

STRATEGIC FORESIGHT

Ensuring the Play, Active Recreation and Sport Sector is Fit for the Future

June 2020



**SPORT
NEW ZEALAND**
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New Zealand Government

Contents

Executive summary	5
Approach to strategic foresight	6
COVID-19	12
Assumed crisis trajectory	14
Longer term uncertainties	14
Financial impact	16
Wider societal wellbeing	17
Globalisation	19
Political leadership	20
Mobility and proximity behaviour	22
Impact on sport and recreation	24
Influences that will shape the future of leisure in New Zealand	25
Personalisation	27
Global influences	29
Changing focus of human purpose	30
Increasing interdependency	32
eSports and the use of millennials' time	34
Availability and sustainability of funding to the play, active recreation and sport system	41
Future changes to the structure and function of society	47
Theme 1: Social structure pressures	49
Theme 2: Challenging societal norms	52
Theme 3: Personal and cultural identities	53
Future of human enhancement	56
Perspective 1 - Enhanced physiology	59
Perspective 2 - Augmented biomechanics	61
Perspective 3 - Neurotechnology and improving cognition	63
Perspective 4 - Pills, nutrigenetics and ingestible robots	64
Demographic change	66
Changing demographics	68
Demographic consequence of aging	74
Climate change	76
Health trends	78
Primary health conditions	80
Increasing morbidity	82
Mental health challenges	83
Lifestyle risk factors	84
Impacts of wider environment changes	87
An evolving health system	89
Health's digital revolution	90

Climate change	92
The science	94
Social impacts	97
Economic consequences	100
Addressing the issue	102
The role for sport and recreation	103
<hr/>	
Economic focus	105
International outlook	107
New Zealand forecasts	108
Individual prospects	110
Business of sport	111
New economic thinking	112
<hr/>	
High Performance sport - post pandemic and beyond	114
Post pandemic context	117
Future elite sports practice	119
Business dynamics post pandemic	122
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Executive summary

This report considers the different drivers of change and trends most likely to impact the future of play, active recreation and sport, and what we can do to best prepare for that change. We call it Strategic Foresight.

- Strategic Foresight reflects on the scale and speed of societal change that is occurring around us and how a more deliberate focus on understanding, anticipating and influencing this change will assist Sport NZ and the play, active recreation and sport sector (the sector) to be better prepared for different possible futures.
- It seeks to enable futures-ready thinking and strategy – that is, to prepare Sport NZ and the sector to both plan for and adapt to whichever of a range of scenarios may come to pass. To achieve this, we must start by understanding what possible and probable future scenarios may look like, and to develop a view on the more or less preferred future(s).
- As a first step toward preparing for different futures, this report identifies some drivers of change for discussion that could impact the future of play, active recreation and sport.
- Through engaging with drivers of change and considering the possible futures they create, we can reach a better understanding of what our future operating context might be; what this could mean for us; how we might respond; and what we need to do differently today.



Approach to strategic foresight

COVID-19 is a global pandemic that is having a significant impact on play, active recreation and sport. However, it is merely the most visible of many disrupters that we need to plan for and respond to within a hyper-accelerated world of change.

Studying these multiple, alternative futures will enable us to prepare for different things that may happen in the future. In doing so, it will assist us to think about the future and to design ways that the sector can thrive within it, including taking more resilient action in the present. This is the intent of having a more deliberate focus on strategic foresight.

We are living in a rapidly changing world in which mega drivers of change are emerging.

Since the end of World War II, the world has enjoyed a period of relative stability, with global governance arrangements setting the scene for a long period of unprecedented growth and technological development. Features of western societies such as globalisation, free trade capitalism and liberal democracy, developed to resolve the challenges of the industrial age, have become de facto organising principles of the world. They have advanced science, raised the standard of living of hundreds of millions of people, and freed many from oppression, sickness and poverty.

For most people, paid employment has created stable income and work has formed our identity, our membership of society and the solid foundation for our livelihoods. Representative democracy has allowed political involvement and supported the increase in wellbeing, and we have become conditioned to regard economic growth as progress.

However, the situation is changing. Social and economic systems have become more complex, uncertainty in the world has increased, and globalisation, free trade capitalism and liberal democracy are facing new kinds of pressures from digitisation, ecological decline and increasing unrest at the unequal distribution of the benefits because of these organising principles. For the latter, you need only to reflect on the voting for Brexit in the UK, and Trump's election in the US – arguably expressions of resentment at the elite few who are reaping the rewards of progress.

Disruptive technologies such as artificial intelligence, robotics and 3D printing are transforming production and distribution of goods and services, with far reaching consequences for productivity, skills, income distribution, wellbeing and the environment. We have yet to see the potential of gene editing technologies such as CRISPR1 for improving long term health and well-being. But there are also risks – for example, if poorly regulated and distributed, we could see richer humans improving their genetics while other groups miss out.

Increasing global connectivity is changing the face and texture of social connections, with cyberspace rapidly altering the nature of cooperation and conflict. Over the past 30 years, there has been exponential growth in the volume and speed at which data can be handled, along with falling processing and storage costs. Over the next five years, the global population online is expected to double to 5 billion (IRD, 2017).

Similar rapid development of sensor technology, with falling sensor size and prices is ushering in the Internet of Things². Over the next five years, the global number of online devices in the Internet of Things is expected to increase fivefold to 50 billion (Better Futures Report, 2018). This has significant implications for

1 Clustered regularly interspaced short palindromic repeats – a family of DNA sequences

2 The extension of Internet connectivity into physical devices and everyday objects.

play, active recreation and sport, in obvious ways like the massive uptake of connected wearables with sensors and fitbit-style devices. However, there are also potentially less obvious benefits such as the ability to enable large numbers of older people to stay more independent and physically active. For example, products like 'AngelSense' and 'Mindme' allow wearers' activities and movements to be tracked – something that is particularly important for people suffering from dementia.

There are also continued shifts in economic and political power from west to east. The rise of the new economic powers of Brazil, Russia, India, China (BRIC) has generally been driven by the rapid structural transformation of their economies, but supported by large working age populations, rapid urbanisation, increased education levels, and greater focus on new, productivity-boosting technologies. Increasingly, we are seeing a direct relationship between those countries with high productivity and the usage of robotics and computers instead of, or alongside human workers.

Power in business and society is also moving, from the centre to the margins, in both the west and east. Alongside political parties and representative democracy, new forms of inclusion and decision-making are emerging. Individuals now have access to vast quantities of information and to publishing platforms that were previously available only to large organisations. This is giving rise to an empowered, technologically-enabled citizenry who are able to play a much more assertive role and expect to do so. The rise and expression given to the Me-Too movement and young people in New Zealand marching for climate change are examples of this.

The flip side to this is the abuse of freely given private data for commercial gain. Originally intent on organising all human knowledge, Google ended up controlling all access to it. We do the searching and are searched in turn. Setting out merely to connect us, Facebook found itself in possession of our deepest secrets. And in seeking to survive commercially beyond their initial goals, these companies realised they were sitting on a new kind of asset – the totality of information about our every thought, word and deed, which could be traded for profit in new markets based on predicting our every need.

Taken to the extreme, the belief that human behaviour can be perfectly modelled, predicted and controlled suggests participatory, democratic society could be replaced with algorithmic certainty. As more people become aware of this invisible coercion, they are expressing their unease, and are seeking to remove themselves from this surveillance. Likewise, governments are exploring means to reduce the power of these technology giants.

Like New Zealand, the planet more generally has an aging human population, driven by falling birth rates, reduced death rates from natural causes and increased lifespans. In general, more developed countries have larger proportions of older people than less developed regions. In areas expected to have a higher proportion of older people (including New Zealand), there are concerns about impacts on governments' financial positions because of reduced labour force participation, increased social welfare entitlements, and increased healthcare costs. In areas expected to have a higher proportion of younger people, there are concerns about social and political stability (historically associated with increased political violence and civil conflict).

Alongside this is a move away from defining progress in terms of economic growth and the prosperity it produces. We are already seeing this in New Zealand with the rise of the wellbeing agenda.

Unarguably the most impactful driver of global change is that involving the climate. While human evolution and history have taken place in a stable climate, this is changing with the climate getting progressively warmer as more carbon is emitted into the atmosphere. More than half the carbon released into the atmosphere in the course of human history has been emitted in the past three decades, and such emissions are expected to double globally between 2010 and 2060 (Productivity Commission, 2018). The potential monetary costs of failing to reduce greenhouse gas emissions have been

estimated to be as high as 20% of the world's GDP (Productivity Commission, 2018). Increasing extreme weather conditions will impact biodiversity, agriculture, livelihoods, health and the built environment. Between 200 million and 1 billion people will be displaced by 2050 due to the effects of climate change (Better Futures Report, 2018). This will place significant pressure on New Zealand's immigration policy. And should we be directly impacted ourselves e.g. increased incidence of flooding, this will place pressure on our budget, potentially diverting resources away from lesser priorities such as play, active recreation and sport.

These drivers of change that have been gathering over the last few decades are now transforming the external environment and bringing in a 21st century world that is very different. They are of a magnitude and impact that signals a change in era.

Play, active recreation and sport have also been transforming, and will continue to be impacted by drivers of change

New Zealand and the play, active recreation and sport sector are not immune to these mega drivers of change. Some of these changes will have greater and more immediate impact than others. To assist us to think further about this, it is useful to reflect on the drivers of change that have impacted play, active recreation and sport in New Zealand in the past 10-15 years.

TABLE 1 - PREVIOUS DRIVERS OF CHANGE IN PLAY, ACTIVE RECREATION AND SPORT

Government agenda	Changes in government have led to significantly changed priorities for Sport NZ, from a strong development through sport for health and education benefit, to a narrower focus on sport for sport and elite success, to the current emphasis on contributing to the wellbeing of all New Zealanders through play, active recreation and sport.
Economic and social systems	The economic and social systems of previous decades have resulted in a range of inequalities of income, wealth, opportunities and outcomes – across ethnicities, gender, generations and geographic locations – which negatively impacts on the ability of these populations to engage in play, active recreation and sport.
Demographic transition	Our growing, aging, diversifying and urbanising population challenges us on how well our offering is adapting to these changes.
Entertainment	There have been significant social shifts in how people like to entertain themselves, with gaming and streaming options such as Netflix competing for the use of people's discretionary time.
Technology	Technological advances have enabled highly personalised play and sport experiences and new avenues of community connection, yet at the same time have also acted as a physical activity diversion, offering a breadth of passive consumption. The current debate on e-sports reflects both this and the uncertainty of integration between the virtual and real world.
Housing density	Increases in infill housing developments and apartment living is challenging the traditional spaces and places for play, active recreation and sport.
Accessible transport	The recent widespread introduction of new modes of individualised transport such as electric and shared scooters and bikes has opened new opportunities to be physically active.

Some of these drivers of change will continue to impact, while new drivers of change will emerge. There are likely to be opportunities as well as risks for participation in play, active recreation and sport because of these changes.

For example, reduced labour force participation, due to both ageing and more automation of work, is likely to raise major questions about income security for many. But it will also leave people needing other ways to fill their time – a trend which could increase demand for play, active recreation and sport opportunities.

The challenge is to pick up on early signals that might become drivers of change

Recent history is filled with examples of failures to pick up early signals of change: Blockbuster video vs. Netflix; Walmart (and most other retailers) vs. Amazon; Kodak vs. Apple; music retail vs Spotify; hotels vs. Airbnb; taxis vs. Uber. And missing key trends is not unique to the business environment either. For example, regulators in the public sector have been slow to spot and adapt to the challenges around censorship and enforcement of public standards in the internet age.

Similarly, there is a case to be made for both market and government failure with respect to the current obesity epidemic facing our nation. Failing to prevent such a poor public outcome is often the result of government agencies defining their responsibilities narrowly so that no one part of government is ultimately responsible for the outcomes for certain groups.

Strategic foresight assists us to pick up on early signals and prepare for a range of possible and plausible futures

Given that we live in times of uncertainty and complexity, which makes it difficult to predict what the future will look like, what can we say about the future? The further away in the future, the more uncertain and the less predictable it will be.

Strategic foresight is not about better predictions of the future. Instead, it is about better preparedness for different futures that are all possible and plausible, as well as clarity around preferred outcomes in the future. Enabling this requires ongoing review of Sport NZ and our sector partners' goals as well as systematic analysis of driving forces of change before developing our policies and plans. These efforts are aimed at finding solutions and policy responses that are likely to bring positive outcomes. Hence, these activities enable better preparedness, because they generate explicit, contestable and a flexible sense of the future.

Furthermore, insight about the implications of possible futures will enable us to capitalise on opportunities and manage various risks, particularly those that are in the long-term future that few people are aware of. New strategies can emerge from understanding these opportunities.

The point of foresight work is ultimately to enable futures-ready thinking and strategy – that is, to prepare the sector to both plan for and adapt to whichever of a range of scenarios may come to pass. To achieve this, we must start by understanding what possible and probable future scenarios may look like, and also to develop a view on the more or less preferred future(s).

So, the basic steps of foresight work involve:

1. Clarifying outcomes (and the time horizons of interest)
2. Identifying driving forces of change
3. Identifying the patterns emerging from the trend analysis – what really matters
4. Identifying assumptions and
5. Exploring possible futures
6. Asking what the sector can do in the long term to create the preferred future and manage risks of less desirable potential / probable futures.
7. Agreeing what needs to be continually monitored and discussed to keep adapting.

Our proposed approach to foresight will be anchored to analysis of driving forces

Strategic foresight looks broadly at the change in the world that might influence us from a systems perspective. For example, what is driving our system? What are the underlying structural relationships? What would be the most appropriate role of the organisations within the sector, in the future?

The first place to look is the contextual environment. The developments that are happening everywhere interact in complex ways that cannot be precisely understood. Influential developments are referred to as drivers of change.

No one can predict the future, but by engaging with drivers of change and considering the possible futures they create, we can reach a better understanding of:

1. What our future operating context might be
2. What this could mean for us
3. How we might respond
4. What we need to do differently today.

The following are areas that will impact the future of play, active recreation and sport. We will draw on these to construct different possible future scenarios that will help us prepare for a better future.

TABLE 2 - FUTURE DRIVERS OF CHANGE

COVID-19	The longer term implications from COVID-19 that are now emerging for the play, active recreation and sport sector.
Time and leisure	The trends in how people spend their time outside the working environment and the influences that technology and emergent sectors (e.g. eSports) have on participation in play, active recreation and sport.
eSports	The rise of eSports and the use of millennials' time.
Funding sustainability	Funding sources that are at risk and underdeveloped, and the possible implications of changes to funding for the play, active recreation and sport sector.
Future changes to the structure and function of society	The trends and issues originating in the global context that have the potential to shift attitudes and behaviours in the New Zealand community.
Human enhancement	Technology influences many of the domains, but this looks specifically at the future of health and mobility technologies that have the potential to enhance people's ability to participate in play, active recreation and sport.
Demographic change	The demographic, social and geographic shifts that may potentially occur over the medium to long term that will influence the mix and extent of sports pursued by respective communities.
Health trends	The health trends in New Zealand and the impacts of modern lifestyle risks.
Climate change	A view of the dimensions of a changing climate and our role in addressing the issue.
Economic focus	The broad economic trends, driven at both a global and national level, which will influence the ability of individuals and organisations to participate in play, active recreation and sport. E.g. Impact from growing inability to insure assets.

Our foresight approach will involve broad engagement, scenario planning and reflection on how we operate

Rather than operating in isolation, it will be important to engage on foresight with those within our sector, government and national and international experts. This will allow us to draw on expertise, test assumptions and biases, bring a diversity of views, and develop a common context for where we are today and where we aspire to be.

As part of our broader collaboration, we will discuss trends in the environment which could impact play, active recreation and sport in New Zealand, and envision multiple possible and plausible futures, including a desired future.

Focusing on foresight will also encourage us to shift to more adaptive and flexible approaches in how we operate. Our on-going challenge is to think about the world in 2025 and beyond, not just today, and the implications for adaptive capability and how we work with and support our system to respond.

COVID-19

This scan looks to highlight some of the longer-term implications from COVID-19 that are now emerging for the play, active recreation and sport sector. It explores:

1. **Assumed Crisis Trajectory:** An assessment of the assumed short-term (3-6 month) outcome of the crisis. Potential reprieve for NZ, but significant impacts globally.
2. **Longer Term Uncertainties:** In the absence of a vaccine the severity of the impact depends on effective government strategies. With failures already evident, expect ongoing disruption into 2021/22.
3. **Financial impact:** Will the severity of the crisis take economies beyond recession into a lengthy period of depression?
4. **Wider Societal Wellbeing:** Beyond the initial physical health crisis, the need for mental health support and broader societal resilience will become more prominent.
5. **Globalisation:** A more fragmented and polarised world will upend previous assumptions of global interconnectedness.
6. **Political leadership:** Now is the time for all organisations to take their cue from the unprecedented steps governments globally are taking to address the crisis.
7. **Mobility and Proximity Behaviour:** The future of play, active recreation and sport will be shaped by the extent to which physical connection and movement behaviours change.
8. **Impact on Sport:** A challenging short-term horizon, but what questions need to be addressed for the longer term?

Summary implications

Creation of new normal	<ul style="list-style-type: none"> • Champion an agenda for physical activity by being at table with other Ministries and local government. • Who can we learn from that already have models for integrating play, active recreation and sport activity into daily life.
Living with social distancing	<ul style="list-style-type: none"> • May become a determinant for whether people engage in team activities, what teams they join and whether they volunteer. • Opportunity to design a system that gives local physical activity a higher status – promoting connectedness, opportunities, ease and cost. • May result in resurgence of doping given postponement of all testing.
Ongoing pandemics	<ul style="list-style-type: none"> • Need to adapt to increased demands for sanitation ‘surveillance’ for contact tracing, health monitoring. • Public facilities (pools, playgrounds) may have to restrict numbers of visitors, set different hours for vulnerable groups.
Border control	<ul style="list-style-type: none"> • Trans-Tasman competitions on ice for 18 months or longer e.g. Super Rugby, A-League. • Implications for New Zealand’s attractiveness as a host nation for sporting events given geographic distance, risk of reinfection, reluctance to travel.
Economic recession	<ul style="list-style-type: none"> • Loss of funding for community sport and recreation groups, as funders direct their efforts toward ‘community at risk’ projects that are also struggling for funds e.g. vulnerable children. • Return to local and voluntary run sector requires need to actively support and champion volunteers as coaches, administrators etc.
Cost as a barrier	<ul style="list-style-type: none"> • Drop in paid participation from those unable to afford entry (through possible increased costs post decline in gaming, and decreased discretionary spending.
Mental health	<ul style="list-style-type: none"> • Opportunity to develop play, active recreation and sport as a positive pre-treatment focus in NZ’s future public health system.
Societal resilience	<ul style="list-style-type: none"> • COVID-19 strengthens desire to live, work, play and support others within local communities.
Expectation inflation	<ul style="list-style-type: none"> • Expectation that sport and recreation organisation receiving public money must act in a socially responsible manner. E.g. pay a living wage, greater sick leave provisions.
New global health agreements	<ul style="list-style-type: none"> • Role of sport may take on heightened importance with Min Foreign Affairs and Trade to support East/West relationships and cooperation.
Transformed work will reshape leisure	<ul style="list-style-type: none"> • Need for sport and recreation to be flexible and adaptable to changing tempo of people’s lives.
Mobility and proximity behaviour	<ul style="list-style-type: none"> • Reduced demand for physical contact sports – rugby, netball; increased demand for non-contact sports – cricket, tennis etc. • Decline in fan base for some codes – nervousness about being in crowds.
Media and broadcasting take hit	<ul style="list-style-type: none"> • Significantly reduced sports media during crisis unlikely to return at same level. Does this impact promotion of sport with flow-on impact on participation? • Broadcasters will return, but under what revised model and with what implications? E.g. decline in available sport product. Is this the entry time into sports broadcasting for Google, Apple or Netflix?

Assumed crisis trajectory

It is unusual to be able to define such a definitive change in era. Still, it's clear the pandemic will redefine societal priorities and policies to the extent what was previously labelled impractical becomes eminently possible.

What's changing?

It could be tempting to view the end of the lock-down period as a return to some form of normality. The changing patterns of human movement, societal control and financial stress make this an unrealistic scenario in the next 12-18 months.

New Zealand is in an 'excellent position' to stop virus spread (stuff.co.nz), but could be facing up to 18 months of social isolation if COVID-19 takes hold in this country. rnz.co.nz

NZ's combined strategy of successful suppression, strong border measures, and widespread contact tracing and testing, resulting in containment could allow periods when control measures can be relaxed, but only if we reduce cases to a handful. tepunahamatatini.ac.nz

This is the 'Hammer Strategy' (see: The Hammer & the Dance medium.com) which will buy time ahead of vaccine development and/or broader immunity being established.

New Zealand will need to create a new normal through active community dialogue beyond the traditional political cycle as the pandemic management plays out over the next couple of years.

How will sport and active recreation advocates support this discussion?

Implications for play, active recreation and sport

- To champion an agenda for physical activity through PARS, we need to be at the table, (with other Ministries, particularly Health, Education, HPA... demonstrating knowledge, connections and ability to influence physical activity. COVID-19 will create an environment where physical activity is more important than ever before – for population health and resilience.
- We need to be at the table with local government.
- May result in resurgence of doping given postponement of all testing
- Can we raise the profile and application of Te Ao Māori frameworks and narratives that champion holistic wellbeing?
- Who can we learn from that already has models for integrating PARS activity into daily life more than in NZ, tapping research, study visits and relationships already established? E.g. Denmark, Wales, etc.

Longer term uncertainties

The establishment of immunity and the effectiveness of national strategies are the uncertainties that will determine the extent of future movement both domestically and internationally.

What's changing?

Vaccines and immunity

Vaccine development is a critical determinant of a return to 'normality' and given the broader shock to global society it is likely that the public sector takes a far more active and direct responsibility for the development and manufacture of medicines.

While new vaccines are being frantically developed (e.g. RNA vaccines theatlantic.com) the reality is that these will be unavailable at scale in the short term. Social distancing could be here to stay for a while.

Informed observers are clear (e.g. here a former US CDC Director edition.cnn.com) that the pandemic response will be protracted with ongoing suppression of episodic outbreaks. It will also have to address extensive risks to societal continuity, including health care for people with pre-existing medical needs and the vulnerability of the supply chain for medicines and supplies.

The crisis also points to the need for greater vaccine development before, not after, outbreaks occur. Even if a coronavirus vaccine were available today, demand would almost certainly outstrip supply and be unevenly distributed to those who could afford it rather than those most at risk. fortune.com

Absent of a vaccine breakthrough, countries will need to constrain travel either globally, or on a bilateral basis as respective jurisdictions get the outbreak under control. As long as the virus persists somewhere, there's a chance that one infected traveller will reignite fresh sparks in countries that have already extinguished their fires. Under these conditions, there are three possible endgames: one that's very unlikely, one that's very dangerous, and one that's very long. theatlantic.com

Managing sporting links and events will prove an ongoing challenge.

COVID-20,21...2X

While COVID-19 is an unprecedented pandemic, it is unlikely to be the last as the climate changes and impacts ecosystem structure and function. We can, therefore, anticipate an increasing level of complexity both for reactive and strategic plans.

The 2016 anthrax outbreak was a previous example of emerging zoonotic diseases that are expected to be particularly vulnerable to climate and biodiversity disturbance. ncbi.nlm.nih.gov

Climate change will exacerbate disease trends and modelling suggests that rising temperatures will help mosquitos infect millions more people. popsci.com

This coronavirus is not a 'black swan' in that the emergence of another coronavirus was predicted by many working in the emerging infectious diseases (EIDs) field. jfsdigital.org

The current pandemic has exposed the vulnerabilities of particular groups, and future virus outbreaks will be even more challenging as they coincide with current negative health trends (e.g. diabetes and obesity). Of particular relevance for coronavirus is the WHO's projection that chronic obstructive pulmonary disease (a progressive and life-threatening respiratory illness without a cure) will become the third leading cause of death worldwide by 2030. investigate.co.uk

Implications for play, active recreation and sport

- Organisations and individuals need to learn the implications of the current emergency and invest in new capabilities for future resilience and agility.
- Personal safety may become a determinant for whether people engage in team activities, what teams they join and whether they volunteer. i.e. Irrespective of the presence of a COVID-19 vaccine, people now understand the implications of zoonotic diseases or diseases caused by bacteria, viruses or parasites and a percentage will change behaviour to reduce personal risk from close contact with others.
- Electronic gaming will continue to rise in popularity, as will individual pursuits over team sports (which have long been the cultural spine of sport in NZ).

- Disruption to competitions as we move between Alert Risk Levels will impact motivation for young people especially, to commit.
- Opportunity to design a system that gives local physical activity a higher status – promoting connectedness, opportunities, ease and cost – one that is less about competitiveness.
- Increased attention to health and safety regulations based on good public health practices: e.g. Our sector will need to adapt to increased demands for sanitation (soap in facility washrooms, increased cleaning regimes, disinfecting), 'surveillance' for contact tracing (knowing who turned up for club practice, attendance records, roll calls, CRM systems), health monitoring (temperature checks, vaccine certification as a condition of enrolment, regular testing).
- Turning up 'sick' for organised activities (schools, sports clubs, recreation groups) will be actively discouraged, and could lead to bullying, naming and shaming behaviour.
- Will it be worth the effort to organise sport given the anticipated ongoing disruption and extra effort required?
- Public facilities (pools, playgrounds) may have to restrict numbers of visitors, set different hours for vulnerable groups.

Financial impact

What's changing?

The cautious optimism of economic commentators observed in January has evaporated and Credit Suisse notes that "economic data in the near future will be not just bad but unrecognizable" ([nytimes.com](https://www.nytimes.com)). Beyond initial health concerns, the financial challenge will be likely be intense for the next decade if the previous GFC-experience is repeated.

In their review of COVID-19's implications for business, McKinsey suggests that being optimistic about demand recovery is a real problem, especially for stressed organisations. They argue it's now essential to face the possibility of a deep, protracted downturn. [mckinsey.com](https://www.mckinsey.com)

The bleak economic reality for the foreseeable future is that when the virus recedes, we may experience a depression ([vox.com](https://www.vox.com)). Until it is safe to return to normal business – and crucially until we feel safe – we will not see much recovery. But importantly, until we can say the same about other major nations, we will not see the global economy recover. [theguardian.com](https://www.theguardian.com)

Preliminary forecasts from the International Labour Organisation indicate 25 million jobs could be lost worldwide as a result of COVID-19 ([ilo.org](https://www.ilo.org)). New Zealand is expected to lose 200,000 jobs, with the unemployment rate climbing to 10%.

This recession will prove very difficult to fight, as it affects both demand and supply. The epidemic has already led to shortages of [drugs](#), industrial [chemicals](#), medical [equipment](#), and consumer [goods](#) as Chinese factory closures disrupt complex trade networks. Quarantine efforts will disrupt the supply of human labour too. This situation will likely be ongoing and vary as economies lift and then reimpose restrictions to manage recurrent outbreaks. [theatlantic.com](https://www.theatlantic.com)

Overall economic estimates of the likely global impact vary dramatically with the [Asian Development Bank releasing scenarios](#) of losses from \$77 billion to \$347 billion and the [OECD](#) projecting a halving of global economic growth. New Zealand GDP is expected to drop by 10% in 2020.

While the numbers above are speculative, it's already clear that the economic impacts of COVID will be increasingly severe and traditional income sources for all individuals and organisations will come under unprecedented pressure. It will likely take a number of years for spending on discretionary items like sport and recreational participation to reach previous levels as all sectors of the New Zealand economy come under pressure.

Implications for play, active recreation and sport

- Loss of funding for community sport and recreation groups, as funders direct their efforts toward 'community at risk' projects that are also struggling for funds e.g. vulnerable children.
- Return to local and voluntary run sector requires us to actively support and champion volunteers as coaches, administrators etc.
- Drop in paid participation from those unable to afford entry – primarily sport related.
- This increases inequity for marginal groups and puts pressure on Sport NZ to prioritise financial support for activities that reach disadvantaged communities.
- Greater demand for quality service, given more pressure on discretionary spend.
- Paired back and simplified competitive sport sector model with national and regional layers trimmed.
- Professional sports salaries reduced, notably in NZ, with loss of players to those overseas leagues offering bet wage. Impact most noticeable on rugby.

Wider societal wellbeing

Supporting mental health will become a critical issue beyond the initial physical health challenges and ongoing community resilience will come to the fore.

What's changing?

Avoiding the mental health pandemic

There is poor mental health within some community sectors both in New Zealand ([mentalhealth.inquiry.govt.nz](https://www.mentalhealth.govt.nz)) and internationally. The WHO had a particularly blunt assessment that "stress is the health epidemic of the 21st century" ([workdesign.com](https://www.workdesign.com)). COVID will place further pressure on mental health statistics.

Several commentators fear that once infections begin ebbing, a secondary pandemic of mental-health problems will follow. It's easy to see how this may eventuate with elderly people, already experiencing an epidemic of loneliness ([weforum.org](https://www.weforum.org)), being asked to distance themselves even further.

Evidence is emerging from China of the impact long bouts of quarantine has had on some individuals. One psychologist observed that "my colleagues in Wuhan note that some people there now refuse to leave their homes and have developed agoraphobia." theatlantic.com

The evidence from the previous SARS outbreak suggests front-line health staff will also require longer term support. Studies note that a couple of years after SARS hit Toronto, [people who dealt with the outbreak](https://www.ncbi.nlm.nih.gov) were still less productive and more likely to be experiencing burnout and post-traumatic stress. [ncbi.nlm.nih.gov](https://www.ncbi.nlm.nih.gov)

The mental health of younger people with financial concerns, minorities

experiencing racism or partners quarantined in abusive relationships are just a few examples of groups under more significant pressure through the pandemic. For people with pre-existing mental health conditions, a pandemic can [further heighten](#) their anxious thoughts and compulsive behaviours. Disrupted support systems and social isolation can leave people with mental health conditions, [especially vulnerable](#) to acute stress reactions in an epidemic. [scientificamerican.com](#)

There is an opportunity to develop active recreation as a pre-treatment focus in NZ's future public health system. The primary health system was already likely to experience increasing pressure through the growing demands of an ageing population. The pandemic is likely to bring increased focus on population wellbeing and sport and recreation will need to consider new strategies to deliver on this goal. [berl.co.nz](#)

Building deeper societal resilience

The pandemic presents a potential break point in societal thinking that could reduce the last few decades' market orientation and individualism. Optimistic forecasts suggest that as people explore new ways to connect and support each other in adversity they'll become newly conscious of interdependency and community. Experience to date in New Zealand suggests this is a real possibility; what needs to happen to make it an ongoing reality?

Getting through coronavirus will be an exercise not just in building societal resilience, but relearning the values of cooperation, compassion, generosity and kindness, and building systems which institutionalize these values. Sport and active recreation can foster many of these traits.

[medium.com - Sect. 4.2 of article](#)

Beyond NZ, a clear choice faces the international community; will continue down the route of disunity, or adopt a path of global solidarity? If we choose disunity, this will not only prolong the crisis but exacerbate future catastrophes too. If we choose global solidarity, it will be a victory not only against the coronavirus but against future crises likely to assail humankind in the 21st century. [ft.com](#)

The crisis may have the effect of illuminating pre-existing economic inequalities and power structures. These tensions will likely reinforce the government's focus on delivering its wellbeing economy agenda instead of reverting to the same old structures: building back better rather than returning to business as usual. The initial innovative financial response may be followed by significant social policy innovations too. [bellacaledonia.org.uk](#)

It's a given that active recreation has a role to play in developing societal resilience. The challenge lies in creating unprecedented strategic innovations that advance policy thinking beyond previous constraints to ensure maximum engagement across all groups.

Implications for play, active recreation and sport

- There is an opportunity to develop PARS as a positive pre-treatment focus in NZ's future public health system.
- Strong positioning of our well-being value proposition across government, will shift the narrative from sport to physical activity. This will resonate particularly for a centre left government.
- Could be less about new ideas and more about a return to the past, adapted to suit today (old stuff done better) – focus on grass-root activities, staying local, volunteer networks, neighbourhood games, play streets...
- COVID-19 strengthens desire to live, work, play and support others within local communities.
- Social resilience argument has been driven through connection that sport enables. How will this be balanced with the new social distancing concerns?

Globalisation

The pandemics brutally exposed the lack of global political cohesion and will likely advance the re-alignment of regional powers as countries firstly overcome the crisis within their borders and then align with partners who have been similarly successful. Developing and maintaining sporting relationships will be challenging, but increasingly important, if isolationist strategies become more widely adopted.

What's changing?

Stoking fear of the other

The origination of COVID-19 has played into global populist sentiment that has largely been absent within New Zealand, though unfortunately racism is not.

The spread of coronavirus has unleashed a wave of panic and, in some cases, outright anti-Chinese sentiment across the globe (orlandosentinel.com) Chinese tourists in particular have found themselves unwelcome due to coronavirus fears. japantimes.co.jp

Fear of coronavirus has exposed latent racist within New Zealand (auckland.ac.nz) with tourists and students facing increasing discrimination. universityworldnews.com

A sad irony is that foreign workers in China are now experiencing discrimination as that country gets the pandemic under control and looks to bar external re-infection (sixthtone.com). It's likely this dynamic will be seen in many countries as the virus ebbs and flows over coming months and years.

An ongoing problem made worse through the pandemic, but pointing to the need for all sectors, including sport and recreation, to redouble efforts to ensure inclusion. This will be increasingly important in a fragmenting world where incidents of discrimination have implications for global relationships.

Trade Agreements giving way to Health Agreements

The coronavirus crisis is likely to have a lasting impact through disruption of international supply chains, a reduction in the hypermobility of global travellers, and increased protectionism and immigration controls.

The global rush to impose travel bans, additional visa requirements, and export restrictions is making economies more national and politics more nationalistic. foreignpolicy.com

Ian Goldin (Oxford professor of Globalisation & Development) notes the pandemic "...reinforces all the fears about open borders [and in] North America and Europe, there is a recalibration, a wanting to engage on a more selective basis". nytimes.com

A more nuanced form of globalism could emerge from the pandemic that places as much emphasis on populations' health as trade. The World Health Organization, and the multilateralism it represents, has had its centrality restored. At the same time, the crisis has also involved the comeback of the nation-state. The crisis demonstrates that there is no implicit or explicit contrast between these two forms of government. They go hand in hand. theglobalist.com

The most significant long-term geopolitical changes may occur through the interrelationship of the pandemic event and the emergent "fourth industrial revolution". Technologies like AI and 3D printing could erode the cost advantages of widely distributed supply chains and have the potential to fundamentally change the ASEAN strategic environment. scmp.com

Global and regional relationships are realigning, and sporting links will need to take these into account. Individuals who previously had vaccinations to avoid infection in a destination could in future be compelled to do so by a host country's refusal to admit without evidence of health records to protect their population. Similarly, we may see nations building bilateral relationships on their respective abilities to maintain population health and wellbeing. The announced commitment to retaining links between Singapore and New Zealand could be a pointer to similar future agreements ([beehive.govt.nz](https://www.beehive.govt.nz)) Those who prove less capable may become more isolated as a result, and this could impact historic sporting links too.

