

Len Smith, Australian National University

Len Smith is a visiting fellow at the Australian Demographic & Social Research Institute at ANU, who has published on Indigenous Australians' demographic and health transitions. Apart from work on closing the gap, Len is currently working with colleagues from the Universities of Melbourne and Tasmania on studies of the health transition of Victorian Kooris and Tasmanian convict descendants, with colleagues from Charles Darwin University on Indigenous ageing, and on a large project to expand the Australian Social Science Data Archive.

"New approaches to estimating Indigenous life expectancy"

A combined presentation from Dr Len Smith will discuss two separate projects: Evaluating indirect estimates of Indigenous life expectancy (with Tony Barnes, Yuejen Zhao and Steve Guthridge); and the other on an enhanced mortality database for monitoring Indigenous life expectancy. (with Ching Choi)

Closing the gap?

Estimating the mortality and life expectancy of Aboriginal and Torres Strait Islander Australians

Tony Barnes

Ching Choi

Michelle Gourley

Len Smith

Yuejen Zhao

With thanks to

- Fadwa Al-Yaman
- Ian Anderson
- Bridget Barker
- Steve Guthridge
- Ken Hill
- Peter McInness
- Mark Short
- Theo Vos
- Kun Zhao
- And others

The commitment

- The Government will close the gap between Indigenous life expectancy and that of other Australians within a generation
 - The Prime Minister, opening the Federal Parliament in February,
- The Government will work with the Indigenous community to eliminate the life expectancy gap within a generation
 - Statement of Intent signed by the Prime Minister, the Minister for Health and the Minister for Indigenous Affairs at the Indigenous Health Summit in March
- States and Territories agreed to close the life expectancy gap in a generation and halve the child mortality gap in 10 years
 - COAG December last year

Reporting Progress

- On the first day of every parliamentary year we will report on progress in closing the gap in life expectancy
 - the Prime Minister in London in April

But...

- Policy-information disconnect
 - significant data issues
 - life expectancy target may only be reported every 5 years.

The public health challenge

- Pessimism in the health sector about the prospects of closing the gap
 - Altman Biddle and Hunter, briefing paper for the 2020 Summit
 - pessimism about improving Indigenous prospects has been overstated
 - discernible progress had been made over the last few decades in a number of fields
 - BUT life expectancy gap is actually increasing
 - life expectancy has been improving, but the non-Indigenous population has been improving even faster

Pessimism (2)

International comparisons

- On most measures Indigenous Australians' health disadvantage is worse than that of the Indigenous minorities in the countries with which we usually compare ourselves – New Zealand, Canada and the United States
 - Oxfam, in a recent review of the health of Indigenous Australians in the international context, confirming what many previous studies have shown.

The Health Service Challenge

- The Oxfam review included a number of case studies of promising local health initiatives, but offered no suggestions as to how the health system as a whole should be changed to address Indigenous disadvantage.
- Challenge for NIHEC to set Australia's Indigenous health *services* and health *policy* in an international context

Health Development Framework

- Indigenous health policy has drawn little on the lessons learned in the developing world
- World Bank: *Investing in Health*
 - Jack and Pat Caldwell have been the major influence
 - Even in very poor countries, major improvements in health have been achieved by a combination of programs aimed at universal education, improved status of women, and effective health services at the local level.
 - Women who have the knowledge, capacity and means to make decisions affecting their families' health have proved to be a formidable force for change.
- Demonstrated in Australian Indigenous communities too.
 - The challenge to health policy is to scale local successes up to national health programs.
 - So far the health system has failed to do so

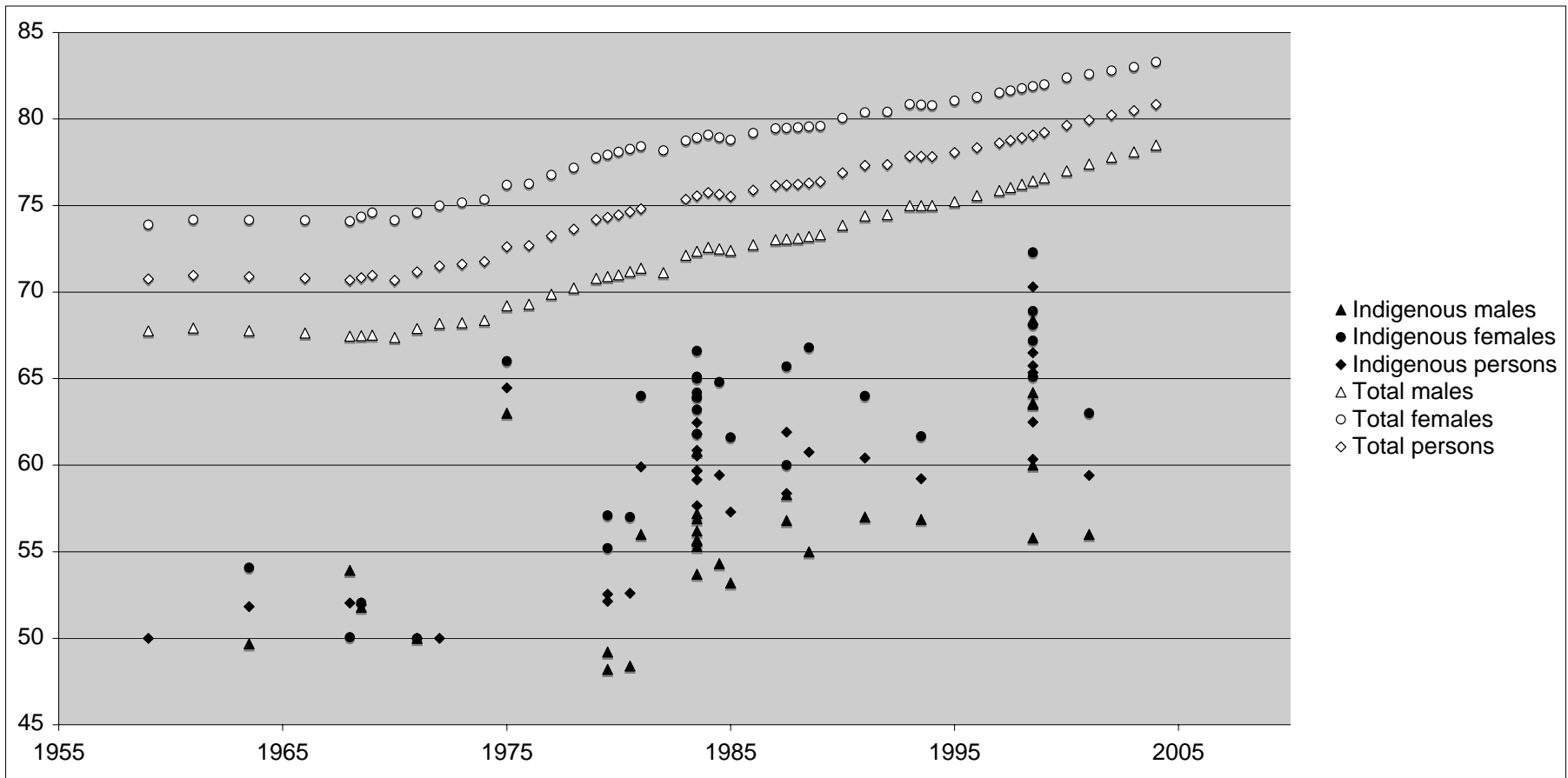
Trends in Indigenous life expectancy

- Pre 1970s only available for NT
 - About 50
 - 20 year gap
- Based on population registers, because
 - enumeration at censuses incomplete
 - Indigenous deaths not identified

