



**Australian Government**

**Department of Health  
and Aged Care**

# Nursing Supply & Demand Model

Methodology Paper



# Contents

<b>Contents</b>	<b>2</b>
<b>Introduction</b>	<b>3</b>
<b>Modelling Overview</b>	<b>3</b>
Registration types of nurses	3
Modelling is undertaken by sector	3
Modelling is informed by the LiTE model	4
Data inputs and linkages	4
<b>Supply and demand methodology overview</b>	<b>5</b>
Supply of nurses	5
Demand for nurses	6
<b>Detailed Supply methodology and inputs</b>	<b>7</b>
Understanding the historical nursing workforce demographics	7
Inputs	7
Quantifying the starting stock of nurses	7
Measuring entries, exits and transitions	7
Simulating ongoing flows of nurses	9
Inputs	9
Microsimulation mechanics of the supply model	9
Assumptions	11
<b>Detailed Demand methodology and inputs</b>	<b>11</b>
Population microsimulation	12
General methodology for nursing demand	12
Data for demand modelling by sector	13
Nursing Demand Constraints	15
Assumptions	16
<b>Limitations of this study</b>	<b>17</b>
Overall limitations	17
Limitations of the supply model	17
Limitations of the demand model	17
<b>Glossary</b>	<b>18</b>

# Introduction

This document provides the detailed methodology for the Supply and Demand Model for the Australian Nursing Workforce. The Model has been designed to forecast the supply and demand for nurses in Australia over the next 12 years. The model has been designed to allow the simulation of complex policy scenarios to analyse nursing workforce implications by sector, nurse type and geography.

## Modelling Overview

The study aims to quantify the supply and demand for nurses between 2023 and 2035 using data collected from several sources between 2014 and 2022. This work builds upon previous studies prepared by the department and from other entities, such as Health Workforce Australia.

### Registration types of nurses

There are two registration types of nurses in Australia, Registered Nurses and Enrolled Nurses (RN & EN). This project models the supply of RNs and ENs separately, however due to data limitations, the demand for RNs and ENs is modelled together and then split based on adjustments to account for different historical growth rates.

Registered Nurses can also obtain an endorsement as a Nurse Practitioner (NP). This project also models supply and demand for NPs.

Midwives are not included in this study as this is a separate profession, however, nurses who are also registered as midwives are included for the hours for which they indicated that they worked as a nurse.

### Modelling is undertaken by sector

Nurses work in many job settings. For the purposes of this study, these settings are grouped into five broad sectors:

- 1. Aged care** nurses provide care to older Australians in areas such as community settings, in-home settings, and residential aged care facilities as well as hospitals.
- 2. Acute care** nurses provide care to people with acute conditions such as infections, metabolic disorders and degenerative conditions who need medical intervention as well as looking after patients with injuries and illness that need surgical intervention. They provide nursing care predominantly in hospitals.
- 3. Primary health care** nurses work in a variety of roles providing healthcare for entry level services to the health system. This includes health promotion and education, and treatment and prevention of illness. They also work in a range of non-hospital settings, including primary care practices including general practice, community health services, aboriginal health services, and drug and alcohol services.
- 4. Mental health** nurses provide care to people with mental ill health and disorders. They offer a range of interventions aimed at promoting the individual's wellbeing, aiding them in recovery, and enhancing their capacity to participate in community life. They work in hospitals, community and residential health services, aged care facilities and correctional services.

- 5. Other sectors** include all other nurses such as those working in education, government departments and professional associations. It does not include those that work in Aged Care, Acute Care, Primary Health Care, or Mental Health.

These sectors represent different healthcare services and modelling them separately will provide insight on which parts of the health system may experience imbalances in comparison to others.

### Modelling is informed by the LiTE model

The department maintains a microsimulation model that creates projections of the characteristics of the Australian population and labour market through to 2050. This model, the Lifetime Transition and Estimation (LiTE) model is used by the department to estimate the prevalence of chronic conditions, frailty, and support needs, as well as the size and composition of the Australian population.

The population projections produced by the LiTE model underpin the demand estimates in the Nursing model. Utilising the LiTE model as the source of population projections ensures consistency between health and aged care workforce projections across the department.

### Data inputs and linkages

The data used for the supply and demand models are extracted from a variety of data sources, which can be categorised as:

1. Primary data sources – used directly in the modelling of key parameters affecting nursing supply or demand.
2. Secondary data sources – used in the construction of the synthetic population and population projections underpinning estimates of demand.