Implications for play, active recreation and sport

- Risk that local efforts are exclusionary due to unconscious or real bias, comfort levels, cultural practices, social distancing reinforcing a sense of security with one's own tribe.
- Is social bridging role of sport heightened or diminished? Increased importance for Sport NZ to drive and support diversity and inclusion as an overriding principle for funding and support.
- Are there lessons from the infectious Aids/HIV era, that can be taken and applied to anticipate potential societal responses to covid-19 and implications for PARS?
- Role of sport may take on heightened importance with Min Foreign Affairs and Trade to support East/West relationships and cooperation e.g. NZ could compete with China, Singapore, Korea to support trade relationships.
- Increased focus on local and regional competitions – cost of travel is prohibitively expensive for teams to cross long-distances.
- NZ identifies more with Asia-Pacific than the Commonwealth for sporting events.

Political leadership

In his 1981 inauguration speech, Ronald Reagan argued that “In this present crisis, government is not the solution to our problem, government is the problem.” The far-reaching steps taken by all governments in response to the pandemic have shattered that doctrine many followed for the last forty years and set the stage for a new era of state action.

What's changing?

All economic bets are off

For decades, small government politicians and economists have preached the need to keep the national debt low and worries about causing inflation through government deficits. As governments face down the pandemic, many are abandoning their previous concerns about the national debt.

[businessinsider.com](https://www.businessinsider.com)

The pandemic has graphically highlighted evidence that a functioning government is crucial for a healthy society. The extraordinary actions being taken by governments (including New Zealand's) is being taken as evidence that traditional economic approaches have failed and for new blueprints to be advanced. In the previous economic scan, it was anticipated that a financial stressor would usher in new economic thinking and that now seems to be occurring. [economics.com](https://www.economics.com)

The many calls (across the political spectrum) for the implementation of a universal basic income (UBI) is a clear example of emergent thinking. Most political commentators have long dismissed the concept as impractical before the crisis. It is now potentially seen as a practical policy that governments could deploy to mitigate the economic effects of the crisis ([brookings.edu](https://www.brookings.edu)).

UBI is also being proposed to address the challenging mental health issue noted in section IV above. [vice.com](https://www.vice.com)

Expectation inflation

While financial inflation may no longer be a current concern, the inflation of the voters' expectations may quickly challenge political leadership. The suspension of particular rules through the crisis is leading some observers to question why they were applied to policies in the first place. Some are even suggesting that the aftermath of the coronavirus is likely to include a new political uprising—an Occupy Wall Street 2.0.

The UK governments call for Local Councils to solve the homelessness question 'by the weekend' provides a vivid example of apparent intractable rules being summarily dispensed with. [theguardian.com](https://www.theguardian.com)

Campaigners argue that the government's reaction to COVID-19 demonstrates what can be done to address a crisis and are anticipating a similar level of urgency to tackle an even greater challenge: climate change. [scoop.co.nz](https://www.scoop.co.nz)

The emissions reductions linked to the pandemic response will be taken as an example of what is possible if economic growth is restrained (theconversation.com). Expect to see calls for increased social and environmental conditions attached to company financial support and a shift to post-growth economic principles. [thecorrespondent.com](https://www.thecorrespondent.com)

Others are pointing to the differences between the current pandemic response and ongoing issues like climate. They note that short-term politics and human nature shape a bias to address only what's right in front of us. [marketwatch.com](https://www.marketwatch.com)

Anticipate significant future tension between calls for a reversion to previous governance approaches and those advocating bold policy initiatives ([stuff.co.nz](https://www.stuff.co.nz)). It could be that the pandemic paradoxically creates both a sense of unity in response but fosters future political polarisation.

What previous orthodoxy's that restrained action on active recreation are now open to question in a post-COVID environment? Is it now possible to envisage a similar vigorous response being taken to address other issues of critical public health (e.g. the reduction in sugar consumption)?

Implications for play, active recreation and sport

- Experience through lockdowns of remote working and reduced commuting time, part-time and flexible working hours, flexi-time employment, etc. will continue giving people more leisure to pursue PARS activities. (c.f. Denmark)
- Recessionary demands for the introduction of UBI and shorter working weeks similarly increases leisure time.
- Expectation that any PARS organisation receiving public money must act in a socially responsible manner. E.g. pay a living wage, greater sick leave provisions...
- Changing notions of how acceptable it will be to travel extensively to play sport

Mobility and proximity behaviour

Through the pandemic, the personal has become dangerous. The comfort of being in the presence of others might be replaced by a greater comfort with absence, especially with those we don't know intimately. Instead of asking, "Is there a reason to do this online?" we may ask, "Is there any good reason to do this in person?"

What's changing?

Reduced travel horizons

Previous assumptions about the ease and cost of international movement are now upended and unlikely to return to the previous state for many years.

The International Air Transport Association (IATA) estimates that industry passenger revenues could plummet \$252 billion or 44% below 2019's figure. This outcome assumes a scenario in which severe travel restrictions last for up to three months, followed by a gradual economic recovery later this year.

iata.org

Coronavirus could end up changing flying for ever as quarantined passengers question their need to travel once restrictions are lifted (theguardian.com). A significant number of airlines could be bankrupt by mid-2020.

edition.cnn.com

Airlines were already feeling under pressure (especially in Europe) from the flygskam movement (marketwatch.com). Recovery could be complicated by the need for more sustainable technologies and calls for growth to be limited to meet environmental concerns. medium.com

Future travel is likely to be logistically and financially more challenging for both spectators and participants. While the challenge will be particularly acute for international long-haul, it can also be expected at the regional level as multiple transport providers cease to provide competitive services.

Transformed work will reshape leisure

The conversation on the 'future of work' needs to be engaged and challenged if the future of leisure is not to emerge by default. There's a symbiotic between the two and the current re-invention of work practices through the lock-down could lead to a realignment of leisure practice too.

Early 2020 might turn into a forced social experiment that could finally answer the question: Do we need rush hour anymore? Could coronavirus be the tipping point in terms of wider-spread adoption of full-time remote work?

geekwire.com

Research has previously identified there are economic benefits to remote working which may become increasingly attractive for firms in an economic downturn. For example, a Stanford study demonstrated a 13% improvement in performance from people working at home (gsb.stanford.edu). A similar Harvard study of one sector alone found the productivity gain could add \$1.3 billion of value to the US economy each year. hbswk.hbs.edu

Longer term, if the work environment remains radically reshaped, it could transform urban life and reshape the way towns and cities are planned.

theguardian.com

A fundamental reshaping of the work environment has significant implications for the pursuit of active leisure. Will gym memberships be renewed if the worker is no longer attending the office nearby? Will workplace-aligned teams still meet for the lunchtime 5-a-side? Will team sport survive in a world of the net-connected remote worker, or will they experience a renaissance as people look for additional opportunities to connect? If the tempo of the working day is no longer “business hours” will individuals abandon the traditional Saturday morning exercise routine? The answers are unknown, but a fundamental reshaping of work habits will make them increasingly relevant to the future of leisure.

A virtual boom

Individuals who are either unable or unwilling to travel may be expected turn online and the current trends in esports could receive a consequent boost.

Prior to the pandemic, commentators were forecasting the global esports viewer base to grow from 355 million in 2018 to 674 million in 2022.

venturebeat.com

The industry has already noted an uptick in interest with Verizon reporting a 75% increase in video game activity during the first week of the US quarantine. NASCAR has found a way to draw eyeballs with iRacing and replaced the television time slot of a recent cancelled race with a virtual version as drivers competed from home. wfaa.com

It's not without challenge as while the crisis is causing a spike in short-term demand for video games and consoles, it's proving challenging for the industry to keep up. Nearly 90% of video game consoles in the U.S. were made in China. time.com

The challenges presented to the wider recreation sector by esports (e.g. participation rates, competitor welfare etc.) prior to the pandemic are set to increase through the effect of the crisis.

Implications for play, active recreation and sport

- Reduced demand for physical contact sports – rugby, netball; increased demand for non-contact sports – cricket, tennis.
- Decline in fan base for some codes – nervousness about being in crowds
- Implications for stadia, with ‘white elephant’ status becoming greater issue for debt conscious Councils.
- Expectation that PARS organisations and activities act in an environmentally sustainable way – e.g. requirement to measure and report carbon footprint, stricter financial policies (reduced travel allowances, fewer conferences attended in person).
- Travel constrained by introduction of MFAT Covid travel advisory.
- Trans-Tasman competitions on ice for 18 months or longer e.g. Super Rugby, A-League.
- Implications for New Zealand's attractiveness as a host nation for sporting events given geographic distance (risk of reinfection, reluctance to travel).
- Increased interest and support for national active recreation events, e.g. running, mountain-biking, triathlons etc.
- Need for sport and rec to be flexible and adaptable to changing tempo of people's lives.

Impact on sport and recreation

What's changing?

Tough financially in the short term

As global habits change to adapt to the new realities of the outbreak, consumer spending also appears likely to fall, and the impacts will have far-reaching effects on the media, sports and entertainment industries. weforum.org

The betting industry has been a high-profile casualty of the current crisis coming as it did on pre-existing business challenges. The cancellation of sporting events will likely cost the TAB \$14 million and that, along with a \$3.8 million error over bonus bets will result in both the half year and full year projections taking a big hit. stuff.co.nz

Media too is coming under further financial pressure as funds from advertisers drop off. This could be felt especially acutely in small remote markets like New Zealand. One veteran media executive noted that with big advertising accounts run out of Sydney, Singapore or Hong Kong "...it's just really easy to cut New Zealand." thespinoff.co.nz

Concerns are starting to emerge that beyond the initial sport hiatus, harsh economic realities may force sponsors, broadcasters and sporting bodies into legal confrontations as respective parties look to maximise their long-term position. controlrisks.com, dailymaverick.co.za

Implications for play, active recreation and sport

- Class 4 funding of \$150m that has sustained community sport and recreation for 20+ years may cease, or at least be significantly reduce, requiring immediate rethink on how community sport and recreation can be supported and what can be sacrificed
- Significantly reduced sports media during crisis unlikely to return at same level. Does this impact promotion of sport with flow-on impact on participation?
- Broadcasters will return, but under what revised model and with what implications? Is this the entry time into sports broadcasting for Google, Apple or Netflix?

Influences that will shape the future of leisure in New Zealand

This section explores the wide-ranging forces affecting how people will use their future leisure time. It has been broken into four themes:

1. **Personalisation** - as individuals are offered increasing capabilities to tailor their leisure experiences and the time available for their potential pursuit becomes more fragmented.
2. **Global influences** - that are emerging not just from an international context, but through disruption in adjacent sectors that start to obscure the boundary between leisure activities.
3. **The focus of human purpose** - that to date has been founded on relatively stable careers followed by modest retirement, but is threatened by changing job patterns and increased longevity.
4. **Increasing interdependency** - as shorter-term factors become a more significant influence on leisure experience and individuals' consequent ability to engage in regular activities.

Aging, sensor technologies, and the future of the work environment emerge as significant drivers underpinning the future use of leisure time. Aging will impact the structure of future New Zealand society and is already breaking down rigid barriers of what the individual typically engages in. Sensory and visual technology enhance this fluidity of choice, and as the historically binary opposite of leisure time, changes in the world of work will add further ambiguity if some of the more extreme scenarios of future job roles eventuate.

Summary implications

Changing nature of employment	<ul style="list-style-type: none">Automation or disruptive business models which change the flow of employment will potentially fragment leisure time.If individuals are forced to become more independent as employees or contractors, this may be mirrored in more independent and personalised forms of leisure.
Moving from rural to urban	<ul style="list-style-type: none">Increasing urban populations should lead to more leisure choices for the city dweller, but a decline in rural communities may undermine the viability of their options.
Technology-mediated choice	<ul style="list-style-type: none">Leisure choices may become increasingly defined by past activity and the data profile of the participant (e.g. Netflix/Amazon profiling).
Technology promotes physical literacy	<ul style="list-style-type: none">Rise of smart agents makes physical literacy more accessible, and may lead to decline of personal coaching.
Technology innovation	<ul style="list-style-type: none">New forms of leisure consumption such as VR/AR will prove highly compelling social experiences and raise the level of competition for available leisure time.
Migration	<ul style="list-style-type: none">New migrants may add diversity to the range of leisure activities on offer, but their visibility may be obscured from the existing New Zealand leisure scene.
Commercial competition	<ul style="list-style-type: none">Emergent business and licensing models may be very different to traditional leisure choices and exclude those without the necessary resources to participate.
Re-invention of retail real estate	<ul style="list-style-type: none">The changing dynamics of adjacent sectors (e.g. retail), may draw on international experience to expand into new areas and provide new forms of leisure venues that blur the distinction between socialising, physical activity, wellness and retail activities.
Reshaping personal identity	<ul style="list-style-type: none">The loss of work-related meaning will lead to the need for purpose through leisure.
Shifting gender perspectives	<ul style="list-style-type: none">Unless wage gap between parents and non-parents is closed, men are more likely to have a higher financial capacity to engage in leisure activity, and that will particularly be the case for lower-income households.
Aging	<ul style="list-style-type: none">The expansion of retirement years will require additional support for individuals to maximise active recreation and maintain mental health.
Climate change impacts	<ul style="list-style-type: none">Leisure activities reliant on outdoor venues may find it increasingly challenging to maintain consistent use if facilities are regularly subject to restrictions (e.g. flooded pitches, heat-stressed participants).
Transportation growth	<ul style="list-style-type: none">Increasing use of information surrounding the activity in real time up until the actual participation or travel to a leisure site (e.g. airlines today). The spur-of-the-moment decision about a leisure activity may become rarer.Increased contingencies mean that the leisure behaviour of individuals becomes more planned, more deliberate, more information rich, and less spontaneous. Our approach to engaging in leisure itself may be changed.
Increasing income inequality	<ul style="list-style-type: none">A future economic downturn, with a consequent increase in inequality, could see significant sectors of society become far more price-sensitive to leisure engagement. This implies less commitment to ongoing gym/club memberships and a shift perhaps to more pay-as-you-go arrangements that undermine forecasts of future participation.
Shifting balance of aged-care provision	<ul style="list-style-type: none">Engagement in leisure activity may become a secondary priority (and less consistent) for the increasing numbers of individuals with care responsibilities to the older generation. Similarly, the activities of less-abled retirees may be contingent on variable care support.
Government perspective	<ul style="list-style-type: none">Consistent support for future leisure and wellness programmes from government may become more variable as budget challenges mount.

Background

Leisure is relatively new as a concept and has looked much the same since the nineteenth century. But how might it look different in the future? Leisure is defined as living in relative freedom from the external compulsive forces of your culture and physical environment, so as to be able to act in ways that are personally pleasing, and intuitively worthwhile³.

This paper explores how people will use their future leisure time with this definition in mind (and that of the Treasury⁴) and focuses on four key drivers of change – personalisation, global influences, the focus of human purpose, and increasing interdependency. The implications from these changes are then considered.

Personalisation

As a product of our social context, it is to be anticipated that as employment patterns change from mass to specialised, and consumer preferences become increasingly tailored, that leisure will similarly change and become more personalised.

What's changing?

Changing nature of employment

As new business and employment models emerge both the amount and nature of leisure time is likely to change commensurately.

In the agrarian economy (pre industrial age), leisure was unregulated – most people worked when there was work to do and didn't work when there wasn't. As society industrialised, a need arose to compartmentalise time into 'work' and 'leisure' with little to no overlap. Work was done in the factory or office and leisure elsewhere. Now, this compartmentalisation is again dissolving. Remote work through digital platforms makes it harder and harder to distinguish between when we are working and not.

As work becomes digitised and unconstrained by time or place, so, to a high degree, does leisure. If we can work anywhere, and at any time, then it also becomes logical that we want stimulation and entertainment anywhere, and at any time.

[Deloitte research](#) proposes seven potent disruptors reshaping work as we know it – technology, mass data, diversity and generational change, artificial intelligence (AI) and robotics, automation, and contingent work. If these factors drive significant change in the world of work, then the face of leisure time will likely change too. The range of potential work profiles will lead to individuals necessarily having varying needs, opportunities and abilities to pursue leisure options.

People are also working more independently. [McKinsey analysis](#) finds that up to 162 million people in Europe and the United States (20 to 30 per cent of the working-age population) are now engaged in some form of independent work.

Recent US data suggests the extent to which these working models will grow over the coming years is uncertain.

³ Godbey, 2011, p. 12

⁴ Treasury define leisure as free time and view access to leisure and recreation as crucial components of a balanced lifestyle.

Moving from rural to urban

Increasing urbanisation and rural depopulation are likely to offer a wider variety of leisure options for individuals in the cities while constraining choices in the regions.

Auckland has been responsible for 50 per cent of New Zealand annual population growth over the past two decades with growth in the regions starting to falter. By 2043, the majority of territorial authorities (44) will be [experiencing a decline in population](#).

The disparity of leisure options is likely to widen in this instance with those in cities experiencing a more extensive choice of possibilities due to population density. Urban density could also put pressure on physical activities that demand significant areas of land as the pressure for urban housing intensifies.

Technology-mediated choice

New technologies will likely extend the trend of tailored leisure choices, but to what extent will that choice be manipulated by commercial factors?

Technology platforms such as Amazon, Netflix and Spotify, have now established a high standard of delivering personalised experiences and curating customer choice. [A survey](#) of over 2500 people in the UK, US and Australia found 69 per cent indicating that they both want, and expect an individualised experience.

[Virtual assistants](#) may mediate future leisure choices as sensors enable them to become fully aware of the individual; not only what the person does but of who they are. AI can already understand an individual's personality by looking into their eyes or by hearing their voice. Half of those currently using virtual assistants (Google Now, Alexa or Siri), in phones or smart speakers, think that their smartphones will soon understand their emotions. Even more anticipate that within five years, devices that sense and react to our moods will be mainstream. When this happens, devices will act on situations rather than commands and make choices for the individual that they may be completely oblivious to.

There are well-publicised concerns relating to the impact on individuals health of screen-based sedentary lifestyles, particularly when most functions of modern life can be fulfilled online without movement. The emergence of virtual assistants has led to concerns that these platforms will introduce similar atrophy to people's decision-making capacity. There is a growing belief that critical thinking will disappear through overuse of virtual assistants, and that we will have to go to 'mind gyms' to practice thinking.

Technology promotes physical literacy

New technologies such as wearables, ingestibles and injectables hold out the promise of individual feedback and personalised training. In the decade ahead, the demands of consumers that have hyper-connected lifestyles may fuel the emergence of [optimised options](#) in leisure and fitness.

The [emergence of immersive](#) augmented reality (AR) and virtual reality (VR) technologies may soon offer training possibilities that could significantly unlock an individual's access to skills training. The majority of AR/VR users anticipate seeing this type of instruction within five years, with 56 per cent envisaging learning how to dance using an instructive AR experience.

Global influences

An individual's ability to tap into networks and fashions across the globe have accelerated through the use of internet technologies, international travel, and social media connectedness. While the current trade war between China and the US casts doubt on the trajectory of economic globalisation it seems likely that cultural and demographic influences, including those impacting leisure, will continue to spread with consequent interdependence.

What's changing?

Technology innovations

Widespread technology innovations that drive behaviour change typically originate offshore from NZ and therefore import their respective cultural practice. New immersive platforms will combine the novel, social and active dimensions to create compelling experiences to compete for our leisure time attention.

The play, active recreation and sports sector needs to think in terms of competing for New Zealander's free time. To limit the focus to play, active recreation and sport will obscure the vision of the emerging activities that will comprise future leisure time.

PwC anticipates that in the next five years, digital revenue will continue to make up more and more of the entertainment industry's income. What emerges from these markets will also likely influence NZ leisure preferences, given the lack of digital barriers. Large-scale [VR theme parks](#) have already started appearing, and technology looks set to change social and active leisure activities with more [modest developments](#) too. The eSports market is also driving cross-over activity within the leisure market, and is capturing increasing amounts of leisure time among millennials (see eSports section).

Migration

The currently modest levels of migration to New Zealand could change significantly dependent on global conflict and climate change. Anticipating potential impacts on leisure pursuits will be challenging and will likely lead to greater diversity in leisure activity rather than a default adoption of locally established activities.

Commercial competition

Increasingly interdependent economies and multinational corporations supplying leisure products will drive national consumer choices including new models of 'pay-to-play'.

As the balance of economic power shifts across the globe, there are implications both for the leisure options that may emerge and also their levels of commercialisation. You need only reflect on the existing commercial differences between North American and European sports codes (e.g. profit vs competition, open vs closed league structures) to appreciate new business models might emerge as alternate pursuits become established.

In their [2019 assessment of the future of sports](#), the Association of Summer Olympic International Federations notes that "regardless of the degree to which their sports are already established globally, International Federations must accelerate their focus on developing effective strategies towards the regions of the world to which economic power continues to shift".

This [shifting balance](#) is illustrated by projections indicating that the US share of world GDP will decline from 16% to around 12% in 2050, while that of the EU will fall even further from 15% to below 10%. By contrast, China and India may reach 20% and 7% respectively by mid-century. Will this re-balancing have implications for the commercial basis of new leisure activities, including active recreation and sport?

The re-invention of retail real estate

Internationally, retail malls are struggling to attract custom and are turning to new concepts such as 'retail-tainment' that blend the broader elements of leisure such as socialising, physical activity, and technology to create more compelling experiences. In the future the leisure centre and the shopping mall may become synonymous as a local recreational destination. Given the international nature of the business, these ideas are likely to be a part of New Zealand's urban leisure landscape too.

The phenomenal rise in popularity of trampolining in the UK is an excellent example of this re-invention of underused retail space. The first trampoline park in the UK opened in May 2014, but there are now already around 100 parks across the country, with additional ones planned.

Trampolining is but one of a multitude of alternative leisure experiences that are emerging to tap into people's desire to try something new while socialising and often re-purposing low-performing retail environments. Under the umbrella of [competitive socialising](#) an array of active recreation ideas such as axe-throwing have become common.

Changing focus of human purpose

The debate over the future of work may just as easily be cast as the future of leisure. If the more extreme projections of automation's impact become reality, the amount of time available for leisure may become significantly greater. This may erode our current belief in the inherent value of jobs and paid employment. Alternatively, this could lead to increasing inequalities and lower incomes that preclude individuals engaging in meaningful leisure activity.

What's changing?

Reshaping of identity

Given the dominance of work in our lives and the importance society places on it, how we think of ourselves is often influenced by our vocation. If the more extreme projections of automation prove correct, both job losses and uncertainty of career projection may lead to a significant loss of work-related status and the need for greater focus on other forms to generate identity and self-worth.

As an example, commentators typically suggest that the jobs available in twenty years are unimaginable to us today. This observation overlooks the fact that a critical source of meaning in work is the psychological fulfilment of not just meeting a specific job's demands but advancing within a career. That requires a reasonable expectation of our employment future and the inability to assess its trajectory will reinforce the need to develop meaning through other aspects of life, including leisure.

Shifting gender perspectives

There appears a distinction between the quality and focus between the genders on their available leisure time. Whether this will change over time is dependent on a re-balancing of care roles and income.

Motherhood generally still comes at a significant price for women with the gender pay gap more significant among parents than non-parents⁵. The wage difference in New Zealand is 5.7 per cent between men and women without children, but 12.5 per cent between men and women who were parents. The potential implication is that unless this gap is closed men are more likely to have a higher financial capacity to engage in leisure activity, and that will particularly be the case for lower-income households.

5 Parenthood and Labour Market Outcomes (2018); Ministry for Women

A [2016 US survey](#) found that retired women are more likely than men to be busy caregiving, socialising with friends and family and giving back to the community. Retired men are more likely to be engaged in leisure and working. Women spend more time than men during their working years caring for family members, and this would likely carry over into retirement.

Aging

The trend to increased longevity is generally regarded as a positive, though a protracted period of retirement can also lead to greater levels of stress if time is not actively used. How can individuals be best supported to develop the skills necessary to engage in the changing landscape of active recreation?

[Lancet researchers](#) argue that the gain of about 30 years in life expectancy in Western economies, including New Zealand, stands out as one of the most important accomplishments of the 20th century. One outcome of this new landscape could be more people working longer and chasing fewer jobs. Alternatively, there may be a shift toward part-time work, both for those in later retirement years and those in younger demographics too. Particularly in this latter outcome, there is likely to be more focus on constructive leisure time as a means for fulfilment in old age.

The mere availability of more time in retirement is no guarantee that it will be expended on active recreation or sport. Just as financial literacy is not innate, the knowledge needed to pursue constructive leisure requires more than just a focus on the skills of a particular activity. Later years may impair an individual's capacity to engage in previous interests and older adults will need triggers to take up more active living and ignore the stereotypes of aging.

[Institute of Economic Affairs](#) research indicates that while retirement may initially benefit health (by reducing stress and creating time for other activities), adverse effects increase the longer retirement goes on. It found retirement increases the chances of suffering from clinical depression by around 40%, and of having at least one diagnosed physical illness by 60%.

Similar evidence appears at younger ages too. In the Netherlands, where people have more leisure time than most other countries in the world, workers also report the highest levels of stress. The available leisure time becomes used for recuperation rather than recreation.

Increasing interdependency

As the speed of change increases in related sectors, the links between these and leisure activity become more variable. For example, venues may be increasingly impacted by climate change, travel may be subject to increasing congestion, and movement itself may be curtailed for health-related reasons such as an outbreak of measles. Similarly, sports facilities may be impacted by water restrictions, or travel constrained by restrictions on car use to combat pollution spikes.

What's changing?

Climate change impacts

The respective impacts of climate change are likely to drive the need for more resilient planning of activities including the provision of real-time participant and spectator information.

While the amount of [warming in New Zealand](#) is likely to be lower than the global average, higher temperatures are now inevitable with the northeast of the North Island warming the most. The shift to warmer winters with fewer frosts may open up new opportunities for outdoor leisure time, though hotter summers will bring increased risks of heat stress.

The likelihood of more frequent intense winter rainfalls will increase river and flash flooding when urban drainage systems become overwhelmed. Pitches and outdoor facilities will be increasingly affected by these episodes. Similarly, sea-level rise will impact leisure facilities dependent on coastal infrastructure.

Increasing drought intensity and drier conditions will likely impact leisure options reliant on natural playing surfaces. Drought will also affect river flows that are likely to be lower in summer and higher in winter. Increasingly variable flows and water quality may disrupt some forms of water-based activity.

Transportation growth

The ability to access central leisure facilities is contingent upon good mobility options that may experience increasing variability.

Mobility will remain a key determinant of New Zealander's participation in activities reliant on central facilities. [Ministry of Transport scenarios](#) suggest that if people wish to retain current models of private mobility, there is likely to be a 35% increase in passenger vehicle kilometres travelled by mid-century. The congestion implied by this scenario is significant. Combined with increasing urbanisation, this may suppress demand for some leisure activities. Alternatively, mobility levels may reduce if lifestyles become more online focused and/or energy costs increase significantly.

Increasing income inequality

There is an increased interest in income equality in New Zealand. Inequality measures of annual income per adult rose during the late 1980s until the early 1990s, but have been fairly flat since. This does not belie the fact that a number of leisure pursuits are price sensitive.

Shifting balance of aged-care provision

As the proportion of the population becoming elderly increases, the pressure on younger family members to provide support will increase. This may impact the consistency of available leisure time at all age levels.

Historically, families have provided a bulk of the care needed to keep seniors active and living independently. The [current US caregiver support](#) ratio of 7:1 (seven potential family caregivers for every person 80 or older) is forecast to drop to 4:1 by 2030 and under 3:1 by 2050. Given the [aging New Zealand population](#), these ratios are likely to be similar with implications for the carers free disposable leisure time and the capacity of the elderly to remain active if care is unavailable.

The exponential growth of the 85+ cohort and a decline in the population most likely to provide regular care implies an increasing demand for family care. Declining birth rates and rising female labour force participation among pre-retirees point to a reduction in the future availability of family members to provide informal care.

Government perspective

The continued three-year political cycle will ensure that the focus of the respective government's interest will remain a potent source of potential short-term change.

Pressure on government finances, rather than political ideology, is likely to remain as the most critical factor influencing the support of active recreation and large-scale leisure provision. With an aging population, the most significant source of that pressure will come from superannuation costs that currently accounts for 16 per cent of core crown revenue. Projections are that retired people will number 1.1 million by 2031, with accompanying pension costs increasing to \$20 billion a year compared to \$12.2 billion in 2015/16.

Analysts are increasingly pointing to an imminent 'demographic crunch' that will see [government expenses rising faster](#) than income gained through tax, which will potentially force future administrations to take drastic action. Government have traditionally encouraged healthy forms of leisure to reduce health costs, but can the linkage between these two elements be strengthened to underpin future funding?

eSports and the use of Millennials' time

This section looks at eSports in the context of how young people will use their future leisure time, and supplements the 'future of leisure time' paper.

To date we have focused on eSports in the context of whether or not it is a sport. Arguably, of greater significance is the impact eSports will have on the discretionary leisure time of millennials, including time being physically active, and how it will challenge and disrupt traditional sport and recreation offerings.

This section sets out the trends in eSports, the underlying drivers of these trends, and the possible implications of eSports on the play, active recreation and sport sector within the next 10 years.

Summary implications

Shifts in support	Millennials follow a much broader range of both traditional and alternative sports than adults, and have a far greater selection of viewing alternatives.
Redirection of brand investment	Consumer brands will follow their customers to eSports platforms.
Disruption to sport and broadcasting models	eSports challenging traditional sport to rethink how it provides itself as an entertainment, event and media proposition that appeals to younger audiences.
Wellbeing	Screen-time and burnout has negative impact on mental health.
Gambling and integrity	Will significant wagering on eSports come at expense of traditional sport? Performance enhancement and gambling practices will raise integrity issues.

Trend definition

Some identify eSports as the world's fastest-growing sport and the first sport, outside of football, that is truly global. Others believe it lacks sufficient physicality to even be considered a sport. What is not in question, is that eSports is a huge passion point for many people under 30, and is taking up a significant share of their discretionary time.

Until recently, the eSports market has been insignificant. A variety of factors have contributed to its rapid rise, including an increasingly wide array of games, the emergence of streaming videos, the convergence of various established industries, and the growing legitimacy of eSports.

While revenues associated with eSports are still relatively modest by comparison with conventional sport, the levels of investment, spectator numbers and participants have seen significant growth in recent years and are anticipated to keep growing.

Much of the data on eSports relates to Asia, North America, and Europe, where eSports is well established. While eSports is still in its infancy in New Zealand, the global trend data is highly relevant to us, and signals the likely growth of eSports here.

What are eSports?

eSports is most commonly defined as organised multiplayer video game competitions between players, either individually or in teams. [eSports range](#) from real time strategy games, to ego-shooters and sport simulations, with each game being as distinct as football, skateboarding or waka ama. Sport simulations are growing in popularity (notably FIFA 19), but fall outside the top 10 most watched eSports. The online battle arena and first-person shooter games are where current popularity and growth reside.

Building on the history of amateur video gaming, the sport has seen an upsurge in interest from the late 2000s as growing internet bandwidth has enabled the viability and growth of live streaming events. This has attracted promotional capital and supported the emergence of professional gamers.

What's changing?

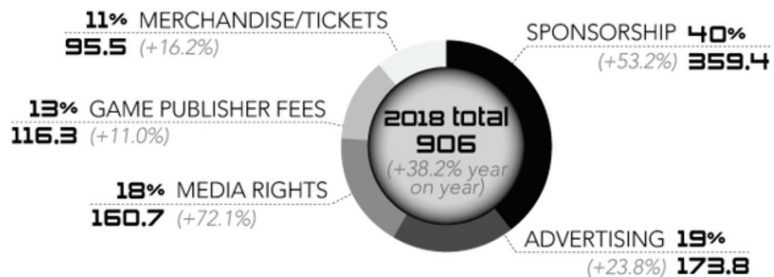
Industry growth

In 2018, worldwide revenue generated in the eSports market was anticipated to be US\$0.9b (Table 1). In terms of revenue, Asia was the [biggest eSports market](#) overall, followed by North America and Europe. Analysts are anticipating this growth to continue, with projected [\\$2.5b revenues in 2020 and \\$3b by 2022](#).

TABLE 1

Esports revenue is projected to jump nearly 40% this year

Breakdown of revenue streams (in millions of dollars)



Source: Newzoo Global Esports Market Report 2018

Of the three major eSports countries (South Korea, China and the US) [a recent PwC report anticipates uptake of eSports will grow the fastest in China](#), at 26.3%. Chinese IT giant Tencent Holdings, itself a game developer, agreed with the eastern city of Wuhu in May 2017 to transform the city into an eSports hub, with a dedicated stadium to host international tournaments and an eSports university to train the next generation of players. E-commerce powerhouse Alibaba Group Holding is already deeply embedded in the industry through its subsidiary Alisports, operating the World Electronic Sports Games international tournament.

Tencent [published a report on the eSports market in China](#) which says that the market size is expected to grow to \$1.5b in 2020. 24% of Chinese eSports users are female, 69% of whom are 21-30 years old.

In 2017 China had an eSports user base of 250 million people, which accounted for 64% of the 390 million global eSports users. The global user base is expected to grow to 590m in 2020, with Chinese users growing to 350m.

[Deloitte Australia recently noted](#) that its local scene is very light on talent due to its small player base. Its smaller geographic region means it has less players than other countries around the world. Australian internet is partly to blame, as it does not have the speeds to compete with other players globally and is therefore limited to its smaller talent pool.

New Zealand is likely in a similar position to Australia, [being ranked 52nd](#) on the list of eSports earnings by country (2019), although our internet speeds are better than in Australia. ESports NZ has a membership of only 950, but a million New Zealanders play video games.

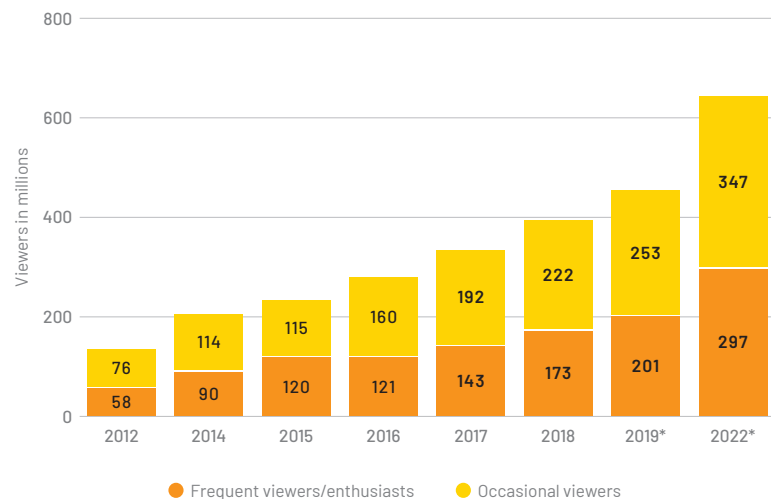
Around 64% of New Zealand's online population are [gaming enthusiasts](#). Of these just over a third watch live-streamed game video content. The most common persona among gaming enthusiasts in New Zealand are people who play games, typically on mobile, to pass the time. eSports is not a major part of their lives. This may change.

