

# The Rise of Kidney and Related Chronic Diseases in Remote-Living Australian Aboriginal People in the Context of Epidemiologic and Health Transition

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## Background and Aim

Reasons for the excess of chronic disease in Aboriginal communities are poorly understood. We describe the emergence of chronic disease and CKD in the Tiwi community and interpret findings in the context of epidemiologic and health transition.

## Methods

We analysed records of death (N=1,666) and numbers of people starting renal replacement (RRT, n=91) for the entire Tiwi Aboriginal community from 1960 to 2010, using meticulous clinic records maintained by the Sisters of the Order of Our Lady of the Sacred Heart (OLSH), burial records maintained by the Missionaries of the Sacred Heart (MSC), as well as more recent records maintained by the North Territory government health services. We recorded all birthweights documented in the hospital and clinic records (recording started in 1956) and used government census data available since 1986 for population figures and rate estimates.

## Results

Against a background of low birthweights (Figure 1), dramatic reductions in infant and childhood deaths occurred over 30 years, due to improved maternal and child care. Historically, death rates have been higher in low birthweight babies. However, improvements in survival have been experienced across the birthweight spectrum, resulting in a relatively greater sparing of mortality in low birthweight infants. Today, most infants and children live to adult life, where those of low birthweight fulfil the predictions of Barker<sup>1</sup> that adults of low birth weight have higher rates of chronic disease and chronic disease deaths (Figure 2C).

Figure 3 shows that, in the early 1960s, more than 70% of recorded natural deaths were in infants and children. As early life mortality fell, numbers of deaths among adults rose, and especially deaths in people at 45 years of age and older.

Figure 4 shows the contribution of chronic diseases to those natural adult deaths. Numbers of deaths from chronic lung disease initially increased but are now falling, cardiovascular deaths increased but are now stable, while renal deaths (start of RRT or death with ESKF), which have largely appeared since 1980, have increased, and now constitute 40% of all natural deaths. However, age of onset of ESKF is progressively rising.

Figures 5A&B show age-standardised population-based death rates since 1986. Profound reductions in deaths before age 15 years are confirmed. The high death rates in young adults, which probably reflect the Barker phenomenon, might now be falling. Death rates of persons of 45 years and older are falling rapidly.

The Tiwi population has increased from an estimated 800 in 1956 to about 2,200 in 2010. The age structure is maturing (Figures 6A-D) from a third world to an intermediate population structure.

## Conclusion

Profound changes in mortality and population structure have occurred over 50 years. Most deaths are now due to chronic disease, and are increasingly occurring at an age of  $\geq 45$  years. With greater life expectancy in adult life, in part due to better management of competing causes of death, especially pulmonary and cardiovascular disease, renal disease has more opportunity to pursue its indolent course to renal failure.

These changes are mirrored across remote Aboriginal Australia and throughout the developing world, except in regions in the grip of famine or war.

As birthweights gradually rise towards non-indigenous levels and as chronic disease management improves further, adult longevity should continue to increase.

These changes reflect triumphs of population and public health programs, which must be celebrated.

Figure 1. Tiwi birth weight z-scores referenced to birth weight of non-Indigenous Australians, 2011