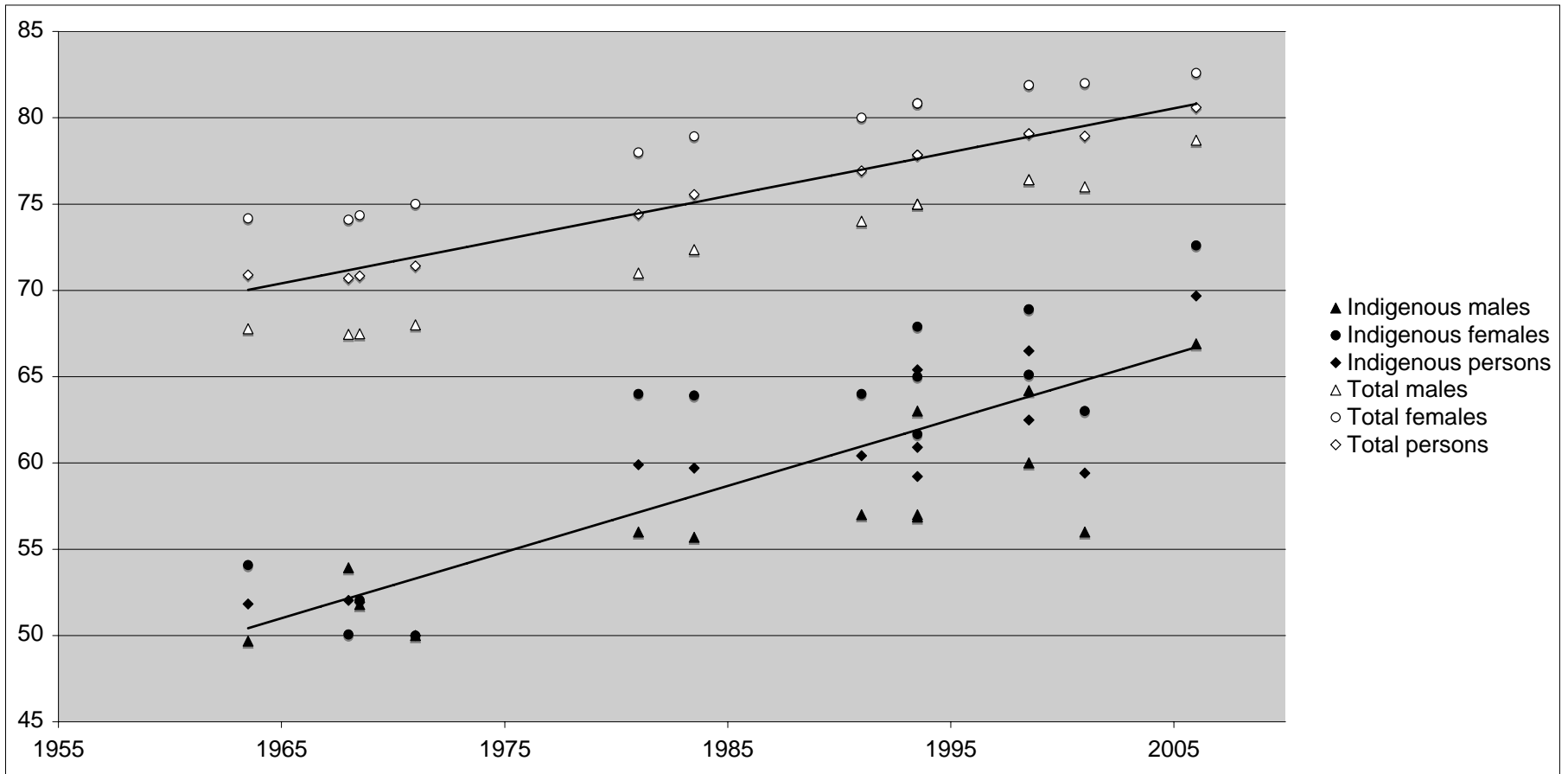
Incomplete data estimates

- Gray, Thomson, Smith etc in 1980s
 - About 59 years
 - 15-20 year gap
- ABS estimates
 - About 60 years
 - 17-18 year gap
- Hill Barker Vos *Indigenous Burden of Disease*
 - About 66 years
 - 13 year gap

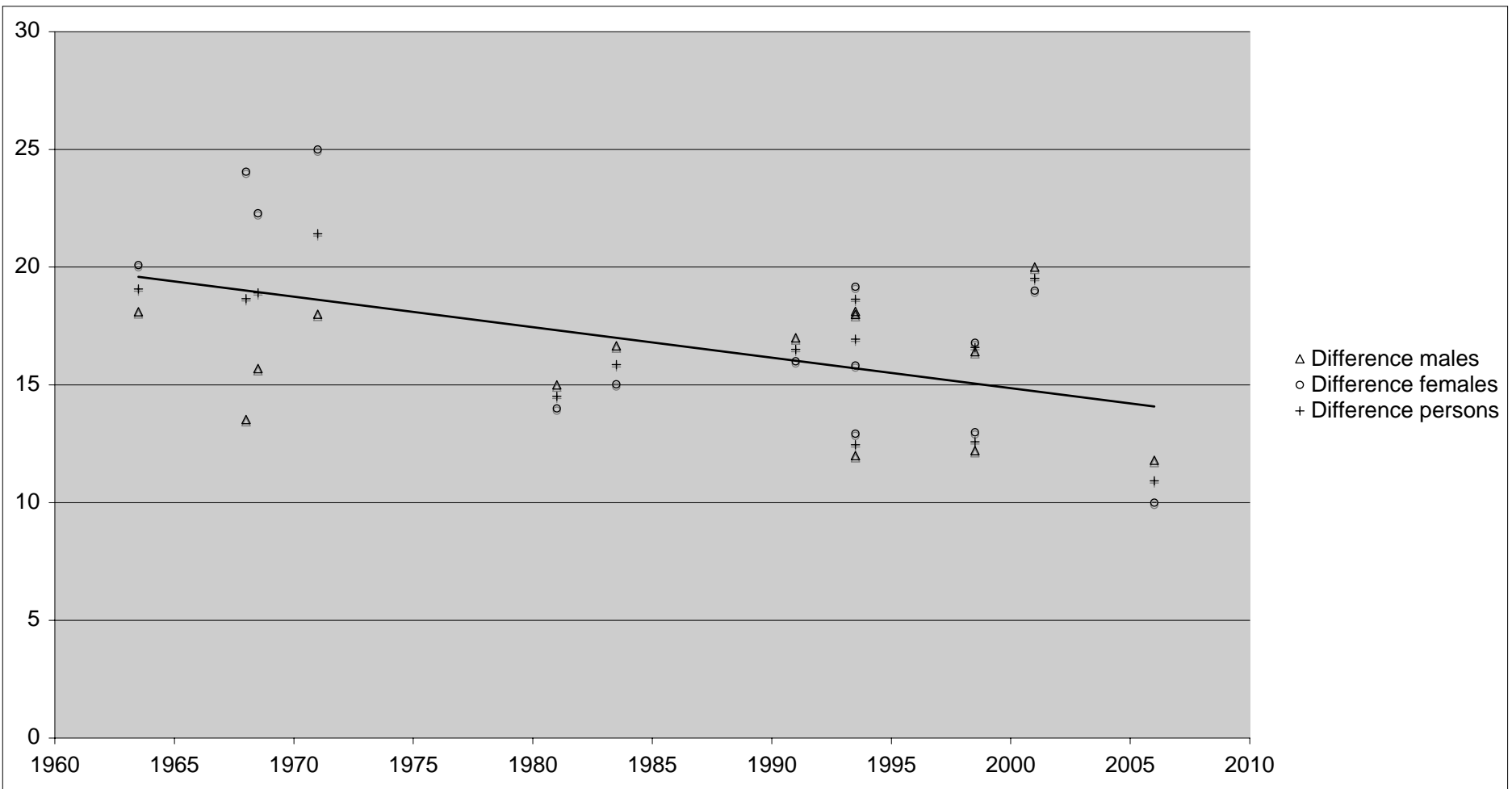
Indigenous and Total Life Expectancy



Indigenous & total life expectancy - Australia only



The gap in Indigenous life expectancy



The policy - information disconnect

- The Prime Minister's commitment is long overdue
- The public health challenge is enormous
- The statistical challenge, by contrast, should be straightforward
- *But* the statistical system cannot deliver

The statistical challenge - obstacles to annual reporting

- Timeliness
- Annual population estimates
- Identification of deaths
- Competing estimates
- Assessing the significance of changes

Annual Estimates of the Indigenous Population

- A success story: census estimates vastly improved in recent years
- Still a continuing need to revise backwards after each census
- Note improvement is in correction factors rather than full enumeration

Under-identification of deaths

- ABS estimated in 2004 that completeness of reporting of indigenous status ranges from 32% to 90%, with an overall figure of 55%
- In 2008 revised estimate of completeness to 85-89%
- Earlier estimate implied about half not stated, half false negatives
- Since revision?

Indigenous Deaths

	% Identified #1	% Identified #2	% Identified #3
New South Wales	45%	76%	85%
Victoria	32%		
Queensland	51%	87%	93%
South Australia	62%	86%	
Western Australia	72%	92%	110%
Tasmania			
Northern Territory	90%	99%	109%
Australia	55%	85%	89%

Under-identification of Indigenous deaths

- The real obstacle to effective monitoring
 - A frank failure of the statistical system
 - Dysfunctional federalism: Indigenous deaths are registered, but not identified as Indigenous
 - Long recognised as a problem
 - Urgent need to remedy
 - Improve identification
 - Improve correction factors
- Two ways of dealing with it in the short term:
 - Improved estimation methods
 - Augmented death data

Indirect methods - Bhat, Hill

- Used by ABS since 1991
- Typically only applicable to intercensal years.
- Dependent on our confidence in the most recent population estimates.
 - probably justified if the most recent estimate is the ERP from the most recent census.
 - but to use indirect methods annually would require intercensal estimates of population, which are themselves currently partly dependent on the indirect estimates based on earlier censuses.
- Competing methods
- No error theory

Inconsistent indirect estimates

- Most recent estimates of Indigenous life expectancy using indirect methods have been produced by the ABS (published in *Deaths Australia*) and the University of Qld in the *Burden of disease and injury in Indigenous Australians*.
- These produced inconsistent results:
 - ABS 2001-2006 estimates 17 year gap
 - Burden of Disease report estimates 13 year gap
 - ABS 2006 estimate 10-11 years

Current activities

- ABS projects:
 - reworked indirect estimates based on 2006 census
 - new direct estimates by linking deaths to Census
- NAGATSIHID projects:
 - 1: degrade good data, assess impact
 - 2: augment bad data, assess impact

ABS

- Indirect estimates unreliable
- New direct estimates indicate death reporting much better than thought
- ERP still an issue
- Dual record correction?
- False matches?