Spectator growth

The global video games market will generate revenues of \$180.1b by 2021, and eSports will be a major driver of this. [Surveys indicate that the proportion of adults](#) who have watched competitive video gaming varies from China (45% of adults), the US (12%), Germany (11%), UK (7%).

An in-depth report into the eSports economy shows that [audiences will grow to 453.8 million worldwide in 2019](#), up 15 per cent from 2018 (Table 2).

TABLE 2 ESports AUDIENCE SIZE WORLDWIDE



[Deloitte estimates](#) that the burgeoning eSports industry will reach a global fanbase of 600 million people by 2020 which would see it overtake the NBA.

In 2018, there were 588 major global eSports events, and by 2021, the global eSports audience is [expected to grow to over 580 million globally](#).

The 2018 League of Legends world finals attracted 205 million concurrent viewers. That's already a lot bigger than the 2015 Rugby World Cup final (120m), the 2018 NFL final (100m), and the 2018 NBA finals (32m), but behind the Football World Cup final (1b).

In 2018, eSports enthusiasts around the world [watched 6.6 billion hours of eSports video](#). By 2022, there are expected to be almost 300 million frequent viewers of eSports worldwide, a vast increase from the 58 million in 2012. Additionally, some 347 million people are forecast to be occasional viewers of eSports by 2022.

eSports demographic is young and diversifying

While its audience is typically male and millennial, there are signs eSports is becoming more diverse. About 29% of US fans between the ages of 13 and 40 began watching in the past year and they "skew less male and are less likely to be millennials than fans who have followed eSports longer," according to a

report from Nielsen. That same report said women now make up approximately 25% of the US fan base, and [women could account for half of eSports viewership growth](#) over the next year.

There's still a distinct lack of professional female gamers to watch, however, and it is one reason why the industry remains unattractive to many women. Currently, all the world's major eSports competitions are technically mixed gender – even if there is little actual diversity in them. Although it seems counter-intuitive, [some are arguing that to create better gender balance in the long-term](#), there should be women-only eSports tournaments created in the short term.

[A study that reviewed gender and gaming](#) determined that even though there are approximately equal numbers of males and females who play video games, most professional gamers are male. Moreover, female players who achieve some level of success are marginalised. Researchers concluded the “video game culture is actively hostile towards women in the private as well as the professional spheres.”

Convergence of eSports with tradition sport

Football and basketball are leading the convergence between eSports and traditional sports, largely motivated by increasing revenue and connecting with a young fanbase [increasingly disinterested in traditional sport](#).

FIFA 19 is the most popular sport simulation game. The Premier League and the Bundesliga have their own FIFA leagues, with every constituent club represented. Bundesliga club Hertha Berlin went a step further, opening their own FIFA academy in January 2018.

Twenty-one NBA franchises have an eSports team, each with their own training camps and expansion draft selections (mirroring the NBA). Some commentators believe that eSports basketball franchises could be [worth the same as NBA teams](#) (US\$1b) in the near future.

Cultural integration

The cultural integration of interactive video games into society is a major contributor to the growth of the eSports industry. The millennial generation has grown up participating and watching eSports as its cultural norm. This new ‘norm’ is starting to shift the norms of older generations.

eSports provides millennials with the opportunity to capitalise on their favourite past times, playing videos games, watching video game content, and communicating with each other. Growing up during the rise of the smartphone, millennials have established media preferences that stand in sharp contrast to their Baby Boomer and Gen X counterparts.

Broadband access and speed

The combination of the widespread availability of computers and faster internet connections in households, along with platforms like Twitch, have enabled eSports to be cheaply and easily live streamed to millions of viewers with minimal network delays.

[Live streaming has dramatically increased over the past few years](#) as a competitor to traditional broadcasting and content streaming. This has only been possible through the growth of internet bandwidth.

There are also now multiple platforms like Twitch, YouTube Gaming, Facebook Live, Mixer, and Caffeine that all feature gaming content, and which are expanding into other content types, including traditional sport.

Cross-media and broader tech-sector integration

Convergence of telecoms, media, sports and entertainment is driving the growth of eSports. [The competition for eSports content is growing, with media and telecom companies vying for rights to teams and leagues.](#)

[Deloitte Australia notes](#) the natural synergy with eSports and telcos, and predicts that telcos will explore eSports as an integrated telco-tainment offering, and a perfect fit for demonstrating their 5G credentials and targeting the next generation of smartphone users.

There is a significant linkage to the broader video game industry and many game developers are actively designing with a professional eSports subculture as their target market. [Employment of gaming software developers, graphic designers, virtual reality engineers, multimedia artists, and animators](#) is projected to grow six percent from 2014 to 2024, according to the U.S. Department of Labor Bureau of Labor Statistics.

Forty-two percent of the gaming market belongs to the mobile industry, and [mobile is projected to claim more than 50% the market by 2020.](#)

Legitimacy

Integration within education settings

While traditional sports continue to be heavily integrated into the educational structure of most countries, including New Zealand, eSports clubs have begun to emerge and establish themselves, most notably in the collegiate clubs and tournaments, and through integration into university programmes.

[Tencent eSports is collaborating with the University of Oxford](#) to create tournaments and courses to drive global development of eSports. The UK's Staffordshire University [launched an eSports degree course](#) in September 2018. The [State University of New York at Canton added eSports](#) to its athletic offerings in 2018 and created a residence hall for its eSports players. [In 2018 The University of Akron \(Ohio\) established dedicated e-arenas](#), varsity teams for four titles, an associated club and a behind-the-scenes crew of staff as well as student coaches. The programme will follow traditional varsity athletics standards, complete with tryouts, uniforms and mandated practice schedules.

Acceptance as a sport

While eSports are becoming increasingly prominent, they are not regarded as "real" sports on a global scale, particularly in most European countries. In contrast, [eSports are officially recognised as sports in Asian countries and will be part of the Asian Games in 2022.](#)

[The World Cyber Games 2019 will take place in the same country](#) as the upcoming 2022 Asian Games, which may include eSports games as medalled events.

There have been recent events where eSports have run in conjunction with conventional events. Melbourne touted itself as Australia's "home of eSports" since launching the Melbourne eSports Open in September 2018 and [hosted a Fortnite tournament at the Australian Open](#) with US\$355,000 prize money.

eSports typically younger demographics may be the [factor that ultimately convinces the IOC to add eSports to the Olympic Games at some point.](#) Viewership for events, both online and on TV, has regularly outpaced that of major traditional sports tournaments.

The question of whether eSports are sports is a question currently in front of Sport NZ, through an application for 'recognition' from the national body for eSports, and a request by RITA to take bets on eSports (only permissible if we deem it a sport).

Implications for the play, active recreation and sport sector within the next 10 years

Shifting support

It is clear that eSports will have an impact on the discretionary leisure time of millennials in New Zealand. This will have implications for traditional sport and active recreation offerings.

Millennials are currently split in terms of their loyalty to traditional sports and competitive video gaming, according to a [LEK Consulting survey](#). While 18 percent are undecided, 40 percent of millennials prefer eSports compared to 42 percent who still favour traditional sports.

Unlike their Baby Boomer and Gen X predecessors, millennials follow a much broader range of both traditional and alternative sports as adults, and have a far greater selection of viewing alternatives.

An estimated 91% of eSports enthusiasts also follow or play traditional sport, but are increasingly directing more time to eSports, with 76% transferring some viewing time from those traditional sports to eSports.

Redirection of brand investment

Consumer brands will follow their customers to eSports platforms, and will also covet eSports millennial audience given their spending power. Most of the money in the eSports scene right now comes from brands, with [Newzoo expecting them](#) to account for \$516 million of this year's \$696 million market

[Many brands such as Coca-Cola](#) are investing in eSports to appeal to younger demographics through the creation and promotion of gaming tournaments.

There are examples of traditional sport using eSports as a means to connect with an audience they have not been able to access. The Tennis Australia Fortnite event at the Australian Open is an example, where tennis was opened up beyond just tennis fans, and found a use and an income generator for a space that would have otherwise been empty. The Open was transformed from a tennis only event into an entertainment event with broader appeal.

Disruption to traditional sports models and sports broadcasting

eSports are challenging traditional sport to rethink how it positions itself as an entertainment, event and media proposition that appeals to younger audiences.

Consumption of eSports is social in a way that traditional sport is not, with 'chat' and social interaction literally built into the distribution platforms. [A US\\$90m two-year deal offering the exclusive streaming rights to giant digital platform Twitch](#) has enabled several eSports-event organisers to sharpen their understanding of how fans use streaming to interact directly with content. eSports viewers on streaming platforms can post comments in real time while watching. Fans are also able to make monetary donations to their favourite players online during a competition, a practice that is turning into a significant revenue source for many amateur and professional players.

Traditional sport and broadcasters looking to attract the millennial fanbase will need to incorporate these features – which means getting comfortable with an unmoderated stream of fan comments and interaction, and losing some control of the product.

There are signs of this beginning to occur. In late 2018, Twitch live streamed NFL games and provided supplementary commentary during the game, similar to an additional sportscaster. This allowed the audience to participate in chat alongside the streamer during the game, creating a fundamentally different experience for the viewer than a traditional live broadcast.

The lack of an international governing body will also challenge the traditional model for sport. It is unlikely the disparate eSports will consolidate into one body. This will be a challenge for entities such as the International Olympic Committee.

Negative impact on wellbeing

The emergence of the eSports sector occurs at a time when the demographic most likely to engage is experiencing pressure on mental health. New Zealand's suicide levels are in line with the OECD average, but [for males under 25, we have the highest rate](#) – and Māori are disproportionately represented in that statistic.

It also comes at a time when one of the world's foremost authorities on child mental health has [issued a warning](#) that technology is threatening child development by disrupting the crucial learning relationship between adults and children.

The management of the interrelationship between the two trends will be critical as [mental health issues remain a pervasive problem in the eSports scene](#) amid reports of eSports players [burning out in their 20s](#).

Gambling and integrity

An [October 2016 report](#) estimated that \$5.5 billion in cash and virtual items were wagered on major eSports titles in 2016, noting that the majority of bets were placed on underground betting sites. The same report projected \$12.9b in eSports bets will be placed globally by 2020. [More bullish forecasts suggest a figure closer to \\$20b](#).

Similar to the world of traditional sports, the growing popularity and profitability has led to an increase of in-game monetary exploitation and fraud, betting on the outcomes of eSports matches and tournaments, and cheating.

eSports athletes are using performance enhancing drugs such as Adderall to improve focus and reaction time. The motivation for performance-enhancement comes from the massive prize pools on offer.

Availability and sustainability of funding to the play, active recreation and sport system

This section reflects on the availability and sustainability of funding to the play, active recreation and sport system. It considers current funding sources for the system, and identifies those that are most at risk, and those that are underdeveloped, and considers the possible implications from changes to the funding profile.

Funding is required to fuel our system. Class 4 gaming is the source most immediately at risk. Its decline could have significant implications for our play, active recreation and sport aspirations. We have options to mitigate the impact of its decline. These include slowing its decline; growing other funding sources; and improving the use of existing funding sources.

Summary implications

Ability of participants to pay	Rising levels of personal debt means increasing numbers of people are susceptible to an economic downturn which may compromise their discretionary spend on sport and recreation.
Declining live audience	Differing priorities among younger fans, high ticket prices, poor in-venue experience, changing viewing habits/media consumption all contribute to declining revenues from ticketing and merchandising from live events.
Rise of virtual reality audiences	5G-enabled virtual reality devices will also allow fans to experience live games from virtually anywhere and with friends across the globe.
Changing local and national government priorities	Responding to climate change and an aging population may result in spending on play, active recreation and sport becoming more discretionary.
Decline in Class 4	Political changes, a continued negative image with local government, the rise of alternative gambling options and decreased accessibility point to a decline in critical funds from Class 4 for community initiatives.
Rise of online gambling	New Zealanders are expected to increase their gambling with offshore online agencies, spending over \$500m per annum. This will impact spend on NZ gambling products that return funds to play, active recreation and sport.
Rise of social enterprise	This may result in a shift from traditional businesses using sponsorships as their means of delivering social good to societal outcomes being embedded in businesses mission and practice.

Background

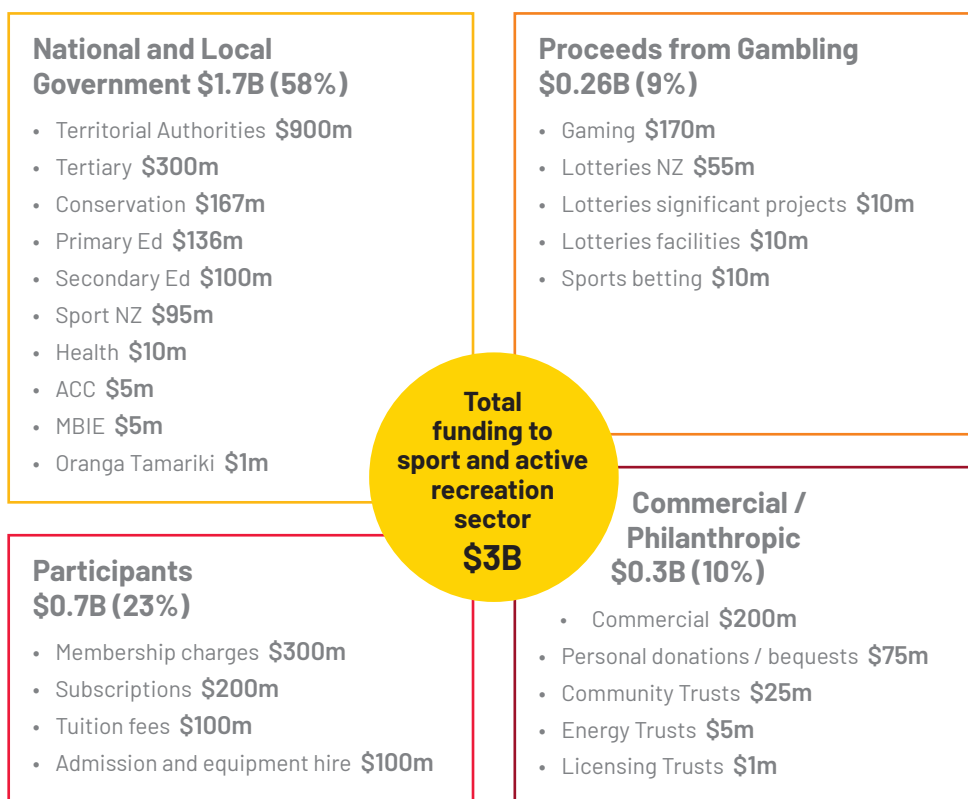
Importance of sustaining funding to our system

Funding is required to fuel the play, active recreation and sport system. Through oversight of the system and environmental scanning we are aware that some current sources of funding are at risk. This threatens the delivery of our aspirations. It is therefore in our interest to understand these risks and mitigate them where we can – ensuring our system is fit for purpose over time. A key mitigation is to protect and grow current sources of funding and introduce new sources to maintain the financial viability of the system. Improved viability might also be achieved through better use of existing or even diminished funds (challenging the assumption that the system needs more funds).

Funding sources for our system

To assist with understanding the emerging funding context, it is important to first understand the sources that fuel our system. Figure 1 provides an overview of these sources.

FIGURE 1



National and Local Government

Much of the funding from national and local government is in the form of fixed assets – the spaces and places that play, active recreation and sport occur such as recreation centres, school gyms, parks, playing fields, walking tracks, roads and other urban environments. These spaces and places are critical to the delivery of play, active recreation and sport aspirations.

In addition, both local and national government also allocate funds to play, active recreation and sport programmes such as teaching of sport skills, learn to swim, targeted community interventions, holiday programmes, injury prevention, healthy families etc. These funds are more fluid than those related to spaces and places.

Participants

Participants directly pay for play, active recreation and sport services. This can be grouped into membership charges (e.g. netball club), subscriptions (e.g. gym membership), tuition fees (e.g. golf coaching), and admission and equipment hire (e.g. attending rugby match or hiring skis).

Increasing participant user charges is a potential means for increasing the flow of funding, but always needs to be weighed against cost being a barrier to participation. Indeed, we are aware that deprivation is a significant contributor to non-participation, and funding from 'participants' excludes those unable to participate.

Commercial/Philanthropic

The philanthropic sector in New Zealand is relatively small when compared globally⁶. This belies the generous nature of New Zealanders. Personal giving totals about \$1.5b principally comprising donations (\$1.4b). Family and individual trusts provide \$0.25b in giving, with Community Trusts contributing \$100m and Energy Trusts \$265m.

The play, active recreation and sport system receives a modest 6% from philanthropy marking it as a funding source that could be grown.

Commercial funding can be difficult to source and is often tied to higher profile sports and events. However, association with the wellbeing agenda makes play, active recreation and sport an attractive proposition for brands and organisations wanting to align with the wellbeing of New Zealanders.

Proceeds from gambling

Proceeds from the four forms of gambling in New Zealand total \$0.75b from total expenditure of \$2.38b. The play, active recreation and sport system does well from gaming, receiving \$170m of the total \$340m proceeds in 2018. For the same year, the sector also received \$75m from Lotto proceeds of \$243m, and \$10.2m from \$160m in distributions from betting on sport and racing. Negligible proceeds are returned to the community from casino profits.

The accessibility, broad discretion in its allocation, and low compliance costs make the proceeds from gambling a particularly valuable funding source to the play, active recreation and sport sector. In 2018, the 35 gaming societies provided 28,000 grants to 11,800 recipients for community-related initiatives.

What's changing?

Government - a reliable source of funding

Government funding to play, active recreation and sport is predominantly directed via Sport NZ, which has as one of its functions to allocate funds.

Since the inception of Sport NZ (formerly Sparc), the Government has been a reliable source of funds for the play, active recreation and sport system. From the initial five-year funding package that progressively grew to \$40m, Government funding has now grown to \$95m per annum.

In seeking additional Government funding, Sport NZ needs to reflect on the Government's broader aspirations (as opposed to taking a narrow focus of its own organisational needs). Currently, this relates to wellbeing. The Government will be seeking initiatives that demonstrate how funding improves the wellbeing of identifiable individuals and groups - what extra do they get by investing more in play, active recreation and sport aligned to wellbeing? Sport NZ needs to give them something they are trying to achieve and something they can sell to the public as offering great value for the taxpayer dollar.

The pressure of an aging population on government finances will likely have the effect of challenging future expenditure budgets.

⁶ Level in individual philanthropy in US is almost double that of NZ (relative to GDP)

Government funding can also be influenced by left-field issues. COVID-19 is merely the most visible of the current crop of wild-cards, with responding to unexpected events such as the Christchurch earthquake and the changing climate also likely to impact Government funding decisions.

Local funding

Local Councils spent \$914m (8.9%) of their total operating expenditure on sport and recreation in the year to 30 June 2018 – compared to \$847m in the previous year.

In general, urban councils spend a higher proportion of their operating expenditure on sport and recreation than their rural counterparts. Hamilton tops the list at 18.6%, Auckland (13.2%), Wellington (9.5%), Christchurch (7.7%)⁷.

Funding for play, active recreation and sport will compete with rising priorities connected to climate change, aging infrastructure and other emerging priorities. The challenge for play, active recreation and sport is to demonstrate it remains important to the wellbeing of the citizens that local government is serving. Failure to do this risks funding for play, active recreation and sport being viewed as discretionary.

The play, active recreation and sport sector needs also to be mindful that activities that negatively impact emerging priorities will be at risk e.g. outdoor facilities requiring extensive water.

Participants ability to pay

A future economic downturn, with a consequent increase in inequality, could see significant sectors of society become far more price-sensitive to recreation and sport engagement. This implies less commitment to ongoing gym/club memberships and a shift perhaps to more pay-as-you-go arrangements. Constrained availability of time for those needing to work multiple jobs may further impact engagement in recreation and sport.

Declining live attendance

Attendance at live sporting events has been on the decline for several years with no obvious reversal of this trend evident. As a result, ticket sales revenues are down and sports properties everywhere are struggling to find ways to make up for the lack of dollars coming in through ticket sales, concession revenues, parking, and merchandise sales. The cause of this problem can be attributed to a multitude of different factors - differing priorities among younger fans, high ticket prices, poor in-venue experience, changing viewing habits/media consumption, and increased access to watch the game and receive highlights and analysis.

The introduction of 5G wireless technology may improve in-stadium experiences as mobile devices provide instant replays, live-TV graphics, faster connectivity, and expedited food and beverage orders. 5G-enabled virtual reality devices will also allow fans to experience live games from virtually anywhere and with friends across the globe.

Commercial opportunities

Technology that allows fans to watch any game at anytime from anywhere, combined with a growing world population, should suggest a positive commercial future as sports audiences increase in size. Codes are becoming concerned with slowing revenue growth though as attention spans shrink. With annual declines of 3% in the number of minutes watched per game per sport per year being reported, the focus for sports such as cricket is to sell the rights to highlight clips rather than screen whole matches. This pressure is leading to increasingly intense competition between sports for fans' money and attention.

⁷ These rates are not necessarily reflective of ongoing contributions and can reflect historical underspending or other one-off priorities.

This 'attention-deficit' challenge, however, makes it easier for online pirates to profit from sports coverage. Digital piracy is a genuine threat to the economics of global sport, estimated to be worth \$90 billion annually. With broadcast rights buyers already coming to terms with a changing commercial and platform dynamic brought by digital, sports are already having to work harder to maintain revenue streams.

Class 4 gaming

Gaming proceeds have been in decline since the industry was regulated in 2003, with reducing venues and machines (down 10,000 in past 15 years). One third of all local councils, including the two biggest markets of Auckland and Christchurch, have sinking lid policies⁸ in place. While the decline has been masked in the past three years through population and economic growth, the industry remains highly susceptible to further decline and possible collapse.

The sustainability of Class 4 funding to play, active recreation and sport is at risk due to:

- Potential political changes – a stronger Green voice would hasten the decline of gaming, aligned to its strong anti-gambling position
- A negative image with local government who have responsibility for gambling policy – including sinking lid policies
- Decreasing accessibility with continued venue closures
- Changes to consumer preferences in the gambling sector – most notably competition from online gambling
- The complexity and costs associated with the regulatory model (making it difficult for Class 4 to develop and compete with other gambling products)
- Potential demographic changes in the gambling population
- Exposure to economic downturns – revenue fell 20% during the global financial crisis
- Increased proactivity from other sectors – sport and recreation receive 54% of total proceeds.

Should Class 4 funding no longer be available the impact would be immediate and significant. No precedent for the loss of funding of this magnitude exists. The impact from the cessation of smoking sponsorship in the mid-1990s was negligible due to the availability of significantly new funds generated by gaming.

Given the local designation of gaming funding, pressure for replacement funding would likely fall on local government. It is unlikely ratepayers would welcome this additional burden.

Lotto funding

Sport NZ receives \$55m in funding from the Lottery Grants Board (LGB) to fund community initiatives. In addition, the play, active recreation and sport system receives a further \$20m through LGB Committees for facilities (\$10m) and significant projects (\$10).

While the funding to Sport NZ has fluctuated and caused some budgeting challenges, profits have been tracking upward, and the 20% share of net profit to sport and recreation, agreed at the outset of Lotto, looks increasingly like an inspired deal.

It is worth reflecting that Lotto was introduced to fund sport and recreation as an alternative to the portfolio attracting Government vote. At the time of its introduction in 1987, this equated to \$30m, and was the total of funding for the Hillary Commission and the Sports Foundation (excluding any corporate funding the latter attracted), until the inception of Sparc in 2002. Sport NZ (\$30m) and HPSNZ (\$65m) now attract significant Vote funding in addition to lotto funding.

⁸ Sinking lid refers to gaming machines not being replaced when a venue is sold or closed.

Sport NZ should be mindful that any review of Lotto may factor in our increased Vote funding when considering whether a fixed 20% of profits remains appropriate.

Sports betting

Sports betting has increased from 10% of NZ Racing Board's total turnover in 2003/04 to 27% in 2018 and is anticipated to keep growing, making it increasingly important to the NZ TAB. Commission payments to the 34 national sports organisations (NSOs) that have a contract with the NZ TAB have correspondingly increased from \$3m in 2003/04 to \$10.2m in 2018. However, like Class 4 Gaming, it is threatened by increasing numbers of New Zealanders betting with offshore agencies.

The sport sector has been strongly engaged with the review of racing and associated legislation. Through this, it seeks to support the global competitiveness of the NZ TAB; and to improve the volume and distribution of funding from sports betting to the sector.

Both sports betting and lotto are susceptible to increased numbers of New Zealanders betting online with offshore agencies. Offshore online gambling is already significant (between \$250m and \$350m in 2019) and is expected to double in the next couple of years to over \$500m.

Philanthropy - a largely untapped source of growth

Crowdfunding has become an increasingly popular aspect of philanthropy. It is the practice of funding a project or venture by raising small amounts of money from many people, typically via the Internet. In 2015, over \$60b was raised worldwide through crowdfunding. Specific events can draw considerable funds, as evidenced by the purchase of Awaroa Beach in 2016 by 40,000 New Zealanders.

Social enterprise - a new form of fundraising

A social enterprise's main purpose is to promote, encourage, and make social change, and is typically created to further a social purpose in a financially sustainable way. Social enterprises appear to be an increasingly important model for societies and are often driven by young leaders.

More New Zealanders are willing to pay for ethical products than ever before and want to work for companies that are thinking about their social and environmental impact.

As more consumers, employees and investors expect businesses to play a greater role in society, and with the rise of the Māori economy (often characterised by mission-driven businesses), it is likely that the rise of social enterprise and corporations as a force for good will continue.

This might mean a shift from traditional businesses using sponsorships as their means of delivering social good to societal outcomes being embedded in businesses mission and practice.

Future changes to the structure and function of society

The anticipated changes to the structure and functions of society are being predominantly driven by the impact of technological advances.

This will result in dramatic social change, the most extreme of the four social contexts typically identified by [social change theories](#) (the other three being stability, inertia, and incremental social change).

Dramatic social change occurs when the following three factors are impacted simultaneously and with speed:

1. **Pressure on social structure:** The resilience of institutions that moderate society's function.
2. **Change in societal norms:** The propensity for the majority of the population to abide by common norms and rules.
3. **Personal and cultural identities:** The ability of individuals and communities to understand their source of identity and worldview.

This section focuses on the drivers of change impacting these three factors of dramatic social change globally and within New Zealand, both currently and into the future.

These drivers of change include changing models of trust; the growth of pervasive surveillance; a move toward new forms of more accessible power; the rise of hashtag politics and sports activism; increased feelings of social isolation; the changing nature of work; increasing immigration pressures; and personal identity becoming more varied.

Sport and active recreation can play a heightened role in this anticipated societal transition through its ability to bring diverse communities together, impact mental health and resilience, and contribute to a sense of individual purpose. This will come with challenges including the need to adapt to changes in models of trust and authority; being comfortable as a platform for social expression; and evolving traditional offerings to remain relevant to changes in gender fluidity.

Summary implications

Technology-enabled ideas eroding trust in institutions	<ul style="list-style-type: none">• Trust in organisations difficult to maintain: Particularly at international level where commercial stakes are high, pressure on integrity will increase.• Disruptive technologies used to impact athlete reputations: International competitions where the stakes are high may lead to less scrupulous competitors or states to deploy disruptive technologies. It is plausible to imagine a leading athlete being brought down not through competition, but through a faked recording admitting to drug use or similar scandal.
The growth of pervasive surveillance	<ul style="list-style-type: none">• Challenging harmful business models: The ubiquity of social media platforms has made them a fundamental component of local event organisation and information sharing. As concern increases over the (mis)use of data by platforms, what role can sport and recreation organisations play in either mitigating the challenge or supporting alternative forms of community?
Shifting power	<ul style="list-style-type: none">• Sport and recreation role to create collective resilience: At a time of unprecedented change, what role can sport and recreation play to help individuals deal with the transition constructively?
Democracy under threat	<ul style="list-style-type: none">• The need to explore alternate trust platforms: What beneficial technologies or approaches are available to ensure the future integrity of sport and recreation is seen to be maintained?
Rise of hashtag politics	<ul style="list-style-type: none">• Positioning sport in relation to broader social/political questions: as an integral component of society, the traditional perspective of sport and recreation institutions, to remain neutral on debates will be increasingly challenged.
Sport Activism	<ul style="list-style-type: none">• Staying ahead of the political curve: the speed of development and impact of social movements will remain high. How do sport and recreation bodies anticipate and respond to disparate challenges?• Athlete activism is likely to increase: If more athletes spoke up on matters of public importance, what would be the implications in a number of areas, such as fan engagement, sponsorships, relationships within teams, athlete health and welfare, and society in general?
Athlete activism changing partnership with brands	<ul style="list-style-type: none">• Funding aligned to social good: There may need to be a far broader demonstration of the social wellbeing outcomes associated with particular sport and recreation activity if future funding is to be unlocked.
Technology contributing to feelings of increased social isolation	<ul style="list-style-type: none">• Risks to physical and mental health: Evidence suggests that feelings of loneliness pose risks to physical and mental health. What role can sport and recreation play to improve mental health?• Communities could change in form and function. Communities determined by circumstance may become deemphasized in favour of digitally connected “chosen” communities. With these communities able to bring together people with shared interests and views, how might sport and recreation interact with immediate, physical communities remains in question.
Changing nature of work	<ul style="list-style-type: none">• Mental health linked to identity: Mental health statistics may worsen in the event of future dislocation in the working environment. Recreation and sport may be a critical forum to support people in finding a renewed sense of purpose.
Immigration pressures likely to increase	<ul style="list-style-type: none">• Increasing need for cross-cultural bridges: Sport and recreation as a role in social bridging and building social cohesion.
Personal identity becoming more varied	<ul style="list-style-type: none">• As genderfluidity develops, strongly gender-aligned activities will come under pressure. The few instances where questions of transgender sport participation have been raised to date are likely to become more frequent if/when wider society becomes more open to gender fluidity.• Changing profile of national sport representation: In future, the emergence of new forms of identity expression may weaken the traditional relationship between the individual's sense of identity and its embodiment through specific sporting codes
The potential for a post-gender society	<ul style="list-style-type: none">• How would sport function in a post-gender society? While mixed teams increasingly be the future norm, and could that be beneficial for wider sport and recreation participation?

Background

This section explores likely changes to the structure and function of society and how these may impact play, active recreation and sport within the next ten years. It is the third in a series of papers and follows the future of leisure and the impact of Esports on the use of millennials' leisure time. The future impact of technological change, notably augmentation, will be addressed in October.

A critical component of the extent of social change is the speed at which a particular trend shifts perspectives. Technological change is arguably the fastest moving driver of change within society, fundamentally disrupting the social fabric we have been used to for decades including the relationships between the state, citizens, communities and business, and the way we learn, work and communicate (*Timeline 2030*).

This has led to global business leaders looking for a [co-ordinated global response](#). An overwhelming 84% favour this, with half believing this response should be led by intergovernmental bodies (e.g. the UN). However, 76% feel their own or other international governments are currently not doing enough to plan effectively for the impact of technology driven change on society.

Rapid social change impacts social structure, societal norms and personal and cultural identity. This paper is segmented into these three themes.

Theme 1: Social structure pressures

Society functions through the resilient operations of social structures that help shape the norms, roles, behaviours, and values of community members that support overall wellbeing. A fundamental quality necessary for these structures to remain stable is the trust citizens have in these operations. This is being eroded by technological advances, which are also challenging traditional power structures.

Public trust in New Zealand is not at the crisis point that it appears to be in other parts of the world, although issues such as the vaccination debate point to surfacing issues. Will New Zealand maintain its levels of public trust in the medium to long term?

What's changing?

Technology-enabled ideas eroding trust in institutions

The nature of trust is undergoing a dramatic shift in contemporary society. We are moving away from a top-down relationship with established institutions and toward a new, horizontal trust relationship with peers.

Shocks like the 2008 financial crisis and even the latest ANZ expenses controversy have amplified scepticism about the established institutions at the heart of our societies, and served to hasten a process that was already underway. Technological change had been sapping confidence in institutions for some time prior to the financial crisis, with access to information about institutions heightened via the internet. Wikileaks is an example of this. Its depictions of the actions of the powerful eroded trust. The Panama Papers added to this erosion.

But new technologies don't just undermine institutional trust by revealing secrets. They can also distort the truth. [Deloitte identified credibility](#) as the component of trust to be causing numerous issues in the world today, and that people's trust in the reliability and honesty of news sources is continuing to decline.

Poorly researched, sensationalist or simply false claims spread rapidly through social-media channels, undermining traditional investigative reporting. Fake

news articles are frequently shared by people who haven't read them – let alone double-checked the content – simply because the headline reflects their worldview.

Fake news is also getting harder to detect. With just 3.7 seconds of audio, [a new AI algorithm](#) developed by Chinese tech giant Baidu can clone a pretty believable fake voice. Much like the rapid development of machine learning software (such as deepfake) that spread the creation of fake videos. This technology shows why it is getting harder to believe any piece of media on the internet.

[Experts are evenly split](#) on whether the coming decade will see a reduction in false and misleading narratives online. Those forecasting improvements, place their hopes on technological fixes and societal solutions.

Taken as a collective, these technology-led changes amount to a significant assault on the credibility of established institutions. The problem for institutions is that rebuilding trust is exceptionally difficult. Once misdeeds have been exposed, it's hard for people to believe that the big institutions are acting properly.

The growth of pervasive surveillance

Today's technologies create a reputation trail for us all. For example, both the providers and users of Uber or Airbnb know that their ratings will affect their ability to use the services in the future. Everyone's past behaviour is visible to all.

Rating platforms able to manage vast amounts of data provide governments and commercial entities with the ability to monitor populations on an unprecedented scale, leading to a likely backlash as citizens object to perceived loss of freedoms.

The Chinese government is embracing technologies like facial recognition and AI to identify and track 1.4 billion people in a nationwide surveillance system – the Chinese Social Credit System. This system rates all Chinese citizens and appraises their overall trustworthiness, creating an immense pressure to conform and maintain a high score.

State sanctioned surveillance is not limited to China. In the US, prison authorities have enrolled hundreds of thousands of [incarcerated people's voice prints](#) into large-scale biometric databases. Technology being introduced in California this year will help decide whether those accused of crimes remain on bail or are instead incarcerated while awaiting trial. Defendants will be [graded by an algorithm](#) and officials will use this grade to determine the individual's liberty. Plans are also afoot to mine social media posts to enable the US government to infer what citizens are really thinking and feeling – and to predict what they will do next.

While these developments may seem distant to the experience of New Zealanders, recent [Five Eyes discussions](#) that focused on the need for spies and police officers to be given special, backdoor access to WhatsApp and other encrypted communications, suggests state sanctioned surveillance could increase.

Surveillance capitalists (also known as siren servers) such as Google, Facebook and Amazon have also discovered the most predictive sources of data are when they come in and intervene in people's lives, through real-time actions, to shape our action in a certain direction that aligns with the kind of outcomes they want to guarantee to their customers.

Google is no longer just about building a search engine, but instead building [the world brain that will take care of every person, all the time and everywhere](#). Amazon's Alexa team wants to take this a step further by analysing the sound of users' voices to [recognise their mood or emotional state](#). Similarly, Facebook now seeks to [own all the data of all the interpersonal/community interactions in the world](#) and profit from them.