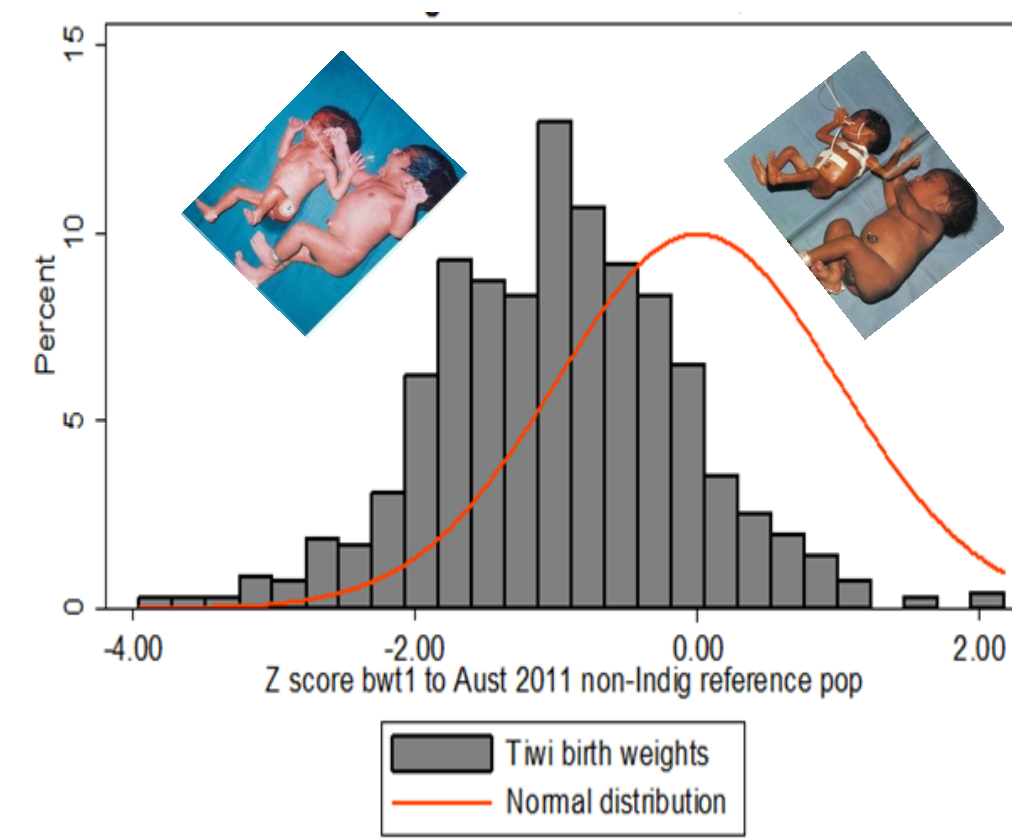


Figure 2. Rates of natural death (per 1,000 py) in infants, children and adults by birth interval and birthweight

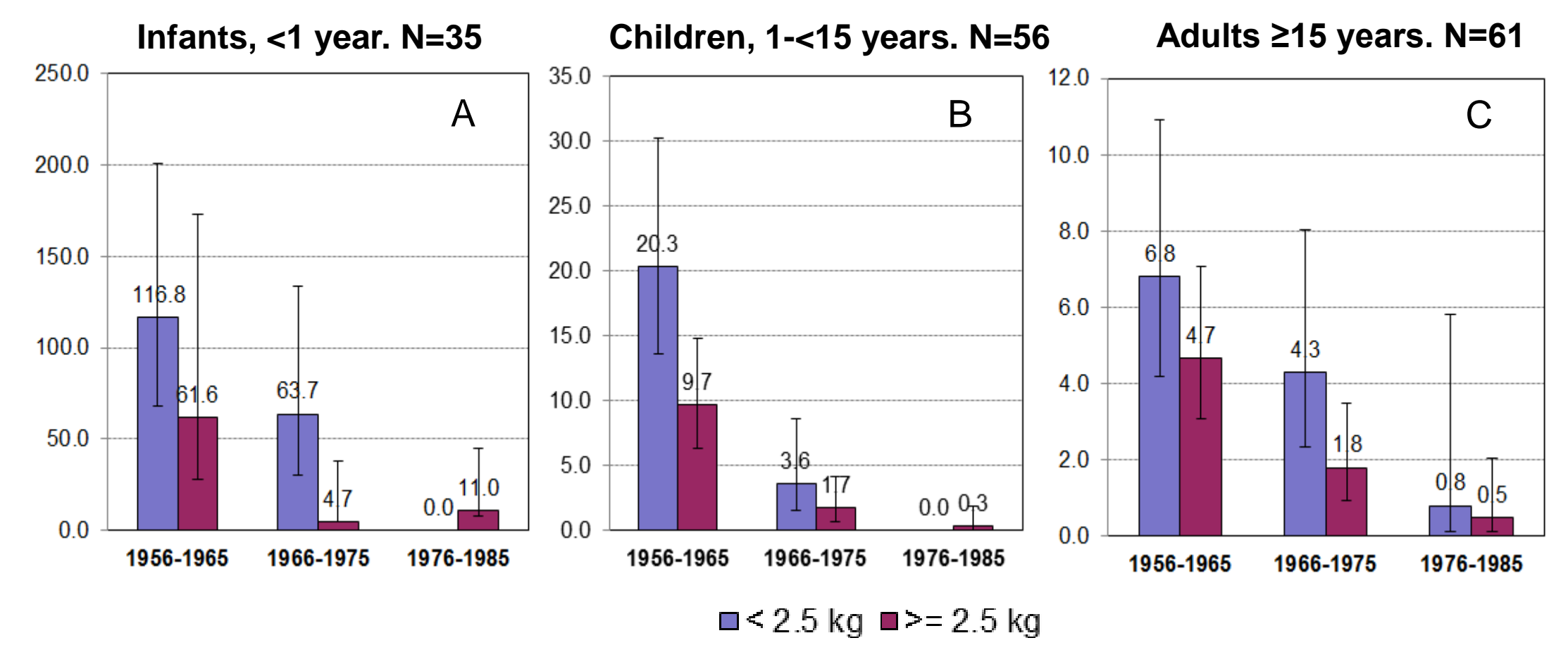


Figure 3. Numbers of Tiwi deaths by age-group and broad cause of death, 1960-2010

