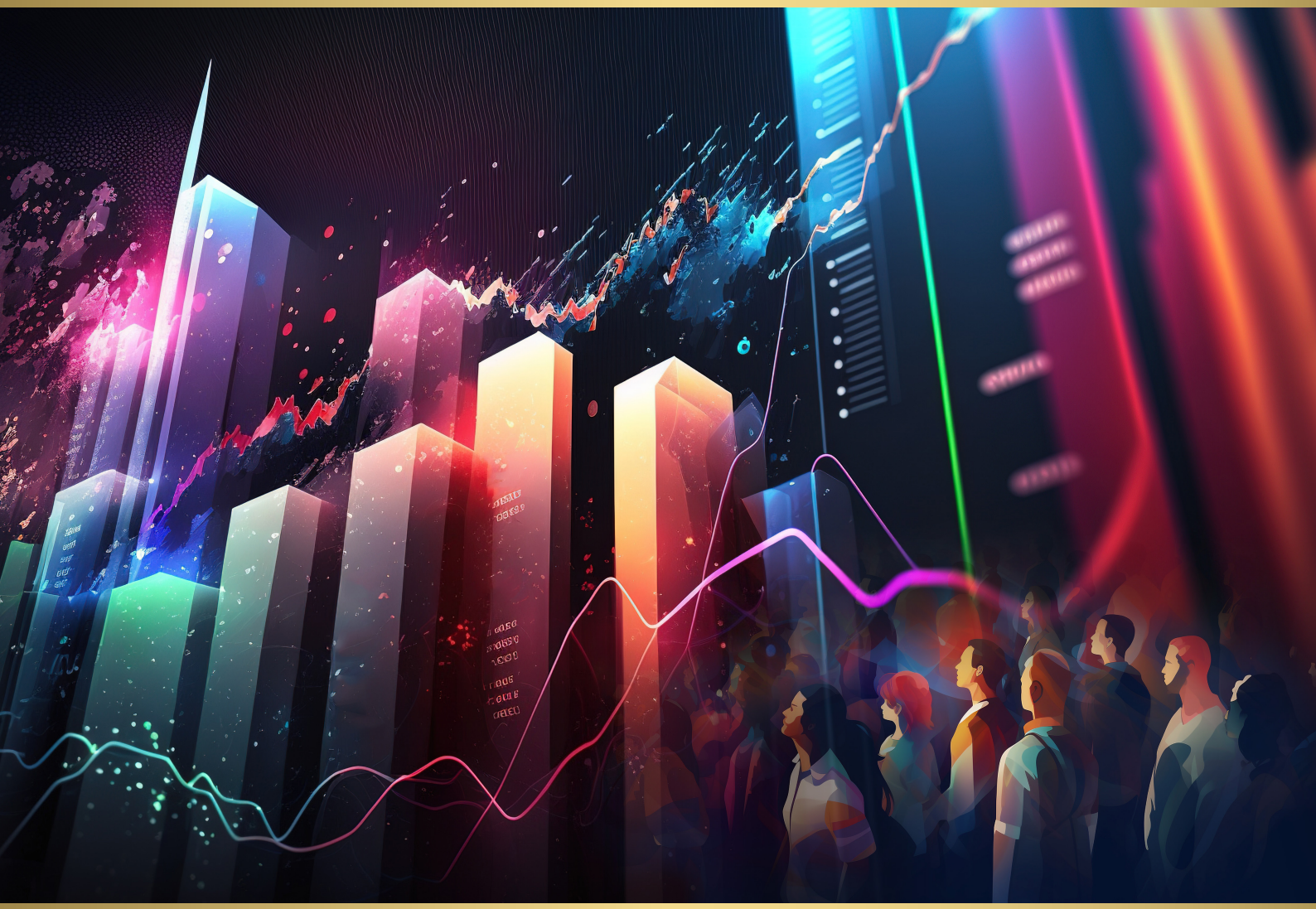
IFSO

8TH GLOBAL REGISTRY REPORT



International Federation for Surgery for Obesity and Metabolic Disorders

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Lilian Kow, Australia

Mehran Anvari, Ontario, Canada

Amir Ghaferi, Michigan, USA

John Morton, USA

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Preface

In my role as the current President of the International Federation for the Surgery of Obesity and Metabolic Disorders (IFSO) it is my honor, and as a bariatric surgeon for 30 years, it is my pleasure to introduce the eighth IFSO Global Registry Report 2023.

The data below were collected from 480,970 Metabolic and Bariatric Surgeries (MBS) that were performed in 24 countries and from 2 regional registries representing 81.4% of known registries. During the past year we welcomed new members including Azerbaijan, Iran, and South Korea. Unfortunately, Argentina, Spain, and Taiwan contributed to the 7th but not the 8th Registry. In addition, this was the second report to contain only aggregated information.

The data collected is extremely rich for several reasons. First, it was collected from almost 500,000 patients worldwide. That creates significant subject diversity, so that the collected data are an extremely accurate portrayal of the current practice of MBS. In addition, the volume of collected data increases yearly perpetually increasing the value of the registry. Furthermore, the collected data enables IFSO and others to be able to understand current patterns in the field, for example, the types of procedure being performed, changes in procedure volumes, patient selection, and patient access to care. Lastly, the collected data are invaluable for conducting clinical research which may affect the popularity of the current MBS procedures, reduce the incidence of perioperative adverse events, improve the long term results of surgery, and welcome endoscopic procedures further improving patient access to care.