The technology trends associated with government and social media platforms are increasingly concerning citizens who both benefit from them, but also provide the valuable data. Cambridge Analytica provided heightened public awareness on how people's data can be deployed without their knowledge to impact significant change.

New trust models

Given these and other digital related concerns, people are increasingly seeking digital trust. [Blockchain may provide the solution](#). Blockchain technology is an emerging platform for trust, providing a record of every action undertaken by anything using the technology. As such it is a kind of digital ledger in which the history of something is permanently stored.

Blockchain technology also has other uses. Think of fake news. If everything was recorded in a permanent online ledger, it would be easy to double-check claims and expose falsehoods before they spread through social media.

Blockchain may also impact the way we interact with the world. The old system of institutional trust relies on handsomely-rewarded experts like bankers, lawyers and real estate agents who were paid to act as middlemen in transactions. Blockchain has the potential to make such intermediaries redundant.

This is already happening. [Estonia provides an example](#). Blockchain serves as Estonia's public ledger that can never be erased or rewritten and lets Estonians verify at any time that their information has not been tampered with. Similarly, Dubai is working towards having 100% of government services and transactions happen on blockchain by 2020.

Shift away from hierarchical power

Digital connectivity is instigating a shift away from the old hierarchical power to more accessible forms of new power that prizes decentralisation, collaboration and transparent execution. This is changing how the world behaves, but also how individuals behave.

Before the 21st century, society was imagined as a giant machine, with people but cogs in this machine, playing standardised roles. Corporations made decisions for those participating in their power systems, believing they knew what was best.

This is changing. Digital connectivity has given rise to distributed digital networks that underpin new civil society groups (e.g. mass protests in Hong Kong), and has empowered individuals through the ability to share their views with wider audiences. This is resulting in higher expectations of interactions with business and government. People are increasingly dissatisfied with merely observing or agreeing and are demanding a right to participate.

New power is also changing people's roles. Consider the traditional 'passive' consumer who advertisers influence to buy or use a product. This advertiser role is being supplanted by the likes of YouTube bloggers. Thanks to accessible technologies, these online users are now able to create content (in addition to consuming it).

Democracy under threat

This shift in power caused by digital connectivity is raising doubt about the control of societies through current forms of political discourse, including democracy. Author James Susskind in his book *Future Politics* (2018), suggests that we are living in the [twilight of politics](#) because of the development of more capable, integrative and invasive information technologies that cannot be controlled through traditional politics.

[A time of rapid technological change](#) encourages innovative capitalists to make the rules regarding how their activities impact the rest of us. Democracy would have traditionally challenged such self-interested rule-making through

creating new regulations to protect the common good. However, this requires the belief in collective action to repair economic disparities, and for people to overcome their inherent tribal instincts and band together. Technology threatens both by creating a [100-year peak in wealth disparity](#) that currently shows no sign of reversing, while the internet works to hasten a retreat to tribes through its highly tailored foundations.

[The principle of democracy](#) is that all ideas and information can exist but without there being any structural direction that would give preferential treatment to a particular political vision. Today, the laws governing this space are largely made by platforms that escape any counterbalancing power and are not at all transparent.

Democracy used to be defined as a system in which a society debates the issues that confront it ahead of a vote being held. This description looks flawed as the process is increasingly driven by political technologists whose only concern is to deliver a majority for a paying client e.g. Cambridge Analytica.

Theme 2: Challenging societal norms

Stable society depends not only on resilient social structures, but also on the conformance of community members to habitual behaviours and norms. When the normative structure is clear, people know what to do and when to engage in specific behaviours in order to meet the overarching goals of the collective.

What's changing?

The rise of 'hashtag' politics

When looking for evidence of future social change, it is worth noting areas that are catalysts for groups to 'break the rules'. Activism conducted through social media has changed the pace, impact and reach of social campaigns and enabled disparate activist populations to align and collectively challenge norms.

[The anti-globalisation protests](#) have pioneered new ways of decentralised, leaderless and internet-enabled organising that threaten to disrupt previously invulnerable international structures. There is a regenerative dimension too as new social movements arise, they serve to funnel recruits deeper into the culture of protest.

[Climate strikes provide a clear example of counter-cultural action.](#) Less than a year after Greta Thunberg's initial protest, walkouts were occurring in at least 112 countries. In Australia, students engaged through a variety of hashtags, thereby circumventing the prohibition on schools endorsing the strikes.

[The hashtag enables the efficient emergence of certain types of communities](#) that have developed a social and political power that has only recently begun to be appreciated.

Sport as an arena for activism

Sport has a long history of political activism, but the wider emergence of social media movements and the perception of commercial advantage (e.g. Nike) are likely to strengthen this trend.

[Female athletes' activism is taking off](#) as their sport grows in status and popularity, fuelled by social media. The growing belief that it is [irresponsible not to use the global sports platform to try to effect change](#) is behind several recent political statements. Indeed, the links between sport and politics seem likely to become more prominent in the future as women become more assertive.

Gender equality activism on and off the pitch is likely to intensify as global awareness of gender imbalance has spiked in recent years. However, at the current rate of change, achieving universal gender equality could take 100 years, according to last year's World Economic Forum estimates.

TJ Perenara's 'Ihumātao' show of solidarity during the last All Black Test is an example of the growing acceptability of this type of protest within New Zealand sport.

Athlete activism is changing partnerships with brands

The traditional wisdom that brands should not express political positions has been explicitly rejected, with brands and athletes collaborating on social issues. An example is LeBron James' documentary with Showtime that looks at the changing role of athletes in the current political and cultural climate.

Brands are making long-term demographic calculations when embracing progressive political causes. In joining forces with the Bend the Knee movement, for example, Nike recognises that its critical demographics in the US and worldwide are younger and blacker than the people challenging their stance.

Political polarisation and viral social movements like #grabyourwallet, #MeToo, and #TimesUp have dramatically changed the face of brand engagement and consumer loyalty. The position of Nike and other brands reflects a recognition of this.

Being bold and taking a stance is fast becoming the norm for brand campaigns as "belief-driven buying" is at an all-time high. 90% of millennials will likely switch to a brand if it associates with a cause they support. Consequently, businesses of every size and across industries, not just sport, are getting on board with this movement.

Theme 3: Personal and cultural identities

Accelerating change that challenges societal structures and influences collective norms also has a substantial impact on the community and individual sense of identity.

What's changing?

Technology contributing to feelings of social isolation

Technology serves both to connect and contribute to feelings of isolation. While social media opens up space for greater interactivity between people, including connecting like-minded people to social campaigns, emerging data indicates that more people feel lonely and disconnected from the world around them as a result of technology. This latter trend is particularly prevalent in more developed countries and is further exacerbated by the changing nature of work.

The most widely used social media platforms are designed in a way that, if relied upon for social fulfillment, can cause feelings of loneliness and general depression. Younger generations who grew up using social media are among the loneliest-feeling subsets of the population. Children who grew up using social media reportedly show lower social literacy and emotional intelligence⁹. Social networking engines that mimic the function of online social networks are now being implemented into many other aspects of life that previously had no "social" component, risking a rise in these effects.

Technology's increasing ability to tailor products and experiences to the end user encourages a greater focus on individual needs and personal preferences,

⁹ Emerging Global Challenges; June 2018

and therefore potentially reinforces individualism and isolation. The rise of 3D printing allow for increased tailoring in areas such as design and production. In the future, technologies like artificial intelligence and [augmented reality](#) could enhance the potential for tailoring moment-to-moment experience.

The changing nature of work

Given the centrality of work within society, any significant shifts in the future work landscape have the potential for profound social implications. [Our relationships are structured around the places where we spend our time;](#) at work or school, with our families and in our homes, and as part of our communities. We have allowed each of these to be degraded in recent years and our social health is suffering as a result. There is an opportunity to rethink how we live and work to make lives better for everyone¹⁰.

[Capitalism's success](#) is centred on the fundamental human yearning for success and recognition, and our drive to thrive and be prosperous. If the era of mass employment comes to an end, what happens to a society without work's moral framework?

The shifting conditions of finding and maintaining work as a result of the increase in automation, and the more isolated nature of operating in the growing gig economy ¹¹, also impacts feelings of isolation. Short-term work opportunities can discourage employees from creating lasting social bonds in their workplaces. While digital connectivity allows more flexible work arrangements, it can also cause physical isolation from others.

In New Zealand the gig economy is currently a small part of the labour market, with 75% of workers in permanent employment, although it is growing.

Immigration pressures likely to increase

Global instability is likely to increase the numbers of people who either elect or (more likely) will be forced to leave their home countries. This will place pressure on New Zealand resettling a maximum of 1,000 refugees annually. The need for a durable and inclusive conversation centred on national identity and diversity will be vital.

[When cultural differences between immigrants and natives are substantial, opposition to immigration can arise](#) even if immigrants are on average economically beneficial and do not create economic losers among natives.

[Internal demographic change is likely to encourage more liberal immigration policy](#) with Canada being highlighted as potentially the first 'post national' country? Starting in the 1990s, low fertility and an aging population began slowing Canada's natural growth rate. Ten years ago, immigration accounted for two-thirds of population growth, but by 2030 it is projected to be 100%. The demographic drivers for New Zealand are similar. This raises the question of whether the social pressures of the 21st century will [end the nation-state's role](#) as the primary instrument of human governance?

Personal identity becoming more varied

The demise of the nation state concept could in part be fuelled by a [greater focus on individual identity](#) with identity increasingly based on a creed or idea, rather than on biology. The rise of gender fluidity is an example of this.

[There is an increasing number of examples of nations developing more sophisticated perspectives on gender identity.](#) Kenya, for example, will shortly become the first country in Africa to collect data on intersex people in its national population census. The survey will determine the number of citizens who identify as neither male or female estimated to be more than 700,000 in the general population of 49 million.

¹⁰ UK Chief Medical Officer; 2018

¹¹ Temporary jobs commonplace and tendency to hire independent contractors instead of full-time employees

Organisations, too, are increasingly embracing a more fluid perspective of identity. US lawyers Ropes & Gray surveyed how companies have created global processes for inviting employees to provide their sexual orientation and gender identity information voluntarily. LGBT+ self-identification is an important, fast-growing, but insufficiently understood practice that enables LGBT+ employees to engage authentically within the broader workforce.

Advocates for broader gender understanding envisage a future where gender definition is less important. It would imply a lot more flexibility in what we regard as being male/masculine or female/feminine – and recognise that many people don't fit well into either box. It would also reflect that gender can be expressed differently throughout life stages.

The potential for a post-gender society

If attempts to broaden gender perspectives are successful across society as a whole it will involve changes to language structures and power relationships that are adopted by the wider community too.

Post-gender perspectives envisage a world where “patriarchal culture will be stripped apart, and a new culture, yet to be created, will emerge victorious. Merit rather than sexist power and privilege will be the dominant characteristic in the professional world.”

Post genderists propose that gender in humans should be voluntary and that we should rely on advanced technology to replace it. The elimination of traditional gender roles and expectations would both liberate individuals and remove a significant negative impact on societal development. Ultimately they envisage technological advances in assisted reproduction could make biological sex moot because a baby could be born from a same-sex couple or from three different parents to create a single foetus.

Future of human enhancement

Executive summary

Physical and cognitive augmentation technologies, such as bionic limbs, neurological enhancements, and gene editing, may soon become part of everyday life for many people. Currently, these technologies are developed mainly to eliminate disease and nullify disability, yet they could soon be deployed to augment and enhance otherwise healthy humans.

This section explores trends in human enhancement and their potential impact on sport and physical recreation from the four perspectives of enhanced physiology (developments in repairing the body); augmented biomechanics (technologies that may be added to remove deficiencies or add more capability); neurotechnology and improving cognition (efforts to improve mental capacity and integrate the brain's function with computing networks); and nutri-genetics and ingestible robotics (what we're likely to put inside our bodies to improve function and diagnose and improve its performance).

Bone, muscle and neurons are all in line for upgrades as new medical technologies make advances that more effectively repair damage and potentially enhance current biology. While developments in understanding and manipulating genetic outcomes will likely result in significant changes to the human form over the next few decades.

Advances in wearables and prosthetics promote an end to physical disabilities, and the prospect of enhancing the able-bodied with super-human strength, speed, and stamina. Developments in new ways of assessing brain capability, point to significantly enhanced mental function that would enable faster, seamless access to information and interaction with machines. Meanwhile, nootropics to improve brain function, genetically matched diet and ingestible robotics will also increase in popularity in the quest for improved wellbeing.

These advances in human enhancement will pose ethical questions about the level of permissible enhancement, the consequences and the further pressures they will place on inequality within society.

Summary implications

3D printed upgrades	<ul style="list-style-type: none"> • Seamless injury repair: The ability to repair significant injuries and potentially upgrade capability will change athlete's career patterns and options • Extension of participation: New techniques for repair and reversal of aging would extend significantly the time individuals were able to participate in active leisure.
Genetics to Predict and Optimise	<ul style="list-style-type: none"> • Genetic based predictions influence leisure activities: leisure activities could be aligned with a greater understanding of the needs of future populations (as determined by their genetic projections).
Bioengineering the human form	<ul style="list-style-type: none"> • Gene-doping as the norm: A foregone conclusion, or a development to be avoided at all costs?
Wearables	<ul style="list-style-type: none"> • Training supplemented by wearable AI: Those able to use training wearables are likely to be at a significant advantage with continual feedback on performance. • Smart clothes that complement movement: the barriers to physical participation for the aging could be removed by clothes that complement movement.
Bionics/ Prosthetics	<ul style="list-style-type: none"> • New forms of human capability: Advances in bionics may redefine what we believe to be possible. • Physical ability becomes technology dependent: If all physical disabilities can be remedied by augmenting technologies, then we will need to redefine disability as lack of access rather than a lack of core ability. If augmentations add to the able-bodied, then the 'naturally abled' may have a similar experience to that of today's disabled community.
Internet of Things and Sensors	<ul style="list-style-type: none"> • Players and coaches as data scientists: The level of data available in the future is going to potentially overwhelm participants and coaches seeking to compete at the highest levels.
Immersive technologies as training aids	<ul style="list-style-type: none"> • Convergence of eSports and physical training: Is there an opportunity to develop cross-over opportunities that use immersive eSports environments to improve real world physical skills?
Mental training and assessment	<ul style="list-style-type: none"> • AI-based assessment adding training pressure: Will attention-monitoring headbands add to the levels of mental pressure already experienced by young people?
Brain Computer Interfaces	<ul style="list-style-type: none"> • Ethical question on level of permissible enhancement: At what point in the BCI development does a debate need to be had about their introduction?
Nootropics	<ul style="list-style-type: none"> • Managing the 'legality' of wonder pills: Some nootropics may not be banned substances for athletes, but what might the side effects be and is there any real benefit?
Nutrigenomics	<ul style="list-style-type: none"> • Genetic data will require careful management: Companies specialising in nutrigenomics promise significant levels of data production both for individuals and teams. Assuming the market grows as anticipated, the quality and privacy of this will need careful management. These skills may not be currently well-rehearsed in sport and recreation agencies.
Ingestible Robotics	<ul style="list-style-type: none"> • Internal monitoring as a competitive edge: The deployment of ingestible robotics to monitor elite performance could well become a competitive edge.

Background

Speed and impact of technological advances

Humanity stands on the brink of significant advances driven by technology. While the pace of major revolutions in technology has been increasing over time, we are currently living through a technological revolution, distinguished from those before it by its lightning speed, large scale and the unprecedented impact it is wielding.

Beginning early in the twenty-first century, this technology revolution has delivered a much more mobile internet, as well as better, cheaper and smaller sensors that are enabling the development of new technologies. It has also seen the rise of machine learning and artificial intelligence (AI)¹². The fact the modern world is more interconnected allows this revolution to evolve exponentially, rather than linearly.

This speed of change means no invention is ever finalised or fixed, as each is a starting point for another invention or development. For example, the advent of personal computers paved the way for the internet, and the iPhone, introduced in 2007, led to around two billion smartphones by 2015 with dramatically refined technology.

The revolution is also defined by unprecedented returns to scale that allow businesses to produce the same or greater value with relatively fewer employment-associated costs. This change is driven by digitisation and automation of production. As an example, when Kodak was at its peak, it employed 145,000 people. By contrast, when Facebook acquired Instagram for \$12 billion in 2012, Instagram had just 12 employees in total. Two years later, Facebook paid \$19 billion for WhatsApp, which had 400 million users but only 55 employees.

A final factor that distinguishes this technological revolution is that it merges a range of domains and connects them across physical, digital and biological platforms. Individually and collectively, these impact sport and recreation, notably within the field of human enhancement.

As such, this paper focuses on the emergent trends in human enhancement from the four perspectives of:

- a. Enhanced physiology – developments in repairing the body
- b. Augmented biomechanics – technologies that may be added to remove deficiencies or add more capability
- c. Neurotechnology and improving cognition – efforts to improve mental capacity and integrate the brain's function with computing networks
- d. Nutri-Genetics and ingestible robotics – what we're likely to put inside our bodies to improve function and diagnose and improve its performance.

¹² AI refers to any computer programme or system that can perform tasks that resemble acts of human intelligence. Examples of this include spam filters, voice transcribers, and virtual assistants like Apple's Siri and Amazon's Alexa.

Perspective 1 - Enhanced physiology

Several developments look set to revolutionise the future physiology of the human form. Bone, muscle and neurons are all in line for upgrades as new medical technologies make advances that more effectively repair damage and potentially enhance current biology. Beyond this, developments in understanding and manipulating genetic outcomes, will likely result in the 'natural' human form changing significantly over the next few decades.

What's changing?

3D printed upgrades

Replacing worn and damaged body joints with implants is an old idea. Yet advances in 3D printing have the potential to be a vast improvement over bone-graft options, and other synthetic replacements. The creation of multiple layers in 3D printing enables a unique porous surface to be applied that encourages bone to grow into the implant, which secures it more firmly in place. It enables surgeons to create patient-matched repairs that perfectly fit the individual and mimic the characteristics of natural bone ([news.science360.gov](https://www.news.science360.gov)). When combined with the precision of robotic surgical processes, will make replacements more successful. [economist.com](https://www.economist.com)

Human cells and tissues can also now be printed, and research into printing complex organs and muscles is well advanced. Scientists are working on creating artificial muscles that will be much stronger than their human counterparts. This will likely challenge the need to go to the gym to upgrade muscles. [interestingengineering.com](https://www.interestingengineering.com)

The approaching affordability and availability of 3D printing to the home user will also be a big game changer. Being able to produce and modify your own physiological enhancements (and other products) whenever you need them minimises the need for large-scale production of many goods on the market, creating resource savings through reductions in waste and shipping (but with corresponding impacts on employment).

Genetics to predict and optimise

Avoiding injury in the first place would seem prudent rather than relying on 3D printing to replace bone, muscle and neurons. Advances in genetic understanding could enable prediction to become routine in the future.

Genetics plays an integral role in athletic performance and is increasingly becoming recognised as a risk factor for injury. By analysing genetics, it may become possible to create a cost-effective one-time test that will help coaches, physios and doctors to personalise training advice (to athletes and the general public) and keep players and participants injury-free. [mdpi.com](https://www.mdpi.com)

In Cincinnati, an experimental study has used genetics-guided biomechanics and patient-derived stem cells to predict what type of inherited heart defect a child will develop. The doctors conclude that it may be possible to predict cardiac phenotype in paediatric patients to guide future monitoring and support counselling patients about future athletic pursuits. [cincinnatichildrens.org](https://www.cincinnatichildrens.org)

Singularity University's Future of Sports believes genetics will be removed as a determinant in future professional sports endeavor with the human body regulated to ensure everyone is genetically 'equal'. It promotes the view that safe and detectable drugs that boost key physiological factors to specific, pre-determined amounts will become legal and mainstream. Success will then be determined more by character, teamwork, strategy, and mental agility rather than by genetics. In this sense, sport will arguably become a purer test than we have today. [usatoday.com](https://www.usatoday.com)

Bioengineering the human form

Gene-editing technologies will assist to hasten the future of sport as promoted by the Singularity University. It is already being used to treat patients with rare diseases by transferring missing genes into skeletal muscles, and is now at a point where potentially it could be used by athletes and participants, if adequately resourced [[edition.cnn.com](#)].

Though it has been around since the 1980s, gene-editing is more precise and affordable than ever. This is thanks to the development of the 2010 CRISPR¹³ system, which uses bacteria to cut DNA in precise locations, like tiny molecular scissors. In 2015, scientists in China used CRISPR to alter genes in an implanted embryo to prevent the development of a severe blood disorder. In 2017, a team in the United States successfully altered defected sperm cells to prevent hypertrophic cardiomyopathy, which reduces the heart's ability to pump blood.

Advanced research into gene-editing will lead us into an era of genetic manipulation that goes far beyond healthcare and is already tackling aging - a critical determinant of athletic ability. CRISPR/Cas9 genome-editing therapy has been found to suppress the accelerated aging observed in mice ([sciencedaily.com](#)). The technique will enable synthetic biologists to take on challenges such as age reversal and the modification of enhanced athletes' DNA. [sciencemag.org](#)

The consequences of such developments are profound but come with significant ethical questions including those that will challenge the integrity of sport. For years, countries have secretly sponsored doping athletes for international competitions. These same countries will soon be able to edit the genes in athletes in the specific ways necessary to bring about the best performance. Given the difficulty in determining whether someone has been genetically edited or not, curtailing how genetics will be used in international sporting competitions presents serious challenges. [synbiobeta.com](#)

There is a ban on gene doping in sport, but some philosophers argue that legalising it is the only sensible option that could make future elite events fairer and safer ([onezero.medium.com](#)). They argue that there is no way to stop gene doping in the long run, and therefore the 2003 ban on it should be reversed before illicit and potentially dangerous forms of it become prevalent. [newscientist.com](#)

The gene doping debate is likely to intensify sharply over the next decade. In the United States, parents can already check the athletic aptitude of their children through genomic tests. Uzbekistan's national sports programme has incorporated genetic testing since 2014. China recently announced that the selection process for the 2022 Winter Olympics will include genetic sequencing.

In the equine area, the industry is already debating whether we should be trying to create super horses. Last year's news that a Chinese couple had given birth to twin girls who had been edited while embryos suggest it is a very pertinent debate for humans too. [sciencemag.org](#)

New Zealand is likely to continue to advocate for international frameworks to manage these issues (a la WADA) and is likely to adhere to any international framework. This is generally how NZ handles issues in sport and out of sport.

Issues like gene doping show the importance of strengthening Drug Free Sport NZ's investigation and intelligence capability. We have seen with conventional doping that cheats are increasingly caught through investigations rather than testing (e.g. Russian scandal, clenbuterol cases in NZ). Gene doping is likely to take this trend to a new level. For this reason, DFSNZ is bidding for Budget funding to strengthen four areas of its work, one of which is intelligence and investigations.

¹³ Clustered regularly interspaced short palindromic repeats

Perspective 2 - Augmented biomechanics

Advances in wearables and prosthetics promise an end to physical disabilities (to those that can afford it), with bionics replacing lost eyes, ears, and limbs - and the prospect of enhancing the able-bodied with super-human strength, speed, and stamina. The associated data generated will drive potentially unprecedented levels of insight.

What's changing?

Wearables

Combining AI analysis of wearable-derived performance statistics continues to expand the level of data available to users. Current generation sensors are typically attached to apparel or embedded within the garment. In the next generation, clothing itself will be the sensor and possibly self-charging through either sunlight or kinetic energy. In the medium term, once smart clothes become the norm, wrist-worn fitness trackers will be rendered obsolete (gadgetsandwearables.com). Products like Ambiotex are already in the market offering the prospect that participants of any level can train like professional athletes and generate cost-effective, non-invasive personal performance profiles. ambiotex.com

Wearable devices that not only track what you do but offer AI-driven 'coaching' to help improve performance are also entering the market. Lumo Run, for example, includes feedback on form and technique, thus assisting runners in increasing their speed and distance while also preventing injuries.

ncub.co.uk

Silicon Valley start-up Seismic is taking wearables to the next level with a line of "Powered Clothing" that they define not as an exoskeleton or even a powered suit, but fashionable clothing fused with robotics and sensor technology. It demonstrates the prospect of being able to augment physical ability by wearing clothes that mimic muscle function and provide simultaneous user data. exoskeletonreport.com

It may soon be possible to dispense with the smart clothing altogether and directly apply a magnetic layer that enables the monitoring of movement. An artificial skin currently under development enables remote tracking while eliminating the need for any electronics on the skin itself. techxplore.com

Bionics/Prosthetics

Advanced prosthetic technologies are enabling individuals not only to replace lost capabilities (bionics) but also to access capabilities previously outside human experience (cyborg). For example, it opens up the possibility of humans hearing ultrasound better than bats and deploying unprecedented limb strength.

Vision is another capacity that seems likely to be upgraded beyond typical human capability. For example, a surgically inserted intraocular medical device lens now provides up to three times better vision, in comparison to perfect eyesight (medium.com). A similarly unprecedented enhancement is being developed by French researchers who have developed a lightweight lens capable of not only providing augmented vision assistance to users but relaying visual information wirelessly.

Overcoming significant design challenges and increasing the speed of development are being addressed by combining technologies and opening up design to broader collaboration (qz.com). AI powered prosthetic legs are now able to make decisions for the wearer with an experience similar to the use of a biological leg (youtube.com). In future, amputees may also regain a sense of touch through developments like graphene 'electronic skin' that also derives power from sunlight. epsrc.ukri.org

These new forms of augmentations can change perceptions of disability. Today, proud amputees can celebrate their prosthetics as fashion accessories (mashable.com) and by doing so, challenge the traditional stigma associated with the less-abled. youtube.com

Bionic technology is removing physical barriers faced by less-abled individuals while raising questions of what it is to be human and the prospect of becoming capable of influencing our own evolution. youtube.com

Internet of Things (IoT¹⁴) and sensors

Embedding sensors in a range of augmentation technologies will generate an exponential amount of data about our world and will be invaluable in future sport training programmes. This data forms a subset of the broader growth of the IoT market anticipated to be worth \$520bn by 2021 (double that of 2017). iot.eetimes.com

The majority of objects in our lives will be able to sense and share and report data and work autonomously when other sensors tell them to. Private enterprise and governments at all levels could use IoT devices and data analytics to customise services to individuals, including physical recreation and sport programmes, while sensors on our bodies and clothing will enable healthcare to be tailored.

IoT is revolutionising the way elite coaches facilitate training, manage players, and address critical situations in each game. Combining advanced analytics with sensors and game video, coaches can quickly process vast amounts of data to obtain metrics on player efficiency, player performance, and opponent weaknesses to better develop the in-game strategy. Embedded devices such as smart insoles and built-in chips offer real-time tracking that provides a holistic view of the athlete, enabling organisations to make the best decision for their longevity and health (www2.deloitte.com). This performance data will also be available to casual participants.

NZ is ranked highly as a nation in terms of IoT readiness, being well positioned to maximise the value of data, with a connected and innovative culture, a growing data economy, and a safe, open data environment to build on.

¹⁴ The IoT describes a network between physical devices and the people who use them. 15 billion devices are already linked through the internet, essentially forming one massive circuit. New connections are made every second through AI, transmitters and sensors and this number is anticipated to increase exponentially

Perspective 3 - Neurotechnology and improving cognition

Developments in new ways of assessing brain capability, how it may be linked to external computing capability, and augmenting its capacity with embedded computing power, open up the prospect of significantly enhanced mental function that would enable faster, seamless access to information and interaction with machines.

What's changing?

Virtual reality as a training aid

Virtual reality (VR)¹⁵ environments could revolutionise how players hone their decision-making skills and speed up their reaction times. Immersive fitness has been around for a few years now (edition.cnn.com) and VR based training has already proven to be successful in military and aviation. The strength of VR based sports training lies in its ability to create real muscle memory through virtual experiences. VR technology puts players right in the experience so that they can actively engage. researchgate.net

As devices become less expensive to produce and purchase, people will be able to spend more time in virtual reality scenarios. As the technology develops to react more accurately to voice and movement, for instance through eye tracking, VR will begin to feel more natural while also offering people the feeling that they have superhuman senses, such as x-ray vision. With time, people may start to perceive such senses as synonymous with regular human senses. A person's interaction with VR technology will undoubtedly change their self-perception, and as a result that person will want to keep interacting with VR. Immersion in technology will become the norm, and objects that don't offer VR capabilities, such as traditional sports, will start to appear 'broken'.

By 2025 new sports are anticipated to emerge that will be designed to test participants' performance across the spectrum of virtual and physical realities. Games that evolve from today's eSports, designed for the modern age, will better take advantage of technology than more traditional sports. eSports will begin to poach athletic talent, as new games will require speed, strength and endurance, with designers building games demanding freak athleticism. Through these changes' sports fans respect for eAthletes will grow.

Mental training and assessment

The cognitive dimension is a significant factor in sports performance, and a new generation of cognitive assessment and elite training technologies are emerging to assist players in enhancing mental capacity.

Technology startup Receptiviti is assessing a different angle of players' neural function by using AI and machine learning to understand their mental strength. It believes that its platform can not only identify the very best players in the long run, but it can also save 'coach's time chasing after players who may not live up to their potential. inbenta.com

VR is also being used to analyse brain function. Magic Leap's SyncThink, for instance, measures brain health using a wearable device that tracks eye movement (fastcompany.com). Similarly, electroencephalography sensors are being used in education settings to measure attention. The sensors can reportedly indicate whether students are engaged in a particular task by analysing fluctuations in the frequencies of brain waves. digitaltrends.com

Brain computer interfaces

Developers are experimenting with ways to change and enhance the function of the human brain. Startup Kernel is envisioning a so-called mind, body, machine interface that can read out your neural activity via a real-time

¹⁵ VR is a form of simulation that is essentially fake but feels real. It is anticipated that 160 million VR headsets will be sold by 2020 (up from 12 million in 2016). There are currently 200,000 developers creating VR content.

dashboard ([youtube.com](https://www.youtube.com)) This type of development opens the door to memory-enhancing brain implants that via the push of a button increases your chances of remembering something later. [newatlas.com](https://www.newatlas.com)

The brain has some unique processing capabilities that have yet to be matched by conventional computing, but a key benchmark has recently been achieved in the development of advanced computing devices designed to mimic biological systems. Superconducting computing chips, modelled after neurons, can now process information faster and more efficiently than the human brain. It is therefore plausible to imagine a future where computers links to the biological brain through a non-intrusive brain computer interface to super-charge human cognition. [nature.com](https://www.nature.com)

This brings us close to the merging of technology and humanity - referred to as the singularity. Transhumanists believe that the singularity will advance our understanding of the human brain so far that we will be able to achieve digital immortality as our bodies become temporary vessels for our digitalised minds, which will be stored in the cloud.

At present, we don't understand enough about how the physical cells of the brain become our conscious mind for this to be achievable. But physicist Stephen Hawking believed that the brain is essentially a computer, and that, therefore, it will be possible one day to copy it and provide life after death. This is a view shared by futurist Ray Kurzweil who adds that within the next 20 years, mobile devices will connect to our brains, making adding capacity as simple as it is to add cloud-based server capacity today [Venturebeat](https://www.venturebeat.com).

Perspective 4 - Pills, nutri-genetics and ingestible robots

The growth of the multi-million-dollar business of sports nutrition will continue to grow as participants look for new ways to enhance fitness. Nootropics to improve brain function, genetically matched diet and ingestible robotics will also increase in popularity in the quest for improved wellbeing.

What's changing?

Nootropics

Nootropics are ingredients that suppliers are promoting as memory enhancers. Supplement manufacturers are claiming improvements in cognitive functions like attention, focus, memory, and even brain health, with many of the same advantages already found in several whole foods. Like many such markets, the hype may not match reality, but Nootropics supplements were a \$1.3 billion industry in 2015, and research predicts nootropics grow to be a \$6 billion industry by 2024. [xtalks.com](https://www.xtalks.com)

Like any new technology, the latest and best nootropics will be expensive. Those who can afford early access to them will become much smarter than those who follow. This advantage will enable them to make faster, smarter decisions and earn more money, which they can use to augment their natural capabilities further. The concern is that our species may split into one that continually enhances and another that, having been left behind once, is condemned to follow organic speeds of evolution. [medium.com](https://www.medium.com)

Nutrigenomics

Personalised nutrition is likely to become more commonplace, as genetic testing of participants will enable sports dietitians to use the information to tailor diets that reflect specific variant gene-nutrient interactions.

By 2026, the consumer genetic testing market is anticipated to be worth \$611 million (up from \$117 million in 2017). The increasing number of genetic tests enlarges the pool of genetic data and consequently improves the dietary

and health knowledge and recommendations that consumers can access. sharonpalmer.com

Specific sports code-aligned services are already on the market that aim to improve performance through genetics. Soccer genomics, for example, promises to find out how your body metabolises food and deliver genetically enhanced nutritional guidance to the individual player. soccergenomics.com

Ingestible robotics

Combining what we eat with technology is also set to become an increasing trend. According to the report Smart Pills Technologies Market (2012-2017), the global smart pills market has already reached nearly a US\$1 billion dollars.

Ingestible technology is already helping Canadian athletes train for the anticipated extreme heat and humidity of the 2020 Tokyo Olympics. For Canadian athletes, knowing how to stay cool during competition could be as simple as swallowing a pill. runningmagazine.ca

Monitoring temperature is just the start. Microelectromechanical systems (MEMS) will be able to detect everything around them including light, temperature, vibrations, pressure, magnetism, chemical composition, humidity, location and acceleration. They will be connected to a wireless network to report information about their surroundings, and deployment of a number of these dust-sized sensors has already begun. It is anticipated there will over 1 trillion active sensors by 2025. sevenfigurepublishing.com

Ingestibles are also likely to become autonomous and directed. Scientists have developed an electronic capsule that can be ingested and controlled wirelessly to deliver drugs to reduce surgical procedures. They believe the device could be used to provide medicines for a variety of diseases that require medication over long periods, especially those that require strict and regular doses. The 3D-printed pill can be controlled externally using Bluetooth and could be developed further to detect infections or an allergic reaction in the future. irishexaminer.com

Demographic change

Executive summary

This section explores demographic shifts in New Zealand and suggests we are facing a future population that is significantly older, urbanised, diverse, and with a growing disparity in wealth. This will impact the play, active recreation and sport sector.

Unlike many areas of the future forecasting, the projection of future demographic change can be assessed with a reasonable level of confidence, barring significant wild-card events. This paper is therefore broken into three sections:

1. **Changing Demographics:** An assessment of current trends in relation to New Zealand's population.
2. **Demographic Consequences:** The key areas of change likely to be associated with the aging population.
3. **Climate Change:** Projections of population impacts likely to occur as a result of global warming, and the likelihood this will influence local demographic trajectories.

Aging is the demographic change likely to have the greatest impact on play, active recreation and sport. It will have flow on impacts on the future labour force, health resourcing, and the focus for government spending.

Urbanisation, globalisation, technological change, together with aging, will likely heighten gaps between population groups engaging in play, active recreation and sport. A slowing rate of growth, diversification, rising wealth inequality and global migration are other demographic factors that will present opportunities and challenges for our sector.