ABS work to improve identification

- ABS currently working with Registrars to improve Indigenous identification in death data
 - Education of funeral directors and doctors
 - From 2007 onwards RBDM will provide ABS with both death notification forms and MCCoD forms to be used in recording of Indigenous deaths
- However it will take some time to see improvements
- For short-term need to look at how to improve the data by other means.

- **NT Project - Key findings**

- Indirect methods can be highly sensitive to relatively small data variations
- Unexplained changes in population data have greater impact than death data deficiencies with indirect methods
- Different approaches to incorporating effects of unexplained changes produce similar estimate, lending some support to published ABS figures
- Standard direct method much more robust than indirect methods to data errors
- Best approach may be to adjust population and death data upfront for all known deficiencies, then use standard direct method

	Indigenous Males	Indigenous Females
Hill, Barker & Vos (2007)	64.2 years	68.9 years
ABS (2004)	59.4 years	64.8 years
Difference	4.8 years	4.1 years

- five phases:
 - obtain all relevant data for the NT and other jurisdictions (mid 1990s to mid 2000s)
 - apply the three life expectancy estimation methods
 - Explore age patterns of NT data degradation
 - estimate life expectancies by applying the three different methods to degraded NT data
 - analyse and interpret the patterns of NT life expectancies derived from different methods

- Project approach:
 - Simulations using modified NT data
 - Estimates using 'real' NT data
 - Standard errors, confidence intervals of estimates
 - Estimates using Australian data

Life expectancies for **1991-1996** estimated by three different methods using Northern Territory registered Indigenous deaths and various Indigenous population data.

Population data used in analysis	Standard method (Chiang)		Hill method (Hill, Barker & Vos; 2007)		ABS/Bhat method (Bhat, 2002; ABS, 2004)	
	Male	Female	Male	Female	Male	Female
Census Counts						
1991(c)-1996(c)	55.7	61.9	60.9	74.4	59.9	72.4
ERPs						
1991(91)-1996(96)	57.5	63.2	66.1	75.6	64.9	73.7
1991(96)-1996(96)	58.4	64.5	55.0	63.3	55.1	62.3
1991(01)-1996(96)	58.4	65.0	62.0	55.1	62.6	54.4
1991(06)-1996(96)	58.6	64.6	61.0	64.8	60.2	63.7
1991(91)-1996(01)	57.7	63.5	62.7	99.1	61.6	95.4
1991(96)-1996(01)	58.6	64.9	53.1	69.8	52.6	68.8
1991(01)-1996(01)	58.5	65.4	59.2	57.9	59.5	57.8
1991(06)-1996(01)	58.9	64.9	58.7	72.0	57.9	70.9
1991(91)-1996(06)	58.1	63.6	63.6	74.4	62.7	72.9
1991(96)-1996(06)	58.9	64.8	53.8	63.6	53.4	62.6
1991(01)-1996(06)	59.0	65.2	60.2	55.5	60.6	54.9
1991(06)-1996(06)	59.1	64.7	59.6	64.9	59.1	64.0

Life expectancies for **1996-2001** estimated by three different methods using Northern Territory registered Indigenous deaths and various Indigenous population data.

Population data used in analysis	Standard method (Chiang)		Hill method (Hill, Barker & Vos; 2007)		ABS/Bhat method (Bhat, 2002; ABS, 2004)	
	Male	Female	Male	Female	Male	Female
Census Counts						
1996(c)-2001(c)	56.9	63.7	56.7	67.8	55.7	67.5
ERPs						
1996(96)-2001(01)	59.1	65.4	57.8	67.2	56.6	66.9
1996(01)-2001(01)	59.2	65.8	60.7	63.0	59.3	62.6
1996(06)-2001(01)	59.6	65.7	59.4	66.7	58.1	66.3
1996(96)-2001(06)	59.7	65.9	58.9	66.7	58.0	66.8
1996(01)-2001(06)	59.9	66.2	62.3	62.8	61.3	62.8
1996(06)-2001(06)	60.1	66.0	60.9	66.0	59.9	66.2

Life expectancies and intermediate k2 and k3 parameters for 1991-1996 and 1996-2001 estimated by GGB method (Hill, Barker and Vos 2007) using Northern Territory registered Indigenous deaths and various Indigenous population data.

Population data used in analysis	Males				Females			
	e ⁰	k1	k2	k3	e ⁰	k1	k2	k3
Census								
1991(c)-1996(c)	60.9	1	1.030	1.371	74.4	1	1.031	1.980
1996(c)-2001(c)	56.7	1	1.022	1.002	67.8	1	0.981	1.231
ERP								
1991(91)-1996(96)	66.1	1	1.021	1.636	75.6	1	1.060	1.964
1991(96)-1996(96)	55.0	1	1.013	0.829	63.3	1	0.995	0.934
1991(01)-1996(96)	62.0	1	0.959	1.181	55.1	1	1.111	0.597
1991(06)-1996(96)	61.0	1	0.911	1.094	64.8	1	0.930	0.978
1991(91)-1996(01)	62.7	1	1.063	1.362	99.1	1	1.041	3.860
1991(96)-1996(01)	53.1	1	1.055	0.751	69.8	1	0.976	1.261
1991(01)-1996(01)	59.2	1	0.996	1.032	57.9	1	1.090	0.699
1991(06)-1996(01)	58.7	1	0.946	0.962	72.0	1	0.911	1.389
1991(91)-1996(06)	63.6	1	1.121	1.472	74.4	1	1.138	2.095
1991(96)-1996(06)	53.8	1	1.113	0.782	63.6	1	1.070	0.958
1991(01)-1996(06)	60.2	1	1.051	1.098	55.5	1	1.193	0.609
1991(06)-1996(06)	59.6	1	0.997	1.030	64.9	1	0.999	1.012
1996(96)-2001(01)	57.8	1	1.033	0.944	67.2	1	0.993	1.098
1996(01)-2001(01)	60.7	1	0.990	1.079	63.0	1	1.011	0.868
1996(06)-2001(01)	59.4	1	0.940	0.956	66.7	1	0.923	1.014
1996(96)-2001(06)	58.9	1	1.101	1.002	66.7	1	1.078	1.084
1996(01)-2001(06)	62.3	1	1.053	1.174	62.8	1	1.097	0.863
1996(06)-2001(06)	60.9	1	0.998	1.046	66.0	1	1.001	1.005

Life expectancies and intermediate k2 and k3 parameters for 1991-1996 and 1996-2001 estimated by ABS/Bhat method (Bhat, 2002; ABS, 2004) using Northern Territory registered Indigenous deaths and various Indigenous population data.

Population data used in analysis	Males				Females			
	e ⁰	k1	k2	k3	e ⁰	k1	k2	k3
Census								
1991(c)-1996(c)	59.9	1	1.151	1.278	72.4	1	1.310	1.780
1996(c)-2001(c)	55.7	1	1.126	0.934	67.5	1	1.102	1.223
ERP								
1991(91)-1996(96)	64.9	1	1.179	1.520	73.7	1	1.390	1.753
1991(96)-1996(96)	55.1	1	1.051	0.830	62.3	1	1.096	0.882
1991(01)-1996(96)	62.6	1	0.957	1.241	54.4	1	1.146	0.544
1991(06)-1996(96)	60.2	1	0.847	1.098	63.7	1	0.965	0.950
1991(91)-1996(01)	61.6	1	1.290	1.243	95.4	1	1.383	3.464
1991(96)-1996(01)	52.6	1	1.172	0.711	68.8	1	1.082	1.219
1991(01)-1996(01)	59.5	1	1.074	1.049	57.8	1	1.106	0.666
1991(06)-1996(01)	57.9	1	0.943	0.947	70.9	1	0.954	1.379
1991(91)-1996(06)	62.7	1	1.492	1.314	72.9	1	1.602	1.803
1991(96)-1996(06)	53.4	1	1.320	0.723	62.6	1	1.251	0.874
1991(01)-1996(06)	60.6	1	1.208	1.092	54.9	1	1.323	0.537
1991(06)-1996(06)	59.1	1	1.066	0.997	64.0	1	1.102	0.950
1996(96)-2001(01)	56.6	1	1.219	0.867	66.9	1	1.161	1.082
1996(01)-2001(01)	59.3	1	1.137	1.007	62.6	1	1.131	0.842
1996(06)-2001(01)	58.1	1	0.982	0.912	66.3	1	0.990	1.037
1996(96)-2001(06)	58.0	1	1.419	0.904	66.8	1	1.335	1.049
1996(01)-2001(06)	61.3	1	1.316	1.080	62.8	1	1.304	0.822
1996(06)-2001(06)	59.9	1	1.138	0.986	66.2	1	1.151	1.013

