health + wellbeing Queensland

OCTOBER 2022 • REPORT 1

Impact of Obesity on Life Expectancy in Queensland

Queensland Government

Accessibility

Report authors

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Executive Summary

Australians (and Queenslanders) have one of the highest rates of child obesity in the world (AIHW, 2020)[1]. Around 1 in 4 (25%) Queensland children and adolescents aged 2–17 are overweight or obese[2]. Recent research has found that there is a large array of programs that can both prevent childhood obesity and save money (referred to as “dominant” programs[3]). Examples include mandatorily restricting television advertising of unhealthy foods and national mass media campaigns related to sugar-sweetened beverages. The problem is that there is not wide-spread social licence nor community acceptance that these sorts of programs are necessary.

To build social licence, people need to accept the gravity of the situation and believe that maintaining healthy weight for children is not solely a parental responsibility. The purpose of this study is to illustrate the potential impact of childhood obesity in Queensland by calculating the expected reduction in life expectancy that would result if nothing were done to reverse it. For the Queensland 2023 birth cohort, we estimate a life expectancy drop between 0.62 and 4.06 years for the population, compared to the Australian Bureau of Statistics (ABS) baseline. We argue that the present cohort might be the first in recent history to experience a reversal in life expectancy. For the Aboriginal and Torres Strait Islander population, compared with the baseline, the projected obesity could wipe between 0.95 to 5.1 years off the life expectancy. Given the large disparity in life expectancy between Aboriginal and Torres Strait Islanders and the general population, if nothing is done about obesity this gap would worsen.

The intention of policies is to change environmental risk factors so that maintaining a healthy weight for children is easier for parents to achieve. It is forecast that the impact of COVID and lockdowns would have exacerbated child obesity. This report builds upon mounting international evidence that addressing system-factors that promote child obesity is a priority for policymakers.

Background

Australians (and Queenslanders) have one of the highest rates of child obesity in the world (AIHW, 2020)[1]. Around 1 in 4 (25%) Queensland children and adolescents aged 2–17 are overweight or obese[2]. The resulting deaths and morbidity mean that we could see a reduction in life expectancy. The purpose of this report is to estimate how much of an impact this high level of childhood obesity would have on life expectancy.

In most cases, whenever we want to reduce the prevalence or impact of a health risk factor, policymakers face a trade-off between the cost of the prevention policies (and programs) and the benefit in terms of a reduction in mortality and morbidity. For example, if we want to improve road safety, there is a cost in terms of changing road design or reducing speed limits. However, in the case of childhood obesity, this is not the case.

Recent research from the George Institute has found that there is a large array of prevention programs that are "dominant"[3]. The concept of dominant programs is used by health economists to refer to programs that both save money and improve health. Therefore, programs such as those listed in Figure 1 entail no such benefit-cost trade-off.

Figure 1: Examples of dominant programs to address childhood obesity

- School-based intervention to reduce sedentary behaviour
- School-based intervention to increase physical activity
- Restricting television advertising of unhealthy foods (mandatory)
- Reformulation to reduce sugar in sugarsweetened beverages (voluntary)
- Menu kilojoule labelling on fast food
- Supermarket shelf tags on healthier products (voluntary)
- Sugar-sweetened beverages tax (20%)
- Alcohol price increase: uniform volumetric tax
- Package size cap on sugar-sweetened beverages (mandatory)
- National mass media campaign related to sugar-sweetened beverages
- Restrictions on price promotions of sugar-sweetened beverages (mandatory)

Source: Ananthapavan et al, 2018[3]

Given the wide range of programs that are expected to have positive welfare, the question for policymakers is why these programs are not being adopted within Queensland and across Australia.

One reason is that the broader community support for these programs does not exist – and Queenslanders are not demanding them from their lawmakers. This lack of urgency in addressing childhood obesity is possibly because the gravity of the situation is lost on the public. While childhood obesity rates are slowly rising, many people believe all that is required to reverse this trend is for parents to be more mindful of what their children eat. The idea that childhood obesity is a "parental" problem – rather than a societal one – means that it is hard to gain the social and community licence necessary to make system-wide changes.

Baker, Gill and Friel et al (2017)[4] look at why the sorts of interventions outlined in Figure 1 are hard to achieve within the Australian context. They conclude that "despite two periods of sustained political attention, political priority for regulatory interventions did not emerge" (page 142).

They identified aspects of the obesity debate in Australia that made it particularly difficult to get traction on regulatory changes. These included a lack of social cohesion and leadership around what the appropriate response to obesity is; the power of the food industry in shaping both the narrative and stifling regulation; lack of urgency within leading Federal agencies[5]; and the complexity of the issue.

Given that a social licence for regulation is a precondition for a State or Territory to be able to move forward with the necessary regulations to reduce the obesogenic environment, policymakers need to be aware of the likely "counter-framing" of the issues by those actors who oppose regulations (Figure 2). For example, the Australian Food and Grocery Council in 2017 with reference to introduction of a sugar tax claimed:

> **"Highly interventionist policies like banning certain foods and imposing new food taxes are like putting a bureaucrat in every kitchen, when we know that for most people the answer is simply to move a bit more and eat a bit less".** [6]

This is an example of what is called "counter-framing", and it is used by industry representatives to counter regulatory efforts.

Figure 2: Counter-frames employed by people who oppose regulations to reduce obesity

"Slippery slope"

- Industry is vulnerable
- Regulation was a 'risk' that would reduce revenue and cost jobs
- Half of the food manufacturing workforce was located in rural Australia

"Nanny State"

Economic case not compelling

Productivity Commission stated that the economic externalities from obesity were complex, difficult to assess, and probably minor.

Questioning the efficacy of interventions

"On balance, the evidence to date suggests that while many interventions to prevent childhood obesity show promise in improving lifestyle behaviours, they have not been effective in stabilising or reducing obesity prevalence to any significant degree." Productivity Commission (2008)

Complex issue without single source of credible expertise

Source: Baker et al, (2017)[4]

Social licence for a policy and regulatory agenda to address childhood obesity is only possible if Queenslanders understand and accept that it is a problem with real consequences for their future, and also recognise that the solution is not one of self-control or personal responsibility but rather of system-wide reforms.

This is the first of three reports on the projected impact of childhood obesity on the Queensland population that are intended to alert Queenslanders to the impact that unregulated obesity will have on their life expectancy. This current report attempts to project the impact on life expectancy of an increase in childhood obesity. There are several reasons that the impact on life expectancy is a valuable projection.

