# Aboriginal Ageing, Aboriginal Health and Epidemiological Transitions

G A (Tony) Broe and Lisa Jackson Pulver

We will examine the meaning of *Aboriginal Ageing* in relation to adverse health outcomes by reviewing and comparing the epidemiologic transition in Aboriginal and non-Indigenous Australians.

## Epidemiological Transition Theory

The epidemiologic transition theory was presented first by Omran (1971) and was designed to explain global population trends in the dynamic relationship between epidemiological phenomena and demographic change. Omran characterised these in three stages, or 'ages': (1) pestilence/famine; (2) receding pandemics and lastly; (3) systemic "man made" degenerative diseases.

In the 1980's Olshanksy and Ault (1986) proposed a fourth stage, "delayed degenerative disease", which followed on from major improvements in cardiovascular disease morbidity and mortality rates in the 1970's. Since then, epidemiologic transition theory has been developed and modified to fit emerging factors, including suggestions that different populations can and do experience these transitions differently. Some observers have called for a major revision of the theory to extend its underpinning concept to become a theory of 'health transition' (Frenk et al 1991 and Caselli et al 2003).

Recently a potential fifth epidemiologic transition has been proposed in which the late-onset neurodegenerative diseases will grow in incidence and prevalence as the population ages. People surviving the systemic diseases, to reach older ages, will experience late-life cognitive impairment, dementia and age-related mobility disorders, which are also neurodegenerative in origin (Broe, 2003). A focus for future research needs to be a better understanding of the interaction of cardiovascular diseases, diabetes and the metabolic syndrome with later onset cognitive impairment and neurodegenerative diseases, which are still poorly defined and poorly diagnosed at a population level; and an understanding of the interactions of both systemic and

neurodegenerative diseases with genetic, social and environmental factors leading to their expression in groups and individuals at different rates. These areas of research are particularly relevant to ageing in Aboriginal people.

**A Delayed Epidemiological Transition in the Aboriginal Community:**

The recent data "showing evidence of a slower rise (or even a fall) in death rates in the NT Indigenous population" in the 1990s "give reason to hope that some improvements… have been putting the brakes on chronic disease mortality among Aboriginal and Torres Strait Islander peoples" (Thomas et al, 2006).

These findings, in our interpretation of the epidemiological transition theory, further suggest a positive view that Aboriginal people are now experiencing a delayed transition of chronic systemic diseases to an increase in life-expectancy which is likely to occur over the coming decades.

Aboriginal peoples, however, are experiencing illnesses that span the full scale of earlier transitions, and in some communities, experiencing the transitions simultaneously, resulting in unacceptably lower levels of life quality and high illness rates experienced nearly a century ago by non-Aboriginal Australians (Jackson Pulver et al 2007). This has a profound effect on ageing Aboriginal "survivors" requiring services in an environment where Aboriginal people don't get the basic care required for conditions eradicated from mainstream Australia decades ago.

Despite the undoubted benefits of the current decreases in infant mortality and increased survival of younger Aboriginal people, with a projected increase in the total Aboriginal population, this "health transition" will lead to a progressive ageing of the older Aboriginal population, which has been exposed to multiple additional risk factors, across the life span, for cognitive decline and dementia. There is little current information on brain development, cognitive status and cognitive strengths in Aboriginal populations, or on rates types and causes of cognitive impairment and dementia or on access to services. The information that is available is in remote communities and suggests high levels of cognitive impairment and

dementia at younger ages; that is, in those only 45 years of age upwards (Lo Guidice et al 2006; Zann 1994).

**In summary:**

Firstly, delayed epidemiological transitions in patterns of systemic disease are responsible for high mortality and disability rates in the Aboriginal population, rather than "premature ageing". Secondly, Aboriginal populations are increasing in absolute numbers and these populations are growing younger as a result of so called "third world" disease transitions. Thirdly, "young old" Aboriginal people (aged 50 to 65) are increasing in absolute numbers (ABS). Fourthly, "older-old" Aboriginal people, those 75 years and over, are likely to be "survivors" who demonstrate "healthy ageing" rather than "premature ageing". Finally, the persistence of socio-economic and other social determinants of health, and consequent educational disadvantage, are likely to continue placing Aboriginal people at a health disadvantage in the coming epidemiologic transition to neurodegenerative diseases, which will accompany population ageing during the 21st century.

