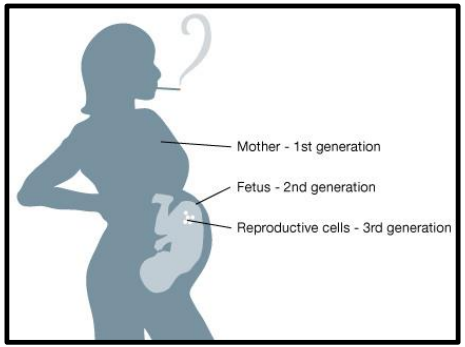
45 and Up

CRE in Aboriginal child and adolescent health

conception | Infancy | Adolescence

Intergenerational Influence of trauma/poor health

Gestation | Early childhood | Adulthood




Source: http://learn.genetics.utah.edu/content/epigenetics/inheritance/

Seeding Success

ECLC evaluation

Child protection

SEARCH

Next Gen Family, community country culture *

Next Generation

Dementia prevention

Youth Mental health nav*

Next Gen University*

# Early life influences on cardio-metabolic disease risk in aboriginal populations—what is the evidence? *

International Journal of Epidemiology 2012

- There was strong evidence for an association between birth weight and:
- type 2 diabetes (6/7 studies);
- impaired kidney function (6/7 studies);
- and high blood pressure (5/6 studies),
- whereas there was limited evidence for an association with metabolic abnormalities (4/7 studies) and adiposity (4/7).

- Exposure to maternal diabetes-
- Strongly associated with type 2 diabetes (9/10 studies);
- Metabolic abnormalities (5/7 studies),
- whereas the association with adiposity was low (3/9 studies);
- limited number of studies, to date, also show a relationship with high blood pressure (2/2 studies).

# Key papers


- Hoy WE, Nicol JL. Birthweight and natural deaths in a remote Australian Aboriginal community. Med J Aust 2010
- Hoy WE, Rees M, Kile E et al. Low birthweight and renal disease in Australian aborigines. Lancet 1998;352
- Hoy WE, Hughson MD, Singh GR, Douglas-Denton R, Bertram JF. Reduced nephron number and glomerulomegaly in Australian Aborigines: a group at high risk for renal disease and hypertension. Kidney Int 2006;70: 104–10.
- Pettitt DJ, Nelson RG, Saad MF, Bennett PH, Knowler WC. Diabetes and obesity in the offspring of Pima Indian women with diabetes during pregnancy. Diabetes Care 1993;16:310–14

# Multigenerational low birthweights among Western Australian Aboriginal infants:

## Is there any evidence for maternal fetal programming?

Alison Gibberd, Judy Simpson, Bridgette McNamara, Sandra Eades
(Lancet Global Health 2019)



# Background

- High rates of intrauterine growth restriction (IUGR) among Australia's Aboriginal and Torres Strait Islander peoples
- IUGR is associated with health behaviours (eg smoking), maternal health, and pregnancy complications
- Low birthweight is often used as a marker for IUGR

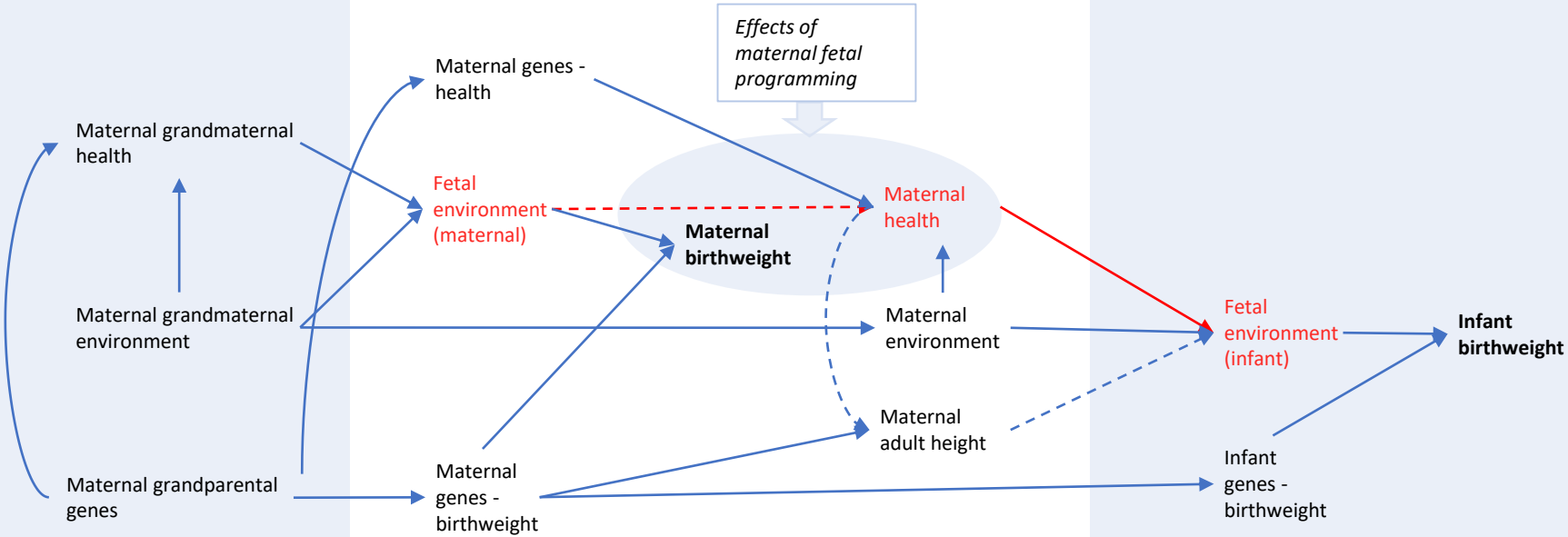
# Aim

To explore whether a poor fetal environment in one generation caused low birthweight in their Aboriginal offspring, using routinely-collected data from WA

(We found little support for this.)