Life expectancy estimates

	Males			Females		
	Census counts	Indigenous ERPs	Backcast from '06	Census counts	Indigenous ERPs	Backcast from '06
1991-1996						
Standard method	55.7	57.5	59.1	62.9	63.2	64.7
GGB method	60.9	66.1	59.6	74.4	75.6	64.9
ABS/Bhat method	59.9	64.9	59.1	72.4	73.7	64.0
1996-2001						
Standard method	56.9	59.1	60.1	63.7	65.4	66.0
GGB method	56.7	57.8	60.9	67.8	67.2	66.0
ABS/Bhat method	55.7	56.6	59.9	67.5	66.9	66.2

Discrepancy from 'gold standard' estimates

	Males			Females		
	Census counts	Indigenous ERPs	Backcast from '06	Census counts	Indigenous ERPs	Backcast from '06
1991-1996						
Standard method	3.4	1.6	(gold standard)	2.9	1.6	(gold standard)
GGB method	-1.8	-7.0	-0.5	-9.7	-10.6	-0.2
ABS/Bhat method	-0.8	-5.8	0.0	-5.8	-9.0	-0.7
1996-2001						
Standard method	3.2	2.9	(gold standard)	2.3	0.6	(gold standard)
GGB method	3.4	-1.9	-0.8	-1.9	-1.3	0.0
ABS/Bhat method	4.4	-1.6	0.2	-1.6	-0.9	-0.2

Assumed completeness of deaths		Males			Females		
		Census counts	ERPs	Backcast from '06	Census counts	ERPs	Backcast from '06
Deaths as recorded, ie K3=1.00	Standard method	56.9	59.1	60.1	63.7	65.4	66.0
	GGB method	56.7	57.8	60.9	67.8	67.2	66.0
	ABS/Bhat method	55.7	56.6	59.9	67.5	66.9	66.2
Deaths reduced by 5%, ie K3=0.95	Standard method	57.7	58.4	61.0	64.6	64.0	66.8
	GGB method	56.7	57.8	60.9	67.8	67.2	66.0
	ABS/Bhat method	55.7	56.6	59.9	67.5	66.9	66.2
Deaths reduced by 10%, ie K3=0.90	Standard method	58.7	61.0	61.9	65.7	67.4	67.3
	GGB method	56.7	57.8	60.9	67.8	67.2	66.0
	ABS/Bhat method	55.7	56.6	59.9	67.5	66.9	66.2
Deaths reduced by 15%, ie K3=0.85	Standard method	59.7	62.0	62.8	66.8	68.5	68.5
	GGB method	56.7	57.8	60.9	67.8	67.2	66.0
	ABS/Bhat method	55.7	56.6	59.9	67.5	66.9	66.2
Deaths reduced by 20%, ie K3=0.80	Standard method	60.8	63.2	63.8	68.0	69.8	69.5
	GGB method	56.7	57.8	60.9	67.8	67.2	66.0
	ABS/Bhat method	55.7	56.6	59.9	67.5	66.9	66.2

- The estimated life expectancy derived using modified deaths data minus the life expectancy derived using the same method and unmodified deaths data

Assumed completeness of deaths		Males			Females		
		Census counts	ERPs	Backcast from '06	Census counts	ERPs	Backcast from '06
Deaths as recorded, ie K3=1.00	Standard method	-	-	-	-	-	-
	GGB method	-	-	-	-	-	-
	ABS/Bhat method	-	-	-	-	-	-
Deaths reduced by 5%, ie K3=0.95	Standard method	0.8	0.7	0.9	0.9	1.4	0.8
	GGB method	0.0	0.0	0.0	0.0	0.0	0.0
	ABS/Bhat method	0.0	0.0	0.0	0.0	0.0	0.0
Deaths reduced by 10%, ie K3=0.90	Standard method	1.8	1.9	1.8	2.0	2.0	1.3
	GGB method	0.0	0.0	0.0	0.0	0.0	0.0
	ABS/Bhat method	0.0	0.0	0.0	0.0	0.0	0.0
Deaths reduced by 15%, ie K3=0.85	Standard method	2.8	2.9	2.7	3.1	3.1	3.5
	GGB method	0.0	0.0	0.0	0.0	0.0	0.0
	ABS/Bhat method	0.0	0.0	0.0	0.0	0.0	0.0
Deaths reduced by 20%, ie K3=0.80	Standard method	3.9	4.1	3.7	4.3	4.4	3.5
	GGB method	0.0	0.0	0.0	0.0	0.0	0.0
	ABS/Bhat method	0.0	0.0	0.0	0.0	0.0	0.0

- Impact of various age-related perturbations of the deaths data on life expectancy estimates for NT Indigenous males
- Estimated life expectancy based on unmodified data minus estimate based on perturbed data

Age Class Perturbed	Magnitude of perturbation of population data	1991-1996			1996–2001		
		Standard & ERPs	ABS/Bhat & ERPs	GGB & Census	Standard & ERPs	ABS/Bhat & ERPs	GGB & Census
Young ages (0-29 yrs)	5%	-0.22	-0.20	-0.23	-0.18	-0.22	-0.22
	10%	-0.43	-0.39	-0.46	-0.37	-0.44	-0.45
	20%	-0.86	-0.79	-0.92	-0.74	-0.89	-0.89
	50%	-2.12	-1.96	-2.30	-1.82	-2.20	-2.22
	100%	-4.14	-3.90	-4.55	-3.56	-4.34	-4.37
Middle ages (30-59 yrs)	5%	-0.39	-0.42	-0.43	-0.41	-0.48	-0.48
	10%	-0.77	-0.83	-0.85	-0.82	-0.96	-0.96
	20%	-1.50	-1.62	-1.67	-1.60	-1.87	-1.87
	50%	-3.52	-3.81	-3.91	-3.76	-4.33	-4.33
	100%	-6.36	-6.84	-6.96	-6.82	-7.59	-7.59
Older ages (60+ yrs)	5%	-0.23	0.59	0.64	-0.28	0.69	0.69
	10%	-0.44	1.14	1.23	-0.53	1.32	1.33
	20%	-0.82	2.11	2.29	-0.97	2.47	2.47
	50%	-1.71	4.32	4.71	-1.98	5.10	5.12
	100%	-2.69	6.63	7.25	-3.05	7.92	7.94

- Impact on estimated life expectancy for NT Indigenous males of making additions to populations in various age groups for one or other of the population data sets used in the simulations
- Discrepancies between the life expectancy estimates with unmodified data and estimates with modified data for various age-related perturbations of the population data

Modified population	Age Class Perturbed	Magnitude of perturbation	1991-1996 data			1996-2001 data		
			Standard & ERPs	ABS/Bhat & ERPs	GGB & Census	Standard & ERPs	ABS/Bhat & ERPs	GGB & Census
First population	Young ages (0-39 yrs)	5%	0.10	2.43	2.15	0.09	1.28	1.41
		10%	0.20	4.72	4.33	0.17	2.48	2.77
		20%	0.37	7.60	8.40	0.33	4.43	5.14
	Middle ages (40-59 yrs)	5%	0.17	1.08	0.66	0.18	1.05	0.88
		10%	0.34	1.68	1.05	0.36	1.97	1.61
		20%	0.65	1.46	1.07	0.69	3.30	2.62
	Older ages (60+ yrs)	5%	0.10	-3.38	-2.71	0.14	-2.26	-2.23
		10%	0.20	-6.15	-5.03	0.27	-4.23	-4.17
		20%	0.40	-10.52	-8.85	0.54	-7.53	-7.43
Second population	Young ages (0-39 yrs)	5%	0.11	-1.69	-1.38	0.09	-0.70	-0.80
		10%	0.22	-3.26	-2.65	0.18	-1.41	-1.58
		20%	0.42	-5.97	-4.87	0.34	-2.77	-3.05
	Middle ages (40-59 yrs)	5%	0.21	-2.00	-1.31	0.23	-1.27	-1.13
		10%	0.42	-3.84	-2.57	0.44	-2.42	-2.16
		20%	0.80	-6.94	-4.83	0.85	-4.38	-3.95
	Older ages (40-59 yrs)	5%	0.14	4.38	3.10	0.15	2.21	2.18
		10%	0.27	10.33	7.02	0.30	4.83	4.80
		20%	0.54	28.55	19.67	0.61	11.94	12.23

- Assumed annual unexplained growth of 1% and 2% for young (0 – 29), middle (30 – 59) and older (60+) age groups

			Assumed unexplained growth = 1% per annum		Assumed unexplained growth = 2% per annum	
	Sex	Age Group	e ⁰	Difference	e ⁰	Difference
1991-1996	Male	0-29	62.83	2.71	60.94	4.55
		30-59	62.12	1.99	58.55	2.16
		60+	46.48	-13.64	38.60	-17.79
	Female	0-29	69.75	3.43	66.66	4.97
		30-59	69.84	3.53	66.05	4.36
		60+	54.44	-11.88	46.87	-14.83
1996-2001	Male	0-29	55.31	1.56	54.14	2.79
		30-59	55.53	1.77	53.96	2.61
		60+	43.80	-9.95	37.26	-14.10
	Female	0-29	64.54	2.43	62.50	3.89
		30-59	64.78	2.67	62.45	3.84
		60+	52.12	-9.99	44.96	-13.65