In terms of informing healthy ageing models in Aboriginal people, specific organ system diseases (heart disease, renal disease, lung disease, diabetes) are of use in measuring adverse health outcomes in Aboriginal populations and obtaining better access to appropriate health services and specific disease prevention programs; however effective preventive health research must also address social and cultural issues relevant to the health of younger people, such as employment, nutrition and housing. In particular we need to address the role of education and employment throughout the life cycle in improving health overall, and specifically in the promotion of factors that stimulate healthy brain growth and delay dementia onset in later life. We believe that the broader approach of epidemiologic transition theory provides another way to describe and act upon the needs of Aboriginal peoples, particularly those suffering the intergenerational impacts of disease, despair and persistent inequity.

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# An Historical view of Ageing

## Risk factors & protective factors for Indigenous & non-Indigenous longevity

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- In this session Tony will examine the "causes" of longevity primarily in non-Indigenous people
- Lisa will examine the concepts of a "delayed epidemiologic transition" prevention and "ageing" in Indigenous people



## Background

- During the 21st century average Australian life expectancy for women at birth is expected to reach 100 years c. 2060 (U.N. Oeppen & Vaupel)
- Although Aboriginal health (Thomas et al 2006) and life span (Wilson & Condon 2006) are improving, at least in the NT, the survival gap remains around 17 to 20 yrs



"In so far as people are simultaneously social and biological organisms is any biological process ever expressed devoid of social context? – or any social process ever unmediated by our...bodies?" Nancy Kreiger J. Epidemiol Community Health 2001 – *Uncontentious?*

- Q1. Are there *Historical* determinants - of health, disease and well being which "cause" longevity? Viewing longevity as a proxy for healthy ageing
- Q2. Are there *social* determinants of *Brain Decline* or *Brain Growth* and human longevity?
- Q3. How do we find *Theories, concepts and methods* to investigate the socio-biological determinants of ageing? And relate these to Aboriginal longevity?



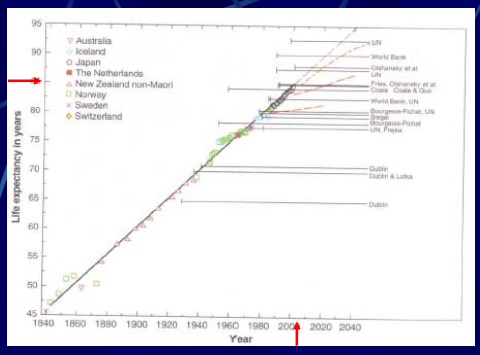
- In looking for *Historical* causes of longevity – social or biological – the answers will depend on how we frame the questions
- Epidemiologic Transition Theory frames social determinants as "a mere background to biomedical phenomena" (Kreiger 2001)
- Demographic Transition Theory helps us examine social determinants as *upstream* factors which delay *downstream* biological risk & outcomes – using a life span or systems approach (McKeown 1956, 1976)

## Epidemiologic Transition Theory
(Omran 1971 Olshansky 1986)

1. Stage of epidemics & trauma from early times to ~1750 with average survival of around 20-30 yrs
2. Stage of receding infections from 1750 to ~ 1900 – average survival went from 30 to ~ 50 yrs
3. Stage of degenerative or *"man-made"* diseases – (heart & lung disease, stroke etc) from1900 to mid 20th C. Omran predicted max. survival of 70y
4. Stage of delayed systemic diseases from ~1950 Olshansky predicts maximum survival of 85 yrs



## History of Broken Limits to life expectancy – 1840 to 2040




(Oeppen & Vaupel Science 2002)



## The next epidemiological transition
(Broe & Creasey 1995, 2003)

- **If** average life expectancy increases as predicted this century (Oeppen & Vaupel 2000; U.N.2000; Wilmoth 2000)
- The age distribution will shift to late-onset slowly progressive neurodegenerative diseases – AD and PD are the paradigms
- And these diseases will become the focus of research in prevention – social? bio-medical?



