Bariatric Surgery Registry 2022 Annual Report

BARIATRIC SURGERY REGISTRY

STATEMENT

This publication was produced by the Australia and Aotearoa New Zealand Bariatric Surgery Registry.

CITATION

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REPORT PREPARATION

The following Bariatric Surgery Registry team members contributed to the report preparation, data analysis and/or data validation for this report: Mr Angus Campbell, Ms Dianne Brown, Dr Jenifer Cottrell, Ms Jennifer Holland, Ms Alyssa Budin, A/Prof Andrew MacCormick, Prof Ian Caterson and Prof Wendy Brown. Additional feedback was provided by Prof Susannah Ahern. The report design work was completed by OWL Graphic Design.

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DATA PERIOD

The data contained in this report was extracted from the Bariatric Surgery Registry as at 31 May 2023 and pertains to procedures performed up to 31 December 2022. As the Registry does not capture data in real time, there may be a lag period between the occurrence of an event and its capture in the Registry's database, BSR-i.

MONASH University

ANZMOSS
Australian & New Zealand Metabolic and Obesity Surgery Society

NIHI The National Institute for Health Innovation

UNIVERSITY OF AUCKLAND

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ACKNOWLEDGEMENT OF FIRST PEOPLES

In the spirit of reconciliation, the Bariatric Surgery Registry acknowledges the Traditional Custodians of Country throughout Australia and their connections to land, sea and community. We pay our respect to their Elders past and present, and extend that respect to all Aboriginal and Torres Strait Islander peoples today. As a bi-national registry, the Bariatric Surgery Registry also acknowledges Māori as Tangata Whenua and Te Tiriti O Waitangi partners in Aotearoa New Zealand. The Registry collects, stores and uses health data of First Peoples of Australia and Aotearoa New Zealand with the utmost respect and integrity.

DATA CUSTODIAN

The Registry Custodian is the Central Clinical School within the Faculty of Medicine, Nursing and Health Sciences at Monash University.

FUNDING

The Bariatric Surgery Registry acknowledges the lead funding support provided by the Australian Government (through the Department of Health and Aged Care) for its Australian operations. Pledged additional support from industry over the years is acknowledged with 2022 activities supported by Medtronic, Gore, Johnson & Johnson and Applied Medical.

RECOGNITION OF PARTICIPANTS

The Bariatric Surgery Registry is ultimately for people who have had bariatric surgery or are considering bariatric surgery, to give them confidence in the safety of the surgery and the quality of care provided. The Registry's data contains the great majority of people who have been under the care of a Registry participating bariatric surgeon, or health service, in Australia or Aotearoa New Zealand. As such, people undergoing bariatric surgery are given the opportunity to have their data included in the Registry. It is remarkable that of the 146,333 Australians and 6,519 from Aotearoa New Zealand that only 2.1% and 1.3% respectively declined to be involved. Every person who has become a participant in the Registry is owed a debt of gratitude, not only from the Registry but from everyone who looks to the Registry for information about the issues to consider regarding bariatric surgery. The participants' involvement is greatly valued and can truly make a difference in the lives of others.

The Bariatric Surgery Registry aspires to have greater consumer engagement and also serves to give the consumer of bariatric surgery greater power when considering their choice of surgeon or health service, with the understanding that those surgeons and bariatric services taking part in the Registry are committed to a high standard of care.

RECOGNITION OF PARTICIPATING SURGEONS, THEIR CLINICAL TEAMS AND PARTICIPATING HEALTH SERVICES

The Bariatric Surgery Registry recognises its participating surgeons, as well as their clinical teams. Their involvement demonstrates the very essence of a health professional with a commitment to integrity, a high standard of performance, quality and safety and the public whom they serve. These surgeons and their dedicated support teams make time to regularly submit vital information to this study, willingly sharing their successes and the management of their patients' complications. With their data, the Registry is able to offer the confidence necessary for making decisions about the provision of bariatric surgery in Australia and New Zealand to the benefit of all stakeholders, but most importantly for those living with obesity who may be considering their treatment options. By taking part in the Bariatric Surgery Registry, participating surgeons are ensuring a high standard of care for people who undergo bariatric surgery. They are owed a debt of sincere gratitude.

MESSAGE FROM THE CHAIR

There are quite a few milestones in this report. (You may have noticed we have moved to a calendar year report). We have now been collecting bariatric surgery data for 10 years! We have recorded over 150,000 procedures in Australia and 6000 in New Zealand! We have begun to publish on this data with a number of papers already published, and we have data on 5-year outcomes.

In addition, we have secured funding from the Australian Government to continue the Registry until June 2026 so there is lots more work to be done. We thank the Australian Government through the Department of Health and Aged Care for this continuing support and their involvement.

The Registry is growing after a hiatus during the pandemic and there is a lot of work in getting the patient data and the long-term outcome data. We have to thank the surgeons and their teams who are involved and help a great deal but also the staff of the Registry who deal with queries and problems, but also gather much of the continuing annual outcome data by phone calls.

Where do we go from here? We already have an enormous data set which shows the safety and efficacy of bariatric surgery for obesity. However, we do need to be able to demonstrate maintenance of weight loss – and because of the specific data we collect whether there is a remission of diabetes or a reduction in the medication needed. So, there is lots more data to be collected and much more work to do

Thank you all again for your involvement, and thank you to the staff for their hard work and continuing cheerfulness.

Ian D Caterson
Chair, Steering Committee
Professor Emeritus, SoLES, University of Sydney
Deputy Clinical Stream Director, Sydney Local Health District

EXECUTIVE SUMMARY

The Bariatric Surgery Registry's 2022 Annual Report provides an update of Registry data and includes data related to procedures that occurred up until 31 December 2022. At the time data was drawn for this report, the Registry had captured 157,581 procedures from Australia and 6,587 from Aotearoa New Zealand.

AUSTRALIA

In the 18 months since the last report in Australia, an additional 31,001 participants have been recruited and 34,554 additional procedures have been recorded. In 2022, the Registry has captured 82% of all Australian bariatric procedures.

PROCEDURES

The Registry captured 16,308 procedures that occurred in 2022 and of these procedures:

- 16,308 were primary procedures and 3,914 were revision procedures
- 80% of primary procedures were a sleeve gastrectomy, 10% were one anastomosis gastric bypass, 9% were Roux-en-Y gastric bypass procedure and other types of procedures accounted for 1% of procedures
- 96.8% of primary procedures and 92.9% of revision procedures were privately funded
- 79.7% of participants having a primary procedure were female
- 41.4 years was the average age at operation for those having a primary procedure
- 10.6% of participants were reported as having diabetes at time of their primary procedure
- 15.1% of participants were on insulin for their diabetes at the time of surgery

SAFETY

90-day outcomes - defined adverse events

The Registry records whether any defined adverse events (unplanned return to theatre, unplanned admission to ICU and/or unplanned readmission to hospital) occur in the 90 days following surgery. The rate of a procedure having any of these defined adverse events for procedures that occurred from July 2021 to June 2022 was:

- 1.3% following primary sleeve gastrectomy
- 5.3% following primary Roux-en-Y gastric bypass
- 3.7% following primary one anastomosis gastric bypass
- 7.5% for procedures that involved a conversion to another type of bariatric procedure or revision of existing bariatric procedure

90-day outcomes - mortality

The Registry has recorded 54 all-cause deaths within 90 days of a bariatric procedure for all procedures since the Registry commenced.

LONG-TERM OUTCOMES

The Registry collects annual outcome data for primary participants up to ten years after their primary bariatric procedure. This outcome data shows:

- 29% average total weight loss at one-year following a primary bariatric procedure
- 70% of participants on insulin for diabetes at time of surgery no longer required insulin at one-year
- 4.1% (4,734 out of 120,419) of primary participants have had more than one procedure

EXECUTIVE SUMMARY

AOTEAROA NEW ZEALAND

In the 18 months since the last report in Aotearoa New Zealand, an additional 3,036 participants have been recruited, more than doubling the total number of Aotearoa New Zealand Registry participants to 6,436 participants, and 3,140 additional procedures have been recorded.

PROCEDURES

The Registry captured 2,108 procedures that occurred in 2022 and of these procedures:

- 2,014 were primary procedures and 383 were revision procedures
- 53% of primary procedures were sleeve gastrectomy, 22% were Roux-en-Y gastric bypass and 25% one anastomosis gastric bypass
- 96.8% of primary procedures and 88.3% revision procedures were privately funded
- 86.0% of participants having a primary procedure were female
- 43.5 years was the average age at operation for primary procedures
- 13.6% of participants were reported as having diabetes at time of their primary procedure
- 16.8% of participants were on insulin for their diabetes at the time of surgery

SAFETY

90-day outcomes - defined adverse events

The Registry records whether any defined adverse events (unplanned return to theatre, unplanned admission to ICU and/or unplanned readmission to hospital) occur in the 90 days following surgery. The rate of a procedure having any of these defined adverse events for procedures that occurred from July 2021 to June 2023 was:

- 3.5% primary sleeve gastrectomy
- 3.6% primary Roux-en-Y gastric bypass
- 3.1% primary one anastomosis gastric bypass
- 7.4% for procedures that involved a conversion to another type of bariatric procedure or revision of existing bariatric procedure

LONG-TERM OUTCOMES

The Registry collects annual outcome data for primary participants up to ten years after their primary bariatric procedure. This outcome data shows:

- 27.4% average total weight loss at one-year following a primary bariatric procedure
- 85% of people on insulin for diabetes at time of surgery no longer required insulin at one-year

EXECUTIVE SUMMARY

RESEARCH

In 2022, the Registry published three papers and had 17 conference oral or poster presentations. The Registry has three related PhD projects:

- Identifying factors for patient selection to improve health resource utilisation in bariatric surgery within the public health system, Dr. Chiara Chadwick.
- Patient experience, quality of life, and psychosocial health following bariatric surgery: A study into the development of patient-reported outcome measures to be included in a national bariatric surgery registry, Alyssa Budin.
- Applications of novel surgical technologies in upper gastrointestinal and bariatric surgery, Dr Yit Leang.

The Registry team resumed attending face to face engagement events and conferences. This included presentations, running a workshop and a booth at the Australian and New Zealand Metabolic and Obesity Surgery Society held in Cairns in October 2022.

OTHER REGISTRY ACTIVITIES, MILESTONES ACHIEVEMENTS

The Registry has reached ten years since it commenced its pilot phase enrolment in 2012 and now has more the 150,000 procedures. In late 2022, the Australian Government Department of Health and Aged Care renewed lead funding for the Registry until June 2026.

The Registry has been active in the international bariatric surgery space with continued contribution to the Standardized Quality of Life Measurement in Obesity Treatment (SQOT) initiative's patient-reported outcome measures (PROMs) consensus work. Three Registry team members were invited to and participated in the second SQOT patient-reported outcome measures two-day consensus meeting held in May 2022 in Maastricht, the Netherlands. Professor Wendy Brown was an invited speaker at Zoom Forward 22 joint Congress on Obesity of the European Association of the Study of Obesity and the International Federation for the Surgery of Obesity and Metabolic Disorders- European Chapter conference in Maastricht Netherlands and presented on "Registries and how to implement new technology".

The Registry was also engaged by the International Federation for Surgery of Obesity and Metabolic Disorders to coordinate the data submissions for the 7th IFSO Global Registry Annual Report which included Australia and Aotearoa New Zealand data from the Registry for the first time.

TIMELINE

2009

With recommendations featured in the Georganas Report, OSSANZ (now ANZMOSS) identified the need for a Registry to track outcomes of bariatric surgery.

2010

Monash University announced as the partner and Registry Data Custodian for the Bariatric Surgery Registry.

2012

The Registry commences as a pilot project within Victoria. Seed funding is provided by OSSANZ as well as industry partners. A Steering Committee is formed with a wide range of representation and an independent Chair.

2014

After the success of the pilot project, funding is secured from the Australian Commonwealth Government to expand the Registry nationwide with 118 surgeons registering their interest to participate. By the end of 2014, 42 surgeons from 33 hospitals are contributing to the Registry.

2016

Sites and surgeons from VIC, NSW, QLD, SA, WA and TAS are active in the Registry. The New Zealand arm of the Registry commences with the support of funding provided by industry.

2017

The Registry successfully secures a 5-year funding agreement with the Australian Commonwealth Government to continue the success of the project in Australia.

2018

The first participant for Aotearoa New Zealand is enrolled. The Registry celebrates the 50,000th participant milestone.

2019

Enrolment of 80,000 participants reached at the end of 2019 with 216 surgeons having contributed from 134 hospitals across Australia and New Zealand. The project now covers all states and territories across Australia. A project focused on Patient-Reported Outcome Measures (PROMs) commences within the Registry to standardise questions for future patient-reported data collection.

2020

By mid-2020, the Registry reaches 90,000 participants. The Registry continues its operations whilst under COVID restrictions which also limit elective surgery across Australia and New Zealand for most of 20/21.

2021

Participant numbers climb to over 115,000. Development of PROMs progressing with surveys about PROMs use from bariatric practices and a modified Delphi survey engaging pre- and post-surgical patients, their friends and family, and a range of healthcare practitioners.

2022

Registry reaches its ten year milestone since participant enrolment commenced with over 150,000 procedures captured across Australia and New Zealand. Funding secured from the Australian Government for the Registry to continue until June 2026 in Australia.

GLOSSARY

Annual outcome data	Outcome data collected for primary participants based on the anniversary of their enrolment procedure
Defined adverse event	The registry refers to any of the following as a defined adverse event if it occurs in the 90-day post-operative period: • Unplanned return to theatre • Unplanned ICU admission • Unplanned hospital readmission
Enrolment procedure	Determined by a participant's earliest recorded procedure date in the Registry
Excess weight	Excess weight is the difference in kilograms between a participant's weight at a given time point and their ideal weight
Financial year	Defined as the Australian financial year from 1 July to 30 June the following calendar year
Ideal weight	Ideal weight is the weight in kilograms that corresponds to the weight a participant would be if they had a BMI of 25 kg/m^2
Initial weight	The greater weight of either a participant's start weight or weight at operation
Legacy participant	Participant whose first entry into the Registry is with a revision bariatric procedure or subsequent intervention
Minor	Individual not considered to be of age to provide independent consent, set at 16 years in Aotearoa New Zealand and 18 years in Australia for the purpose of this registry
National mutual acceptance	Scheme under the NHMRC which allows for single ethical review of multi-centre research studies
Ninety-day outcome data	Participant outcome data collected regarding the 90-day post-operative period
Opt out	Refers to a participant who has been invited to join the Registry but has elected to opt out, meaning that their data is not included
Partial opt out	Option for participants who do not want to be contacted by the Registry for any annual outcome data but will allow the registry to hold data provided by their surgeon or clinic
Participating hospital	Any hospital site currently contributing health information to the Registry

GLOSSARY

Participating surgeon	Any surgeon currently contributing health information to the Registry
Percentage excess weight loss (%EWL)	Percentage excess weight loss is the measure of the percentage of excess weight a participant has lost from one time point to another
Percentage total weight loss (%TWL)	Percentage total weight loss is the measure of the percentage of the total weight a participant has lost from one time point to another
Operation status	A status to indicate if the operation record is for a person's primary bariatric procedure or a revision procedure
Primary participant	Participant whose first entry into the Registry is with their initial bariatric surgical procedure
Primary procedure	A participant's first bariatric procedure
Revision procedure	A participant's revision bariatric procedure or subsequent intervention required because of previous bariatric surgery
Sex	The distinction between male, female and others who do not have biological characteristics typically associated with either the male or female sex
Subsequent intervention	A participant's procedure performed to manage an acute or chronic complication
Total weight	Total weight is a participant's weight in kilograms at a given point in time

ABBREVIATIONS

ACHI	Australian Classification of Health Interventions
ACT	Australian Capital Territory
ACSQHC	Australian Commission on Safety and Quality in Health Care
AIHW	Australian Institute of Health and Welfare
AANZGOSA	Australian and Aotearoa New Zealand Gastric and Oesophageal Surgery Association
ANZMOSS	Australian and New Zealand Metabolic and Obesity Surgery Society (formally OSSANZ)
AoNZ	Aotearoa New Zealand
Band	laparoscopic adjustable gastric band
BMI	body mass index
BSR	Bariatric Surgery Registry
BSR-i	Bariatric Surgery Registry interface
DAE	defined adverse event
FY	financial year
HREC	human research ethics committee
ICU	intensive care unit
IQR	interquartile range
MBS	Medicare Benefits Schedule
NHMRC	National Health and Medical Research Council
NIHI	National Institute of Health Innovation
NMA	National Mutual Acceptance scheme
NSW	New South Wales
NT	Northern Territory
OAGB	one anastomosis gastric bypass
OSSANZ	Obesity Surgery Society of Australia and New Zealand, currently known as ANZMOSS
PROMs	patient-reported outcome measures
QLD	Queensland
RACS	Royal Australasian College of Surgeons
RYGB	Roux-en-Y gastric bypass
SA	South Australia
Sleeve	laparoscopic sleeve gastrectomy
CCS	Central Clinical School
SD	standard deviation
TAS	Tasmania
VIC	Victoria
WA	Western Australia

INTRODUCTION

This is the tenth annual report of the Australia and Aotearoa New Zealand Bariatric Surgery Registry. This year the report has a focus on the 2022 calendar year rather than a financial year focus as in previous reports.

PURPOSE OF THE BARIATRIC SURGERY REGISTRY

Within the remit of a clinical quality registry, the Bariatric Surgery Registry seeks to monitor the safety and efficacy of bariatric surgery across Australia and Aotearoa New Zealand. The Registry has been designed with the underlying principle to report data that is accurate, complete and valuable. Accuracy and completeness are controlled by the definitions, collection, verification, storage, and analysis and reporting as outlined in the Registry's Data Governance Framework.

STAKEHOLDER AND PARTICIPANT BENEFITS

The Registry continues to encourage high-level stakeholder engagement and facilitates collaborations with governments, surgeons, private health groups, individual hospitals, medical technology and device industries, private health insurers and medical defence organisations to ensure that the data remains valuable.

Most importantly, the Registry engages with participants to address how the Registry can aid in decision-making, assessment of risk and on-going journey of treatment. The involvement of the participants is paramount in regard to the data collection which the Registry strives to achieve, especially the annual outcome data.

GOVERNANCE

The Registry follows the fundamentals detailed in the 'Operating Principles and Technical Standards for Australian Clinical Quality Registries 2008' and the 'Framework for Australian Clinical Registries 2014' as published by ACSQHC. This is to ensure that, as a registry, it aligns and complies with the national standard and provides assurance to all stakeholders.

The Registry is governed by the Steering Committee and this has convened since 2012, chaired by an independent obesity expert, Professor Ian Caterson (Appendix 1). The Committee meets at least twice a year to advise the Registry on matters such as strategic direction, financial budget, data access, clinical quality and safety, quality development and operations. The Bariatric Surgery Registry Executive Management Committee (EMC) oversees the day-to-day operations of the Registry.

Membership of the Steering Committee includes representatives from the following organisations and/or societies:

- Monash University
- Australian Government (Department of Health and Aged Care)
- Australian and New Zealand Metabolic and Obesity Surgery Society (ANZMOSS)
- Australian and Aotearoa New Zealand Gastric and Oesophageal Surgical Association (AANZGOSA)
- Royal Australasian College of Surgeons (RACS)
- National Institute for Health Innovation, University of Auckland
- Medical Technology Association of Australia (MTAA)
- Community representation
- Consumer representation

The Registry has established a Data Governance Framework and the associated policies and processes which underpin the Registry.

ETHICAL REVIEW

The Bariatric Surgery Registry was established for the purpose of improving the quality and safety of bariatric surgery and is considered to be in the public's interest. To function as a clinical quality registry, the Bariatric Surgery Registry collects, stores, and uses identifiable, personal and sensitive health information about people who have had bariatric surgery, for research into the quality, safety and effectiveness of bariatric surgery as treatment for obesity.

The opt-out approach to participation is used to recruit participants due to the scale and significance of the Registry. In accordance with the State and Federal privacy legislation of Australia and Aotearoa New Zealand, the Australian National Statement for Ethical Conduct in Research (NHMRC, 2018), and the Aotearoa New Zealand National Ethical Standards (National Ethics Advisory Committee, 2019), approval for using the opt-out approach is sought from an ethics committee nominated by the hospital and the Southern Health and Disability Ethics Committee in Aotearoa New Zealand.

In Australia, the Registry has ethics approval under the National Mutual Acceptance (NMA) scheme as Project 40238 from the Alfred Hospital Human Research Ethics Committee (EC00315). Additional ethics approval has been sought for the project where the NMA is not recognised, these additional HRECs with oversight of the Registry in Australia include:

- Calvary Health ACT HREC (EC00105)
- Mater Misericordiae Ltd HREC (EC00332)
- St John of God Health Care Ethics Committee (EC00286)
- St Vincent's Health and Aged Care HREC (EC00324)
- Tasmania Health and Medical HREC (EC00337)

PARTICIPANT ENROLMENT AND DATA CAPTURE

Anyone who undergoes bariatric surgery for the treatment for obesity with a participating surgeon in Australia or Aotearoa New Zealand is eligible for inclusion in the Bariatric Surgery Registry. An opt-out approach is followed for adults, whilst minors will only be recruited with signed consent from a parent or guardian. Prospective adult participants are to be given a Registry flyer by their surgeon or clinic to inform them that their information will be shared with the Registry. Data is provided by the surgeon or bariatric clinic using one of the following options:

- Web browser with secure authorised entry using the Bariatric Surgery Registry interface (BSR-i); or
- paper-based data forms

Upon receipt of bariatric patients' data, the Registry sends them each a Participant Fact Sheet, as an invitation letter to participate. This letter describes the Registry and what their participation entails. It also advises them of a two-week period in which they can opt out, or partially opt out, of the Registry by calling a free-call number. However, participation may be withdrawn at any time. No information is kept in the Registry for those who choose to opt out. Bariatric patients who choose to partially opt out allow the Registry to collect and keep their operation information, but will never be contacted directly by the Registry again for any annual data or research. The Registry collects information about the funding of procedures captured, noting that some procedures which are publicly funded may have been done at private hospitals as well as the occurrence of privately funded procedures at a public health service.

To ensure that all bariatric procedures are captured, the Registry engages with each hospital or hospital group in order to receive regular admitted patient data extracts based on procedure coding (ACHI codes) which identify bariatric procedures performed by surgeons who participate in the Registry. These reports are used to verify data submitted to the Registry and are also used as the primary source of data if the surgeon and/or clinic has not previously provided patient and operation data.

Surgeons or clinics provide operation, 90-day outcome data and annual outcome data, primarily through submission on the BSR-i. If a surgeon and/or clinic indicates they have not seen a primary participant for an annual review appointment, then Registry staff will attempt to contact the participant to collect annual outcome data.

Individuals recruited to participate with their first bariatric procedure are termed as "primary participants". If they are recruited with a revision, or subsequent, procedure then the term "legacy participants" applies.

Data captured by the Registry for each participant type is shown in Table 1.

Data captured	Primary participant	Legacy participant
REGISTRY ENROLMENT PROCEDURE	PRIMARY BARIATRIC PROCEDURE	SUBSEQUENT (OR REVISION) PROCEDURE
Subsequent (or revision) procedures captured by Registry	Yes	Yes
Operation data	Yes (for enrolment & subsequent procedures)	Yes (for enrolment & subsequent procedures)
90-day (peri-operative) outcome data	Yes (for enrolment & subsequent procedures)	Yes (for enrolment & subsequent procedures)
Annual outcome data	Yes (based on primary procedure date)	No

Table 1 - Data captured by participant type

The Registry aims to capture all procedures for its participants, including subsequent interventions required as a result of previous bariatric surgery. The procedures and interventions collected include those listed in Table 2. A free text option is available for procedures not listed, or yet to be added to the interface. Critical to the collection of unplanned revisions or subsequent interventions is the reason why the procedure was required.

Primary Procedures	Revision Procedures (Includes Subsequent Interventions)
■	■ Laparoscopic sleeve gastrectomy
■	■ Roux-en-Y gastric bypass (RYGB)
■	■ One anastomosis gastric bypass (OAGB)
■	■ Laparoscopic adjustable gastric band (LAGB)
■	■ Single anastomosis duodeno-ileostomy (SADI)
■	■ Stomach intestinal pylorus-sparing surgery (SIPS)
■	■ Bilio-pancreatic bypass/duodenal switch (BPD/DS)
■	■ Endoscopic sleeve gastroplasty (ESG)
■	■ Gastroplasty
■	■ Gastric imbrication
■	■ Gastric imbrication plus band
	■ Revision of previous sleeve gastrectomy
	■ Revision of previous gastric bypass
	■ Surgical reversal of bypass
	■ Addition of ring over bypass or sleeve
	■ Reversal of gastroplasty
	■ Surgical reversal of gastric band
	■ Port revision -removal
	■ Port revision -insertion
	■ Removal of ring over bypass or sleeve
	■ Sub-total gastrectomy
	■ Small bowel resection
	■ Control of bleeding
	■ Dilatation of stricture
	■ Division of adhesions
	■ Lavage/washout +/- drainage
	■ Stent removal
	■ Stent insertion
	■ Wound debridement

Table 2 - Procedures captured by the Registry

Ninety-day outcome (or peri-operative) data is collected following all procedures regarding the 90-day post-operative period to ascertain if the participant had an unplanned return to theatre, unplanned ICU admission or unplanned hospital readmission, collectively referred to as a 'defined adverse event'. The reason for the defined adverse event is collected, and any unplanned return to theatre is expected to be included in the Registry as a subsequent intervention or revision procedure.

Annual outcome data is collected for primary participants based on the anniversary of their primary procedure. The data to be collected includes their weight, diabetes status, diabetes treatment, and whether they had a revision procedure or intervention in the preceding 12 months. The Registry's data element list can be reviewed in Appendix 2 and data completeness report for key data items is presented in Appendix 3.

DATA QUALITY

The need for near complete data capture is required to ensure the reliability of the Registry's reporting. The collected data provides information on the participant (to allow tracking and to identify risk factors), the participant's weight and BMI, the participant's health (diabetes status and treatment), the type of surgery undertaken, the device(s) utilised, the need for revision surgery or subsequent intervention, unplanned admission to ICU or readmission to hospital as well as mortality.

Data validations and quality checks are performed on a monthly and quarterly basis to ensure the timely review and correction of data if required. These processes are to ensure information received is clinically correct and is recorded correctly in the BSR-i and that missing data for most of the data elements collected is kept to a minimum. Data validation processes include cross checking with hospitals, surgeons and/or participants to ensure that the Registry maintains the highest level of data integrity.

The data presented in this report has been cross-check for accuracy through a separate data analysis and data checking process.

REPORTING

The data preparation and analysis for this report were completed using Microsoft PowerBI.
The Registry follows a reporting cycle throughout the year to provide valuable data back to the key stakeholders. These reports include the publicly released annual and semi-annual reports, individual surgeon reports, hospital-level reporting and bespoke reports for Registry funders and stakeholders. In addition, the Registry also regularly distributes a newsletter to all stakeholders.

The public annual reports and newsletters are also published on the Registry's website for participants and the public to access.

https://www.monash.edu/medicine/ccs/research/registries/bariatric/policies-procedures

AUSTRALIA

AUSTRALIA ACKNOWLEDGEMENT

Planned surgical activity slowly returned to normal levels over 2022 across the states and territories of Australia following the long periods of disruption in 2020 and 2021. Long waiting lists in both public and private hospitals across all surgical specialties led to increased demand for our limited theatre resources, and meant that there was not resumption of normal activity until late 2022, meaning overall numbers of bariatric procedures performed in 2022 were still down when compared to pre-pandemic levels.

