

# Emerging diabetes and metabolic conditions among Aboriginal and Torres Strait Islander young people

Intersectoral collaboration is needed to engage communities and design effective culturally and age-appropriate interventions

**T**he gap between the health of Aboriginal and Torres Strait Islander and non-Indigenous Australians is well documented, with many policies and programs currently working towards improving outcomes. Despite these efforts, life expectancy is 10–11 years less than that of non-Indigenous Australians,<sup>1</sup> and 65% of deaths occur before 65 years of age, compared with 19% in the non-Indigenous population.<sup>1</sup>

Cardiovascular and metabolic diseases are responsible for most of the gap in life expectancy and are associated with higher hospitalisation and mortality rates.<sup>1</sup> In 2013, hospitalisation rates for cardiovascular disease were 1.6–2.5 times higher in Indigenous people depending on age, and Indigenous adults are six times as likely to die from diabetes as non-Indigenous Australians.<sup>1</sup> Indigenous adolescents with type 2 diabetes are over ten times more likely to be hospitalised than non-Indigenous adolescents.<sup>2</sup> While we acknowledge that hospitalisations are a poor indicator of the true prevalence of diabetes-related complications within the community, they suggest that the burden of disease associated with a diagnosis of diabetes is greater in the Aboriginal and Torres Strait Islander population.<sup>1</sup>

Importantly, the age of onset of cardiometabolic conditions, such as diabetes, obesity and cardiovascular disease, is significantly younger in Indigenous than in non-Indigenous Australians, and the incidence of these conditions continues to increase in Indigenous youth.<sup>3</sup> With limited national data currently available, however, the prevalence of type 2 diabetes among Indigenous young people is not known. Studies from different states consistently report higher rates, from a younger age, of youth onset type 2 diabetes in the Indigenous Australian population.<sup>3–5</sup> While we have seen an increasing prevalence among all Australian youth over the past 20 years, Indigenous young people have experienced a much greater rise in new diagnosis rates. Western Australian data indicate a disturbing discrepancy, with a type 2 diabetes incidence of 12.6 per 100 000 person years in Indigenous youth aged 16 years or less, compared with an incidence of 0.6 in non-Indigenous youth — a striking 20-fold difference.<sup>3</sup> A 2007 New South Wales study suggested that type 2 diabetes was 6.1 times as common among Indigenous young people aged 0–19 years than among non-Indigenous young people,<sup>4</sup> and a 2013 Northern Territory study reported that Indigenous youth represented 88% of youth type 2 diabetes diagnoses.<sup>5</sup>



These statistics indicate the extent of the issue despite likely diagnostic underestimation, as many children with type 2 diabetes may be managed in primary care rather than by paediatric or diabetes services, or are not diagnosed until a later age.<sup>5</sup> The increasing incidence in the young Indigenous Australian population parallels the global context, where type 2 diabetes in youth has been described as an avoidable “disease of poverty” concentrated in populations of socio-economically disadvantaged young people.<sup>6</sup> Risk factors for diabetes and metabolic syndrome have been reported at a significantly earlier age and at much higher frequency among the Indigenous Australian population,<sup>7,8</sup> suggesting that the prevalence of diabetes will continue to rise exponentially in the future without intervention.

In Indigenous Australian young people with type 2 diabetes, there are also higher rates of comorbidities, with 59% also having hypertension, 24% having dyslipidaemia and 61% having obesity.<sup>3</sup> These comorbidities will have a significant impact on the future burden of disease, and may lead to renal, cardiac, neurological and ophthalmological complications. Canadian data demonstrated that 45% of patients with youth onset type 2 diabetes had reached end-stage renal failure, requiring renal replacement therapy, 20 years after diagnosis, compared with zero people with type 1 diabetes.<sup>9</sup> Youth onset type 2 diabetes was associated with a 23 times higher risk of kidney failure and 39 times higher risk of need for dialysis, compared with young people without diabetes.<sup>9</sup> This implies that many young people who are being diagnosed with diabetes now will be on dialysis by 30 years of age, with significant effects on Aboriginal and Torres Strait Islander families and communities.

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Global reports also suggest that the pathophysiology, phenotype, treatment response and prognosis of youth onset diabetes differ significantly from later onset diabetes.<sup>10</sup> This contributes to greater concern regarding the future health of young people, as youth onset diabetes (defined as that diagnosed before the age of 25 years) appears to progress more rapidly, be more difficult to treat, have more comorbidities, and have a higher risk of complications. There is also a greater risk of mental health concerns, and the diagnosis of diabetes appears to worsen any pre-existing comorbidities,<sup>11</sup> which is of great concern in an already very vulnerable population. Type 2 diabetes is known to carry a burden of stigma, potentially further isolating young people,<sup>6,10</sup> and there has been a lack of research focusing on strengths or resilience factors that would enhance engagement and self-management.<sup>6</sup>