There is an assumption that life expectancy is always improving – and indeed this has been the case for the last century in Australia[7]. Whilst much of the recent improvement in life expectancy is due to the impact of smoking reduction, this improvement is slowing down. The same push on obesity is needed if we are not to throw away these gains.

A quantification of projected obesity on life expectancy can help policymakers determine their priorities regarding alternative policy goals. Whilst there are urgent issues for the health system – including the global shortage of health workforce, the expanding needs of an ageing population, and increasing cost of medicines – each of these issues must be weighed up against each other to emerge as a priority in a crowded health policy agenda. Quantifying the real threat of obesity on the whole structure of our health care system will support the anti-obesity regulation becoming a vital component of the health reform agenda on successive Government. As has been argued recently in a piece in The Conversation:

"Public health's long-term view disadvantages it within a three-year election cycle that favours fast outcomes, even if those outcomes are more expensive. It's easier and quicker to see the impact of treatment than prevention. Currently, the system is set up to fund personal (individual) health. It's harder to cut personal healthcare, if only because a real person missing out on surgery or drug therapy makes better headlines." [8]

An important dimension of quantifying the impact of obesity in driving life expectancy is that the Aboriginal and Torres Strait Islander population has lower life expectancy and higher rates of obesity. It is possible – as we show in this report – that neglecting to reverse childhood obesity rates will have a greater impact on the life expectancy of this population.

A second report will quantify the impact of obesity on morbidity – in particular, the impact of lifetime prevalence of CVD, Diabetes, Hypertension, Sleep Disorders and Cancer. This will help to communicate to Queenslanders the fact that not only will obesity shorten life; but it will create high rates of disability and reduce the number of disability free years that are available for survivors.

A third report will evaluate the impact of the total costs of projected obesity on the Queensland health system. While we have already conceded that many of the prevention programs are dominant and are cost savings, it is still valuable for Queenslanders to understand the fiscal implications of growing obesity.

COVID and Childhood Obesity

At the time of completing this report we have no direct information about the impact of COVID and lockdowns on the childhood obesity rates amongst Queensland children. However, data released from Scotland and the UK[9] suggests that there was a dramatic increase in obesity amongst those children who stayed at home[10]. We also know from early evidence in Australia that we should expect similar patterns at the next survey[11]. Such weight gain will add to the cohort effects that were already seen pre-pandemic and be very difficult to reverse.

Methodology for Projecting Life Expectancy

Life expectancy is a synthetic quantity meant to provide a projection of how long – on average – a person born in a specific cohort is expected to live. For example, according to the baseline ABS calculations, a Queensland child born in 2021 is expected to live on average 80.3 years if they are male and 84.7 years if female.

Life Tables from the Australian Bureau of Statistics (ABS) can be sourced at: https://www.abs.gov.au/statistics/people/population/life-tables.

The baseline ABS projections are based on a backward-looking profile of mortality by age. For example, the projected mortality for a cohort born in 2023 at age 10 will not be observed until 2033. However, because we want to project their life expectancy in 2023, baseline life expectancy projections assume that the mortality of a 50-year-old in 2073 is the same as the mortality of 50-years-olds observed now. Therefore, we can think of the ABS baseline life expectancy at birth as being a "guess" of life expectancy, given the currently observed age-mortality profile.

However, we know that when the current birth cohort ages to 50-years, we would expect that there would be a different mortality rate faced by the 2023 birth cohort. The purpose of the current study is to try to calculate how much the expected increase in obesity could contribute to the heightened mortality of a 50-year-old in 2073 compared with a 50-year-old in 2023.

There are three components to estimating the impact of increased childhood obesity on the life-expectancy of the 2023 cohort:

1. Project how increased childhood obesity for the 2023 cohort would translate into increased lifetime obesity and overweight in terms of increased average BMI.
2. Calculate how the trajectory of BMI would increase mortality through the age groups.
3. Calculate the impact of the increased mortality on the life expectancy at birth.

We undertake two different methods – the conservative and realistic approaches.

Figure 3: Assumptions for two modelling scenarios

Projection I (conservative)

- Keeps childhood obesity rates the same for the 2023 cohort as the 2003 cohort.
- Within each obesity group, average BMI is constant.
- The only increase in obesity is a cohort-specific growth.

Projection II (realistic)

Same as above with an added assumption that average BMI within each obesity group is also increasing.

Under the **conservative approach (Projection I)**, we assume that the 2023 cohort reaches age 18 with the same rate of overweight and obesity as is currently observed in the Queensland population. We then project their obesity and overweight rates by applying currently observed cohort specific growth rates. We start by assuming that obesity and overweight rates for 18-24 years olds are the same as in the 2017 survey. We then look at the average observed growth rate of obesity and overweight rates for the 1995, 2007 and 2017 AIHW surveys[12] across the age groups.

For example, to estimate the growth from the 18-24 age group to 25–34 we observe that for the 1973-1982 cohort, the growth rate was 2.19 (53.6/24.7) and for the 1983-1992 cohort the growth rate was 1.62 (57.6/35.5) (see Figure 4), yielding an average growth rate of overweight and obesity prevalence from the 18-24 age group to the 25–34 group of 1.9. Table 1 provides the estimated growth rate for each of the age groups.

Table 1: Average growth rates of obesity and overweight prevalence estimated across age groups

Age Group (years)	Estimated Growth Trajectory (fold-change)
18-24	
25-34	1.9
35-44	1.3
45-54	1.2
55-64	1.1
64 years and over	1.1

Figure 4. Prevalence of Overweight and Obesity by Age and Cohort in Australia 1995, 2007, 2017