#### Primary data sources

#	Source	Description and use in model
1	MBS data <i>Department of Health and Aged Care</i>	MBS claims data are extracted relating to the provision of services by Nurse Practitioners in the Primary Care setting.
2	NHWDS data <i>Australian health practitioner regulation agency (AHPRA)</i>	The National Health Workforce dataset is used to provide unit record nursing data including age, sex, nurse type, primary SA4, average weekly hours worked, and registration start date.
3	GEN aged care data <i>Australian Institute of Health and Welfare (AIHW)</i>	AIHW GEN Aged Care dataset is used to derive service volumes of people receiving aged care, separated into Residential Aged Care (RAC), Home Care Package (HCP) and Commonwealth Home Support Programme (CHSP).
4	NAPEDC data <i>AIHW</i>	Non-admitted Patient Emergency Department Care datasets are used to extract historical episode-level data for presentations to emergency departments, in the outpatient setting.
5	APC data <i>AIHW</i>	Admitted Patient Care data are used to extract historical service/separation volumes for patients admitted for treatment and/or care in the hospital setting.
6	LiTE model population projections <i>Department of Health and Aged Care</i>	Population projections by age, gender, and geography.

## Secondary data sources

#	Source	Description and use in model
1	Population projections <i>Department of the Treasury (Centre for Population)</i>	Updated population projections between ABS releases.
2	HILDA survey <i>The Melbourne Institute</i>	Household Income and Labour Dynamics in Australia (HILDA) used to model household and employment transitions.
3	ABS data	National Health Survey (NHS) data are used to model health condition prevalence in the population.  Survey of Disability and Ageing and Carers (SDAC) data is used to provide a view of frailty and support needs for individuals.  Population and household projections developed by the Department based on ABS Series B population projections and the ABS Census distributions of household type.

# Supply and demand methodology overview

The supply model follows a “bottom-up” simulation approach where entries and exits to the nursing workforce are distinctly modelled in detail and projected separately. The demand model follows a “top-down” approach where the ratio of nurse to service volumes in each sector, and the ratio of services to the population are used to forecast the expected demand for nurses.

## Supply of nurses

A microsimulation approach is used to estimate the number of employed nurses. Inflows and outflows are simulated in accordance with a set of predefined modelling parameters and historically sampled data. The model incorporates user adjustable parameters to enable users of the model to run complex workforce scenarios.

Historical data for the supply model is drawn from several sources collected between 2014 and 2022. This data is used to model new nurse attributes, workforce transitions (nurse type or sector), workforce retention, geographical transitions and allocations.

The observed workforce as of 2022 is used as the starting stock in the microsimulation. In each iteration of the microsimulation, nurses are modelled in accordance with observed statistical distributions to:

1. Age and exit the workforce, either permanently or temporarily for a number of years.
2. Transition between nurse type. i.e., EN to RN or RN to NP.
3. Transition between sectors i.e. Aged Care to Acute Care.
4. Transition between different regions in Australia (SA4 region transitions)
5. Estimate the Full Time Equivalent (FTE) workload in-line with the nurses’ individual attributes.
6. Introduce new nurses to the nursing workforce in line with expected inflow volumes.

## Demand for nurses

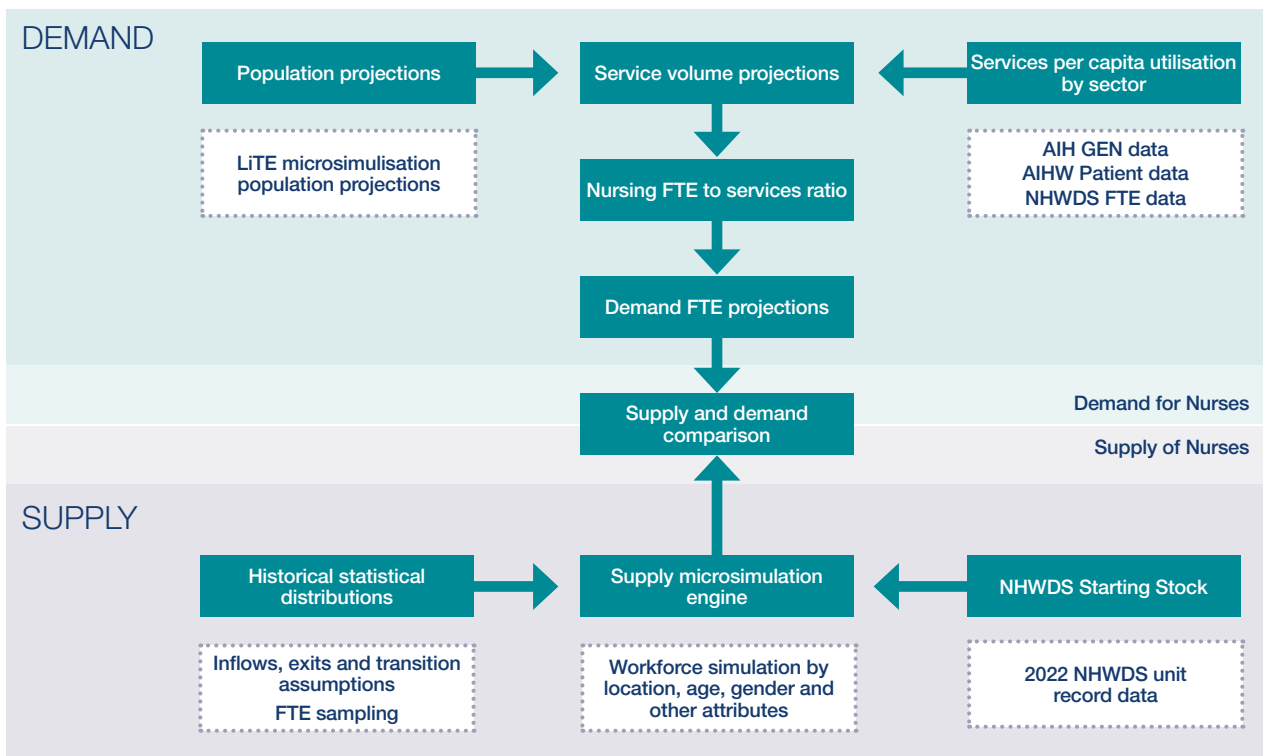
The future demand for nurses is estimated using state level LiTE population projections. LiTE simulates people and household changes to provide a complete picture of the population composition in each year up to 2032.

