Submission on the: A Stronger Tomorrow - State Infrastructure Strategy Discussion Paper

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Doctors for the Environment Australia

Doctors for the Environment Australia (DEA) is an independent, self-funded, non-government organisation of medical doctors in all Australian states and territories. DEA is focused on the complex interaction between human health and our natural environment and is therefore interested in environmental protection and restoration to promote human health and social stability. We advocate to protect health through care for our natural environment and to address the diseases caused by damage to it.

DEA's work is supported by a distinguished Advisory Committee of scientific experts whose knowledge of medical and public health issues is fully contemporary. Our members work across all specialties in community, hospital and private practices.

Introduction

We support the concept and proposal of taking a long term and broad approach to infrastructure planning and development starting with an assessment of current infrastructure.

Our view as a medical organisation is that health should be a central consideration in planning, development and policy. There are notable health related omissions both in content and methodology in the discussion paper and scenarios.

Recommendations:

- Health Risk Assessments be undertaken on new and upgraded infrastructure to allow measurement of health impacts and enable harm minimisation.
- Health Impacts are considered as part of the existing infrastructure review.
- IWA and decision makers should involve public health expertise at an early stage to identify, prevent and minimise health impacts.
- Population forecasts should be reviewed with regard to underlying drivers of demographic change, including longevity, and not based on extrapolation of recent trends.
- The net zero greenhouse gas emissions target is agreed and not aspirational. This should be reflected in IWA process and publication. In addition, the timeline of decarbonisation should be considered and included. We will need to reduce emissions by 7.5% per annum globally to limit global warming to 1.5C[i]

Defining health

WHO: *"Health is a state of complete physical, mental and social well-being and not merely the absence of disease or infirmity".*

It is essential not to confuse health with health care. Health care is primarily responsible for the treatment and management of illness. There is little prevention occurring in health services (mostly general practice) with less than 2% of the health budget directed to prevention. Most of this it to dedicated programs such as reducing smoking and alcohol and providing immunisations. However, most 'health" is determined by factors that lie outside the health sector. These include social, economic and environmental factors. These "determinants of health" explain and shape health outcomes in society and are affected by built infrastructure and our natural environment.

To understand how health relates to infrastructure it is important to understand the concept of determinants of health. (Fig 1)

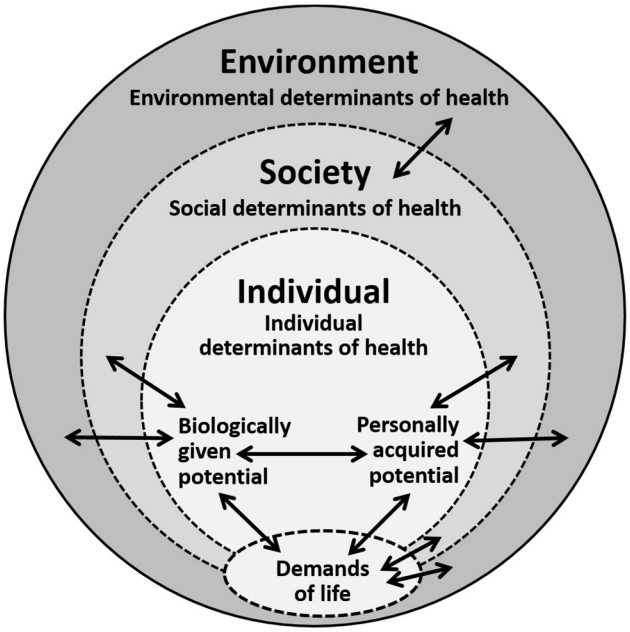

Fig 1. Determinants of health model.

Health and infrastructure

Over the last 150 years our life expectancy has near doubled, we have better health generally, and far lower infant and maternal mortality rates.
The underlying cause is multifactorial but infrastructure, informed by science and engineering, has played a central part. The relatively small part that hospitals and health services have played is demonstrated by fact that the majority of health gains were achieved prior to the mid-20th century and the advent of modern medicine and hi-tech health care.

For example, providing safe water to urban residents is deemed to be the single biggest health advance in human history.

Health effects from infrastructure are not however limited to those designed to prevent harm or provide direct health services, in fact nearly all infrastructure has health impacts – both positive and negative. Often the potential health effects related to new developments or projects are known or the risks foreseeable.

But despite this, new infrastructure and regulations often do not include adequate or even any health consideration.

