Australian Government
Department of Health, Disability and Ageing

Psychiatry Supply and Demand Model - Methodology Paper

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1.0 Introduction

This document provides an overview of the methodology for the demand and supply model for the psychiatry workforce.

This study aims to quantify the demand and supply for psychiatrists between 2024 and 2048 using data collected from several sources between 2014 and 2023. This work builds on previous studies prepared by the Department of Health, Disability and Ageing (the Department) and from other entities, such as Health Workforce Australia.

2.0 Modelling Overview

2.1 Scope

In Australia psychiatrists must be registered with the Australian Health Practitioner Regulation Agency (AHPRA) to practise. All psychiatrists must undergo the Royal Australian & New Zealand College of Psychiatrists (RANZCP) Fellowship Program or International Specialist Pathway for Specialist International Medical Graduates (SIMG) to become accredited to practise Psychiatry. SIMGs are defined as medical practitioners whose initial specialist qualification was from overseas.[1]

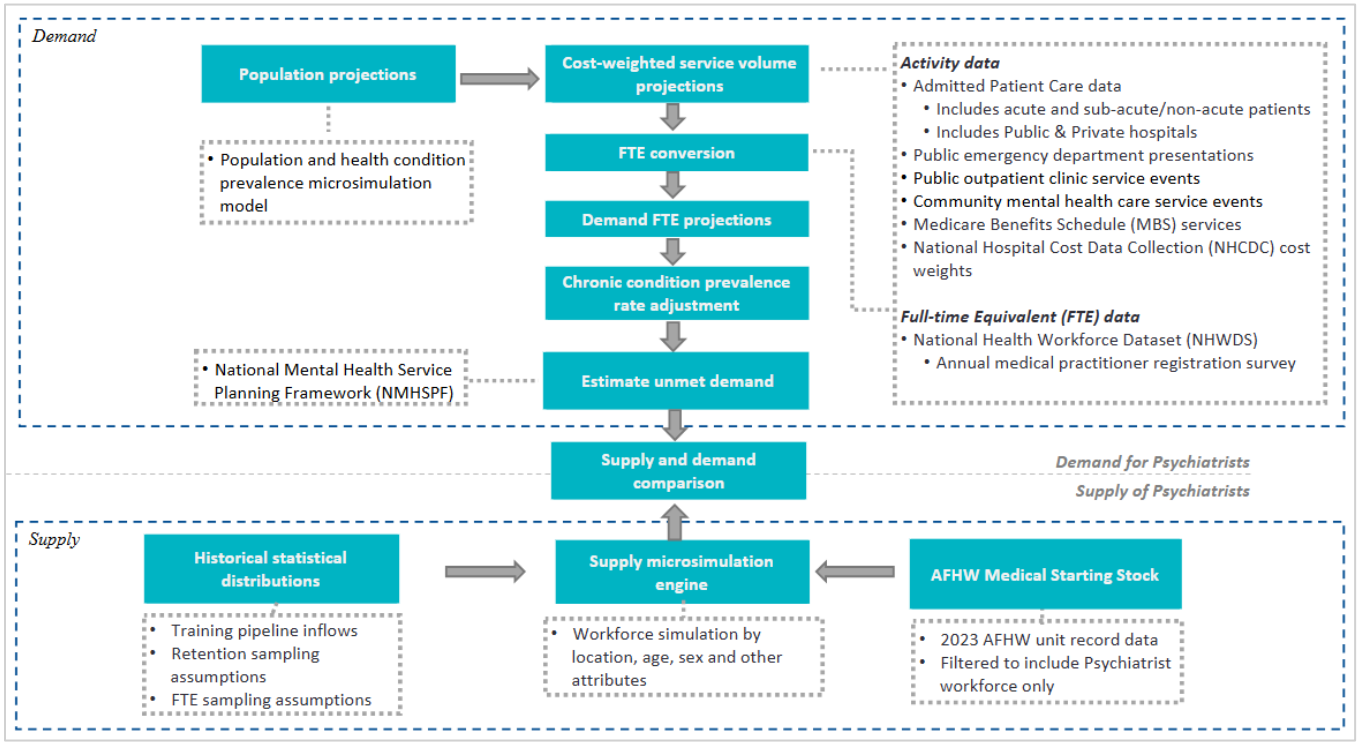
This study focuses on modelling demand for and supply of psychiatrists who are currently working clinical hours and who are not currently trainees. Psychiatry trainees are modelled as part of the training pipeline analysis (see section 4.2.1 New entries) which focuses on modelling trainees to inform inflows into the psychiatry workforce over the projection period.

