

Patterns of service utilisation and future demand of critical care in New Zealand public hospitals

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Population conference 2023

Background

Coronavirus could flood our hospital ICUs with COVID-19 patients, so do we have enough beds?

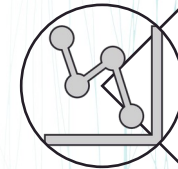
Facing a Covid-19 surge, doctors will be forced to decide who gets bed in ICU,
says Malaysia health chief

Dying in line: Brazil's crunch for COVID-19 intensive care beds

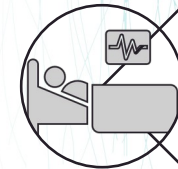
California Covid-19 Update: Statewide Available ICU Capacity Falls To 0% On Christmas Day



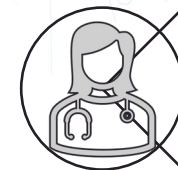
**Critical Care
Infrastructure National
Service Plan**



1. Utilisation analysis



**2. Capacity demand
projection**



**3. Model of care and
service delivery
framework**

Methodology

- **Inclusion:**

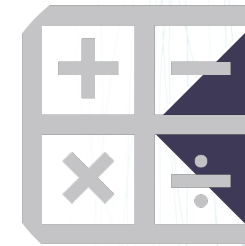
- Intensive care unit (ICU), high-dependency unit (HDU) and paediatric intensive care unit (PICU)

- **Exclusion:**

- Coronary care unit (CCU) and neonatal intensive care unit (NICU)

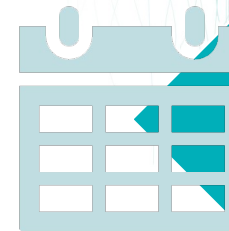
- **Data and data matching**

- National Minimum Dataset for hospital inpatient events (NMDS)
- Datasets from Australian and New Zealand Intensive care Society (ANZICS)
- Population projection from Stats NZ
- Local data



Measures

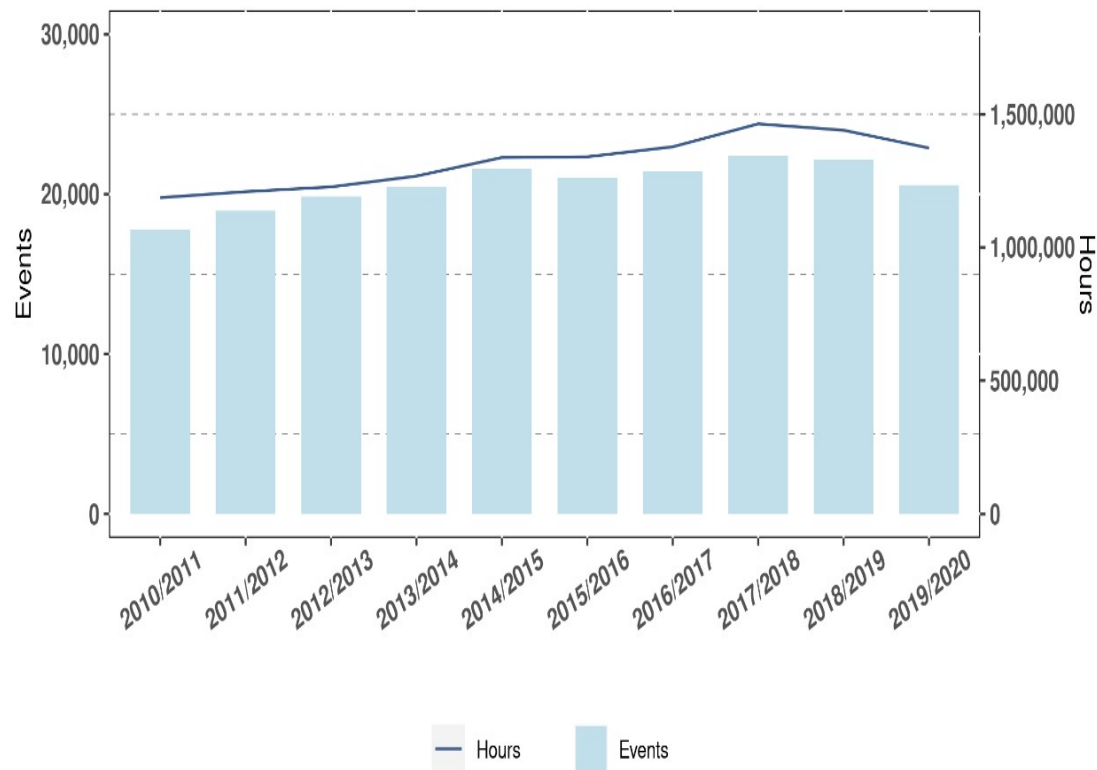
- Intensive care events
- Intensive care hours
- Population based rates



Time period:

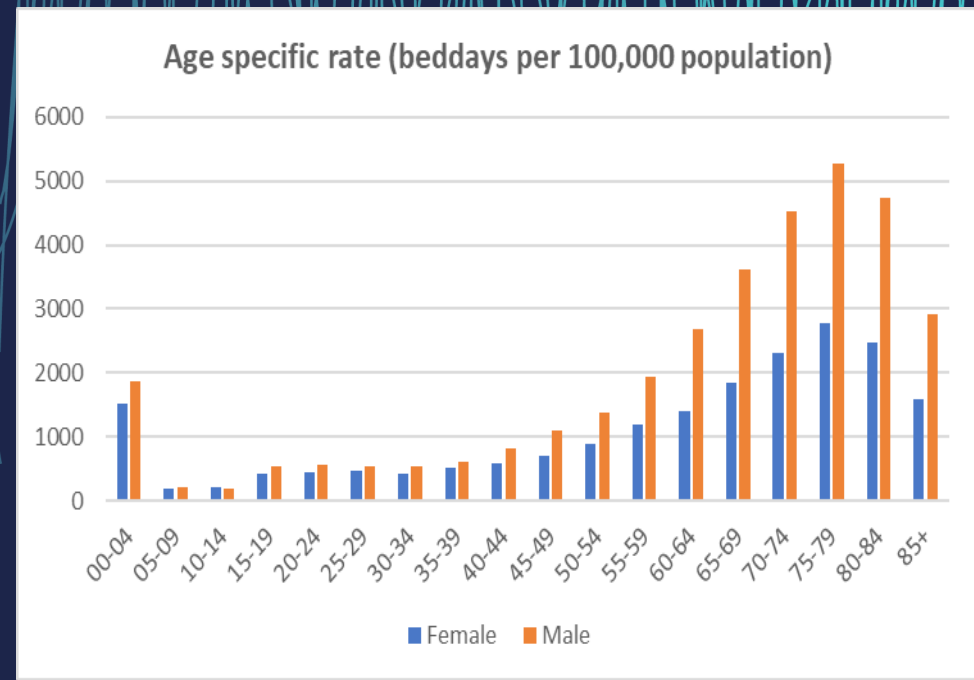
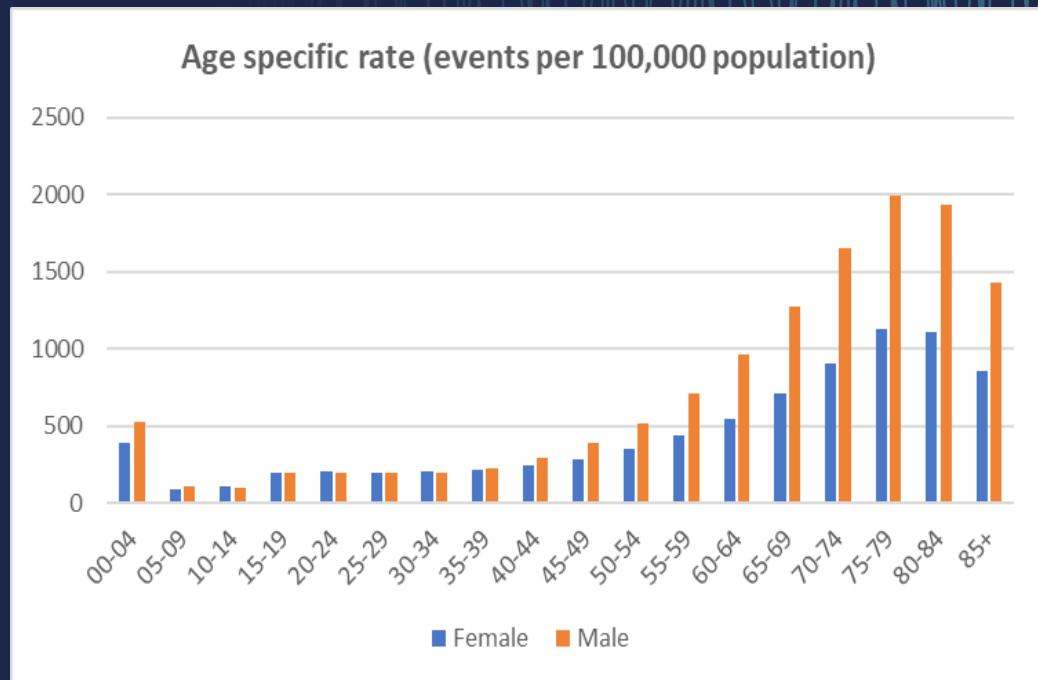
- Utilisation analysis :
July 2010 to June 2020
- Projection to June 2035