Summary implications

Aging	<ul style="list-style-type: none">• Long-term active recreation Building the habits of active recreation will become increasingly important as people live longer. What support do elders need to establish new pursuits that may be unfamiliar? Is our supply chain fit for purpose?• Cost/benefit changing government priorities Rising cost of supporting an aging population may have government focusing its agencies on contributing to reducing these costs.
Slowing growth	<ul style="list-style-type: none">• Reduced pressure on supply Slowing growth may alleviate some pressure on the need for new facilities and use of recreational spaces.
Urbanisation	<ul style="list-style-type: none">• Diversity of recreational opportunity One size will not fit all as regional populations potentially experience contraction and urban centres boom. Within these the diversity of backgrounds and access to facilities will vary.• Urban planning challenges Increased pressure on transport and space may compromise play, recreation and sport opportunities.• New activities will evolve from urban environment Parkour, 3x3 basketball and scootering are products of an urban environment. What next?
Diversity	<ul style="list-style-type: none">• Blending migrant activities within the NZ framework There is an opportunity both to support the transition of migrant community recreation patterns and adopt these for inclusion in the NZ context. Extending social bonding to social bridging.• The return of Maori sport organisations Heightened commitment to the Treaty may result in a push for national bodies for Māori sport.
Rising wealth inequality	<ul style="list-style-type: none">• Understanding Barriers to Entry A younger cohort that is more financially precarious and transient in living arrangements may experience greater barriers to engaging in active recreation.
Changing labour force	<ul style="list-style-type: none">• Aging Workforce Strategy Like all employers, the sport and recreation sector will need to understand the future age profile of its workforce and the needs of more elderly staff who may not be replaced with a younger cohort. This also applies to volunteering.
Changing health demands	<ul style="list-style-type: none">• Health Education Individuals living longer and coping with health challenges of old age may be ill-educated in understanding their own physical function. Active recreation and sport could be a key vehicle to improving this low level of education.• Connection Through Recreation Even as the population gets more urbanised the challenge of individual isolation appears to be growing with consequent implications for health. Active recreation and sport have a role to play cementing community relationships.
Financial pressures	<ul style="list-style-type: none">• Future Funding Profile The pressure of an aging population on government finances will likely have the effect of challenging future expenditure budgets
Climate impacts high-growth populations	<ul style="list-style-type: none">• High Impact on High Growth Populations The real wild card that could lead to significant population shifts in the medium-long term that happen extremely rapidly and with major disruption.
Climate change influence on New Zealand demographics	<ul style="list-style-type: none">• Increasing Pacific Migration Pacific migration will likely increase in coming years putting further pressure on facilities in urban New Zealand.• Localised NZ Support Required Internal population displacement through climate events is likely to be the first impact New Zealand feels in relation to global warming.

Changing demographics

New Zealand, like most developed economies, is facing a future population that is significantly older, urbanised, diverse and with a growing wealth disparity.

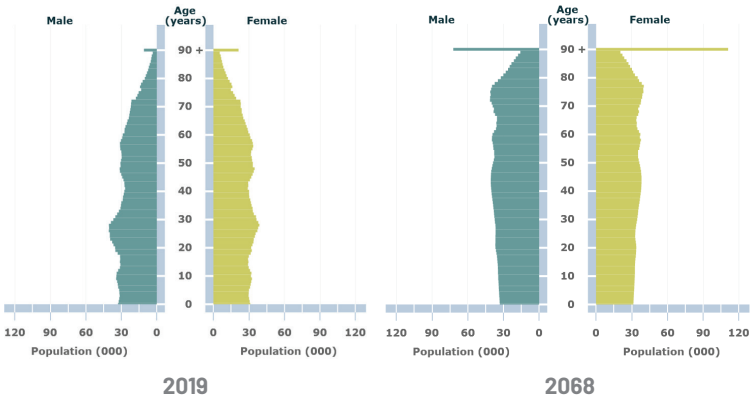
What's changing?

Aging

Continued declines in fertility and mortality make the overall aging of the global population inevitable. Older adults' (ages 65+) share of the global population is projected to almost double from 9% in 2018 to 16% by 2050 (up from 5% in 1960). The fastest growth will be in the 85+ segment. Children's (ages 0 to 14) share is falling, from 37 per cent in 1960, to 26 per cent in 2018, with a projected decrease to 21 per cent by 2050. prb.org

New Zealand's profile will follow this broad path, although we are slightly behind in the aging process compared to the rest of the world. At the national level, the median age is projected to increase from 37 years in 2013 to 43 years in 2043. The proportion of the population 65 years and older is increasing and is now around 15%. This is projected to rise to 20% by 2030 and reach close to 30% by 2068.

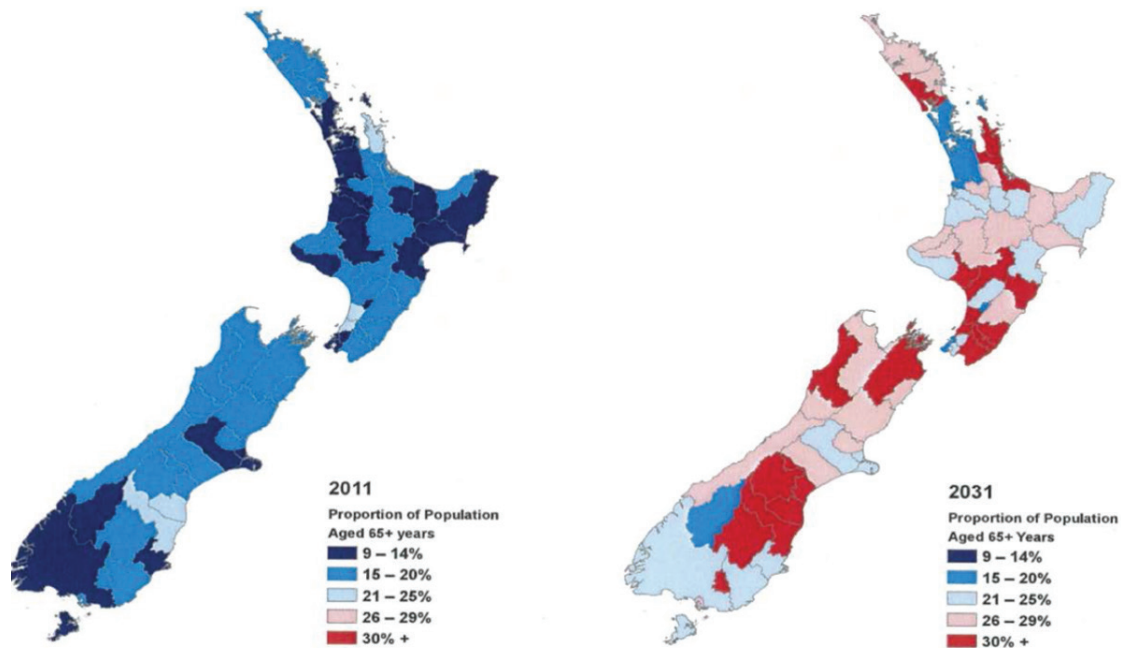
A contributor to this profile is our increasing lifespan. A baby girl born today could expect to live to 95 according to the Statistics NZ [lifespan calculator](#). That's 25 years longer than for a girl born a century earlier.



While the population of all 67-territorial authority (TA) areas is expected to age in the future, both in number and percentage of people at older ages, provincial towns are aging much faster than main centres.

The oldest median ages are generally in areas experiencing low fertility and/or a net outflow of young adults (aged 15-29) and a net inflow of people aged 35-74. The youngest median ages are generally in areas experiencing high fertility and/or a net inflow of young adults (such as cities with major tertiary education facilities).

Forty-seven TA areas will have fewer children in 2043 than in 2013, with deaths outnumbering births in three-fifths of TA areas by 2043. Stats NZ



Slowing growth

New Zealand's overall population will continue to grow but at a slower rate than previously. Fifty-nine TAs are projected to have more people in 2028 than in 2013, and 50 are projected to have more people in 2043 than in 2013 (medium projection). Our total population in 2038 is anticipated to be 5.8 million, growing to 6.5 million by 2068.

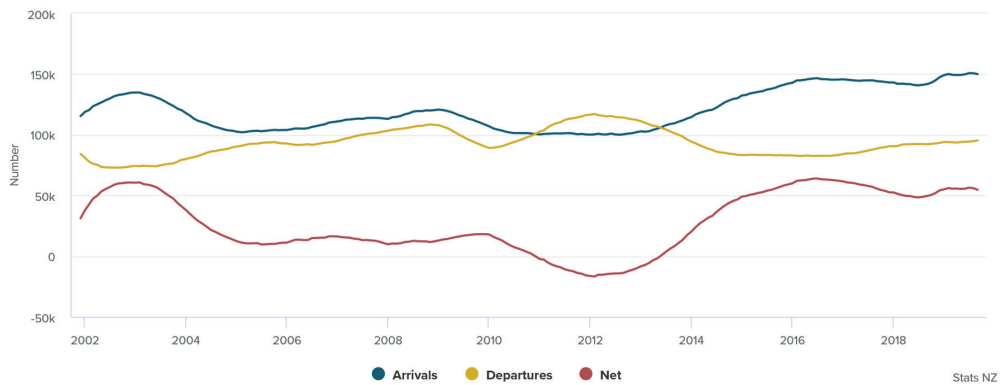
The projected slower population growth across New Zealand is driven by the narrowing gap between births and deaths, with net migration anticipated to remain within the 2015-2018 range of 48,000 to 64,000. Nationally, natural increase is projected to decrease from 164,000 during 2009-13 to 78,000 during 2039-43 (medium projection). This is due to more deaths, up from 147,000 during the five years to 2013 to reach 238,000 in the five years ending 2043.

In 49 TAs the number of births is expected to drop between 2009-13 and 2039-43, due to the assumed slightly lower fertility rates, combined in many areas with fewer women in the childbearing ages.

Not surprisingly, with an aging population, deaths are expected to increase in all areas, albeit life expectancy is expected to increase slightly. In 2016, about three deaths in four occurred at age 65 years and over. Maori and Pacific are over represented in the 25% of deaths under 65.

New Zealand's net migration rate was 11.4 per 1,000 people in the year ended June 2019, reflecting annual net migration of about 56,000. This rate is similar to Australia's in 2017-18.

Estimated migration, rolling year ended, December 2001–September 2019



Urbanisation

New Zealand’s population is already predominantly urban-centred and this trend is projected to continue over the coming decades. In 2017, 86.47% of New Zealanders lived in urban areas and cities. tpk.govt.nz

Of this, about one third live in the Auckland region alone. It has experienced rapid population growth driven by immigration and natural increase. Its population looks quite different to the rest of New Zealand, being younger and more culturally diverse.

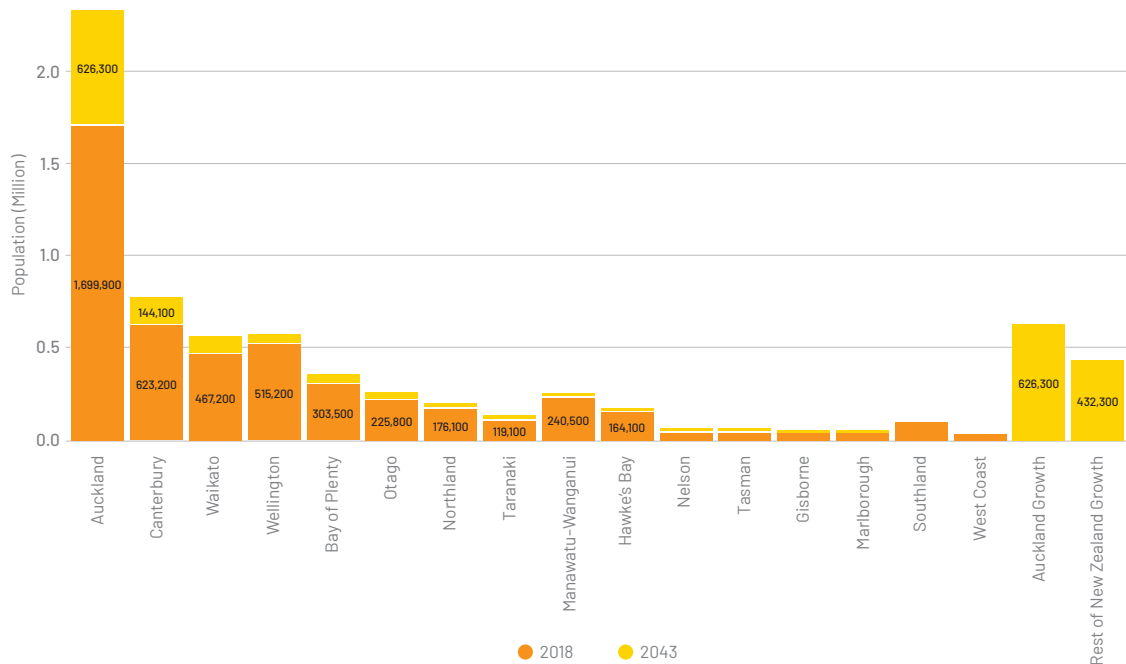
The Auckland-Hamilton-Tauranga triangle is home to more than half of all New Zealanders but is still only a fifth the size of the smallest international megacity.

The Auckland region is projected to reach two million by 2033 and will account for more than half New Zealand’s population growth between 2013 and 2043, with an increase of 833,000 – from just under 1.5 million to over 2.3 million (medium projection). In 2028, Auckland is projected to be home to 37% of New Zealanders, compared with 34% in 2013.

At the same time we will see declining growth in provincial towns and regions, which may result in increasing geographic inequality. This is reflected in the results from the latest Local Authority Census which shows urban councils spend a higher proportion of their operating expenditure on sport and recreation than their rural counterparts. New Zealand Councils spent \$914m (8.9%) of their total operating expenditure on sport and recreation in the year to June 2018, compared to \$847m (8.6%) the previous year. Hamilton allocated the largest proportion (18.6%) with the growing number of people moving to Hamilton (and the subsequent higher demand and rating base) the main reason (Australasian Leisure Mgmt).

Rural depopulation (notably of young people) may be counteracted by the twin forces of more affordable housing and the increasing ability to work from anywhere (through digital advances). While intuitive, there is no evidence as yet to suggest this is occurring.

REGIONAL POPULATION GROWTH PROJECTIONS 2018-2043 (MEDIUM PROJECTION)



Source: Statistics New Zealand

Diversification

Over the past two decades, New Zealand has become one of a small number of culturally and linguistically 'superdiverse' countries. We have more than 200 ethnicities and speak around 190 languages. Forty percent of Auckland residents were born overseas, compared to 18.2% for the rest of New Zealand. The latter contrasts with only 15% in 1966 (64% of whom came from the UK).

The 2018 census found that 15.1% defined themselves with at least one Asian ethnicity, growing from 11.8% in 2013. Pacific ethnic groups grew to 8.1% from 7.4% over the same period. European or 'other' currently make up 72% of our population, however this number is predicted to fall to 65% by 2038. stuff.co.nz

Geographic clusters of ethnic groups and culturally based local economies are increasingly apparent in Auckland. While new immigrants are likely to gravitate to "ethno-burbs", New Zealand's historically high rates of ethnic intermarriage has also seen a shift towards a pattern of identification with multiple ethnicities. This trend will likely continue creating a diversity of identities. tpk.govt.nz

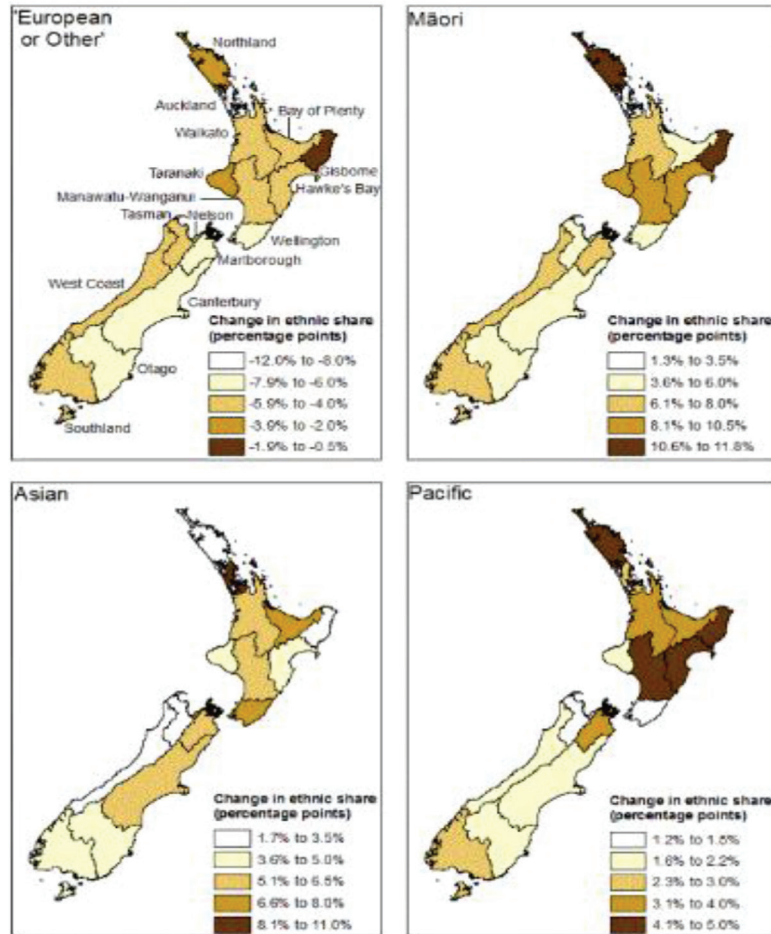
There will continue to be distinct regional differences, with super diversity in Auckland and to a lesser extent Wellington and Christchurch. Maori will likely continue to be over-represented in the northern regions, and older Pakeha populations will feature across the rest of New Zealand.

Nationally, Maori and Pacific people will become an increasing share of our population. These populations are younger than the general population and will make up a greater proportion of our workforce in coming years.

By 2038 it is anticipated that:

- European/Pakeha will have fallen from 72% to 65% (72% to 68% of those 0-14 years)
- Māori will increase from 15% to 18% (25% to 30% of those 0-14 years)
- Asian will increase from 12% to 22% (12% to 21% of those 0-14 years)
- Pasifika will increase from 7% to 10% (13% to 18% of those 0-14 years)¹⁶

Projected change in ethnic shares
Medium projection by regional council area
2013(base)-2038



Source: Statistics New Zealand

Housing costs contributing to rising wealth inequality

The richest 10% of New Zealanders hold 50% of total wealth (with 1% holding 20%), with the poorest 40% holding just 3%. Middle New Zealand hold 47% of wealth. There are 185,000 New Zealanders who are worth at least NZ\$1.57m, yet approximately half of all New Zealanders are worth less than \$157,000, and 18% of New Zealanders have a net worth below \$15,700.

Median individual net worth for Europeans was \$138,000 and \$29,000 for Māori¹⁷. Individual net worth increases with age until around retirement. Young people (15-24 years) have the lowest median individual net worth (\$2,000); people in the traditional retirement ages (65-74) had the highest (\$416,000).

In New Zealand, wealth was distributed relatively evenly from the 1950s up until the 1980s - but for the following two decades we had the developed

¹⁶ Percentages do not add to 100% as some people identify with more than one group.

¹⁷ Māori is a much younger population (so would be expected to learn less).

world's biggest increase in income inequality. In that time, the average income of someone in the richest 1% doubled, from just under \$200,000 to nearly \$400,000 (adjusting for inflation). In contrast, the average disposable income for someone in the poorest 10% increased only slightly from its 1980s level.

Wealth and New Zealand

The disparity in wealth is being exacerbated through continuing rising housing values. In June 1984 New Zealand's houses were worth NZ\$58 billion, but by 2014 they were worth NZ\$708 billion. In the past 25 years the average house price has risen from \$110,000 to \$600,000 (and in Auckland from \$130,000 to \$800,000). The vast majority are owned by those aged over 40.

In 1980, you could buy a house for two to three times the median income - a level of affordability which was normal for decades. Today, a median home costs six times the median income (and in Auckland, nine times).

Economist Shamubeel Eaqub believes the "entire economic experiment of the last 30 years" had led to a big transfer of wealth to those born prior to 1974 with "the ownership of assets concentrated among this group, meaning it is getting harder and harder for younger people to get into the housing market". Short of a major disruption to the status quo, this will result in an increase of renting.

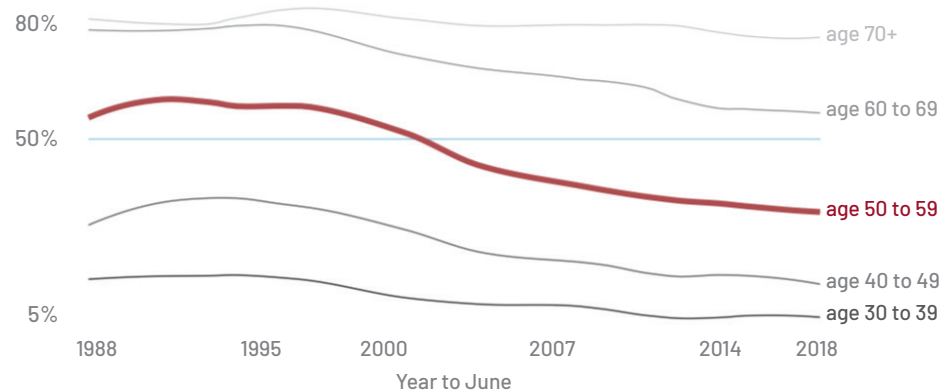
population.org.nz

This aligns with home ownership dropping to 64.5%, compared to nearly 74% in the early 1990s (2018 census). This puts New Zealand behind the UK and Australia at 65%, Canada (66.4%), Norway (82.6%), and Romania (96.8%) (Swinton Insurance).

Housing makes up an unusually large proportion of New Zealanders' wealth. It's also a major factor in retirement security, and quality of life. Lack of housing wealth is a contributor to low wealth being disproportionately found among younger age groups. This is unlikely to be addressed through inheritance, with the amount passed down between generations likely to decrease with people living longer.

Full home ownership becoming less common

PROPORTION OF PEOPLE WHO FULLY OWN BY AGE AND YEAR



LOESS trend lines

People who own: includes full ownership by household, and since 2007, in a family trust. Excludes people living with parents.

Source: Statistics New Zealand, Household Economic Surveys 1988-2018

Global migration

A net loss of New Zealand citizens since 1979 has been approximately offset by a net gain of non-New Zealand citizens. Approximately one million New Zealanders now live overseas with the majority in Australia. tpk.govt.nz

With the increase in diversity noted earlier and continued projections of Asian migration it may be implied that the local aging population may be counter-balanced by younger immigrants.

Demographer Natalie Jackson suggests this will not be the case. She notes that “the number of migrants required to offset structural aging is too large, while competition for them is growing. The global population aged 0-64 is projected to be around 59 million smaller in 2038 than in 2013.” briefingpapers.co.nz

Asian countries are themselves aging. The United Nations is projecting a substantial decrease in the number of under-15-year-olds in Asia over the coming decades, falling from 1.1 billion today to 0.7 billion by 2100, as a result of low fertility rates. As such, Asia will shift from being the biggest contributor to the global working-age population to subtracting hundreds of millions of people from it. ourworldindata.org

The pace of population aging is much faster than in the past. Between 2015 and 2050, the proportion of the world's population over 60 years will nearly double from 12% to 22%. By 2050, the world's population aged 60 years and older is expected to total 2 billion, up from 900 million in 2015. Today, 125 million people are aged 80 years or older.

France had almost 150 years to adapt to a change from 10% to 20% in the proportion of the population that was older than 60 years. However, places such as Brazil, China and India will have slightly more than 20 years to make the same adaptation.

India is likely to emerge as a greater influence in future migration and demographic statistics as it overtakes China as the world's most populous country. China and India currently account for about 37% of the entire global population of roughly 7.7 billion, with China currently home to about 1.4 billion people and India to 1.3 billion. But by 2027, India will have more people than China, according to the UN's 2019 World Population Prospects report, and by 2050 the gap is expected to have widened even further. edition.cnn.com

All countries face major challenges to ensure that their health and social systems are ready to make the most of this demographic shift. www.who.int

Demographic consequence of aging

The impact of the change in our aging profile will be felt across society, particularly through changes to the availability of employees, pressures on the health system, and broader economic impacts.

What's changing?

Changing labour force

New employment strategies will need to be considered as the aging process alters the entry/exit ratio of the New Zealand workforce.

The entry/exit ratio in 2013 was below 0.9 (nine people at entry age per 10 in the retirement zone), down from 27 per 10 as recently as 1996. In fact, New Zealand has one of the highest rates of over-65-year-olds still working in the OECD – 24% (double the percentage in Australia).

Industries concerned with health, community care, teaching, farming, horticulture, and transport have entry/exit ratios around 3-5 employed people aged between 15-29 for every 10 employed aged 55+. briefingpapers.co.nz

The issues of aging, both in the workplace and more widely in society, will become more important over the next decade. In the twice-yearly scan of how New Zealand organisations see and respond to diversity, aging is identified

as an issue, yet nearly 60% of responders did not have formal policies or initiatives in place to address aging.

Similarly, a Commission for Financial Capability survey of 500 New Zealand chief executives found that a third were worried about their older workers retiring, even though 80% had no policy to retain or recruit workers over 50.

This suggests many recognise aging is an important and growing issue but appear not to know quite what to do in the workplace.

[Terruhn, J. & Spoonley, P. \(2018\)](#)

Other countries are responding to labour force issues through incentivising birth, opening up immigration, and investing more in robotics.

Over the last decade, South Korea has spent about \$70 billion in inducements such as free childcare to try and encourage couples to have children, but this has failed to reverse the trend. www.axios.com. The Scandinavian countries have mitigated the trend somewhat establishing significant social support networks and focusing on gender equity. sweden.se

Overall the conclusion drawn by a number of commentators is that 'baby bonuses' alone don't seem to work. This may be one explanation for the significant increase in robotics in Asia, and notably Japan, following the logic that if you can't grow it or import it, the next step appears to be to make it.

As an example, the diminishing workforce has led the Tokyo Olympics and Paralympics games' organising committee to incorporate robots to work alongside their human counterparts in directing guests to competing venues and rendering foreign language support.

Canada uses external immigration to address its domestic population imbalances. It has raised the immigration cap to 300,000 people per year and has committed to raising it to 370,000 by 2023. This reflects the stability of the immigration system and political debate in Canada. This contrasts with the tension over the issue in New Zealand (and elsewhere).

Changing health demands

Increasing longevity naturally forces individuals to manage their bodies longer, but unfortunately our levels of 'health literacy' appear low. Health literacy defines individuals' ability to manage their health and well-being and engage with healthcare providers effectively to manage ongoing conditions and care. Research finds that in the US, less than 5% of adults 65 years or older have "proficient" health literacy. That figure drops to only 3% for those in the lower income scales. priviahealth.com

The low levels of health literacy combined with the growing numbers of those living with health conditions or disability will place great pressure on aged care support services.

There are 33,000 caregivers currently employed in aged care in New Zealand. Demand for workers is expected to increase by between 50% and 75% (full time equivalents) by 2026 as between 12,000 and 20,000 more residents will need aged residential care by 2026. www.newzealandnow.govt.nz

These care services will in many instances be key to ensuring the elderly remain connected with their wider communities and thereby enhancing their wellbeing. 2017 Research by AARP found that loneliness was as robust a predictor of early death as alcoholism, smoking 15 cigarettes a day, and a stronger predictor than obesity or a sedentary lifestyle. www.csa.us

Financial pressures

Globally, the financial pressure on the pensions system is growing, though generally overlooked by short-term focused administrations. Historically, people typically worked for 40-45 years, and then spent 10-15 years in retirement. Now we're approaching a tipping point where some people will spend more of their life as retirees than they did as workers. This presents

the risk of not having enough money in retirement. Ironically, it is likely to be healthy people who will be the burden on the public health budget as they will live longer, rather than smokers and the overweight.

A global survey recently found evidence of a “crumbling social contract” around pensions and noted only 7% of workers and retirees globally feel social security will remain affordable in the future. Yet, only 25 percent of workers globally believe that they are on course to achieve their expected retirement income needs. [transamericacenter.org](https://www.transamericacenter.org)

While not amongst the country list in the above survey, the outlook for New Zealand looks similar given our demographic profile. Local commentators are arguing for action to address the imminent ‘demographic crunch’. The point at which NZ Government expenses begin to rise faster than income gained through taxation is coming quickly. [interest.co.nz](https://www.interest.co.nz)

Some commentators suggest this financial pressure may lead to increased intergenerational conflict brought about through demographics, automation and inequality. They believe it’s inevitable that there will need to be a significant conversation as governments grapple with existing pension obligations, the scarcity of highly skilled workers, social pressure to address job losses and declining incomes among mid- to low-skilled workers. www2.bain.com

Climate change

The evidence above all tends to point to a trajectory of slowing growth and aging for the New Zealand population that appears unlikely to be changed by existing patterns of immigration. However, the projections of climate-induced population movement appear potentially significant, though the research to model these changes is currently absent.

What’s changing?

Climate impacts high-growth populations

Developed economies are facing a decline in fertility so pronounced that some will see their future populations and economies shrink. Sub-Saharan Africa (an area of high climate risk) faces the opposite situation: Its population has more than doubled in the past three decades and is expected to triple again by the end of this century. [washingtonpost.com](https://www.washingtonpost.com)

Africa’s challenge is underscored by a World Bank report assessing the worsening impacts of climate change in three densely populated regions of the world. It concludes that we could see more than 140 million people move within their countries’ borders by 2050. Only concerted global action to reduce greenhouse gas emissions, and robust development planning at the country level, will reduce this worst-case scenario. [worldbank.org](https://www.worldbank.org)

Bangladesh is one of the most exposed countries in this respect with the World Bank anticipating that it will have to manage more than 13 million people internally displaced people by 2050. With neighbouring India by then leading the world as the largest national population, the pressures from the region are likely to be intense. [pri.org](https://www.pri.org)

A 2017 Cornell University study estimated that one in five of the world’s population could become refugees due to rising ocean levels by 2100. Similar research in The Lancet suggests that this unprecedented displacement of people is likely to cause an international health crisis. [independent.co.uk](https://www.independent.co.uk)

Climate change influence on New Zealand demographics

There is significant uncertainty over the dire projections above, and it seems unlikely in the short to medium term that New Zealand will experience significant refugee increases from either Asia or Africa. It is, however, more plausible that climate will drive both intra-Pacific migration and domestic migration within New Zealand.

In assessing the challenge, a recent government Cabinet paper noted that it is expected that the 180,000 people living in the low-lying countries of Kiribati and Tuvalu – alongside inhabitants of Tokelau and atolls in some larger Pacific Island countries—will be most significantly affected by climate-related internal and cross-border migration. It concludes that it is not currently possible to estimate reliably the social and economic impacts of Pacific climate migration on New Zealand. www.mfat.govt.nz

The academic debate was reviewed in a Waikato University paper. It observes that while climate change is likely to have profound impacts there has been no systematic evaluation of the likely impacts of climate change on domestic demographic trends. It goes on to note that the effect on international migration will largely depend on future immigration government policy, though migration from the Pacific will likely increase regardless, both in absolute terms and as a proportion of total migration. Changes in the pattern of internal migration is also likely, as climate change will differentially affect the various regions in New Zealand. www.waikato.ac.nz

Health trends

Executive summary

This section explores health trends in New Zealand as we move from a health environment focused on disease and injury treatment and management, towards one of prevention and addressing the impacts of modern lifestyle risks in order to live longer and in good health. This can be characterised as a shift to adding 'life to years' in addition to the previous focus on adding 'years to life'.

The health trends are explored in seven sections:

1. **Primary health conditions:** Those prevalent in New Zealand's population
2. **Increasing morbidity:** The relationship between longevity and wellbeing outcomes
3. **Mental health challenges:** A growing issue across countries with multiple causalities
4. **Lifestyle risk factors:** A changing pattern impacted by new patterns of living
5. **Impacts of wider environment changes:** the context beyond individual control
6. **An evolving health system:** Moving from disease response to wellbeing support
7. **Health's digital revolution:** Emerging technology facilitating new wellbeing practices.

Increased life-expectancy and the desire to live well will require systems to meet the needs of an older population in addition to young people. This will place increased financial and resourcing pressures on our health system, and will have Government seeking complementary health prevention, management and enhancement options. This will bring wellbeing and the components of wellbeing, such as active recreation and sport, into sharper focus; notably in the areas of mental health and combating obesity.

Active recreation and sport has the opportunity to enhance its positioning as part of a holistic approach to improved health, integrating with other wellbeing components such as nutrition.

Summary implications

Primary health conditions

- **Targeting of recreation activity** If active recreation and sport are to address long-term wellbeing issues a greater focus on the types of activity likely to address the pre-cursors to non-communicable diseases will be needed
 - **Access for vulnerable groups** To what extent will current active recreation and sport approaches be accessible to socio economic barriers and a growing aged population?
 - **Integrated approaches** How is active recreation and sport effectively integrated with other wellbeing measures to ensure the individual gets the maximum lifetime benefit?
-

Increasing morbidity

- **Recreation throughout life** Long lasting wellbeing will be based on a pattern of active recreation and sport that extends throughout life and adapts to physical capability.
 - **Diversity of activities and levels** Remaining active for longer will demand more diversity of active recreation and sport that both potentially prevents degenerative conditions, but also matches the needs of sufferers.
 - **Individually targeted to maximise function** One size will not fit all and a reliance on one particular activity type could lead to longer term issues.
-

Mental health challenges

- **Active recreation and sport as a counter** Recognition that active recreation and sport can provide mental as well as physical wellbeing is going to become increasingly important.
 - **A broader focus** Understanding the components that provide mental health benefit and integrating these within the range of active recreation and sport activities will become increasingly necessary (e.g. is meditation 'active recreation'?)
 - **Establish habits at young age** Increasing importance of instilling a life-long love of active recreation and sport from young age to ensure benefits are maximised and 'stick'.
-

Lifestyle risk factors

- **Activity vital to addressing 'sitting disease'** Active recreation and sport provide the most obvious counter to the issue of sedentary living and provides some response to emergent obesity issues.
 - **Holistic approach to risk** Active recreation and sport are relatively small parts of overall risk factors that overall present a significant counter to wellbeing strategies. Increasing the linkages between wellbeing strategies (e.g. recreation and nutrition) will be increasingly important to reduce overall risk levels.
 - **Sponsorships at risk** Links between sport and alcohol and unhealthy foods will face increasing opposition.
-

Impacts of wider environmental changes

- **Work-based recreation** Studies show even those who are highly active outside work are vulnerable if their work pattern is still primarily sedentary. It implies there may be a need to shift thinking toward a 'little-and-often' activity approach that blends active recreation more effectively into the working day.
 - **Supporting tolerance** Active recreation and sport can provide an effective platform to reduce the risks associated with the 'fear of the other' and the knock-on impact for minority population health. The negative correlation between racism and health underlines the need for active recreation and sport to continue to address the issue.
 - **Environments for senior connection** Active recreation and sport patterns across life may form a useful support for ongoing social connection to counter elder isolation.
-

An evolving health system

- **Active recreation as pre-treatment** With a primary health system likely to remain under increasing pressure as demand grows and the workforce ages, ensuring population wellbeing becomes more important. In future, will individuals be pro-actively offered a range of active recreation options tailored to their specific needs ('green prescription').
- **Integrated approaches** The linkage of active recreation and sport within a 'complementary healthcare system' will require a clear understanding of the benefits respective activity approaches can bring to the broader wellbeing of the participant.
- **Increasing health inequalities** Pressure on public health systems and rise of human enhancement technologies (for those can that can afford them) may increase health and ability divide between those with and without means.