Modelling has been undertaken at the Statistical Area 4 (SA4) geography where data availability permitted. However, results will be published at State and Territory level, with their aggregation used to produce the national results.

The baseline projections assumes an initial equilibrium between demand and supply in the base year, 2023. Figure 1 provides an overview of the modelling process. The following sections will explain the steps in further detail.

[1] Please note that this definition differs from the standard way International Medical Graduates (IMGs) are typically described in the literature. In most cases, the definition is based on a practitioner's initial medical qualification rather than their specialist qualification.

Figure 1: Overview of the Psychiatry modelling process



2.2 Key data inputs

The key datasets used for the psychiatry demand and supply models are extracted from the following sources:

Informing the demand model

#	Source	Description and use in model
1	Medical Benefits Schedule (MBS) data	Contains data on patients billed through the MBS, including patient demographics such as sex, age, location, service provider location, the specific MBS item and benefit paid. A hospital flag indicator is used to exclude any MBS services delivered in hospitals to avoid overlap with Admitted Patient Care (APC) data.
2	Admitted Patient Care (APC) data	Contains data on episodes of care for admitted patients in all public and private acute and psychiatric hospitals, free standing day hospital facilities, alcohol and drug treatment centres, and hospitals specialising in dental, ophthalmic aids and other specialised acute medical or surgical care.

#	Source	Description and use in model
		The data includes patient demographics such as sex, age, location of residence, service provider location and type of facility (used to derive sector). It also includes detailed data on procedures and diagnoses to best determine the correct Enhanced Service Related Group (ESRG).
3	Non-Admitted Patient Emergency Department Care (NAPEDC) data	Contains data on episodes of care for patients who physically present to emergency departments. The data includes patient demographics such as sex, age, location of residence, service provider location, the length of stay measured in minutes and various classifications relating to the principal diagnosis from which subspecialty can be derived.
4	National Non-Admitted Patient Database (NNAPD)	Contains data on services provided to non-admitted patients in Australian public hospitals, including the types of services provided, service delivery settings and selected patient characteristics. This data collections exclude non-admitted patient services provided during emergency department care and to admitted patients.
5	National Community Mental Health Care Dataset (NCMHCD)	Contains data on care provided by public sector specialised community mental health services in Australia.
6	Population and household projections based off ABS data	Population and household projections developed by the Department based on ABS Series B population projections and the ABS Census household distribution type. Population projections by age group, sex, geography and year.
7	National Weighted Activity Unit (NWAU)	NWAU is used as part of the National Funding Model and is a measure of health service activity expressed as a common unit, against which the National Efficient Price (NEP) is paid. It provides a way of comparing and valuing each public hospital service, including emergency care, subacute care, admitted care and non-admitted care, weighted for clinical complexity.

#	Source	Description and use in model
8	National Hospital Cost Data Collection (NHCDC)	NHCDC Public Sector, collected through the states and territories, is an annual and voluntary collection of public hospital data. The NHCDC is used to develop the national efficient price, which determines the level of funding public hospitals receive annually.

Informing the supply model

#	Source	Description and use in model
1	Australia's Future Health Workforce (AFHW) dataset	The AFHW datasets are created from the National Health Workforce Datasets (NHWDS) for modelling purposes. A sequence of rules (supply criteria) is applied to each NHWDS to determine the which practitioners meet the definition of supply for each profession (and sub-groups where applicable). The headcount and workload of these practitioners, along with other variables required for modelling, are included, derived or imputed in the AFHW datasets. The AFHW dataset contains unit record data on psychiatrists, including demographic variables and information on their career (such as hours worked which is converted to Full-Time Equivalent).
2	Yearly snapshot of trainees in the RANZCP Fellowship Program and substantial/partial comparability pathways (provided by the RANZCP)	Contains unit record data on psychiatry trainees, including SIMG indicator, training status, training stage, training type, state, extract date, sex, program, date of birth, etc.