# Causes of maternal-offspring birthweight association

- Birthweights of mothers and offspring are correlated:
  - fetal programming?
  - genetic factors affecting birthweight
  - genetic factors affecting pregnancy
  - **environmental factors (eg smoking)**




Grandmothers

Mothers

Infant

# Exposures and outcomes

Exposures:

- Mother was small for gestational age (SGA)
- Mother's birthweight z-score

Outcomes:

- Infant was small for gestational age (SGA)
- Infant's birthweight z-score

# Samples

**1. Full sample:**

12,865 Aboriginal singletons born in WA in 1998-2011

- gestational age 20 weeks or more
- mothers born in WA from 1980 onwards

**2. Subsample with both parents:**

5,504 also had a known father born in WA from 1980 onwards

**3. Subsample of cousins:**

2,609 had at least one cousin with the same maternal grandparents in the sample

# Data sources

## Birth records (from 1980)

Infant:

- Birthweight
- Gestational age
- Sex

Mother:

- Height
- Parity
- Smoking (from 1998)
- Alcohol misuse
- Drug misuse
- Health (diabetes, hypertension, herpes, gonorrhoea, other infections)

## Hospital & mental health records

Mother:

- Alcohol misuse
- Drug misuse
- Health (diabetes, hypertension, herpes, gonorrhoea, other infections)
- Assault against the mother

## Birth registrations

Mother

- Parity

## Family Connections System

Family relationships

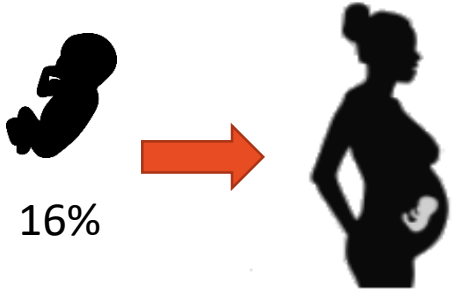
# Mothers born SGA

16%

# Mothers not born SGA

84%

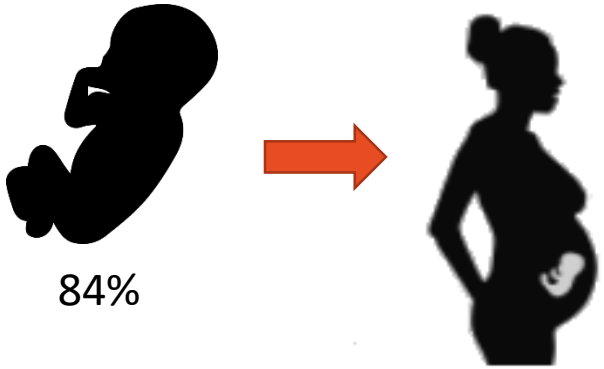
# Mothers born SGA



16%

25% of infants born SGA

# Mothers not born SGA



84%

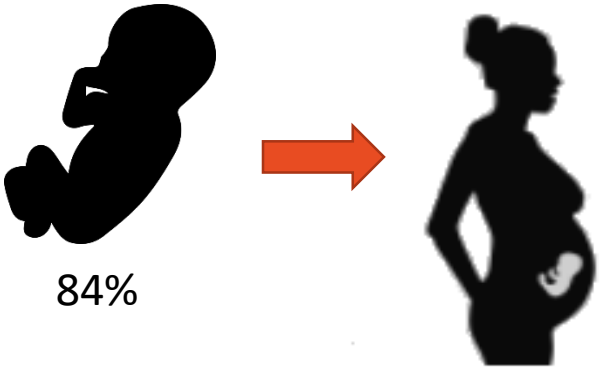
15% of infants born SGA

# Mothers born SGA

16%

10% hypertension
5% diabetes
1% gonorrhoea

# Mothers not born SGA



84%

10% hypertension
4% diabetes
1% gonorrhoea

# Approach 1: Initial regression model

infant birthweight = $\beta_M$ maternal birthweight (+ covariates)

- Nested models with covariates added sequentially
- Poisson (SGA) and linear (z-score) regression
- Generalised estimating equation (GEE) approach to account for clustering by mother

# Relative risks for SGA (infant)

| Factors in model | RR (95% CI) |
|---|---|
| Maternal SGA status | 1·62 (1·47, 1·80) |
| + grandmaternal parity | 1·65 (1·49, 1·83) |
| + maternal height | 1·51 (1·36, 1·68) |
| + parity, smoking, drug and alcohol misuse, assault against the mother | 1·48 (1·34, 1·64) |
| + maternal health (diabetes, hypertension, obesity, gonorrhoea, herpes, other infections) | 1·48 (1·34, 1·64) |

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Residual confounding?