In this post-pandemic phase, staffing remains a key challenge in all industries, and the BSR has not been immune to this phenomenon. Jennifer Holland and Jenifer Cottrell have done a stellar job rebuiliding the team, ensuring that our data is correct and complete from the outset. Angus Campbell has done an amazing job managing the data, creating processes that have protected us from some of the staff losses. Robin Thompson and Dianne Brown continue to lend their expertise as important consultants. Over the year we farewelled Simone Wilkins, Hayley Cottrell, Marjan Hamidimanesh, Giorgia Scott, Zahli Hansen and Katy Shaw. We welcomed back Anagi Wickremesinghe. I would like to acknowledge all of the team's hard work, without them we would not have the quality of data required to produce this report.

As the data in the Registry becomes more mature we have the exciting opportunity to start to not only report on the data, but also use the data to answer important clinical questions. This year, we have seen two PhD Students, Chiara Chadwick and Alyssa Budin, publish important papers on the equity of bariatric surgery and patient reported outcomes. The BSR is seeking ways to better collaborate with contributors to ensure we utilize this precious resource as effectively as possible, thought direct analysis of current data but also registry-based trials.

The Registry would not be able to function without the support of the Australian Government. We have recently received another 4 years of funding from the Department of Health and Aged Care, recognising the value that the Government places on Registries. We thank the Australian Government and their continued support for the BSR. Their advice and support is invaluable. I would also like to thank our industry supporters in 2022, GORE, Medtronic, Applied Medical and Johnson & Johnson. It has been a difficult year for the device industry, but most have stuck with us, and for that we are very grateful.

Finally, I need to thank all the contributing bariatric surgeons, their teams and most importantly the people with obesity who chose to have a bariatric procedure and agreed to be a part of this Registry. Without you, we would not have the opportunity to learn or grow or improve. Your contributions are both valued and valuable.

Professor Wendy Brown
MBBS (Hons) PhD FACS FRACS
Clinical Director Bariatric Surgery Registry
Clinical Lead, Australia

HOSPITAL AND SURGEON PARTICIPATION

Registry participation varies over time due to surgeons retiring and new surgeons joining as well as changes to where surgeons are operating. Figure 1 shows Australian hospital and surgeon participation in the Registry for 2022, with both New South Wales and Victoria having the highest number of participating surgeons and New South Wales having the highest number of participating hospitals. In 2022, surgeon participation across Australia has increased to 195 surgeons compared to 184 for 2021 and hospital participation has increased by one since 2021 (Figure 2).

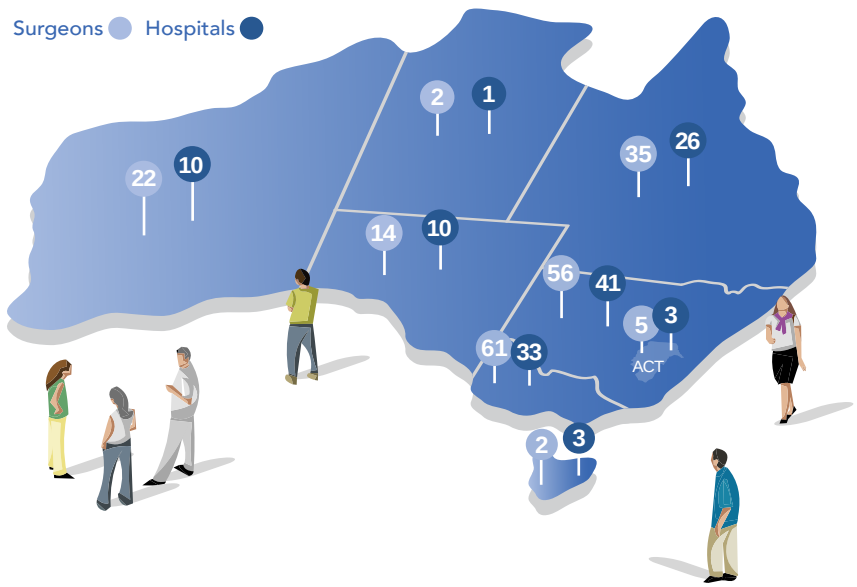


Figure 1 - Hospitals and surgeons for 2022 operations captured by the Registry, Australia

There are 2 surgeons in Australia that contribute to the Registry in multiple juisdictions

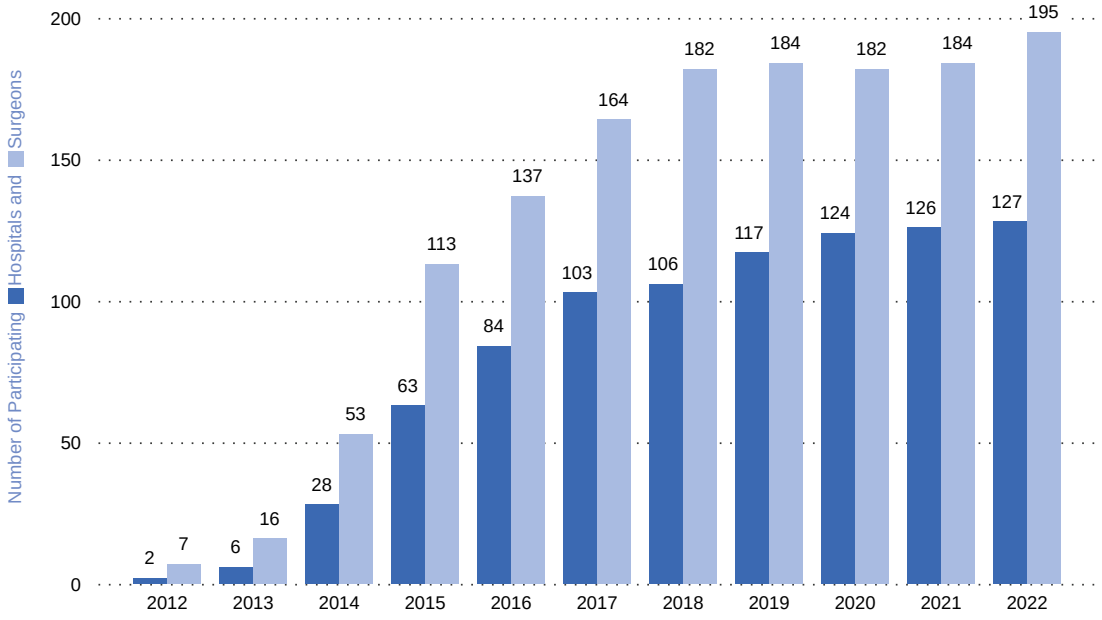


Figure 2 - Participating hospitals and surgeons by year since Registry commenced, Australia

PARTICIPANT ENROLMENT

Since Australian recruitment commenced in 2012, the Registry has enrolled 143,199 participants who have had a procedure up until 31 December 2022, this includes 140 participants who only have an abandoned procedure recorded in the Registry (Table 3). A further 3,134 (2.14 %) people who had a bariatric procedure with a participating surgeon have chosen to opt out of Registry participation. Primary participants make up 84% of the Registry and legacy participants represent 16% (Table 4). Since the last annual report 31,001 more Australian participants have been enrolled into the Registry and Figure 3 demonstrates the growth in Registry enrolment since its commencement.

143,199	3,134	2.14%
Number of participants	Number opted out	Opt Out Rate

Table 3 - Participant enrolment, Australia

	FEMALE		MALE		ALL	
Primary Participants	94,245	83.2%	26,267	87.9%	120,512	84.2%
Legacy Participants	19,069	16.8%	3,616	12.1%	22,685	15.8%
TOTAL	**113,314**	**100%**	**29,883**	**100%**	**143,197**	**100%**

Includes 140 Australian participants who only had an abandoned procedure.
Excludes 2 participants with sex recorded as 'Other'.

Table 4 - Participants by primary or legacy participant type and sex, Australia

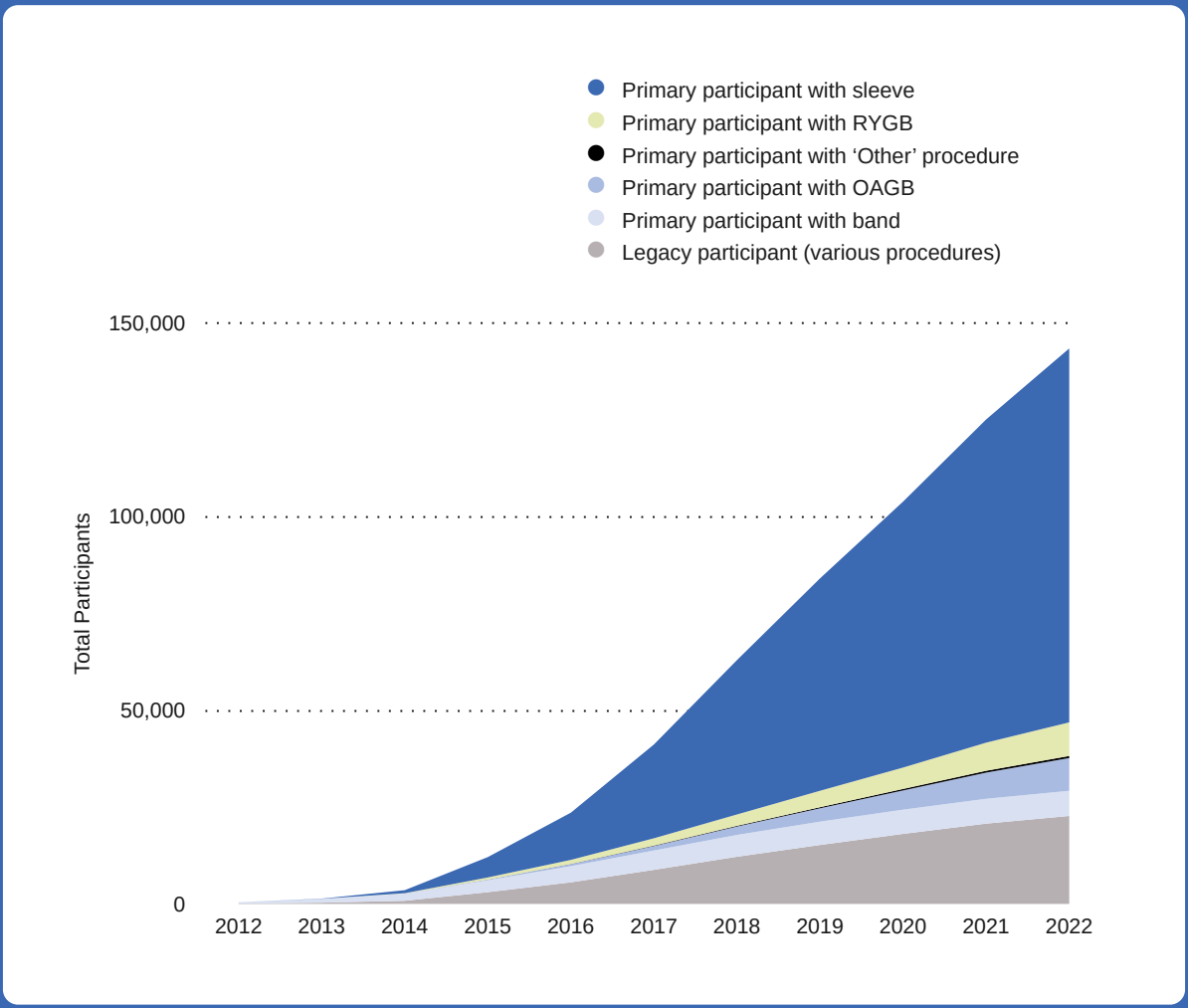


Figure 3 - Cumulative enrolment by participant type and procedure when enrolled, Australia

Includes participants who only had an abandoned procedure (n=140). Sleeve=laparoscopic sleeve gastrectomy, RYGB=Roux-en-Y gastric bypass, OAGB=one anastomosis gastric bypass, band=laparoscopic adjustable gastric band. Total 143,199 Australian participants with procedures up until 31 December 2022.

NATIONAL PROCEDURE ASCERTAINMENT

Medicare Benefits Schedule (MBS) data remains a timely and easily accessible data source for the Registry to monitor volume of procedures completed in Australia by jurisdiction and to estimate Registry case ascertainment. However, comparisons between the Registry and MBS data should be considered a guide only due to limitations related to the use of administrative data (MBS) and clinical Registry data. For example, MBS data is by date of processing rather than date of procedure and MBS jurisdiction is based on patient residential address rather than jurisdiction of procedure. MBS data includes only private hospitals' billing for sleeve gastrectomy, gastric band, Roux-en-Y gastric bypass and one anastomosis gastric bypass procedures, and as some codes are more general in description, there may be differences in how surgeons/sites allocate MBS codes. Registry case ascertainment is reported as at the time data was extracted for this report.

Table 5 shows total MBS procedures by jurisdiction for 2022 and the percentage captured by the Registry. South Australia, Queensland, Northern Territory and Australian Capital Territory all have procedure capture rates greater than 90%. The Registry captured 110.8% of South Australian procedures which is accounted for by the differences in data reporting and indicates that a number of South Australian residents are likely having surgery in a different jurisdiction.

	ACT	NSW	NT	QLD	SA*	TAS	VIC	WA	TOTAL
MBS procedures total	247	7,333	200	5,239	1,185	320	4,814	2,665	22,003
MBS procedures captured by the Registry	224	5,550	186	4,908	1,313	182	4,275	1,461	18,099
% MBS data captured by the Registry	90.7%	75.7%	93.0%	93.7%	110.8%	56.9%	88.8%	54.8%	82.3%

Table 5 - Medicare Benefits Schedule (MBS) bariatric procedures and Registry private procedure capture by jurisdiction for 2022, Australia

Registry and MBS procedure numbers include only sleeve gastrectomy, gastric band, Roux-en-Y gastric bypass and one anastomosis gastric bypass procedures that were privately funded. Comparisons between datasets are a guide only as MBS data is an administrative data set and does not always match the Registry's data due to differences in reporting.
* >100% result is likely explained due to differences in processing and reporting of data between MBS data and Registry data.

The Registry captured 18,099 (82.3%) of the 22,003 private bariatric procedures represented in MBS data for 2022 (Figure 4). The Registry's capture of procedures has been steadily increasing over time with the 82.3% of procedures captured in 2022 being the highest rate of capture since the Registry began. Interestingly, the total number of procedures for 2022 is fewer than it has been for the previous five years.

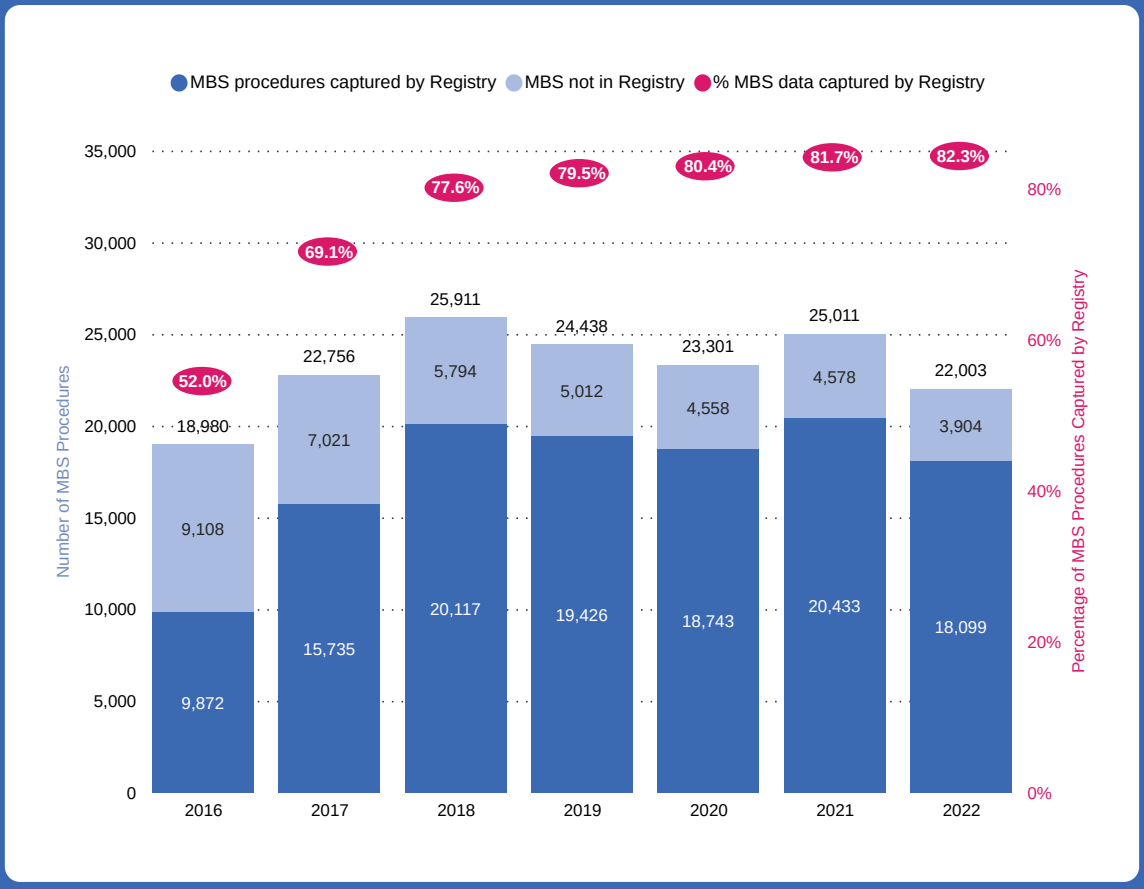


Figure 4 - MBS procedures by year and by Registry capture rate, Australia

Registry and MBS procedure numbers include only sleeve gastrectomy, gastric band, Roux-en-Y gastric bypass and one anastomosis gastric bypass procedures that were privately funded. Comparisons between datasets are a guide only as MBS data is an administrative data set and does not always match the Registry's data due to differences in reporting.

PROCEDURES

The Registry has captured 157,581 procedures for 143,059 participants in Australia and an additional 328 abandoned procedures which are not reported further. Of the 20,222 procedures that occurred in 2022, 16,308 (80.6%) were primary procedures and 3,914 (19.4%) were revision procedures or subsequent interventions (Figure 5). The types of primary and revision procedures captured by the Registry are shown in Table 6. Figure 6 shows procedures over time with a drop in total number of procedures in 2022 which is consistent with the total number of MBS procedures (Figure 4).

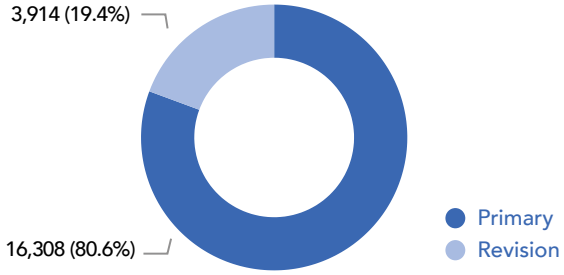


Figure 5 - Procedures by primary or revision type for 2022, Australia, n= 20,222

	2022			All Australia		
	PRIMARY	REVISION	TOTAL	PRIMARY	REVISION	TOTAL
Sleeve gastrectomy	13,064 (80.1%)	489 (12.5%)	13,553 (67.0%)	96,335 (80.0%)	6,322 (17.0%)	102,657 (65.1%)
RYGB	1,407 (8.6%)	1,304 (33.3%)	2,711 (13.4%)	8,652 (7.2%)	8,635 (23.2%)	17,287 (11.0%)
OAGB	1,693 (10.4%)	610 (15.6%)	2,303 (11.4)	8,435 (7.0%)	3,691 (9.9%)	12,126 (7.7%)
Gastric band	79 (0.5%)	53 (1.4%)	132 (0.7%)	6,474 (5.4%)	2,017 (5.4%)	8,491 (5.4%)
SADI/SIPS	58 (0.4%)	67 (1.7%)	125 (0.6%)	296 (0.2%)	395 (1.1%)	691 (0.4%)
Surgical reversal of gastric band	-	861 (22.0%)	861 (4.3%)	-	10,782 (29.0%)	10,782 (6.8%)
Dilatation of stricture	-	115 (2.9%)	115 (0.6%)	-	1,206 (3.2%)	1,206 (0.8%)
Port revision	-	94 (2.4%)	94 (0.5%)	-	1,326 (3.6%)	1,326 (0.8%)
Lavage/washout +/- drainage	-	39 (1.0%)	39 (0.2%)	-	603 (1.6%)	603 (0.4%)
Other	7 (0.0%)	282 (7.2%)	289 (1.4%)	227 (0.2%)	2,185 (5.9%)	2,412 (1.5%)
TOTAL (100%)	**16,308**	**3,914**	**20,222**	**120,419**	**37,162**	**157,581**

Table 6 - Procedures by procedure type and operation status for 2022 and for all Australia

OAGB = one anastomosis gastric bypass, RYGB = Roux-en-Y gastric bypass, SADI/SIPS = single anastomosis duodeno-ileostomy/stomach intestinal pylorus-sparing surgery. Excludes abandoned procedures.

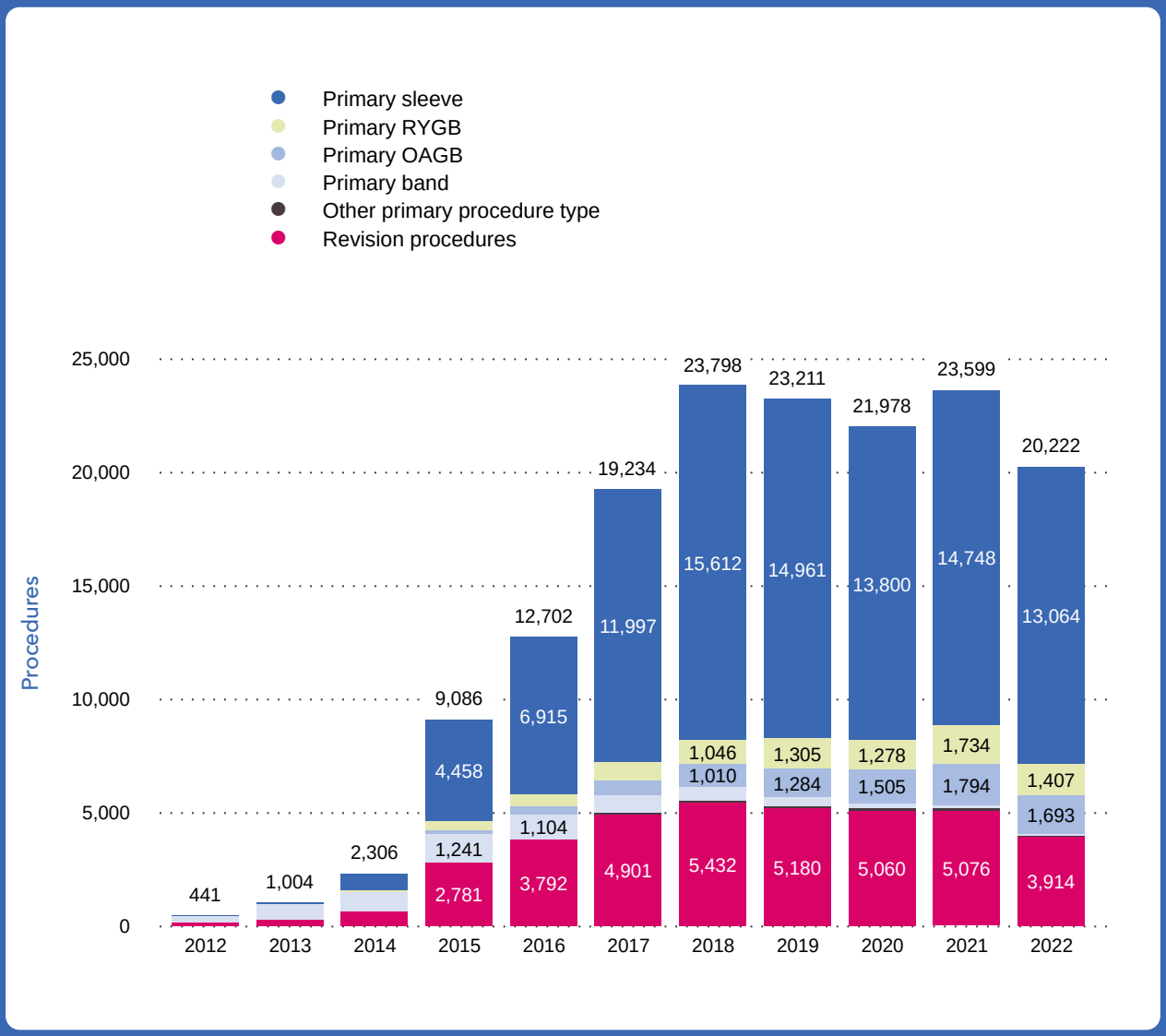


Figure 6 - Procedures over time by procedure type, Australia, n=157,581

PRIMARY PROCEDURES

The majority of the 16,308 primary bariatric procedures that occurred in 2022 were sleeve gastrectomy (80.1%), followed by one anastomosis gastric bypass (10.4%), Roux-en-Y gastric bypass (8.6%) and a small number of the remaining types of primary bariatric procedures (0.9%) which includes gastric band, single anastomosis duodeno-ileostomy (SADI) /stomach intestinal pylorus-sparing surgery (SIPS) and other bariatric procedures (Table 6). Whilst sleeve gastrectomy remains the most common primary procedure in Australia the proportion of people having primary gastric bypasses has continued to grow over time from 11% of primary procedures in 2018 to 19% in 2022 (Figure 7).