The value of the Global Registry was demonstrated this past year. Bariatric surgery began in the mid-1950s with the intestinal bypass procedures. However, these procedures were hypoabsorptive procedures and often resulted in severe macronutrient, vitamin and mineral deficiencies as well as other metabolic derangements. The introduction of the gastric bypass in 1967 traded significant nutritional/metabolic complications for anatomic complications such as bleeding, anastomotic leak and venous thromboembolic disease. In addition, there were no guidelines for patient selection, management, or choice of operation. Each surgeon practiced according to their own preferences. Complication rates were high and poor outcomes were not uncommon.

In 1991, the U.S. National Institutes of Health NIH) created a Consensus Conference to review the published data and create criteria for undergoing MBS. While these criteria were beneficial in 1991, they became increasingly out of date, and a means for controlling access for care by the health insurance payers. The 1991 guidelines were still in use, essentially unchanged 30 years later. Although the guidelines did not change, the field changed considerably, including the introduction of laparoscopy and newer, safer procedures.

With no support from the payers, IFSO in partnership with the American Society for Metabolic and Bariatric Surgery (ASMBS) decided to take matters into our own hands. A writing group consisting of bariatric surgeons from both organizations did a deep dive into the currently published literature. The group wrote new criteria for surgery based on the current published data reflecting the introduction of laparoscopy, and the improvements in patient safety, selection, and outcome as well as the adoption of safer procedures like the sleeve gastrectomy, that did not exist in 1991. The criteria created by this group was simultaneously published in both Obesity Surgery and Surgery for Obesity and Related Diseases. These criteria are based on solid data and are slowly becoming accepted around the world. In the United States, several health insurance carriers now use our guidelines for determining access to care. Similar effects are occurring worldwide. There is no doubt that this would not have been possible without the large number of published manuscripts that were based on registry data.

Despite all of the benefits of a registry, there are also some limitations. First, not all national/regional registries have complete data ascertainment; meaning that not every person who undergoes MBS is included in the registry. Secondly, not all registries have complete follow up data from the perioperative period, meaning that important complications may not have been reported and recorded. Thirdly, there were differences in the way each registry audits and confirms that the data that they have is accurate. Lastly, definitions of various reported items vary between registries. This can make comparisons between registries difficult.

The proper collection of data from around the world, categorizing it to allow for interpretation, and the analysis of this data is a major undertaking year in and year out. It is a tremendous amount of work and those who have volunteered to do this work deserve our praise and gratitude.

Professor Scott A. Shikora
President
International Federation for Surgery for Obesity and Metabolic Disorders

Foreward

In front of you is the 8th IFSO Global Registry report, representing 480,970 procedures: It is the 8th time that data from Metabolic Bariatric Surgery interventions worldwide were collected from 24 IFSO national societies and 2 complete regional registries.

It is the second report that is in compliance with the European "General Data Protection Regulation (GDPR)" that changed the process for collecting and using individual data from last year on: Only aggregated data and not from individual level data were used and only data from national or regional registries. It is of utmost importance to respect patient privacy and data security to maintain public trust and protect patient rights.

But why is IFSO making such a big effort in providing an "IFSO Global Registry Report" every year? Registries play an important role in in Metabolic/Bariatric Surgery for several reasons:

1. **Data collection and research:**
   By capturing information from a large number of patients over time, registries provide valuable data for research and analysis. This provides us with information on treatment outcomes, side effects, risk profile of specific procedures and other important factors that will contribute to medical knowledge and finally improve patient care.

2. **Monitoring safety and effectiveness:**
   By tracking outcomes in real- world settings and huge numbers ("big data"), registries can identify potential safety concerns, adverse events and long-term effects of treatments that may have not been observed in RCTs. This information is crucial for regulatory agencies, healthcare providers and patients to make informed decisions about the use of interventions.

3. **Quality improvement:**
   By collecting and analyzing data on specific operations, outcomes and adherence to guidelines, registries can help to identify variations in practice between different nations and chapters and highlight areas for improvement ("benchmarking").But why is IFSO making such a big effort in providing an "IFSO Global Registry Report" every year? Registries play an important role in in Metabolic/Bariatric Surgery for several reasons:

4. **Health policy and resource planning:**
   Registries provide valuable data for health policy development and resource planning. By understanding treatment patterns and outcomes at a population level (and being able to compare between nations and chapters), policy makers are able to make informed decisions about resource allocation and healthcare funding leading to improved healthcare delivery and patient outcomes.

   On the "wishlist":

5. **Patient monitoring and follow up:**
   Registries can enable long-term monitoring of patients – by capturing comprehensive data over time, registries can track disease progression/remission, treatment response and overall patient outcomes.

Our Registry Committee did a fantastic job – not only providing this yearly report, but also thinking about the future of a global uniform IFSO registry by defining a coreset of data that can be compared between all nations and chapters as a first step.