Utilisation analysis

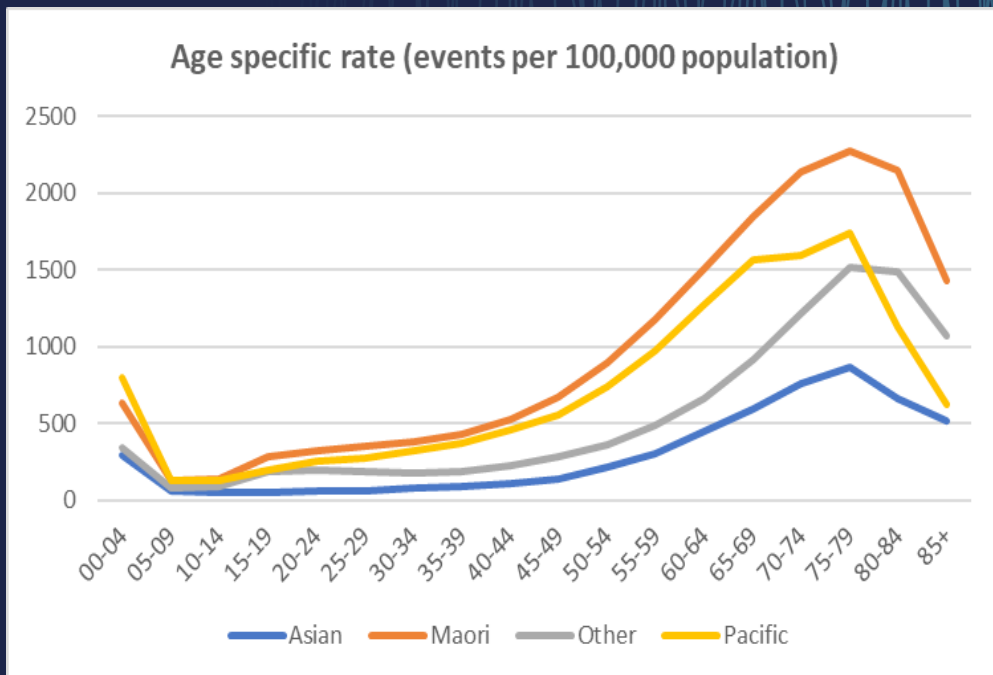


- **In total, included**
 - 206,000 critical care hospital events, and
 - associated 13.2 million critical care hours
- **Age-standardised rates of NZ patients**
 - 433 events per 100,000 population
 - 1,150 beddays per 100,000 population
- **Impact of COVID-19**
 - 2019/2020
 - Medical conditions

Age specific rates



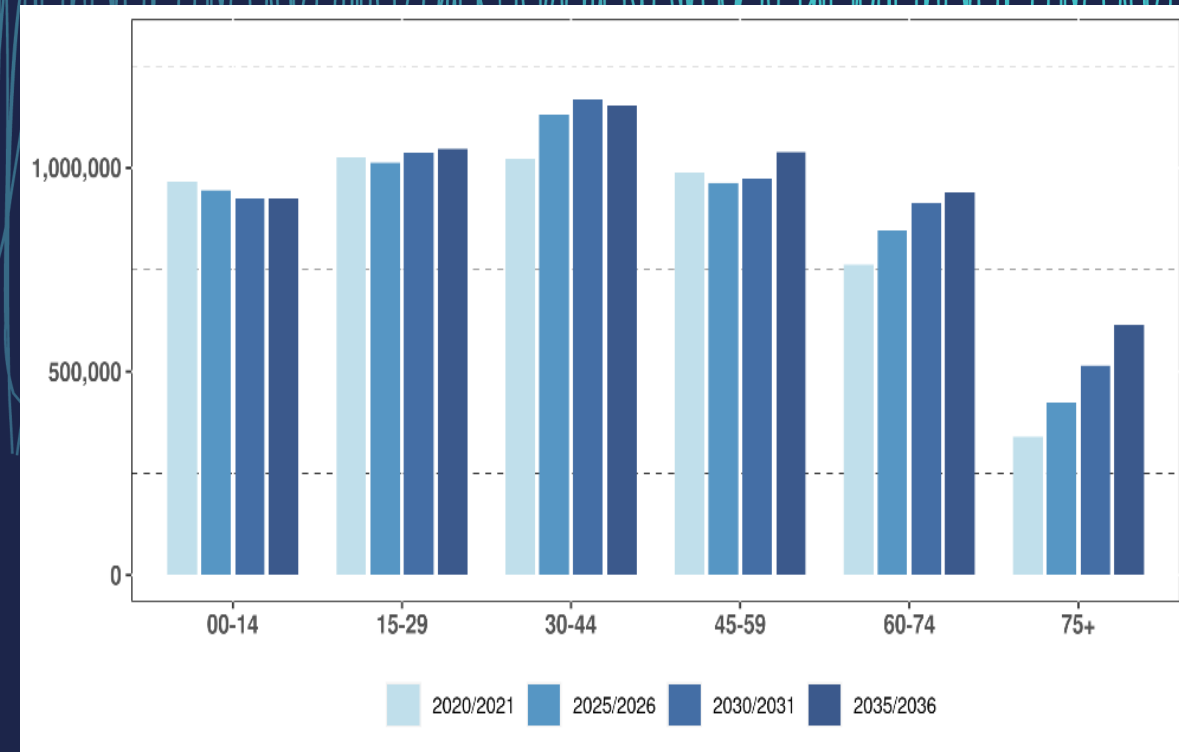
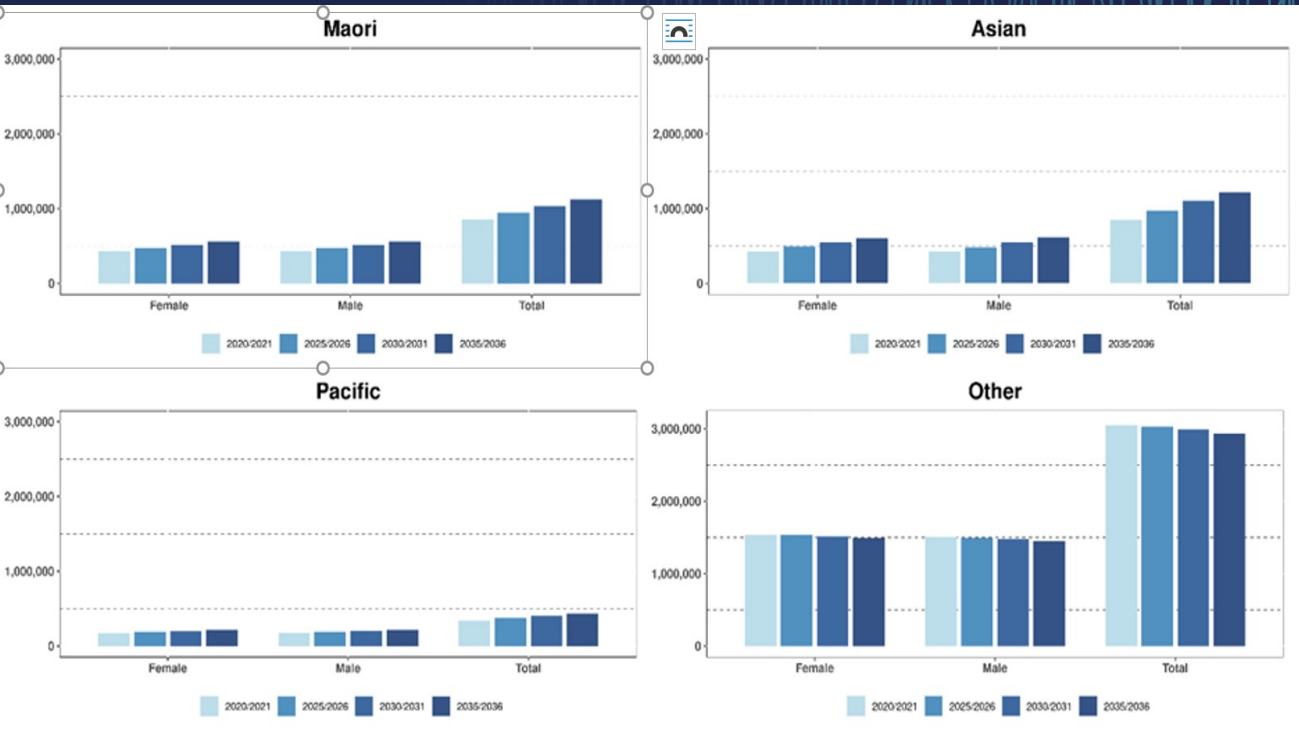
Ethnic difference and main causes of diagnosis