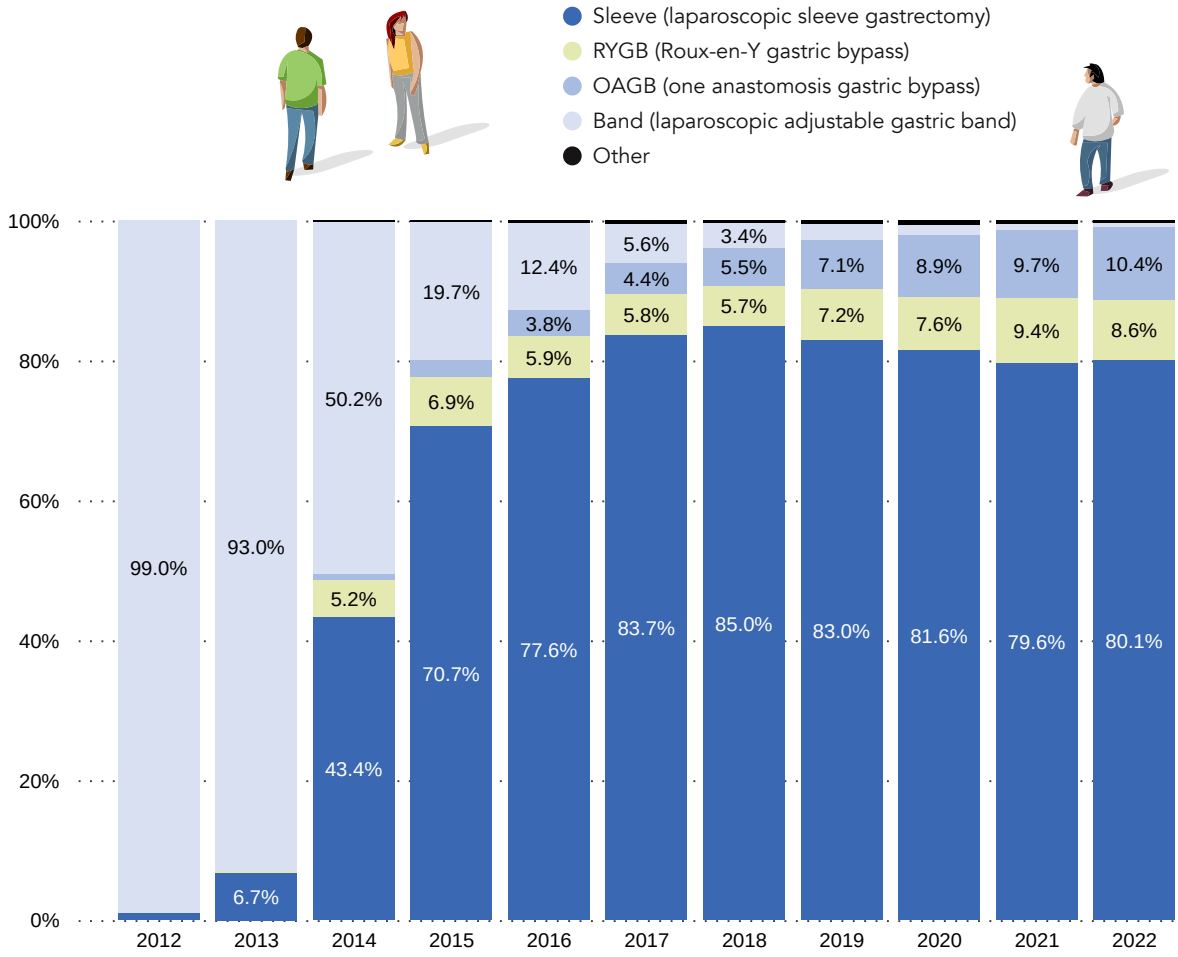


Figure 7 - Proportion of primary procedure type by year, Australia, n= 120,419

REVISION PROCEDURES

Revision procedures captured by the Registry include any subsequent procedure performed upon a person who has had a previous bariatric procedure. Examples of revision procedures include conversion to a subsequent type of bariatric procedure (for example, changing from having a gastric band to a sleeve gastrectomy), revision of a previous bariatric procedure with the same type (for example, a revision of a previous bypass) and procedures that are performed to manage complications related to an existing bariatric procedure such as dilatation of a stricture, division of adhesions, lavage and drainage for a leak or a reversal of a gastric band. A participant may have more than one type of revision procedure in a single visit to the operating theatre and in these cases the Registry records only the major procedure.

The Registry captured 3,914 revision procedures in 2022 representing 19.4% of all Australian procedures that occurred in that year (Table 6). The most common revision procedure captured was Roux-en-Y gastric bypass (33.3%), followed by reversal of an existing gastric band (22.0%), one anastomosis gastric bypass (15.6%), sleeve gastrectomy (12.5%), dilatation of a stricture (2.9%), port revision (2.4%), single anastomosis duodeno-ileostomy/stomach intestinal pylorus sparing surgery (1.7%), lavage/washout (1.0%) and all other types accounted for 8.6% of revision procedures.

PROCEDURES BY JURISDICTION

Figure 8 shows primary and revision bariatric procedures by Australian jurisdiction for 2022 with 80.4% of procedures captured by the Registry being completed in either Queensland, New South Wales or Victoria. However, it is important to note these proportions only reflect procedures captured by the Registry, with procedures completed at non-participating sites or by non-participating surgeons not included. In some jurisdictions there are surgeons who complete a significant proportion of the jurisdiction's bariatric procedures and subsequent interventions who are not participating in the Registry.

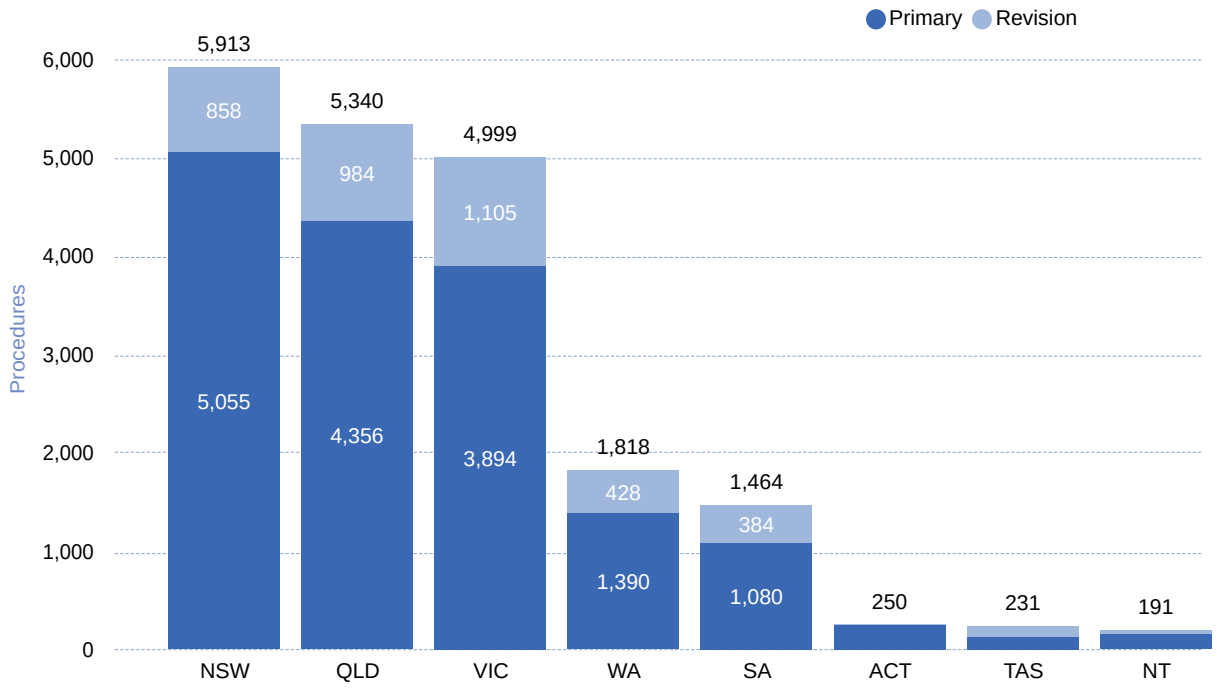


Figure 8 - Procedures by Australian jurisdiction and operation status for 2022, n= 20,206

This excludes procedures that occurred at sites that do not participate in the BSR and for which jurisdiction is not recorded (n=16)

PROCEDURE FUNDING

In 2022, the majority of both primary (96.8%) and revision procedures (92.9%) were privately funded (Figure 9). The proportion of privately funded procedures varied by jurisdiction from 90.4% privately funded in Western Australia to 100% privately funded in the Northern Territory (Figure 10). The higher proportion of publicly funded surgery in Western Australia should be interpreted with caution as the Registry captures only 54.8% of Western Australian procedures, as shown in MBS procedure data (Table 5).

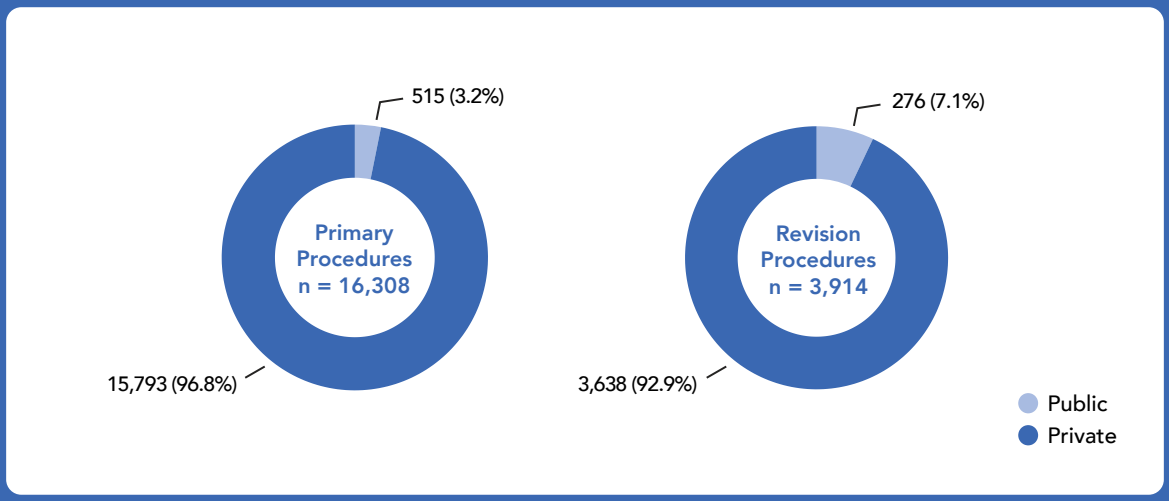


Figure 9 - Procedures by operation status and funding for 2022, Australia

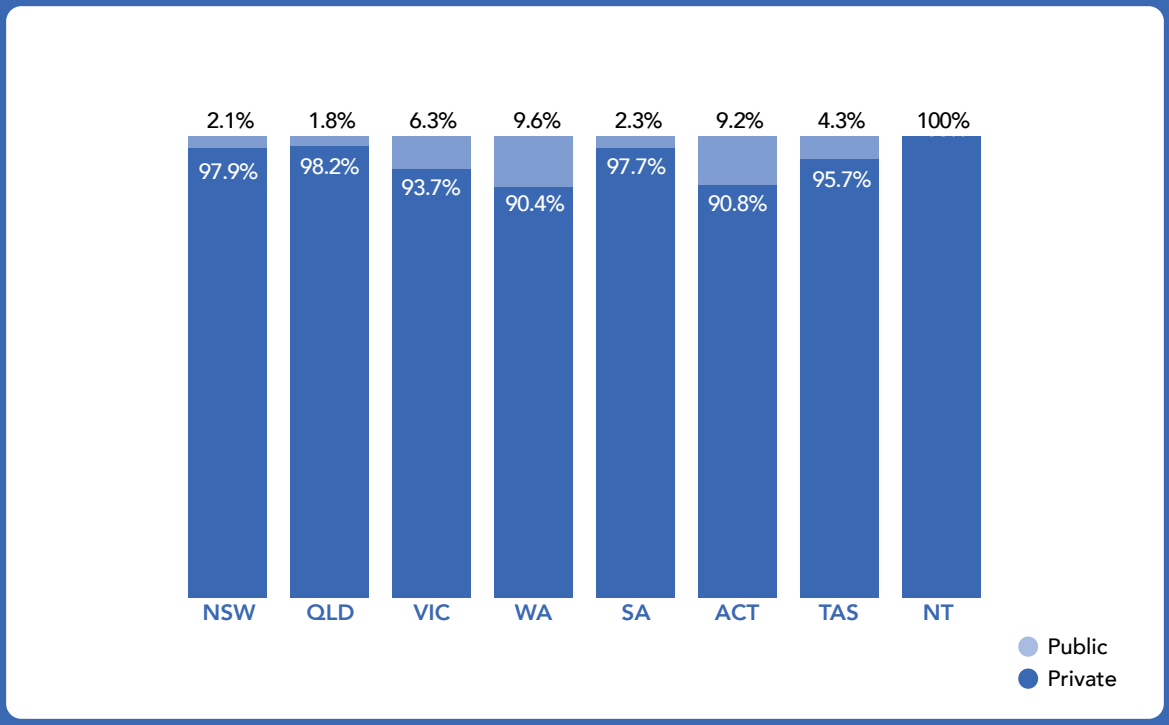


Figure 10 - Procedures (primary and revision) by jurisdiction and funding for 2022, Australia, n= 20,222

PARTICIPANT CHARACTERISTICS

SEX

In 2022, 79.7% of primary procedures were completed for females and this is consistent with previous years (Figure 11).

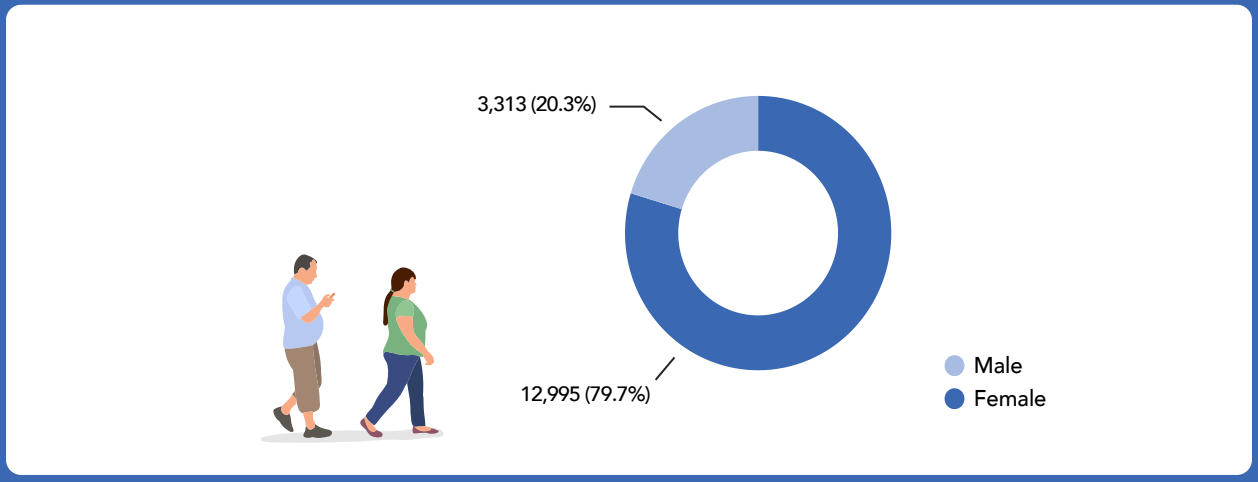


Figure 11 - Primary procedures by sex for 2022, Australia, n= 16,308

AGE AT PROCEDURE

The age distribution for 2022 primary procedures is shown in Figure 12. with the 35-39 year age group being the most common for both males and females. In 2022, the Registry captured 18 Australian participants were under 18 years of age at the time of having their primary procedure.

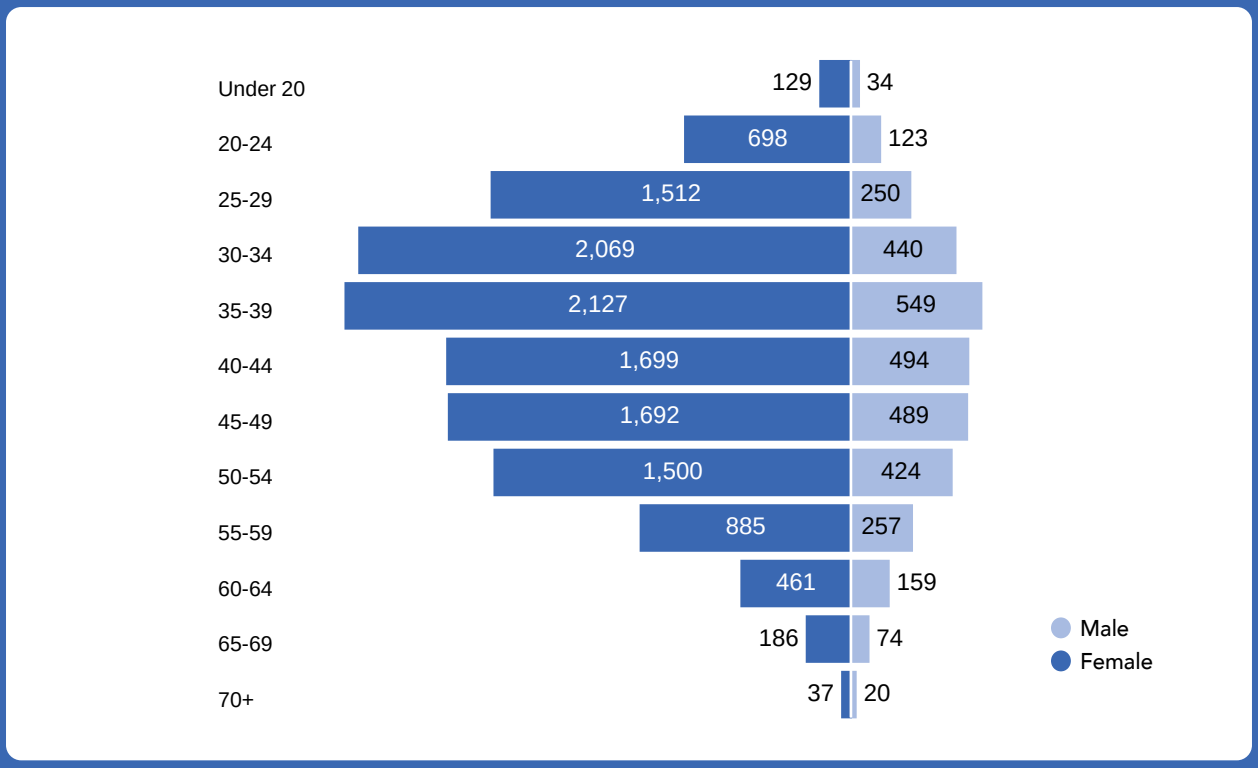


Figure 12 - Age distribution at primary procedure by sex for 2022, Australia, n = 16,308

The average age at the time of primary procedure in 2022 was 41.4 years with a standard deviation (SD) of 11.2 (Table 7). Female participants on average were 41.0 years (SD 11.2) at the time of their primary procedure compared to males who were two years older with an average age of 43.1 years (SD 11.2) at time of primary procedure. The youngest participant having a primary procedure in 2022 was 14.1 years and the oldest was 78.6 years.

	Age at procedure	Sleeve	RYGB	OAGB	Band	Other	Total
FEMALE	n	10,437	1,103	1,351	58	46	12,995
	Mean (SD)	40.6 (11.2)	43.3 (10.9)	42.3 (11.3)	44.8 (12.1)	42.6 (12.0)	41.0 (11.2)
	Min/Max	14.1 / 78.6	18.2 / 73.4	17.4 / 74.5	20.4 / 64.3	23.1 / 73.3	14.1 / 78.6
MALE	n	2,627	304	342	21	19	3,313
	Mean (SD)	42.9 (11.1)	44.9 (11.8)	43.3 (11.3)	41.8 (11.5)	43.8 (12.5)	43.1 (11.2)
	Min/Max	16.0 / 77.4	18.1 / 76	18.1 / 70.3	23.3 / 60.6	19.7 / 66.0	16.0 / 77.4
TOTAL	**n**	**13,064**	**1,407**	**1,693**	**79**	**65**	**16,308**
	Mean (SD)	**41.0 (11.2)**	**43.6 (11.1)**	**42.5 (11.3)**	**44.0 (11.9)**	**42.9 (12.0)**	**41.4 (11.2)**
	Min/Max	**14.1 / 78.6**	**18.1 / 76.0**	**17.4 / 74.5**	**20.4 / 64.3**	**19.7 / 73.3**	**14.1 / 78.6**

Table 7 - Participant age at primary procedure by sex and type of bariatric procedure for 2022, Australia

INITIAL BMI

In addition to collecting a participant's weight at operation, the Registry also collects start weight for primary procedures. Start weight is the weight of a participant at the first presentation to a health service when the intention to treat with bariatric surgery is made. Finally, an initial weight is derived and equals the higher of either a participant's start weight or weight at operation. Once a participant's initial BMI is calculated using their initial weight and height, their initial BMI is classed into one of six BMI ranges (underweight, health weight, overweight but not obese, obese class I, obese class II, obese class III) (WHO, 2000; Appendix 4).

Figure 13 shows of the participants having a primary procedure in 2022, 62.8% were in the obese class III range, 28.6% in the obese class II range, 8.4% in the obese class I range and <1% in the overweight range. This is consistent with previous years. In 2022, those who had publicly funded bariatric surgery were more likely to have an initial BMI in the obese class III range (86.4%) compared to those having privately funded surgery (62.0%) (Table 8). Males were more likely to be in the obese class III group compared to females for both public and privately funded bariatric surgery.

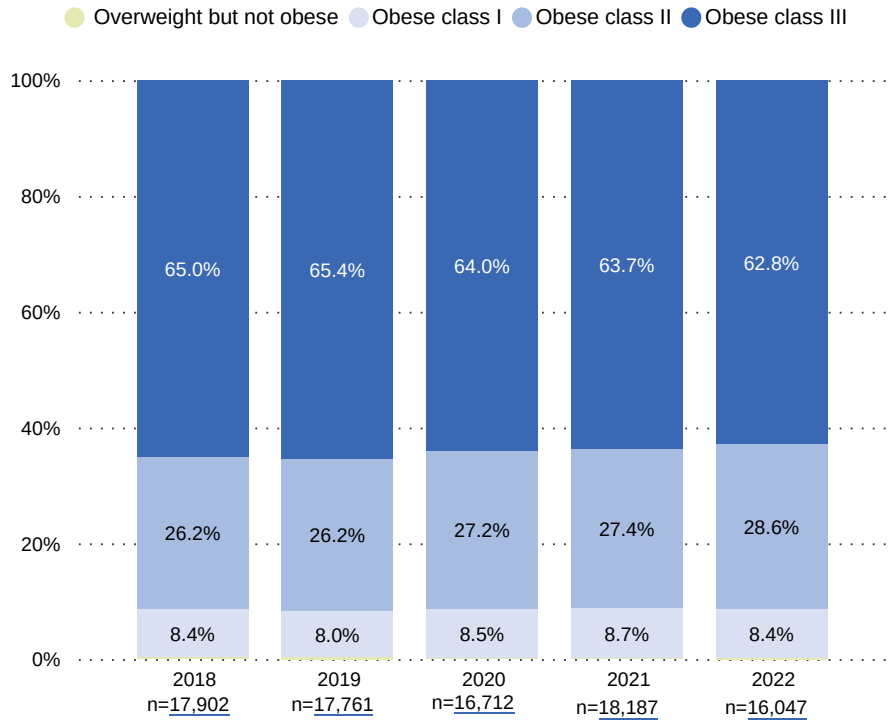


Figure 13 - Initial BMI range for adult participants at time of primary procedure for the last five years, Australia, n= 86,609

	PRIVATE			PUBLIC		
	FEMALE	MALE	TOTAL	FEMALE	MALE	TOTAL
Obese class III	7,450 (60.1%)	2,194 (69.7%)	9,644 (62.0%)	338 (85.8%)	94 (88.7%)	432 (86.4%)
Obese class II	3,733 (30.1%)	791 (25.1%)	4,524 (29.1%)	51 (12.9%)	11 (10.4%)	62 (12.4%)
Obese class I	1,190 (9.6%)	159 (5.1%)	1,349 (8.7%)	5 (1.3%)	1 (0.9%)	6 (1.2%)
Overweight but not obese	27 (0.2%)	3 (0.1%)	30 (0.2%)	0	0	0
Total	12,400 (100.0%)	3,147 (100.0%)	15,547 (100.0%)	394 (100.0%)	106 (100.0%)	500 (100.0%)

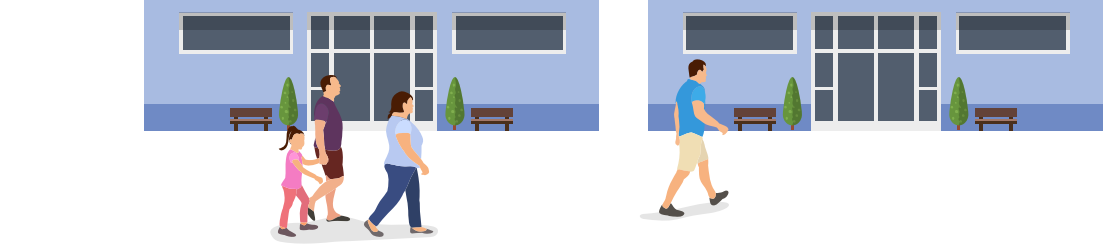


Table 8 - Initial BMI range for participants having a primary procedure by sex and funding for 2022, Australia, n= 16,047

DIABETES AT BASELINE

Amongst participants who had a primary procedure in 2022, 10.6% were reported as having diabetes mellitus, referred to in this report as 'diabetes' (Figure 14). The proportion of participants reported to have diabetes at the time of their primary procedure has reduced over time. It should be noted that presence of diabetes (diabetes status) in the Registry is based on a clinical report (from surgeons) and no data is collected about type of diabetes or the results of diagnostic test/s completed, for example, HbA1c blood test results.

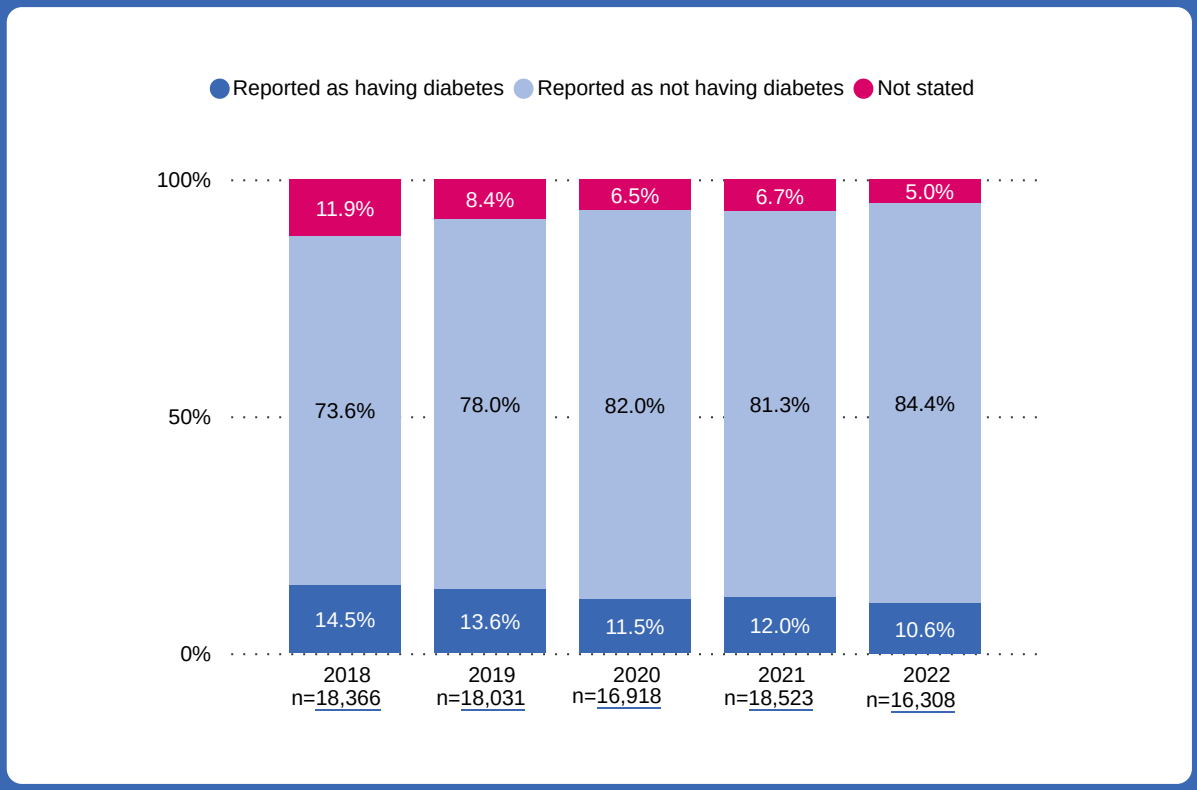


Figure 14 - Reported diabetes status at time of primary procedure for last five years, Australia

In 2022, 9.3% of female primary participants were reported as having diabetes at the time of their primary procedure compared to 15.5% of male participants (Figure 15). A higher proportion of diabetes was reported for participants having a primary Roux-en-Y gastric bypass (20.3 %) or one anastomosis gastric bypass (15.8 %) when compared with primary sleeve gastrectomy (8.8 %) (Figure 16).