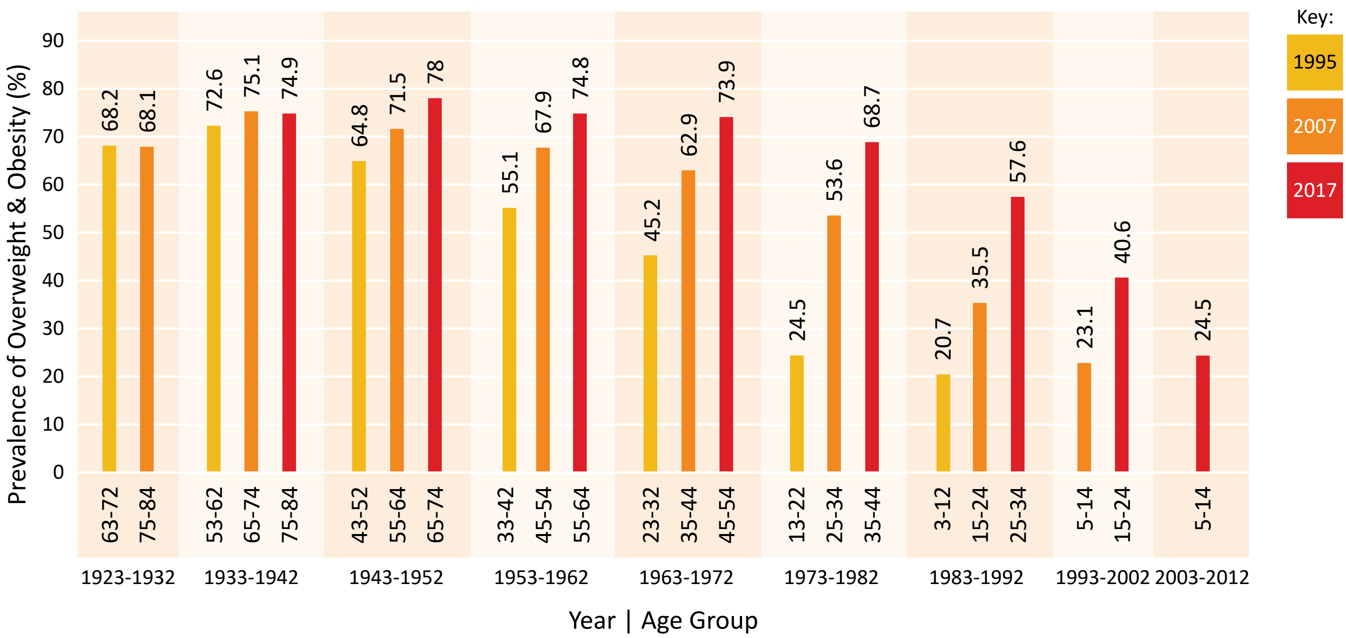


Figure 5 and Figure 6 show the projected prevalence for males and females compared to that which is observed in the cross-section. The reason we project higher rates is that we assume a cohort effect in addition to the ageing effect. Reither, Olshansky, and Yang (2011)[13] refer to this as the "third dimension" of predicting mortality in the face of growing obesity. They make the point that, as the current generation of children become adults, they will face a higher burden of obesity and mortality rates. Therefore, assuming that the risks they face as heavier adults is the same as the current adults (who were half their weight when they were children) is unrealistic. To illustrate their point, they undertake two approaches to the prediction of CVD mortality – one which takes into account the growth of risk that is cohort specific (similar to what we do here) and one which does not (similar to the ABS projections). They show that their projected cardiovascular disease mortality is much closer to the actual mortality rate, whilst the one that doesn't take into account this cohort specific growth substantially under-estimates the CVD mortality rates. Simmonds et al, (2016)[14] look at the correlation between childhood obesity and adulthood obesity. They undertake a systematic review of published data and conclude that obese children and adolescents were around five times more likely to be obese in adulthood than those who were not obese.

For the conservative approach, we assumed that the BMI of the obese and overweight at age 18 for the 2023 cohort is the same as what is observed in the 2017 data. For the **realistic model (Projection II)**, we assume that as the proportion of those overweight and obese increases, the average BMI of the overweight and obese also rise. That is, we project a systematic shift in weight across the overweight and obese group.

Figure 5. Female Overweight/Obesity Prevalence - observed in cross-section vs projected

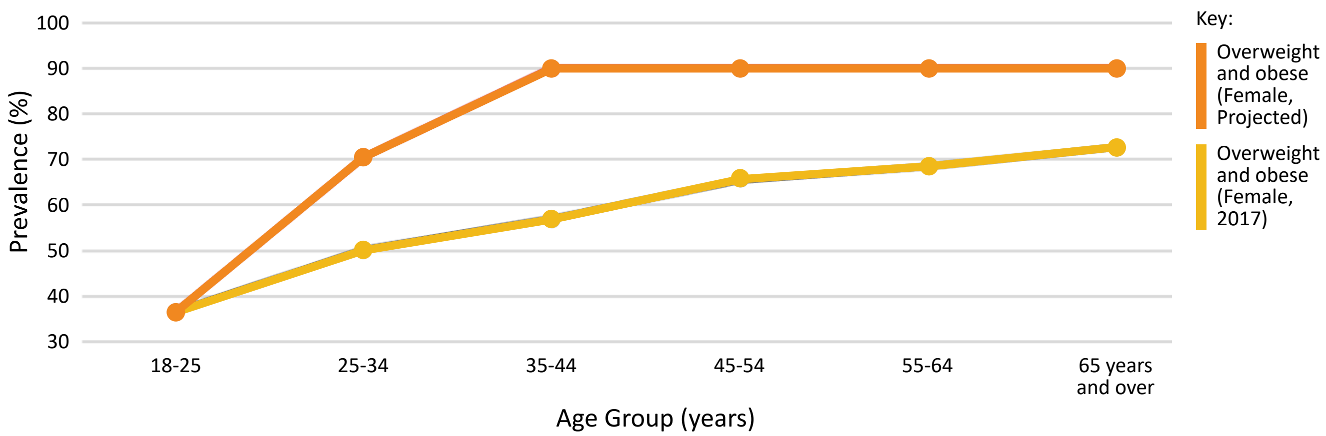


Figure 6. Male Overweight/Obesity Prevalence - observed in cross-section vs projected