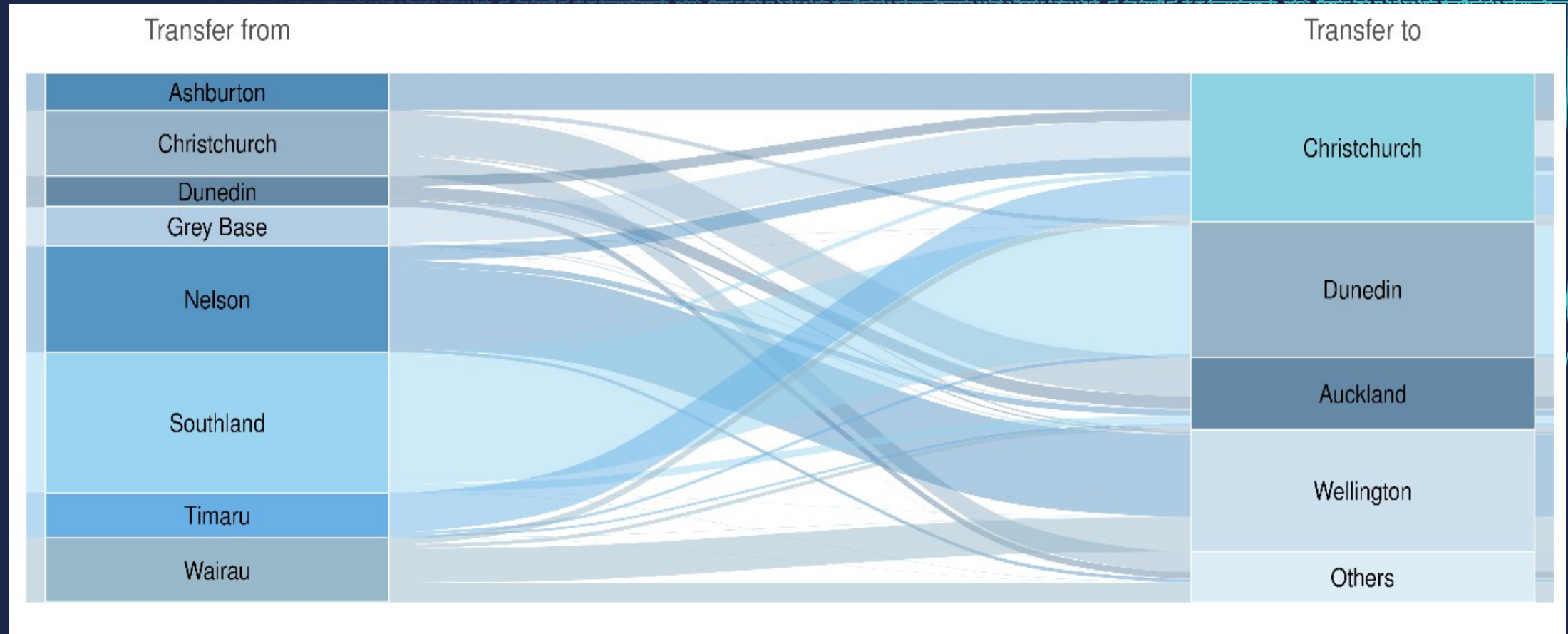
Main causes of hospitalisation:

1. Cardiovascular diseases (28%)
2. Injuries (17%)
3. Respiratory diseases (13%)
4. Neoplasms (9%)
5. Diseases of digestive system (9%)

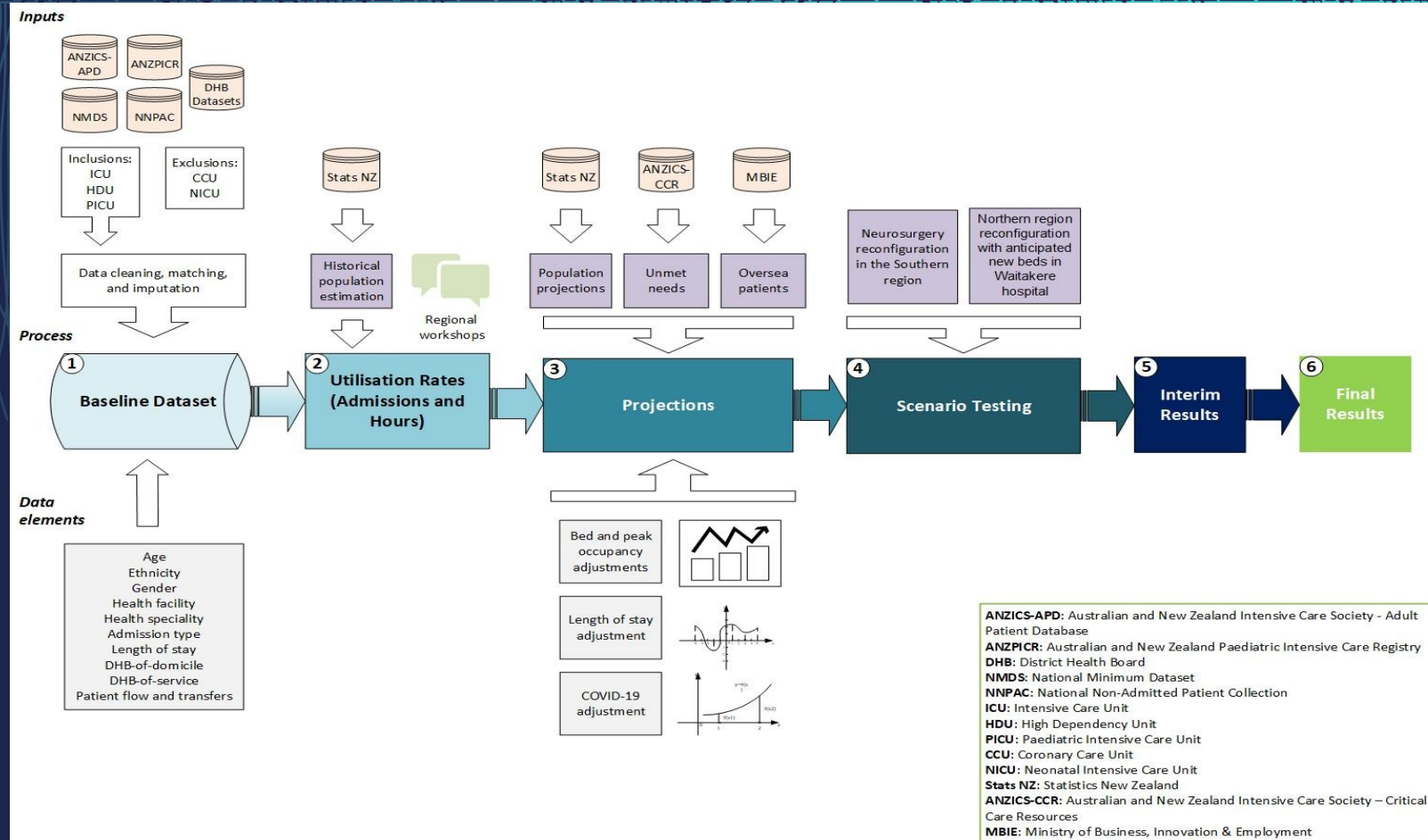