Service utilisation forecasts apply historical service per capita ratios in 2022 to the projected population to estimate the likely demand for nursing services in the projection period. The demand for individual nurses is estimated by converting the projected services volumes to FTE using the nurse FTE to service ratios.

The top-down modelling process for projecting the demand for nurses is as follows:

1. The demand model uses population projections from the LiTE model:
  - a. A synthetic population is constructed as an input for the LiTE microsimulation to produce the population projections. This process involves calibration with demographic data published by the ABS and high-level population projections from the Treasury.
2. Data including AIHW patient information is used to calculate nursing services to population ratios. The services to population ratio are also increased based on their respective historical growth rate. NHWDS is used to calculate nursing FTE to services ratios under the assumption that formal demand equals supply in the starting year.

The diagram below shows the key data flows in the supply and demand models:



# Detailed Supply methodology and inputs

## Understanding the historical nursing workforce demographics

The nursing supply model methodology begins by identifying the current stock of nurses and analysing their demographic profile and historically observed work patterns. Statistically significant predictors of future nursing supply are selected, and their historical distributions are measured to allow the development of a microsimulation model.

### Inputs

#	Source	Description and use in model
1	NHWDS data	This provides unit records of nurses including their age, sex, nurse type, primary SA4, average weekly hours worked as a nurse and registration start date.
2	NRMW 2022 Concordance File	Allocates individual nurses a workforce sector given their reported job area, job role and job setting.  This concordance file is maintained by the Health Workforce Division and is used consistently in NHWDS publications.

### Quantifying the starting stock of nurses

The NHWDS is unit record longitudinal data, where each respondent is assigned a unique *token number* that can be linked across multiple years.

Nurses complete an annual survey at the time of their annual renewal of registration leading to a high response rate, even for individuals that are not actively working as a nurse during the year.

The supply methodology models the number of employed nurses in Australia. For this project employed nurses are defined as those who are registered and employed in Australia, and not on extended leave of 3 months or longer. Individuals who hold a nursing qualification but are not working as a nurse or nurses working overseas are excluded as they do not provide healthcare services.

Nurses are assigned to a sector based on the respondents' reported Job Role, Job Area and Job Setting in the NHWDS data. The five sectors include Aged Care, Acute Care, Mental Health, Primary health care and Other. The set of rules used to classify nurses into these five sectors is contained in the NMRW concordance file maintained by the department. This concordance file is updated each year to ensure the classification is accurate and in-line with the possible responses in the NHWDS.

### Measuring entries, exits and transitions

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

The demographic probabilities and distributions are sampled to understand the effects age, gender, place of initial qualification, nurse type and nursing sector have on nurse workforce patterns. Nurses place of initial qualification is reported as either Domestic or Overseas trained graduates.

### **New entries**

New entries are identified in the NHWDS data as a nurse working for one reporting period based on their registration date.

The distribution of new nurses by demographic characteristic is modelled for:

- Place of initial qualification over the sampling period.
- Gender distribution by place of initial qualification.
- Nurse Type by place of initial qualification and gender.
- Age distribution by place of initial qualification, nurse type and gender.
- Nursing sector by place of initial qualification, gender, nurse type and age.
- Geospatial allocation by place of initial qualification, nurse type and sector.

### **Exits and re-entries**

Exits from the nursing workforce are derived from historical NHWDS data – tracking individual nurses' participation in the workforce based on their unique token number. Nurses identified in the NHWDS one year and not in the following year are classified as an exit. Exits are modelled by age, gender, place of initial qualification, nurse type and sector as covariates.

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

- Permanent exit – worked as a nurse for at least one reporting period and subsequently left the nursing workforce. Did not return to the nursing workforce within a 4-year period.
- Temporary exits – worked as a nurse for at least one reporting period and subsequently left the nursing workforce. Returned to the nursing workforce within a 4-year period.