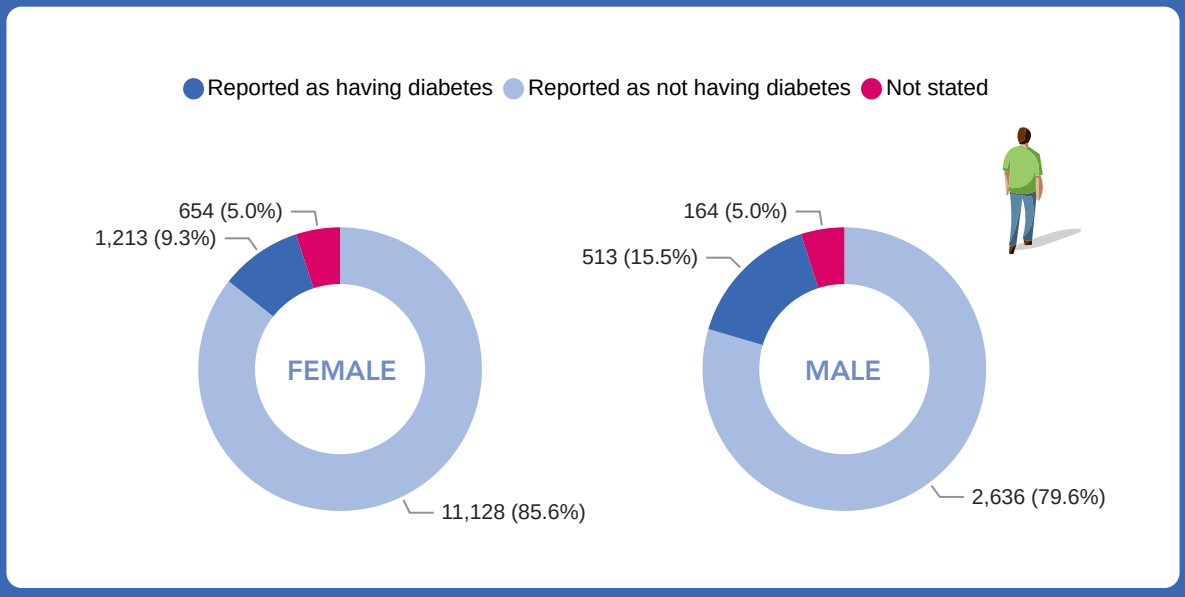


Figure 15 - Reported diabetes status at time of primary procedure by sex for 2022, Australia, n= 16,308

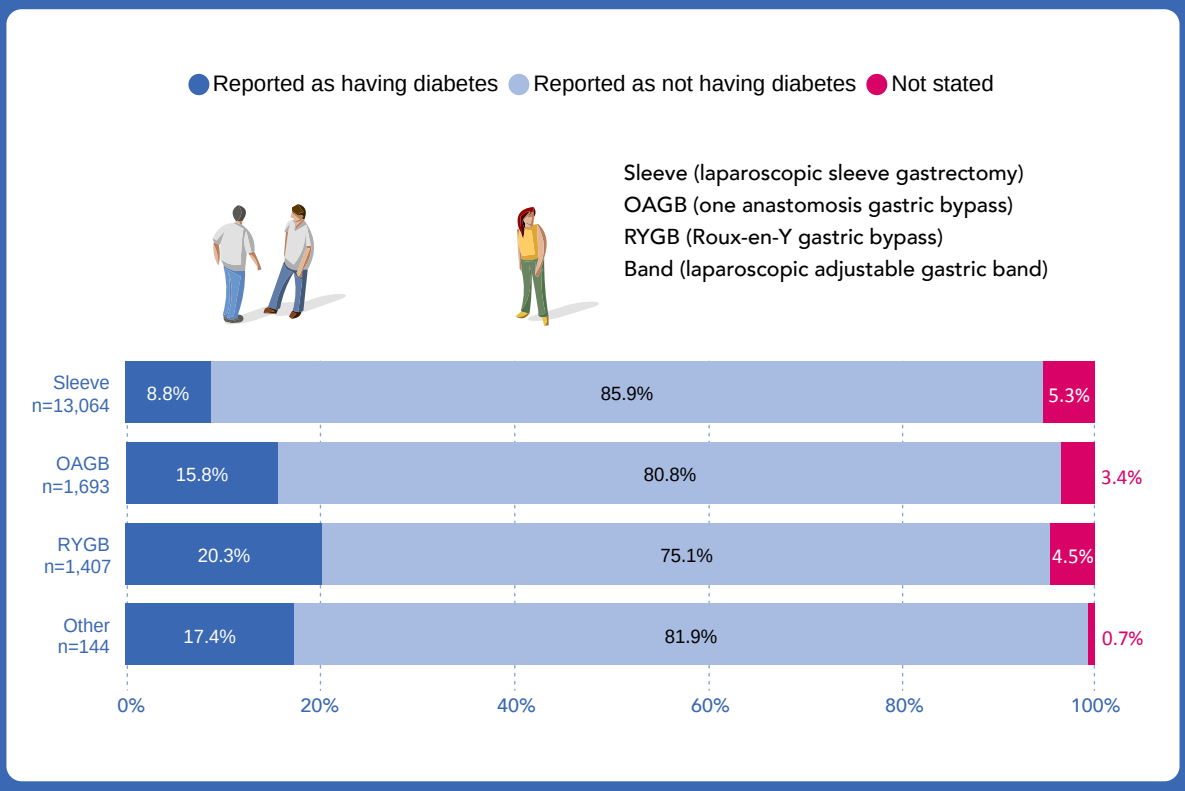


Figure 16 - Reported diabetes status at time of primary procedure by procedure type for 2022, Australia, n= 16,308

DIABETES TREATMENT AT BASELINE

In 2022, the most common diabetes treatment for participants at the time of their primary procedure (baseline) was non-insulin (single) therapy (34.1%), followed by diet/exercise (24.9%), non-insulin (multiple) therapy (17.8%), insulin (15.1%) and treatment type not stated for the remaining 8.2% participants (Table 9). Diabetes treatment type was insulin for a larger proportion of males (16.8%) compared to females (14.3%) (Figure 17). Participants who had a primary one anastomosis gastric bypass were more likely to be on medication to treat their diabetes compared to those having other types of primary procedures (Figure 18).

	2022			All Australia		
DIABETES TREATMENT	FEMALE	MALE	TOTAL	FEMALE	MALE	TOTAL
Diet/exercise	321 (26.5%)	108 (21.1%)	429 (24.9%)	2,617 (24.6%)	899 (17.4%)	3,516 (22.3%)
Non-insulin therapy (single)	422 (34.8%)	167 (32.6%)	589 (34.1%)	3,705 (34.8%)	1,657 (32.1%)	5,362 (33.9%)
Non-insulin therapy (multiple)	206 (17.0%)	101 (19.7%)	307 (17.8%)	1,683 (15.8%)	1,083 (21.0%)	2,766 (17.5%)
Insulin	174 (14.3%)	86 (16.8%)	260 (15.1%)	1,850 (17.4%)	1,156 (22.4)%)	3,006 (19.0%)
Not stated	90 (7.4%)	51 (9.9%)	141 (8.2%)	777 (7.3%)	373 (7.2%)	1,150 (7.3%)
TOTAL 100%	1,213	513	1,726	10,632	5,168	15,800

Table 9 - Diabetes treatment at baseline by sex for participants with reported diabetes at time of primary procedure, Australia

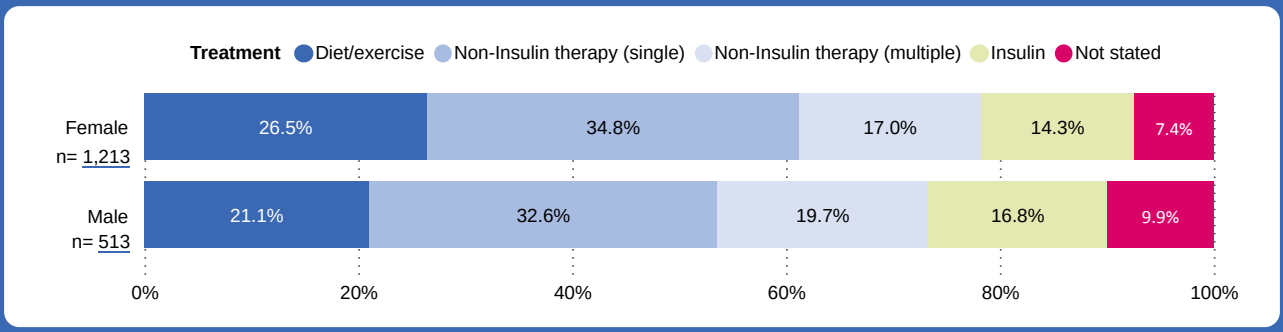


Figure 17 - Diabetes treatment at time of primary procedure by sex for 2022, Australia, n= 1,726

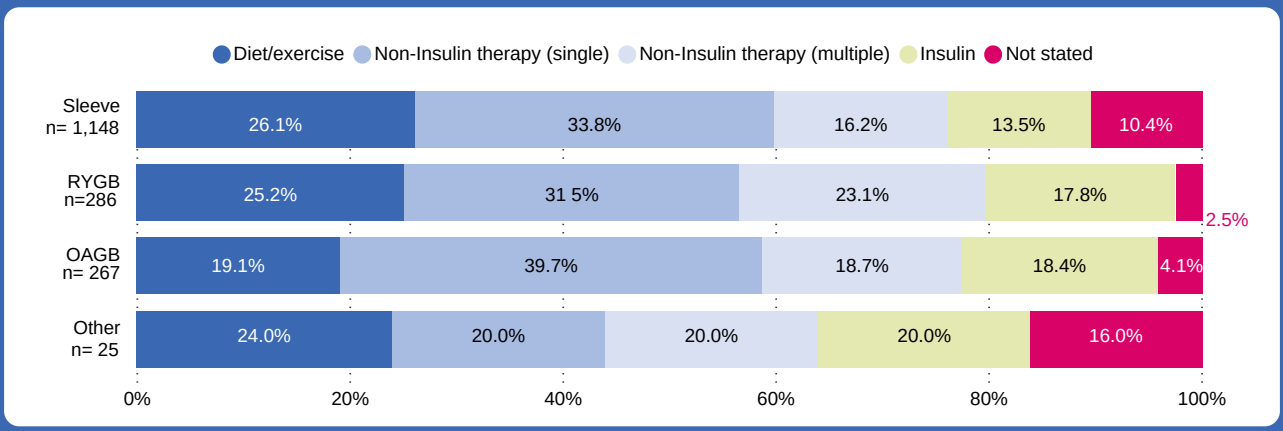


Figure 18 - Diabetes treatment at time of primary procedure by procedure type for 2022, Australia, n= 1,726

SAFETY REPORTING

90-DAY OUTCOMES - DEFINED ADVERSE EVENTS

The Registry considers any of the following as a defined adverse event (DAE) if it occurs in the 90 days following a primary or revision bariatric procedure:

- unplanned return to theatre
- unplanned admission to ICU
- unplanned re-admission to hospital

To allow for the time lag in receiving 90-day outcome data, the data relating to operations in financial year 2021/22 was used for defined adverse event analysis. Ninety-day outcome data was recorded for 18,747 (85.3%) of the procedures captured for financial year 2021/22 and of these 295 primary procedures had one or more associated DAE, whereas 413 revision procedures had one or more associated DAE (Table 10).

The proportion of primary procedures with any DAE varied depending on procedure type being 1.3% for sleeve gastrectomy, 3.7% for one anastomosis gastric bypass, 5.3% for Roux-en-Y gastric bypass and 8.4% for gastric band (Table 11).

	PRIMARY	REVISION	TOTAL
Procedures with any defined adverse event	295	413	708
Unplanned return to theatre	146	351	497
Unplanned admission to ICU	7	18	25
Unplanned readmission to hospital	180	108	288

Table 10 - Defined adverse events by primary revision type for financial year 2021/22, Australia

	Procedures with any defined adverse event	Percentage with any defined adverse event	Procedures with completed 90-day outcome data
PRIMARY PROCEDURES	295	2.0%	15,044
Sleeve gastrectomy	151	1.3%	11,907
RYGB	76	5.3%	1,440
OAGB	57	3.7%	1,537
Gastric band	9	8.4%	107
SADI/SIPS	2	3.9%	51
Other	0	0.0%	2
CONVERSION/REVISION	173	7.5%	2,301
Sleeve gastrectomy	20	4.8%	419
RYGB	123	9.8%	1,261
OAGB	28	5.4%	518
Gastric band	1	3.2%	31
SADI/SIPS	1	1.8%	57
Other	0	0.0%	15
REVERSAL	19	2.4%	805
Surgical reversal of gastric band	16	2.0%	789
Other	3	18.8%	16
ADJUSTMENT/CORRECTION	221	37.0%	597
Dilatation of stricture	82	49.1%	167
Port revision	7	7.9%	89
Lavage/washout +/- drainage	27	51.9%	52
Other	105	36.3%	289
Total	708	3.8%	18,747

Table 11- Defined adverse events by procedure type for financial year 2021/22, Australia

Any unplanned procedure performed in the 90 days after a bariatric procedure or subsequent intervention is automatically recorded as a 'return to theatre' according to the Registry's definition of a defined adverse event. As such, adjustment/correction procedures which are often repeated in a sequence of interventions to treat a post-operative complication (such as the treatment of a leak or management of stricture) have an inherent higher rate of return to theatre due to the Registry's rules.

It is important to note that only procedures with completed 90-day outcome data are included in defined adverse event reporting.

The following limitations should also be considered in interpreting defined adverse event data:

- The Registry does not capture all bariatric procedures in Australia, as some sites and surgeons do not participate.
- The defined adverse event rates have not been risk-adjusted to account for casemix and other key factors such as weight at operation, BMI, age or comorbidities which are known to impact outcomes.
- Defined adverse event data is submitted by participating surgeons so is not from an independent source which could result in under-reporting.
- Readmissions to a non-participating hospital site may not be captured by the Registry and this may also lead to underreporting of defined adverse events.

The Registry also collects data on the reasons for a defined adverse event but this data has not been analysed in depth and is not included in this report. Each defined adverse event may have multiple reasons attributed to the DAE recorded and the most common reason reported in 2022 was the 'other' category and therefore not specific. Reasons frequently reported included vomiting, abdominal pain, leak, dehydration or electrolyte imbalance, haemorrhage, stenosis or stricture, dysphagia, nausea, and deep vein thrombosis/pulmonary embolism or other venous thromboses.

90-DAY OUTCOMES - MORTALITY

Deaths are rare in the Registry, but as a longitudinal registry there is an expectation that reporting the death of participants will occur. It is possible that the Registry does not receive notification of all deaths, in particular for those participants who are legacy participants or are primary participants who have been lost to follow-up. In this report the Registry is reporting all-cause mortality within 90 days. Reporting all-cause mortality includes all deaths regardless of whether the death is deemed related to the bariatric procedure or not. This advantage of all-cause reporting over cause-specific mortality reporting is that it can be reported in a more timely manner without the need to wait for Coroner's reports or other reports in order to determine if the death was related to the procedure.

The Registry has recorded 54 all-cause deaths that occurred within 90 days of a primary or revision procedure (Table 12). The most frequently reported causes of death were sepsis/septic shock/multi-organ failure or peritonitis (29.6%), cardiac event (24.1%), thrombosis (including DVT and pulmonary emboli) (9.3%), and trauma including died by suicide (9.3%). Overall the Registry has recorded 54 deaths within 90-days of a procedure for 157,909 Australian procedures (including abandoned procedures).

Table 12 - 90-day all cause mortality and cause of death since Registry commenced Australia

Cause of death	Number of deaths - n (%)
Sepsis/septic shock/multi organ failure/peritonitis from leak	16 (29.6%)
Cardiac event	13 (24.1%)
Thrombosis (including DVT and pulmonary emboli)	5 (9.3%)
Trauma	5 (9.3%)
Cancer	2 (3.7%)
Cerebrovascular event	2 (3.7%)
Other cause	3 (5.6%)
Specific cause not yet determined	8 (14.8%)
TOTAL	54 (100%)

LONG TERM OUTCOMES

ANNUAL OUTCOME DATA COLLECTION

The Registry's protocol is to collect annual outcome data for primary participants up until ten years after their primary procedure. At annual outcome data collection points a participant's weight, diabetes outcomes and any subsequent procedures are recorded. A participant will not have annual outcome data collected if they have passed away, if the Registry does not have current contact details or if the participant has notified the Registry that they do not wish to be contacted.

The Registry has annual outcome data for 154,087 data collection points ranging from one year to ten years after primary bariatric procedure (Table 13). Surgeons, their allocated staff or the bariatric clinic have collected 67.7% of annual outcome data whilst 32.3% of annual outcome data has been collected directly from participants through calls made by Registry staff.

Annual data point	Cumulative participants that have reached data point	Data completed n (%)	Completed by surgeon/rooms/clinic	Completed by Registry
1 year	110,790	66,587 (60.1)	53,722	12,865
2 year	93,150	39,405 (42.3)	23,776	15,629
3 year	73,498	23,049 (31.4)	12,034	11,015
4 year	58,043	12,957 (22.3)	6,886	6,071
5 year	39,412	6,660 (16.9)	3,832	2,828
6 year	22,830	3,239 (14.2)	2,135	1,104
7 year	12,501	1,393 (11.1)	1,115	278
8 year	4,565	534 (11.7)	496	38
9 year	1,443	207 (14.3)	196	11
10 year	598	56 (9.4)	56	0
TOTAL	416,830	154,087	104,248	49,839

Table 13 - Completion of annual outcome data by data collection point for primary participants, Australia

WEIGHT OUTCOMES

Figure 19 shows the distribution of BMI classification for participants at one-year compared to their initial BMI. The one-year weight (BMI) outcomes for participants who had an initial BMI in the obese class III range showed 13.0% (4,867) of participants remained in obese class III, 19.4% (7,232) were now considered to be in the obese class II range, 34.7% (12,981) were in the obese class I range, 27.4% (10,237) were overweight but not obese, with 5.5% (2,037) now classified in the healthy weight range and less than one percent in the underweight range.

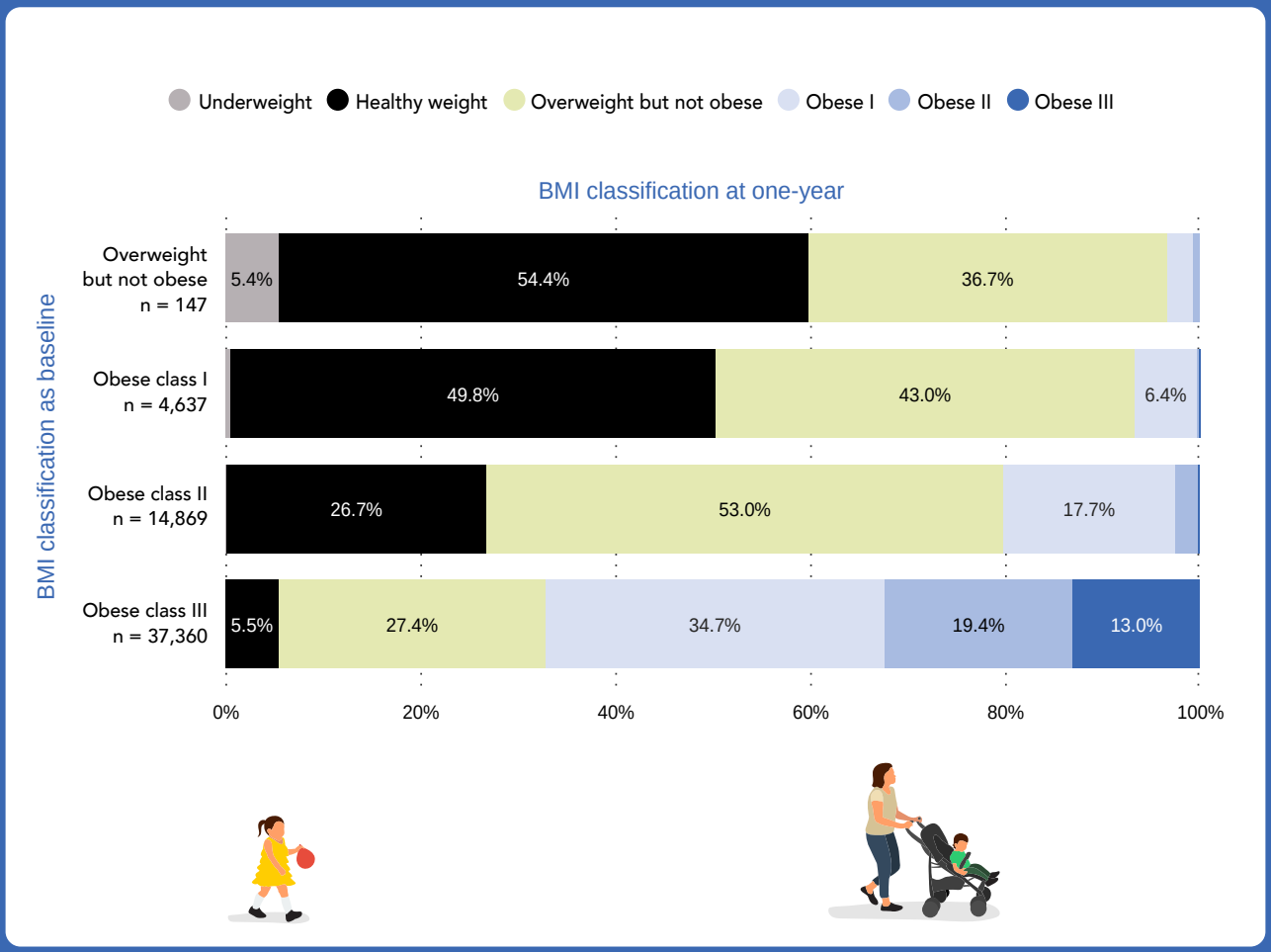


Figure 19 - Initial BMI range and one-year BMI for adult primary participants, Australia, n= 57,013

Excludes participants <18 years at age at primary procedure, participants for whom baseline and/or one-year weight is not available, participants who have a verified initial BMI <25. Percentages not shown: overweight but not obese at baseline group, 2.7% were in obese class I range and 0.7% were in obese class II range at one year; obese class I at baseline group, 0.5% were in the underweight range, 0.2% were in the obese class II and 0.2 % were in the obese class III range at one-year; obese class II at baseline group, 0.1% were in the underweight range, 2.3% were in the obese class II range and 0.2% were in the obese class III range at one-year; obese class III at baseline group, <0.1% were in the underweight range at one-year.

	Sex			Procedure type					
	FEMALE	MALE	TOTAL	SLEEVE	RYGB	OAGB	Band	Other	TOTAL
PRIVATE (n)	41,724	11,638	53,362	40,752	4,154	3,930	4,312	214	53,362
% EWL Mean (SD)	75.3 (30.9)	68.4 (23.8)	73.8 (29.6)	76.1 (28.8)	79 (25.4)	76.6 (25.1)	45.3 (29.8)	69.7 (32.6)	73.8 (29.6)
% TWL Mean (SD)	29.4 (9.5)	28.3 (9.4)	29.1 (9.5)	29.8 (8.6)	32.1 (8.7)	32.3 (8.8)	16.6 (9.1)	30.2 (13.8)	29.1 (9.5)
PUBLIC (n)	2,817	834	3,651	2,367	395	83	790	16	3,651
% EWL Mean (SD)	59.5 (32.4)	54.9 (25.6)	58.5 (31)	65.2 (30.1)	70.7 (23.6)	68.1 (22.0)	31 (20.8)	63.1 (10.9)	58.5 (31.0)
% TWL Mean (SD)	26.7 (11.5)	25.2 (11.3)	26.3 (11.5)	29.3 (9.8)	30.9 (8.9)	33.3 (9.8)	14.2 (9.2)	31.8 (5.3)	26.3 (11.5)
ALL (n)	44,541	12,472	57,013	43,119	4,549	4,013	5,102	230	57,013
% EWL Mean (SD)	74.3 (31.2)	67.5 (24.1)	72.8 (29.9)	75.5 (29.0)	78.3 (25.3)	76.5 (25.0)	43.1 (29)	69.3 (31.6)	72.8 (29.9)
% TWL Mean (SD)	29.2 (9.7)	28.1 (9.6)	29 (9.7)	29.8 (8.7)	32 (8.7)	32.3 (8.8)	16.2 (9.1)	30.3 (13.4)	29 (9.7)

Table 14 - Weight outcomes at one-year for adult primary participants by sex, procedure type and funding, Australia

Excludes participants <18 years of age of primary procedure and those with sex recorded as 'other'.
OAGB=one anastomosis gastric bypass, RYGB=Roux-en-Y gastric bypass and sleeve=laparoscopic sleeve gastrectomy

The Registry also tracks weight outcomes for up to 10 years by calculating annual excess and total weight loss. Table 14 shows percentage excess and total weight loss outcomes at one-year for adult primary participants in Australia by sex, funding and type of primary procedure. The Registry has 57,013 adult participants with baseline and one-year weight recorded. For these participants the mean percentage EWL is 72.8% (SD 29.9%), and mean TWL is 29.0% (SD 9.7%). Participants with publicly funded procedures have a lower mean EWL (58.5%) and TWL (26.3%) compared to participants who had their procedure privately (mean EWL 73.8% ; mean TWL 29.1%). Female participants have a higher percentage EWL (74.3%, SD 31.2%) and TWL (29.2%, SD 9.7%) at one-year compared to males' EWL percentage (67.5%, SD 24.1%) and percentage TWL (28.1%, SD 9.6%). Participants who had a primary sleeve gastrectomy, gastric bypass and other type of procedures have a higher average percentage EWL and percentage TWL at one-year compared to those who have had a primary gastric band.

Figures 20 and 21 show the average EWL percentage and TWL percentage for 5,759 participants who have four years of complete annual data. The participants with a sleeve gastrectomy or gastric bypass have a higher average percentage EWL and percentage TWL over all four years when compared to those who had a gastric band. The highest average percentage EWL and percentage TWL is seen at the two-year point for all procedure types, with a small decline in percentage EWL and percentage TWL after that point.