# Approach 2: Parental contributions

infant birthweight = $\beta_M$ maternal birthweight +

$\beta_P$ paternal birthweight (+ covariates)

- Coefficients for maternal and paternal birthweight compared
- If $\beta_M > \beta_P$ due to the uterine environment

# Coefficients for z-scores

infant birthweight = $\beta_M$ maternal birthweight +

$\beta_P$ paternal birthweight (+ covariates)

| Factors in model | $\beta_M$ | $\beta_P$ |
|---|---|---|
| Parental z-scores only | 0·17 (0·14, 0·20) | 0·13 (0·10, 0·16) |

# Coefficients for z-scores

infant birthweight = $\beta_M$ maternal birthweight +

$\beta_P$ paternal birthweight (+ covariates)

| Factors in model | $\beta_M$ | $\beta_P$ | $\beta_M - \beta_P$ |
|---|---|---|---|
| Parental z-scores only | 0·17 (0·14, 0·20) | 0·13 (0·10, 0·16) | 0·03 (–0·01, 0·08) |

# Coefficients for z-scores

infant birthweight = $\beta_M$ maternal birthweight +

$\beta_P$ paternal birthweight (+ covariates)

| Factors in model | $\beta_M$ | $\beta_P$ | $\beta_M - \beta_P$ |
|---|---|---|---|
| Parental z-scores only | 0·17 (0·14, 0·20) | 0·13 (0·10, 0·16) | 0·03 (–0·01, 0·08) |
| Fully adjusted | 0·14 (0·11, 0·17) | 0·13 (0·10, 0·16) | 0·01 (–0·03, 0·05) |

# Coefficients for z-scores

infant birthweight = $\beta_M$ maternal birthweight +

$\beta_P$ paternal birthweight (+ covariates)

| Factors in model | $\beta_M$ | $\beta_P$ | $\beta_M - \beta_P$ |
|---|---|---|---|
| Parental z-scores only | 0·17 (0·14, 0·20) | 0·13 (0·10, 0·16) | 0·03 (−0·01, 0·08) |
| Fully adjusted | 0·14 (0·11, 0·17) | 0·13 (0·10, 0·16) | 0·01 (−0·03, 0·05) |
| Maternal smoking | | | −0·39 (−0·45, −0·34) |
| Diabetes | | | 0·58 (0·39, 0·77) |

# Approach 3: Cousins

infant birthweight = $\beta_M$ maternal birthweight +

$\beta_{GP1}$ grandparents1 +

$\beta_{GP2}$ grandparents2 + …. +

$\beta_{GP(m-1)}$ grandparents(m-1) (+ covariates)

Each set of maternal grandparents except the reference set (m-1 sets) are fixed effects

# Maternal z-score - cousins

| Factors in model | Coefficient (95% CI) |
|---|---|
| Maternal z-score | 0·16 (0·12, 0·21) |
| + grandmaternal parity | 0·17 (0·12, 0·22) |

# Maternal z-score - cousins

| Factors in model | Coefficient (95% CI) |
|---|---|
| Maternal z-score | 0·16 (0·12, 0·21) |
| + grandmaternal parity | 0·17 (0·12, 0·22) |
| + maternal grandparents | 0·00 (−0·05, 0·06) |

# Conclusions from 3 approaches

1. Regression with full sample: Increased risk of SGA but genetic factors not controlled for
2. Parental contributions: No evidence for fetal programming
3. Cousins: No evidence for fetal programming

# Discussion

- Little evidence of multigenerational effects of fetal programming
- Major improvements in perinatal health are possible in a single generation

THE UNIVERSITY OF SYDNEY

INDIGENOUS HEALTH

# No official identity: a data linkage study of birth registration of Aboriginal children in Western Australia

Alison J. Gibberd,[1] Judy M. Simpson,[1] Sandra J. Eades[2]

# Evidence of identity required


# Delays in birth registration

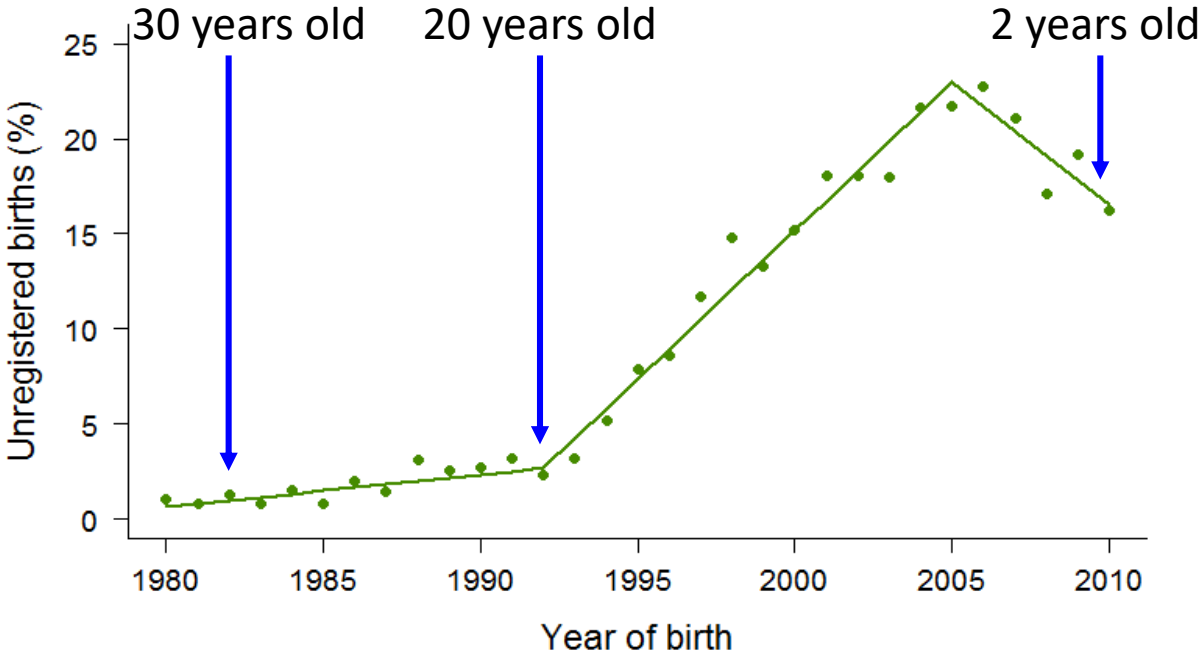
- Births registered in 2012 where person was at least 6 years old (ABS):
  - all Australians: 1%
  - all Aboriginal Australians: 8%
  - all Aboriginal Western Australians: 15%

# Research question

- What factors are associated with birth registration for babies born to Aboriginal mothers in Western Australia?