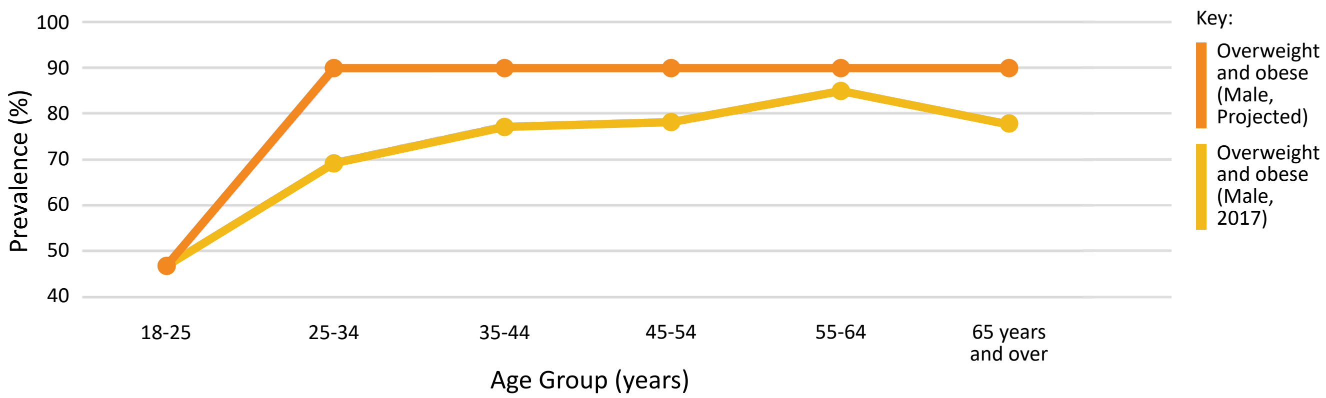


Figure 7 and Figure 8 show the difference in the projected BMI of the two projects – conservative and realistic – for males and females.

Figure 7. Difference in Projected BMI for Male Cohort Simulations for Projection I vs II

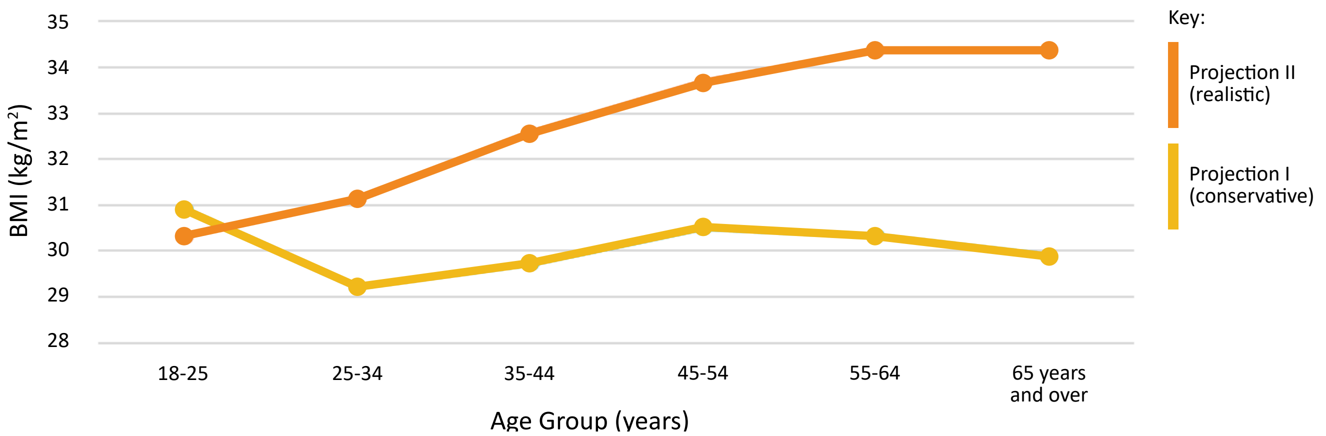
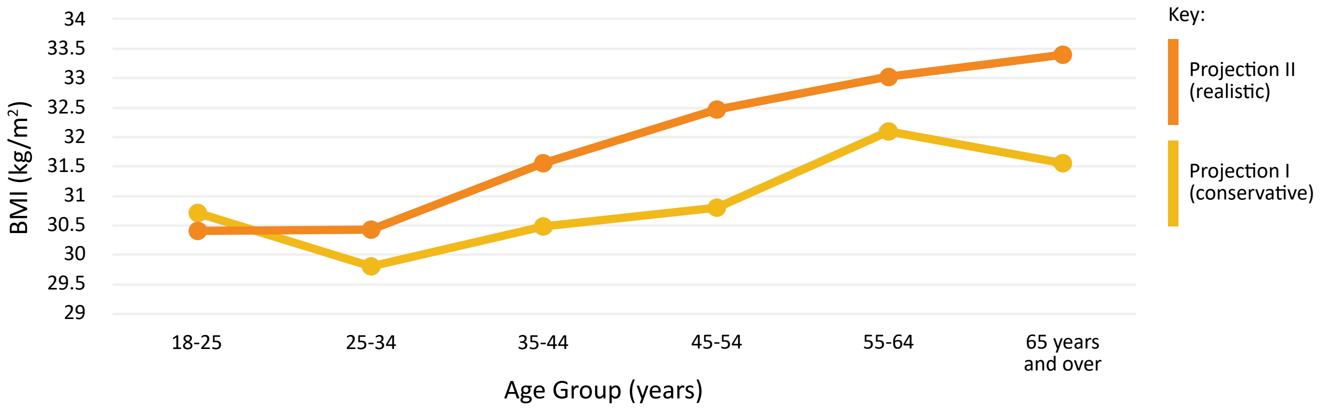


Figure 8. Difference in Projected BMI for Female Cohort Simulations for Projection I vs II



Calculating Relative Mortality Risk from Obesity

Using the projected BMI figures from Projection I and II, we apply a factor that calculates the increased relative mortality risk from the increased BMI. To calculate this, we use the figures provided by the Prospective Studies Collaboration (2009)[15].

Table 2 provides the hazard rates used in the model. Note that the estimated hazard rates relate to an increase of 5 kg/m^2. For a typical Australian female aged 35-59 with a height of 1.61m, gaining 5kg of weight if they were overweight would mean they had approximately 14% higher chance of mortality each year. For an overweight male of height 1.75m, gaining 10kg in weight would increase their risk of death by almost 25%. Using these hazard rates on the projected BMI that we obtain under the two approaches, yields a new estimated average age-specific mortality rate for a new Queensland life table. This then can be used to adjust the ABS baseline life expectancy to calculate an adjusted life expectancy which takes the higher BMI and mortality rates into account.