Re-entries are the rate at which nurses that leave the workforce re-enter in subsequent years. Covariates included in modelling re-entry probabilities are nurse type, gender and age.

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

### **Sector transitions**

Transitions between the five nursing sectors are modelled as the probability of a nurse changing their primary place of work from one sector to another. Covariates used to determine sector transition rates are nurses' sector, age and nurse type.

### **Nurse type transitions**

This component determines the share of nurses that will transition to a new registration type throughout their nursing career. It includes Enrolled to Registered Nurse registrations and Registered Nurse to Nurse Practitioner registrations. Covariates used in calculating transition rates include sector, gender, place of initial qualification and age.



## Geospatial transitions

Regional movement of nurses is calculated based on the probability of nurses changing their primary place of work from one SA4 to another. Covariates used to determine transitioning rates and destinations are nurses initial SA4, age, nurse type and sector.

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

Full Time Equivalent (FTE) is derived from the NHWDS data. One Full-Time Equivalent (FTE) is defined as 38 self-reported weekly average hours worked.

The simulated nursing workforce headcount is converted to FTE by sampling from the historical distribution of these nurses sharing the same demographic attributes. The distribution is estimated by age, gender, place of initial qualification and nurse type.

Spatial effects are applied to these demographic based FTE estimates to represent that a nurse's workload may vary based on their primary work location.

## FTE – adjusting for ageing

FTE adjustments are made based on the ages of nurses to account for differences in working patterns from ageing. The multiplier is derived from the year-on-year changes in average FTE over time.

## Simulating ongoing flows of nurses

The workforce simulation module provides the main microsimulation engine that calculates nursing supply over the projection period. The nursing workforce is simulated using a combination of historically observed statistical distributions, policy setting assumptions and training inflow assumptions.

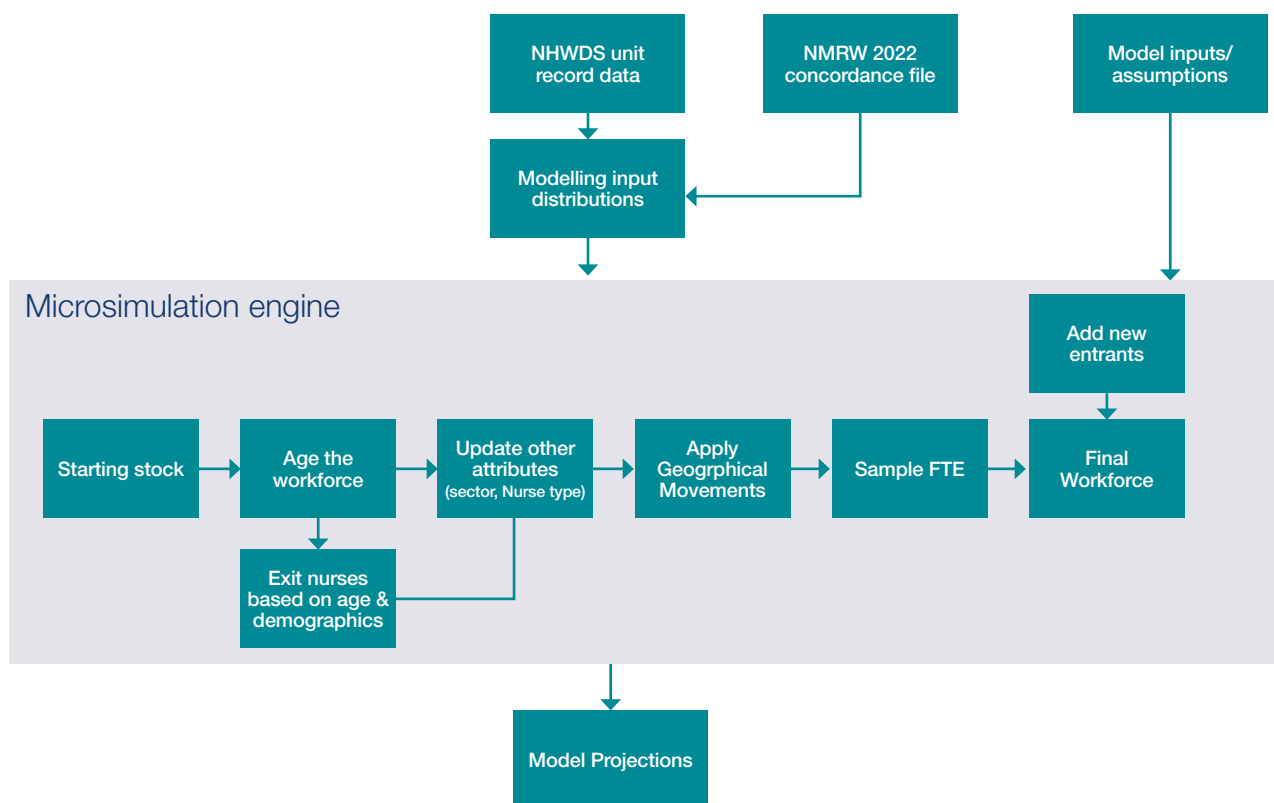
## Inputs

#	Source	Description and use in model
1	Sampling Data frames	This provides sampling distributions for the generation of simulated nurses and the simulation of existing nurse behaviour from the starting stock into the projection period.
2	Baseline Assumptions File	Contains a set of baseline assumptions used in the microsimulation including inflow volumes – calculated based on observed new nurse inflows in the NHWDS data.