An enhanced mortality database

- Indigenous deaths are already recorded
 - But almost half (?) are not identified on the death notification form
- So look for other ways to identify them
 - Medical certificates (routine from 2007)
 - Other statistical systems
 - Other population lists
- Dual record estimates

Sources of information used to report on Indigenous deaths

- **ABS Deaths Registration Database**
 - Data provided to ABS by RBDM in each state/territory
 - Demographic information including Indigenous status information is taken from death notification forms filled in by Funeral directors on behalf of relatives of deceased
 - Data published in *Deaths Australia* annually
- **AIHW National Mortality Database**
 - Data provided to AIHW by ABS (duplicate of Deaths Registration Database)
 - Data published regularly in a number of AIHW publications

Project overview

- AIHW have received funding from DoHA to undertake a project to improve estimates of Indigenous mortality
- This will be done by linking death registration data held at the AIHW with alternative data on Indigenous deaths

Project Advisory Group

- A project advisory group has been established with an Indigenous advisor from University of Melbourne and representatives from ABS, AIHW, DOHA, and ANU to:
- Review progress of project and provide project oversight
- Provide guidance to AIHW on data linkage and technical issues
- Coordinate results from this project with current ABS work on Indigenous mortality

Alternative data sources on Indigenous deaths

- Perinatal data
- Hospital separations data
- Residential aged care data
- Medical certificate of cause of death

These 4 data sources have not been used in previous Indigenous mortality studies and should be useful as input into improving the current data that relies solely on death notifications.

Perinatal data

- Midwives data collection
- Data submitted to state/territory health authorities
- National perinatal data compiled by AIHW in National Perinatal Data Collection
- Collects information on births in hospitals, birth centres and the community in Australia.
- Indigenous status information assessed by AIHW as adequate in all states and territories except Tasmania
- 150 Indigenous perinatal deaths each year
- Unit record data (no names but unique id)

Hospital separations data

- Information provided by state/territory health departments to AIHW
- Counts of separations not persons.
- Over half of all deaths occur in hospital.
Approximately 1,200 Indigenous deaths in hospital recorded each year
- Assessment by AIHW in 2007 found that NSW, Vic, Qld, WA, SA & NT have adequate level of Indigenous identification (over 70%).
- Unit record data (no names but unique ID)

Residential aged care data

- Information provided by residential aged care facilities to DoHA annually
- DoHA provide data to AIHW and is compiled in Residential Aged Care Services Data Collection
- Collection of information on residential aged care services in Australia
- Approximately 800 Indigenous deaths recorded each year
- Unit record data (includes names)

Medical Certificate of Cause of Death (MCCoD)

- Held by RBDM in each state/territory
- Completed by certifying doctor
- Includes cause of death information
- Has field for Indigenous status but prior to 2007 was not referred to in recording of deaths in ABS death registrations data
- Includes names

National Death Index

- Housed at AIHW. Data provided to AIHW by RBDM in each state/territory
- Contains names of the deceased
- Contains field for Indigenous status however this field is very inconsistent across years and jurisdictions and thus is currently not used by ABS or AIHW
- Therefore NDI will only be used to link names and not to obtain Indigenous status

Indigenous identifiers

Type of collection	Year of commencement of identifying Indigenous status							
	NSW	VIC	QLD	SA	WA	TAS	NT	ACT
Death notification form	1986	1987	1996	1986	1985	1988	1988	1984
Medical certificate of causes of death	1998	1987	1996	1997	1983	1998	1988	1998
Medical certificate of causes of perinatal deaths	1998	1995	1996	1997	1983	1998	1988	1998
Hospital separation form	1979	1986	1993	1984	1981	1997	1976	1981
Perinatal form	1986	1982	1987	1981	1980	1996	1986	1989

Project will involve 2 stages

Stage 1:

- Identify Indigenous identified records from deaths in perinatal, aged care and hospital databases and from MCCoD
- Link these to deaths recorded in the AIHW mortality database for period 2001-2006 to create an enhanced mortality database

Stage 2:

- Use this enhanced dataset to estimate mortality rates and life table values using direct and indirect methods
- These rates and life table values will be assessed for their quality in the context of known Indigenous health status and pattern of diseases
- An estimate of statistical uncertainty will also be made in terms of the confidence of the estimates
- Estimates at the national and state/territory level are intended to be produced

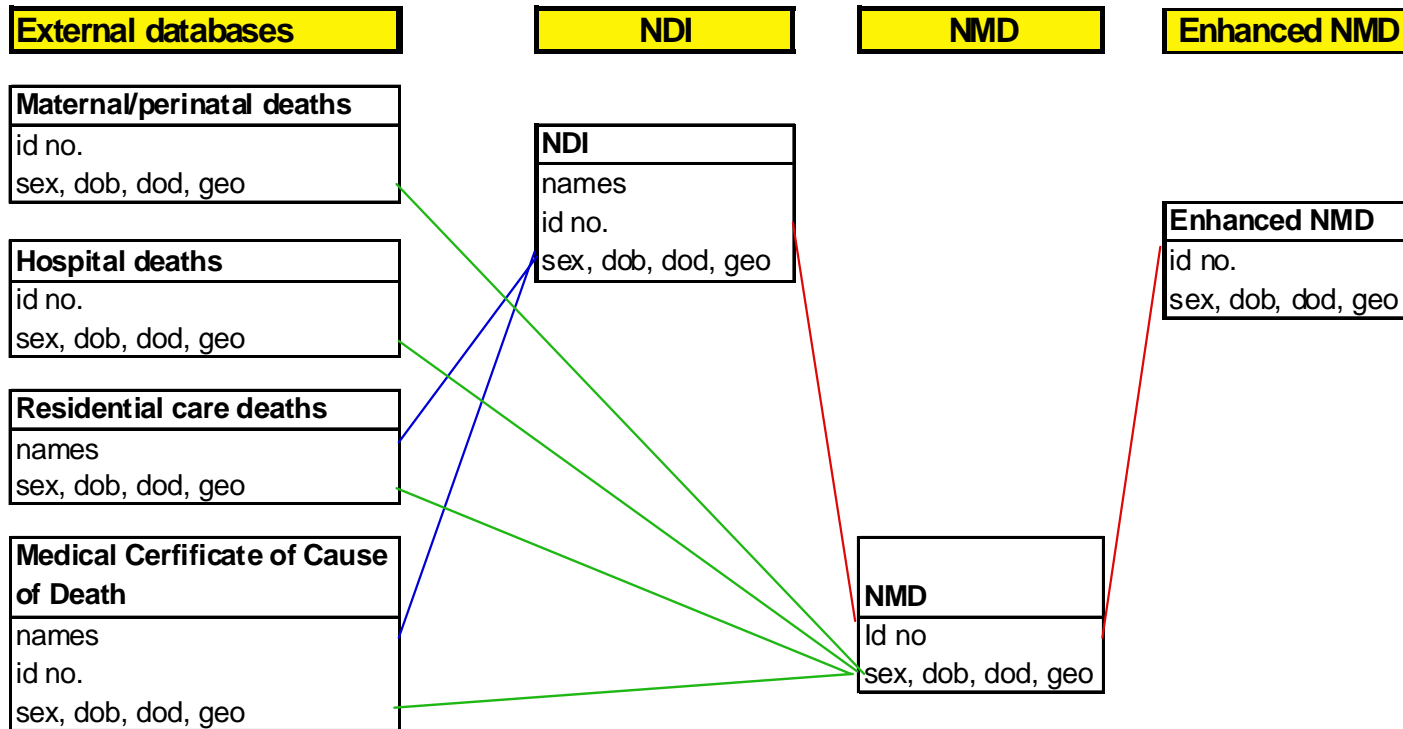
Project goals

- Objective is to first test whether the use of enhanced mortality data will give more robust and reliable estimates of Indigenous mortality.
- If so, the AIHW intends to maintain regular in-house enhanced Indigenous mortality datasets which:
 - can be used to produce more reliable estimates of Indigenous mortality rates
 - can be used to produce yearly estimates of Indigenous life expectancy using direct and indirect demographic methods

Data linkage

- Indigenous deaths from the 4 alternative sources of Indigenous will be linked with the AIHW mortality database to form a single enhanced database
- Linkage using name (if available), sex, postcode, date of death, date of birth, state/territory. Where necessary, names from NDI will be linked.

Linkage method



Data linkage (cont)

- Indigenous identifiers from alternative data sources not captured in AIHW mortality database will be added to enhanced mortality dataset
- These records will later be linked back to the AIHW mortality database to establish whether they have any characteristics in common
- Clerical rules for accepting or rejecting matches documented

Linkage (cont)

- If recorded as Indigenous in any source then will generally be recorded as Indigenous in enhanced data set
- After matching, dual record/recapture methods will be used to estimate Indigenous deaths that are missed altogether and statistics will be adjusted accordingly

Uncertainty

- Calculate life tables using direct and indirect methods, and compare results before and after enhancement
- Estimate uncertainty for all estimates

Confidentiality and privacy

- Unit record data will be kept within the secure AIHW computer environment and password protected, in keeping with its privacy and confidentiality procedures
- Data linkage work will be conducted onsite by authorised AIHW staff, and consultants
- Once data linkage work is complete, identifying information in the combined unit records death data set will be deleted.
- The data will be de-identified immediately after matching for linkage has been complete.
- The combined de-identified data set will be kept permanently in secure AIHW computer environment.