Table 2: All-cause mortality hazard rates used for modelling age-specific mortality

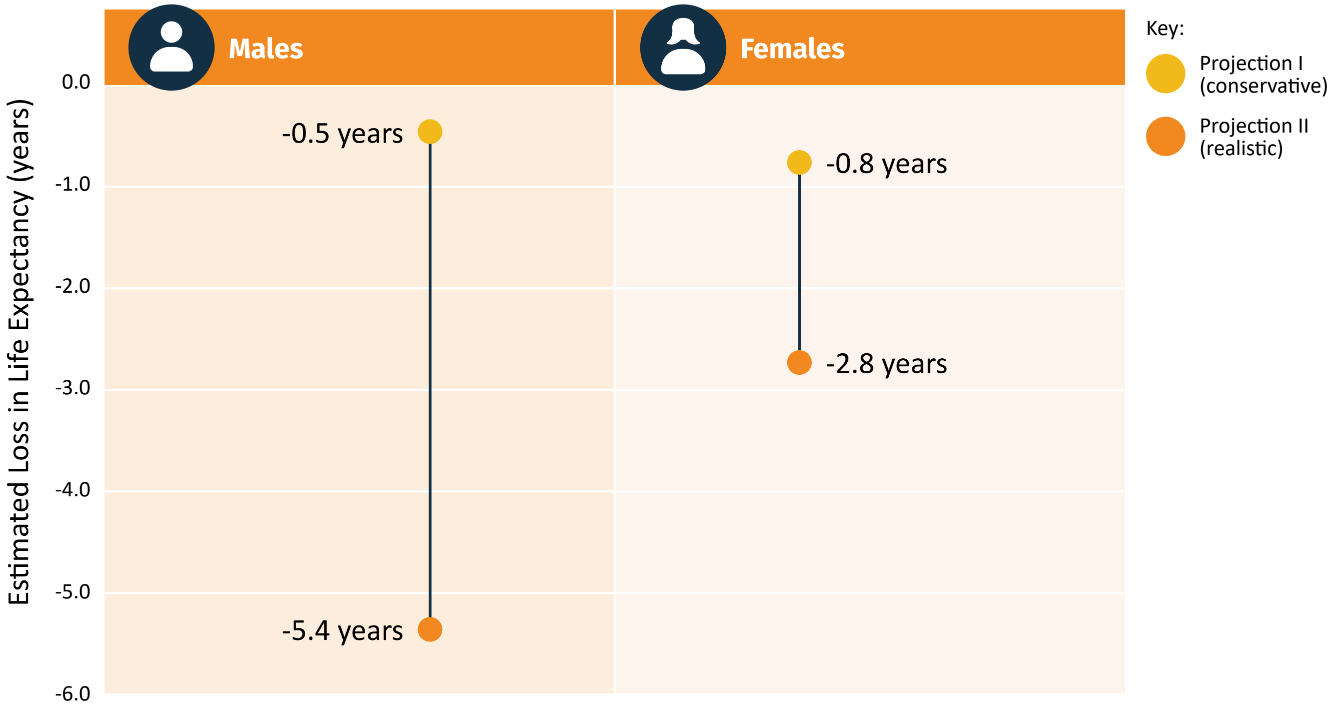
Age at risk	Annual hazard ratio for All-Cause Mortality p.a. (for obese and overweight)
35-59	1.37
60-69	1.32
70-79	1.27
80-89	1.16

(Source: Prospective Studies Collaboration, 2009)[15]; p.a. – per annum

Results

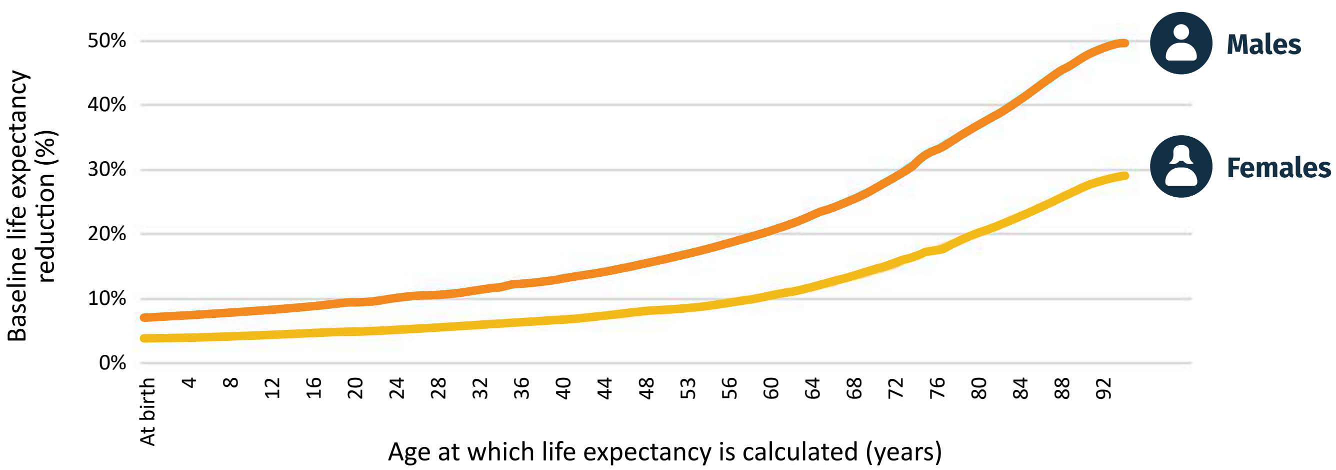
For the Queensland 2023 birth cohort, we estimate a life expectancy drop of between 0.62 and 4.06 years for the population, compared to the ABS baseline. The decrease of 0.62 years relates to Projection I (the conservative estimate) and 4.06 years from Projection II (the realistic estimate). Figure 9 gives the estimated fall in life expectancy for males and females under both projections.

Figure 9. Estimated Loss in Life Expectancy for Queenslanders born in 2023 compared with Australian Bureau of Statistics (ABS) Baseline (Projections I and II)



An interesting question is to estimate at what age the impact of obesity is most acute. To do this, we graph the percentage reduction in life expectancy at each age compared with the baseline ABS life expectancy at each age. It is clear that the largest impact is felt at older ages.