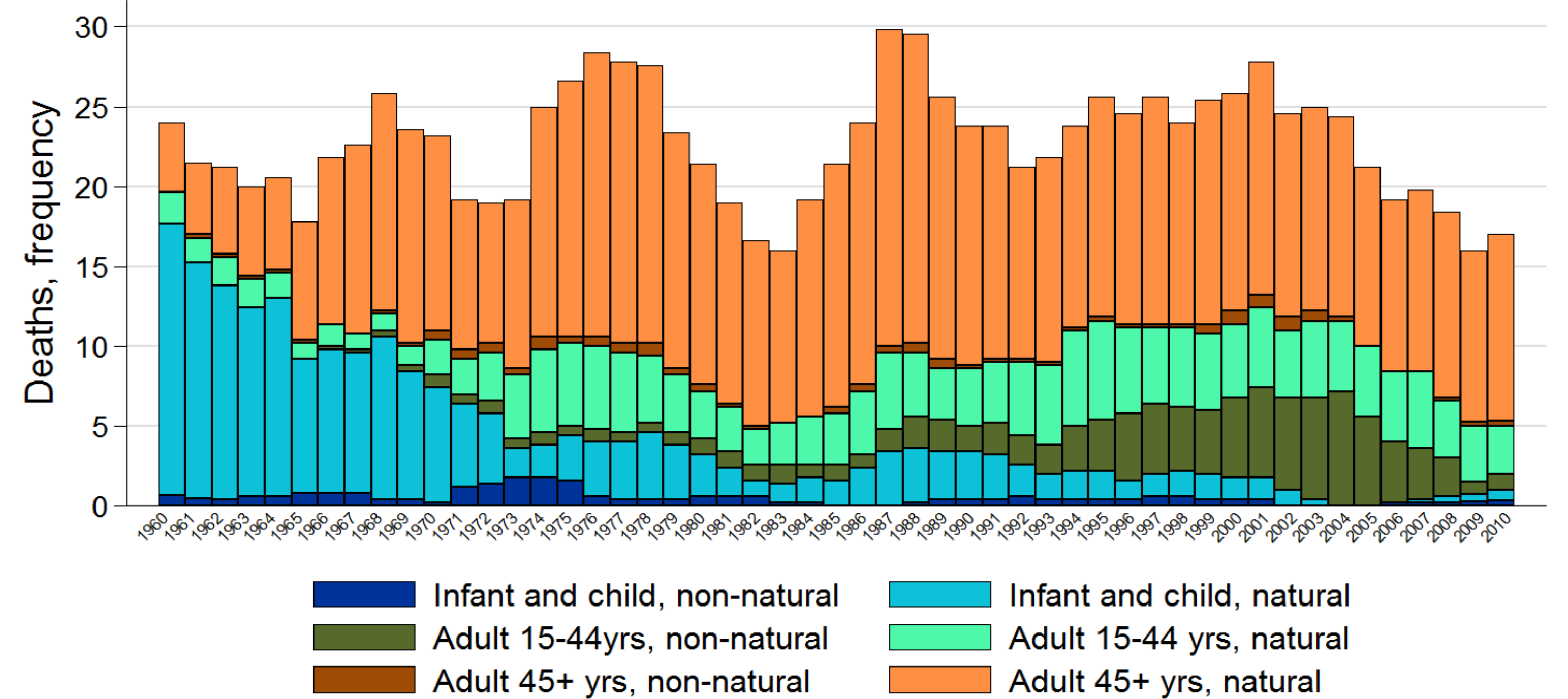
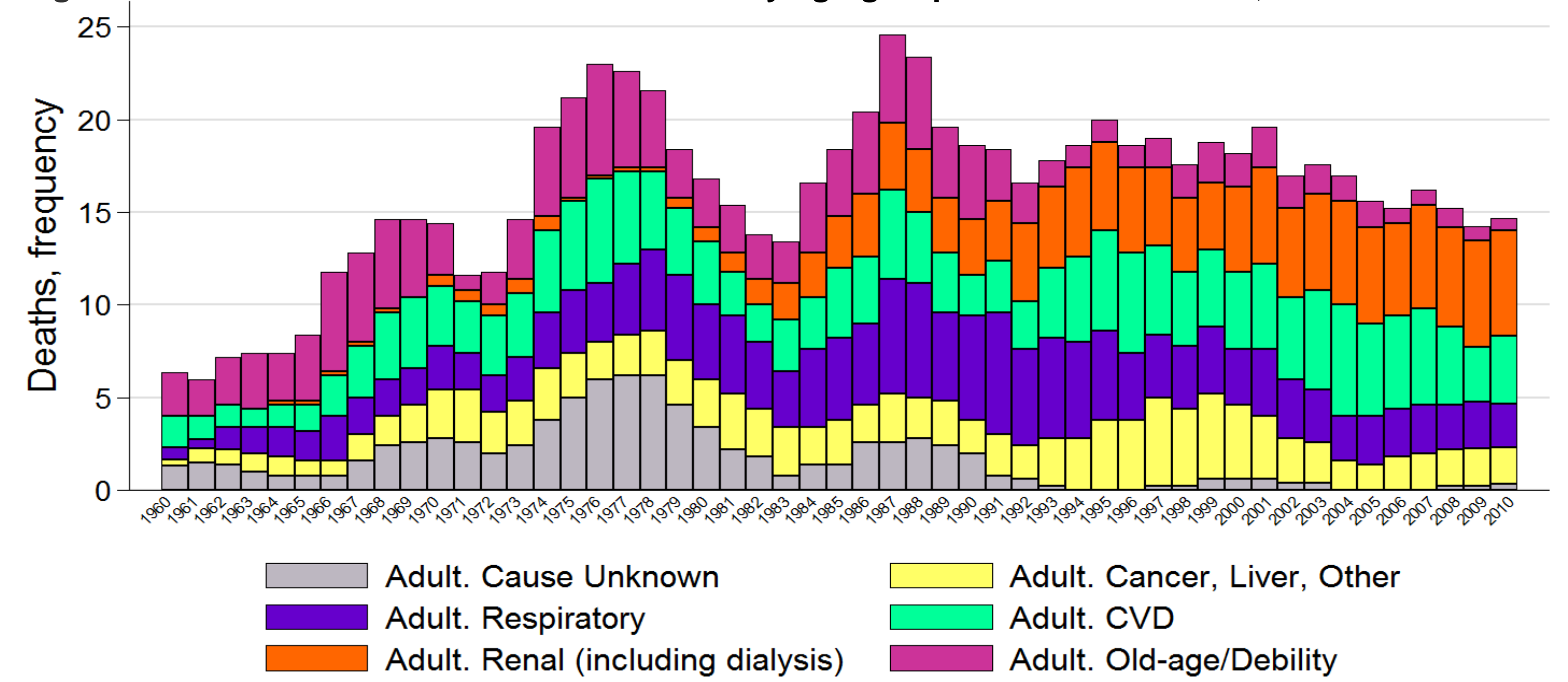
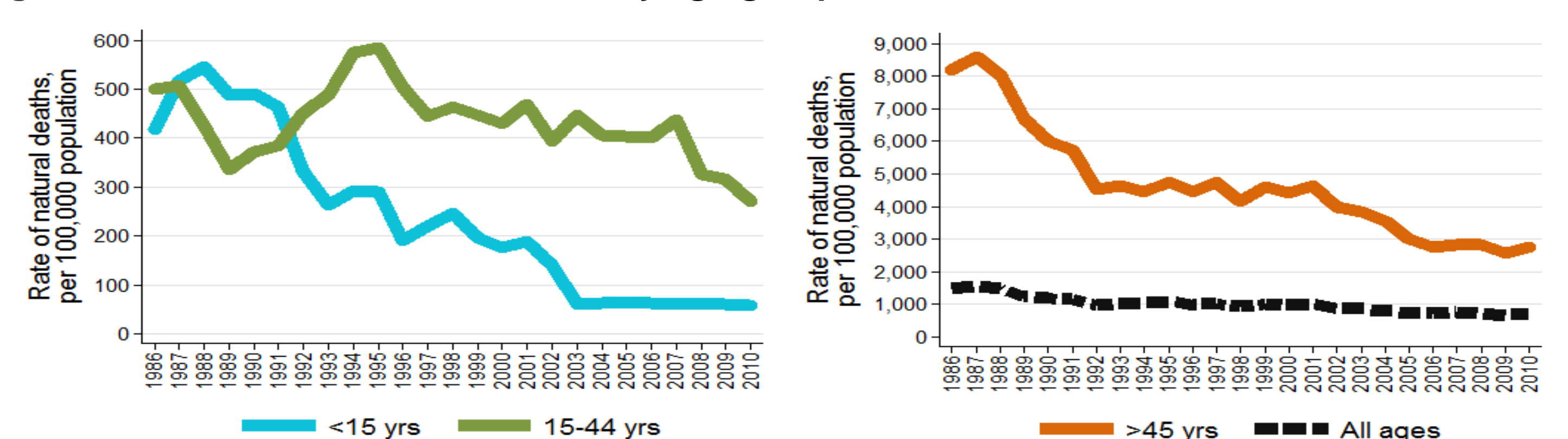


Figure 4. Numbers of Tiwi natural adult deaths by age-group and cause of death, 1960-2010



Figures 5 A-B. Tiwi natural death rates by age-group, 1986-2010



Figures 6A-D. Age distribution of the Tiwi population at four time-points, by sex, 1971-2011