I want to thank the Committee Chair Wendy Brown, the Vice Chair Ronald Liem and the entire Registry committee are working so hard on this report and the vision of providing ONE database/registry to all our members/nations/chapters to collect 100% comparable data for the benefit of our patients

Professor Gerhard Prager
President Elect
International Federation for Surgery for Obesity and Metabolic Disorders.

Purpose of the IFSO Global Registry

The stated mission of the IFSO Global Registry is: *to aspire to provide the most credible and transparent information available on metabolic bariatric surgery.* To achieve this mission we aim to provide descriptive data about caseload / penetrance of surgery for metabolic disease and obesity in various countries as well as aspire to provide real-world post approval surveillance of procedures / devices.

History of the IFSO Global Registry Report

The first IFSO Global registry report was produced in 2014. In that report, information was included from 18 countries from 5 continents who contributed 100,092 operation records, with 53,197 in the calendar years 2011-2013. The number of operations contributed ranged from one individual centre that entered 24 operation records to over 34,000 each from two countries with established national registries (Sweden and the United Kingdom).

Over time, contributions to the Global Registry have grown, and by the sixth report there were 507,298 operations submitted by 50 contributor countries, 10 of whom were national or regional registries. However, the inclusion of individual level data created significant challenges for IFSO particularly with the rigorous standards required by General Data Protection Regulations (GDPR).

A new direction for the IFSO global registry report

In 2022, the IFSO Global Registry Committee proposed to the Executive Board of IFSO that future reports include only aggregated data from established national or regional registries using a data dictionary focusing on demographic and descriptive data only.

- Aggregated data means that the data is given to the registry already analysed as a mean or a median, and there is no individual data transfer required. This means that there is no risk to IFSO according to GDPR. Whilst it means that we are not able to do statistical comparisons, it does provide a real-world "snap-shot" view of global activity.
- By only including national or regional registries we are properly representing the activity of that location. Each registry has been asked to provide information on the completeness of their data, meaning it is easier to see potential sources of bias.
- The data dictionary used for this report was focused on demographic and descriptive data only as these were thought to be the most useful. Outcome data was inconsistently collected by registries around the world, however, this remains an aspiration of the Committees. The 12 core data items identified through the IFSO/Bristol collaboration are included in this dataset.[1]

This is the eighth report of the IFSO global registry and the second to contain only aggregated data from established national and regional registries. It contains information on 480,970 procedures from 24 national and 2 complete regional registries, representing 81.4% of all registries known to IFSO.

Future directions

By ensuring the groundwork is correct, with reliable and consistent data definitions, data collection and data governance, we hope that the reports in the years ahead will fulfil our important mission. The data elements identified through the IFSO/Bristol collaboration have now been published.[1] A Delphi process has been completed to define these items, and future reports will utilize this data set.

The IFSO core data set with its associated data dictionary will also be available to societies that wish to establish their own registry. Consent forms, data sharing agreements and ethics packs are also available, and a course will be run at IFSO 2023 to help new registries establish themselves.

Acknowledgements and thanks

I would like to acknowledge the hard work and dedication of all the members of the IFSO Global Registry Committee, the leaders of all the national registries, Manuela Mazzarella, Meaghan Thomson from Owl Graphic Design and the team at the Australia and New Zealand Bariatric Surgery registry who collated the data from around the world. Most importantly I would like to thank the teams running our contributing registries as well as the people who have undergone a metabolic bariatric procedure who have gifted their information to their local registry. Without your support, we would not have this report.

The IFSO Global Registry has achieved an enormous amount. As I reach the end of my tenure as Chair of the Committee, I want to thank everyone for their support and encouragement. Thank you for giving me the opportunity to help craft this initiative that is now set to provide the most accurate comparative global data on metabolic bariatric surgery.

Professor Wendy Brown
Chair, IFSO Global Registry Committee

REFERENCE

1.Coulman KD, Chalmers K, Blazeby J, et al. Development of a Bariatric Surgery Core Data Set for an International Registry. Obes Surg 2023; 33(5): 1463-75.

This is the Eighth Report of the International Federation for the Surgery of Obesity and Metabolic Disorders (IFSO) Global Registry, and the second report to contain only aggregated information on only from national or regional metabolic bariatric surgery registries.

The focus of this report is on the demographics of people undertaking metabolic bariatric surgical procedures; the number and types of metabolic bariatric operations undertaken in each country; and the perioperative outcomes of metabolic bariatric surgery.

The reported data items align with the minimum dataset previously identified through the IFSO collaboration with Bristol University, providing important insights into the impact of metabolic bariatric surgery in the "real-world" setting.

Important caveats

Data provided by national or regional registries are more likely to represent the practice of the area where they are established, with less chance of bias compared to when data is included from single centres representing an entire country.

However, there are important limitations that should be considered when interpreting the data contained within this report:

- Not all national/regional registries have complete data ascertainment, meaning not every person with obesity who undergoes a metabolic bariatric procedure are included in the registry.
- Not all registries have complete follow up in the peri-operative period meaning important complications may not have been reported and recorded.
- There are differences in the way each registry audits or confirms that the data they have is accurate.
- Definitions of various reported items vary between registries. This can make comparisons between registries difficult.[1] Major differences in definitions are flagged in the body of the report.