Ethics and approvals required

- An ethics application for the project was submitted to the AIHW ethics committee in early July 2008. Approval was given on 29 July 2008.
- Letter sent to the hospital data custodians and perinatal data custodians in each state/territory in mid July 2008 asking for their approval to release their hospital and perinatal data for use in the project.
- 2 states advised that a submission will need to be made to their own ethics committees. This was undertaken in August

Ethics and approvals required (cont)

- Letter sent to RBDM in each state/territory in August to:
 - 1) seek approval to use the individual records in the NDI and AIHW National Mortality Database to link with other data bases located at the AIHW
 - 2) seek approval to access records of medical certificates of causes of death including data on Indigenous identification

Progress to date

- all jurisdictions have given approval for hospital data to be used in linkage
- all jurisdictions have given approval for perinatal data to be used in linkage
- 7 RBDM have given approval for use of data from NDI and AIHW National Mortality Database
- 2 RBDM have given permission to access medical cause of death certificate data
- AIHW/DoHA have given permission for residential aged care data to be used in linkage

Next steps

- Linkage work to be undertaken in November/December and analysis of enhanced data set to be undertaken in early 2009.
- AIHW to produce a report on Indigenous mortality in all jurisdictions based on enhanced data set upon completion of analyses
- If enhanced dataset able to provide improved estimates it will be maintained by AIHW in the future
- If successful, second stage will extend back in time, incorporate MCCOD data

And beyond that..

- Other linkage studies WA, Vic kids, NSW
- Register studies

Finally

- It's past time the death reporting was sorted out

Closing the gap

- The gap between Indigenous and non-Indigenous mortality is of great concern.
- Government commitment to report annually on progress in closing life expectancy gap
- Robust measurements of Indigenous mortality are needed to monitor the success or otherwise of government and community efforts to reduce the gap.
- Currently the ABS produces Indigenous life expectancy estimates every 5 years
 - Coverage of Indigenous deaths not sufficient for calculation of annual estimates and population estimates from Census are required

- Value of k2 and k3 parameter and life expectancies estimated by ABS/Bhat method applied to Indigenous registered death data for NT and ERPs based on same Census years
- Assumed annual unexplained growth of 0.0%, 1%, 2%, 3% and 4%

	Assumed annual % unexplained growth	Assumed k1	Males			Females		
			k2	k3	e ⁰	k2	k3	e ⁰
1991-1996	0	1	1.179	1.520	64.9	1.390	1.753	73.7
	0.01	1	1.205	1.165	60.1	1.444	1.202	66.3
	0.02	1	1.236	0.936	56.4	1.501	0.913	61.7
	0.03	1	1.269	0.779	53.4	1.561	0.735	58.3
	0.04	1	1.305	0.666	50.8	1.623	0.615	55.7
1996-2001	0	1	1.219	0.867	56.6	1.161	1.082	66.9
	0.01	1	1.254	0.733	53.8	1.211	0.832	62.1
	0.02	1	1.291	0.632	51.4	1.264	0.675	58.6
	0.03	1	1.331	0.555	49.3	1.320	0.567	55.8
	0.04	1	1.374	0.494	47.4	1.378	0.489	53.5

High level of under-reporting of Indigenous deaths in death registration data

- While almost all deaths are registered in Australia, Indigenous identification of these deaths is incomplete and the degree of incompleteness varies between s/t
- The estimated degrees of coverage by the ABS for deaths recorded in 2006 are:

NSW: 45%

Vic: 32%

Qld: 51%

WA: 72%

SA: 62%

Tas: n.p.

ACT: n.p.

NT: 90%

Australia: 55%

- Currently, only data from Qld, WA, SA & NT considered of sufficient quality to report on Indigenous deaths

ERPs used in fits		Male			Female		
ABS/Bhat method fitted with ERPs		k2	k3	e ⁰	k2	k3	e ⁰
1996(96)-2001(01)	1996(96)-2001(01)	-0.006	0.028	0.5	0.000	-0.002	0.0
1996(01)-2001(01)	1996(01)-2001(01)	0.003	-0.024	-0.4	-0.007	0.040	0.9
1996(06)-2001(01)	1996(06)-2001(01)	-0.004	-0.027	0.5	-0.003	0.026	0.4
1996(96)-2001(06)	1996(96)-2001(06)	-0.002	0.009	0.2	0.000	-0.003	-0.1
1996(01)-2001(06)	1996(01)-2001(06)	0.006	-0.048	-0.8	-0.007	0.036	0.8
1996(06)-2001(06)	1996(06)-2001(06)	0.002	0.018	0.3	-0.003	0.024	0.4
GGB method fitted with ERPs							
1996(96)-2001(01)	1996(96)-2001(01)	0.027	0.056	-1.7	0.011	-0.040	-0.7
1996(01)-2001(01)	1996(01)-2001(01)	-0.160	0.045	-1.0	-0.015	0.041	-0.9
1996(06)-2001(01)	1996(06)-2001(01)	-0.033	0.098	-1.8	0.000	-0.002	0.0
1996(96)-2001(06)	1996(96)-2001(06)	0.002	-0.004	-1.1	0.035	-0.105	-1.9
1996(01)-2001(06)	1996(01)-2001(06)	0.008	-0.032	-0.2	0.005	-0.011	-0.3
1996(06)-2001(06)	1996(06)-2001(06)	-0.016	0.048	-1.3	0.021	-0.072	-0.7

Using various data sets for 1996-2001 – males

Fit no.	Model used	Unexplained annual growth (ABS/Bhat only)	Spreadsheet used	Population data used	Deaths data used	Regression slope	Regression intercept	Life expectancy (years)
1	ABS/Bhat	Approx 2.0% (*see below)	ABS Publ'n	96(96) & 01(01)	Adjusted	not provided	not provided	59.4
2	GGB	Not applicable	HBV Publ'n	Census counts	Nearly actual	not provided	not provided	64.2
3	ABS/Bhat	2%	ABS	96(96) & 01(01)	Adjusted	1.5001	0.018045	59.3
4	ABS/Bhat	2%	Ours	96(96) & 01(01)	Adjusted	1.5001	0.018284	59.4
5	ABS/Bhat	0%	ABS	96(96) & 01(01)	Adjusted	1.0890	0.022092	64.1
6	ABS/Bhat	0%	Ours	96(96) & 01(01)	Adjusted	1.0890	0.022317	66.2
7	ABS/Bhat	0%	ABS	96(01) & 01(01)	Adjusted	1.7716	0.018448	56.8
8	ABS/Bhat	0%	Ours	96(01) & 01(01)	Adjusted	1.7716	0.018412	57.8
9	GGB	Not applicable	HBV	Census counts	Adjusted	1.0434	-0.00904	63.4
10	GGB	Not applicable	Ours	Census counts	Adjusted	1.0434	-0.00902	63.7
11	GGB	Not applicable	HBV	Census counts	Actual	1.0671	-0.00826	64.3
12	GGB	Not applicable	Ours	Census counts	Actual	1.0672	-0.00824	64.7
13	GGB	Not applicable	HBV	96(96) & 01(01)	Adjusted	1.0426	-0.01387	65.0
14	GGB	Not applicable	Ours	96(96) & 01(01)	Adjusted	1.0428	-0.01384	65.5
15	GGB	Not applicable	HBV	96(96) & 01(01)	Actual	1.0664	-0.01316	65.8
16	GGB	Not applicable	Ours	96(96) & 01(01)	Actual	1.0665	-0.01314	66.6
17	GGB	Not applicable	HBV	96(01) & 01(01)	Adjusted	1.1713	-0.00066	58.5
18	GGB	Not applicable	Ours	96(01) & 01(01)	Adjusted	1.1727	-0.00065	58.3
19	GGB	Not applicable	HBV	96(01) & 01(01)	Actual	1.7511	0.00043	59.6
20	GGB	Not applicable	Ours	96(01) & 01(01)	Actual	1.7511	0.00045	59.9