## Epidemiologic transitions

| 19th century | 20th century | 21st century |
|---|---|---|
| Infants/Children | Adults/Young old | Older old |
| *Infectious diseases* | *Systemic diseases* | *Neurodegenerative* |
| Flu | Heart diseases | Dementia |
| Typhoid | Vascular/Stroke | Parkinsonism |
| Cholera | Hypertension | Cognitive loss |
| Dysentery | Obesity/Diabetes | Gait slowing |
| Small Pox | Lung diseases | Sensory loss |
| Tuberculosis | Cancer | |



## Epidemiologic or DiseaseTransitions
Focus on bio-medical causation –Downstream factors

| 19th century | 20th century | 21st century |
|---|---|---|
| **Infants & Children** | **Adults** | **Older old** |
| *Infectious diseases* | *Systemic diseases* | *Neurodegenerative* |
| Chlorinated water instead of wells | Medical advances | Anti-oxidant drugs |
| Vaccination | Antibiotics (1930-50) | Anti-lipid drugs |
| Public Health | Salt – ice chest/fridge | Hypotensive agents |
| - Sanitation | Diuretics/Hypotensives | Glycolytic agents |
| - Drains | Anti-lipid drugs | Anti-amyloid agents |
| - Garbage collection | Glycolytic agents | Immune therapy |
| Horses | New Public Health | Hormone therapy |
| | Cigs Alcohol Exercise | Gene/protein therapy |
| | Cars | |



## Demographic Transition Theory
Allows a focus on Upstream Factors

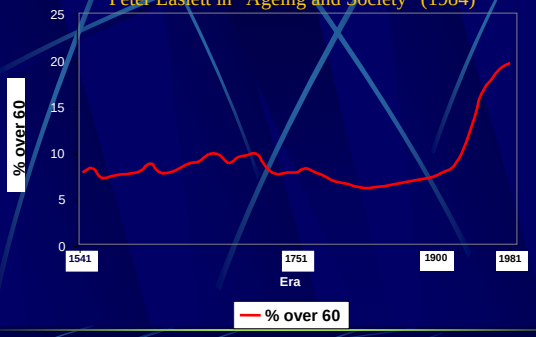
Infectious, systemic and neurodegenerative diseases have always been with us (Thucydides, Hippocrates, Ecclesiastes)

At each Stage of the epidemiologic transition it is the balance between fertility, longevity and mortality that changes - *average survival; age distribution of death*

Rather than new diseases arising - an old one is waiting in the wings, to become the "new" cause of morbidity and death as the popn ages (Wilmoth 2000)

## History of Ageing - England 1541 to 1981

Peter Laslett in "Ageing and Society" (1984)

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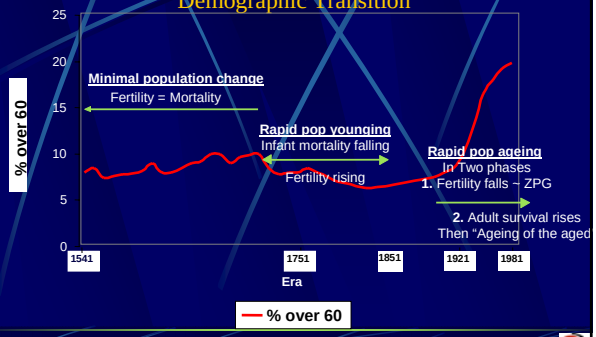
## History of Ageing - England 1541 to 1981

Demographic Transition

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## Population Ageing - in the Western world

Social causation – Upstream factors

| 1750 to 1900 | 20th century | 21st century |
|---|---|---|
| **Young survival**<br>*(Infectious disease↓)*<br>*More food: Infants and children survive and adults can work*<br>*Economic advances household wealth;*<br>***Education:** universal primary education*<br>*Women choose less kids & more education*<br>*Brain development* | **Mid-life to older survival**<br>*(Systemic disease↓)*<br>More household wealth<br>More calories = capacity for work and income up<br>Old Public Health then - 1950 - New Public Health<br>**Better Education** - more people in secondary and higher education; Women in education & jobs; less hard labor & smarter jobs<br>Brain growth | **Old-old Survival**<br>*(Neurodegeneration)*<br>More income, wealth, nutrition, exercise etc<br>***Better brain survival**<br>Human Capital Devel. Early childhood educat, tertiary, adult, workplace & 3rd age education; literacy & reading; mental & social activity; global - media, I.T. "Wii"<br>Women in workplace |

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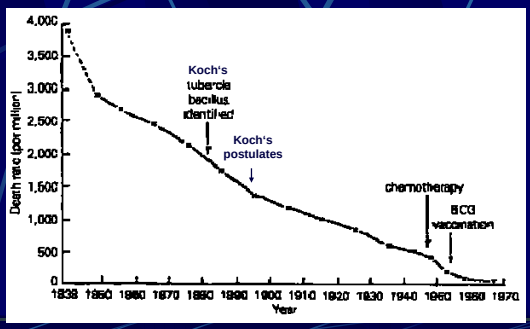
## TB as primarily a socio-economic disease?