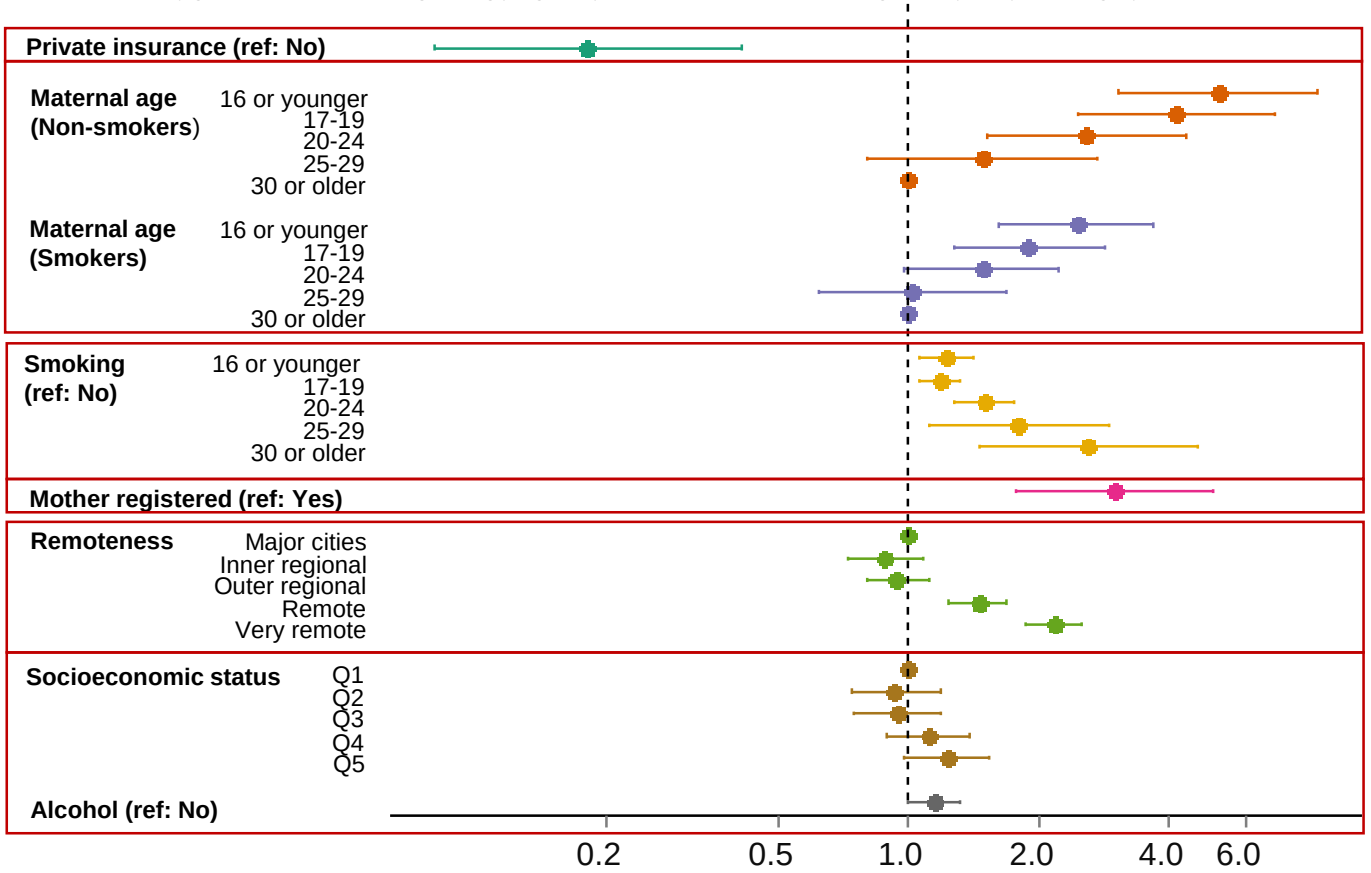
# Results - Unregistered births by year of birth

- - 49,694 Aboriginal children born 1980-2010 ;- 5,272 (11%) did not link to a birth registration record; (Model 2 - in children under 16 years of age 18%)



# Odds ratios for unregistered birth

Adjusted for: baby's year of birth; remoteness (ARIA+); socioeconomic disadvantage (SEIFA, private health insurance); other maternal characteristics (age at first birth, smoking during pregnancy, alcohol use, own birth unregistered); hospital category of birth