Despite these limitations, the data within this report is remarkably consistent between contributing registries, suggesting that we are well on our way to meeting our mission:

To aspire to provide the most credible and transparent information available on bariatric / metabolic surgery

Key outcomes in this report

- 480,970 operations from 24 countries and 2 complete regional registries representing 81.4% of known registries.
  - New countries this year: Azerbaijan, Iran, South Korea, United Kingdom
  - Countries that contributed to seventh report but not eighth: Argentina, Spain, Taiwan
- The majority of patients with obesity who underwent metabolic bariatric procedures are female.
- The median start BMI of participants undergoing a primary metabolic bariatric procedure in the registry ranged from 36.1 kg/m2 for females in South Korea to 47.65 kg/m2 for males in South Africa. The majority of registries reported start BMI 40-45 kg/m2.
  - Countries with lower start BMI tended to have higher rates of type II diabetes.
- The median age on the day of surgery varied from 34 years in Kuwait to 45 years in Italy and the Netherlands.
- The most common preoperative co-morbidity reported by contributing registries was type II diabetes. The highest rates of type II diabetes in people with obesity undergoing metabolic bariatric surgery are in Azerbaijan and the lowest rates in France, Australia and Norway.
- Males are disproportionately more likely to have OSA, Hypertension, Diabetes and Dysplidemia at the time of their metabolic bariatric procedure.
- The majority of primary operations recorded by all registries are sleeve gastrectomy
- Roux-en-Y gastric bypass is the most frequently performed revisional metabolic bariatric operation
- There are an increasing number of "other" procedures being performed, particularly in the revisional setting.
- The majority of operations are performed laparoscopically, although it is noted that the uptake robotic surgery continues to increase particularly in the revisional setting.
- Length of stay is higher for revisional procedures than primary procedures.
- Metabolic bariatric surgery is very safe with reported rates of mortality <1% in most registries.

REFERENCE

1. Akpinar EO, Marang-van de Mheen PJ, Nienhuijs SW, Greve JWM, Liem RSL. National Bariatric Surgery Registries: an International Comparison. Obes Surg 2021; 31(7): 3031-9.

Data collection and collation process

A word about the data included

The data items that are reported on in this eighth report are based upon the seventh report and were chosen to describe the demographics of people with obesity who undergo metabolic bariatric procedures, the types of procedures that are being undertaken as well as markers of perioperative safety. By collecting these items across national or regional registries we are able to see where there are similarities, and differences, across our Federation. The data dictionary is found in Appendix 2 and the actual definitions used by each registry for various co-morbidities in Appendix 3.

Given that all of the contributing registries are well established and already collect data according to their own definitions, it was not possible to completely align the data set against the common data dictionary. Where there are important differences in the definitions used by different countries/regions, the definitions used are described in the body of the report.

Not all countries/regions collected all of the data items that were chosen for the global report. Where an item is not collected, the country is not included in the outcome information.

Process for collecting data from national/regional registries

All of the existing metabolic bariatric surgical registries known to IFSO were contacted initially by Manuela Mazzarella and the team at the IFSO secretariat inviting them to contribute to the report. Of the 32 known registries, 26 agreed to participate.

The team at the Australia and New Zealand Bariatric Surgery registry (ANZBSR) – Jennifer Holland, Angus Campbell, Robin Thompson, Jenifer Cottrell and Dianne Brown – updated the data dictionary, and managed a Redcap™ data base to collect data from each contributing national/regional registry who had indicated that they were willing to contribute to the global report. The key contacts from each registry can be found in Appendix 1. The Redcap™ database was securely housed at Monash University, Melbourne, Australia.

Aggregated data was provided via the Redcap™ database directly in most instances, but in some instances data was provided on Excel™ spreadsheets. In those instances, the ANZBSR team entered the data fields into the Redcap™ database. Data was checked for completeness then this report was generated by the Global Registry Committee, led by Wendy Brown. Prior to finalization of the report all graphs were circulated to contributors and to the global registry committee of IFSO to ensure data accuracy.

Reporting

Meaghan Thomson from Owl Graphic Design, Australia, formatted the report. Graphs were generated by Wendy Brown. The descriptive text was provided by Wendy Brown, Ronald Liem, Scott Shikora and Gerhard Prager with editorial support from Manuela Mazzarella.

Acknowledgments and thanks

The data collection and collation process could not have been undertaken without the assistance of the ANZBSR. Jennifer Holland (Executive Officer), Jenifer Cottrell (Operations Manager), Angus Campbell (Data Services Manager), Robin Thompson (Database Business Analyst) and Dianne Brown (Consultant) all put in an enormous amount of work to update the data dictionary, data definitions, a Redcap™ database and then collect, collate and clean the aggregated data from national/regional registries. Many thanks to them for their enormous efforts in a short timeframe.

Meaghan Thomson has provided a wonderful visual for the report. There were delays receiving data, and despite this she has done an extraordinary job to meet very tight timelines. We are very grateful for her expertise.

Manuela Mazzarella has worked tirelessly to engage all the registries, support the Global Registry Committee and promote the importance of the global registry. Without Manuela we would not have a report.