3.0 Psychiatry Demand

Demand is measured in terms of observed utilisation of medical services which captures expressed (observed) service demand for psychiatric services across a variety of care settings. Historical patterns of usage are examined and used to estimate the future demand for psychiatrists, accounting for differences in service demand across various age groups and

geographies. Estimation of future demand for psychiatric services also considers the Australian Bureau of Statistics (ABS) Population Projections.

The model, known as the Medical Specialist Health Workforce Prediction of Demand (MeSHWPoD) is used by the Department to provide demand projections for Specialist workforce. For further details on MeSHWPoD methodology with worked examples, please refer to **Attachment A**.

3.1 Unmet demand

Unmet demand for psychiatric services occurs when there are not enough psychiatric services to meet the needs of people who require them. This study uses the National Mental Health Service Planning Framework (NMHSPF) to estimate the level of unmet demand.[2]

The NMHSPF provides estimates of prevalence of mental health conditions by severity (mild, moderate or severe) and age-group, which are then used to define smaller populations – referred to as “need groups”.

For each need group, a care profile is assigned where the number of mental health services the group will need is estimated, including:

- the proportion of individuals within the needs group requiring a specific service
- number of services needed
- the length of time each service takes (in minutes or days)
- the workforce type delivering the service (e.g. individual psychiatrist or team/bed-based care).

This information together with the formulas outlined in the Technical Appendices for the NMHSPF is used to estimate unmet demand.[3]

3.2 How services for psychiatrists are defined

Defining services within the scope of practice for psychiatrists is done using dataset-specific methods.

3.2.1 MBS data and Derived Major Specialty

A provider may have more than one registered specialty with Medicare. The Derived Major Specialty (DMS) classification provides a single specialty, derived to represent the major/highest qualification and/or major activity of a provider during the observed period according to key service groups. Psychiatry services from MBS data can be derived using the DMS group(s) for psychiatrists.

[2] Australian Institute of Health and Welfare, 2025, NMHSPF model - National Mental Health Service Planning Framework, accessed 16 October 2024.
[3] National Mental Health Service Planning Framework, 2023, Technical Appendices for the NMHSPF, accessed 18 October 2024.

More specifically, DMS codes have 3 progressive levels. The first level is determined solely by the provider's highest registered specialty. The second and third levels are determined by the provider's qualifications and major services provided.

Providers who are classed as DMS level 2: Specialist-Psychiatrist DMS, are identified as in-scope for the psychiatry demand model.

3.2.2 APC data

Every separation contained in the APC data has a Diagnostic Related Group (DRG) and Australian-Refined Diagnostic Related Group (ADRG) attached to group patients with similar diagnoses and/or interventions, reflecting similar resource use.

- These two classifications can be mapped to Enhanced Service Related Groups (ESRGs), which group patients by specific diagnoses and/or procedures, derived from the specialty of the attending medical officer.
- Episodes of care with psychiatry-related ESRGs are then counted as in-scope services for psychiatrist demand (see Table 1).

Table 1: In-scope ADRG/ESRG codes for Psychiatry APC data, 2015-2022

ADRG code	ADRG Description	ESRG Code
U60	Mental Health Treatment without ECT, Same-day	823
U63	Major Affective Disorders	826
U67	Personality Disorders and Acute Reactions	837
U61	Schizophrenia Disorders	825
U40	Mental Health Treatment with ECT, Same-day	824
U64	Other Affective and Somatoform Disorders	826
U65	Anxiety Disorders	828
U62	Paranoia and Acute Psychotic Disorders	829
U66	Eating and Obsessive-Compulsive Disorders	832
U68	Neurodevelopmental Disorders and Symbolic Dysfunctions	829

3.2.3 NAPEDC data

To determine psychiatric episodes within the NAPEDC data, principal diagnosis codes (based on ICD-10 codes) are mapped to Emergency Department Diagnosis Groups (ECDG).