Figure 10. Estimated loss in Life Expectancy of Queenslanders born in 2023 compared with Australian Bureau of Statistics (ABS) Baseline calculated at different ages (Projection II - Realistic Approach)

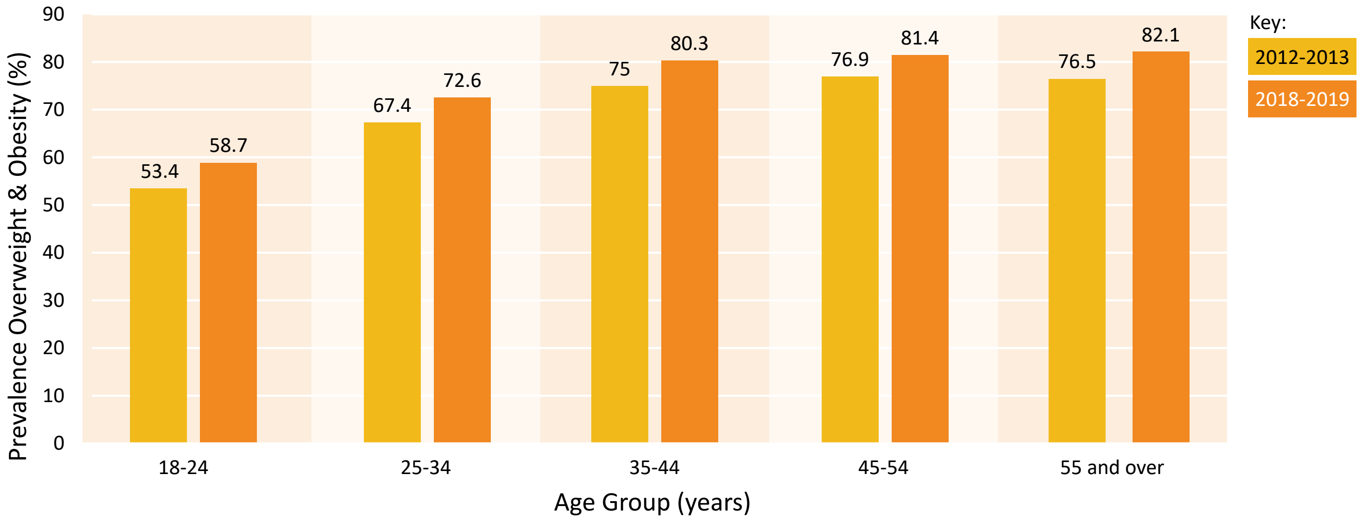


Aboriginal and Torres Strait Islander Population

There is a substantial gap between the health of Aboriginal and Torres Strait Islanders and non-Indigenous Australians – with a large life expectancy difference. 65% of deaths occur before 65 years of age, compared with 19% in the non-Indigenous population[16]. A large part of this difference is due to cardiovascular and metabolic diseases resulting from obesity, leading to calls for addressing childhood obesity to be a major priority for Australia as it tries to reduce the disparity in life expectancy between these population groups.

Figure 11 shows the trajectory of obesity and overweight rates amongst the Aboriginal and Torres Strait Islander population. These rates are much higher than the general population. Additionally, even between the five years across the previous two surveys, the rates were higher across all age groups. This suggests that there is an even greater urgency to address the problem for this population.

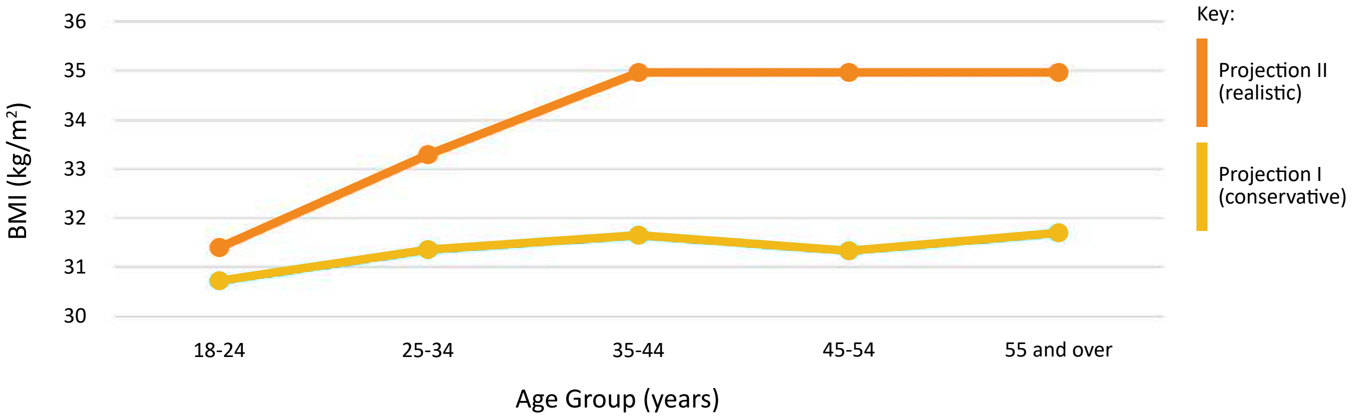
Figure 11. Prevalence of Overweight & Obesity during 2012-13 and 2018-19 per Age Cohort of Aboriginal and Torres Strait Islander Population



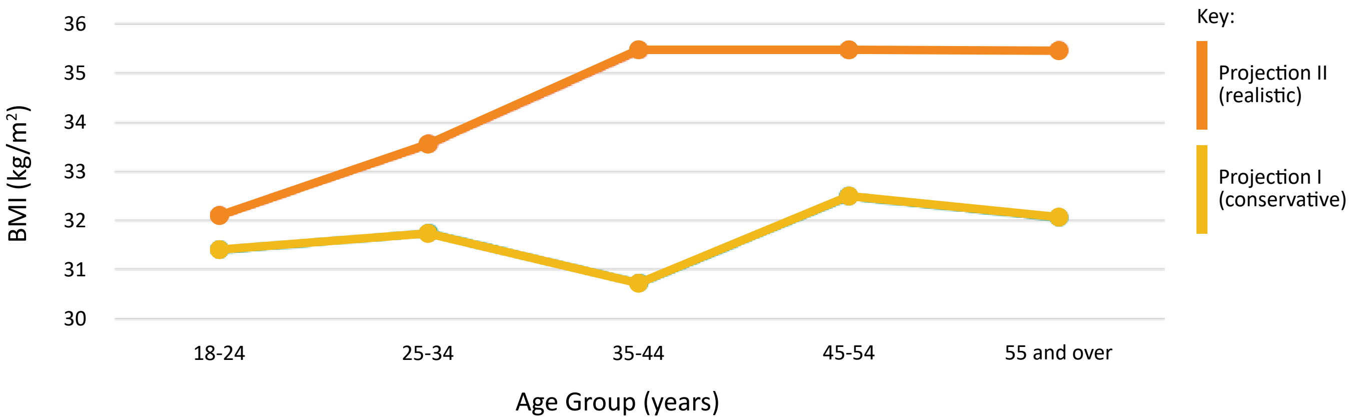
In Figure 12 we graph the projected BMI for females (12A) and males (12B) from the Aboriginal and Torres Strait Islander population. In projection 2, we assume that over time the average BMI within each of the overweight and obesity subgroups grows. We apply these estimates to the ABS baseline life expectancy for the Aboriginal and Torres Strait Islander population.