## Microsimulation mechanics of the supply model

The stock of employed nurses in 2022 is used as the starting stock for the microsimulation module. The annual simulation is applied to both the starting stock and any new entrants to the nursing workforce. The microsimulation is illustrated below.

## Microsimulation diagram



## Microsimulation process

Nurses are sampled in accordance with historical distributions. In each iteration of the microsimulation:

1. The workforce is aged, and some nurses exit the workforce based on their age, gender, place of basic qualification, sector and nurse type.
  1. Exits are sampled to determine if the exit is permanent or temporary.
  2. Nurses 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. Attributes such as nurse type and sector are updated.
3. Geographical movements are applied to nurses based on historic SA4 migration patterns broken down by age and sector.
4. FTE is updated based on smoothed historical FTE year-on-year changes by age, unless a nurse:
  1. Geographically Transitions to a different SA4.
  2. Transitions Nurse Type, i.e., EN to RN transitions / RN to NP transitions.
  3. Transitions Sector, i.e., Aged Care to Acute Care transitions
5. Nurses flagged for re-entry are brought back into the workforce based on a re-entry probability given their nurse type, age and gender. The nurses FTE is sampled for and becomes non-zero once they re-enter.
6. New nurses are added to workforce either as:
  1. A domestic graduate
  2. A migrant joining the workforce from overseas.

The modelling process iterates annually, where the number of employed persons in each group in the following year is calculated as the number of employed persons in the current year, minus the number of people exiting and transitioning-out, plus those entering the workforce and transitioning-in in the new year. In other words:

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

## Assumptions

#	Assumption	Detail	Implication
1	Static Sampling assumptions	The microsimulation module applies static sampling distributions based on historical data from 2014 to 2022 to simulate projected behaviour.	<ul style="list-style-type: none"> <li>New nurse assumptions are not modelled to change in the projection period.</li> <li>Some workforce behaviours can be dynamically adjusted through scenario analysis.</li> </ul>
2	Inflow Growth Rate Assumptions	The number of new nurses entering the workforce during the projection period is applied a growth rate in accordance with average year on year inflows throughout the sampling period.	<ul style="list-style-type: none"> <li>Inflow assumptions are not static but increasing in accordance to historically observed data.</li> </ul>
3	Fair Work Commission (FWC) 15% minimum wage increase for Aged Care Workers	The baseline supply model has accounted for the 15% wage rise to Aged Care workers by adjusting retention rates, the distribution of new nurses across sectors and the flow of nurses between sectors. This was done in accordance with the method undertaken by the Supply and Demand study undertaken under the National Health Reform Agreement.	<ul style="list-style-type: none"> <li>Historical distributions have been adjusted to reflect the impact of an increase in the relative wage of Aged Care nurses to that of nurses working in other sectors.</li> <li>Overall graduates and internationally qualified new nurses entering the Australian workforce are assumed to remain unchanged.</li> </ul>

## Detailed Demand methodology and inputs

The demand methodology combines the results of the LiTE population microsimulation, the nursing fulltime equivalent information from the NHWDS, and the demand for nursing related services from various data sources to calculate the number of services in each sector during the observation period.

Demand projections use the utilisation method which measures demand based on observed service utilisation volumes per individual. In addition to historical utilisation, the impacts of the mandatory care minute responsibility for residential aged care and the 24/7 registered nurse responsibility have been included in the baseline. This method makes no assumptions about any potential unmet demand.

## Population microsimulation

The nursing FTE demand projection is built upon the LiTE population microsimulation that projects the size and demographic composition of the Australian population until 2050. The microsimulation applies several models at the individual persons level each quarter to derive their health and support needs status, and ultimately the likelihood of death. LiTE also simulates the number of births and household separations each quarter to produce a complete picture of the estimated resident population.

## General methodology for nursing demand

The exact modelling methodology varies between each type of care depending on what service use data is available. However, all projections have three main elements:

### i. Service demand projection

- Utilisation rate (or services per capita) is calculated as the number of services divided by the total population in the historical data.

$$\text{Utilisation rate} = \left( \frac{\text{Number of services}}{\text{Total population}} \right)$$

- The utilisation rate is then applied against the population projections from the LiTE model to forecast service volumes. The utilisation rate grows in line with the historical pattern.