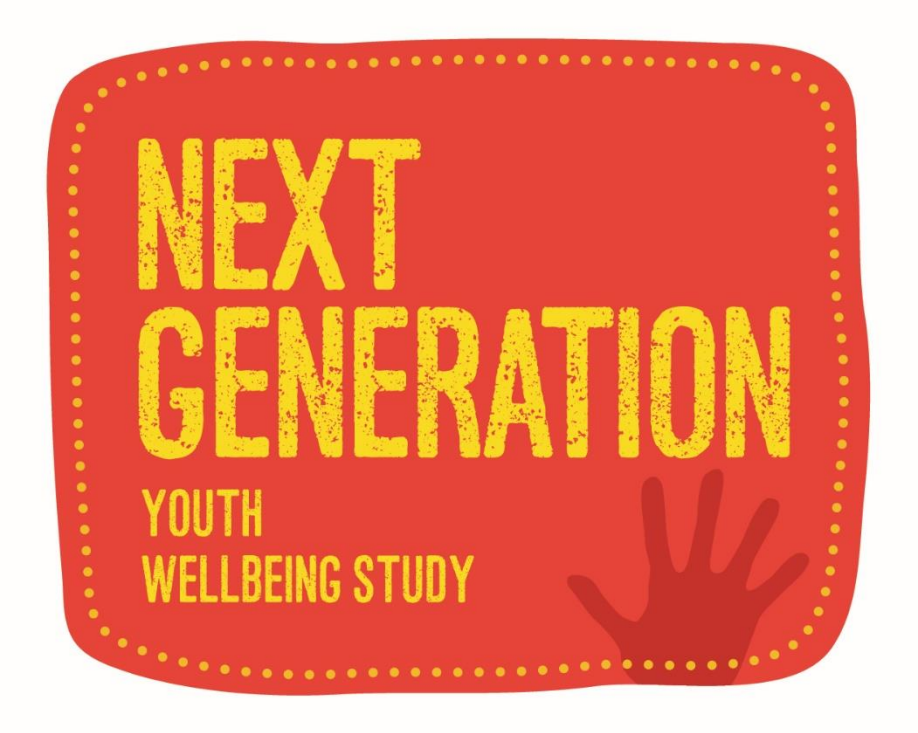
# Translation

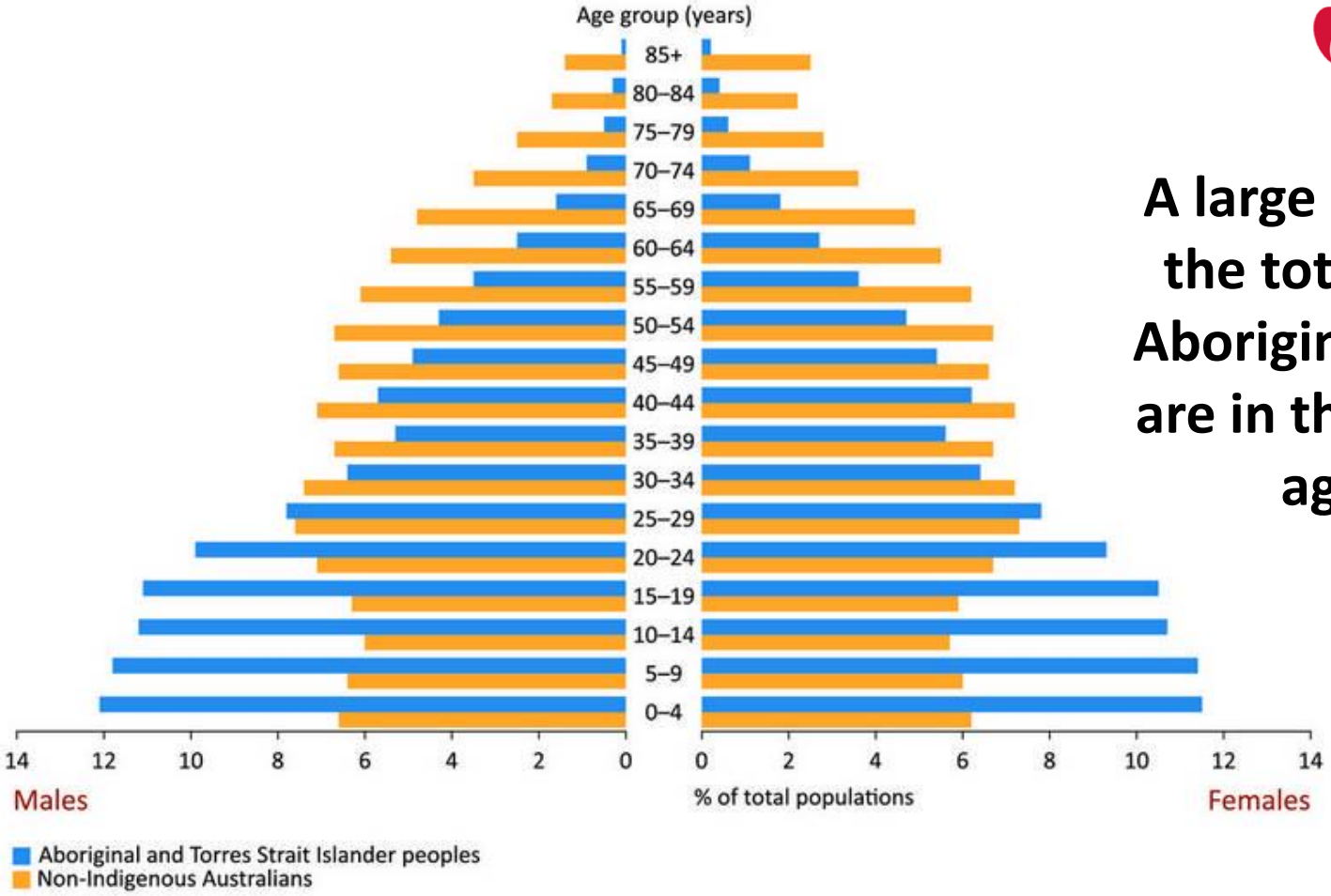
Translation Victoria – requirement for all Aboriginal children to have their birth registration forms filled out prior to leaving hospital