Contributors to the eighth report

The International Federation for Surgery for Obesity and Metabolic Disorders (IFSO) is a Federation composed of national associations of metabolic bariatric surgeons and Integrated Health professionals. Currently, there are 72 member societies of IFSO with a total of more than 10,000 members throughout the world.

Since its inception in 1995, IFSO has strived to unify the global scientific, surgical and integrated health communities, for the purpose of dissemination of knowledge, collaboration and establishing universal standards of care for the treatment of individuals with adiposity-based chronic disease.

The IFSO Global Registry collates information that has been analysed by national registries, focusing on caseload and penetrance of surgery for metabolic disease and obesity in member countries. This provides an overview of bariatric and metabolic surgery activity around the world enabling meaningful comparisons between countries, and identifying areas where there are service gap needs. This is critical information that can be to inform the profession and patients and facilitates evidence-based advocacy for improved services and access to this effective treatment.

In this eighth report we present data contributed by 24 countries and 2 complete regional registries including information on 480,970 metabolic bariatric procedures in either 2021 (UK) or 2022 (rest of world). The different years are due to different reporting cycles. Whilst the difference in temporality is important to acknowledge, it unlikely that practice in one country is likely to change materially over a 12-month period.

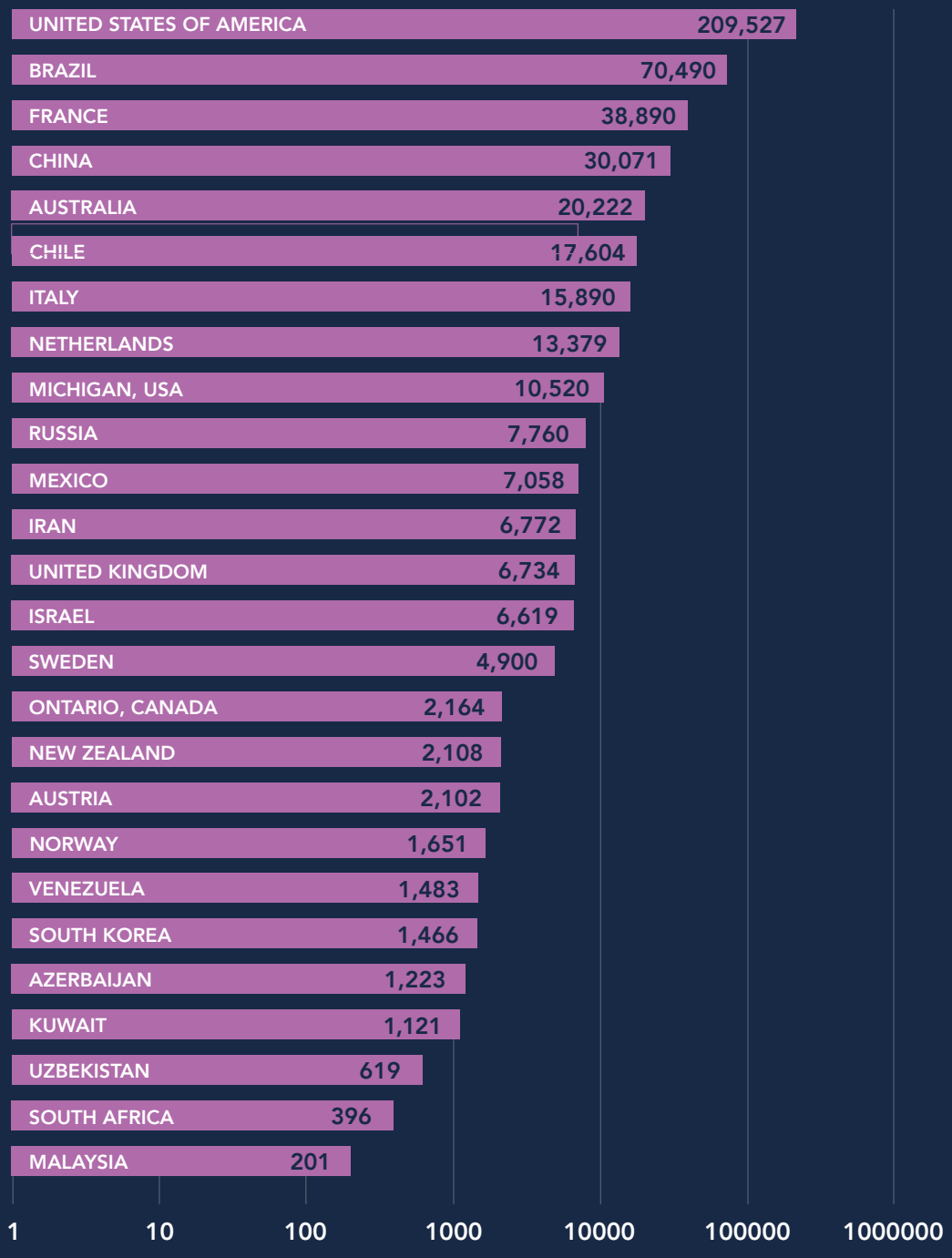
Whilst some registries had complete case ascertainment – meaning every person who underwent a metabolic bariatric procedure in a given country was captured by their local Registry, the majority did not report case ascertainment or had incomplete ascertainment. This is important to note as the lower the rate of case ascertainment, the higher the risk of selection bias.