Digital revolution

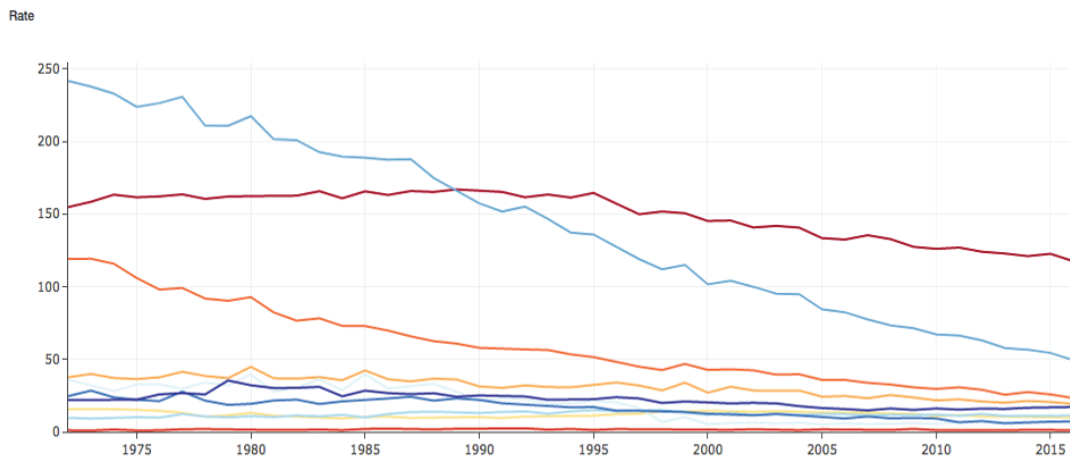
- **Recreation data interfaces** The flow of personal data associated with active recreation and individual body function is likely to form a useful complement to proactive health interventions, if privacy concerns can be effectively addressed.

Primary health conditions

The general trend is for New Zealanders to both live longer, and in better health for a greater proportion of that extended life-span. The Ministry of Health measures the loss of years lived in full health - disability-adjusted life years (DALYs¹⁸) - which over recent years has been declining by 1.2% per annum. Yet because the population is growing and aging, the absolute number of DALYs is still increasing.

This reflects New Zealand's advance through epidemics and infectious diseases to non-communicable diseases caused by smoking, alcohol consumption, poor diet and a lack of regular physical activity. 88% of health loss is now caused by non-communicable diseases (NCDs - i.e. long term mental and physical conditions) and 8% is attributable to injuries.

minhealthnz.shinyapps.io



Notes: Rates are per 100,000 and age-standardised to the World Health Organisation (WHO) standard world population. Source: New Zealand Mortality Collection records 1996 - 2016 and publications in the Ministry of Health Mortality data and stats series 1948 - 1995 .

- All cancer
- Assault
- Cerebrovascular disease
- Chronic lower respiratory diseases
- Diabetes mellitus
- Influenza and pneumonia
- Intentional self-harm
- Ischaemic heart disease
- Motor vehicle accidents
- Other forms of heart disease

18 DALY is the unit of health loss. One DALY represents the loss of one year lived in full health.

What's changing?

Cancer tops the charts

Cancer remains New Zealand's single biggest cause of death, with the three most common being lung, bowel, and breast cancer. Globally, cancer killed an estimated 9.6 million people in 2018 (more than malaria, tuberculosis, and HIV combined) and remains a formidable hurdle to boosting life expectancy.

health.govt.nz

Aging populations are more vulnerable to cancer as cancer takes advantage of the waning immune system and the accumulated DNA damage that accompanies longer life. The prevalence of the main risk factors are changing too, and specialists are concerned that in the next decade, the cancer-causing effects of obesity could reverse the downward trend ushered in by the decline in smoking. Obesity could soon become the number one risk factor globally for cancer which will make halting cancer's associated rise exceedingly challenging. hsph.harvard.edu

Recognising this ongoing challenge, the Government opened a new independent cancer control agency on 3 December 2019 to lead a [cancer action plan 2019-2029](#).

Ischaemic Heart Disease in decline

Ischaemic Heart Disease (IHD) remains the second most prevalent cause of morbidity in New Zealand, though its rate has been declining since the 1960s. These declines have been attributed to rapid progress in the prevention and treatment of cardiovascular disease, including reductions in blood cholesterol and smoking prevalence, and improvements in blood pressure control. However, as with cancer, there are concerns that rising rates of obesity and diabetes may halt, or even reverse, these favourable trends. nzma.org.nz

Chronic Obstructive Pulmonary Disease (COPD) increasing with age

COPD is a group of progressive and life-threatening respiratory diseases without a cure. The World Health Organisation (WHO) estimates that it will become the third leading cause of death worldwide by 2030.

investigate.co.uk

In New Zealand there is a decreasing trend in mortality from COPD, but increasing levels of hospitalisation from the disease which implies increasing health care costs. Though historically associated with smoking, the relationship between socio-economic deprivation and housing conditions is well-established (e.g. Māori women have the highest rate of COPD that has been recorded for any female group). As the percentage of New Zealanders over 65 grows from 12% to 22% over the next 25 years, the number of vulnerable individuals is likely to increase. Healthyhousing.org.nz

The current Novel Coronavirus is most threatening to those with respiratory conditions. As such, this and the spread of other respiratory conditions is an issue for New Zealand.

Diabetes becoming more prevalent

Twenty-five percent of New Zealanders are estimated to have prediabetes, and an average of 40 people are diagnosed with diabetes every day. Approximately 6% of the total population has diabetes. The prevalence of diabetes is highest in older age groups, reaching approximately 15–20% in people aged over 65 years; however, frequency is increasing in younger people. The occurrence of diabetes is two to three and a half times higher in adults aged 25–39 years of Māori and Pacific ethnicity compared to those of European ethnicity.

bpac.org.nz

Obesity a rising precursor for morbidity

New Zealand has the third highest adult obesity rate in the OECD, and our rates continue to increase. One in three adult New Zealanders (over 15 years) is classified as obese, and one in 10 children. A recent Otago University report showed the average Body Mass Index (BMI) of Kiwis increased from 26.4 in 1997 to 28.3 in 2015. If the trend continues then 2 million New Zealanders may be clinically obese by 2038. health.govt.nz

UNICEF's 2019 State of the World's Children 2019 found 39% of New Zealand children to be overweight or obese. At 42%, the United States is the only OECD country with a higher rate of obesity among 5 – 19-year-olds. [OECD Report](#)

Childhood obesity is associated with a higher chance of premature death and disability in adulthood. Overweight and obese children are more likely to stay obese into adulthood and to develop noncommunicable diseases (NCDs) like diabetes and cardiovascular diseases at a younger age. The most significant health consequences of being overweight or obese in childhood, that often do not become apparent until adulthood, include cardiovascular diseases (mainly heart disease and stroke), diabetes; musculoskeletal disorders, and certain types of cancer (endometrial, breast and colon). who.int

US National Cancer Institute studies found that if every adult reduced their body-mass-index by one percent, which equals about one kilogram for an adult of average weight, there would be about 100,000 fewer cancer cases. kucancercenter.org

Increasing morbidity

While we are living longer, only 70–80% of the years of life gained over the past quarter century have been lived in good health. Our health system and wider society have proved more adept at preventing early death than at avoiding or improving morbidity. A greater focus on addressing the impact of non-fatal disabling conditions, whether through prevention or improved management, will enable people to live more of their 'extra' years of life in full health.

What's changing?

Dementia as an inevitable factor of old age?

With age the biggest risk factor for dementia, the number of people living with this condition is expected to rise as the population ages and life expectancy increases. An Alzheimer's Research UK report finds that 32% of those born in the UK in 2015 will develop dementia during their lifetime (27% of males and 37% of females).

The WHO estimates that globally around 50m people suffer from dementia with the number projected to reach 82m in 2030 and 152m in 2050. Incurable Alzheimers is the most common form of dementia contributing to 60-70% of cases. eurekalert.org

Both the incidence and the prevalence of dementia increase exponentially with increasing age, but there is now debate as to whether dementia is an inevitable consequence of aging. Evidence is emerging that suggests intervention strategies that promote general health, maintain vascular health, and increase cognitive reserve are likely to help preserve cognitive function till late life, thereby achieving the goal of aging without dementia. ncbi.nlm.nih.gov

There are considerable incentives to break the linkage as Australian authorities have estimated that dementia care costs are likely to rise from \$15 billion in 2018 to \$18.7 billion in 2025 and more than \$36.8 billion by 2056. 52% of all residents in Australian residential aged care facilities suffer dementia. dementia.org.au

The impact of age on bone health

Otago researchers estimate the burden of knee osteoarthritis costs predicted to rise from \$199m in 2013 to \$370m by 2038 due to population aging and increasing rates of obesity. Osteoarthritis is a common and debilitating chronic disease and one of the leading causes of disability in New Zealand and worldwide. Reducing obesity rates is seen as critical to help slow the need for remedial osteoarthritis treatment. otago.ac.nz

Globally the trend is similar with the worldwide incidence of hip fracture in 2050 projected to increase by 310% for men and 240% in women, compared to rates in 1990. iofbonehealth.org

Physical inactivity and a sedentary lifestyle as well as impaired neuromuscular function (e.g. reduced muscle strength, impaired gait and balance) are all risk factors for developing fragility fractures. Smoking and high alcohol intake are also precursors to future fractures (e.g. over four units of alcohol/day can double the risk of hip fracture). Some young females, particularly those training for elite athletic competition, may exercise too much, eat too little, and consequently experience amenorrhea which makes them at risk for low bone mass and fractures. iofbonehealth.org

Aging sport participants may also be at a greater risk of developing arthritis and other musculoskeletal problems than the general population. A study led by the Arthritis Research UK Centre for Sport, Exercise and Osteoarthritis at the University of Oxford has suggested that rugby players, for example, may need to be monitored specifically to help address the potential impact that playing the sport can have on their bodies. versusarthritis.org

Mental health challenges

The statistics for mental health disorders are both challenging and heading in the wrong direction. The 2018/19 New Zealand Health Survey found that 8.2% of New Zealand adults had experienced psychological distress in the past four weeks with around 620,000 (15.7%) diagnosed with depression at some stage in their lives. ([Min Health survey](#))

What's changing?

Overall indicators continue to deteriorate

The WHO estimates that unipolar depressive disorders will be “the leading cause of the global burden of disease” by 2030. medicalnewstoday.com

A broader understanding of mental health issues on the workforce is starting to be seen with the WHO noting that, “stress is the health epidemic of the 21st century.” Additional research has found that stress is the number one lifestyle risk factor for mental health that is negatively impacting workers today—ahead of obesity, drug and alcohol use, and poor health. workdesign.com

New Zealand's experience was found by a recent inquiry to be mirroring the ‘rising tide of mental distress and addiction’ seen in similar economies. It suggests some of the shared problems reflect common features of life in contemporary Western countries. The inquiry concluded that the response needs to lie with a wider societal look at the issues to complement health service interventions. mentalhealth.inquiry.govt.nz

Youth Mental Health of Particular Concern

Ministry of Health figures indicate a growing number of young New Zealanders are battling psychological distress, defined as having “high or very high probability of anxiety or depressive disorder”. The percentage of 15 to 24-year-olds struggling with mental health has been steadily rising from 5% in 2012 to almost 12% in 2017. ([Min Health survey](#))

Again, the New Zealand figures reflect global patterns. An American study found the percentage of youth experiencing certain types of mental health disorders has risen significantly over the past decade, with no corresponding increase in older adults. The study suggests the shift may be due in part to the rise of digital media. [sciencedaily.com](https://www.sciencedaily.com)

A review into the efficacy of post-secondary institution-based recreation programmes developed with the purpose of supporting students' mental health found that those emphasising meditation, Tai Chi, yoga, exercise, and animal therapy may reduce perceived stress, anxiety, depression and negative mood. [tandfonline.com](https://www.tandfonline.com)

The impact of mental health is increasingly costly

Every country in the world is seeing a rise in mental health disorders with an estimated cost to the global economy of up to \$16 trillion between 2010 and 2030 if not checked. This estimate from a Lancet Commission report by 28 global specialists in psychiatry, public health and neuroscience suggests the growing crisis could cause lasting harm to people, communities and economies worldwide. [reuters.com](https://www.reuters.com)

The first ever Global Ministerial Mental Health Summit last year noted that mental health is now the leading cause of lost economic output, with an estimated cost of nearly \$2.5 trillion annually, expected to increase to \$6 trillion by 2030. The human cost is severe too with people experiencing mental illness 60% more likely to die prematurely because of their underlying condition and related conditions such as dementia and epilepsy. However, the average global spend on mental health remains low at just 2.8% of government health spending. In New Zealand the figure is 3% while the equivalent UK spend is around 9.5%. [happiful.com](https://www.happiful.com)

About 4.7% of New Zealanders are estimated to have severe mental health needs. Mental health and addiction services for people with severe needs saw about 3.6% of the population in 2016, with DHBs funded to cover 3%. www.asms.org.nz

The Government Inquiry into Mental Health and Addiction was received in November 2018 with 40 recommendations. The government has asked the Ministry of Health for information on suicide prevention, reform of the Mental Health Act 1992, and establishing a Mental Health and Wellbeing Commission. [He Ara Oranga : Report of the Government Inquiry into Mental Health and Addiction](#)

Lifestyle risk factors

Potentially, over one-third of all health loss is preventable suggesting the opportunity to achieve health gains by reducing risk factors remains strong. Although tobacco use has been declining for almost half a century, its impact on the New Zealand population's health, particularly Maori health, remains significant. Even greater challenges are to address diet, physical inactivity and the obesity epidemic - challenges that go well beyond the health system and require a society-wide response.

What's changing?

Alcohol

New Zealanders are drinking much less than 20 years ago, counter to global trends, partly driven by a younger generation that is increasingly risk-averse and health conscious. According to the Lancet study though, despite the drop in consumption, 30% of Kiwis are still binge-drinking regularly.

[Min Health survey](#)

The Ministry of Health estimates that over 780,000 adults are hazardous drinkers with the number increasing by more than 50% among the older age who are now among some of the heaviest drinkers in the world. [Min Health survey](#)

Smoking

Smoking has been declining over the past 40 years with the proportion of regular cigarette smokers aged 15 years and over dropping from 35.6% in 1976 to 13.2% in 2018. The reduction is being driven by a number of factors, including rapidly rising costs of tobacco, a lower number of young adults taking up smoking, an increase in smoking alternatives such as vaping, and stop-smoking programmes. [[stats.govt.nz](#)]

Severe lung diseases among people who vape has raised significant questions about the safety of vaping. "It's unsurprising that lung problems might develop in people who vape: our lungs were meant to inhale clean air and nothing else. It took many years to recognize the damage cigarettes can cause and there are some suggestions vaping could follow a similar trajectory". [health.harvard.edu](#)

Smoking doubles the risk of dementia by increasing the risk of cardiovascular disease, diabetes and stroke, narrowing the blood vessels in the heart and brain, and causing oxidative stress which damages the brain. Quitting smoking could therefore prove to be one of the easiest ways to prevent dementia. [publichealthmatters.blog.gov.uk](#)

Inactivity

Insufficient physical activity has been identified by the WHO as the fourth leading risk factor for global mortality. [uitp.org](#)

The WHO also found in a recent survey that more than 80% of adolescents worldwide are not active enough, putting their health at risk by sitting focused on a screen. The study across 146 countries, found that there has been so little improvement in physical activity among those aged 11 to 17 since 2001 that the WHO's global target for getting adolescents moving is unlikely to be met and is a major concern for the future. Physical activity is important to the development of bone and muscular strength, and heart and lung health. It helps young people reduce their risk of developing obesity, heart disease, cancers and diabetes. There is growing evidence that it helps cognitive development, as well as social and motor skills.

There is no single answer that explains why activity levels are so low but there are some common themes. Basically, we have engineered physical activity out of our everyday lives through increased reliance on cars, and labour saving devices.

While the implications for lifetime health are most pronounced for the low activity young, the WHO also highlights concern with sedentary office environments. Given that working age people spend most of their awake time at work, it has been legitimately identified as a key root cause of the "sitting disease". [personneltoday.com](#)

Nutrition

The quantity and quality of food consumed are key contributors to poor health. The strongest nutrition risk factors for poor health are salt content of food, saturated fat, added sugars, and highly processed foods.

Based on a review of New Zealanders' food choices, researchers have concluded that high rates of obesity are 'inevitable'. The study looked at the composition of more than 13,000 packaged foods, food labelling, marketing and prices as well as foods sold in schools, hospitals and sport centres. They found New Zealand's very high rates of obesity come from the "unhealthy state of food environments." [Eating and Activity Guidelines](#)



8

Number of unhealthy food ads played on TV during child peak viewing times (6-9pm)



96%

Of schools use unhealthy foods for fundraising



1 in 10

Sponsors for popular children's sports were food or beverage companies



9

Average number of ads for unhealthy foods found within a square kilometre of a school



36%

Of the cost of New Zealand diets is spent on unhealthy food and drinks



1 in 4

Promotions in supermarket flyers are for junk foods and drinks



2.4

Number of convenience stores and takeaway outlets within 500m of urban schools

SOURCE: HOW HEALTHY ARE NEW ZEALAND FOOD ENVIRONMENTS? UNIVERSITY OF AUCKLAND.

Specific food items are receiving greater scrutiny from health professionals as the impact of respective morbidities is increasingly felt. In the UK for example, senior food scientists and doctors are citing "a growing consensus of scientific opinion" that nitrites in processed meats result in the production of carcinogenic nitrosamines, which are believed to be responsible for bowel cancer. independent.co.uk

A recent Oxford study concluded that the adoption of diets in line with global dietary guidelines could avoid 5.1m deaths per year by 2050 while even greater benefits could come from vegetarian and vegan diets. Approximately half of the avoided deaths were due to reduction of red meat consumption, with the other half due to a combination of increased fruit and vegetable intake and a reduction in calories, leading to fewer people being overweight or obese. oxfordmartin.ox.ac.uk

The rise of 'meatless' foods could be seen as support for this trend, though nutritionists potentially see challenges ahead. The new products that aim to replicate burgers, for example, come with a comparable amount of the saturated fats associated with increased rates of both heart disease and premature death. Their role as a healthy alternative may therefore be limited. health.harvard.edu

Impacts of wider environment changes

Beyond individuals' lifestyles the wider context has clear linkages to wellbeing, from the physical environment, workplace, through societal attitudes to the changing climate at the macro level. cph.co.nz

What's changing?

Physical environment

Increased urbanisation has resulted in several environmental factors which may discourage participation in physical activity such as high-density traffic, low air quality, pollution and lack of parks, sidewalks and sports/recreation facilities.

This aligns to study findings that greater access to recreational facilities, greater opportunities to exercise, and increased time spent outside resulted in higher physical activity levels in children and adolescents; while the number of roads to cross and traffic density/speed have been found to be related to decreased levels of physical activity. biomedcentral

Work undermining employee health

Continuing disruption of the work environment is contributing to findings that only 13% of the global workforce is positively engaged in their current work experience, despite the organisational efforts to reduce redundancies, increase automation and advance human services. forbes.com

The finding above is striking given a UK study indicating middle-aged adults who feel stressed, powerless or overworked on the job may be more likely to develop mental health problems in the coming years than more contented co-workers. The Lancet Psychiatry survey found that by age 50, workers who reported high levels of job strain five years earlier were more than twice as likely to be diagnosed with mental health disorders as the people who had low-stress jobs. reuters.com

A similar study from a UK mental health charity revealed widespread poor mental health, with 48% of respondents saying they have experienced a mental health problem in their current job. With continued workforce uncertainty due to automation and digital disruption these figures are likely to worsen. mind.org.uk

Even those secure in their roles are suffering from the effects of the workplace. The amount of time a person sits during the day is associated with a higher risk of heart disease, diabetes, cancer, and death, regardless of regular exercise. Researchers find that despite the health-enhancing benefits of physical activity, this alone may not be enough to reduce the risk of disease. uhn.ca

Discrimination and exclusion

Discrimination has a direct influence on health and high levels of sexism have been found to fuel poor mental health among women. A UCL study found 20% of women reported sex discrimination and these women are more likely to develop poorer mental health after the sexist experience. medicalxpress.com

Researchers looking at health disparities between majority and minority populations find that the strongest evidence to date points to social-environmental factors such as poverty, health care inequities and racism. Such a direct link has not been demonstrated in local studies, but racism is still a challenge in the New Zealand context. rnz.co.nz Studies reflect the experience of racism being highest among the Asian community followed by Māori and Pasifika. The higher experience of racism among non-European groups remains an issue in New Zealand and its potential effects on health may contribute to ethnic health inequities. ncbi.nlm.nih.gov

Elderly isolation

Research has linked social isolation and loneliness to higher risks for a variety of physical and mental conditions, and even death. This issue is anticipated to increase with members of an aging population who may find themselves unexpectedly alone due to the death of a partner, separation from friends or family, retirement, loss of mobility, and lack of transportation. Keeping people engaged in meaningful, productive activities has been shown to help maintain their well-being and may improve their cognitive function. nia.nih.gov

Awareness of this issue is leading to the exploration of new living patterns with companionship seen as a key reason some US seniors are turning to shared housing. Loneliness is recognised as a significant health risk for the elderly, bigger than smoking or obesity according to a 2015 Brigham Young University study. mercurynews.com

The changing climate's health impact

The World Health Organisation (WHO) has identified a number of emergent issues associated with changing climate conditions. Extreme high air temperatures contribute directly to deaths from cardiovascular and respiratory disease, particularly among elderly people. High temperatures will also raise the levels of ozone and other pollutants in the air that exacerbate cardiovascular and respiratory disease. Pollen and other aeroallergen levels are also higher in extreme heat. These can trigger asthma, which affects around 300 million people. who.int

Ministry for Environment (MFE) analysis suggests the direct impacts of changes in climate extremes are likely to be relatively small, though notes climate trends may already be impacting the health of New Zealanders. In addition to the pollutant hazards noted above, it projects that parts of the North Island are likely to become receptive to populations of the major mosquito vector of dengue fever, while much of the country may become receptive to a less efficient vector species. If this occurs the risk of transmission will likely increase. mfe.govt.nz

The Royal Society's assessment of climate impacts on New Zealanders' health suggests increased temperatures, extreme weather events, and displacement of people from homes and communities will all have significant mental health and well-being consequences. They conclude these will range from minimal stress and distress symptoms to clinical disorders such as anxiety, depression, post-traumatic stress and suicidal thoughts. Other consequences include effects on everyday life, perceptions, and experiences of individuals and communities attempting to understand and respond appropriately to climate change and its implications. royalsociety.org.nz

An evolving health system

What's changing?

Intensifying pressure on existing health services

The global demands of long-term if not life-long treatment for chronic conditions are placing unsustainable pressure on an overloaded health workforce. It is estimated that the management of non-communicable diseases and conditions like dementia will require 40 million new health workers by 2030 in wealthy countries. who.int

Acute admissions in New Zealand's hospitals are increasing at more than twice the rate of population growth. The steep rise in acute admissions appears to be displacing non-urgent admissions, which are increasing at only half the rate of population growth. In many hospitals, bed occupancy rates are frequently close to and sometimes over 100%. The widely accepted clinical safety level for bed occupancy is a maximum of 85%. rnz.co.nz

New Zealand faces an increasing doctor shortage as figures indicate nearly half the country's GPs are planning to retire within the next 10 years. Shortages are also anticipated in other health professional fields such as midwifery and radiography. tvnz.co.nz

The US is facing similar pressures on its health workforce and is exploring alternate health care delivery options including, for example, providing better care coordination across settings, reducing unnecessary hospitalisations and reducing obesity and tobacco use. Analysis suggests that these initiatives will only marginally reduce (by 1%) demand for physicians by 2032. aamc.org

Rethinking the health service model

Despite the US analysis above, New Zealand's response to the pressure on the primary care workforce is driving new innovations. GPs are experimenting with phone triaging remotely and the use of online portals. The primary-care workforce is also set to diversify with more work going to nurses, nurse prescribers, clinical pharmacists, health coaches and health improvement practitioners. noted.co.nz

Some commentators are also envisaging a complementary system that will provide health, wellbeing and happiness needs in support of the current medical system. This complementary system would essentially be a preventative health system that will assess an individual holistically (considering the individual's relationships, lifestyle, diet, exercise, sleep and mental health) to provide health care. berl.co.nz

The reactive healthcare model where the individual gets sick, visits the doctor, then takes medication is looking increasingly dated against the challenges of 21st century health needs. Its limitations are highlighted in the care of elderly people, who fall into depressing cycles of health emergencies, as their prescription list grows and the quality of life diminishes – especially for those who cannot afford quality healthcare. Doctors are busily keeping people alive with medication, but patients aren't necessarily leading healthier lives. There are growing numbers of initiatives now focused on delivering an alternate preventative system based on a holistic, nuanced and customised approach to medical care. This would be facilitated through deeper access into patient data and new technologies that anticipate health issues before they become a problem. Doctors can therefore focus on keeping the public healthy, rather than only reacting to patient illness. idealog.co.nz

Health's digital revolution

A growing gap between needs and resources suggests health authorities will be looking to drive responsibility to the individual – encouraging, incentivising, and pushing us towards better self-care, including physical health, diet, and mental wellbeing. Technology will be a critical enabler of this trend both in terms of its support for new delivery models and innovative predictive analysis of individual health data. Both these areas are likely to interface directly with the broader wellbeing and recreation sectors.

What's changing?

MedTech driven system innovation

The medical technology (MedTech) field is growing rapidly with the e-health market set to triple in the next five years. The US National Institutes of Health defines e-health as the “intersection of medical informatics, public health, and business, referring to health services and information delivered or enhanced through the Internet and related technologies.” The goal is the use of big data, smart analytics, and reliable connectivity at the system and individual patient level in support of effective service configuration and delivery, patient engagement, and positive health outcomes. [mailchi.mp]

Global research reveals 36% of consumers are already using the internet to research health issues and healthcare products, jumping up to 42% for users aged 55-64, where a focus on health becomes even more crucial. Half of UK and US consumers say the ability to consult with a doctor by a phone or video call instead of in-person would help them manage their healthcare more effectively, showing there's great appetite for digital appointments. Technological advancements could potentially alleviate some of the capacity problems noted above and creating more efficient and effective delivery. [thejournalofmhealth.com]

Robotics and automation could also prove invaluable in augmenting traditional healthcare advisors, especially for the more vulnerable groups who would benefit from ongoing intervention. For example, 'Buddy bots' are now being trialled in New Zealand to help patients with lung disease. The bots, deployed in the home, effectively reminded patients with chronic obstructive pulmonary disease (COPD) to take their medication and exercise. [nzherald.co.nz]

As consumer behaviour and preferences change, the digital health landscape is able to adapt quickly to provide various regulated and non-regulated tools and platforms – the aim is to provide personalised, efficient care to make the user feel safe, satisfied and mindful. In this new era of digital health, tech giants and smaller companies are racing to make sense of the available data, to monitor patient communities and to provide on-demand digital health services. [nature.com]

Increasing data exploitation

Artificial intelligence could be deployed to analyse lifestyle risk factors and thereby prevent subsequent degenerative diseases. New AI methodologies could have significant implications as a 'doctor's assistant' that would help stream people onto the right pathway for treatment. For example, one could even initiate lifestyle changes that may delay the beginning stages of Alzheimer's or even prevent it altogether. [eurekalert.org]

PWC analysed the potential benefits from AI applications in Europe's healthcare system and found it could save up to \$151 billion over the next 10 years through the prevention of childhood obesity; \$13.4 billion in dementia diagnosis costs and overall help save up to \$124 billion over the next 10 years, if used on a large scale. The driver to adopt such technologies, if the savings are tangible, will prove compelling for cash-strapped health authorities [pwc.nl]

Internet of Things' (IoT) technologies enables real-time patient monitoring of heart rate, glucose levels, breathing rate, and many other data points. The potential preventative health gains are obvious, though data ownership is

likely to become an increasingly challenging issue. Are patients likely to opt for free treatments in exchange for all their data being shared with an insurance company? [techrepublic.com]

AI and machine learning promises to transform areas like early diagnosis, automation of tasks, development of new medicines, and precision surgery. However, privacy and security issues remain a big concern for patients which could slow adoption even as the technology becomes more mature. Recent studies found that the vast majority of consumers are comfortable sharing their data with their healthcare provider, but this dips significantly for technology firms – 39% of consumers don't feel comfortable sharing their health data with technology firms, and a further 27% are unsure how they feel. [thejournalofmhealth.com]

Climate change

Executive summary

This section of the report takes a high-level view of the dimensions of a changing climate including:

1. **The science:** the current position, levels of confidence and potential forecasts for the globe and New Zealand.
2. **Social impacts:** the impact on people in terms of societal change, health and consumer behaviour.
3. **Economic consequences:** the concerns of the financial sector both in terms of economic stability and future business positioning.
4. **Addressing the issue:** energy transition and political action required to mitigate climate change.
5. **The role for sport and recreation** in addressing climate change.

Rising global temperature, growing ocean acidification, more frequent forest fires, expanding desertification, decreasing biodiversity, and more destructive weather are symptoms of a changing climate.

Play, active recreation and sport will not be immune to the consequences of climate change, both directly - where and when activity can take place, and how people can participate - and also indirectly, as local, national and commercial priorities and consumer behaviour change in response to climate change.

The play, active recreation and sport sector can play an important role in addressing climate change through reducing carbon emissions within its own industry, and being used as a tool to educate and advocate. It has a vested interest in doing so.

Summary implications

Demand for indoor facilities	Disruption from extreme weather, water shortages for ground preparation and heat-stressed participants may see rising demand for indoor facilities.
Viability of outdoor sports	Water shortage will impact cost and viability of many sports (football, cricket, rugby, hockey, golf, etc). Temperature rise will bring new grass diseases and there will be heightened opposition to current chemical spraying. Increased costs will be passed onto participants heightening cost as a barrier to entry.
Decline home advantage	NZ will struggle to meet the increasing requirement for events to be ecologically sustainable given the high carbon footprint of flying to or from here.
Rising tide	Sea-level rise, salinisation of groundwater and erosion of land will impact leisure facilities dependent on coastal infrastructure and will impact ability to get insurance cover for facilities and events.
Coping mechanism for mental impact	Increased temperatures, extreme weather events, displacement of people, and the need to change consumption habits will all have significant mental health and wellbeing consequences. Opportunity for sport and recreation to position itself both as a constant and a coping mechanism.
Pacific Islands more severely affected	The impacts of a changing climate will be more severely felt by smaller Pacific Island nations. They may have fewer resources to devote to international sporting events in the future or may need more assistance to participate.
New activities	A shift to warmer winters may open up new opportunities for outdoor leisure time, though hotter summers will bring increased risks of heat stress.
Anti-sport activism	International sport travel may become a target for protest given high carbon footprint from flying.
Climate refugees	Climate impacts may drive both intra-Pacific migration and domestic migration within New Zealand, thereby disrupting communities.
Leadership	Opportunity for NZ sport and active recreation to reposition itself as leader in climate change, following lead of the UN launched sports for climate change.
Local and central Govt. priorities	The all-encompassing nature of climate change impact will dominate local and national government priorities and resource allocation (e.g. upgrading critical infrastructure), at the expense of discretionary spend such as 'sport'.

Introduction

A foresight scan aims to highlight weak signals of change that suggest alternate scenarios to challenge our collective view of an assumed future. These alternative scenarios are driven by low probability but high impact factors. Climate change presents a paradox as both its impacts and likelihood are high, but the inadequate societal action to date implies an apparent belief that its full effects are unlikely to be felt. This inaction suggests a misplaced faith in a future that is less plausible than the more challenging one science indicates we are facing.

The science

Unsustainable patterns of production and consumption are undermining the ecosystem services that support life on the planet, leading to rapidly changing environments.

The Intergovernmental Panel on Climate Change (IPCC) released a report in October 2018, that outlines the expected impacts of global warming of 1.5° above pre-industrial temperatures as compared to those for a 2°C warming scenario. Its findings are:

- a. global warming is likely to reach 1.5°C above pre-industrial temperatures at some point between the years 2030 and 2052;
- b. the impacts of a 1.5°C global warming scenario, while great, are significantly less than a 2.0°C global warming scenario;
- c. in order to limit global warming to 1.5°C, greenhouse emissions must decline to 45% below 2010 levels by 2030, and must reach net zero by 2050;
- d. such reductions are physically possible, but will require unprecedented transitions in all aspects of society; and
- e. even if global warming is limited to 1.5°C, we can expect consequences such as extreme temperatures; massive increases in frequency and intensity of precipitation, floods, droughts and other extreme weather events; sea-level rise; loss of coastal land; loss of species; an increase in ocean acidity; issues with food and fresh water availability; and all of the associated impacts that these will have on economic growth and human health and wellbeing.

In 2015, most of the world's leaders met in Paris to agree on a new set of goals to tackle climate change. From these talks came the central objective of keeping global average temperatures below 2°C higher than pre-industrial levels.

Despite this, the world is currently on track to produce far more fossil fuels in 2030 than would be compatible with a 2°C pathway. Specifically, countries' current plans and projections for fossil fuel production would lead to the emission of 39 billion tonnes of carbon dioxide in 2030 - 53% more than would be consistent with a 2°C pathway. sei.org

The IPCC report states that if governments take aggressive action on global warming now, and immediately enact all policy changes agreed to in Paris, we'll probably still get a global temperature increase of 3.2 degrees before warming stops. However, no industrial country is even close to enacting all the policy changes.

New Zealand is the 50th highest producer of carbon dioxide at 7.7 metric tons per capita. This places us behind the UK (5.6), but ahead of Australia (16.8), US and Canada (16.1), and China (8).

What's changing?

Increasing urgency of warnings

Scientists have been warning about severe global impacts from climate change for more than three decades. But over the past 12 months those warnings have become increasingly strident as they become more confident of the severe impacts inherent in delayed mitigation. (Click [here](#) to see a rundown.)

In November 2019, exactly 40 years since scientists from 50 nations met and agreed that alarming trends for climate change made it urgently necessary to act, an international group released a letter reiterating warnings of the dangers ahead. In their "World Scientists' Warning of a Climate Emergency", the signatories note that scientists

“...have a moral obligation to clearly warn humanity of any catastrophic threat and to “tell it like it is.” On the basis of this obligation... we declare, with more than 11,000 scientist signatories from around the world, clearly and unequivocally that planet Earth is facing a climate emergency... To secure a sustainable future, we must change how we live.