Changes to online birth registration in NSW associated with significant improvements

One in five Indigenous children born in Western Australia has no birth certificate: study http://
11:11 AM - Jul 4, 2016

One in five Indigenous children born in Western Australia has no birth certificate: study says most unregistered children born to teenage mothers and face further social disadvantage later in life
theguardian.com


NEXT
GENERATION
YOUTH
WELLBEING STUDY



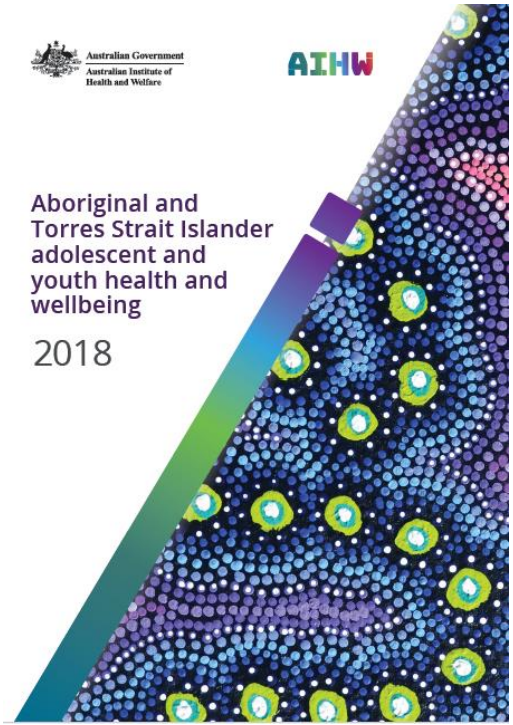

**A large proportion of the total Australian Aboriginal population are in the 10-24 years age group**

Source: ABS population projections based on the 2011 Census (ABS 2014g)

# Aboriginal and/or Torres Strait Islander Youth Health Report 2018

Summary of Findings:

- In 2016, 65% had Year 12 equivalent attainment
- Daily smoking rates have declined to 31% in 2014-15
- 60% self reported having ‘excellent’ or ‘very good’ health
- 50% of indigenous babies born to mothers aged 24 years or less
- *Data Gaps: Culturally appropriate measures of wellbeing, treatment of mental health conditions, data on use of sexual health services and primary health care, survey data for 10-14 year olds*




Source: Australian Institute of Health and Welfare 2019 - Catalogue No. IHW 202 (Sandra Eades and Lina Gubhaju were on the advisory committee when drafting this report. Sandra Eades’ chaired the advisory committee meetings)

# Changes in the age young Aboriginal and Torres Strait Islander people start smoking, 2002–2015 (PHRP 2019)

- Objectives: To analyse trends in smoking initiation and prevalence among young Aboriginal and Torres Strait Islander people (Indigenous people) to identify which stages of adolescence and young adulthood prevention activities should target.
- Methods: Secondary analysis of 'daily smoking' and 'never smoked' responses from Indigenous people aged 15 years and older in five national Indigenous surveys from 2002 to 2014–15, and of initiation age among those aged 18 years and older in 2004–05 and 2012–13.
- Results: **Smoking prevalence among 15–24-year-olds declined significantly between 2002 and 2014–15, falling 14 percentage points** (95% confidence interval [CI] 8, 21) from 45% to 31%. The greatest decline was among 18–19-year-olds, with a decrease of 17 percentage points (95% CI 4, 29) from 48% to 31%. The proportion of 15–24-year-olds who had never smoked increased significantly, by 12 percentage points (95% CI 6, 18) from 44% in 2002 to 56% in 2014–15.
- Between 2004–05 and 2012–13, the proportion of 18–24-year-old smokers who had started daily smoking before the age of 18 years declined significantly, down 8 percentage points (95% CI 2, 15) from 84% to 76%. In 2012–13, 24% of smokers aged 18–24 years started daily smoking after age 18, half (49%) started between 15 and 18 years, and around a quarter started before age 15.
- Conclusions: **There have been significant declines in smoking prevalence among young Indigenous people between 2002 and 2014–15 as fewer take up smoking. Smoking initiation occurs over a wide age range. The majority of daily smokers started before the age of 18**; however, initiation may be delayed until early adulthood for an increasing number. The challenge for tobacco prevention is to reach young people in early adolescence and continue to reinforce smoke-free intentions into young adulthood.

# Next Generation: Youth Wellbeing Study

- This study aims to understand the factors that determine future health and wellbeing for Aboriginal adolescents and young people and to inform the development of health services and health and social policy

*Specific Aims:*

Phase 1: To explore the views and opinions of i) Young people aged 10-24 years of age ii) their parents/carers and iii) youth health care providers

Phase 2: To establish a longitudinal cohort of young Aboriginal people to examine health trajectories

Study Protocol - Gubhaju et al (2019) BMJ Open; 2019 Mar 12;9(3):e028734

# Study Sites and Community Partners

- Central Australian Aboriginal Congress (Alice Springs)


- Derbal Yerrigan Health Service (Perth)
- South West Aboriginal Medical Service
- South West Aboriginal Land and Sea Council
- Southern Aboriginal Corporation
- WA Country Health Service

- Awabakal Local Aboriginal Land Council (Newcastle)
- Indigenous Development and Employment (TIDE) (Taree)
- Mingaletta Aboriginal Corporation