- Registries with complete, or near-complete, case ascertainment included Sweden, Michigan, Norway, Netherlands and Israel.
- Australia has 83% case ascertainment.
- Rate of case ascertainment was not provided by other contributors

There were four countries contributing this year that did not contribute to the seventh report: Azerbaijan, Iran, South Korea and United Kingdom.

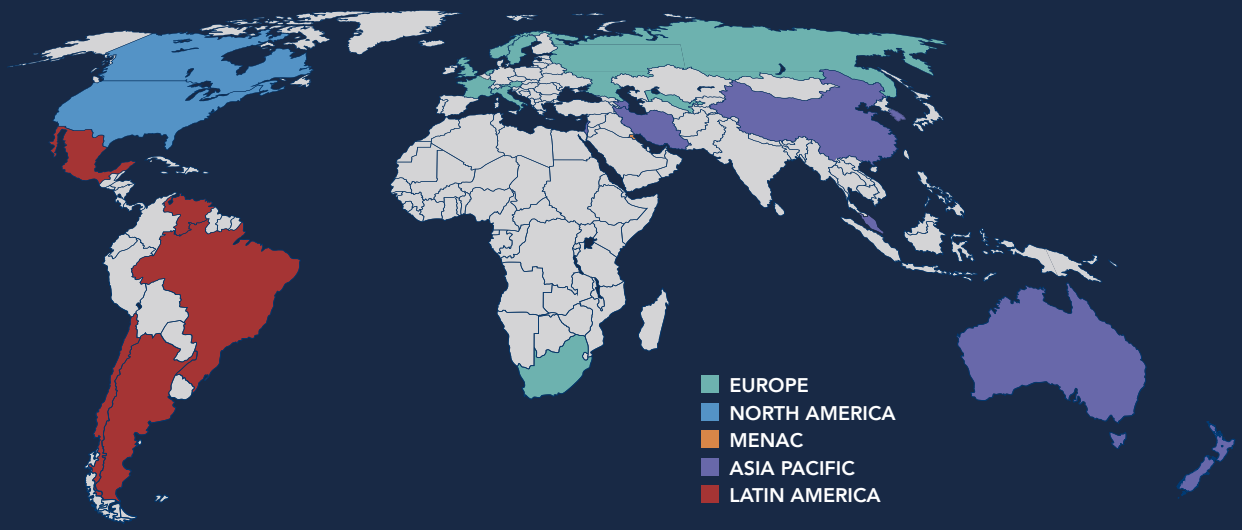
Countries that contributed to seventh report but not this report were: Argentina, Taiwan and Spain.

Over time, collation of annual data will enable identification of trends and changes in practice in a real-world setting.



Number of metabolic bariatric surgical procedures per country or region, primary and revisional.

A total of 480,970 procedures contributed by 24 countries and 2 regional registries. Michigan is a state of the USA and 39 of 41 sites that contribute to the Michigan registry also contribute to MBSAQIP (United States of America), meaning 10,437 procedures are potentially represented twice in this graph.



Geographic distribution of contributors to the eight IFSO global registry report - seen on the map above. Each of the IFSO Chapters is represented. A list of key contacts can be found in Appendix 1.

Austria	Österreichische Gesellschaft für Adipositas- und metabolische Chirurgie (OGAMC)
Azerbaijan	Azerbaijan Bariatric and Metabolic Surgery Association (ABMSA)
France	Société Française et Francophone de Chirurgie de l'Obésité et des Maladies Métaboliques (SOFFCO.MM)
Israel	Israeli Society for Metabolic and Bariatric Surgery (ISMBS)
Italy	Società Italiana di Chirurgia dell'Obesità e delle malattie metaboliche (SICOB)
Netherlands	Dutch Society for Metabolic and Bariatric Surgery (DSMBS)
Norway	Norwegian Society for the Surgery of Obesity (NSSO)
Russia	Society of Bariatric Surgeons of Russia (SBSR)
South Africa	South African Association for Obesity and Metabolism (SASSO)
Sweden	Swedish Association for Bariatric Surgery(SABS)
United Kingdom	British Obesity and Metabolic Surgery Society (BOMSS)
Uzbekistan	Association of Bariatric and Metabolic Surgeons of Uzbekistan (UZAMBS)
Canada- Ontario*	Canadian Association of Bariatric and Physicians and Surgeons (CABPS)
USA	American Society for Metabolic and Bariatric Surgery (ASMBS)
USA - Michigan*	Michigan Collaborative (MC)
Kuwait	Kuwait Laparoscopic and Obesity Surgical Society (KLOSS)
Australia	Australian & New Zealand Obesity Surgery Society (ANZMOSS)
China	China - Chinese Society for Metabolic & Bariatric Surgery (CSMBS)
Iran	Iranian Society of Metabolic & Bariatric surgery (IRSMBS)
Malaysia	Malaysian Metabolic And Bariatric Surgery Society (MMBSS)
New Zealand	Australian & New Zealand Obesity Surgery Society (ANZMOSS)
South Korea	Korean Society for Metabolic and Bariatric Surgery (KSMBS)
Brazil	Sociedade Brasileira de Cirurgia Bariátrica e Metabólica (SBCBM)
Chile	Sociedad Chilena De Cirugia Bariátrica Y metabólica (SCCBM)
Mexico	Colegio Mexicano de Cirugía para la Obesidad y Enfermedades Metabólicas (CMCOEM)
Venuzuela	Venezuelan Society Of Obesity Surgery (SOVCIBAM)