### ii. Utilisation Growth Rates

- Excess growth rates by sector are calculated as the difference between historical service utilisation growth rates by sector and historical population growth rates.

$$\text{Excess Growth Rate} = \text{Utilisation Growth Rate} - \text{Population Growth Rate}$$

- Excess growth rates are then applied to service volumes.

### iii. Nursing FTE projection

- Nursing FTE to services ratio (number of full-time nurses to provide a service) is calculated as the total nursing FTE (from NHWDS) divided by the number of services in the historical data.
- This ratio is then applied to the service volume projections to forecast demand.
- The demand for nurses is projected to increase proportionally to service volume projections, which is itself driven by underlying population changes.
- Where data is not available to quantify service volumes, a simplified nurse FTE to population ratio was derived in the historical data to forecast nursing FTE demanded:

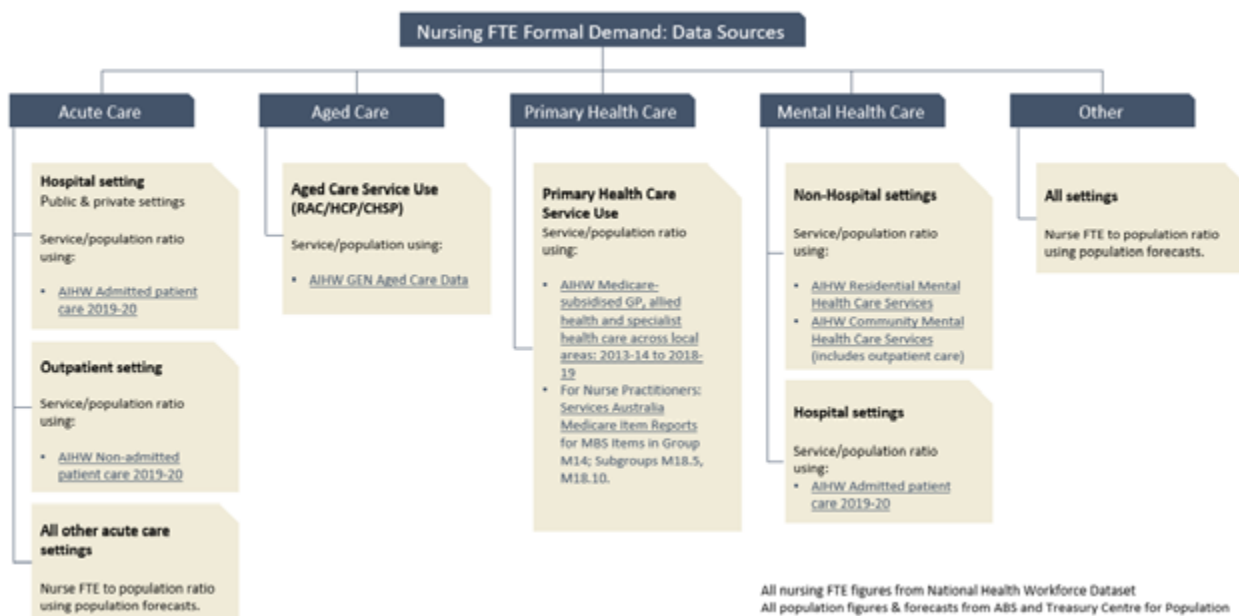
$$\text{Nurse FTE to services ratio} = \left( \frac{\text{Number of services}}{\text{Total population}} \right)$$

The level of granularity of demand projections is limited by the granularity of service volume data available. In general, nursing FTE demand projections are modelled at the state and sector level.

Note: that using the NHWDS to calculate the total nursing FTE implicitly assumes that formal (or observed) demand is equal to supply in the historical years.

## Data for demand modelling by sector

As described in the previous section, the demand for nurses is modelled via service volume projections for the five sectors separately. The diagram below shows the key data sources that informed each sector.



### Acute Care

Service volumes by broad category is drawn from the Admitted Patient Care dataset (AIHW) for both public and private hospitals. The utilisation rate is calculated from the historical data and applied to the population projections to forecast service volumes by broad category to 2032. Nurse FTE to services ratio is calculated using the NHWDS and AIHW data and applied to the service volume projections to forecast nursing demand, this is then aggregated for nursing FTE demanded in Acute Care.

Demand for nurses in Acute Care outpatient setting applies a similar approach on nonadmitted patient service events published by the AIHW. Demand for nurses in other Acute Care settings were projected using a nurse FTE to population ratio. Broad categories relating to mental health services are removed for this sector and were instead accounted for in the Mental Health nurse projections.

### Aged Care

Service volumes of people receiving aged care is separated into Residential Aged Care (RAC), Home Care Package (HCP) and Commonwealth Home Support Programme (CHSP) from the AIHW GEN Aged Care dataset. The utilisation rate is calculated for the eligible population (aged 65 plus, or 50 plus if of Aboriginal or Torres Strait Islander descent) and applied to the population projections to forecast service volumes for RAC, HCP and CHSP to 2032.