Thomas McKeown (1956,1976) Or social theory overkill?

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## Q.1.Are there social determinants of health, disease, well being - and longevity? Many

Historically the big three are:

- Education & upbringing - viewed as human capital development - starting in England & Scotland & cumulative (for some) over this whole period of two+ centuries (R. Lucas)
- Food, calories, and capacity to work (R. Fogel)
- Jobs, income, and household wealth

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## Q2. Are there *social* determinants of *brain growth* and human longevity? Yes

- Neuronal networks and synapses grow throughout the life span and brain cells don't "fall out" - absent brain disease *(Double et al 1996)*
- *Early life* cognitive growth delays *late life* cognitive decline, dementia & death independent of other factors *(Head size, Scottish and Nun Studies)*
- Socio-emotional (frontal) functions develop and are modifiable well into adult life = *curiosity, confidence, control, risk aversion, conscientiousness, time preference*. These skills promote adult cognitive growth & successful ageing *(Heckman JJ. PNAS 2007)*

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**The Brain Networks most susceptible to education and mental activity across the life span are:**

***Hippocampal cortex:*** encodes & retrieves memory - Hippocampus matures in childhood in a sequence that may predict the pattern of later Alzheimer's disease (Braaks) . Hippocampal size correlates and changes with memory function in adult life (London Taxi Drivers, SOPS)

***Pre frontal cortex:*** plans, programs & controls our attention, behaviour and socio-emotional functions. It is "grown" (for good or bad) by our parents, educators, role models & experiences (Luria; Raz; Demasio)



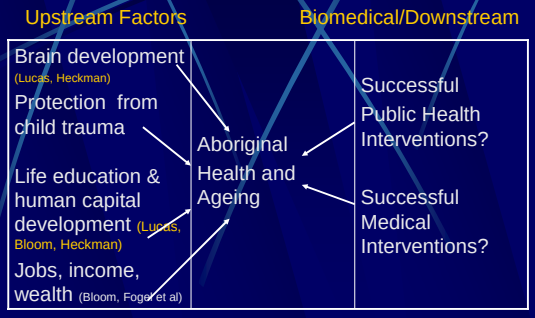
Q. 2. Are there *social* determinants of brain decline & neurodegeneration? Yes? Indigenous RFs:

- High intrauterine metabolic risk and low birth weight
- Childhood separation, trauma, stress, abuse
- Education disadvantage, learning defects, illiteracy
- Pervasive racial discrimination at all ages
- Unemployment, low status jobs, poverty
- High adolescent
  - Incarceration rates
  - brain trauma rates
  - smoking, alcohol, drug abuse rates
- High mid-life cardiovascular & metabolic risk



Q.3. How to integrate these factors in research?

A systems life-span approach to Aboriginal Ageing






- Lisa will examine the concepts of a "delayed epidemiologic transition" prevention and "ageing" in Indigenous people



## What we did

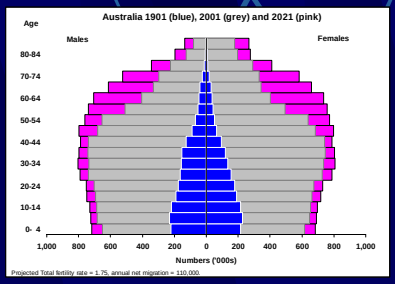
- Review and compare epidemiologic transition in Aboriginal and non-indigenous peoples in order to:
- Examine the meaning of "Aboriginal ageing" in relation to adverse health outcomes in the Aboriginal Community
- Examine appropriate preventive health programs for the 21st century