Table 2: In-scope ECDG codes for Psychiatry NAPEDC data, 2022

ECDG code	ECDG Description
E1990	Mental, behavioural and neurodevelopment disorders, other
E1910	Alcohol and drug related mental and behavioural disorders
E1920	Psychoses
E6020	Abuse and neglect

3.2.4 NNAPD data

To determine outpatient psychiatric services within the NNAPD data, the Tier 2 Non-Admitted Services Classification (Tier 2) is used. Tier 2 categorises a hospital's non-admitted services into classes which are generally based on the nature of the service provided and the type of clinician providing the service. NNAPD services classified at '20.45 Psychiatry', '20.03 Pain Management' and '20.04 Developmental Disabilities' are considered in-scope due to psychiatrists being listed as a usual provider of services in the Tier 2 classification definitions manual.

3.2.5 NCMHCD data

Community mental health service contacts are published by patient age group, sex and state/territory. The NCMHC data does not uniquely identify patient's or the type of service provided. It is assumed that demand for community psychiatry services is in line with the overall service contact volume trends. The rate of community mental health care services per population is used within the model by patient age group, sex and state/territory.

3.3 Definition of Demand Activity

Psychiatric separations and services from each data source are grouped into 5 categories:

1. MBS billings
2. Public Hospital (Admitted)
3. Private Hospital (Admitted)
4. Public Hospital Non-admitted (Emergency Department and NNAPD)
5. Community Mental Health

The number of services or separations alone is not a sufficient metric for comparison, as different services or separations require varying levels of resources, particularly in terms of workforce effort. That is, it does not consider the severity of conditions, complexity of procedures, or degree of medical input required.

To address this, services and separations are converted into a more universal metric known as units of demand activity. This metric is weighted to better represent the relative effort required by specialists for each service or separation and allows for a more accurate comparison of resource use within each category.

3.3.1 Weighting methodology

MBS billings

The weighting factor is calculated as the benefits paid for in-scope services (Year x Provider location x Patient Sex x Patient Age x Patient location) divided by the reference cost which is the average benefit paid for in-scope services for a given specialty (i.e. DMS) and year. The number of services is then multiplied by this weighting factor to get the weighted demand activity.

Public and Private Hospital (Admitted) separations

Public and private hospital separations within the APC dataset are weighted through the application of NWAU cost weights, which reflect the relative cost or resource intensity associated with different types of care. These cost weights are linked to separations based on DRG classifications.

Public Hospital Non-admitted (NAPEDC and NNAPD)

Emergency Department (ED) episodes are also weighted using NWAU cost-weights. However, they are linked to patient records based on ED-specific classification codes – Urgency Related Group (URG) for years up to 2020, Urgency Disposition Groups (UDG) for 2021 and Australian Emergency Care Classification (AECC) for years beyond 2021. The cost weights are used to calculate a weighted length of stay.

The NNAPD services are weighted using NWAU cost-weights published by Tier 2 classification. The NNAPD services are combined with NAPEDC episodes by applying an adjustment factor to NNAPD services to improve comparability. The adjustment factor is calculated based on the relative ratio of cost-weighted NNAPD service volumes to cost-weighted NAPEDC episode volumes.

Community Mental Health

The NCMHCD provides service rates per population, so no weighting is applied to this data.

3.4 Projection of Demand Activity

The process of projecting the count of services over the forecast period consists of the following key steps:

1. Calculate and project service utilisation using a generalised linear regression model (GLM). The covariates in the GLM model include year, patient age group, patient sex, and patient/provider location. Population projections are used for estimation of the population at risk.
2. Demand activity projections are then converted to Full-Time Equivalent (FTE) by comparing the demand values against the supply FTE from AFHW dataset for a specified reference base year. Specifically, the base year supply FTE is divided by the base year demand activity to yield an FTE-to-activity ratio, which is then multiplied by the demand projections for each forecast year. This forms the baseline projection.
3. To incorporate mental health prevalence rate to the model, the projected FTE is multiplied with the projected change in mental health prevalence rate.