Population projection



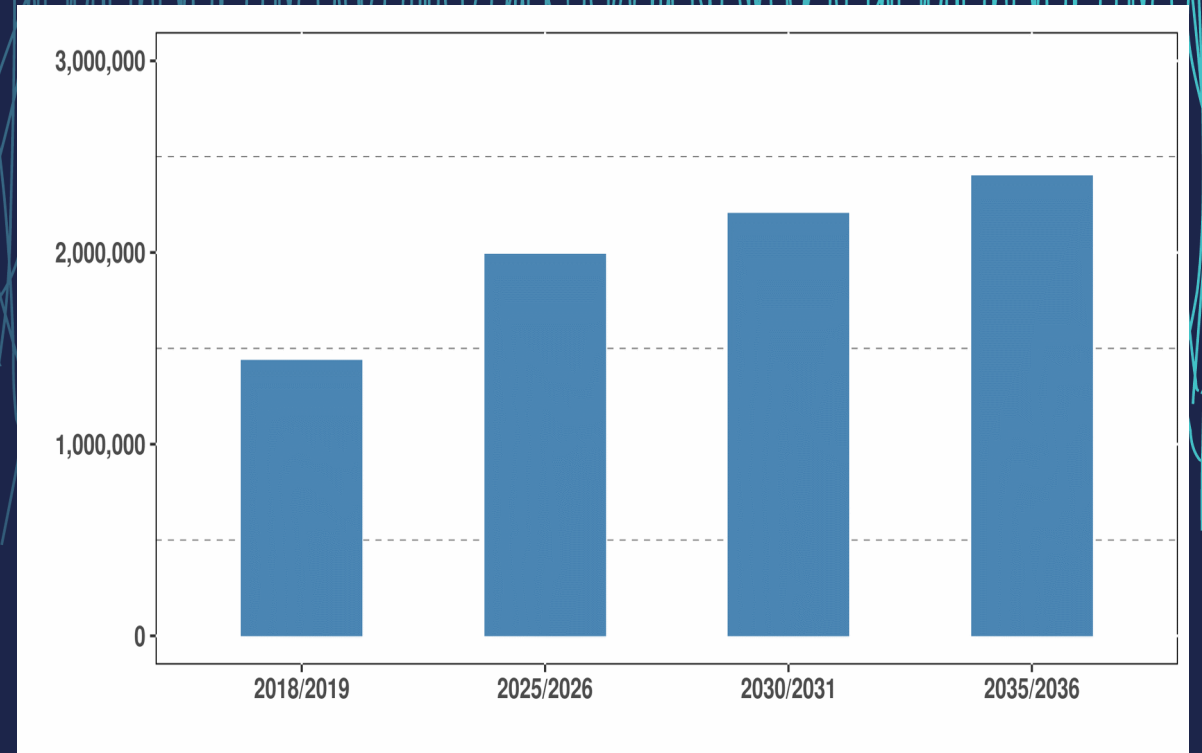
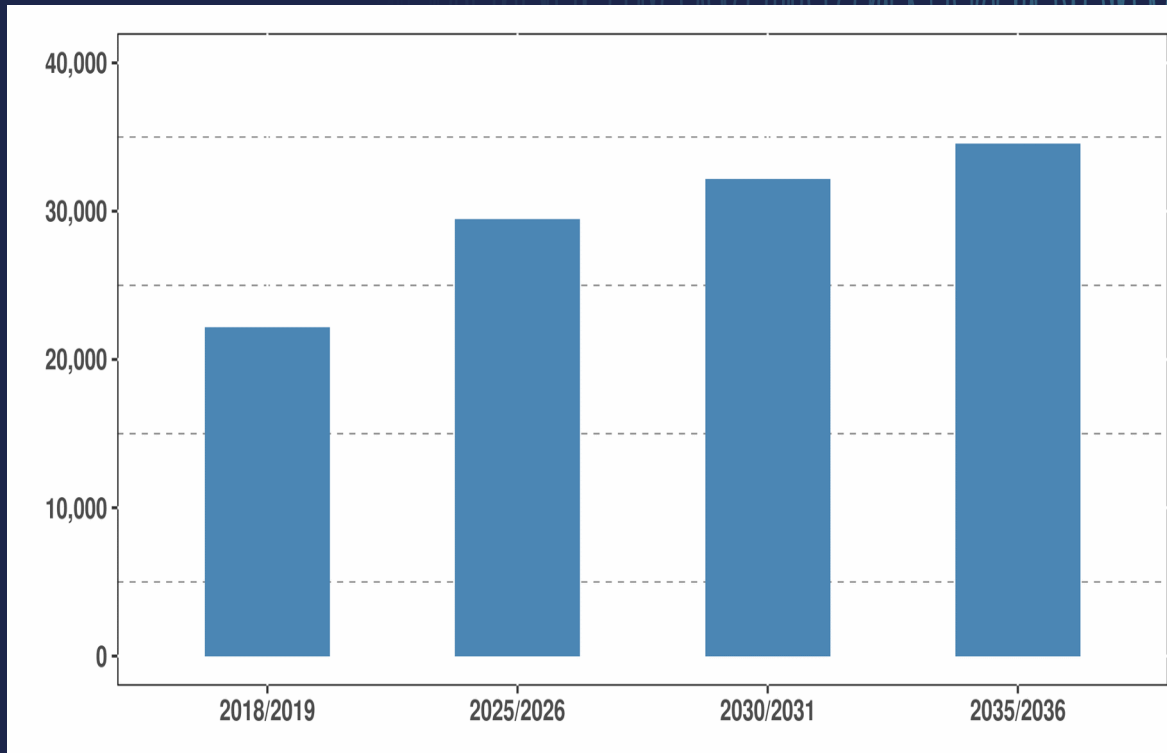
Patient flow and transfer (South Island)