Figure 12. Difference in Projected BMI for Female and Male Aboriginal and Torres Strait Islander Cohort Simulations for Projection I vs II

12A: Female Aboriginal and Torres Strait Islander Simulation Cohort

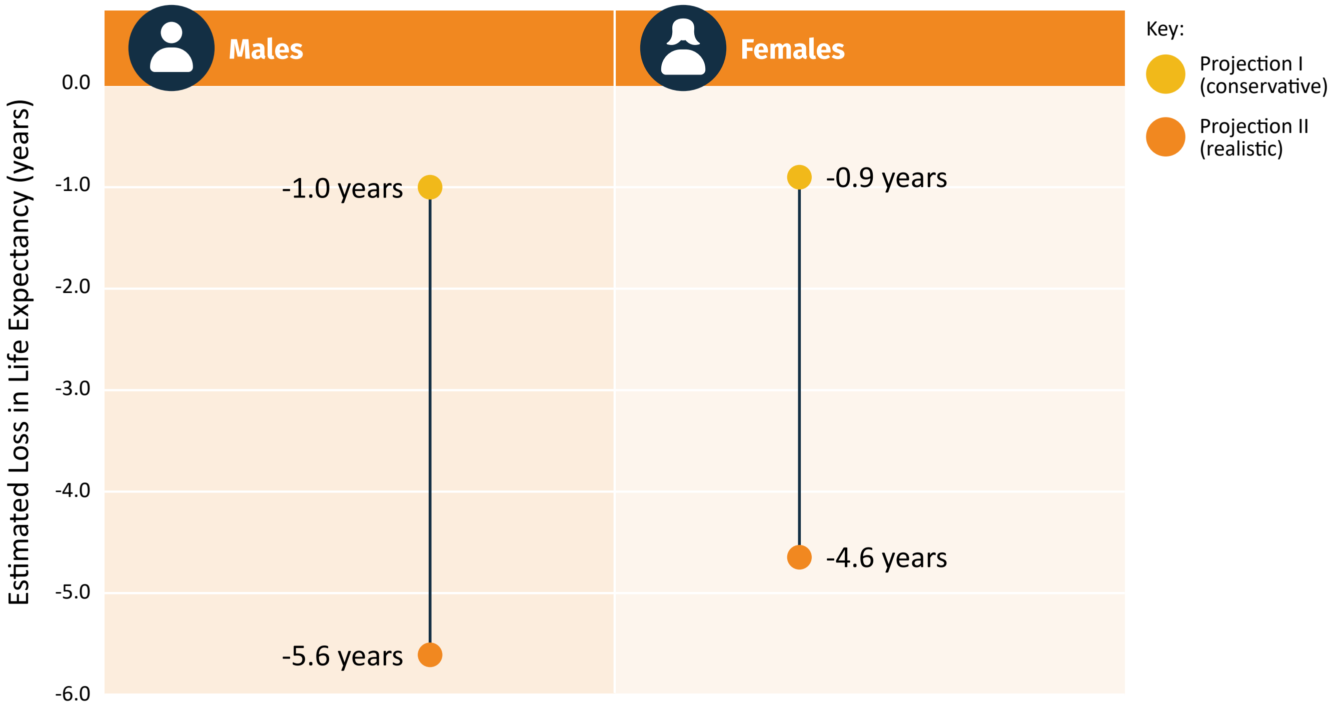


12B: Male Aboriginal and Torres Strait Islander Simulation Cohort



We calculate that for the Aboriginal and Torres Strait Islander population, compared with the baseline, the projected obesity could wipe between 0.95 to 5.1 years off the life expectancy. Figure 13 provides the reduction for males and females. Given that the life expectancy difference between Aboriginal and Torres Strait Islanders and the non-Indigenous population is 10-11 years[17], if nothing is done about obesity this difference would get worse because the impact of obesity on the Aboriginal and Torres Strait Islander life expectancy is larger than that on the rest of the population. For example, in the realistic assumption, the impact on the Aboriginal and Torres Strait Islander population is 5.1 years whilst for the general population it is 4.1 years. This represents a 10% widening in the life-expectancy gap between the two groups.

Figure 13. Estimated Loss in Life Expectancy for an Aboriginal or Torres Strait Island person born in 2023, Compared with Australian Bureau of Statistics (ABS) Baseline (Projections I and II)



Policy Implications

We undertook policy simulations to calculate what it would take to restore life expectancy to the baseline. For this exercise we used the conservative projections so that the simulations told us the *minimum* impact that would be required. Figure 14 shows the projected life expectancy under various scenarios. Its shows that we need to at least halve the childhood obesity rates in order to achieve the ABS baseline life expectancy.

Figure 14. Projected Life Expectancy of Queensland Population According to Different Childhood Obesity Targets