Energy generation is a prime example

Coal powered energy generating infrastructure has powered our economy during the industrial period but also continues to be one of the largest sources of air pollution. Air pollutants from coal mining and combustion are known to cause deaths and disability from cardiovascular and respiratory disease, strokes and lung cancer even at low levels of exposure. This affects both communities where these industries are cited but also distant large population centres. However, these costs continue to be unaccounted (or 'externalised') when assessing energy infrastructure and generation. As US economist Nordhaus calculated in 2011[ii], the negative health costs of coal for the US economy are greater than economic benefits gained.

As we discussed in our 2014 paper "the health factor"[iii]; if health was considered and factored into developments, we could significantly improve the social and longer term economic outcomes of many projects and policies.

We therefore strongly recommend that "health risk assessment" be included in infrastructure planning so that the health benefits might be maximised, and the negative consequences avoided. It is nearly always more costly and more difficult to retrofit adaptations or solutions later.

The IWA discussion paper notes (p12), the IWA must
"assess the current state of infrastructure" and "… identify current and future deficiencies in Western Australia's infrastructure and identify areas in which infrastructure deficiencies that contribute to significant social, economic and environmental costs"

We support this approach in determining deficits as pertaining to health but also recommend that in assessing current infrastructure that negative health costs arising from that infrastructure are also identified and measured.

The SARS COV 2 pandemic

Firstly, we should recognise that a viral pandemic of this nature has been foreshadowed for some time. There are many historical examples as well as recent near misses like SARS, but we still did not prepare adequately.

Not only will Coronavirus be with us for some time but there will likely be other infectious disease outbreaks that we have to deal with. Moreover, this pandemic, like the majority of other novel diseases, was a zoonotic disease that jumped from another species in large part due to human interference in ecological systems. Displacement from deforestation, land use change and climate change can bring species that were formerly spatially separated into proximity allowing infectious disease transmission to humans[iv].

Covid19, like SARS in 2003, are examples of negative costs arising from development and policy taken without consideration of broader potential ecological or health impacts.

Non communicable diseases (NCDs)

Whilst COVID-19 has focused our attention on communicable diseases, it should be noted that we are also in the midst of a multidecadal non-communicable disease epidemic.

Rising rates of coronary heart disease, stroke, diabetes, dementia and some of the common cancers are promoted by inactivity, obesity, pollution exposure and isolation. These in turn are shaped by our built environment.

Cities that are designed for car transport lock people into car-based commuting, increase urban air pollution and reduce access to green space. Inactivity is known to be a major factor in the development of NCDs; less well known is that over 3000 Australians die each year[v] from exposure to ambient air pollution, – mostly from vehicle use in our 4 biggest cities – from heart disease, respiratory disease, stroke and lung cancer. Yet we are building more roads and inducing more vehicle use, bringing more residential dwellings in proximity to major roads as well as more traffic emissions near vulnerable populations at hospitals, childcare centres and schools.

Access to green space is also a major determinant in physical and mental health. Recent studies have shown that the further you live from green space when you are growing, the worse your mental health outcomes are throughout life. For some mental illness this increase your lifetime risk by as much as 50%[vi].
This continuing "business as usual" urban development and infrastructure can only mean worsening health outcomes.

Future infrastructure should therefore be informed by public health expertise on both direct health consequences – positive and negative - and those mediated through environmental pathways and these costs and benefits be accounted in the economic and social case.

Climate change, resilience and health

Climate change has been framed as an environmental problem, but it is also a health problem. In fact climate change has been recognised as the greatest threat to our health this century[vii] .

Whilst the IWA discussion paper notes that climate related heatwaves, extreme weather, bushfires, and some infectious diseases pose a direct threat to health, it is important to be aware that changes to determinants of health mediated through environmental, social and economic pathways are more insidious and of far greater potential magnitude. Many of these pathways depend or involve existing or yet to be built infrastructure. Maintaining supply and quality of urban water, food security, access to and functioning of healthcare services are prime examples.

Increasing temperatures, humidity, regional drought and climate variability, extreme weather events and sea level rises resulting from climate change intersect with infrastructure in various and complex ways.

Infrastructure must be built or adapted to be resilient in the face of these changing conditions but must also be able to meet changing population needs. Existing infrastructure should be "stress-tested" for climate risks for the same reason that banks are financial stress tested – we cannot afford for them to fail.

Resilience is also identified in the report, it is also important to consider vulnerability both of infrastructure and also of the populations affected by compromised infrastructure.

Studies of the 2011 Queensland floods demonstrate the enormous financial and health consequences of infrastructure failure compounding the initial direct damage, with the largest share of costs being long term health costs[viii].