Nurse FTE to services ratio is calculated using the NHWDS and the number of people receiving aged care services in RAC, HCP and CHSP in the historical data. This is then applied to the service volume projections above to forecast nursing FTE demanded for Aged Care.

The 24/7 registered nurse supplement for residential aged care policy will commence 1 July 2023. This policy change, as well as the mandatory care minute responsibility for residential aged care from 1 October 2023, has been factored into the baseline projections. Scenario modelling of these policy changes have had an impact on demand for both RNs and ENs.

Data from the Aged Care QFR relating to both current care minutes and 24/7 RN coverage in Residential Aged Care (RAC) facilities were used to derive the additional workforce hours needed to meet policy mandates. Additionally, following the revision of various data sources including the 2020 Aged Care workforce census, it is assumed that the current workforce is working at full capacity and resources needed to meet policy mandates will have to be attained through an increase in workforce numbers (as opposed to a redistribution of current resources). The approach used to model such scenarios, was the same approach undertaken by the Department's National Health Reform Agreement.

## Mental Health

### i. Primary Mental Health

- Service volumes for primary mental health comes from the Primary Health Network (PHN). The PHN covers all primary provider referrals by Mental Health Nurses<sup>1</sup>. The types of services include psychological intervention, clinical care, paediatric and indigenous-specific mental health services and support programs<sup>2</sup>.
- The utilisation rate is calculated for each of the relevant PHN items in the historical data and applied to the population projections to forecast service volumes to 2032. The nurse FTE to services ratio is calculated using the NHWDS and by each of the PHN items. This is then applied to service volume projections to forecast nursing FTE for Primary Mental Health.

### ii. Acute Mental Health

- Broad categories of mental health services from the Admitted Patient Care dataset (AIHW) that were taken out of Acute Care were accounted for in Acute Mental Health.
- Like Acute Care, utilisation rate is calculated from the historical data and applied to the population projections to forecast service volumes by the broad category relating to mental health services. The nurse FTE to services ratio is calculated using the NHWDS and AIHW data and applied to the service volume projections to forecast nursing FTE demanded to 2032.
- Nursing demand projections for each of the broad categories in Acute Mental Health and the PHN items in Primary Mental Health is then aggregated for total nursing demand in this sector.

1 See <https://docs.pmhc-mds.com/projects/data-specification/en/v2/data-model-and-specifications.html#episode-referrer-profession>, code 9: Mental Health Nurse from the referrer profession field is the scope of the Primary Mental Health Care.

2 See <https://docs.pmhc-mds.com/projects/data-specification/en/v2/data-model-and-specifications.html#service-contact-type> for the formal list of mental health treatments covered under PHNs.

## Primary Health Care

There is very limited data that covers services provided by nurses that work in Primary Health. PHN data has some information on Medicare subsidised services performed by Nurse Practitioners in general practice clinics. These services are projected using historical utilisation rates. Nurse FTE to services ratio is then calculated from the historical data and applied to the projection of these Nurse Practitioner services to forecast nursing FTE demanded to 2032.

There is insufficient service volume data to model demand for other nurses in Primary Health – instead the nurse FTE to population ratio is used. This is then combined with nursing FTE projections derived using Nurse Practitioner services for total nursing demand in this sector.

Note: Workforce Incentive Program (WIP) data relating to primary care nursing have not yet been incorporated.

## Other

Due to the miscellaneous nature of this sector and the lack of any meaningful service volume data, the demand for nurses in the Other sector is projected using the nursing FTE to population ratio from the broad practice areas of all other nurses in the NHWDS. Nursing FTE projections in this sector are largely dependent on the population projections from the LiTE model.

## Nursing Demand Constraints

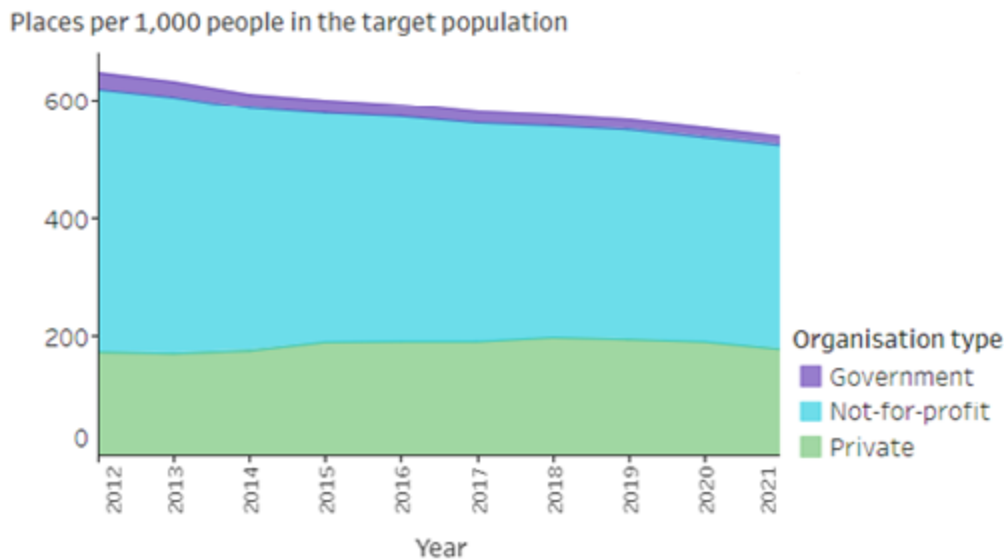
Demand may be constrained by factors not directly observable in the available data. Demand for Nursing cannot be observed directly through MBS claims data in the same way as for other professions such as General Practitioners.