Experience internationally from other First Nations populations suggests a stark trajectory ahead for Australia, as emerging cardiometabolic disease develops among Indigenous Australian young people, with associated early morbidity and mortality. Among First Nations peoples of Canada, 43% of children born to mothers diagnosed with type 2 diabetes before 18 years of age developed diabetes by 10–19 years of age and 25% developed diabetes by 7 years of age.<sup>11</sup> Intergenerational and epigenetic factors have been suggested as important potential contributory factors in understanding increasing diabetes rates in Indigenous young people.<sup>12,13</sup> Changes in DNA methylation may be induced by the in utero environment, with lifelong metabolic risk possibly influenced by the timing of exposure, although limited longitudinal data are currently available.<sup>14</sup>

Work among the Pima Indian peoples of Arizona has explored intergenerational risk. A 3.7-fold higher risk of type 2 diabetes was reported in Pima Indian children exposed to intrauterine hyperglycaemia compared with siblings who were born before the mother developed diabetes, and these children also had a higher body mass index, suggesting that the intrauterine environment may be more important than underlying genetic risk.<sup>13</sup> The risk of diabetes at 10–14 years of age was 16.9 (95% CI, 4.1–70.8) times higher in overweight American Indian children than normal weight children, and children who already demonstrated impaired glucose tolerance at 5–9 years of age had a 188.2 (95% CI, 43.8–808.0) times greater risk of developing diabetes by 10–14 years of age, although the small numbers of incident type 2 diabetes cases should be noted.<sup>15</sup> It has been suggested that 47% of type 2 diabetes in youth may be subsequent to intrauterine exposure to maternal diabetes and obesity, with each generation developing cardiometabolic disease at a younger age than the preceding generation.<sup>16</sup> However, the limitations of such studies should be acknowledged, including the inability to measure general societal changes contributing to increased prevalence of cardiometabolic conditions in some populations.

Comprehensive strategies, action plans and both funding and better communication across sectors (health, education, infrastructure and local

government) and departments are required to address obesity, diabetes and metabolic risk among Indigenous young people in Australia. It requires a radical rethinking of our current approach which is failing Aboriginal and Torres Strait Islander young people and communities, and a commitment to reconsider the paradigm, to be open to innovative approaches and the involvement of multiple sectors.

It is critical that we act now to prevent these emerging public health issues, with engagement of Indigenous communities in the design of interventions being crucial. A suite of interventions across the life course are required, targeting children and young people before they develop disease, particularly childhood obesity, as well as targeting their parents to prevent intergenerational transmission of metabolic risk. The in utero period and first 5 years of life are influential in terms of the long term risk of chronic disease, and we propose that identifying and improving childhood metabolic health be a targeted priority of health services. Key time points for intervention to prevent intergenerational metabolic disease are before conception (optimising general health of women of child bearing age), during pregnancy (optimising health and diagnosing and managing any chronic disease early), after pregnancy (optimising health and improving rates of breastfeeding to reduce risk of obesity and diabetes in children of women with diabetes), and in early childhood (encouraging healthy feeding practices and physical activity, and preventing childhood obesity).

Public health approaches and intersectoral collaboration are needed to address these issues, engage communities, and design effective and culturally and age appropriate interventions. Simple public health messages, such as breastfeeding initiation and continuation for more than 4 months, and smoking cessation and prevention of uptake in young people offer possible points of intervention to reduce later metabolic risk, with limited breastfeeding and early smoking both shown to increase the risk of young onset obesity and diabetes.<sup>17,18</sup> International studies demonstrate that interventions targeting high risk 7–10-year-old children and engaging families and school staff, as well as peers as mentors, in culturally appropriate ways can be effective in reducing risk factors for type 2 diabetes and metabolic disease.<sup>18</sup> In conjunction with targeted programs, the political commitment for broad system changes across sectors, with adequate resourcing, is required in order to address entrenched socio-economic inequities.

Collaboration between clinicians and researchers across Australia is required to establish the true prevalence and disease burden of type 2 diabetes among Indigenous young people. We need to hear from young people and families as to how diabetes and health are conceptualised amid the many competing priorities of life, aiming to improve models of care and educational strategies. Despite the high risk of cardiometabolic diseases within the Indigenous population, and our knowledge that this occurs from a young age, annual screening rates for type 2 diabetes vary from 0 to 43% across Australia, with particularly

low rates reported in younger adults.<sup>19</sup> Increased screening rates, especially in areas of established high risk, may contribute to earlier diagnosis and management of diabetes, and so improve long term outcomes. The “diabetes story” needs to truly engage with Indigenous people and be seen as a national priority. We need to act now to prevent a further increase in cardiometabolic conditions among children and young people, which will have long lasting impacts on Aboriginal and Torres Strait Islander communities.

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