Local politicians have followed scientific warnings, with 1,432 jurisdictions in 28 countries representing 820 million citizens having declared a climate emergency. This includes New Zealand Councils representing 74 per cent of the population. climateemergencydeclaration.org

Levels of confidence

The increasing level of concern being expressed reflects growing confidence in the underlying science. Scientists are now in the position to detect the influence of climate change on any single day of weather at a global scale. [nature.com](https://www.nature.com)

Climate modelling is continually improving with predictions of warming over several decades into the future now possible ([sciencedaily.com](https://www.sciencedaily.com)). As modelling improves, the potential challenge increases rather than decreases. New climate models are showing carbon dioxide is a more potent greenhouse gas than previously understood, a finding that scientists fear could push the Paris treaty goals for capping global warming out of reach. [phys.org](https://www.phys.org)

Taking the current temperature

According to independent analyses by NASA and National Oceanic and Atmospheric Administration (NOAA), Earth's global surface temperatures in 2019 were the second warmest since modern record-keeping began in 1880. Globally, 2019 temperatures were second only to those of 2016 and continued the planet's long-term warming trend: the past five years have been the warmest of the last 140 years. [nasa.gov](https://www.nasa.gov)

NIWA's annual climate summary shows it's now been 35 months since New Zealand had a month with below average temperatures, 2019 was NZ's fourth warmest year, and January 2020 was our third warmest. Five of the past seven years have been among New Zealand's hottest on record.

Ocean feeling the heat

While most focus is on atmospheric temperatures, over 90% of the warming is being absorbed by the world's oceans. Given New Zealand's long coastline and dependence on the marine environment, understanding this dimension to the climate challenge will be critical for our future.

The future heating is a result of the storage capacity of the marine environment that will continue to heat the environment even if humans achieved zero-carbon economies in the near future. twitter.com

Ocean warming lifts sea levels by virtue of expansion. In recent years, scientists have also discovered that warm ocean currents are helping to melt some glaciers from the bottom up, both in Greenland and particularly in parts of West Antarctica.

Incoming tide

Understanding the impact of warming on future coastlines continues to evolve with the most recent research suggesting the issue may have been previously underestimated.

Rising seas could affect three times more people by 2050 than previously thought, according to new research, threatening to all but erase some of the world's great coastal cities. New research shows that 150 million people are now living on land that will be below the high-tide line by mid-century.

[nytimes.com](https://www.nytimes.com)

The findings indicate coastal communities must prepare for much more difficult futures than currently anticipated. Recent work has suggested that, even in the US, sea-level rise this century may induce large-scale migration away from unprotected coastlines, redistributing population density across the country and putting great pressure on inland areas. [nature.com](https://www.nature.com)

This issue is identified as a key issue for New Zealand communities. For example in a report on New Zealand Communities and Climate Change, it is noted:

“Climate change is increasing the likelihood of hazards such as coastal erosion, rising water tables and flooding. It will also mean significant challenges for the communities that are exposed to these hazards. They will need to be able to be resilient to hazard events as they arise, and also plan for a changing future at a time when they may be facing financial and personal stresses from those events.” [motu.nz](https://www.motu.nz)

Degradation of coastal environments and ecosystems are expected to adversely affect economic, social and cultural values across Māori society. This relates to Māori as owners and managers of affected land, and to the impact to customary practice and the associated wellbeing and resilience that Māori derive from their close relationships between people and place.

New Zealand's forecast

The best estimates of New Zealand temperatures are for an expected increase of about 1°C by 2040, and 2°C by 2090. However these projections of future warming cover a wide range: 0.2–2.0°C by 2040 and 0.7–5.1°C by 2090.

Temperature rise is expected to speed up. The rate of temperature increase from these projections is expected to be higher than a linear extrapolation of the historical New Zealand temperature record for the 20th century. Projected rainfall and wind patterns show a more marked seasonality than was evident in previous models. [mfe.govt.nz](https://www.mfe.govt.nz)

The destructive effects of climate change act as chain reactions, triggering further warming

Working out how severe impact of climate change is difficult, because climate change depends on so many different moving parts, such as how much more carbon we emit and what technologies we might invent to reduce this.

But there are other, more complicated factors which warm the planet – the most complex of these are called cascades – an effect of climate change that warms the planet even more, causing more effects and more warming in a destructive feedback loop.

One clear example of a cascade is the melting of Arctic ice sheets. Because the color white is a great reflector of light and heat, our polar ice caps reflect

a huge amount of sunlight back into space. As our ice sheets shrink, less heat is reflected and more of it is absorbed. This warms the planet and causes ice sheets to shrink faster, accelerating warming further.

Wildfires are another cascade. Because we're experiencing unprecedented heat, forests are more susceptible to fires. But the most harmful effect of wildfires is the carbon they release. When trees absorb carbon to convert into oxygen, they store it as opposed to making it disappear. When a wildfire decimates a forest, accumulated carbon is released back into the atmosphere. This heats the planet further, making future wildfires even more likely.

Social impacts

A changing climate has the potential for significant social impacts. At the extreme, several commentaries are now appearing with concerns for the future of civilisation itself together with population migrations. Short of these dire predictions, it's clear that there are implications both for population health and consumer behaviour. A significant change to travel patterns and eating preferences would reshape the two most significant sectors of the New Zealand economy.

What's changing?

An existential threat?

'Unprecedented' is a word frequently used to describe the current climate position. With no precedent for our experience though, we may be being too conservative in our consideration of plausible futures. It's led to some, at the extreme end of the debate, suggesting the need to consider the prospect of societal collapse.

For example, the director of the Earth System Science Center at Pennsylvania State University Michael Mann warns "In a world where we see continual weather disasters day after day (which is what we'll have in the absence of concerted action), our societal infrastructure may well fail ... We won't see the extinction of our species, but we could well see societal collapse."

theguardian.com

Climate change comes with a health warning

The progress that medical science has made over the past century could be wiped out in a single generation by climate change. As temperatures rise, the areas in which disease can take hold will increase.

The WHO estimate there will be 250,000 additional deaths per year through malnutrition, malaria, diarrhoea and heat stress between 2030 and 2050.

who.int

In its annual report on climate change and human health, the medical journal reported on a study that considered a range of over forty indicators, including extreme weather, energy trends, and agricultural impacts. It concludes that a child born today could live in a world that's four degrees warmer than in pre-industrial times, and this resulting impacts could undermine the last 50 years of gains in public health and overwhelm the health systems we rely on.

wired.com

Within the Asia Pacific region, an Australian study identified a range of impacts of climate change on public health including the potential for an increased prevalence of many other conditions: heat illness, asthma, heart disease, anaemia, injuries, and other infectious diseases including diarrhoea. It notes that many water sources will become undrinkable and that climate change has even been linked to depression. glham.org

Rise of “gen less” movement

Every new human is the equivalent of 58.6 tonnes of carbon emissions per year. Having one fewer child is 25 times more effective than the next most effective measure of combatting climate change – ditching the car that saves 2.4 tonnes every year; or eating a plant-based diet (0.8 tonnes).

As denialism of climate change fades, more and more people are seeing it as a real threat and may decide they don't want to add to the problem – or they don't think it's a good idea to bring children into a world where those children's quality of life will be lower than theirs. As such, the concept of having only one or no children may gain traction.

Promotion of this individual centric approach to tackling climate change is unpopular with national agencies who advocate that meaningful change can only be made through national policy change.

The cause of hunger and malnourishment

Climate change will impact the supply and demand of staples such as rice, wheat and maize that collectively makes up two-thirds of all human food consumption.

The UN estimates that by 2050, the world will need twice as much food as today. Yet, for every degree of warming our planet experiences, cereal crop yields decline by about 10 percent – mostly because it makes our environment less hospitable to these plants.

People on the move

The potential for future population displacements can be readily seen with 17.2 million new displacements associated with disasters recorded across 148 countries in 2018 alone. [un.org](https://www.un.org/)

Unicef outlines a challenging future through its report 'For every child, every right'. It notes;

“If current trends persist, in 30 years the world's children are likely to face a much bleaker outlook. Three quarters of the world will live in cities, but much of the urban environment will be unplanned and unfit for children's growth and development. Millions more children will be on the move, as scarcity fosters conflict and violence, and climate change and environment degradation take their toll. [unicef.org](https://www.unicef.org/)”

The Syrian conflict, described by many observers as the first climate war in history, provides a recent example. Due to rising global temperatures, between 2006 and 2011, the Syrian countryside suffered massive, unprecedented droughts. Huge areas of farmland became unusable, and nearly 85% of livestock died. The resulting demographic pressure of farmers fleeing to the cities, and built-up resentment about President Bashar al-Assad's handling of the situation, finally resulted in the armed conflict that became tangible to the West as the refugee crisis.

The World Bank estimates that the worsening impacts of climate change in three densely populated regions of the world could see over 140 million people move within their countries' borders by 2050, creating a looming human crisis and threatening the development process. With concerted global action this could be reduced by more than 100 million people. [worldbank.org](https://www.worldbank.org/)

A 2017 University of Otago Report identified climate as the strongest driver of voluntary migration (Wesselbaum). Some suggest climate enforced migration will inundate New Zealand, although Economist Michael Cameron refutes this and believes we are more likely to only take responsibility for the modestly populated low lying pacific atoll counties – Nauru and Kiribati.

Putting the brakes on travel (and tourism)

Carbon-intensive travel patterns must change to avoid the worst climate change scenarios. These may result from either regulation to alter consumption (e.g. frequent flyer levies) or through individuals themselves choosing to adopt lower-cost alternatives. Both have implications for an industry upon which New Zealand is economically dependent.

Flying provides the biggest carbon footprint because burning fuel at higher altitudes causes the emissions to have a more harmful impact – the full extent of which is still being determined by scientists.

The recent report of the Parliamentary Commissioner for the Environment notes that the future of long-distance air travel as an “existential issue” for the tourism industry. “Unlike almost any other sector, tourism faces an emissions challenge with long-haul travel for which there solutions are difficult. Domestic emissions may well be manageable but at the global level there have to be serious doubts about whether tourism in its current shape and form can continue if we are to have a chance of heading off the worst consequences of climate change.” [pce.parliament.nz](https://www.pce.parliament.nz)

Airlines are already registering concern with Air France CEO Anne Rigail identifying changing consumer sentiment driven by climate concerns as their biggest challenge. [vox.com](https://www.vox.com)

Falls in the number of passengers taking domestic flights have been noted among Nordic countries and Germany with even the UK experiencing some drop off in demand ([carbonindependent.org](https://www.carbonindependent.org)). Airlines hope to reverse the trend by working on sustainability with Qantas, for example, aiming for zero net emissions by 2050 ([enweconomy.com.au](https://www.enweconomy.com.au)). Such offset schemes though are subject to heavy criticism with Prof. Kevin Anderson characterising them as ‘losing weight by paying other people to go on a diet’.

Confronting food choices

The recent controversy over Ministry of Education teaching materials promoting reduced meat consumption as a means for combatting climate change points to an issue that will likely intensify over coming years. Agriculture will need to respond both to new forms of food production and consumer concerns over its role in environmental degradation.

Research indicates that a dietary shift towards reduced meat consumption is an efficient strategy for countering biodiversity loss and climate change in regions (developed and transition countries) where consumption is already at a very high level or is rapidly expanding (such as China). About 14.5 % of the world’s green house gasses are calculated to be the result of (mainly industrial) livestock farming. link.springer.com

Approximately nine-tenths of beef’s footprint comes from what happens on the average cattle farm, and the big contributor here is the fact that cows are ruminants, meaning they chew cud and release lots of methane in the process. Methane is 25 times more harmful than CO₂.

This type of finding has prompted commentators to predict that “lab-grown food will soon destroy farming – and save the planet.” ([theguardian.com](https://www.theguardian.com)) While it’s unlikely the ultimate solution will be solely the result of plant-based protein given the value of livestock within the overall farming ecosystem, there seems little doubt that New Zealand’s agricultural sector will need to radically change as market preferences change.

Economic consequences

We are witnessing a step-change in climate-related business risk. Climate change is no longer a mere environmental concern: for many, it presents a material financial risk. Climate change issues facing businesses today include uncertainty over stranded or compromised assets, threatened natural resources, regulatory changes, insurance concerns, interruptions to supply chains, coastal property devaluation and rapidly evolving consumer demands.

What's changing?

Global financial crisis 2.0

Environmental threats are underpinned by a recognition that the global economy is still in a relatively fragile state post-GFC, with little capacity to absorb climate consequences that have massive financial implications.

A report issued by an umbrella organisation for the world's central banks argues that environmental changes could cause the next financial crisis and warns that bankers lack the tools to deal with what could be one of the most significant economic dislocations of all time ([nytimes.com](https://www.nytimes.com)). This threat may now have been overtaken by COVID-19.

A growing number of companies, too, are recognising the economic consequences and are now publicly reporting the effects of climate change on their businesses. A new report published by CDP shows that 215 of the world's biggest companies, including giants like Apple, JPMorgan Chase, Nestlé, and 3M, see climate change as a threat likely to cumulatively cost them a trillion dollars within the next five years. [wired.com](https://www.wired.com)

The UN estimates that rising temperatures could lead to the loss of 80 million jobs by 2030, with developing countries worst hit. Their analysis finds that a temperature rise of 1.5° by 2100 could lead to a 2.2% drop in working hours (equal to 80 million full-time jobs) costing the global economy \$2.4 trillion. [reuters.com](https://www.reuters.com)

National economies will consequently feel the pressure with implications for both fiscal policy and budgets. In Australia, for example, it is anticipated to cost the economy billions. [abc.net.au](https://www.abc.net.au)

Follow the money

The increased understanding of future economic impacts is causing investors to realign their portfolios to low-carbon opportunities and insurers to re-evaluate risks covered.

The CEO of BlackRock Larry Fink (the world's largest asset manager with nearly \$7 trillion in assets under management), recently warned that the financial risks of climate change dwarf any previous crisis he's experienced. He explained that BlackRock would, therefore, put sustainability at the centre of their investment approach, from portfolio construction to launching new investment products that screen out fossil fuels. [cnbc.com](https://www.cnbc.com)

Insurers are warning that climate change could make coverage unaffordable. Ernst Rauch, Munich Re's chief climatologist, recently noted that premium rises were already under discussion where clients held climate-vulnerable assets. "If the risk from wildfires, flooding, storms or hail is increasing, then the only sustainable option we have is to adjust our risk prices accordingly. In the long run it might become a social issue," he said after Munich Re published a report into climate change's impact on wildfires. "Affordability is so critical [because] some people on low and average incomes in some regions will no longer be able to buy insurance." [thebulletin.org](https://www.thebulletin.org)

In New Zealand this issue is starting to become a real concern. Responding to a Deep South survey, one local council officer observes; "In the long term there are likely to be few viable adaptation responses in some areas other than managed retreat - this will be extremely disturbing to many in these areas and funding such responses will be beyond the community's ability to pay.

Local government will be in the invidious position of having to present such scenarios to their constituents without necessarily having a palatable or even practicable solution." [newsroom.co.nz](https://www.newsroom.co.nz)

Eroding real estate wealth

Given most New Zealanders proximity to the coast, the changing stance of the insurance market and funders will have direct consequences for property owners. Sea levels around New Zealand rose by up to 220 mm in the last century and are expected to rise by a further 300–400 mm in just the next 30–40 years.

MBIE estimates \$19 billion worth of buildings, 43,000 homes, 130000 people, five airports, more than 2,000km of road and 48km of railway face higher levels of coastal risk exposure. It notes that almost two thirds of New Zealanders live in areas prone to flooding and rising sea levels, which will worsen erosion and impact drainage for low-lying land and coastal farms.

LGNZ has also analysed replacement value of local government infrastructure exposed to sea level rise of 0.5 metres (\$2.7b), 1 metre (\$5.1b), 1.5 metres (\$8b) and 3 metres (\$13.3b). [LGNZ](https://www.lgnz.govt.nz)

With the local reliance on property ownership as a core component of wealth management, the Reserve Bank noted the risks associated with climate-prone properties in its November 2018 Financial Stability Report. It observes that "some insurers in New Zealand appear to have begun adjusting their products and pricing to reflect emerging climate risks, and some existing properties could ultimately become uninsurable." [level.org.nz](https://www.level.org.nz)

Primary sector facing a stressful future

The exact impacts of a changing climate on New Zealand's primary industries are likely to be significant. Agriculture, forestry and other primary industries are likely to be "strongly affected" by climate change through an increase in climate variability, changed average rainfall and temperature, erosion, droughts and more extreme weather events.

Some regions will become better suited to growing crops and producing goods than others. Increased rainfall can result in erosion and increase sediment in our waterways. Soil loss can damage the stability of land and reduce its productivity. The variety of pests and diseases we are vulnerable could also change. [mpi.govt.nz](https://www.mpi.govt.nz)

Future drought may very well be the climate change impact with the most significant effect on our economy. A 2018 report estimated that the economic losses of \$720m from droughts between mid-2007 and mid-2017. Drought already impacts a wide range of activities in New Zealand, including urban water, primary production, and electricity generation. It also has significant impacts culturally and in our communities. (Motu report Drought & climate change adaptation: impacts & projections)

The massive amounts of heat being absorbed by the world's oceans will also have an impact on New Zealand's aquaculture industries. Alongside ongoing long-term warming, discrete periods of extreme regional ocean warming have increased in frequency. [nature.com](https://www.nature.com)

Infrastructure costs

In urban areas, heat waves and sea level rise will cause increases in repair and upgrade costs for infrastructure such as transport, communications, water supply and waste systems. The supply of and demand for electricity will be affected by warmer temperatures and changes in rainfall.

Addressing the issue

The evidence highlights the need for change, and an apparent acceptance across sectors that there needs to be action. What is less appreciated is the transformation required to avoid the worst climate scenarios.

What's changing?

Energy transition

Whether the global community can reduce the emissions sufficiently is fundamentally dependent on the speed of energy transition away from fossil fuels. The critical indicators are the projections of fossil fuel production together with the prospects of widespread adoption of renewables.

The International Energy Agency (IEA) reports that despite overwhelming evidence of carbon-fuelled climate change, oil is so entrenched in the modern world that demand is still rising by up to 1.5% a year. There is no consensus on when world oil demand will peak, but it is clear much depends on how governments respond to global warming. [reuters.com](https://www.reuters.com)

In their Global Oil Supply and Demand Outlook to 2035, McKinsey anticipates that demand growth will hit its peak in the early 2030s due to slow chemicals growth and peak transport demand driving down oil consumption. [mckinsey.com](https://www.mckinsey.com)

A report commissioned by the International Renewable Energy Agency observes, "No country has put itself in a better position to become the world's renewable energy superpower than China". As the World's largest carbon polluter, China's stance is critical to a successful transition. It burns half the World's coal and has added 40% of the World's coal capacity since 2002. However, it is pivoting to clean energy with forecasts indicating Beijing will invest more than \$6 trillion in low carbon power generation and other clean energy technologies over the next 20 years. [forbes.com](https://www.forbes.com)

Going carbon negative

In the absence of active constraints on fossil-fuel emissions, a focus will be needed on carbon dioxide removal operations. Keeping global temperature rise within acceptable limits would require the removal of 50% of annual human emissions. This would equate to the extraction of 20 billion tons of carbon dioxide each year, indefinitely. [washingtonpost.com](https://www.washingtonpost.com)

Tree planting is an obvious choice for carbon drawdown, but while there's potential for using reforestation as a climate mitigation tool, there are many factors to consider. Scientists caution that planting trees will never be a substitute for decreasing fossil fuel emissions. climate.nasa.gov

More radical actions are being proposed, such as solar geoengineering to reflect incoming sunlight and thereby cool rising temperatures. Proponents suggest this could help avoid the worst consequences of global warming and enable global GDP growth of 200%. [sciencedaily.com](https://www.sciencedaily.com)

There are considerable risks associated with geoengineering approaches that would not be a permanent fix in themselves and have the potential for significant unforeseen consequences. [sciencenews.org](https://www.sciencenews.org)

Despite this, some governments are turning to geo-engineering to protect their populations. For example, Indonesia's air force seeded clouds with salt recently to try to stop rainfall reaching the sinking capital after deadly flash floods and landslides triggered by some of the heaviest rain ever recorded. There are major geo-political implications of such actions if weather patterns are altered in neighbouring nations. [reuters.com](https://www.reuters.com)

The circular economy

To date, efforts to tackle climate change have focused on a transition to renewable energy, complemented by energy efficiency. These measures can only address 55% of emissions. The remaining 45% comes from producing

products we use every day. Proponents of the circular economy argue that increasing the use rates of assets (e.g. vehicles and cars), and recycling the materials used to make them will complement emissions reductions. This reduces demand for products and the emissions associated with their production. [Circular Economy Tackles Climate Change](#)

Navigating the politics

A recent report by researchers from Imperial College London says an upheaval in lifestyles is the only way to meet the UK Government's target to cut carbon emissions to net-zero by 2050. It warns that significant shifts in policy across vast areas of government activity are needed to keep the public onside. [bbc.com](#)

The New Zealand Government's Climate Change Response (Zero Carbon) Amendment Act carries a similar level of ambition to the UK Government's goal. The Act locks NZ's targets for cutting greenhouse gas emissions into primary legislation for the first time and establishes a framework of five-year emissions budgets to achieve them. It also initiates the politically neutral and independent Climate Change Commission to assess progress and to hold future governments accountable. While at this stage, National has indicated they may 'tweak' it in government, it will likely become key guidance for policy especially as further events, such as Australia's recent fires, reinforce the public's expectation of action. [mfe.govt.nz](#)

While the framing of the Act is intended to be politically neutral, its implementation will inevitably require the examination of some challenging political questions. Perhaps the most confronting of these are the arguments over whether economic growth is compatible with an ecologically finite planet. The outcome of this 'decoupling war' will be a crucial determinant of our ability to deliver a more sustainable prosperity. [science.sciencemag.org](#)

The Government's wellbeing focus is drawing international attention as the first Western country to take an active step to potentially address this question. Notably, economic growth is still a key objective though, which avoids the question of whether a society can thrive without it. [huffpost.com](#)

Alongside the Zero Carbon Bill, the Government has announced major reform of the New Zealand Emissions Trading Scheme; the intention to regulate agricultural emissions will be regulated with a price placed on greenhouse gas emissions, by 2025; phasing out off-shore oil and gas exploration; promotion of electric vehicles; improvements to public transport, walking and cycling infrastructure; and investments in forestry.

The role for sport and recreation

Climate change is already having a huge influence on sport and recreation across the world. The impacts of more extreme weather are increasingly determining where and when sport and recreation can take place, and how people can participate. It is the number one issue for members of Aotearoa Recreation.

Sport and recreation is not just a victim of climate change; it is also a net contributor through greenhouse gas emissions linked to travel, energy use and other forms of consumption. This suggests that in addition to taking measures to adapt to the impacts of climate change, sport and recreation organisations have a responsibility to limit their climate impacts.

Through its connection across society, and its ability to inspire and influence, sport (in particular) has a unique ability to demonstrate leadership and undertake systematic efforts to promote greater environmental responsibility.

What's changing?

Feeling the effects

A recent study shows that by mid-century, almost half of the past Winter Olympics host cities would likely be too warm for outdoor Alpine sports. Russia spent \$50 billion on the Sochi Games, making them the most expensive Olympics ever, with an unreported portion of that cost going toward making and preserving hundreds of thousands of cubic yards of artificial snow.

The Climate Institute [report](#) on the threat of climate change to sports in Australia. One particularly compelling example is the Australian Open, which revised its heat policy for 2015, setting an upward limit on ambient temperatures in which athletes can play after 2014's extreme heat became a serious health issue, causing hallucinations, vomiting and fainting.

A similarly motivated [report](#) shows how climate change is impacting sport in the UK. It points to extreme weather causing disruption to recreational golf; the possible collapse of the Scottish skiing industry within 50 years; increased rainfall threatening the viability of grassroots football; and the rate of rain-affected cricket matches more than doubling since 2011.

Taking the lead

In December 2018 the [Sports for Climate Action Framework](#) was launched to gather sports organisations, teams, athletes, and fans in a concerted effort to raise awareness and action to meet the goals of the Paris Climate Change Agreement.

Representatives of the diverse global sports industry, working with UN Climate Change, created the Framework to drive emission reductions of sports operations and tap the popularity and passion of sport to engage millions of fans in the effort. Founding signatories include the International Olympic Committee (IOC), FIFA, International Sailing Federation, and the Tokyo 2020 and Paris 2024 Summer Olympics. It has subsequently been joined by World Rowing, and as a consequence, Rowing NZ.

The International Olympic Committee and UN Climate Change have cooperated to produce [publications](#) to assist sport to combat climate change.

Economic focus

A scan of the economic horizon considering some implications for the play, active recreation and sport environment.

The COVID-19 outbreak presents a current threat to the world economy exacerbating its longer-term vulnerabilities – high corporate and individual debt, and high government debt in many countries; globalised supply chains; and central banks with limited options.

The longer term economic uncertainties this brings has potential implications for play, active recreation and sport, notably through impacts on individual discretionary spend; changing funding priorities of corporates and local and national government; workforce disruption; and the possible expediting of new technologies and business models such as e-learning and working from home that enforced isolation will promote.

This section explores:

1. **International outlook:** The global context including economic snapshots of major economies and geopolitical instabilities.
2. **NZ forecasts:** Summarising local commentaries addressing the medium term outlook and forecasts for major sectors.
3. **Individual prospects:** Focused on the economic context for NZ households given the wider economic context.
4. **Business of sport:** Highlights the economic challenges that specifically relate to the sport context and their implications for management and development.
5. **New thinking:** A brief look at the shifting political perspectives that may suggest a break with current economic orthodoxy.

Summary implications

Global economic downturn	<ul style="list-style-type: none">• May result in pressure on global sport revenues; individual discretionary spend; will 'colour' the 2020 NZ and US elections.
Decreased global economic co-operation	<ul style="list-style-type: none">• Sport is likely to be linked with geopolitical tensions – as it has been historically e.g. Cold War Olympic Boycotts.
NZ sector pressures increasing	<ul style="list-style-type: none">• Support and sponsorship to sport and recreation may be constrained. Decreased tourism could impact viability of events and venues e.g. golf.
Increasing individual wealth disparities and housing debt	<ul style="list-style-type: none">• Will lead to variable access to sport and recreation through the barriers of cost and time. Increasing housing costs/debt may result in sport and recreation being viewed as non-essential spending.
New business models	<ul style="list-style-type: none">• COVID-19 may normalise e-learning and working from home. What impact for play, active recreation and sport?
Increased competition for discretionary dollar	<ul style="list-style-type: none">• Need sport and recreation to adapt to match ever evolving competing interests. Need strong articulation of value proposition.
Gambling decrease	<ul style="list-style-type: none">• Gambling decreases with reduced discretionary spend. This will impact funds available to community sport and recreation.
Workforce disruption from automation or economic downturn	<ul style="list-style-type: none">• Opportunity for play, active recreation and sport to pick-up displaced workforce.
Increased competition between sports for fans and funding	<ul style="list-style-type: none">• Move toward dog-eat-dog environment commonplace in US and Australia, challenging the existing spirit of collaboration within the sector.
Rise of cause sponsorship	<ul style="list-style-type: none">• Greater expectation of businesses to play a stronger role in society may see rise of social enterprise and corporations as a force for good. May mean a shift from traditional sponsorships.
Increasing climate and infrastructure costs	<ul style="list-style-type: none">• May dominate local and national government priorities and resource allocation, at the expense of play, active recreation and sport. Has Council funding to sport and recreation hit a high at \$900m?
Emergent economic models	<ul style="list-style-type: none">• Ensure sport and recreation retains strong linkage to wellbeing and mental health agenda.

International outlook

- Economic confidence for next decade appears fragile. PwC's annual CEO confidence survey: 27% of CEOs 'very confident' in 2020 revenue growth; low not seen since 2009. [pwc.com](https://www.pwc.com)
- Confidence has declined further with COVID-19 outbreak. International Monetary Fund (IMF) views virus as the biggest immediate threat to global economy; worse than SARS in 2003 that cost global economy US\$40B.
- As at 11 March economists view a recession as probable. Minister of Finance confirmed economic impact of COVID-19 would impact NZ economy for at least the rest of the year.
- COVID-19 is testing the ability of central banks to respond. They deal with demand – cutting rates to stimulate it and raising rates to constrain it.
- Uncertain what if any impact cuts will have as COVID-19 is first-and-foremost a supply side issue. Increasing demand is of limited use if the goods demanded are not available.

What's changing?

Major economies

- IMF's latest outlook report projects global growth, estimated at 2.9% in 2019, to increase to 3.3% in 2020. This predates COVID-19 & is likely to be adjusted backward. [imf.org](https://www.imf.org)
- IMF and private sector forecasters expected this year's growth to decline as low as 5.8%. Prior to COVID-19, most anticipated an improvement in 2020 as trade-war tensions ease. [thediplomat.com](https://www.thediplomat.com)
- Outlook for Europe's economy is for stable, subdued growth over two years. This will prolong longest period of expansion since launch of the euro in 1999. ec.europa.eu
- The Conference Board forecasts US economic growth will slow to 2% this year and risks from US-China trade dispute replaced by new issues like the COVID-19 outbreak. [conference-board.org](https://www.conference-board.org)
- World's fourth-largest economy, India, has had its worst slowdown in a decade. Economy heavily interlinked with China's manufacturing; IMF warns it will suppress global growth. [thebalance.com](https://www.thebalance.com)

Geopolitics

- Few commentators are prepared to confidently assert a long-term perspective, and most allude to increasing geopolitical uncertainties.
- December 2019 US and China trade deal positive in short term. Relations remain fragile. Longer-term threat: US and China decoupling in technology, investment and trade. [forbes.com](https://www.forbes.com)
- UN Secretary-General António Guterres fears "the possibility of a Great Fracture – with the two largest economies splitting the globe in two." [news.un.org](https://www.un.org)
- OECD is urging governments to cooperate and invest in order to prevent prolonged stagnation. [oecd.org](https://www.oecd.org)
- Emergence of international co-operation and goodwill looks unlikely, given fractious political atmosphere in major economies and new sources of tension, e.g. looming tax war. [foreignaffairs.com](https://www.foreignaffairs.com)

Unexpected events on the horizon

- Against this long-term uncertainty are several left-field issues. COVID-19 most visible wild-card. Fossil-fuel transition and climate change likely to have long-term significant impact.
- Should COVID-19 sweep across world, global economy will need significant stimulus. Main complication will be lack of central-bank ammunition, as interest rates already low. [economist.com](https://www.economist.com)

- Four-fold increase in global economic dependence on China worldwide since 2003 means COVID-19 likely to have significant global impact on trade. Most vulnerable rely on factories in China for parts and materials. [Harvard business review Feb 2020](#)
- Path back to growth under COVID-19 will depend on a range of drivers, e.g. degree to which demand is delayed or foregone, whether shock is truly a spike or lasts, etc.
- Chief Economist of BCG Philipp Carlsson-Szlezak believes the most likely of three scenarios from COVID-19 is a rebounding of growth after the initial displacement of output – a V-shaped scenario. [Harvard Business Review](#)
- History suggests the global economy after a major crisis like COVID-19 will likely be different in a number of ways. Crises can spur adoption of new technologies and business models.
- COVID-19 will likely hasten progress to more decentralised global value chains and test political systems' ability to protect their populations; maybe shape NZ and US elections. [Harvard Business Review](#)
- Transition from fossil-fuels greater long-term impact on stable global economy than COVID-19. Institute for Energy Economics & Financial Analysis found largest publicly-traded oil and gas firms experiencing large cash shortfalls. [ieefa.org](#)
- Geological Survey of Finland recently warned the increasingly unsustainable economics of oil industry might lead to major disturbance in global financial system and energy markets. [dieselnet.com](#)
- Climate change now recognised as a significant economic risk to oil and gas sector. Companies increasingly likely to default on their debt with \$50 a tonne carbon tax. [Reuters.com](#)
- Bank of International Settlements taking an increasing interest in climate-related "green swan" risks – potentially extremely financially disruptive events. [bis.org](#)
- The points above underline recent research that highlights the difficulty of effective economic forecasting. Few commentators commit to a long-term view. [weforum.org](#)

New Zealand forecasts

- As a small open economy, NZ has enjoyed benefits of globalisation, but COVID-19 is an e.g. of negative costs. NZ is economically dependent on China (26% of exported goods).
- Economists struggling to reassess duration and depth of COVID-19 downturn. Treasury forecasts global spread increasing risks of substantial negative impact for several quarters. [Treasury](#)
- ANZ downgraded growth forecasts in early March, but chief economist Sharon Zollner said forecasts were "already looking out of date given the spread of the virus, its presence in NZ, and the violent sell-off in global financial markets".
- NZIER was assuming in early March that trade disruptions from COVID-19 will occur mainly over first half of 2020. Tertiary, aviation and tourism sectors may challenge this view.

What's changing?

Domestic overviews

- Despite COVID-19 the fundamentals for the NZ economy are still strong. Prior to outbreak, households were feeling more optimistic and business confidence was recovering. [NZIER](#)

- NZ's GDP growth forecast to remain 2.5% in 2020–21. OECD: should further stimulus be needed, NZ well placed to deliver it as government budget in surplus and debt is low. oecd-ilibrary.org
- ANZ pre COVID-19 snapshot for 2020 optimistic both at home and abroad. "We are particularly encouraged by the strength in labour markets and strong consumer spending." anz.co.nz
- Infometrics less optimistic. Believes nothing has changed to help economy avoid mediocre results beyond 2021. infometrics.co.nz

Business confidence

- ANZ Business Confidence Index in NZ declined to 19.4% of respondents reporting they expect general business conditions to deteriorate in year ahead in January 2020 from 13.2% previous month. Post COVID-19 responses were more negative, but an improvement from the 53% of respondents with negative outlook in September 2019.
- 77% of NZ CEOs are concerned that a skills shortage will impair growth, with NZ among the bottom 20-40% in the OECD with regards to alignment of skills with the labour market.

Sector specific outlooks

- Despite short-term uncertainties resulting from COVID-19, respective projections for NZ's largest economic sectors remain largely optimistic.
- MBIE's NZ Tourism Forecasts (2018 – 2024) anticipate international visitor arrivals reaching 5.1m in 2024 (up from 3.7m in 2017). mbie.govt.nz
- Deloitte suggests over period to 2040, the economy will be \$11.5 billion (4.3%) larger in real terms if specific regions grow at national export growth target set for tourism. deloitte.com
- MPI expecting export revenue to increase by 3.3% to \$47.9 billion in 2020 and further 2.1% increase in 2021 (mpi.govt.nz). Deloitte projects additional GDP of \$4 billion over next 20 years. deloitte.com
- Tertiary education sector less upbeat. Approx \$300m lost revenue to Universities and a further \$300m loss to surrounding regions as Chinese students prevented from NZ entry.
- Air New Zealand is also negatively impacted, with its full-year profit potentially down by as much as \$75m, in addition to its loss of close to \$1 billion of market value this year.
- International Air Transport Association anticipating falling passenger demand as a result of COVID-19 outbreak will cost the industry \$44 billion this year. iata.org

Potential industry disruptors

- Relying on extrapolations of the current operating environment is fraught with risk given the uncertain global context and potential sector disruptions.
- BNZ economists are concerned that the hit to NZ economy from recent drought conditions could be as bad as the impact from COVID-19, saying recession is a 'very real risk'.
- Dairy's significant role in NZ export dollars faces a threat that some suggest could threaten its future viability. Lab-grown milk protein now stepping into the bulk ingredient arena. rnz.co.nz
- Crude oil prices influence both international mobility and primary industry exports. Likely to have implications for tourism and agriculture too. [hoogwegt.com\(pdf\)](http://hoogwegt.com(pdf))

Individual prospects

Global and national economic prospects are of secondary importance for those whose primary concerns remain whether they have somewhere to live, a reasonable income and long-term job prospects.