A note on data provided by each registry

Appendix 2 contains the data dictionary used for the purpose of this report. Not every national registry contains information on each of these variables, and whilst definitions are provided in the data dictionary, there are instances where the definition used by the contributing countries differ. Where differences occur, these are noted in the report. Comorbidity definitions are provided in Appendix 3.

Future directions

It is hoped that in future reports that we will be able to engage with all of the known national registries.

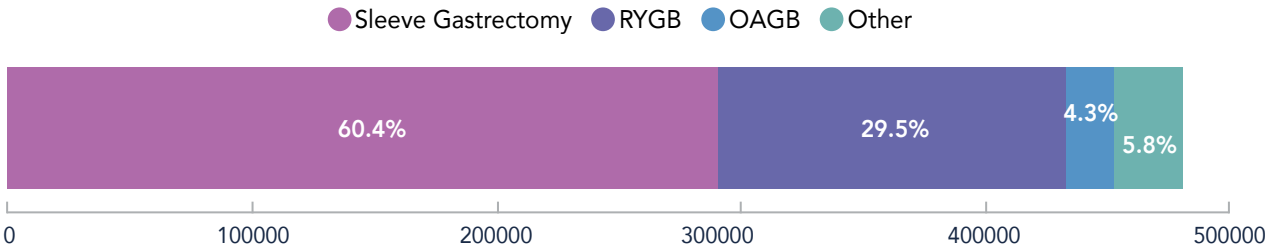
For these global reports to achieve their potential, ideally we would be able to include information from all 72 member societies. IFSO is aware of 5 national registries that have not been able to share their data in this report, meaning there are at least 43 member societies that do not have a national registry. To address this need, the IFSO global registry committee has been working on developing a minimum dataset and data dictionary as well as a "tool kit" that will enable member societies that wish to establish a registry.

Procedures & Operative approach

There were 480,970 metabolic bariatric procedures reported by contributing registries.

The Michigan Registry is also potentially represented in the total number of the United States of America as 39 of their 41 sites also contribute to the American College of Surgeons MBSAQIP database, meaning 10,437 procedures are potentially represented twice in some areas of this report.

Sleeve gastrectomy (SG) is the predominant procedure around the world, followed by Roux-en-Y Gastric Bypass (RYGB) and One Anastomosis Gastric Bypass (OAGB). Procedures labelled "other" continue to increase, these procedures include Single-anastomosis duodenoileal bypass with sleeve gastrectomy (SADI-DS), BilioPancreatico Diversion (BPD), Adjustable Gastric Band (AGB) and endoscopic procedures.



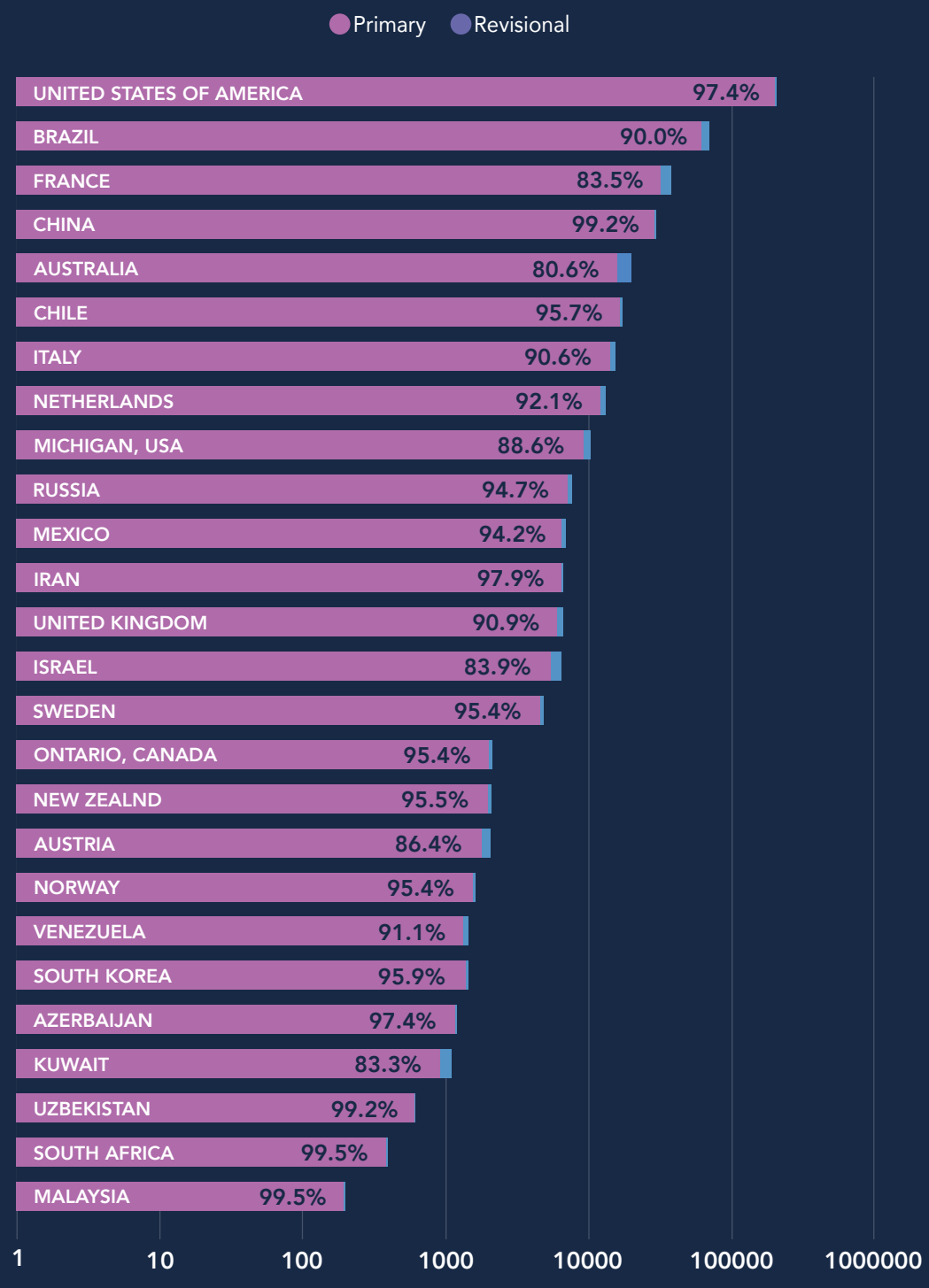
All procedure types (n=480,970).