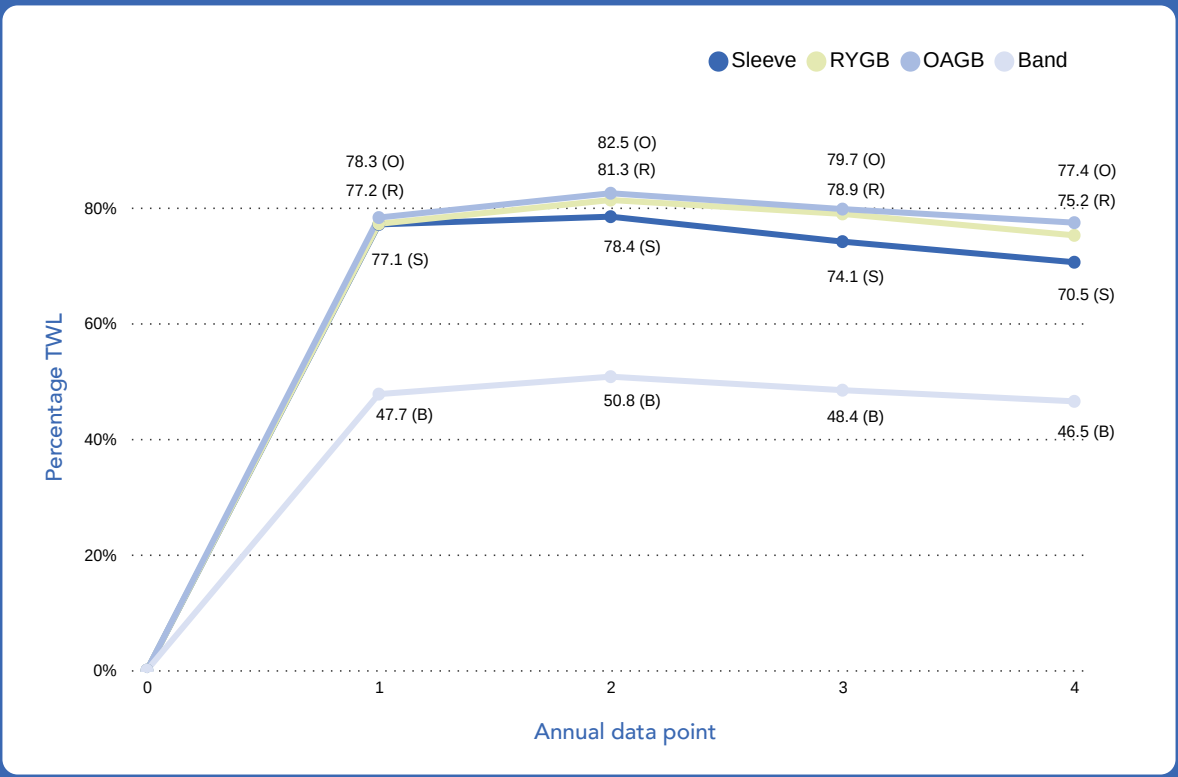


Figure 20 - Average percentage excess weight loss (%EWL) for adult primary participants who have annual weight data for the first four years by procedure type, Australia, n= 5,759

Excludes participants that do not have weight data for all of the first four annual data collection points. S or Sleeve= laparoscopic sleeve gastrectomy (n=3,220), R or RYGB= Roux-en-Y gastric bypass (n=479), O or OAGB=one anastomosis gastric bypass (n=207), B or Band= laparoscopic adjustable gastric band (n=1,853).

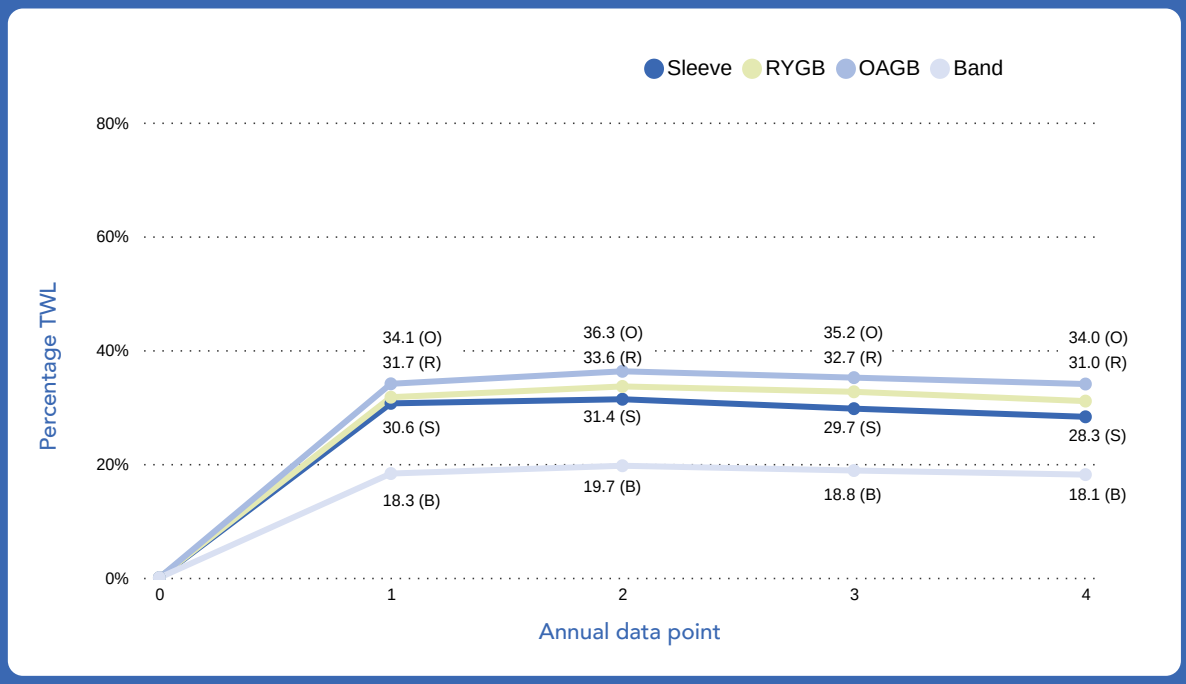


Figure 21 - Average percentage total weight loss (%TWL) for adult primary participants who have annual weight data for the first four years by procedure type in Australia, n= 5,759

Excludes participants that do not have weight data for all of the first four annual data collection points. S or Sleeve= laparoscopic sleeve gastrectomy (n=3,220), R or RYGB= Roux-en-Y gastric bypass (n=479), O or OAGB=one anastomosis gastric bypass (n=207), B or Band=laparoscopic adjustable gastric band (n=1,853).

DIABETES OUTCOMES

The Registry has 10,399 participants reported as having diabetes at time of surgery or baseline who also have one year diabetes data (Table 15). At one-year, 9.3% participants reported diet/exercise as treatment for diabetes, whilst 46.5% of participants no longer reported having diabetes. The proportion of participants reporting insulin for diabetes treatment reduced from 20.4 % at the time of procedure to 5.9% at one-year. However, it is important to note that diabetes treatment data is not available at the one-year data point for 55.7% of participants who reported diabetes at baseline (17.6% due to missing data and 38.1% being lost to follow-up).

Diabetes treatment	Baseline - n (%)	One year - n (%)
Surgery alone	-	4,834 (46.5)
Diet/exercise	2,204 (21.2)	971 (9.3)
Non-insulin therapy (single)	3,630 (34.9)	996 (9.6)
Non-insulin therapy (multiple)	1,719 (16.5)	248 (2.4)
Insulin	2121 (20.4)	612 (5.9)
Treatment not stated	725 (7.0)	1,828 (17.6)
Lost to follow-up	-	910 (8.8)
TOTAL	**10,399 (100.0)**	**10,399 (100.0)**

Table 15 - Diabetes treatment at baseline for those primary participants with reported diabetes at baseline and diabetes treatment one-year, Australia

Figure 22 shows the distribution of diabetes treatment at one-year based on a participant's treatment type at baseline, and excludes those with missing diabetes treatment data. Of the 1,601 participants who reported 'insulin' as their diabetes treatment at baseline, at one-year 30.1% reported continued treatment with insulin, 20.5% reported treatment with non-insulin therapies (singlr or multiple medications), 8.6% reported diet/exercise alone as their diabetes treatment and for 40.8% no diabetes was reported. A reduction in the proportion of participants treated with non-insulin therapies is also seen at one-year.

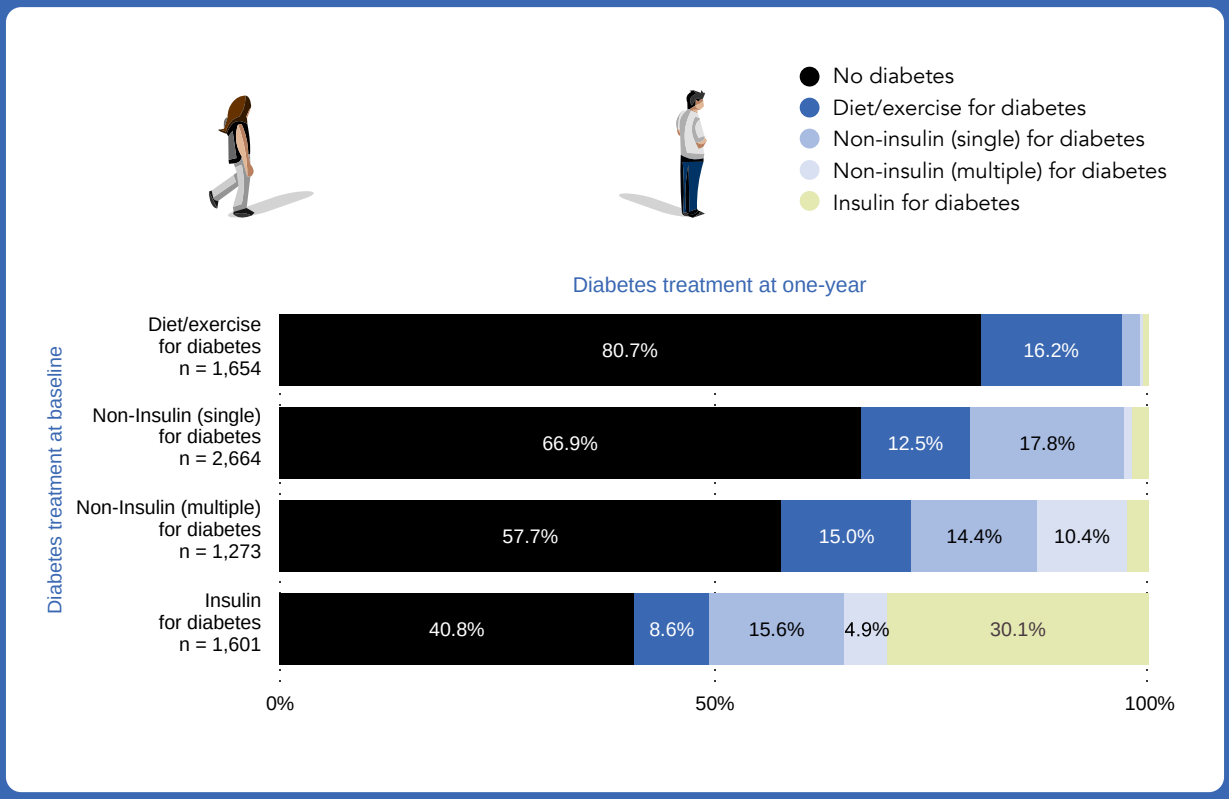


Figure 22 - Diabetes treatment outcomes at one-year for participants who reported diabetes at primary procedure, Australia, n=7,192

Percentages not shown: Diet/exercise at baseline group, 2.2% reported non-insulin (single) therapy, 0.3% reported non-insulin (multi) therapy and 0.7% reported insulin for diabetes at one-year; non-insulin (single) at baseline group, 0.9% reported non-insulin (multi) therapy and 1.9% reported insulin for diabetes at one-year; non-insulin (multi) therapy at baseline group 2.5% reported insulin for diabetes at one-year. Excludes 3,207 participants with unknown diabetes treatment at baseline and/or one-year.

SUBSEQUENT PROCEDURES

The Registry has recorded 4,734 primary participants who have had more than one procedure, representing 3.9% of all primary participants in Australia . Table 16 shows the number of participants who have had subsequent procedures recorded by year since primary surgery. For example, of those participants who are up to five years post-procedure, 4.0% have required one subsequent intervention, 0.6% had two subsequent interventions, 0.1% had three subsequent interventions with < 0.2% have had four of more subsequent interventions.

Table 17 shows the median time in days from primary procedure to subsequent intervention. Median time to first subsequent intervention following a primary sleeve gastrectomy is 877 days with an interquartile range (IQR) of 182 to 1,471 days showing a some degree of variability. The median time is lower for Roux-en-Y gastric bypass and one anastomosis gastric bypass with a median of 66 (IQR 18-390) and 236 (IQR 30-669) respectively, it is higher for those with a primary gastric band with an average of 1,693 (IQR 510 - 1,743) days.

Number of procedures	Years since procedure										
	1	2	3	4	5	6	7	8	9	10	Total
Primary procedure only	17,455	19,361	15,091	18,029	15,774	9,622	7,152	2,658	584	333	106,059
One subsequent procedure	152	230	297	493	669	560	593	331	179	118	3,622
Two subsequent procedures	19	34	37	76	95	115	147	105	63	64	755
Three subsequent procedures	9	9	9	17	19	20	29	23	12	12	159
Four or more subsequent procedures	5	18	21	16	25	12	15	5	7	7	131
TOTAL	17,640	19,652	15,455	18,631	16,582	10,329	7,936	3,122	845	534	110,726

Table 16 - Primary participants by number of subsequent interventions and 'number of years' since primary procedure, Australia, n= 120,419

Number of procedures	Band		Sleeve		OAGB		RYGB	
	n	Median (IQR)	n	Median (IQR)	n	Median (IQR)	n	Median (IQR)
One subsequent procedure	1,693	1,078 (510-1,743)	2,177	877 (182-1,471)	325	236 (30-669)	501	66 (18-390)
Two subsequent procedures	579	266 (99-667)	281	36 (11-210)	68	28 (9-262)	129	23 (12-93)
Three subsequent procedures	108	304 (99-853)	105	14 (6-58)	24	37 (14-77)	56	16 (7-42)
Four or more subsequent procedures	23	137 (60-581)	63	20 (8-42)	14	8 (6-291)	33	16 (7-30)
Five or more subsequent procedures	5	211 (182-1,481)	163	18 (8-44)	34	9 (3-12)	61	15 (6-36)

Table 17 - Days between subsequent interventions for primary participants by primary procedure type, Australia, n= 4,696

AOTEAROA NEW ZEALAND

AOTEAROA NEW ZEALAND ACKNOWLEDGEMENT

Tēnā koutou katoa,

We would like to thank our industry funders for their on-going support. Their commitment to best quality care is much appreciated. Their funding has allowed the establishment and ongoing conduct of the Bariatric Surgery Registry in Aotearoa New Zealand.

We could not have started in Aotearoa New Zealand without the support of the staff at National Institute of Health Innovation (NIHI), University of Auckland. Thank you to Vanessa Ding and Professor Chris Bullen who provided their support, ensuring the Registry continued its momentum.

I would also like to acknowledge the considerable effort that every bariatric surgeon in Aotearoa New Zealand, their teams and the participating hospital sites have put into the Bariatric Registry.

We acknowledge the extra work, it is time consuming, yet the enthusiasm to make the Registry work has been amazing. It is so heartening to see the commitment we share as the bariatric surgical community to improving the quality of the care we provide our patients.

Finally thank you to our participants who generously share their information with us to improve the quality of bariatric surgery. Participant numbers have doubled in the 18 months since the last report (FY 20/21). We are indebted to all of you!

Ngā mihi nui,

Associate Professor Andrew MacCormick

BHB MBChB PhD FRACS

Clinical Lead Aotearoa New Zealand

HOSPITAL AND SURGEON PARTICIPATION

Registry participation varies over time due to surgeons retiring and new surgeons joining as well as changes to where surgeons are operating. Figure 23 shows Aotearoa New Zealand hospital and surgeon participation in the Registry for 2022. Surgeon and hospital participation across Aotearoa New Zealand has remained steady for the last two years with 19 surgeons and 18 hospitals contributing (Figure 24).

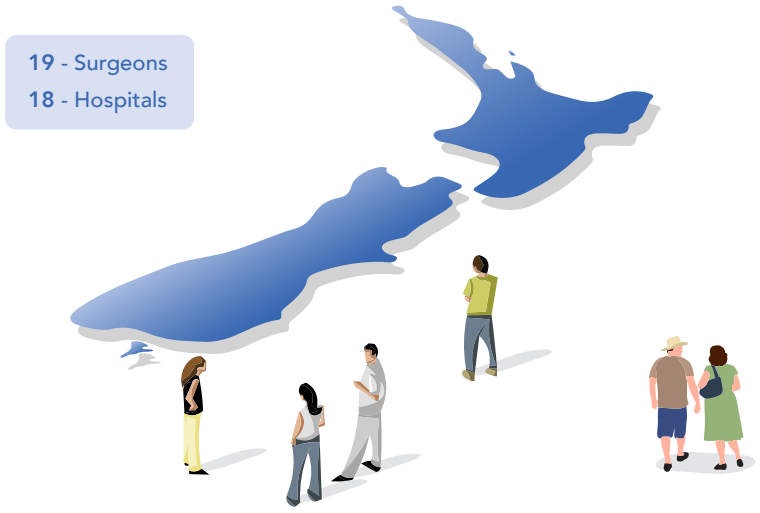


Figure 23 - Hospitals and surgeons for 2022 operations captured by the Registry, Aotearoa New Zealand

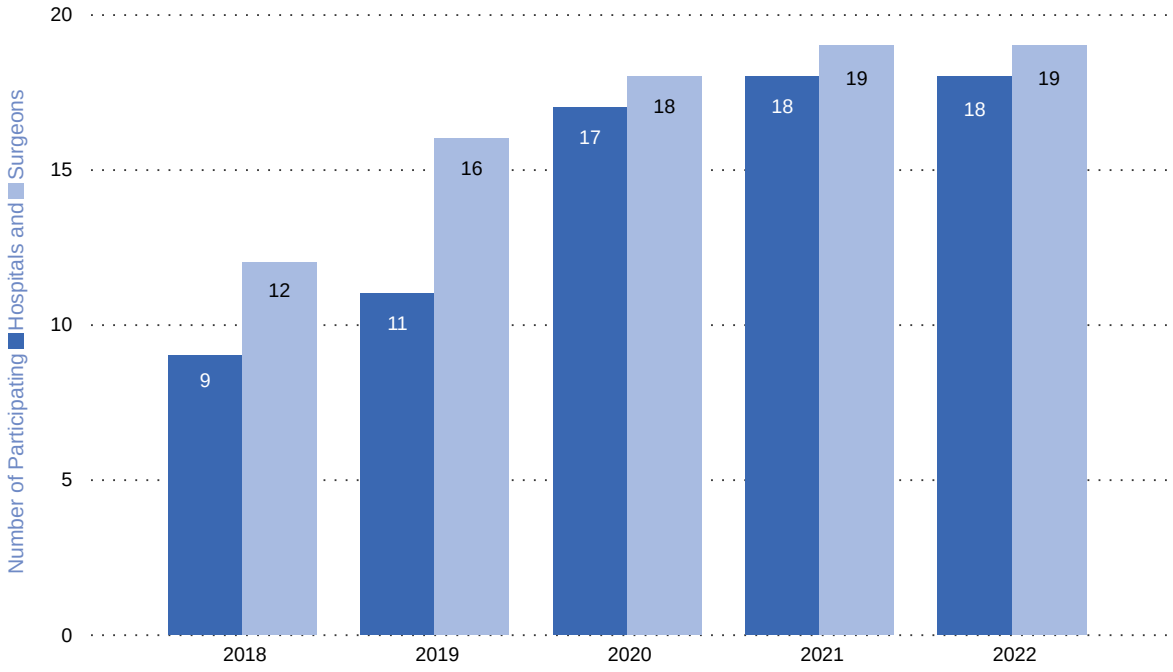


Figure 24 - Participating hospitals and surgeons by year since Registry commenced, Aotearoa New Zealand

PARTICIPANT ENROLMENT

Since Aotearoa New Zealand recruitment commenced in 2018, the Registry has enrolled 6,436 participants who have had a procedure up until 31 December 2022, this includes 3 participants who only have an abandoned procedure recorded in the Registry (Table 18). A further 83 (1.27%) people who have had a bariatric procedure with a participating surgeon have chosen to opt out of Registry participation. Primary participants make up 96.4% of the Registry and legacy participants represent 3.6% (Table 19). Figure 25 demonstrates the growth in Registry enrolment since its commencement in Aotearoa New Zealand.

6,436	83	1.27%
Number of participants	Number opted out	Opt Out Rate

Table 18 - Participant enrolment, Aotearoa New Zealand

	FEMALE		MALE		ALL	
Primary Participants	5,212	96.4%	993	96.5%	6,205	96.4%
Legacy Participants	193	3.6%	36	3.5%	229	3.6%
TOTAL	**5,405**	**100%**	**1,029**	**100%**	**6,434**	**100%**

Includes 3 Aotearoa New Zealand participants who only had an abandoned procedure.
Excludes participants with sex recorded as 'other', n=2.

Table 19 - Participants by primary or legacy participant type and sex, Aotearoa New Zealand

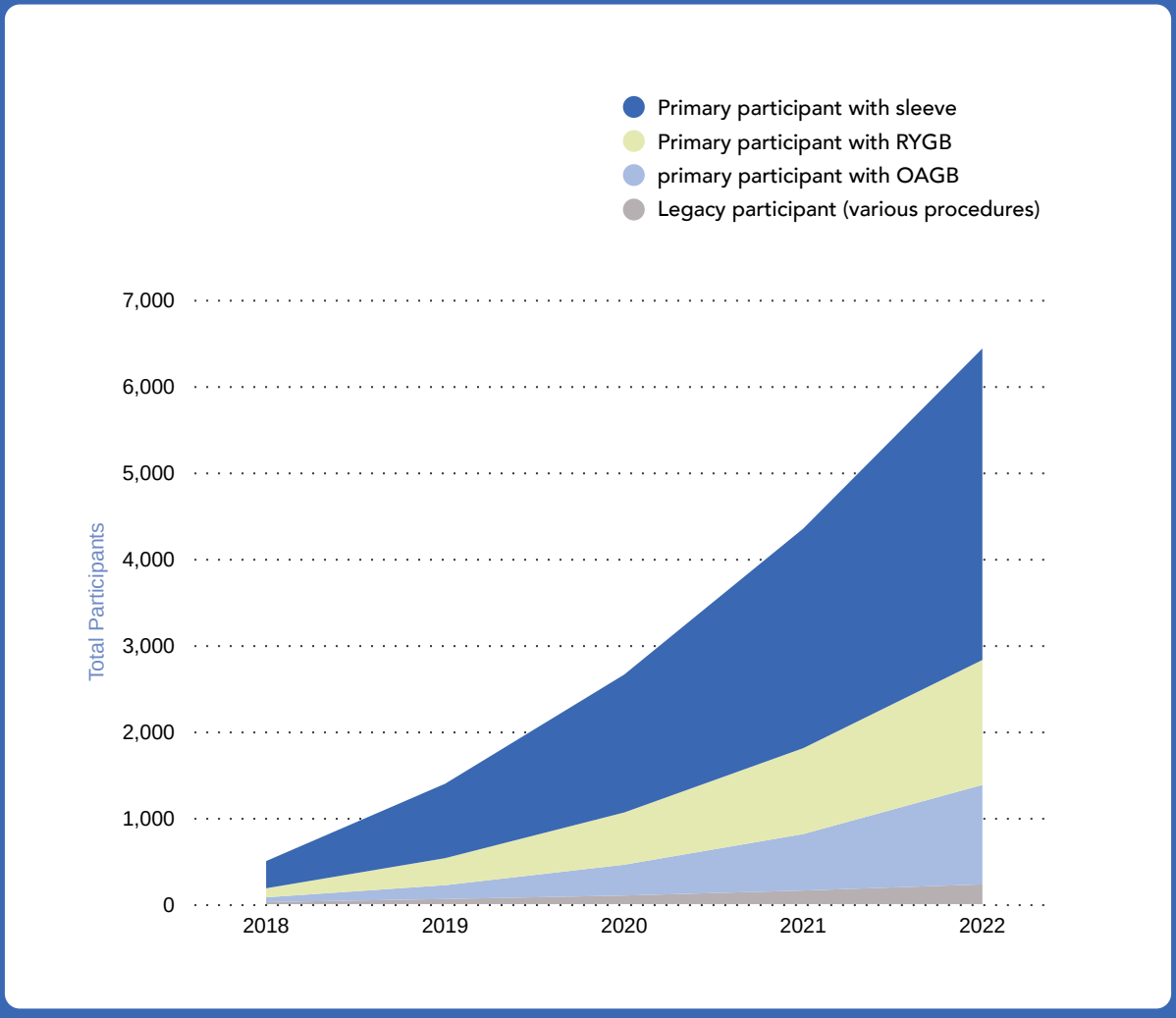


Figure 25 - Cumulative enrolment by participant type and procedure when enrolled, Aotearoa New Zealand

Includes participants who only had an abandoned procedure (n=3). Excludes one participant with 'other' procedure type. Sleeve= sleeve gastrectomy, RYGB= Roux-en-Y gastric bypass, OAGB=one anastomosis gastric bypass.

PROCEDURES

The Registry has captured 6,587 procedures for 6,433 participants in Aotearoa New Zealand and an additional 4 abandoned procedures which are not reported further. Of the 2,108 procedures that occurred in 2022, 2,014 (95.5%) were primary procedures and 94 (4.5%) were revision procedures or subsequent interventions (Figure 26). The types of primary and revision procedures captured by the Registry are shown in Table 20. Since the last annual report the Registry has captured 3,136 procedures and Figure 27 shows procedures over time for Aotearoa New Zealand.

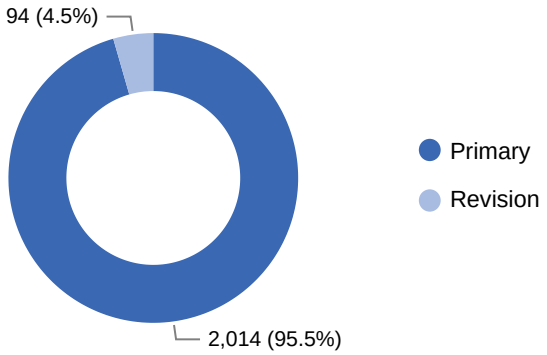


Figure 26 - Procedures by operation status for 2022, Aotearoa New Zealand, n= 2,108

	2022			All Aotearoa New Zealand		
	PRIMARY	REVISION	TOTAL	PRIMARY	REVISION	TOTAL
Sleeve gastrectomy	1,063	3	1,066	3,605	17	3,622
RYGB	452	59	511	1,446	183	1,629
OAGB	498	16	514	1,152	39	1,191
SADI/SIPS	1	0	1	1	0	1
Surgical reversal of gastric band	0	2	2	0	12	12
Dilatation of stricture	0	7	7	0	64	64
Lavage/washout +/- drainage	0	2	2	0	27	27
Other	0	5	5	0	41	41
TOTAL (100%)	**2,014**	**94**	**2,108**	**6,204**	**383**	**6,587**

Table 20 - Procedures by procedure type and operation status for 2022 and all Aotearoa New Zealand

OAGB = one anastomosis gastric bypass, RYGB= Roux-en-Y gastric bypass, SADI/SIPS = single anastomosis duodeno-ileostomy/stomach intestinal pylorus-sparing surgery. Excludes abandoned procedures.