3.5 Assumptions

#	Caveat/Limitation	Description and implications
1	COVID-19 impact	The effects of COVID-19 are not explicitly accounted for but are captured implicitly through two ways: 1) the most recent hospital and MBS data, available till 2022, will reflect changes in demand due to COVID-19, which will subsequently affect predictions for future years, and 2) the provision of COVID-19 telehealth and telephone MBS item codes. The model may not fully reflect the long-term changes in demand patterns caused by the pandemic.
2	Specialty derivation from APC data	Specialty for APC data is derived from the ESRG as per the mapping table, assuming it matches the main attending medical officer's specialty. However, 1) more than one attending medical officer may be involved in an episode of care, 2) other specialists may also contribute to a patient's care, e.g. through consultation, especially for palliative physicians, geriatricians, anaesthetists and radiologists, 3) registrars/advanced trainees and other junior medical officers may also be involved. The measure of demand activity may underestimate the true value of demand for a given episode of care. (However, these discrepancies will likely have little impact when demand activity is converted to FTE).
3	Activity for patients in each ESRG	The time spent by a clinician caring for a patient is assumed to be similar to other patients within the same ESRG, regardless of the patient's condition. The time spent by a clinician, and thus the true level of demand, may vary between patients within the same ESRG.

4.0 Psychiatry Supply

The psychiatry supply model uses the AFHW data on psychiatrists from 2018 to 2023.

The supply model uses the microsimulation approach where attributes such as entries and exits to the workforce and practitioner FTE are modelled distinctly. The supply methodology begins by identifying the current stock of psychiatrists, analysing their demographic profile and historically observed work patterns. Statistically significant predictors of future psychiatry workforce supply are selected, and their historical distributions are measured to allow the development of a microsimulation model.

Overall, the microsimulation works at a yearly time-step; each year progressing psychiatrists throughout their career, adding new fellows, removing psychiatrists who have gone on temporary or permanent leave, and transitioning psychiatrists between geographies. The following sections describe how each of the component is defined and modelled in the supply model.

4.1 Historic and starting stock

The AFHW data is a unit record longitudinal dataset, where each respondent is assigned a unique identifier that can be linked across multiple years. To be in scope, psychiatrists must be:

1. registered as a medical practitioner and have psychiatry as one of their 6 specialties registered with AHPRA
2. working in medicine in Australia including those on extended leave, and
3. working clinical hours, and indicate psychiatry as a specialty they worked the most or second most hours in.

4.1.1 Total Hours (Full-Time Equivalent)

Psychiatrist total specialist hours (clinical and non-clinical) are used in modelling supply. If a psychiatrist is employed but on extended leave (defined as a period of over 3 months), their hours are halved for simplicity, assuming they worked an average of 6 months during the year.

One Full-Time Equivalent (FTE) is defined as 40 self-reported weekly average hours in the AFHW dataset (across 46 weeks in the year).

4.2 Measuring entries, exits and transitions

The AFHW dataset enables tracking of individuals as they age, relocate, progress in their careers and transition in and out of the workforce. Historical data relating to entries, exits and transitions is used to determine future trends based on the analysis of historical demographic probabilities and distributions.

The demographic probabilities and distributions are sampled to understand the effects of age, sex, state of primary workplace and place of specialist qualification on workforce patterns over time.

4.2.1 New entries

New entries into the psychiatry workforce include individuals entering through both the domestic RANZCP Fellowship Program and the RANZCP international pathways.

New entries are modelled through a training pipeline module that considers assumptions about inflows to the Fellowship Program and international pathways and estimates the number of new fellows each year based on transition probabilities between stages in the training program. The number of new fellows is then converted into the number of new psychiatrists that meet the criteria in section 4.1. This is done by estimating transition rates from the AFHW dataset which gives the number of new psychiatrists as an inflow to the supply microsimulation model.

The main data source informing this modelling is the trainee and new fellow data provided by the RANZCP that covers reporting periods 2019 to 2023.

Inflows to RANZCP Domestic Fellowship Program and international pathways

A medical practitioner joining the RANZCP Fellowship Program is classified as a trainee in the domestic program, whereas those joining the partially/substantially comparable pathways are classified as trainees in the Specialist International Medical Graduate (SIMG) program.

It is assumed that the number of new entries to the domestic and SIMG training pathways stay constant over the projection period. An average of the last 5 years of new entries is used for new domestic trainees, whereas an average of the last 3 years of new entries is used for international trainees.[4]

The rate of transition between each stage of the training program (and to becoming a new fellow) remain constant using the average transition rates observed between 2022 and 2023.