Mitigation and co-benefits

The discussion paper refers to "aspirational targets" of net zero by 2050. Australia is a signatory to the Paris agreement and therefore has endorsed this target – it is not aspirational!

As climate change is so strongly linked to future health outcomes, and because Western Australia is highly vulnerable to climate impacts, it is also in our interest to support global action.

The paper refers to gas both as a major export commodity to 2040 (LNG) and as being a means of reducing greenhouse emissions. Gas is not a low emissions fuel. Fossil gas is 90% methane. It has a global warming potential of 80 times that of CO2 over a 20 year timeframe. When fugitive emissions are included, and processing and transport, gas is no better than coal in terms of climate change.

Reaching our required greenhouse gas targets will therefore mean not developing new gas fields and phasing out gas altogether well before 2050. For this reason, money spent on gas infrastructure will likely become a stranded asset with significant loss to WA taxpayers.

As renewable energy technologies are able generate cheaper electricity than fossil fuels and as battery storage continues to fall, gas does not have a significant role as a transition fuel.

It is also the case that most climate mitigation actions, including switching to renewable energy, have co-benefits both for health and environmental outcomes.

As previously described burning fossil fuels (oil, gas and coal) produce air pollution that results in adverse human health impacts. Coal and unconventional gas industries use and pollute large volumes of fresh water. Switching electricity generation to wind and solar photovoltaic generation can therefore save valuable water as well as benefitting health by avoiding air pollution.

This is especially relevant in our water scarce region where further drying is occurring.

Urban heat

The same urban design factors that are leading to congestion, inactivity and air pollution are also contributing to urban heat island effects. Cities can be several degrees hotter than their surrounds by day and night, compounding the effects of climate change.

Humans, like other species, are temperature sensitive. The optimal daily average temperature for us is in the low to mid 20's (C) as temperatures depart from this many health outcomes worsen particularly in vulnerable groups like the elderly, those with underlying ill health and children.

Numerous research papers in Australian and other cities document a close "U-shaped" relationship between average, daily-maximum and night-time temperature and health outcomes. (fig 2)[ix]

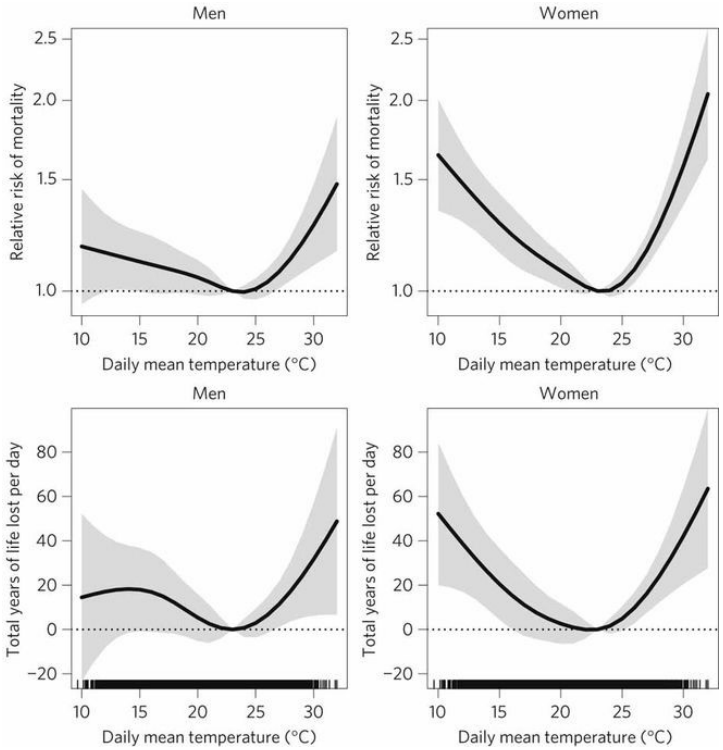

Fig 2 The effects of temperature on mortality risk in Brisbane, Australia, 1996-2004

Several days of hot weather can escalate demand and overwhelm emergency departments and ambulances. Hence the State's hazard plan that is enacted to increase and free up health sector resources when a heatwave is forecast.

A small rise in average temperature translates to a much large rise at the extremes of temperature. The increase in occurrence of extreme weather, including heat extremes, is compounded by increasing variance (fig 3) which is occurring as a consequence of climate change.