Figure 27 - Procedures over time by procedure type, Aotearoa New Zealand
Excludes 'other' procedure type, n=1

PRIMARY PROCEDURES

The majority of 2,014 primary bariatric procedures that occurred in 2022 were sleeve gastrectomy (52.8 %), followed by one anastomosis gastric bypass (24.7 %) and Roux-en-Y gastric bypass (22.4 %) (Table 20). The proportion of primary sleeve gastrectomy has decreased over time with the proportion of primary gastric bypass procedures growing over time from 33.8% in 2018 to 47.1% in 2022 (Figure 28).

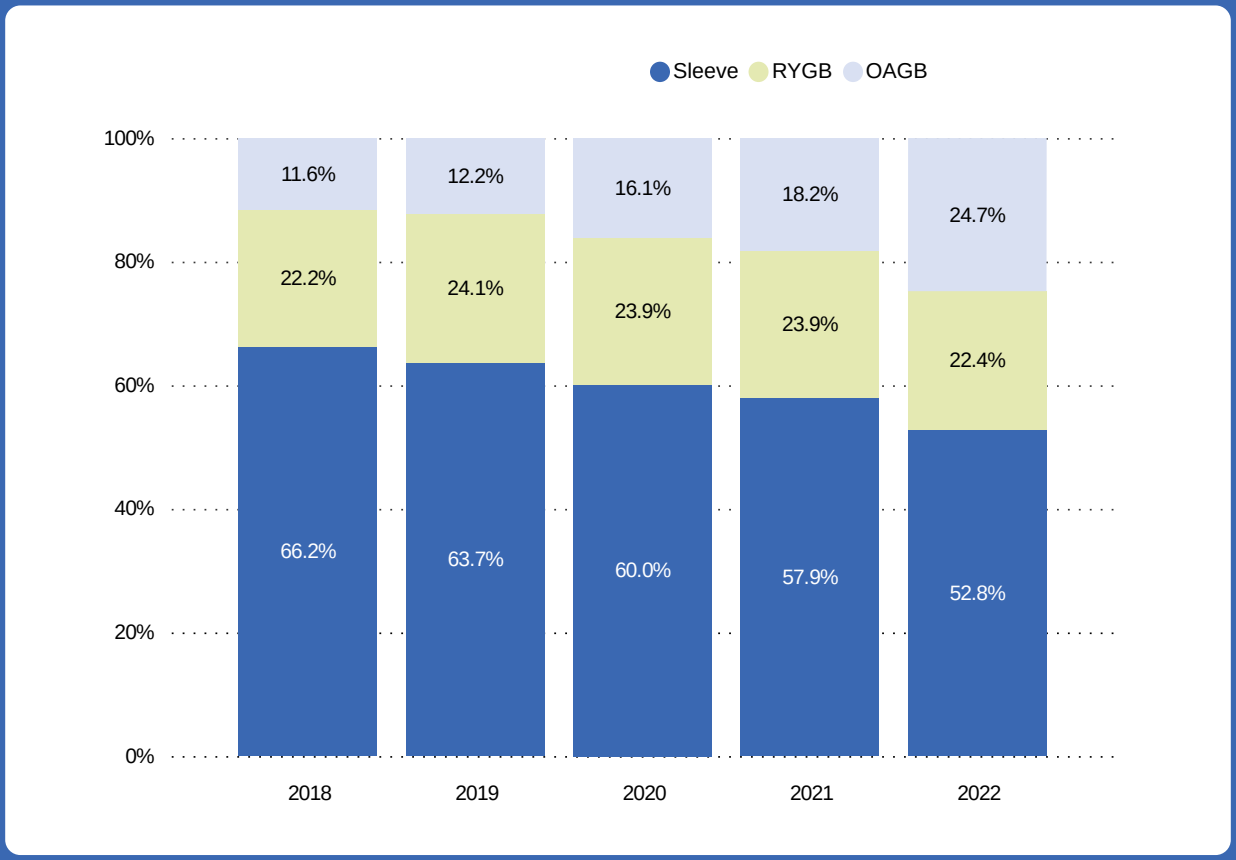


Figure 28 - Proportion of primary procedure type by year, Aotearoa New Zealand, n=6,202

Excludes primary procedure completed in 2017, n=1 and 'other' procedure type, n=1

REVISION PROCEDURES

Revision procedures captured by the Registry include any subsequent procedure performed upon a person who has had a previous bariatric procedure. Examples of revision procedures include conversion to a subsequent type of bariatric procedure (for example, changing from having a gastric band to a gastrectomy), revision of a previous bariatric procedure with the same type (for example a revision of a previous bypass) and procedures that are performed to manage complications related to an existing type of bariatric procedure such as dilatation of a stricture, division of adhesions, lavage and drainage for a leak after a previous bariatric procedure, or a reversal of a gastric band. A participant may have more than one type of revision procedure in a single visit to the operating theatre and in these cases the Registry records the major procedure.

The Registry captured 94 revision procedures in 2022 representing 4.5% of all procedures captured by the Registry in Aotearoa New Zealand in that year (Table 20). The most common revision procedure captured was Roux-en-Y gastric bypass (62.8%) which represents both the revision of an existing bypass and conversion to a Roux-en-Y gastric bypass, followed by one anastomosis gastric bypass (17.0%), dilatation of stricture (7.4%), sleeve gastrectomy (3.2%), reversal of band (2.1%), lavage/washout (2.1%) and all other types accounted for the remaining 5.3% of revision procedures.

PROCEDURE FUNDING

In 2022, the majority of both primary (96.8%) and revision procedures (92.9%) were privately funded (Figure 29).

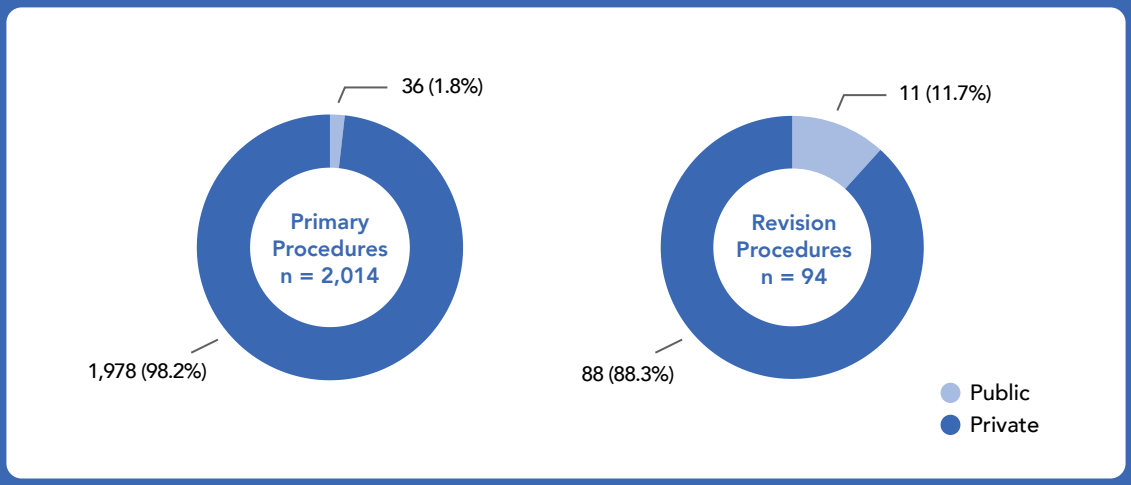


Figure 29 - Procedures by operation status and funding for 2022, Aotearoa New Zealand

PARTICIPANT CHARACTERISTICS

PARTICIPANT SEX

In 2022, 86.0% of primary procedures were completed for females (Figure 30).

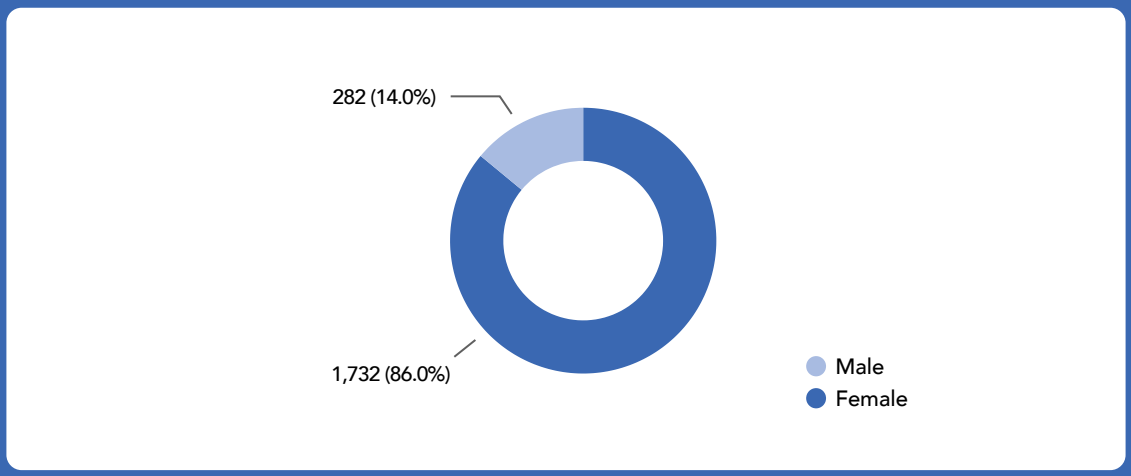


Figure 30 - Primary procedures by sex for 2022, Aotearoa New Zealand, n= 2,014

PARTICIPANT AGE

The age distribution for 2022 primary procedures is shown in Figure 31 with the 45-49 year age group being the most common for both females and males.

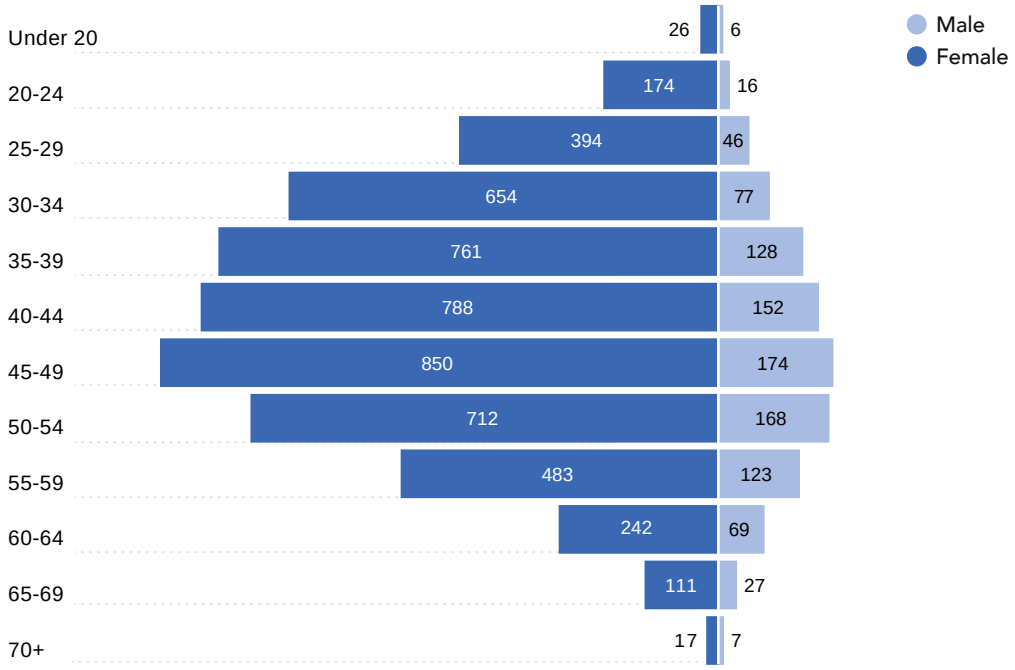


Figure 31 - Age distribution at primary procedure by sex for 2022, Aotearoa New Zealand, n = 2,013

The average age at the time of primary procedure in 2022 was 43.5 years with a standard deviation (SD) of 10.9 years (Table 21). Female participants on average were 43.1 years (SD 10.9) at the time of their primary procedure compared to males who were almost three years older with an average age of 46.0 years (SD 10.7) at time of primary procedure, and this difference was statistically significant. The youngest participant having a primary procedure in 2022 was 16.7 years and the oldest was 74.1 years.

Age at procedure	Sleeve	RYGB	OAGB	Total
FEMALE - n	909	389	433	1,731
Mean (SD)	42.5 (10.7)	45.1 (10.9)	42.7 (11.0)	43.1 (10.9)
Min/Max	16.7 / 74.0	18.8 / 70.8	19.1 / 68.3	16.7 / 74.0
MALE - n	154	63	65	282
Mean (SD)	45.8 (10.6)	47.0 (11.0)	45.4 (10.7)	46.0 (10.7)
Min/Max	18.5 / 69.4	18.1 / 68.5	18.3 / 74.1	18.1 / 74.1
TOTAL - n	**1,063**	**452**	**498**	**2,013**
Mean (SD)	**42.9 (10.7)**	**45.3 (10.9)**	**43.1 (11.0)**	**43.5 (10.9)**
Min/Max	**16.7 / 74.0**	**18.1 / 70.8**	**18.3 / 74.1**	**16.7 / 74.1**

Table 21 - Participant age at primary procedure by type of bariatric procedure and sex for 2022, Aotearoa New Zealand

Sleeve= laparoscopic sleeve gastrectomy, RYGB= Roux-en-Y gastric bypass, OAGB= one anastomosis gastric bypass, SD= standard deviation, Min= minimum age, Max= maximum age.

INITIAL BMI

In addition to collecting primary participants' weight at operation, the Registry also collects their start weight. Start weight is the weight of a participant at the first presentation to a health service when the intention to treat with bariatric surgery is made. Finally, an initial weight is derived and equals the higher of either a participant's start weight or weight at operation. Once a participant's initial BMI is calculated using their initial weight and height, their initial BMI is classed in one of six BMI ranges (underweight, health weight, overweight but not obese, obese class I, obese class II, obese class III) (WHO, 2000; Appendix 4).

Figure 32 shows of the participants having a primary procedure in 2022, 70.4% were in the obese class III range, 23.1% in the obese class II range, 6.3% in the obese class I range and <1% in the overweight but not obese range. Participants who had publicly funded bariatric surgery were more likely to have an initial BMI in the class III obesity category (82.0%) compared to those having privately funded surgery (70.1%) (Table 22). Males were more likely to have class III obesity compared to females for both publicly and privately funded bariatric surgery.

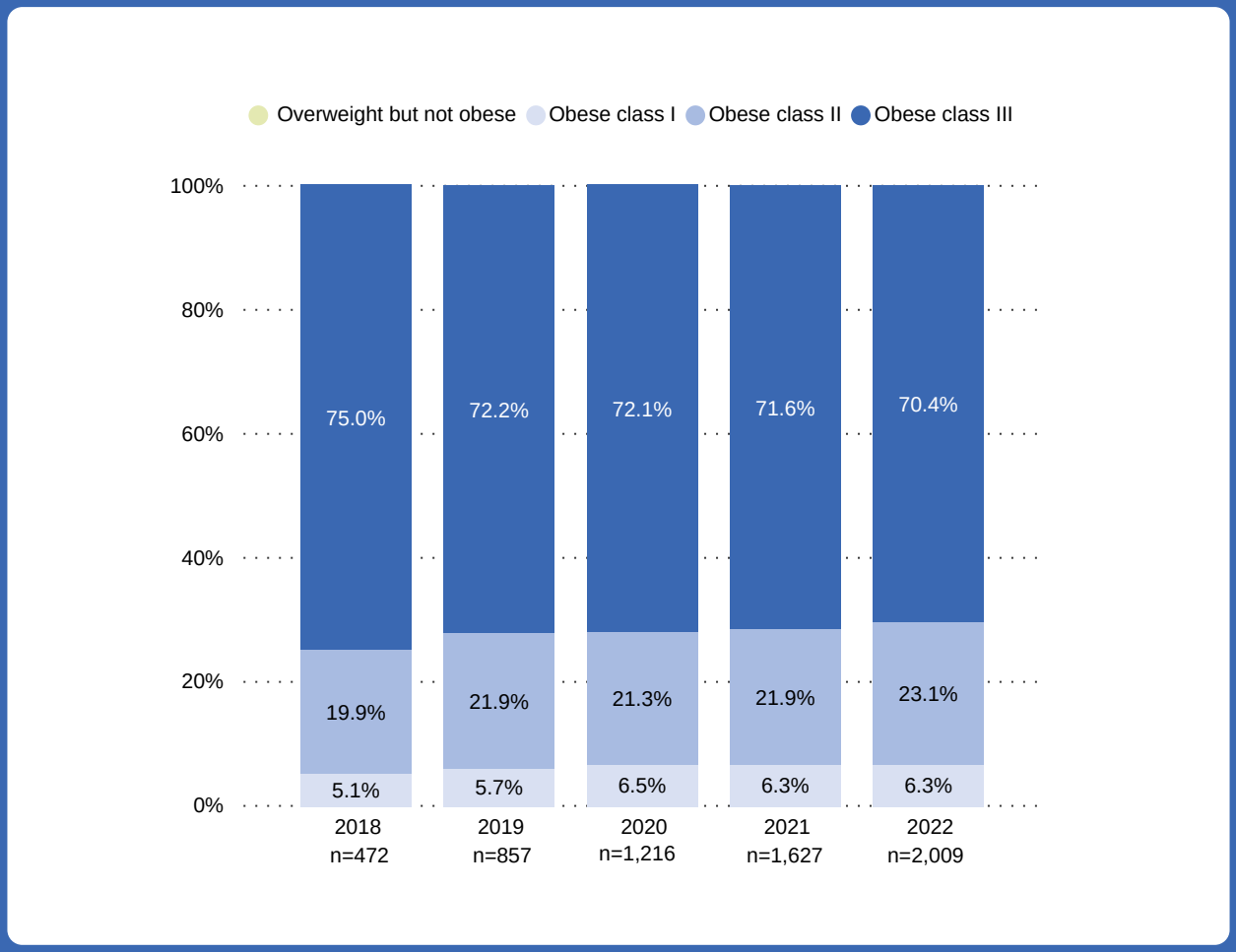
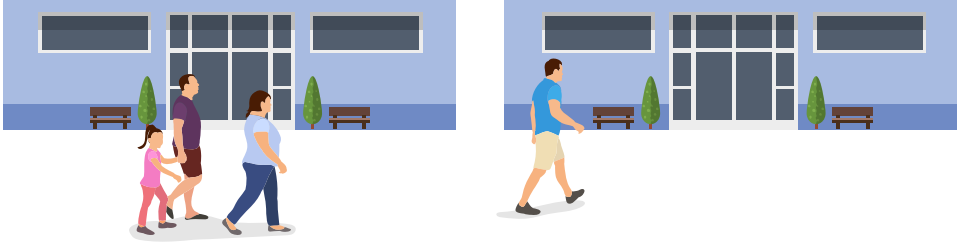


Figure 32 - Initial BMI range for participants at time of primary procedure for the last five years, in Aotearoa New Zealand, n= 6,181

Percentage overweight but not obese is <1% for all years. Excludes participants <18 years at age at time of primary procedure (n=5); and participants for whom an initial BMI cannot be calculated.

	PRIVATE			PUBLIC		
	FEMALE	MALE	TOTAL	FEMALE	MALE	TOTAL
Obese class III	1,179 (69.2%)	204 (75.8%)	1,383 (70.1%)	21 (87.5%)	11 (91.7%)	32 (88.9%)
Obese class II	405 (23.8%)	55 (20.4%)	460 (23.3%)	3 (12.5%)	1 (8.3%)	4 (11.1%)
Obese class I	117 (6.9%)	10 (3.7%)	127 (6.4%)	0	0	0
Overweight but not obese	3 (0.2%)	0	3 (0.2%)	0	0	0
Total	1,704 (100.0%)	269 (100.0%)	1,973 (100.0%)	24 (100.0%)	12 (100.0%)	36 (100.0%)



Excludes participants <18 years at age at procedure, participants where sex is recorded as 'Other', and participants for whom an initial BMI could not be calculated.

Table 22 - Initial BMI range for participants having a primary procedure by sex and funding for 2022, Aotearoa New Zealand, n= 2,009

DIABETES AT BASELINE

Amongst participants who had a primary procedure in 2022, 16.3% were reported as having diabetes mellitus. (Figure 33). The proportion of participants reported to have diabetes at the time of their primary procedure has reduced over time. It should be noted that presence of diabetes (diabetes status) in the Registry is based on a clinical report (from surgeons) and no data is collected about type of diabetes or the results of diagnostic test/s completed, for example, HbA1c blood test results.

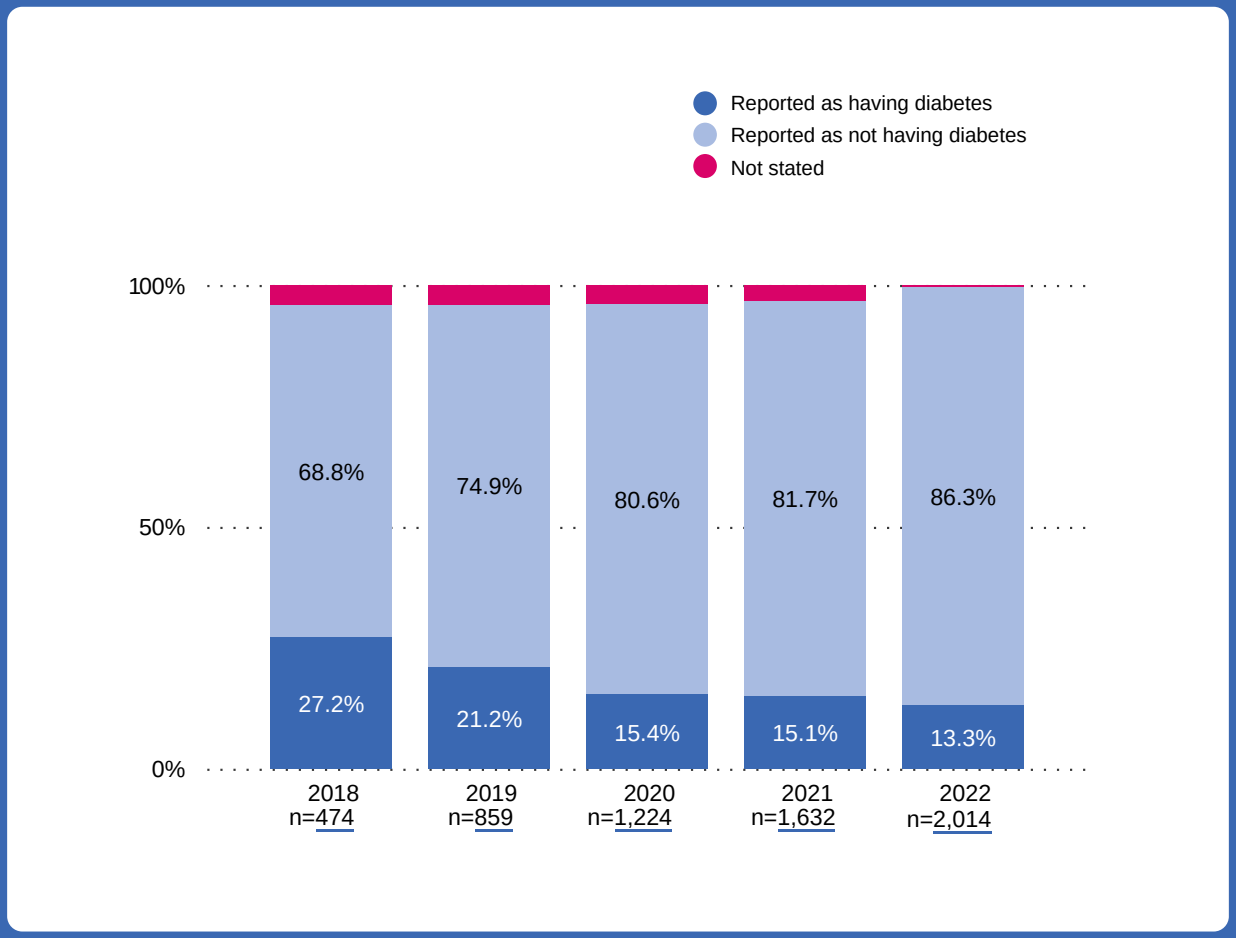


Figure 33 - Reported diabetes status at time of primary procedure for last five years, in Aotearoa New Zealand

In 2022, 11.8% of female primary participants were reported as having diabetes at the time of their primary procedure compared to 22.3% of male participants (Figure 34). A higher proportion of diabetes was reported for participants having a primary gastric bypass procedure (14.6% Roux-en-Y gastric bypass, 14.3% one anastomosis gastric bypass) compared with those having a primary sleeve gastrectomy (12.2%) (Figure 35).

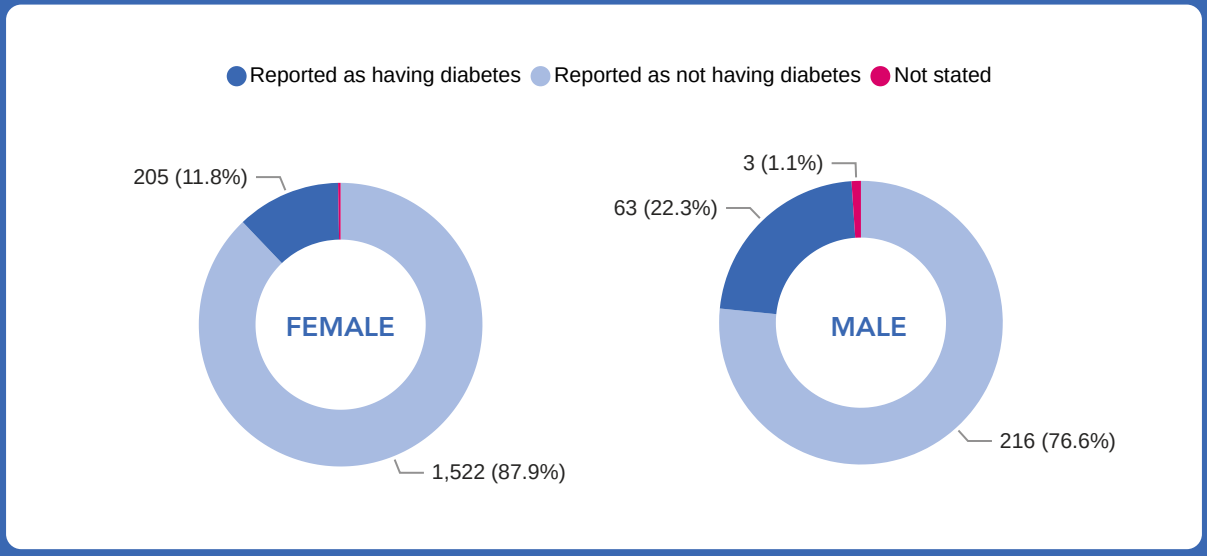
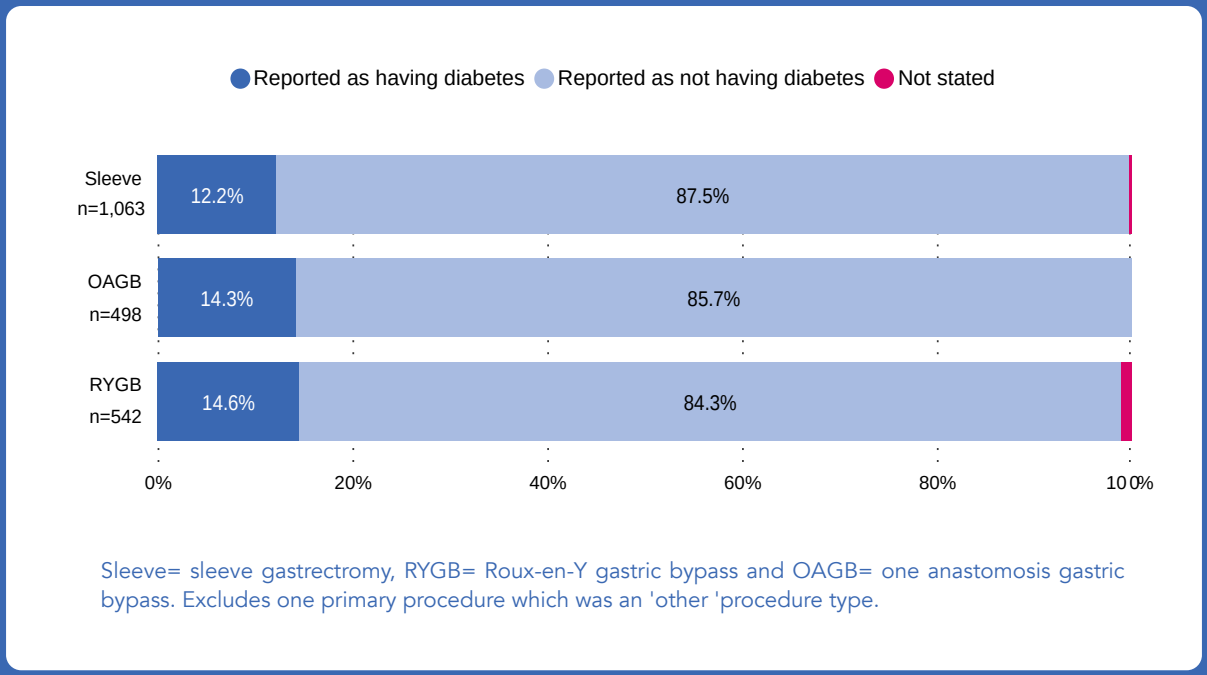


Figure 34 - Reported diabetes status at time of primary procedure by sex for year 2022 in Aotearoa New Zealand, n= 2,014



Sleeve= sleeve gastrectomy, RYGB= Roux-en-Y gastric bypass and OAGB= one anastomosis gastric bypass. Excludes one primary procedure which was an 'other 'procedure type.