What's changing?

Housing costs

- Housing costs remain a key issue for New Zealanders, and the challenge appears set to continue despite the current government's efforts.
- Relative to purchasing power or income, house prices are the most expensive they have ever been. helenclark.foundation
- Homeownership for 25-40-year-olds dropped from 46% to 35% between 2001-2013. Combined with student loans, unaffordable housing makes homeownership out of reach.
- *Somewhere to Live: Exploring solutions to the housing affordability crisis in Aotearoa New Zealand* report concludes the very high levels of household debt may trigger a recession. helenclark.foundation
- Harvard report into US market finds since last recession (December 2007), a surge in wealthier families opting to rent is driving up prices, making affordable housing scarcer. A pointer to NZ's housing future? jcs.harvard.edu

Income and debt

- Wage growth for New Zealanders remains relatively low, though consumer debt continues to grow.
- OECD notes some growth in NZ's wage growth, partly boosted by minimum wage hikes and increases in caregiver wages. Though overall nominal wage growth remains muted. oecd.org (pdf)
- Household debt is growing at 6% per annum, down from 9% in 2016, but still rising faster than income.
- Nearly 40% of new mortgages are to people borrowing more than 5X their annual incomes (stuff.co.nz). Auckland house prices are 10X household incomes. Could be driving growth of affluent renters noted in Harvard study above. rbnz.govt.nz

The impact of disruptive technologies on Kiwis

- While NZ unemployment levels relatively low at 4%, future uncertainty being driven by impact of automation. Given jobs' importance to self-worth and societal position, will have more than economic impact.
- NZIER analysis found half of current NZ jobs were at risk of technological displacement over the next few decades. nzier.org.nz
- NZIER's findings mirror Frey & Osborne's often cited study that suggested a huge automation impact with 47% of total US employment at risk. oxfordmartin.ox.ac.uk
- McKinsey argues that fewer than 5% of occupations can be fully automated, but 60% partly, implying substantial workplace transformations (mckinsey.com). PwC identifies how this process might unfold. pwc.co.nz (pdf)
- One aspect of the automation trend, which has potential consequences for regional NZ is the finding that smaller centres face greater impact. royalsocietypublishing.org

Business of sport

A shifting and uncertain economic context together with new disruptive business approaches imply an increasingly complex set of factors will need to be managed in the future of play, active recreation and sport.

What's changing?

Economic drivers of participation

- In the US, the rising cost of playing sports plus rising economic inequality is increasingly causing poor and even middle-class families to leave sport. [cbsnews.com](https://www.cbsnews.com)
- There is not evidence to suggest NZ participation rates are influenced to the same extent by changing economic factors. [Sport NZ](https://www.sportnz.govt.nz)

Competition for discretionary spend

- The fragmentation of consumption channels creates a real challenge for organisations and teams dependent on retaining fans' money and attention.
- Technology to watch any game at any time from anywhere, along with a growing world population, should suggest a positive commercial future. But slowing revenue growth is increasing intense competition between sports for fans' money and attention. [economist.com](https://www.economist.com)
- This 'attention-deficit' challenge makes it easier for online pirates to profit from sports coverage. Digital piracy is estimated to be worth \$90 billion annually. [insideworldfootball.com](https://www.insideworldfootball.com)

Future competition for fan attention and funding

- In context of competition for participants and fans, sports will need to reinvent themselves continually to remain viable. Cricket is an exemplar of how to reinvent a game. [economist.com](https://www.economist.com)
- NZ Rugby will be seeking to follow this example, through its independent review.
- Understanding the underlying drivers of change will be key to ensuring future financial viability for a particular code. [bloomberg.com](https://www.bloomberg.com)
- Competition is emerging for fans' attention and dollars beyond the traditional pitch, especially from the eSports arena – expected to generate \$1.5 billion in 2020. [Deloitte](https://www.deloitte.com)
- Some eSports success may be down to ability to connect with their base. With eSports and virtual reality gaming increasingly popular among Gen Z and Millennials, major sports need to make fans feel like active participants. [si.com](https://www.si.com)
- Example of this connection is the creation of sports based on rules most suited to the target market – concept behind use of AI to invent a new sport called 'Speedgate'. [weforum.org](https://www.weforum.org)
- The growth of women's sport, opening opportunities for creation of new professional leagues, franchises and corporate sponsorships, will also increase competition for fan attention and funding. [Deloitte](https://www.deloitte.com)
- Trend towards prize money parity; more common in individual sports (e.g. tennis) but Cricket Australia's promise to their women following Twenty20 World Cup could prove a catalyst for other sports.

Increasing complexity of sport business management

- Sports management will need to embrace business dimensions beyond the game at hand to maintain financial viability and agility in the face of uncertain economic conditions.
- Increasing business competition will force managers to ensure the business aims of their organisation align with desires of customers and fans. Sports businesses will also need to focus on wider community concerns through core ethical guidelines. sportbusiness.com
- Environmental concerns will need to be given high priority as climate crisis worsens and carbon-intensive dimension of globalised sports events comes under scrutiny.

Disrupted economics of climate

- While the business of sport has implications for environmental degradation, the impact of climate change is projected to have increasing economic consequences for sporting events.
- Since 2000, 27% of England's home One Day Cricket Internationals have been played with reduced overs because of rain disruptions (thecommittee.org). Economic consequences are becoming increasingly significant. weforum.org
- Climate is increasingly being factored into venue decisions which have knock-on economic effects. asia.nikkei.com
- In Canada, the outlook is extremely bleak for winter sports with recent studies finding ski-tourism industry could lose nearly 75% of its capacity by mid-century. tandfonline.com

New economic thinking

Whether it be the broader economic uncertainty or the financial consequences of factors such as climate change or the energy transition, we appear to be at a point where 'business as usual' is being challenged by new modes of thinking. Could the emergence of Wellbeing Economics or the Modern Monetary ideas of the Bernie Sanders campaign suggest other possibilities in the way we address future economic questions?

What's changing?

Questioning growth

- Should developed countries be working to slow economic growth to help reduce climate challenge? (newsmax.com) This is already beginning to occur at a consumer level. latribune.fr
- Can developed economies enjoy prosperity without growth? Winners of 2019 Nobel Prize in Economics argue that a larger GDP doesn't necessarily mean a rise in human wellbeing. newyorker.com
- Czech-Canadian scientist Vaclav Smil believes growth must be left behind to "ensure the habitability of the biosphere". nymag.com
- Perspectives such as Smil's are increasingly being reflected in more mainstream articles, and a recent Harvard Business Review piece suggests a tipping point in thinking. hbr.org

New political perspectives

- Challenged by a fragile global economy, a number of ideas are emerging which may have implications for future public spending and create new perspectives of societal wellbeing.

- Modern Monetary Theory is amongst these new ideas; a country with its own currency, such as NZ, doesn't have to worry about accumulating too much debt as it can print more money to pay interest.
[bloomberg.com](https://www.bloomberg.com)
- The emergence of discussion around wellbeing economics is also indicating the willingness of a number of governments to rethink priorities.
eesc.europa.eu
- Our current government's thinking is in line with this perspective and raises the question of whether NZ could be a leader in 'wellbeing economics'.
[victoria.ac.nz \(pdf\)](https://victoria.ac.nz)
- Business commentator Rod Oram suggests developing a long-term vision for a transition towards a low-carbon, greener economy would help NZ defend the 'green' reputation we have acquired internationally.
newsroom.co.nz

High Performance sport - post pandemic and beyond

This environmental scan looks at the post-pandemic environment to consider a number of drivers pertinent to high-performance sport.

While COVID-19 is having a significant impact, change was underway ahead of the pandemic, as evidenced by the following quote from the 2019 Association of Summer Olympic International Federation's report on the 'Future of Global Sport'.

“ Stakeholders are having to rethink their value proposition, prepare themselves to integrate or compete with new market players and elaborate a sustainable strategy to remain relevant in the future. This requires a higher degree of entrepreneurialism than was previously the case.

While the pandemic has brought obvious short-term disruptions, it's interesting to consider how it will affect these pre-existing trends. To explore this, the scan is split into the following three sections:

1. **Post pandemic context:** The global context that will form the backdrop for future competition, including the pandemic's conclusion and future movement.
2. **Future elite sport practice:** The future competitor environment; particularly wellbeing and the use of biometric data.
3. **Future business dynamics:** Highlights the future business challenges, innovation opportunities and potential new business models.

Summary implications

Post pandemic context	<ul style="list-style-type: none">• Coronavirus vaccine unlikely to be ready before end of 2021.• In absence of vaccine, travelling or participation in events outside a defined 'bubble' will probably rely on testing – logistically challenging and costly in an environment where competitors would need to be presumed positive ahead of screening and continually tested while in contact with others.
International mobility	<ul style="list-style-type: none">• Immediate implications on events and training opportunities. Heightened collaboration with Australia and other virus-controlled countries.• Implications for NZ's attractiveness as a host nation for sporting events with quarantining and reluctance to travel compounding existing geographic distance. Conversely, early 'elimination' and perception of safe haven may make NZ more attractive as athlete training and competition destination.
2021 elite event prospects	<ul style="list-style-type: none">• Continued uncertainty on whether Olympic/Paralympic Games will proceed and if so, in what form. Women's cricket and rugby world cups in NZ among other events that may be disrupted.• Pandemic may be opportunity for IOC to fast track changes to Olympic programme, with possible impact to sports that NZ target.
Global economic downturn	<ul style="list-style-type: none">• Financial viability of national sports organisations threatened, with flow-on impact on athlete preparation, negative (disruption) and positive (less loading, injuries, cost).• Economic downturn, with consequent increase in inequality, could see sectors of society become far more price-sensitive to engagement in sport. This, and return to a more voluntary run sector, has potential to impact the athlete pathway.• May result in pressure on global sport revenues and individual discretionary spend, although sport historically immune to short-term discretionary spend cutting.
Physical distancing	<ul style="list-style-type: none">• May result in reduced demand for physical contact sports and increased demand for non-contact sports. May also result in decline in fan base for some codes through increased nervousness about being in crowds.
Climate change	<ul style="list-style-type: none">• May become competitive advantage given our temperate climate and topography which allows year-round outdoor activity, and ability to develop athletes without the manufacture of suitable environments.• International sport travel may become a target for protest given high carbon footprint from flying. Would impact NZ's 'home advantage' as struggle to meet increasing requirement for eco sustainable events. Further promotes eSports.
Global power shifts and the demise of neo-liberalism	<ul style="list-style-type: none">• Role of sport may take on heightened importance with international diplomacy to support East/West relationships and cooperation.• Global power shifts may impact scheduling of key events, international federations, changing of rules and awarding of events e.g. India's influence on cricket. Will NZ increasingly align to China vs US/UK? What impact will this have on our high-performance programme?• Reversal of globalisation will have implications for talent pipelines of elite teams and opportunities for athletes.• Winning and competition have been part of a neo liberal approach that's diminishing. What does high performance sport look like within a more collaborative world?

Broadcasting disruption and decline in live audience	<ul style="list-style-type: none"> • Significantly reduced sports media unlikely to return at same level or in same form. Consolidation occurring through Comcast and Disney. Is this the entry time into sports broadcasting for Google, Apple or Netflix? Also, eSports is challenging traditional sport to rethink how it promotes itself as an entertainment, event and media proposition that appeals to younger audiences. • These changing priorities among younger fans, along with high ticket prices, poor in-venue experience and changing viewing habits and media consumption all contribute to declining revenues from ticketing and merchandising from live events. This will be further compounded by 5G-enabled virtual reality devices that allow fans to experience live games from virtually anywhere and with friends across the globe. Opportunity for sport to capture return on their IP. • Pandemic has accelerated rise of eSports with live sports broadcasters considering it a much better investment than most second-tier sports.
NSO sustainability and collaboration	<ul style="list-style-type: none"> • Need for NSOs to adapt to match ever evolving competing interests, heightened by consumer brands following customers to likes of eSports platforms. May result in move toward dog-eat-dog environment commonplace in US and Australia. • Sustainability of funding model has been exposed by COVID-19 with NSOs needing to reflect on their operating models and cost structures. May impact focus and support for elite athletes.
Sport activism	<ul style="list-style-type: none"> • Athlete activism is likely to increase with athletes speaking up on matters of public importance if they do not have access to good advice to make good decisions. What implications will this have on fan engagement, sponsorships, relationships within teams, athlete health and welfare, trust in international bodies where commercial stakes are high and pressure on integrity will increase.
Change in Government priorities	<ul style="list-style-type: none"> • Consistent support for sport from government may become more variable as budget challenges mount from likes of recession, climate change and aging population. This will demand strong alignment to government priorities of the day. How strong is high performance sport's alignment to wellbeing?
Digital revolution	<ul style="list-style-type: none"> • The level of data available in the future is going to potentially overwhelm participants and coaches seeking to compete at the highest levels. • Access and capability to use data may result in disparity between competitors, and ownership of personal data may open financial opportunities and corresponding contention about where the benefits should flow. • The flow of personal data associated with sport and individual body function is likely to form a useful complement to proactive health interventions, if privacy concerns can be effectively addressed. The deployment of ingestible robotics to monitor elite performance could become a competitive edge
Human enhancement through technology	<ul style="list-style-type: none"> • If all physical disabilities can be remedied by augmenting technologies, we will need to redefine disability as lack of access rather than lack of core ability. Advances in bionics may redefine what we believe to be possible, while those able to use training wearables are likely to be at a significant advantage with continual feedback on performance. • The ability to repair significant injuries and potentially upgrade capability will change athletes' career patterns and options. • Genetic based predictions may influence talent identification, but at what cost to balanced activity? Similarly, is gene-doping a foregone conclusion, or a development to be avoided at all costs? • Is there an opportunity to develop cross-over opportunities that use immersive environments to improve real world physical skills? • Will these enhancements undermine the inspirational element of sport?

Identity and gender fluidity	<ul style="list-style-type: none"> • As genderfluidity develops, strongly gender-aligned activities will come under pressure, with mixed teams possibly increasingly the future norm. • The emergence of new forms of identity expression may weaken the traditional relationship between the individual's sense of identity and its embodiment through specific sporting codes. • Risk to the integrity and public acceptance of female sporting contests where there are transgender athletes participating.
Athlete wellbeing	<ul style="list-style-type: none"> • The mental pressures associated with high-performance are now being compounded by the pandemic's impact, with international athletes contemplating a future of competing in countries with less successful COVID-19 responses. • Lack of commonly accepted definition of athlete wellbeing risks under and overplaying responses. • Increased expectation that sport organisations and athletes receiving public money must act in a socially responsible manner
Equality	<ul style="list-style-type: none"> • Possible deacceleration of women's sport. While sports have made a big show of investing in women in recent years, the current scramble for survival will test the enduring nature of that commitment.

Post pandemic context

A conclusion to the pandemic and its impact will determine the extent to which high-performance sport can return. Virologists and public health experts generally agree that immunity is vital – either through widespread safe and effective vaccination, or when enough of the global population has recovered from infections and gained herd immunity. singularityhub.com

What's changing?

Vaccine availability

- Coronavirus vaccine may not be ready before end of 2021. Severin Schwan, Roche's chief executive, predicts 12 to 18 months (businessinsider.com.au). Anthony Fauci, US director of the National Institute of Allergy and Infectious Diseases, aligns with this projection. newyorker.com
- Distribution will further delay things. Panel of experts assessed enough doses of approved COVID-19 vaccines to inoculate 25 million people would not be distributed in the US before April 2022. goodjudgment.io

Testing

- In the absence of a vaccine, travelling or participation in events outside a defined 'bubble' will probably rely on testing. These continue to develop and are getting closer to real time analysis. Coronavirus testing using CRISPR detects disease in under 40 minutes. cnet.com
- Would be logistically challenging in environment where competitors would need to be presumed positive ahead of screening and continually tested while in contact with others.

Potential complications

- Critical assumptions are that the virus remains relatively unchanged and for most, the health implications are relatively mild. This is being challenged as the recovered population increases.

- Scientists from London School of Hygiene and Tropical Medicine have discovered coronavirus is adapting to humans with mutations that could help it spread more rapidly ([independent.co.uk](https://www.independent.co.uk)). A more detailed understanding is also emerging of the unexpected ways the virus hits the human body including the blood, brain, heart, kidneys, and immune systems ([technologyreview.com](https://www.technologyreview.com)). Might this have more impact on elite athletes who place more strain on their bodies?
- The question of immunity is thrown into doubt by studies on similar coronaviruses that found people frequently became re-infected with the same strain. [technologyreview.com](https://www.technologyreview.com)
- These elements likely point to a future where the virus never fully goes away. The WHO's Dr Michael Ryan makes this point and suggests the virus may become just another endemic virus in the global community. [science.thewire.in](https://www.science.thewire.in)

Prospects for international travel

- Unlikely that patterns of global mobility will return to pre-pandemic normality. In addition to severed air links, geo-political and regional factors will likely influence the timing of national re-connections.
- Impacts of coronavirus will ultimately be determined by the length and severity of the outbreak. However, the longer consumers and businesses adjust to restrictions and identify potential cost savings, the more likely these changes will become structural and long-lasting. Decreasing convenience and increasing costs. [techxplore.com](https://www.techxplore.com)
- Industry commentators see Asia-Pacific region as key first mover for re-opening of 'regional bubbles' (e.g. Trans-Tasman [sciblogs.co.nz](https://www.sciblogs.co.nz)). However, prospects for easy global connections appear to remain a long way off. This will impact our athletes to bench-mark themselves against others and deprive them of competition.

The silver bullet of immunity passports

- Given the variable nature of countries' response to containing the pandemic, the obvious solution is to rely on an individual's clear test or recovery to allow freedom of movement. Heathrow's CEO, John Holland-Kaye, backs the idea of "immunity passports" to allow people who have already had COVID-19 to travel more freely. [theguardian.com](https://www.theguardian.com)
- The complications with this concept though, suggest it's unlikely to achieve widespread adoption. [medicalfuturist.com](https://www.medicalfuturist.com)
- Immunity passports would inevitably create artificial restrictions on who can participate. May even encourage people to become infected. [adigaskell.org](https://www.adigaskell.org)

Reversing the trend of globalisation

- The COVID-19 pandemic increases the distance between countries and among people, with consequent implications for trends of globalisation and urbanisation. Some suggesting coronavirus could throw global progress into reverse. [axios.com](https://www.axios.com)
- Pre-pandemic article from New York Times looked at flow of high-performance athletes across borders and noted world will continue to shrink for most elite athletes ([nytimes.com](https://www.nytimes.com)). This is unlikely to be the case post-pandemic.
- Pandemic could exacerbate power shift from Washington to Beijing. Move away from US dollar-reliance could be assisted by China encouraging digital yuan usage at 2022 Winter Olympics. Trend toward cyber-currency propelled by need to move away from cash-handling. [finews.asia](https://www.finews.asia)
- VISA, prime sponsor of Olympics since 1986, currently adapting its marketing plans following Tokyo postponement ([sportspromedia.com](https://www.sportspromedia.com)). In next decade, could be eclipsed by Tencent (WeChat) and Alibaba (AliPay).

Future elite sports practice

Deloitte completed its annual review of critical sport industry disruptions ahead of the pandemic and noted the rise of women's sports, continued evolution of esports, legalised sports betting, college athletes maximising their short-term value, 5G and sports in the cloud (www2.deloitte.com).

Reflecting on list through a post-COVID perspective, potentially hindering some trends (e.g. women's sport) while accelerating others (e.g. esports). Implicit in many of these trends is the use of data. Post-pandemic environment will place even greater emphasis on collection and use of sport-derived information.

What's changing?

Ubiquitous connectivity

- Adoption of 5G likely to be accelerated by the pandemic – infrastructure will be a critical component of new trends in fan connection and player performance monitoring and enhancement. The *Ericsson Mobility Report* estimates 5G will handle 45% of global mobile data traffic by end of 2025 (2.6 billion subscriptions). siliconrepublic.com
- From remote work and virtual events to virus-monitoring big data, *Singularity Hub* notes a number of new technologies (including 5G) that are now entering centre stage as a result of the pandemic. singularityhub.com
- By 2025 there will be somewhere between 75 billion and a hundred billion connected devices on the Internet of Things (IoT). That's 10 to 12 devices for every human and each of these devices will have about a dozen or so sensors. sebastiaans.blog
- 5G and further expansion of IoT devices are expected to increase data consumption and connectivity. This increased demand will need heightened security. newelectronics.co.uk

Future sports medicine

- Future of sports medicine may well be found in technology-driven prevention, early diagnosis, minimally invasive surgery and using body's own cells to rejuvenate cartilage and ease injuries. jerseysbest.com

Prevention and monitoring

- Understanding the biological performance of the body on a real-time basis will become increasingly ubiquitous across all sporting levels. Trend toward monitoring tools that provide all-in-one health tracker capability. E.g. 'BioSticker' strip of electronics sticks on the body to continuously monitor vital signs for up to 30 days. medicalfuturist.com
- Blood profiling and monitoring (part of emerging field of sportomics) is being increasingly used to provide more focused, in-depth data on athletic performance (researchgate.net). Data from a simple blood analysis allows coaches to optimize performance and prevent injury. fitnesscity.com
- Combining sportomics approaches with ingestibles is an area of significant potential and growth. Global smart pills market already nearly a billion dollars (USD). whatsyourtech.ca

Repair

- Ground-breaking cartilage regeneration techniques are assisting damaged joints to regain function. Demand from an expanding elderly population will help develop technology and provide greater access to athletic community too.
- The promise of regenerative medicine lies in its use of stem cells and tissue engineering to "fix" tissues that have failed to repair themselves.

However, expectations have sometimes run ahead of the science, and its potential to repair and rebuild cartilage has yet to be fully realised. arthritis.org, sports-health.com

- At the cutting edge is the development of a ground-breaking roadmap of how human skeletal muscle develops. While primarily focused on developing muscle stem cells in the lab for regenerative cell therapies for muscle diseases and ageing, insights should support more effective regenerative medicine approaches across populations. medicalxpress.com

Recovery

- Advances in minimally invasive surgical procedures associated with artificial intelligence (AI) and robotics are delivering faster recovery time for high-performance athletes. The result is fewer athletes permanently side-lined by injuries.
- Internationally, the growth of Medical Robot market is being driven by rise in demand for accurate laparoscopic surgery for ageing population, and the increasing cases of trauma and brain-related injuries (medgadget.com). Growing AI and robotics in sports medicine means surgical procedures are becoming more minimally invasive, precise and personalised, with shortened recovery time. sportsmd.com
- Robots outside the operating theatre are being used to help stroke survivors walk faster and farther (techxplore.com). Scientists have now developed a robotic arm that can sense touch and be controlled with the mind (hackster.io). Perhaps such technologies may play a part in future sport rehabilitation and training. Will advances in sports medicine be widely accessible? dw.com

Data: the life-blood of sport?

- The level and dimensions of information derived from athletic activity appears to be at a tipping point, with an almost infinite number of data points being scrutinised for performance and commercial advantage.

The athlete / technology interface

- The size of the potential commercial opportunity afforded by new data streams is reflected in recent market acquisitions. Whoop, a company that meshes wearables with machine learning and number-crunching analytics to help athletes optimise their performance, has raised \$55 million in a round of funding (venturebeat.com). Makers like Whoop are now offering ways to track coronavirus symptoms. bizjournals.com
- Google and Adidas have teamed up to create a wearable designed to be placed in the insole of a soccer boot to measure players' data - how far they have run in a match and how fast, how hard they kick the ball, or when they collide with other players. This can be used to improve performance and be fed into video games such as FIFA20. forbes.com
- Last season, Louisiana State University players wore neuroimaging headgear for the first time to get a peek at how their brains function in simulated athletic conditions (nytimes.com). Tennis is also looking at ways in which it can assess a player's mental perspective during intense competition. sporttechie.com

Data science and analytics

- Using data to engage and manage fan bases is also becoming more critical both to maximise revenue and reduce risk in the post-COVID environment.
- Motion analytics company Inside has upgraded its platform to monitor crowd movement and spacing inside sporting venues. This could help enforce social distancing once sporting venues reopen to the public. sporttechie.com

- It is regarded as essential to now have an effective Fan Relationship Management (FRM) tool to work based on data and information in an objective and integrated way. *Nuno Mena* observes that those who adopted this methodology in times of crisis (2008/9, 2012/13) achieved significantly better marketing and commercial results. [sportsvenuebusiness.com](https://www.sportsvenuebusiness.com)
- It seems inconceivable that computing power can keep up with the exponential amount of data now being produced. However, new Quantum Computing tool processes enormous sets of data and finds patterns never previously discovered. E.g. Google's quantum computer was reportedly able to solve a calculation in 3 minutes 20 seconds, that would take the world's fastest traditional supercomputer around 10,000 years. [insidehighered.com](https://www.insidehighered.com)

How will data change sport, and for whose benefit?

- With a tsunami of data being used for everything from player performance and health, to critical commercial decisions, it will increasingly raise challenging questions around the ethical use of information, its ownership and athlete privacy. [digitalpulse.pwc.com.au](https://www.digitalpulse.pwc.com.au)
- US soccer academies are part of a \$7 billion business as they develop talented players and sell them to other teams. Technology now allows them to provide objective measurements of player ability. [nytimes.com](https://www.nytimes.com)
- [Driblab](https://www.driblab.com) has for several years carrying out complex analyses based on the data generated by players to advise soccer clubs on their transfer decisions. At a time of financial stress, the incentive to apply advanced data analytics will only increase. [forbes.com](https://www.forbes.com)
- At pro level in the US, who owns the data, who can sell the data, use the data, and for what purposes is already an area of negotiation between player associations and franchise owners. [legalsportsreport.com](https://www.legalsportsreport.com)
- In December 2019, [a study by Andrew Manley and Shaun Williams](https://www.sportperformanceanalysis.com) from the University of Bath triggered a new debate of whether the essence of the sport (i.e. enjoyment of the players) seen during the amateur era and the early professional years has been lost. [sportperformanceanalysis.com](https://www.sportperformanceanalysis.com)
- As use of data expands, it will become increasingly necessary to focus on the development of trust. Athletes will be mindful of how their information is shared, managed and stored, and the protection around that. [leadersinsport.com](https://www.leadersinsport.com)

Athlete mental wellbeing

- Mental pressures associated with high-performance (emphasised in the Manley & Williams ref) are now being compounded by the pandemic's impact. Our international athletes will likely contemplate a future of competing in countries with less successful COVID-19 responses.
- Clinical sport psychologist Kristin Keim advises Olympic athletes denied an opportunity to participate need time for self-reflection. Research indicates it will take time to steer negative emotions into a productive direction. [bbc.com](https://www.bbc.com)
- Ironically, the greater mental challenge may be for those athletes forced to compete in a COVID-comprised environment. Fearful athletes are likely to be more vulnerable to other forms of injury. [explica.co](https://www.explica.co)
- There is a potential for cross-over here too between managing player wellbeing and pandemic-constrained workplaces. A platform used by Cycling Australia and Australian Football League clubs is enabling staff to record how they are feeling about work and their overall wellbeing. [theleadsouthaustralia.com.au](https://www.theleadsouthaustralia.com.au)
- Athlete wellbeing extends beyond mental wellbeing. The lack of a universal and comprehensive understanding of wellbeing can result in its misrepresentation.

Gender equality

- According to Deloitte's '[2020 Sports Industry Outlook](#)', the rise of women's sports was at the top of their list of predictions earlier this year. It appears the pandemic has raised potential to stall this momentum.
- Strong concerns here that women's sport will be adversely affected by COVID-19 as sports bodies put money first ([stuff.co.nz](#), [rnz.co.nz](#)). These reports follow the International Working Group (IWG) on Women & Sport Global Executive's decision to declare the pandemic a significant threat to the 'women in sport and physical activity' movement, globally. [womeninsport.org.nz](#)
- A report commissioned prior to the pandemic, but released only recently, outlines the future needs of women's sport. [fifpro.org](#)

Addressing transgender perspectives

- The contentious debate around transgender participation looks set to continue, if not intensify, as competition opportunities are constrained post-pandemic.
- Transgender athletes at all levels of sport are winning medals, spurring a contentious debate over the future of gendered competition ([wired.com](#)). It remains a source of growing contention. [theguardian.com](#)
- Last year's failure to agree new transgender guidelines suggest sport is still grappling with the issues, first articulated in 2005 ([bjsm.bmj.com](#)). These issues are likely to be much canvassed ahead of the next Olympics. [open.ac.uk](#)

Business dynamics post pandemic

Deloitte's report "2020 Sports Industry Outlook," has been updated to reflect the subsequent impacts of the pandemic on the sector. It suggests three critical strategic approaches that sports organisations need to consider for recovery:

- How to help fans feel safe returning to live events
- How to leverage digital tools to support year-round fan engagement
- How these tools support a holistic, data-driven strategy for their business
- Given the financial challenges at both domestic and global levels, these questions will be increasingly relevant as sport organisations consider critical investment opportunities and the scrutiny of potential sponsors and media players facing the same financial constraints.

What's changing?

Olympic prospects for 2021 and beyond

- As the premier event of the elite calendar, the ability of the Olympic structure to bounce back from 2020's postponement will be a critical determinant of high-performance sport's future.
- Japan Medical Association president recently argued that the Olympics are only possible if infections are under control in the host country and globally ([kxan.com](#)). Others suggested the games should be cancelled altogether given other more pressing economic demands in Japan ([bos-cbscsr.dk](#)). This seems unlikely. Estimated market effect of Olympics and Paralympics more than JPY 32 trillion.
- Pandemic provides opportunity for international sports federations to re-evaluate their role and function. Last year's [ASOIF report](#) already called for organisations to engage in more entrepreneurial thinking.

- An article ahead of last year's SportsAccord observed trends are placing an unprecedented strain on the organising body model as it stands, but engaging creatively with these developments could inspire effective, positive change. [sportspromedia.com](https://www.sportspromedia.com)
- Several national organisations remain focused on future Olympics bids despite the current disruption to the process. India is planning to revive its bid for the 2032 Olympics and 2026 Youth Olympics. [gamesbids.com](https://www.gamesbids.com)

Financial pressures

- All national sports organisations are reporting significant financial hits relating to the pandemic. ESPN analysis of the US found the sudden disappearance of sports will erase at least US\$12 billion in revenue and economic catastrophe will more than double if college football and NFL are wiped out too. [espn.com](https://www.espn.com)
- Canada's sports ecosystem is experiencing significant pressure and government has promised CA\$0.5 billion in support for the Arts, Culture and Sports, which puts the NZ Government's support package of \$265m in a very positive context. [cbc.ca](https://www.cbc.ca)
- UK leaders from football, cricket, rugby union, the Olympics and Paralympics have advised a parliamentary select committee they collectively face a potential £740 million shortfall. [msn.com](https://www.msn.com)
- The financial dimensions of the proceed/cancel decision for the 2021 Olympics are significant ([nbcmontana.com](https://www.nbcmontana.com)). Financial ramifications for postponed Olympics are massive, with Japan's National Audit Board estimated total cost to be \$22.3 billion. Cancelling the Games outright would multiply this figure, perhaps incentivising organisers to proceed even if health conditions are not ideal. [forbes.com](https://www.forbes.com)
- There's significant desire to get the 2021 event on track to assist repair of global balance sheets. [portsmouth.co.uk](https://www.portsmouth.co.uk)
- While the immediate financial impact on sport will be severe, history has shown that harsh global economic conditions have had only a modest impact on sport's commercial growth. [twocircles.com](https://www.twocircles.com)

New business opportunities

- Beyond international competition and government support, the emergence of data-related revenue streams is compelling. US professional sports leagues may have hit on a way to cash in, selling their official data to gambling companies. [apnews.com](https://www.apnews.com)
- For individual competitors too, the combination of biometric data and consumer demand for wearable technology to deliver health and fitness goals has the potential to deliver a unique new source of earnings; both during and after conclusion of a playing career. [mondaq.com](https://www.mondaq.com)
- Ownership of data may be an issue of contention. Organisations cannot profit from data unless they can claim ownership of it. They cannot do this without partnering with athletes.

Media / sponsorship

- With global sport disrupted, and business models under pressure, media companies are looking to drive new revenue streams. The current suspension in play presents an opportunity to explore creative ways of driving digital fan engagement. [sportspromedia.com](https://www.sportspromedia.com)
- Velon, a cycling consortium focused on using IoT and data to transform the economics of the sport, is experimenting with innovative fan engagement techniques. [ey.com](https://www.ey.com)
- Apple investing in this area is a clear indication of future commercial opportunity – acquiring NextVR, which creates sport-related content and experiences for virtual reality. [arstechnica.com](https://www.arstechnica.com)

- Farhan Ahmed, Twitch's strategic partnerships manager, described the Amazon-owned streaming service's trial broadcast of last year's Formula One Mexican Grand Prix as one of its "biggest success stories to date" in Europe. sportspromedia.com
- These exciting developments are tempered with a cautionary perspective emerging from the Australian industry. [theroar.com.au]
- In a broader context, the shift towards more focus on the intimate, digital connection with fans is being driven by wider pressures in the advertising sector. singularityhub.com

Insurance

- Future event insurance is likely to be regarded as a prudent necessity and a greater cost for those staging competitions.
- Wimbledon showed how pandemic insurance could become vital for sports. insurancejournal.com
- The insurance industry will price such cover accordingly, particularly as losses from this event are likely to be the most expensive in the history of the re/insurance industry. reinsurancene.ws
- Given the extent of these losses, even expensive cover may not be available. Insurers have already moved to strip coronavirus from event-cancellation cover. For those planning music, sporting or trade events now, there may be no protection. reuters.com

eSports

- The trend toward esports was already well established and is again an area that will likely benefit and be accelerated by the pandemic. It combines the elements of entertainment, social distancing and potentially gambling, thereby throwing the gaming industry a small lifeline.
- All game segments have seen an increase in engagement and revenues as a result of the COVID-19 measures, but mobile gaming saw the biggest increase. In total, mobile games will generate revenues of \$77.2 billion in 2020, growing 13.3% from 2019. venturebeat.com
- With a void in live traditional sports created by the pandemic, gaming appears to be in prime position to capitalise and create a very different future. sportspromedia.com
- The COVID-19 crisis was the break FIFA20, NBA2K and other competitive video games needed to really go mainstream. Regular sports fans discovered it is not much different to cheer for your favourite teams in real life or in a virtual gaming environment. linkedin.com

Scheduling

- COVID-19 has disrupted the international sports calendar. E.g. we have become accustomed to the Olympic and Paralympic Games and the FIFA World Cup, taking place two years apart, as has occurred since 1948.
- Moving the Tokyo Games to 2021 has caused the World Athletics Championships to move to mid-2022, when both the European Athletics Championships and Commonwealth Games are taking place. Athletes will have to prioritise events over each other, as will broadcasters, fans, and sponsors. twocircles.com
- Whilst there is significant consumer demand for sport, there will be losers in this scheduling battle. They will be those events that get rescheduled to a date that negatively impacts the attention they receive, or don't get rescheduled at all because they are deemed surplus to requirements.