Indigenous mortality

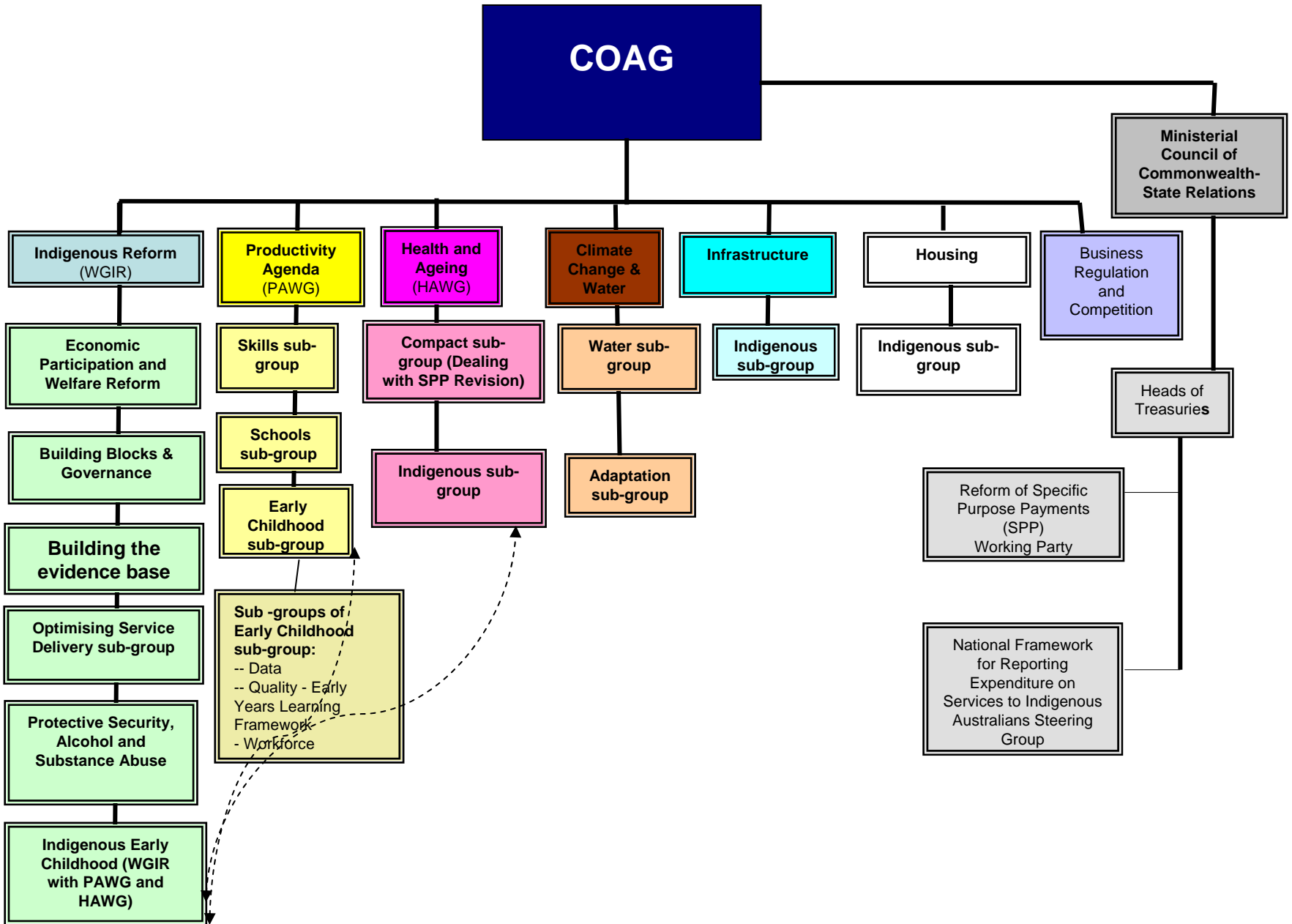
- Current estimates of Indigenous mortality suffer from imperfect identification of Indigenous deaths in the death records.
- They also suffer from changes in coverage in the estimates of the Indigenous population.
- While estimates of the size of the Indigenous population have improved through better population census counts, improvements in death data have been slow.

NAGATISHID/OATSIH project (Barnes-Smith)

- Assessed Indigenous life expectancy estimates in NT
- Degraded sources of data to assess magnitude of patterns of error in estimation methods and their impact on estimates
- Compared direct & indirect estimates
- Found indirect methods extremely unstable
- Recommended focus on improving data for direct estimates rather than accepting the shortcomings with current indirect estimation methods

- NT male deaths for 1991-1996 and populations based on Census counts

k3								
k2	1.15	1.2	1.25	1.3	1.35	1.4	1.45	1.5
1.01							62.5	62.9
1.015						61.7	62.2	63.0
1.02				60.6	61.0		62.5	62.7
1.025			59.9	60.3			62.1	
1.03		59.2	59.6		61.2	61.6		
1.035		58.9		60.5	60.8			
1.04	58.3	58.5	59.7	60.1				
1.045	58.3	58.5	59.2					



Indirect methods

- ABS have relied on indirect demographic methods to produce life expectancy estimates to correct for inconsistencies between Indigenous death data and population estimates
- These calculations have been made difficult because of the need to adjust for the high level of under-reporting of Indigenous deaths
- The larger the error to be adjusted, the less robust the results of estimation

Monitoring strategy

- Not enough data for time series
- Curve fitting problematic
- Given competing estimates, focus on changes rather than absolute levels
 - In life expectancy
 - In gap
- State/Territory and Urban/Rural/Remote
- Develop error theory
- Improve the death data!

Draft Reporting Framework

Term	Definition	Draft examples
<i>Headline indicators</i>	The precise measure of the outcome target	Life expectancy estimates, released five yearly by ABS
<i>Proxy indicators</i>	An annual indicator to be used where the headline indicator is only available in the 5 yearly Census.	Death rate by jurisdiction, age and gender.
<i>Interim targets</i>	Goals or milestones to aim for over time, ie, at regular intervals between now and the target year.	The gap in life expectancy at 5, 10, 15, 20, 25 years
<i>Trajectory</i>	The line or path to be taken to reach the target	To be determined. This could be a straight line from now to 25 years.
<i>Progress indicators</i>	Key indicators of the most significant factors which provide the best measure of progress, ie, based on evidence that they reflect the delivery chain or provide a line of sight between what we do and changes in the headline indicator.	Access to primary health care. Changes in leading causes of mortality such as smoking rates, prevalence of overweight and obesity. Early detection and treatment rates. Chronic disease management.
<i>Priority progress indicators</i>	A small set of progress indicators selected for inclusion in the annual report on progress.	To be determined.
<i>Contributing factors</i>	Factors which are known to influence the outcomes (ie, the targets). The progress indicators are measures of some of these factors.	Education. Employment status. Income.

Outline

- Background
 - Indigenous mortality
 - Current sources of information on Indigenous deaths
 - Closing the gap
- Project overview
- Processes of linkage
- Ethics/approvals required
- Status of project to date
- Next steps

Using various data sets for 1996-2001 – females

Fit no.	Model used	Unexplained annual growth (ABS/Bhat only)	Spreadsheet used	Population data used	Deaths data used	Spreadsheet used	Regression Slope	Regression intercept	Life expectancy (years)
1	ABS/Bhat	Approx 2% (*see below)	ABS Publ'n	96(96) & 01(01)	Adjusted	ABS Publ'n	Not provided	Not provided	64.8
2	GGB	Not applicable	HBV Publ'n	Census counts	Nearly actual	HBV Publ'n	Not provided	Not provided	68.9
3	ABS/Bhat	2%	ABS	96(96) & 01(01)	Adjusted	ABS	1.7814	0.01694	63.7
4	ABS/Bhat	2%	Ours	96(96) & 01(01)	Adjusted	Ours	1.7814	0.01727	63.9
5	ABS/Bhat	0%	ABS	96(96) & 01(01)	Adjusted	ABS	1.1383	0.02333	69.7
6	ABS/Bhat	0%	Ours	96(96) & 01(01)	Adjusted	Ours	1.1383	0.02373	72.0
7	ABS/Bhat	0%	ABS	96(01) & 01(01)	Adjusted	ABS	1.8997	0.01965	62.8
8	ABS/Bhat	0%	Ours	96(01) & 01(01)	Adjusted	Ours	1.8997	0.01979	63.9
9	GGB	Not applicable	HBV	Census counts	Adjusted	HBV	1.0979	-0.00536	69.2
10	GGB	Not applicable	Ours	Census counts	Adjusted	Ours	1.0980	-0.00534	69.9
11	GGB	Not applicable	HBV	Census counts	Actual	HBV	1.1463	-0.00532	68.9
12	GGB	Not applicable	Ours	Census counts	Actual	Ours	1.1464	-0.00530	69.8
13	GGB	Not applicable	HBV	96(96) & 01(01)	Adjusted	HBV	1.0824	-0.00991	70.7
14	GGB	Not applicable	Ours	96(96) & 01(01)	Adjusted	Ours	1.0825	-0.00988	72.0
15	GGB	Not applicable	HBV	96(96) & 01(01)	Actual	HBV	1.1301	-0.00987	70.4
16	GGB	Not applicable	Ours	96(96) & 01(01)	Actual	Ours	1.1303	-0.00984	72.1
17	GGB	Not applicable	HBV	96(01) & 01(01)	Adjusted	HBV	1.8492	-0.00043	64.3
18	GGB	Not applicable	Ours	96(01) & 01(01)	Adjusted	Ours	1.8490	-0.00042	64.3
19	GGB	Not applicable	HBV	96(01) & 01(01)	Actual	HBV	1.9308	-0.00037	64.0
20	GGB	Not applicable	Ours	96(01) & 01(01)	Actual	Ours	1.9306	-0.00035	64.2

- NT male deaths for 1991-1996 and populations based on ERP

Average of e^0	Value of k_3								
Value of k_2	1.05	1.06	1.07	1.08	1.09	1.1	1.11	1.12	1.13
0.9875					67.25	67.41	67.65	67.80	67.93
0.99			66.90	67.04	67.16			67.82	67.91
0.9925	66.55	66.67	66.80				67.56	67.74	
0.995	66.46				67.15	67.36			
0.9975	66.46	66.60	66.79	66.99					

Headline Targets

- Outcomes-focused targets COAG 20 Dec 2007:
 - Close the life expectancy gap in a generation
 - Halve the child mortality gap in 10 years
 - Halve the literacy and numeracy gap
- Further targets COAG 26 March 2008
 - Halve the gap in employment outcomes within a decade
 - Halve the gap for Indigenous students in Year 12 by 2020
 - In five years all Indigenous four year olds in remote Indigenous communities will have access to a quality early childhood education program.