# Overview of Study Design

Health check
(45 minutes)

AND

Complete a survey
(45 minutes)

- Height
- Size of your hip and waist

Weight

Blood pressure

Breathing test
(Lung function)

Blood test
(few drops) for:
fats, sugar

Urine test
(kidney function)


Survey of your health and wellbeing (online)

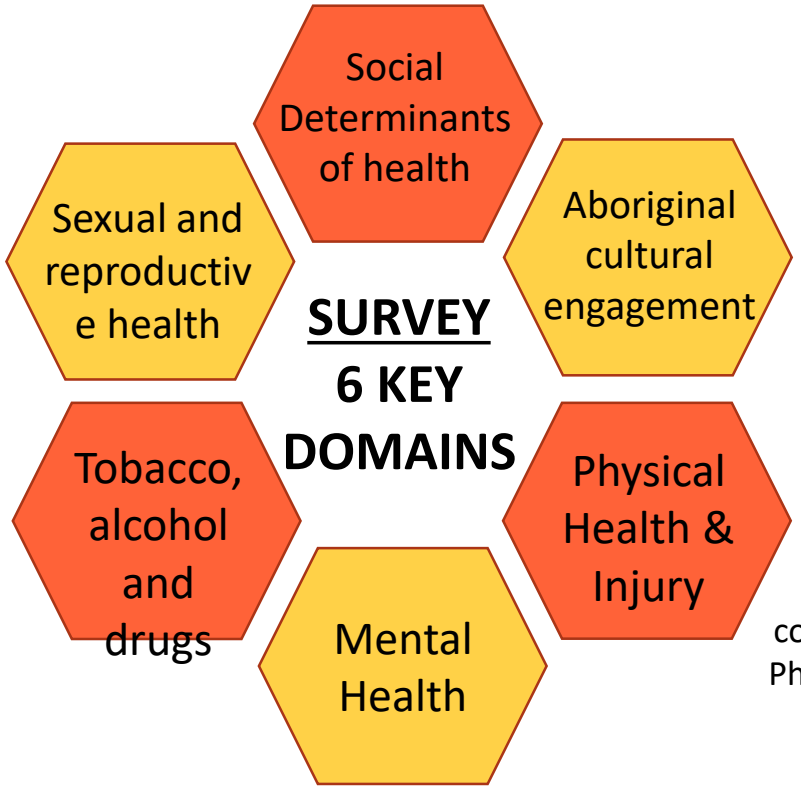
Study Protocol - Gubhaju et al (2019) BMJ Open; 2019 Mar 12;9(3):e028734

Education; Employment; Financial security; Driver License; Housing; Racism/discrimination; Police/Justice contact

Puberty, Sexual activity, STIs, Contraception, Pregnancy, Parenting, Access to health services

**Only for 16-24 year old participants**

Identity; Practices; Knowledge; Family/Community Connection

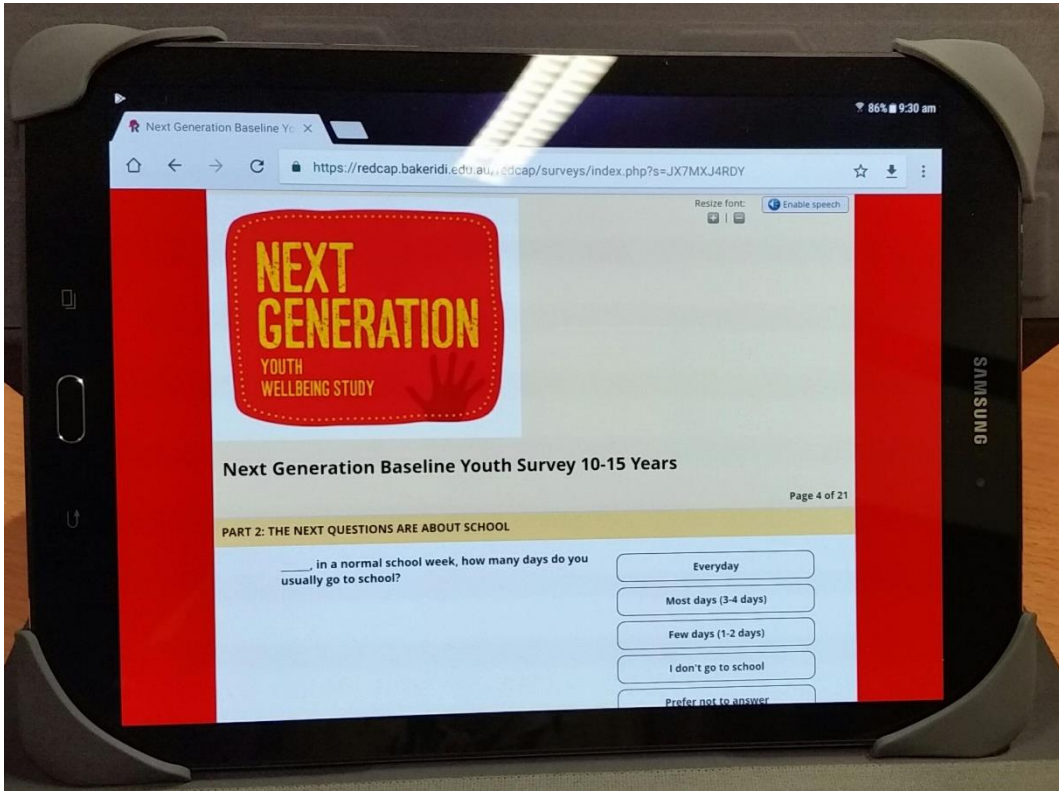



Tobacco, Alcohol, Drugs (Initiation, Frequency, Amount, Attitudes)