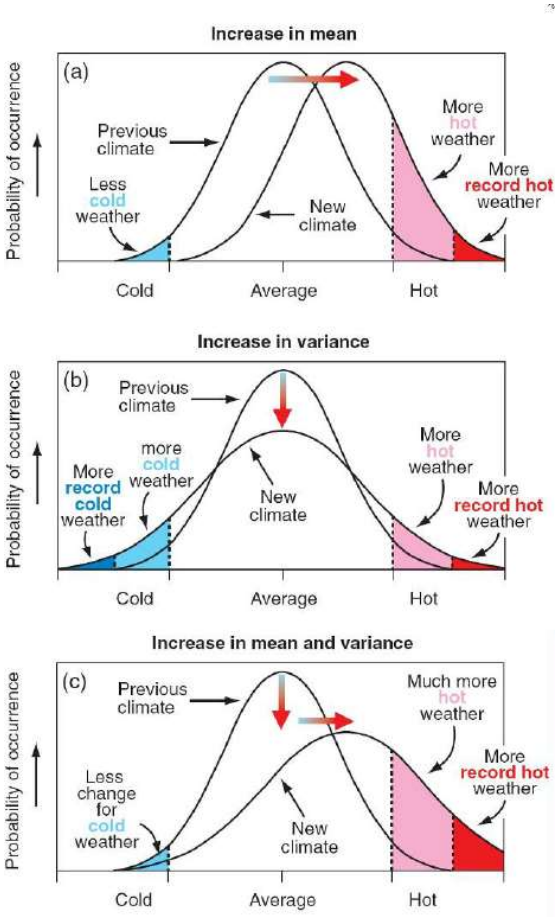

Fig 3 Illustration showing the probability of climate related temperature change[x]

The exposure to heat and burden of health effects therefore rises disproportionately to the increase in average. Temperature records in Australia show that the increase so far recorded in monthly average temperatures has equated to an increase of 2+ standard deviation high temperatures by a factor of nearly 400%.

It is a non-linear effect with correspondingly non-linear health (and other) consequences.

Reducing both global temperatures rise through playing our part in mitigation and urban heat island effects through urban design and development will be essential to avoid escalating health impacts and associated healthcare, productivity and infrastructure repair costs.

From an infrastructure perspective it is established that modifiable urban conditions can determine local climatic conditions such as temperatures, winds and humidity. It logically follows, and has been supported by Australian research, that modifying temperature by city level factors can reduce health impacts[xi]

As with Covid19 and 'NCDs, the impacts are not shared equally across the population. In the case of climate impacts, socially disadvantaged groups, those with existing morbidity, the elderly and very young, suffer disproportionately.

The impacts in the regions are likely to be magnified due to already decreased access to health services, increasingly dangerous temperatures in the North of the state, the greater reliance of agriculture on predictable rainfall and temperatures, the intrusion of destructive industries like unconventional gas extraction, and change in some infectious diseases due to rainfall variability (eg melioidosis, mosquito borne viral infections).

The association of drought and mental impacts has been documented[xii] and there is growing evidence that mental health outcomes (suicide and depression) in the regions are being adversely affected by climate related changes, both in terms of drying during winter months and heavier rainfall events in the harvesting season[xiii].

In contrast, access to mental health services in the regions is worse than urban areas and there is little to suggest that the services required to address this current let alone increasing burden will be provided.

Demographics

In terms of changing population, the discussion paper makes similar assumptions as the recent Federal Intergenerational Report, extrapolating recent trends into the future. The report itself notes that the changes of the last 20 years have been quite different from a simple extrapolation of trends.
In this case it is important to look at the underlying drivers of population and demographic change.

Even though the discussion paper notes that population growth slowed after the mining boom ended 5 years ago and even further during the Covid19 pandemic, it then cites the '*Western Australian Planning Commission (2014) WA Tomorrow Population Report No. 9 Long Term Population Forecasts for Western Australia 2031 to 2061'* (WAPC) in assuming that the recent exponential growth of Perth's population will resume and continue.

It is clear, that population growth in Australia generally has been driven by immigration and that fertility is falling (as noted in the WAPC report).
There is no compelling reason to expect a resumption in mining construction of anything like the magnitude of the 2004-2014 period (employment is far greater during construction that operation).

The demographics of population change in WAPC have also been based on extrapolating increase in longevity without examining the underlying conditions

that determine health. In some Western countries this increase has now slowed or in some cases altogether (eg UK and US)[xiv].

This should not be a surprise and has been predicted by some researchers because of the deterioration in underlying social and environmental determinants of health and the continuing rise in prevalence of NCDs, which is noted in the IWA discussion paper.

Therefore, we recommend examining the assumptions predicting our population is going to increase and age as a continuing trajectory of past trends before costly infrastructure decisions are made.

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