4.2.2 Exits and re-entries

Exits from the psychiatrist workforce are derived from historical AFHW data by longitudinally tracking individual psychiatrist's participation in the workforce. Psychiatrists who are identified in the AFHW data in a given year and not in the following year are classified as an exit. Exits are modelled by age, sex, place of initial specialist qualification and state of primary workplace as covariates.

These one-period exits are further classified as temporary or permanent exits:

- **Permanent exits**: someone who worked as a psychiatrist for at least one reporting period and subsequently left the workforce and did not return within a 4-year period.
- **Temporary exits**: someone who worked as a psychiatrist for at least one reporting period and subsequently left the workforce and then returned to the psychiatrist workforce within a 4-year period.[5]

Having left the workforce in a given year, psychiatrists are then sampled to return in line with historical probabilities within a 4-year period.

Retention/Re-entries are estimated using the rate at which psychiatrists that leave the workforce, re-enter in subsequent years. Covariates included in modelling re-entry probabilities are age, sex, place of initial specialist qualification and state of primary workplace.

4.2.3 Interstate transitions

Interstate movement of psychiatrists is estimated based on the probability of psychiatrists changing their primary place of work from one state to another. Covariates used to determine

[4] This assumption uses all data available, with an exception for international trainees where COVID-19 affected new trainees numbers in 2020.
[5] The 4-year period is used due to recency of practice considerations beyond that period. This is used for both historical and future exits.

transition rates and destinations are a psychiatrist's initial state, sex and place of initial specialist qualification.

4.2.4 Estimating full-time equivalent (FTE) of entries, re-entries and transitions

The number of FTE each psychiatrist produces is a central component of the model. FTE is a complex measure which can vary significantly between individuals and between years. One FTE is defined as 40 self-reported weekly average hours worked.

To account for the variations in FTE by various demographics of psychiatrists, the simulated psychiatrist workforce FTE distribution is estimated by age, sex, place of initial specialist qualification and state of primary workplace.

1. A psychiatrist's FTE may change from year to year. To account for this, we re-sample an existing psychiatrist's FTE annually to align with their demographic attributes. Additionally, their FTE is adjusted by a time-dependent modifier based on changes to the average FTE observed over the past 5 years.
2. Additional FTE adjustments, in the form of a series of multipliers, then get applied to a psychiatrist's FTE, following one of the workforce status changes below:
    - a workforce exit or entry, or
    - a change in state of workplace.

Note that these adjustments are applied after any new FTE re-sampling has been applied. This is because the adjustments effectively adjust for breaks in regular employment.