## What we found

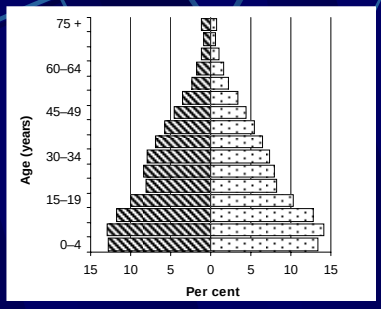
- Aboriginal people are now in a mixed "mid 20th century" epidemiologic transition
- Population is increasing and ageing at the same time
- Older people are likely to be healthy survivors rather than ageing prematurely
- Persistence of continuing educational and social disadvantage

# Population Profile




Source: Census of the Commonwealth of Australia, Population by age and sex, Australian States and Territories (3201.0)



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# Proportion of older Indigenous people

| | | 2001 | | 2009 | |
|---|---|---|---|---|---|
| | | No. | % | No. | % |
| Older Indigenous Australians | 50+ | 46,900 | 10.2 | 61,500 | 11.6 |
| | 65+ | 13,100 | 2.8 | 14,900 | 2.8 |

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# Indigenous health and ageing

"…the 20 year gap in life span, compared with the non-Indigenous community and with Indigenous groups overseas, is a national disgrace which requires immediate attention, sustained action and on-going national inquiry to seek causes and implement solutions"

Australian Association of Gerontology - National Newsletter April 2006

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# The 21st Century

- A 4th transition will take place in the 21st century; Systemic diseases (heart, lung, renal etc) will be delayed and Aboriginal people will age successfully
- Aboriginal longevity will increase; the gap with the non Indigenous community may narrow; and neuro-degenerative disorders will increase
- However current Aboriginal disadvantage in literacy, education, and in factors promoting brain growth, could reduce employment prospects and increase disadvantage in the coming generations

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# Current use of information

- We collect Indigenous health data by <u>whose</u> criteria
  - Identification of people
  - heart lung disease, trauma, diabetes, renal disease
- We study non-indigenous health risk factors
  - vascular, obesity, diabetes, trauma, alcohol, cigarettes, drugs
- We research provision of health care by organ systems
  - dialysis, cardiac care, chronic respiratory care, diabetes management

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# Implications for stakeholders

Changing the paradigm

- Older Aboriginal people are "healthy survivors"
- Appropriate research aims
- And better care within peoples own communities



## Factors Impacting on Indigenous health status- Interactions of social and physiological determinants of health.

**Socio economic**
- Low incomes
- Low employment
- Low education levels
- Poor nutrition

**Lack of access to quality primary care**
- Location issues
- Poor health linkages
- Cultural/social factors
- Lack of a public health focus
- Workforce issues
- Financial barriers

**Environmental factors**
- Poor living environments
- Substandard housing
- Poor sewage water quality
- Poor food storage and access to healthy food

Poor Health Status
- High mortality rates
- Lower life expectancy
- Multiple morbidities
- Higher injury, disability rates
- Higher hospital admission rates
- Higher Incarceration rates

**Specific health risk factors.**
- Poor nutrition
- Hazardous alcohol use
- High Tobacco use
- Low Physical Activity

**Historical, social & political factors**
- Removal from land
- Separation of families
- Dislocation of communities
- Mistrust of mainstream services
- Culturally Inappropriate services
- Poor cross communication
- Relocation of women for birth.



# Indigenous ageing research

- Organ diseases must be effectively addressed - but they are most useful as research outcome measures
- What are the potentially remediable causal factors to address as major research aims for Aboriginal Health?



# Indigenous health and ageing

- Social and environmental progress
  - Education, meaningful employment, housing, opportunities
- Food security
  - Includes access, quality, type and choice
- Basic public health
  - Water, hygiene, vaccines and medicines, advocacy
- Lower trauma level
  - Safety, both physical and cultural



How to integrate these factors in research ?

A systems life-span approach to Aboriginal Ageing

| Upstream Factors | | Biomedical/Downstream |
|---|---|---|
| Brain development (Lucas, Heckman)<br>Protection from child trauma<br>Life education & human capital development (Lucas, Bloom, Heckman)<br>Jobs, income, wealth (Bloom, Fogel et al) | Aboriginal Health and Ageing | Successful Public Health Interventions?<br>Successful Medical Interventions? |