Adolescent health conditions; Injuries; Sleep; Physical activity; Sedentary behaviour; Diet

Psychological distress; Self harm; Resilience; Bullying; Support systems; Access to services

# Survey Design



# Our recruitment strategy

- Community/youth organisations
- Researcher networks
- Community events
- Sporting events / clubs
- Sporting events and after school programs
- Youth clubs and youth specific services
- *Schools /* School based programs
- Peer recruiters

# Preliminary recruitment results to date
*March 2018 – March 2019*

**SURVEY RESPONSES**

| | 10-15 | 16-24 | Parent/carer | Youth Total | TOTAL (ALL) |
|---|---|---|---|---|---|
| Alice Springs | 33 | 48 | 40 | 81 | 121 |
| New South Wales | 29 | 44 | 4 | 73 | 77 |
| Western Australia | 142 | 81 | 89 | 223 | 312 |
| | | | | | |
| **TOTAL** | **204** | **133** | **133** | **377** | **510** |

**CLINICAL MEASURES**

| | 10-15 | 16-24 | TOTAL |
|---|---|---|---|
| Alice Springs | 33 | 41 | 74 |
| New South Wales | 23 | 16 | 39 |
| Western Australia | 98 | 47 | 145 |
| | | | |
| **TOTAL** | **138** | **100** | **238** |

# Recruitment successes

- STAFFING
- Aboriginal staff
- Young people felt comfortable with Aboriginal research staff
- Peer recruiters

- COMMUNITY ORGANISATIONS / EVENTS
- Organisations that are family focused better for younger age groups (10-14 years)
- Sporting events
- Taking part in events organised through Aboriginal community organisations (*e.g recruited 20-30 participants in a day in such events*)

- APPRECIATION
- Showing appreciation of participant's time through: voucher reimbursements, providing catering

- SOCIAL MEDIA
- Limited success with Facebook and Instagram – more successful if posts are made/shared by Aboriginal community organisations

# Challenges

- YOUTH ENGAGEMENT
- Generate enough interest among youths to participate and give us their time
- EVENTS
- Organising events without full commitment from community/youths
- OVER-BURDENED COMMUNITIES
- Community is overburdened with requests for participation in research studies
- Timing
- ETHICS
- Extensive ethical requirements were a barrier to recruiting through *schools*
- Extensive paperwork for consent was a deterrent to participation for some

# Conclusions

- Life course approach essential
- Public health impacts across multiple points
- Health change within a generation possible

# Improving the health of Aboriginal people across the life-course – tackling vulnerability in the very young and old

Reports *

**WAAIFS**

Defying the Odds

TAPPC – adolescent smoking

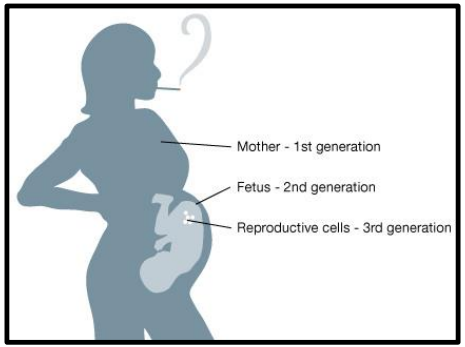
45 and Up

CRE in Aboriginal child and adolescent health

conception | Infancy | Adolescence

Intergenerational Influence of trauma/poor health

Gestation | Early childhood | Adulthood




Source: http://learn.genetics.utah.edu/content/epigenetics/inheritance/

Seeding Success

ECLC evaluation

Child protection

SEARCH

Next Gen Family, community country culture *

Next Generation

Dementia prevention

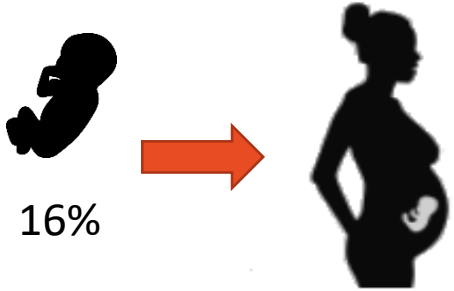
Youth Mental health nav*

Next Gen University*

# Acknowledgements


- National Health and Medical Research Council for funding support
- WA Health for providing the data
- Bellberry Ltd for PhD scholarship
- Telethon Institute for Child Health Research for support in initiating study and ongoing assistance
- All Aboriginal nations in WA

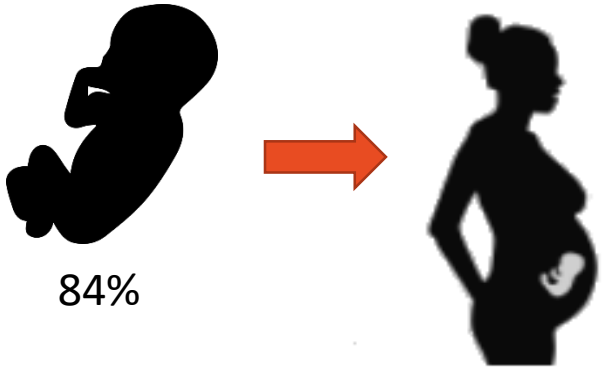
# Mothers born SGA



16%

160 cm
Smoking: 50% of pregnancies
Drug misuse: 9% of pregnancies

# Mothers not born SGA



84%

164 cm
Smoking: 47% of pregnancies
Drug misuse: 6% of pregnancies