Figure 35 - Reported diabetes status for primary participants by primary procedure for 2022 in Aotearoa New Zealand, n=2,013

DIABETES TREATMENT AT BASELINE

In 2022, the most common diabetes treatment for participants at the time of their primary procedure (baseline) was diet/exercise (36.6%), followed by non-insulin (single) therapy (29.1%), insulin (16.8%), non-insulin (multiple) therapy (13.8%), and treatment type not stated for the remaining 3.7% participants (Table 23). Diabetes treatment type was insulin for a larger proportion of females (17.1%) compared to males (15.9%) for 2022 (Figure 36). However, the opposite is seen in the all Aotearoa New Zealand diabetes treatment data with 27.7% of males on insulin compared to 19.7% females. Participants who had a primary one anastomosis gastric bypass were more likely to be on medication to treat their diabetes compared to those having other types of primary procedures (Figure 37).

	2022			All Australia		
DIABETES TREATMENT	FEMALE	MALE	TOTAL	FEMALE	MALE	TOTAL
Diet/exercise	79 (38.5%)	19 (30.2%)	98 (36.6%)	266 (35.8%)	51 (18.8%)	317 (31.3%)
Non-insulin therapy (single)	60 (29.3%)	18 (28.6%)	78 (29.1%)	203 (27.3%)	89 (32.8%)	292 (28.8%)
Non-insulin therapy (multiple)	23 (11.2%)	14 (22.2%)	37 (13.8%)	100 (13.5%)	52 (19.2%)	152 (15.0%)
Insulin	35 (17.1%)	10 (15.9%)	45 (16.8%)	146 (19.7%)	75 (27.7%)	221 (21.8%)
Not stated	8 (3.9%)	2 (3.2%)	10 (3.7%)	28 (3.8%)	4 (1.5%)	32 (3.2%)
TOTAL 100%	205	63	268	743	271	1,014

Table 23 - Diabetes treatment at baseline by sex for participants with reported diabetes at time of primary procedure, Aotearoa New Zealand

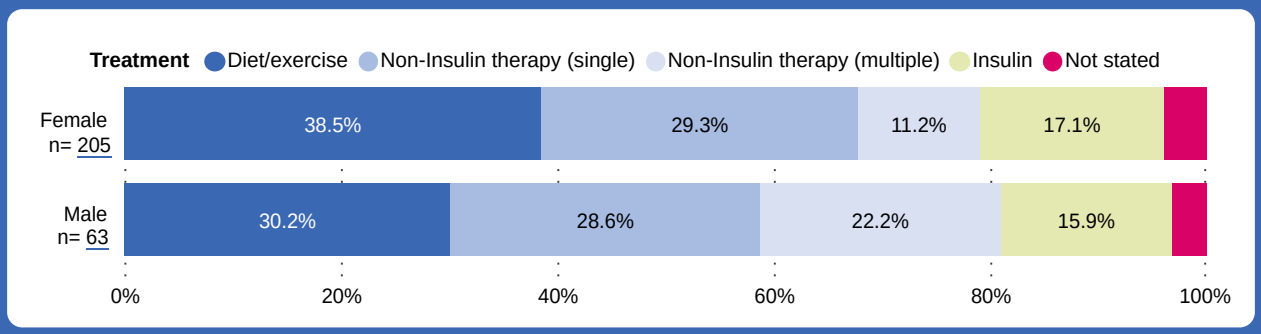


Figure 36 -Diabetes treatment at time of primary procedure by sex for 2022, Aotearoa New Zealand, n= 268

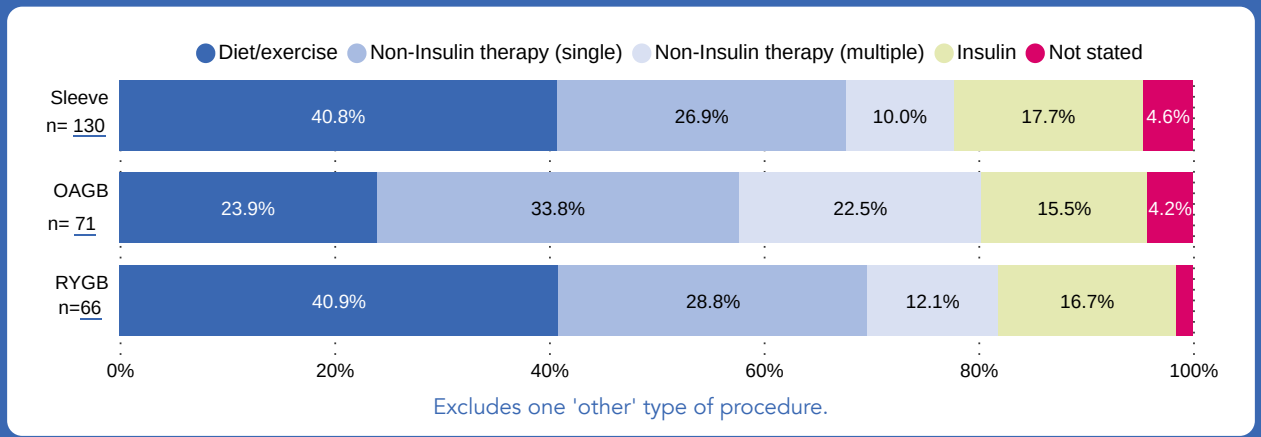


Figure 37 - Reported diabetes treatment at time of primary procedure by procedure type for 2022, Aotearoa New Zealand, n=267

SAFETY REPORTING

90-DAY OUTCOMES - DEFINED ADVERSE EVENTS

The Registry considers any of the following as a defined adverse event (DAE) if it occurs in the first 90 days following a primary or revision bariatric procedure:

- unplanned return to theatre
- unplanned admission to ICU
- unplanned re-admission to hospital

To allow for the time lag in receiving 90-day outcome data, the data relating to operations in financial year 2021/22 was used for defined adverse event reporting. Ninety-day outcome data was recorded for 1,843 (97.2%) of the procedures captured for 2022 and of those 62 primary procedures had one or more associated DAE, whereas 14 revision procedures had one or more associated DAE (Table 25).

The proportion of completed primary procedures varied depending on procedure type being 3.7% for sleeve gastrectomy, 3.6% for Roux-en-Y gastric bypass and 3.1% for one anastomosis gastric bypass (Table 25). The types of revision procedures with any DAE included Roux-en-Y gastric bypass, one anastomosis gastric bypass, dilatation of stricture and lavage/washout with or without drainage.

	PRIMARY	REVISION	TOTAL
Procedures with any defined adverse event	62	14	76
Unplanned return to theatre	18	9	27
Unplanned admission to ICU	2	0	2
Unplanned readmission to hospital	56	7	63

Table 24 - Defined adverse events by operation status for financial year 2021/22, Aotearoa New Zealand

PROCEDURE	Procedures with any defined adverse event	Percentage with any defined adverse event	Procedures with completed 90-day outcome data
PRIMARY PROCEDURES	62	3.5%	1,747
Sleeve gastrectomy	37	3.7%	1,005
RYGB	14	3.6%	384
OAGB	11	3.1%	358
CONVERSION/REVISION	5	7.4%	68
Sleeve gastrectomy	0	0%	5
RYGB	4	8.2%	49
OAGB	1	7.1%	14
REVERSAL	0	0%	3
Surgical reversal of gastric band	0	0%	2
Other	0	0%	1
ADJUSTMENT/CORRECTION	9	36.0%	25
Dilatation of stricture	3	42.9%	7
Lavage/washout +/- drainage	3	60.0%	5
Other	3	23.1%	13
Total	76	4.1%	1,843

Table 25 - Defined adverse events by procedure type for financial year 2021/22 in Aotearoa New Zealand

Any unplanned procedure performed in the 90 days after a bariatric procedure or subsequent intervention is automatically recorded as a 'return to theatre' according to the Registry's definition of a defined adverse event. As such, adjustment/correction procedures which are often repeated in a sequence of interventions to treat a post-operative complication (such as the treatment of a leak or management of stricture) have an inherent higher rate of return to theatre due to the Registry's rules.

It is important to note that only procedures with completed 90-day outcome data following a procedure are included in defined adverse event reporting. The following limitations should also be considered in interpreting defined adverse event data:

- The Registry does not capture all bariatric procedures in Aotearoa New Zealand, as some sites and surgeons do not participate.
- The defined adverse event rates have not been risk-adjusted to account for casemix and other key factors such as weight at operation, BMI, age or comorbidities which are known to impact outcomes.
- Defined adverse event data is submitted by participating surgeons so is not from an independent source which could result in under-reporting.
- Readmissions to a non-participating hospital site may not be captured by the registry and this may also lead to under-reporting of defined adverse events.

The Registry also collects data on the reasons for a defined adverse event but this data has not been analysed in depth and is not included in this report. Each defined adverse event may have multiple reasons attributed to the DAE recorded and the most common reason reported in 2022 was the 'other' category and therefore not specific. Specific reasons more frequently reported included vomiting, leak and dehydration or electrolyte imbalance.

LONG TERM OUTCOMES

ANNUAL OUTCOME DATA COLLECTION

The Registry's protocol is to collect annual outcome data for primary participants up until ten years after their primary procedure. At annual outcome data collection points a participant's weight, diabetes outcomes and any subsequent procedures are recorded. A participant will not have annual outcome data collected if they have passed away, if the Registry does not have current contact details or if the participant has notified the Registry they do not wish to be contacted.

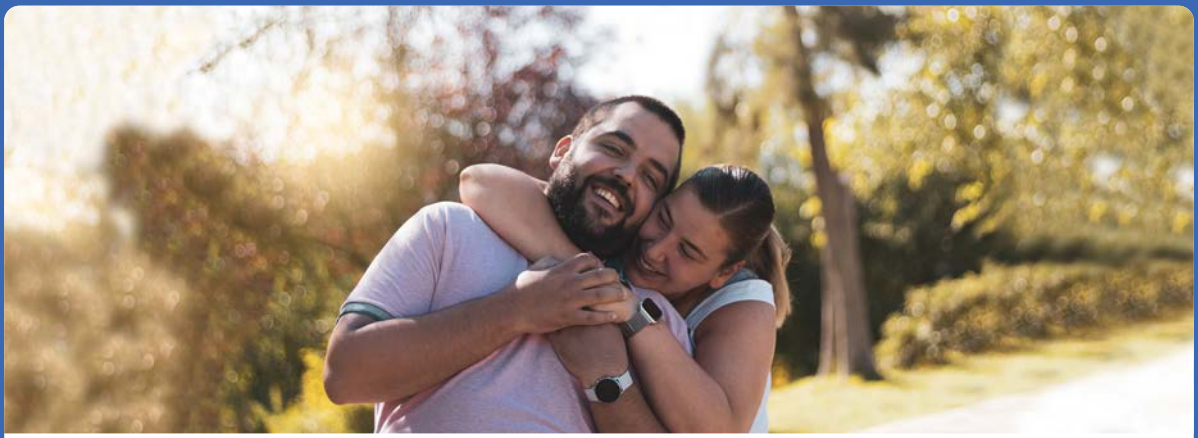
The Registry has now collected annual outcome data for 6,952 data collection points ranging from one year to five years following a participant's primary bariatric procedure (Table 26). One-year annual outcome data has been collected for 83.4% of primary participants. The annual outcome data presented in this report should be interpreted with caution as Aotearoa New Zealand participants numbers are relatively small and the data set is still maturing.

Annual data point	Cumulative participants that have reached data point	Data completed n (%)	Completed by surgeon/rooms/clinic	Completed by Registry
1 year	4,958	4,137 (83.4)	3,647	490
2 year	3,203	1,852 (57.8)	902	950
3 year	1,652	763 (46.2)	244	519
4 year	803	198 (24.7)	88	110
5 year	94	2 (2.1)	0	2
TOTAL	**10,710**	**6,952**	**4,881**	**2,071**

Table 26 - Completion of annual outcome data by data collection point for primary participants, Aotearoa New Zealand

WEIGHT OUTCOMES

Figure 38 shows the distribution of adult participant BMI classification for participants at one-year compared to their initial BMI. The one-year weight (BMI) outcomes for participants who had an initial BMI within the obese class III range showed 6.8% (181) of participants remained in the obese class III range, 14.4% (381) were now considered to be in the obese class II range, 33.5% (888) were in the obese class I range, 33.9% (899) were overweight but not obese, with 11.2% (298) now classified in the healthy weight range 0.1% and 2 participants were in the underweight range.



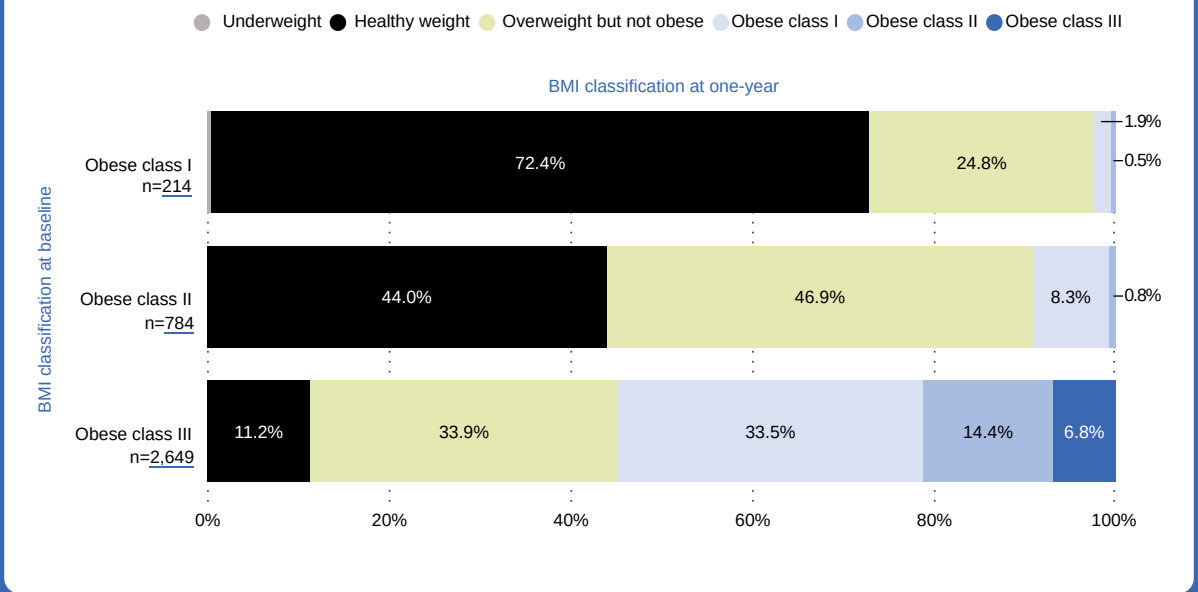


Figure 38 - Initial BMI range and one-year BMI for adult primary participants in Aotearoa New Zealand, n= 3,647

Percentages not shown: <0.1% of participants with start BMI in obese class I range or obese class III were in the underweight range at one-year. Excludes participants <18 years at age at primary procedure, participants with start BMI in overweight category and participants without either start BMI or one-year BMI.

	Sex			Procedure type			
	FEMALE	MALE	TOTAL	SLEEVE	RYGB	OAGB	TOTAL
PRIVATE (n)	2,900	499	3,399	1,861	862	676	3,399
% EWL Mean (SD)	83.6 (28.2)	75.0 (22.9)	82.4 (27.7)	81.5 (26.8)	88.5 (31.9)	76.9 (22.3)	82.4 (27.7)
% TWL Mean (SD)	33.7 (8.6)	32.3 (9.3)	33.5 (8.7)	31.3 (8.2)	36.5 (8.8)	35.5 (8.3)	33.5 (8.7)
PUBLIC (n)	174	76	250	221	20	9	250
% EWL Mean (SD)	72.9 (22.5)	73.7 (20.0)	73.2 (21.8)	71.8 (21.6)	87.7 (20.2)	75.5 (18.8)	73.2 (21.8)
% TWL Mean (SD)	32.0 (8.7)	32.4 (9.3)	32.2 (8.9)	32.0 (9.0)	33.1 (7.7)	33.3 (7.5)	32.2 (8.9)
ALL (n)	3,074	575	3,649	2,082	882	685	3,649
% EWL Mean (SD)	83.0 (28.1)	74.8 (22.5)	81.7 (27.4)	80.5 (26.5)	88.4 (31.7)	76.9 (22.2)	81.7 (27.4)
% TWL Mean (SD)	33.6 (8.6)	32.3 (9.3)	33.4 (8.7)	31.4 (8.3)	36.4 (8.8)	35.5 (8.3)	33.4 (8.7)

Table 27 - Weight outcomes at one-year for adult primary participants by sex, procedure type and funding, Aotearoa New Zealand

Excludes participants < 18 years of age at primary procedure and those with sex recorded as 'other'.

The Registry also tracks weight outcomes for up to 10 years by calculating annual excess and total weight loss. Table 27 shows percentage excess and total weight loss outcomes at one-year for adult primary participants in Aotearoa New Zealand by sex, funding and type of primary procedure. The Registry has 3,399 adult participants with baseline and one-year weight recorded. For these participants the mean percentage EWL is 81.7% (SD 27.4), and mean TWL is 33.4% (SD 8.7). Participants with publicly funded procedures have a lower mean EWL (73.2%) and TWL (32.2%) compared to participants who had their procedure privately (mean EWL 82.4% ; mean TWL 33.5%).

Female participants have a higher percentage EWL (83.0%, SD 28.1) and TWL (33.6%, SD 8.6) at one year compared to males' EWL percentage (74.8%, SD 22.5) and percentage TWL (32.3%, SD 9.3). Participants who had a primary sleeve gastrectomy or Roux-en-Y gastric bypass have a higher average percentage EWL and percentage TWL at one-year compared to those who have had a primary one anastomosis gastric bypass.

DIABETES OUTCOMES

The Registry has 694 participants reported as having diabetes at time of surgery or baseline who have one-year diabetes outcome data (Table 28). At one-year, 4.2% participants reported diet/exercise as treatment for diabetes, whilst 68.2% of participants no longer reported having diabetes. The proportion of participants reporting insulin for diabetes treatment reduced from 23.6% at the time of procedure to 2.9% at one-year. However, it is important to note that diabetes treatment data is not available at the one-year data point for 20.0% of participants who reported diabetes at baseline (19.9% due to missing data and 0.1% being lost to follow-up).

Diabetes treatment	Baseline - n (%)	One year - n (%)
Surgery alone	-	473 (68.2)
Diet/exercise	211 (30.4)	29 (4.2)
Non-insulin therapy (single)	202 (29.1)	29 (4.2)
Non-insulin therapy (multiple)	100 (14.4)	4 (0.6)
Insulin	164 (23.6)	20 (2.9)
Treatment not stated	17 (2.4)	138 (19.9)
Lost to follow-up	-	1 (0.1)
TOTAL	**694 (100.0)**	**694 (100.0)**

Table 28 - Diabetes treatment at baseline for those primary participants with reported diabetes at baseline and diabetes treatment one-year, Aotearoa New Zealand

Figure 39 shows the distribution of diabetes treatment at one-year based on a participant's treatment type at baseline, and excludes those with missing diabetes treatment data. Of the 127 participants who reported 'insulin' as their diabetes treatment at baseline, at one-year 15.0% reported continued treatment with insulin, 13.4% reported treatment with non-insulin therapies (single or multiple medications), 3.9% reported diet/exercise alone as their diabetes treatment and 67.7% were reported as no longer having diabetes. A reduction in the proportion of participants treated with non-insulin therapies is also seen at one-year.

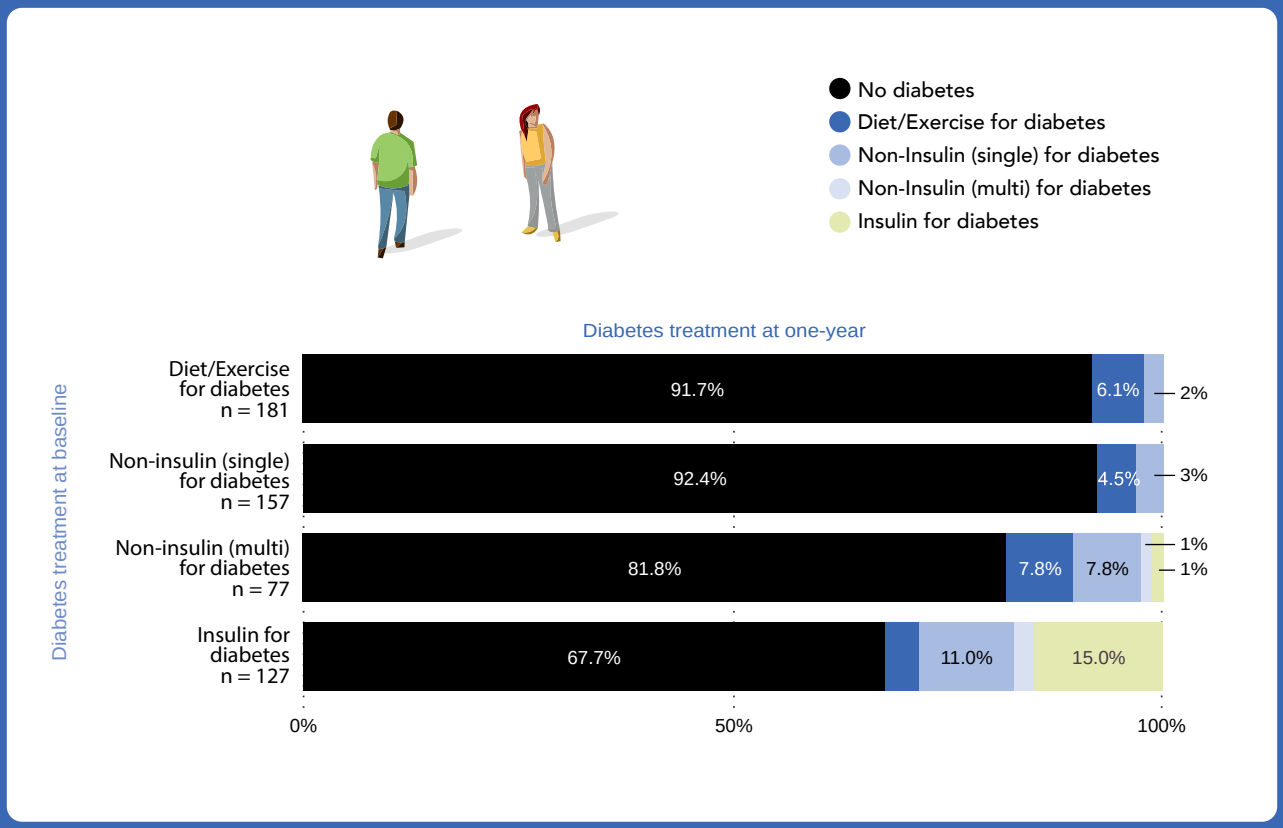


Figure 39 - Diabetes treatment outcomes at one-year for participants who reported diabetes at primary procedure, Aotearoa New Zealand n= 542

Excludes participants with unknown diabetes treatment at baseline and/or one-year, n=152.

RESEARCH AND OTHER ACTIVITIES

Since the release of the last annual report, the Registry has published three papers and has had 17 oral or poster presentations at national and international conferences (Appendix 7). The Registry now has a mature and rich data set and should be considered valuable asset from which to base additional research. Currently three PhD projects are in progress utilising the Registry data as a key resource:

- Identifying factors for patient selection to improve health resource utilisation in bariatric surgery within the public health system, Dr. Chiara Chadwick.
  This project utilised Registry data to investigate outcomes of privately and publicly funded surgery and has reported on average length of hospital stay for bariatric procedures in Australia with publications to follow.
- Patient experience, quality of life, and psychosocial health following bariatric surgery: A study into the development of patient-reported outcome measures to be included in a national bariatric surgery registry, Alyssa Budin. See below for further detail about this project.
- Applications of novel surgical technologies in upper gastrointestinal and bariatric surgery, Dr Yit Leang.
  This project will use Registry data to compare outcomes of laparoscopic bariatric surgery with robotic procedures.

The Registry team resumed attending face-to-face engagement events and conferences. This included presentations, running a workshop and a booth at the Australian and New Zealand Metabolic and Obesity Surgery Society held in Cairns in October 2022 and presenting at the Australian Registry Annual Scientific Meeting held in Adelaide in November 2022.

PATIENT-REPORTED OUTCOME MEASURES (PROMS)

The development of a bariatric surgery specific PROM for use within the Registry continues to be driven through the associated PhD project. The first stage of the PROM development project included a literature review of patient-reported measures (PRMs) used in the context of obesity and bariatric surgery. This resulted in a comprehensive item bank, covering 18 domains of interest with more than 1,600 potential items.

A survey of bariatric practices across Australia and Aotearoa New Zealand was completed, providing an indication of current PRM use, as well as providing an opportunity for initial engagement with clinicians regarding the future implementation of these measures within the Registry. Responses from 65 health professionals reporting on 120 bariatric practices generated a clear overview of the prevalence of PRM use in the Australian and Aotearoa New Zealand context. The results of this survey are being used to shape the Registry's PRM questionnaire, to ensure it is applicable, meaningful, and useful to clinician end-users. The resulting publication, Surgeon Engagement with Patient-Reported Measures in Australian and Aotearoa New Zealand Bariatric Practices, was published in the peer-reviewed journal Obesity Surgery in August 2022.