Previous nursing supply and demand studies have modelled scenarios of constrained demand by factors such as economic growth (real GDP growth). Certain nursing settings may be constrained by factors such as available aged care places, hospital beds or emergency department capacity.

It is anticipated that demand scenario analysis would centre on these constraints.

## Residential Aged Care beds growth

The growth in residential aged care beds has not kept pace with the growth in the aged population (individuals 70+). This leads to the observed demand for nurses in the residential aged care setting being constrained despite the growing ageing population. Using the utilisation method described above to project demand for nurses in residential aged care will lead to flat growth over the projection period.



Source:

***Providers, services and places in aged care - AIHW Gen ([gen-agedcaredata.gov.au](http://gen-agedcaredata.gov.au))***

Assumptions around future residential aged care places growth, and the subsequent flow on impact to nursing demand in this setting can be modelled through scenarios.

### Acute Care beds growth

The constrained growth in hospital beds may flow on to nursing demand in the hospital setting. Scenarios regarding increasing hospital beds by jurisdiction can be modelled by incorporating available beds as a user adjustable input.

## Assumptions

### Utilisation Growth Rate Projections

Nursing demand growth rates by sector are assumed to grow in line with a single compound growth rate throughout the projection period. The calibration is applied post-utilisation rate calculations.

1. Historical service utilisation growth rates by sector are calculated.
2. Population growth rates are calculated.
3. Raw excess growth rates are calculated by sector. Represented as:

$$\text{Service utilisation Growth Rate} - \text{Population Growth Rate}$$

4. Calibrated excess growth rates are calculated as:

$$\text{Excess Growth Rates} = \text{Raw excess growth Rate}^{p-s}$$

Where: p = Projection Year and s = Starting Stock Year

Further exploration into projection methods used in utilisation growth may be undertaken to provide challenger growth projections. Some of the methods to be explored may include, but are not limited to:

- Average arithmetic/geometric annual growth
- Regression analysis



# Limitations of this study

## Overall limitations

1. Initial equilibrium where FTE demand is met by FTE supply in the starting stock is assumed. This is achieved by calibrating national FTE demand to meet national FTE supply in the starting stock year of the microsimulation. Equilibrium here can be interpreted as the baseline for future projections in supply and demand.

## Limitations of the supply model

1. The Microsimulation approach would infer static past/current trends into the projection period without attempting to model the impact of changing population needs into the future.

## Limitations of the demand model

1. The demand model does not differentiate services provided by EN and RN because of limitations in the data. The implicit assumption is that they are interchangeable and would have retained the 2022 ratio in perpetuity. A simplified correction is applied to reduce EN growth in line with the supply projections and reality.
2. The demand model does not consider changes to prevalence of health conditions within the population. This is a result of a lack in data availability and no direct linkage between nursing demand and most sectors identified in the nursing industry, i.e. no direct linkage between asthma prevalence and nursing demand.
3. The demand model assumes that the utilisation ratio will exhibit the same trends in the projection period as it did in the historical data. This historical growth rate is often volatile from year to year and is not guaranteed to continue in the projection period. On the other hand, the nurse FTE to services ratio is assumed to be constant but may change over time. This limitation is a result of the number of historical data points and the quality of the available data.
4. Demand projections only quantify formal (or observed) demand and do not account for unmet or latent demand as there is limited data on waiting times for healthcare services that can be used for this study. Individuals who drop out due to long waiting times or accessibility are not observed in the data.
5. Demand may be constrained by factors not directly observable in the available data. Demand for nursing cannot be observed directly through MBS claims data and may be constrained by external factors such as hospital bed numbers.

# Glossary

Term	Definition
FTE	Full Time Equivalent
EN	Enrolled Nurse
RN	Registered Nurse
NP	Nurse Practitioner
NHWDS	National Health Workforce Dataset
RAC	Residential Aged Care
HCP	Home Care Package
CHSP	Commonwealth Home Support Programme
NAPEDC	Non-admitted Patient Emergency Department Care
APC	Admitted Patient Care