The current reporting environment

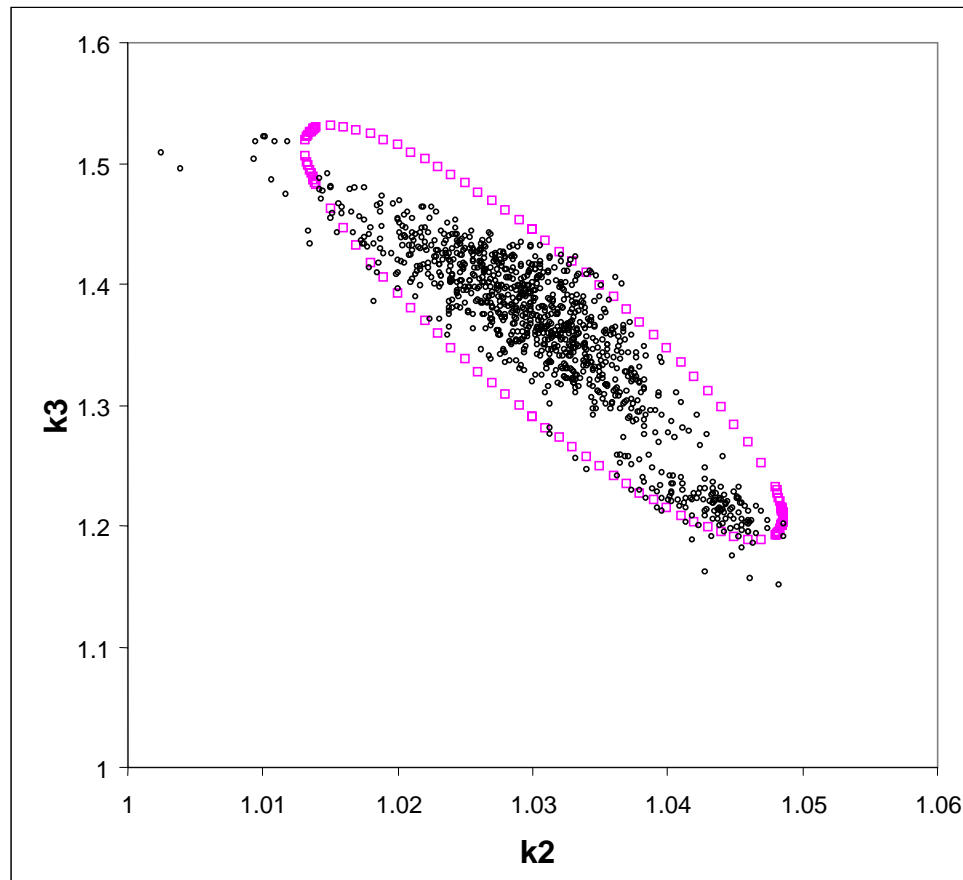
- Complex, ambitious
- COAG *Working Group on Indigenous Reform* (WGIR) oversees work towards the headline targets
- WGIR includes a *Building the Evidence Base* subgroup, which will specifically look at how the targets can be effectively monitored
- A number of other COAG Working Groups have specific Indigenous sub groups or sub-groups with a particular focus on Indigenous issues

The Evidence base:

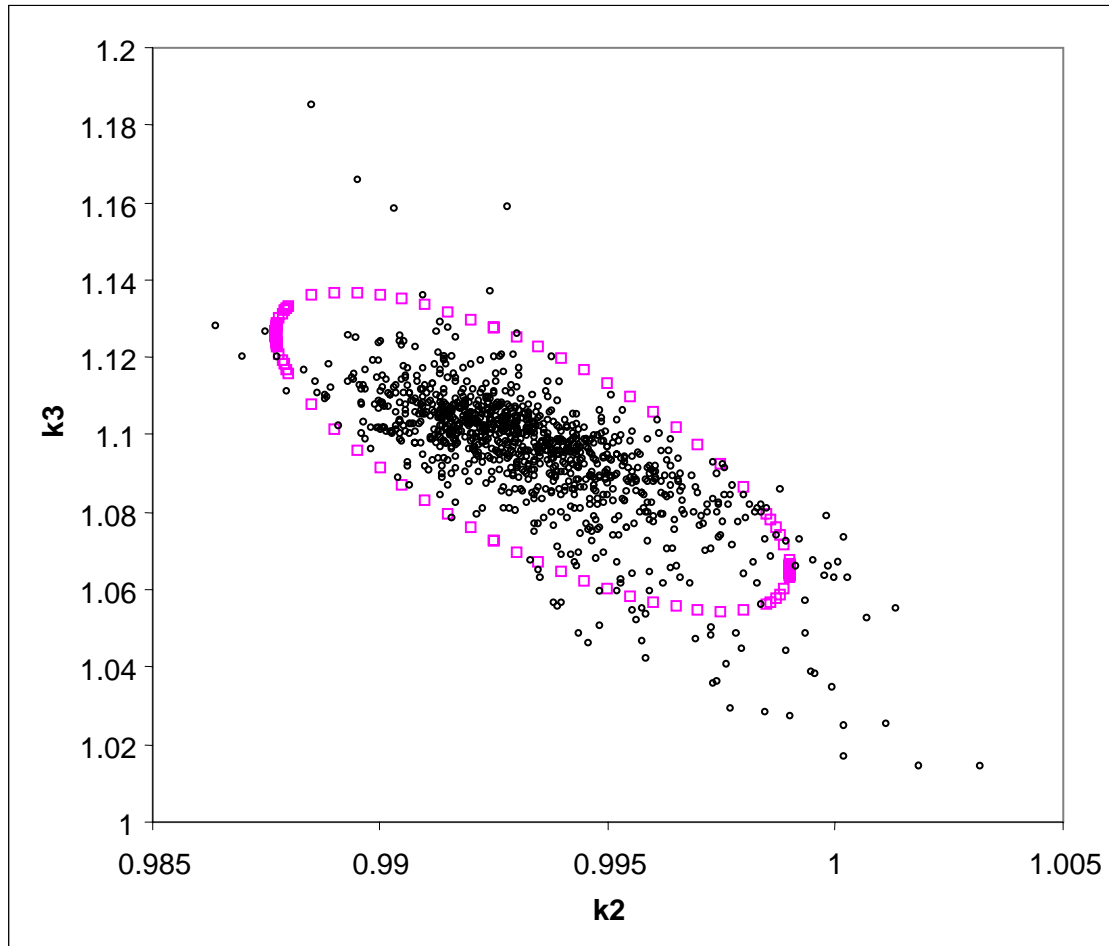
Life expectancy gap

- Aboriginal and Torres Strait Islander Health Performance Framework Report 2006 (HPF)
- Overcoming Indigenous Disadvantage Report
- Indigenous Burden of Disease Report
- Indigenous Health Expenditure Report
- Studies of the causes of inequality in life expectancy
- Improving the quality of Indigenous statistics (ABS/AIHW, hospitals, Medicare, etc)

- Bivariate normal 95% confidence ellipses for GGB estimates of k_2 and k_3 derived by bootstrap methods using male deaths for 1991-1996 and populations based on Census counts



- NT male deaths for 1991-1996 and populations based on ERPs



Barnes Smith Review

- Conflicting estimates

Indigenous health targets

- A long and not particularly encouraging history.
- Previous federal Labor administration in 1973 adopted a National Plan for Aboriginal Health, which had as its objective the
 - elimination of Indigenous disadvantage within ten years
 - the development of comprehensive Aboriginal health statistics so that progress could be measured
- Neither objective was achieved

Indigenous Health Targets

- In 1983, another Labor government endorsed a National Health Strategy based on a partnership between government and community services, incorporating specific priority objectives and comprehensive monitoring data
- The strategy was never effectively implemented.

Indigenous Health Targets

- The last Government initially favoured mainstreaming, ‘practical reconciliation’ and individual responsibility
 - Framework agreements with outcome targets
- Ended in its last year with a policy of ‘stabilise, normalise and exit’ in remote communities.
 - Outcome targets unclear