A large-scale modified Delphi survey engaging pre- and post-surgical patients, and a range of healthcare practitioners involved in the management of bariatric patients has also been completed. The results of this survey were analysed and taken to focus groups with patient stakeholders in May 2022. Focus group discussions and voting sessions identified 32 outcomes considered highly important and which should be included in a draft questionnaire. These results, alongside subsequent interviews with patient and health care practitioner stakeholders, will enable the refinement of the previously developed item bank to generate a pilot PROM. This PROM will be tested with participants of the Bariatric Surgery Registry to ensure the developed PROM is reliable, valid and responsive before being implemented Registry-wide. Pilot testing and refinement of the PROM are expected to commence in 2023.

OTHER ACTIVITIES AND ACHIEVEMENTS

The Registry has reached ten years since it commenced its pilot phase enrolment in 2012 and now has more the 160,000 procedures. In late 2022, the Australian Government Department of Health and Aged Care renewed lead funding for the Registry until June 2026.

The Registry has been active in the international bariatric surgery space with continued contribution to the Standardized Quality of Life Measurement in Obesity Treatment (SQOT) initiative's patient-reported outcome measures (PROMs) consensus work. Three Registry team members were invited to and participated in the third SQOT patient-reported outcome measures two-day consensus meeting held in May 2022 in Maastricht, the Netherlands. Additionally, after participating in earlier meetings of this initiative, an associated paper was published in Obesity Reviews in 2022 (de Vries et al, 2022)

Professor Wendy Brown was an invited speaker at Zoom Forward 22 Joint Congress on Obesity of the European Association of the Study of Obesity and the International Federation for the Surgery of Obesity and Metabolic Disorders - European Chapter conference in Maastricht Netherlands and presented on "Registries and how to implement new technology".

In early 2022 the Registry was engaged by the International Federation for Surgery of Obesity and Metabolic Disorders (IFSO) to develop a system to coordinate the data submissions for the 7th IFSO Global Registry Annual Report. For the first time, Australia and Aotearoa New Zealand data was included in the global report (IFSO, 2022).

CONCLUSION

10 YEARS AND MORE THAN 160,000 PROCEDURES CAPTURED!

More than ten years have now passed since the first participant was enrolled in the Registry pilot in 2012. Over this time, the Bariatric Surgery Registry has captured more than 160,000 procedures across Australia and Aotearoa New Zealand and enrolled almost 140,000 participants. Since the Registry's last report a further 34,037 participants have been enrolled and 37,694 procedures have been added. In 2022, over 200 surgeons contributed data for operations in 2022 that were performed in 145 Australian and Aotearoa New Zealand hospitals and the Registry captured 82% of all Australian bariatric procedures.

The Registry collects outcome data relating to the first 90-days following a bariatric procedure or subsequent intervention to monitor the safety of bariatric surgery. This data continues to confirm the safety of bariatric surgery. Additionally, participants' long-term outcomes of bariatric surgery are recorded through annual outcome data collection up until ten years after primary bariatric surgery and this data continues to confirm the efficacy of bariatric surgery.

The number of actively participating surgeons has remained strong throughout. After the disruption to activities related to the COVID-19 pandemic restrictions, the Registry has resumed attending face-to-face conferences and other engagement activities both nationally and internationally. The Registry's workshop and booth at the 2022 ANZMOSS conference provided opportunity to reconnect with the profession and participating surgeons.

The mature Registry data set provides a valuable platform from which additional research can be based and requests to access data for research are encouraged. Currently there are a three registry-related PhD projects in progress one of which is focussed on the development of a PROM for use in the Registry. The pilot testing phase for this PROM is planned for 2023 with a final version of the PROM to be ready by early 2024. Another project has used Registry data to look at the difference in outcomes between privately and publicly funded surgery as well as to look at average length of hospital stay.

The Registry sincerely thanks its participants, contributing surgeons, hospitals, industry and the Australian Government for their ongoing support.

STEERING COMMITTEE MEMBERS

Prof Ian Caterson	Committee Chair
Prof Wendy Brown	Deputy Chair, BSR Clinical Director
A/Prof Andrew MacCormick	AoNZ Clinical Lead
Prof Susannah Ahern	Public Health & Preventive Medicine, Monash University
Ms Brooke Backman	Community Representative
Dr Jasjit Baveja	MTAA Representative
Prof Chris Bullen	NIHI Representative
Dr Jacob Chisholm	ANZMOSS Representative
Ms Jennifer Holland	Registry Executive Officer
Prof Jeffery Hamdorf AM	ANZMOSS Representative
Ms Lexii Marquardt	Consumer Representative
Ms Meron Pitcher	Independent RACS Representative
Mr Ross Roberts	AANZGOSA Representative
Ms Cindy Schultz-Ferguson	Consumer Representative

The Registry acknowledges the outgoing members of the Steering Committee and thanks them for their valuable contribution to the Registry: Dr Samuel Baker, Dr Chris Bullen, A/Prof Michael Talbot, Prof Neil Merrett, A/Prof Arul Earnest and Ms Meron Pitcher.

CLINICAL LEADS

Prof Wendy Brown	**Australia**
A/Prof Andrew MacCormick	**Aotearoa New Zealand**

EXECUTIVE MANAGEMENT COMMITTEE

Prof Ian Caterson

Prof Wendy Brown

A/Prof Andrew MacCormick

Prof Susannah Ahern

Ms Jennifer Holland

REGISTRY STAFF – AUSTRALIA

Prof Wendy Brown	Clinical Director
Ms Jennifer Holland	Executive Officer
Dr Jenifer Cottrell	Operations Manager
Mr Angus Brian Campbell	Data Services Manager
Ms Dianne Brown	Consultant
Ms Alyssa Budin	Research Assistant
Ms Anagi Wickremasinghe	Research Officer
Ms Shivangi Shah	Administration Assistant
Mr Edan McCartney	Administration Assistant

Past staff recognition during the reporting period:

Simone Wilkins (Administration Officer), Hayley Cottrell (Technical Officer), Marjan Harmidimanesh (Technical Officer), Giorgia Scott (Administration Assistant), Zahli Hansen (Administration Assistant), Katy Shaw (Administration Assistant), Hannah Dempsey (Administration Assistant).

REGISTRY STAFF – AOTEAROA NEW ZEALAND

A/Prof Andrew MacCormick	Clinical Lead
Ms Helen Fitzgerald	Project Manager
Ms Wendy Yoon	Project Coordinator
Mr Jack Carter	Administration Assistant

Past staff recognition during the reporting period:

Ms Dianne Wood (Project Manager), Ms Juma Rahman (Project Coordinator).

DATA ELEMENTS

Day of Surgery

Name*
Date of birth*
Sex
Address*
Phone numbers
Medicare & DVA information

Hospital Unit Record (UR) number
National Health Index (NHI) number [AoNZ]
Name of hospital*
Name of surgeon*
Indigenous status (Aus) / Ethnicity (AoNZ)
Date of surgery
Start weight*
Weight at operation
Height

Diabetes status
Diabetes treatment
- Diet/Exercise
- Non-insulin therapy (single)
- Non-insulin therapy (multiple)
- Insulin

Status of procedure (primary or revision)
- If revision – last bariatric procedure
- If revision – planned or unplanned
- If unplanned – reason

Type of procedure
Procedure abandoned or completed
Device type
Device brand
Device model
Use of staple line reinforcement, type
Surgical approach
Concurrent liver transplant
Concurrent renal transplant

90-day outcome (peri-operative) data

Date of follow-up

Defined adverse event
- Unplanned return to theatre
- Unplanned ICU admission
- Unplanned re-admission to hospital
- If yes – reason

Mortality
- If deceased
- Date of death
- Cause of death
- Death related to procedure

Annual outcome data**

Date of follow-up
Weight
Weight self-reported?

Diabetes status
Diabetes treatment
- Diet/Exercise
- Non-insulin therapy (single)
- Non-insulin therapy (multiple)
- Insulin

Procedure in last 12 months?
If yes – reason

Mortality
- If deceased
- Date of death
- Cause of death
- Death related to procedure

BSR to follow-up

*** Data element required to be entered to enrol participant**
**** Collected for primary participants only**

DATA COMPLETENESS

PROCEDURE DATA

The data completeness of each data element is listed below for Australian procedures and Aotearoa New Zealand procedures:

	2022				Since commencement			
	Australia		Aotearoa New Zealand		Australia		Aotearoa New Zealand	
	PRIMARY	REVISION	PRIMARY	REVISION	PRIMARY	REVISION	PRIMARY	REVISION
Type of procedure	100.0%	100.0%	100.0%	98.9%	100.0%	100.0%	100.0%	99.5%
Diabetes status	95.0%	93.4%	99.6%	96.8%	92.1%	88.2%	97.4%	98.7%
Diabetes treatment	91.8%	90.2%	96.3%	100.2%	92.7%	92.3%	96.8%	98.3%
Height	98.6%	96.0%	100.0%	100.0%	98.4%	94.9%	99.7%	98.7%
Weight at operation	93.6%	91.0%	93.5%	87.2%	84.2%	87.1%	85.6%	80.9%
Weight at consult	67.8%	-	64.5%	-	76.9%	-	70.9%	-
Initial BMI	98.4%	-	99.8%	-	98.1%	-	99.6%	-

90-DAY OUTCOME DATA

Overall 90-day (peri-operative) outcome data completeness for Australia and for Aotearoa New Zealand, by primary or revision procedure type shown here.

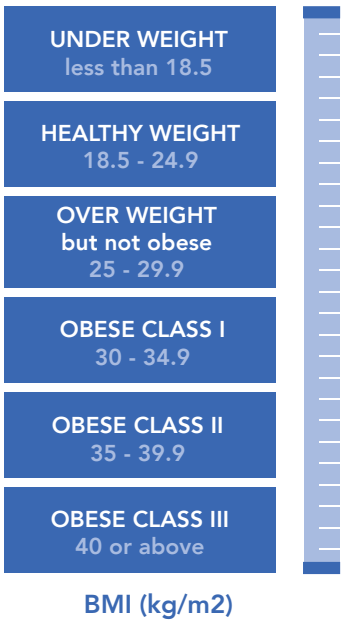
	2022		Since commencement	
Type of procedure	Australia	Aotearoa New Zealand	Australia	Aotearoa New Zealand
Primary	75.6%	93.4%	88.1%	96.9%
Revision	72.5%	93.6%	88.2%	97.4%
Total	75.0%	93.4%	88.1%	96.9%

ANNUAL OUTCOME DATA

Overall annual outcome data completeness is 43.6 % for Australia and 65.4 % for Aotearoa New Zealand. Within the 154,087 Australian completed annual data points and the 6,952 Aotearoa New Zealand completed annual data points, the data completeness of each data element is listed below:

Data item	Australia	Aotearoa New Zealand
Diabetes at the annual data point	91.1%	77.9%
Diabetes treatment at annual data point	86.5%	88.3%
Weight at annual data point	83.9%	73.3%

BMI CLASSIFICATION IN ADULTS



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HOSPITALS SITES FOR 2022 PROCEDURES

AUSTRALIA

VICTORIA

Austin Hospital
Box Hill Hospital
Cabrini Malvern
Epworth Eastern
Epworth Freemasons
Epworth Geelong
Epworth Richmond
Glen Iris Private Hospital
Hamilton Base Hospital
Heidelberg Repatriation Hospital
Holmesglen Private Hospital
Jessie McPherson Private Hospital
John Fawkner Private Hospital
Knox Private Hospital
Latrobe Regional Hospital
Maryvale Private Hospital
Monash Medical Centre
Mulgrave Private Hospital
Northpark Private Hospital
Peninsula Private Hospital
Shepparton Private Hospital
St John of God Ballarat Hospital
St John of God Bendigo Hospital
St John of God Berwick Hospital
St John of God Geelong Hospital
St John of God Warrnambool Hospital
St Vincent's Hospital Melbourne
St Vincent's Private Hospital Fitzroy
The Alfred Hospital
The Avenue Private Hospital
Wangaratta Private Hospital
Warringal Private Hospital
Western Private Hospital

NEW SOUTH WALES

Albury-Wodonga Private Hospital
Baringa Private Hospital
Brisbane Waters Private Hospital
Calvary Riverina Hospital
Campbelltown Private Hospital
Concord Repatriation General Hospital
Delmar Private Hospital
Dubbo Private Hospital
East Sydney Private Hospital
Gosford Hospital
Gosford Private Hospital
Holroyd Private Hospital
Hurstville Private Hospital
John Hunter Hospital
Kareena Private Hospital
Lake Macquarie Private Hospital
Lakeview Private Hospital
Lingard Private Hospital
Mater Hospital Sydney
Nepean Private Hospital
Newcastle Private Hospital
North Shore Private Hospital
Northern Beaches Private Hospital
Norwest Private Hospital
Orange Private Hospital
Port Macquarie Private Hospital
Prince of Wales Private Hospital
Royal North Shore Hospital
Royal Prince Alfred Hospital
Southern Highlands Private Hospital
St George Hospital
St George Private Hospital
Strathfield Private Hospital
Sydney Adventist Hospital
Sydney Southwest Private Hospital
Tuggerah Lakes Private Hospital
Wagga Wagga Base Hospital
Westmead Private Hospital
Wollongong Private Hospital

HOSPITALS SITES FOR 2022 PROCEDURES

QUEENSLAND

Brisbane Private Hospital
Buderim Private Hospital
Cairns Private Hospital
Gold Coast Private Hospital
Greenslopes Private Hospital
Hillcrest Rockhampton Private Hospital
John Flynn Private Hospital
Kawana Private Hospital
Mater Private Hospital Brisbane
Mater Private Hospital Mackay
Mater Private Hospital Rockhampton
Noosa Private Hospital
North West Private Hospital
Pindara Private Hospital
St Andrew's Hospital Toowoomba
St Andrew's War Memorial Hospital
St Andrew's-Ipswich Private Hospital
St Stephen's Hospital
St Vincent's Private Hospital Northside
St Vincent's Private Hospital Toowoomba
Sunnybank Private Hospital
Sunshine Coast University Private Hospital
The Wesley Hospital

WESTERN AUSTRALIA

Glengarry Private Hospital
Hollywood Private Hospital
Joondalup Health Campus
Mount Hospital
Peel Health Campus
St John of God Bunbury Hospital
St John of God Mt Lawley Hospital
St John of God Murdoch Hospital
St John of God Subiaco Hospital
Waikiki Private Hospital

AUSTRALIAN CAPITAL TERRITORY

Calvary Bruce Private Hospital
Calvary John James Private Hospital
National Capital Private Hospital

NORTHERN TERRITORY

Darwin Private Hospital

SOUTH AUSTRALIA

Ashford Private Hospital
Burnside War Memorial Hospital
Calvary Adelaide Hospital
Calvary Central District Hospital
Calvary North Adelaide Hospital
Flinders Medical Centre
Flinders Private Hospital
The Queen Elizabeth Hospital
Western Hospital

TASMANIA

Calvary St Vincent's Hospital
Hobart Private Hospital
Royal Hobart Hospital

AOTEAROA NEW ZEALAND

Anglesea Hospital
Auckland City Hospital (ADHB)
Boulcott Plus Health Ltd
Chelsea Hospital Trust
Christchurch Hospital (CDHB)
Gisborne Hospital (HTDHB)
Grace Hospital
Manuka Street Hospital
MercyAscot Hospital
Mercy Hospital
Middlemore Hospital (CMDHB)
Ormiston Hospital
Southern Cross Hospital Brightside
Southern Cross Hospital Christchurch
Southern Cross Hospital Hamilton
Southern Cross Hospital North Harbour
Southern Cross Hospital Wellington
St George's Hospital
Tauranga Hospital (BOPDHB)
Waikato Hospital (Waikato DHB)
Wakefield Hospital

AUSTRALIAN HOSPITALS
WITH APPROVAL AS AT 31 - DECEMBER 2022

ACT
Calvary Bruce Private Hospital
Calvary John James Hospital
Canberra Hospital
National Capital Private Hospital

QUEENSLAND
Brisbane Private Hospital
Buderim Private Hospital
Cairns Private Hospital
Gold Coast Private Hospital
Greenslopes Private Hospital
Hillcrest Rockhampton Private Hospital
John Flynn Private Hospital
Kawana Private Hospital
Mater Hospital Brisbane
Mater Private Hospital Brisbane
Mater Private Hospital Bundaberg
Mater Private Hospital Mackay
Mater Private Hospital Redland
Mater Private Hospital Rockhampton
Mater Private Hospital Springfield
Mater Private Hospital Townsville
Nambour Selangor Private Hospital
Noosa Private Hospital
North West Private Hospital
Pindara Private Hospital
St Andrew's Hospital Toowoomba
St Andrew's War Memorial Hospital
St Andrew's-Ipswich Private Hospital
St Stephen's Hospital
St Vincent's Private Hospital Northside
St Vincent's Private Hospital Toowoomba
Sunnybank Private Hospital
Sunshine Coast University Private Hospital
The Wesley Hospital

VICTORIA
Austin Hospital
Beleura Private Hospital
Box Hill Hospital
Cabrini Hospital Brighton
Cabrini Malvern
Epworth Eastern
Epworth Freemasons
Epworth Geelong
Epworth Richmond
Footscray Hospital
Glen Iris Private Hospital
Hamilton Base Hospital
Heidelberg Repatriation Hospital
Holmesglen Private Hospital
Jessie McPherson Private Hospital
John Fawkner Private Hospital
Knox Private Hospital
Latrobe Regional Hospital
Maryvale Private Hospital
Melbourne Private Hospital
Mildura Base Hospital
Mildura Health Private Hospital
Monash Medical Centre
Mulgrave Private Hospital
Northpark Private Hospital
Peninsula Private Hospital
Shepparton Private Hospital
St John of God Ballarat Hospital
St John of God Bendigo Hospital
St John of God Berwick Hospital
St John of God Geelong Hospital
St John of God Warrnambool Hospital
St Vincent's Hospital Melbourne
St Vincent's Private Hospital Fitzroy
Sunshine Hospital
The Alfred Hospital
The Avenue Private Hospital
The Bays Hospital
Wangaratta Private Hospital
Warringal Private Hospital
Waverley Private Hospital
Western Private Hospital
Williamstown Hospital

AUSTRALIAN HOSPITALS
WITH APPROVAL AS AT 31 - DECEMBER 2022

NEW SOUTH WALES
Albury-Wodonga Private Hospital
Baringa Private Hospital
Belmont Hospital
Brisbane Waters Private Hospital
Calvary Riverina Hospital
Campbelltown Private Hospital
Concord Repatriation General Hospital
Delmar Private Hospital
Dubbo Private Hospital
Dudley Private Hospital
East Sydney Private Hospital
Gosford Hospital
Gosford Private Hospital
Holroyd Private Hospital
Hurstville Private Hospital
John Hunter Hospital
Kareena Private Hospital
Lake Macquarie Private Hospital
Lakeview Private Hospital
Lingard Private Hospital
Mater Hospital Sydney
Nepean Private Hospital
Newcastle Private Hospital
North Shore Private Hospital
Northern Beaches Private Hospital
Norwest Private Hospital
Nowra Private Hospital
Orange Private Hospital
Port Macquarie Private Hospital
Prince of Wales Private Hospital
Royal North Shore Hospital
Royal Prince Alfred Hospital
Southern Highlands Private Hospital
St George Private Hospital
St Vincent's Lismore
Strathfield Private Hospital
Sydney Adventist Hospital
Sydney South West Private Hospital
Tamara Private Hospital
Tuggerah Lakes Private Hospital
Wagga Wagga Base Hospital
Westmead Private Hospital
Wollongong Private Hospital

NORTHERN TERRITORY
Darwin Private Hospital

SOUTH AUSTRALIA
Ashford Private Hospital
Burnside War Memorial Hospital
Calvary Adelaide Hospital
Calvary Central District Hospital
Calvary North Adelaide Hospital
Flinders Medical Centre
Flinders Private Hospital
Royal Adelaide Hospital
The Queen Elizabeth Hospital
Western Hospital

TASMANIA
Calvary St Vincent's Hospital
Hobart Private Hospital
Launceston General Hospital
North West Private Hospital
Royal Hobart Hospital

WESTERN AUSTRALIA
Glengarry Private Hospital
Hollywood Private Hospital
Joondalup Health Campus
Mount Hospital
Peel Health Campus
St John of God Bunbury Hospital
St John of God Midland Private Hospital
St John of God Mt Lawley Hospital
St John of God Murdoch Hospital
St John of God Subiaco Hospital
Waikiki Private Hospital

AOTEAROA NEW ZEALAND HOSPITALS
WITH APPROVAL AS AT 31 - DECEMBER 2022

Anglesea Hospital
Auckland City Hospital (ADHB)
Boulcott Plus Health Ltd
Chelsea Hospital Trust
Christchurch Hospital (CDHB)
Gisborne Hospital (HTDHB)
Grace Hospital
Manuka Street Hospital
MercyAscot Hospital
Mercy Hospital
Middlemore Hospital (CMDHB)
Ormiston Hospital
Southern Cross Hospital Brightside
Southern Cross Hospital Christchurch
Southern Cross Hospital Hamilton
Southern Cross Hospital North Harbour
Southern Cross Hospital Wellington
St George's Hospital
Tauranga Hospital (BOPDHB)
Waikato Hospital (Waikato DHB)
Wakefield Hospital

REGISTRY PRESENTATIONS - JULY 2021 TO DECEMBER 2022

REGISTRY PUBLICATIONS

Aly, A., Talbot, M., and Brown, W.A. (2022). Bariatric surgery: a call for greater access to coordinated surgical and specialist care in the public health system. Med J Aust 2022; 217 (5): 228-231. doi: 10.5694/mja2.51673

Brown W.A., Ahern S., MacCormick A.D., Reilly J.R., Smith J.A., Watters D.A. Clinical quality registries: urgent reform is required to enable best practice and best care. ANZ J Surg. 2022 Jan;92(1-2):23-26. doi: 10.1111/ans.17438

Budin, A.J., Sumithran, P., MacCormick, A.D. et al. (2022). Surgeon Engagement with Patient-Reported Measures in Australian and Aotearoa New Zealand Bariatric Practices. Obesity Surgery, 32:3410–3418. https://doi.org/10.1007/s11695-022-06237-z

CONFERENCE PRESENTATIONS

Brown, W. (2022, May). Registries- and how to implement new technology. [Invited speaker]. Zoom Forward 22 joint Congress on Obesity of the European Association of the Study of Obesity and the International Federation for the Surgery of Obesity and metabolic disorders- European Chapter. ECO IFSO-EC, Maastricht, Netherlands.

Brown, W, et al. (2022, October). The Australia and New Zealand Bariatric Registry - Community Level Outcomes in the first 112,198 participants. [Oral presentation]. International Congress on Obesity, Melbourne.

Budin, A. (2021, July). Assessing Quality of Life and Psychosocial Health Following Bariatric Surgery, The Development of a Specific New PROM. [Poster]. Using PROMs "Down Under", Sydney Quality of Life Office, University of Sydney, Virtual.

Budin, A. (2021, July). Clinical Engagement with Patient-Reported Measures for Bariatric Surgery. [Poster]. Using PROMs "Down Under", Sydney Quality of Life Office, University of Sydney, Virtual.

Budin, A. (2021, July). Developing a New Specific PROM for Bariatric Surgery- Which Outcomes to Measure? [Poster]. Using PROMs "Down Under", Sydney Quality of Life Office, University of Sydney, Virtual.

Budin, A., Sumithran., & Brown, W. (2021, October). Variation in depression among patients undergoing different bariatric procedures: A systematic review and meta-analysis. [ePoster]. The Australian and New Zealand Metabolic and Obesity Surgery Society (ANZMOSS) conference, Virtual.

Budin.A., Sumithran., & Brown, W. (2021, October). Clinical Engagement with Patient-Reported Measures for Bariatric Surgery. [ePoster]. The Australian and New Zealand Metabolic and Obesity Surgery Society (ANZMOSS) conference, Virtual.

Budin.A., Sumithran., & Brown, W. (2021, October). The importance of physical and psychosocial outcomes of bariatric surgery – a modified Delphi study. [ePoster]. The Australian and New Zealand Metabolic and Obesity Surgery Society (ANZMOSS) conference, Virtual.

Budin, A, et al. (2022, October). The Importance of Patient-Reported Outcomes of Bariatric Surgery - A Modified Delphi Study. [Oral Presentation]. The Australian and New Zealand Metabolic and Obesity Surgery Society (ANZMOSS) conference, Cairns.

Budin, A, et al. (2022, October). Patient Feedback on the Most Important Outcomes of Bariatric Surgery. [Oral presentation]. The Australian and New Zealand Metabolic and Obesity Surgery Society (ANZMOSS) conference, Cairns.

Budin, A, et al. (2022, October). Surgeon Engagement with PRMs in Australian and Aotearoa New Zealand Bariatric Practices [Oral presentation]. ISQua (International Society for Quality in Health Care) Conference, Brisbane.

Budin, A, et al. (2022, October). Patient Feedback on the Most Important Outcomes of Bariatric Surgery. [Oral presentation]. ISQua (International Society for Quality in Health Care) Conference, Brisbane

Campbell, A.B. (2022, November). Using REDCap to collect and collate data from national bariatric surgery registries for the International Federation for the Surgery of Obesity and Metabolic Disorders (IFSO) Global Registry Report. [Oral presentation]. Australian Registry Annual Scientific Meeting, Adelaide.

Chadwick., C., Brown, W., & Burton, P. (2021, October). Bariatric Surgery resource consumption and health outcomes in public vs private healthcare settings: 8 years of Australian data from the national Bariatric Surgery Registry. [Rapid-fire presentation]. The Australian and New Zealand Metabolic and Obesity Surgery Society (ANZMOSS) conference, Virtual.

Cottrell, J. (2022, November). Yes, you can grow a CQR in a pandemic. [Oral presentation]. Australian Registry Annual Scientific Meeting, Adelaide.

Holland, J., Backman, B., Cottrell, J., Campbell, A., Brown, D., MacCormick, A., Caterson, I., & Brown, W. (October 2021). The Bariatric Surgery Registry: monitoring safety and efficacy of bariatric surgery in Australia and New Zealand. [Oral presentation]. The Australian and New Zealand Metabolic and Obesity Surgery Society (ANZMOSS) conference, Virtual.

McCormick, A. (2021, October). Updates from NZ BSR. [Oral presentation]. The Australian and New Zealand Metabolic and Obesity Surgery Society (ANZMOSS) conference, Virtual.

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de Vries, CEE, Terwee, CB, Al Nawas, M, et al. (2022). Outcomes of the first global multidisciplinary consensus meeting including persons living with obesity to standardize patient-reported outcome measurement in obesity treatment research. Obesity Reviews. 2022; 23(8):e13452. doi:10.1111/obr.13452

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WHO (World Health Organization) (2000). Obesity – Preventing and Managing the Global Epidemic: Report on a WHO Consultation, Geneva, World Health Organization.

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All information and publications of the Bariatric Surgery Registry can be found on its internet home page: monash.edu/medicine/ccs/research/registries/bariatric

BARIATRIC SURGERY REGISTRY