Conceptual model and processes of projection



Projection on critical care demand (events, care hours)



Baseline projection on critical care beds (without resilience capacity)

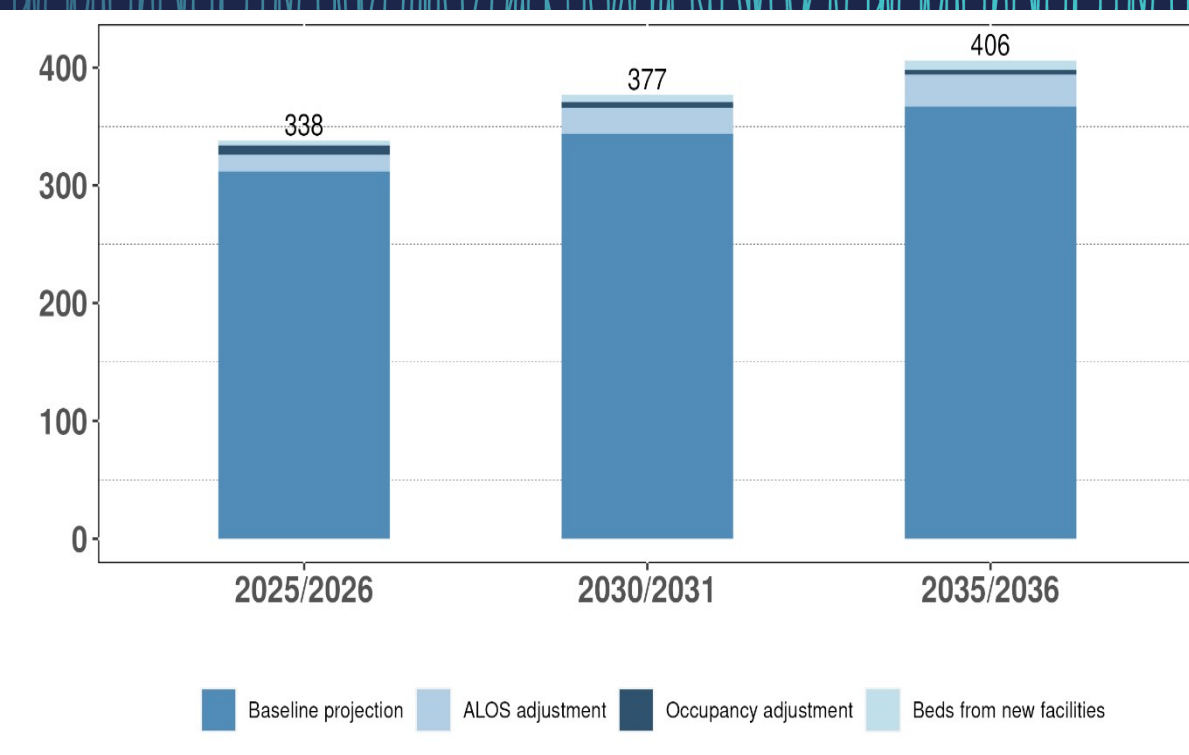
Critical care level (I, II, III) and type (PICU, non-PICU)

Occupancy rate

Utilisation rate

Annual service hours

Adjustments



Resilience capacity

- Theoretical critical care capacity, to deal with the need of:
 - Pandemic, epidemic or significant acute event
 - Without impact on routine care delivery
- Estimate based on a modelling on pandemic of **delta** variant, and critical care experience in Australia in 2021
- 138 beds

Critical care for Māori patients

- **Ethnicity specified approach**
 - The high critical care utilisation rates in Māori population were assumed to continue
 - With growing and gradual increase of population in the older age groups
 - Critical care units treated more Māori patients, gained more projected beds

Discussion and summary

- **Population as a key driving factor**
- **Utilisation analysis**
 - Insights
 - Interactions of different parts of the system
- **Sector engagement and consultation**
 - Earlier stage
 - Interpret and implementation