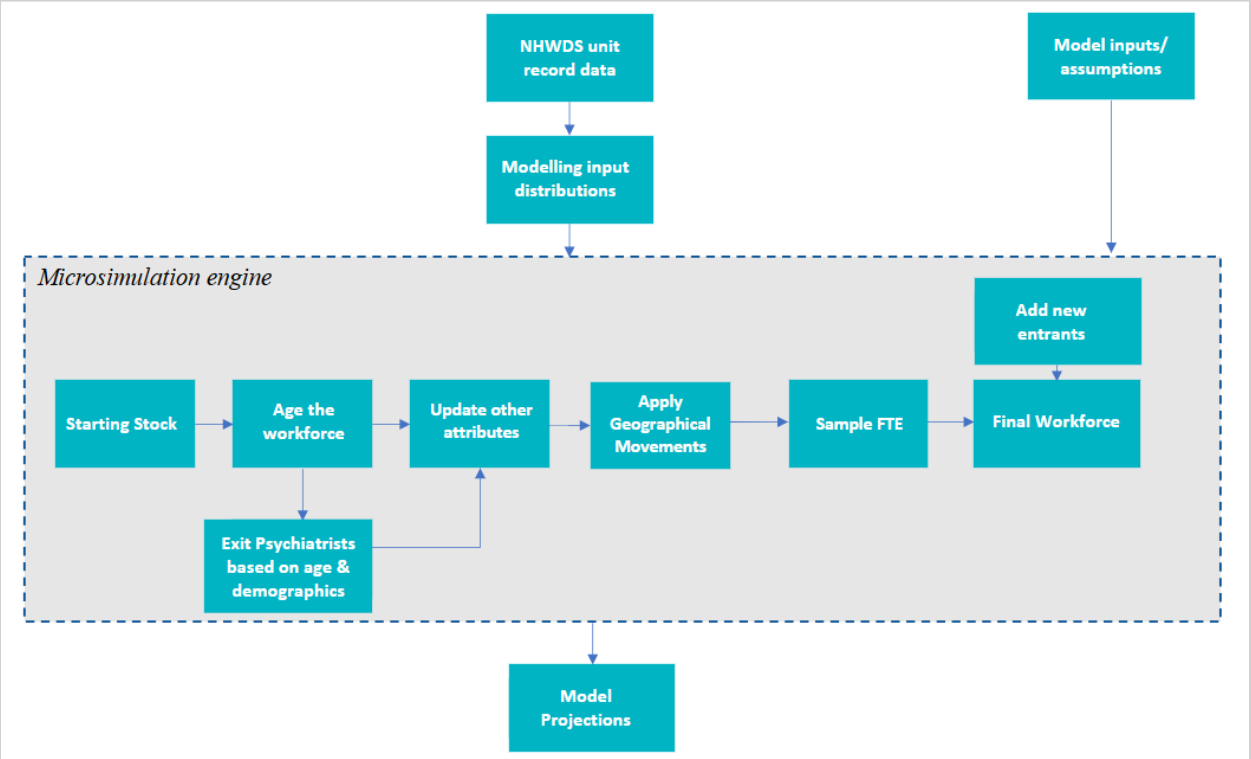
4.3 Modelling

4.3.1 Supply microsimulation

A microsimulation process is used to project supply for psychiatrists. An overview of this process is shown in Figure 2. The supply model uses the following attributes:

1. full-time equivalent (FTE) based on 40 hours per week
2. sex
3. age
4. specialty graduation country (domestic RANZCP Fellowship Program versus international pathways)
5. primary work location (state, SA4).

Figure 2: The supply microsimulation process



In each iteration of the microsimulation:

1. The workforce is aged, and some psychiatrists exit the workforce based on their age, sex, specialty graduation country and state of primary workplace.
    a) Exits are sampled to determine if the exit is permanent or temporary.
    b) Psychiatrists that temporarily exit will re-enter the workforce during a subsequent period of up to 4 years, in accordance with the historical distribution of re-entries following up to 4 periods of absence.
2. Geographical movements are applied to psychiatrists based on historic state migration patterns broken down by sex, specialty graduation country and state of primary workplace.
3. FTE is updated based on smoothed historical FTE year-on-year changes by age, unless a psychiatrist:
    a. geographically transitions to a different state or
    b. returns from a temporary exit.
4. Psychiatrists that are flagged for re-entry are brought back into the workforce based on a re-entry probability given their age, sex, specialty graduation country and state of

primary workplace. Re-entering psychiatrists have their FTE sampled from a distribution trained on historical AFHW data.

5. New psychiatrists are added to the workforce either as:
    a. new fellows that completed the RANZCP Fellowship Program or
    b. new fellows that completed one of the RANZCP partially/substantially comparable pathways.
6. The modelling process iterates annually, where the number of psychiatrists in the following year is calculated as the number of psychiatrists in the current year, minus the number of psychiatrists exiting and transitioning-out, plus those entering the workforce and transitioning-in in the new year. In other words:

$$\text{Supply}_{(t+1)} = \text{Supply}_{(t)} - \text{Exits}_{(t+1)} + \text{Entries}_{(t+1)} + \text{Net transitions while staying employed}_{(t+1)}$$

4.4 Assumptions

#	Caveat/Limitation	Description and implications
1	Static sampling assumptions	The microsimulation module applies static sampling distributions based on historical data from 2018 to 2022 to simulate projected behaviour.
2	COVID-19 impact	The effects of COVID-19 on affected years (2020-2021) are unclear and will be confirmed with further analysis of updated data. It is likely that there are trainees who were unable to progress due to the pandemic. If this is the case, some stage transition displacement affects the years following this period as well.
3	Technological change	Technological improvements in the projection period that may affect workforce FTE in providing primary care is not considered.

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All information in this publication is correct as at 19 June 2025.