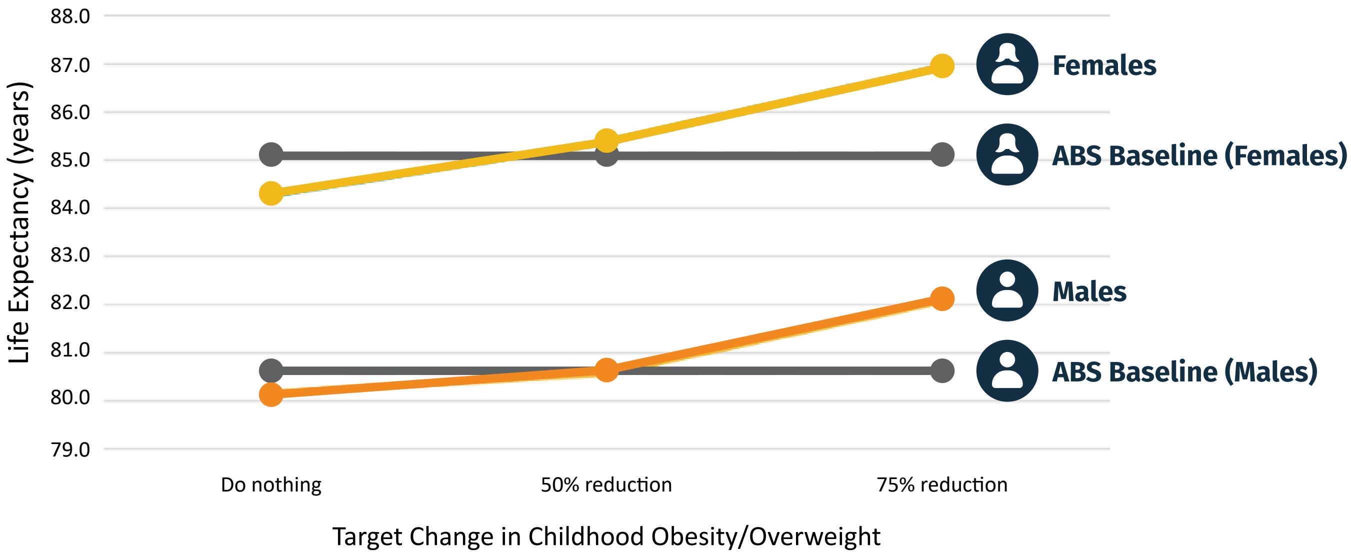
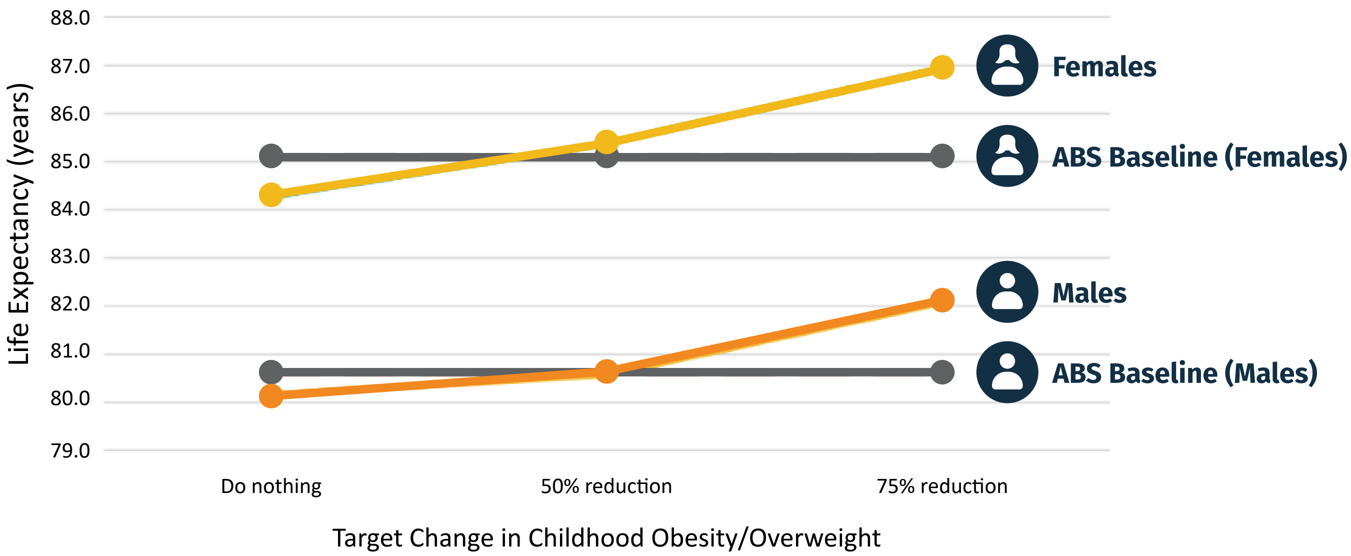


Figure 15. Projected Life Expectancy of Queensland Aboriginal and Torres Strait Islander Population According to Different Childhood Obesity Targets



For both the general population and the Aboriginal and Torres Strait Islander population, our simulations show that there would need to be a halving of childhood obesity in order to restore the baseline projection.

Swinburn et al, (2011)[18] provide a useful schema describing what it takes to reduce obesity at the population level. Their point is that the population level drivers are the hardest to change and therefore require the greatest social licence for action. Unfortunately, scientific evidence seems to have a minimal impact on policy reform in the obesity space. A recent case study is a report and publication which showed large[20] benefits to banning trans-fatty acids in Australia. The report authors estimated that over the lifetime of the adult population, around 40,000 deaths due to ischemic heart disease could be prevented, and about 100,000 health-adjusted life years could be gained. Yet, despite this information being reported in the media and the report being published in a high impact journal, there has been little done to ban trans-fatty acids. Indeed, according to a WHO report, Australia has one of the highest disease burdens from trans fats and yet have lax regulations, along with countries such as Egypt, Iran, Mexico, Azerbaijan, Ecuador, Pakistan, Republic of Korea, Bhutan, and Nepal[21]. This shows that even high-quality evidence of harm is not enough to motivate policy or political will.

Baker et al, (2017)[4] argue that the correct framing of the issue is crucial. They advise that an initial "*focus on children (child obesity), framing the determinants of obesity as 'obesogenic environments', and the deployment of 'protecting kids', … and 'economic costs' frames generated political attention*".

Concentrating on how the obesogenic environment impacts parenting is needed to counter the framing of childhood obesity as a responsibility of parents. Rather, it is the environmental factors that are making unreasonable demands on parents, and like anti-smoking legislation which made it easier to quit and to not take up smoking, we need to regulate the environment so that it is easier for parents to maintain a child's healthy weight.

Key takeaways

If nothing is done to reverse childhood overweight and obesity rates, **current Queensland birth cohorts could see a reversal in their life expectancy.**

The difference in life expectancy between Aboriginal and Torres Strait Islanders and the general population could worsen.

A framing of the issue as one of personal responsibility or responsible parenting must be countered. Parenting in today's highly obesogenic environment poses challenges that are beyond parents' ability to navigate.

Alerting the community to the need for system-wide regulatory reform is important.

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