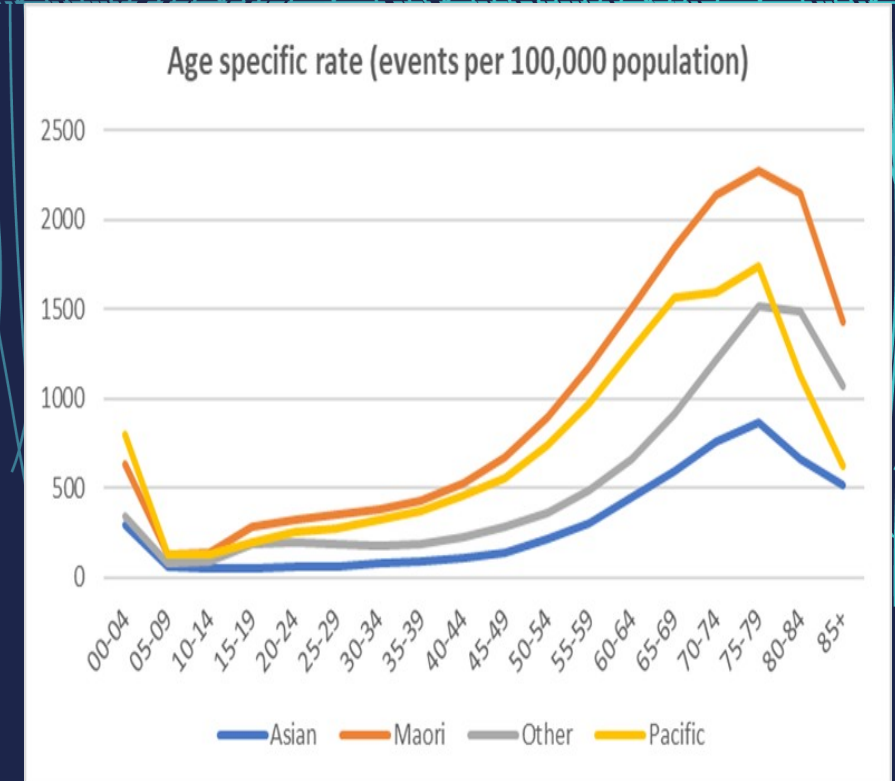
Stakeholders involved

- Clinicians in DHBs
- Chief Medical Officer, MOH
- Māori Health Authority
- National Network of CMOs, COOs, GM of Planning & Funding and Director of Nurses
- College of Intensive Care Medicine
- Australia and New Zealand Intensive Care Society
- Critical care capacity demand working group...

Discussion and summary

- **Challenges**

- Low utilisation rate in Asian population
- Long term population projection e.g. 50 year projection
- Others



Acknowledgments

Acknowledgment

The development of the Critical Care Infrastructure National Service Plan has been collaborative.

This work, including service model design, statistical analysis and modelling, project management and report writing, was conducted by the Service Planning team, Infrastructure and Investment Group at Te Whānui Ora. The team was comprised of Astuti Balram (Manager), Zhi-ling (Jim) Zhang (Principal Analyst), Dr Dee Alexander (Principal Advisor), Albert Chin (Senior Analyst), David Chen (Analyst) and Jing Wu (Analyst).

A steering group, representing clinical leadership and sector engagement, has participated in the governance process and provided strong support to this work. The steering group included:

Alex Psirides	Co-Clinical Lead of ICU, Wellington Hospital
Seton Henderson	Clinical Director of Intensive Care, Christchurch Hospital
Andrew Stapleton	Director of Intensive Care, Hutt Hospital
	Chair (New Zealand) of the College of Intensive care Medicine National Committee
Andy Simpson	Ex Chief Medical Officer, Māori Hauora – Ministry of Health
Craig Carr	Critical Care Director, Dunedin Hospital
	Chair (New Zealand) of Australian and New Zealand Intensive Care Society
Chris Nash	Chief Operation Officer, Te Whānui Ora – Te Manawa Taki
	Nominated representative from National Chief Operation Network
Gareth Fannin	Director, Funding and Provider Relationship, Strategy and Funding, Te Whānui Ora – Waikato
	Nominated representative from the National General Managers, Planning and Funding Network

Geoffrey Thompson	Manager, Māori Health Insights, Māori Hauora – Ministry of Health
Gillian Bishop	Clinical Director, Department of Critical Care Medicine, Auckland City Hospital
James Egoletou	Respiratory Consultant, Wellington Hospital
	Medical Director, Asthma and Respiratory Foundation NZ
John Baca	Clinical Director of Child Health, Starship Children's Hospital
Kerry Benson-Cooper	Service Clinical Director, Department of Critical Care Medicine, Auckland City Hospital
Kylie Head	Consumer Adviser and Consultant
	Nominated representative from the Health Quality and Safety Commission
Martin Chadwick	Chief Allied Health Professions Officer, Māori Hauora – Ministry of Health
Nick Baker	Chief Medical Officer, Nelson Marlborough Health
	Nominated representative from the National Chief Medical Officer Network
	Chair of South Island Alliance Intensive Care Programme
Steve Kirby	Charge Nurse, Middlemore Hospital
	Chair of New Zealand College of Critical Care Nurses
Sue Walters	Chief Health Professions Officer, Te Whānui Ora – Te Toka Tūāhiki Auckland
	Nominated representative from National Directors of Allied Health, Scientific & Technical Network
Ulrike Beuthe	ICU Consultant, Rotorua Hospital

In addition to the support from the steering group, many internal and external experts contributed to the development of analytical concepts, data collection, modelling and peer review, including:

Gary Jackson	Director of Population Health, Te Whānui Ora – Counties Manukau
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Peter Watson	Interim District Director, Te Whānui Ora – Counties Manukau
Angela Pidd	Manager, National Collections and Reporting, Te Whānui Ora
Tracy Thompson	Senior Analyst, National Collections and Reporting, Te Whānui Ora
Emmanuel Jo	Manager, Analytics and Insights, Te Whānui Ora
Christopher Lane	Senior Advisor, Analytics and Insights, Te Whānui Ora

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The background is a dark blue gradient. The top half features a repeating geometric pattern of concentric diamonds and triangles in a lighter blue color. The bottom half is filled with a dense, chaotic field of thin, light blue lines that appear to be drawn or scribbled, creating a textured effect.

Questions?