*potential for 10,437 procedures to be represented twice due to possible overlaps with the datasets of USA and Michigan.

COUNTRY OR REGION	PRIMARY (n)	REVISIONAL (n)	PRIMARY (n)	REVISIONAL (n)
USA	204,092	5,435	97.4%	2.6%
BRAZIL	63,442	7,048	90.0%	10.0%
FRANCE	32,490	6,400	83.5%	16.5%
CHINA	29,823	248	99.2%	0.8%
CHILE	16,855	749	95.7%	4.3%
AUSTRALIA	16,308	3,914	80.6%	19.4%
ITALY	14,391	1,499	90.6%	9.4%
NETHERLANDS	12,327	1,052	92.1%	7.9%
MICHIGAN, USA	9,319	1,201	88.6%	11.4%
RUSSIA	7,345	415	94.7%	5.3%
MEXICO	6,649	409	94.2%	5.8%
IRAN	6,631	141	97.9%	2.1%
UNITED KINGDOM	6,118	616	90.9%	9.1%
ISRAEL	5,556	1,063	83.9%	16.1%
SWEDEN	4,677	223	95.4%	4.6%
ONTARIO, CANADA	2,064	100	95.4%	4.6%
NEW ZEALAND	2,014	94	95.5%	4.5%
AUSTRIA	1,817	285	86.4%	13.6%
NORWAY	1,575	76	95.4%	4.6%
SOUTH KOREA	1,406	60	95.9%	4.1%
VENEZUELA	1,351	132	91.1%	8.9%
AZERBAIJAN	1,191	32	97.4%	2.6%
KUWAIT	934	187	83.3%	16.7%
UZBEKISTAN	614	5	99.2%	0.8%
SOUTH AFRICA	394	2	99.5%	0.5%
MALAYSIA	200	1	99.5%	0.5%

Primary and revisional procedures by country or region.

*potential for procedures to be represented twice due to possible overlaps with the datasets of USA and Michigan.

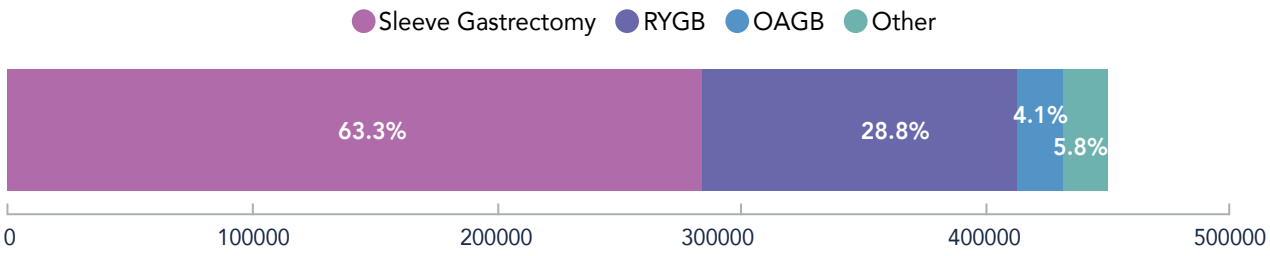


Proportion of primary and revisional metabolic bariatric procedures by country or region.

Primary procedures

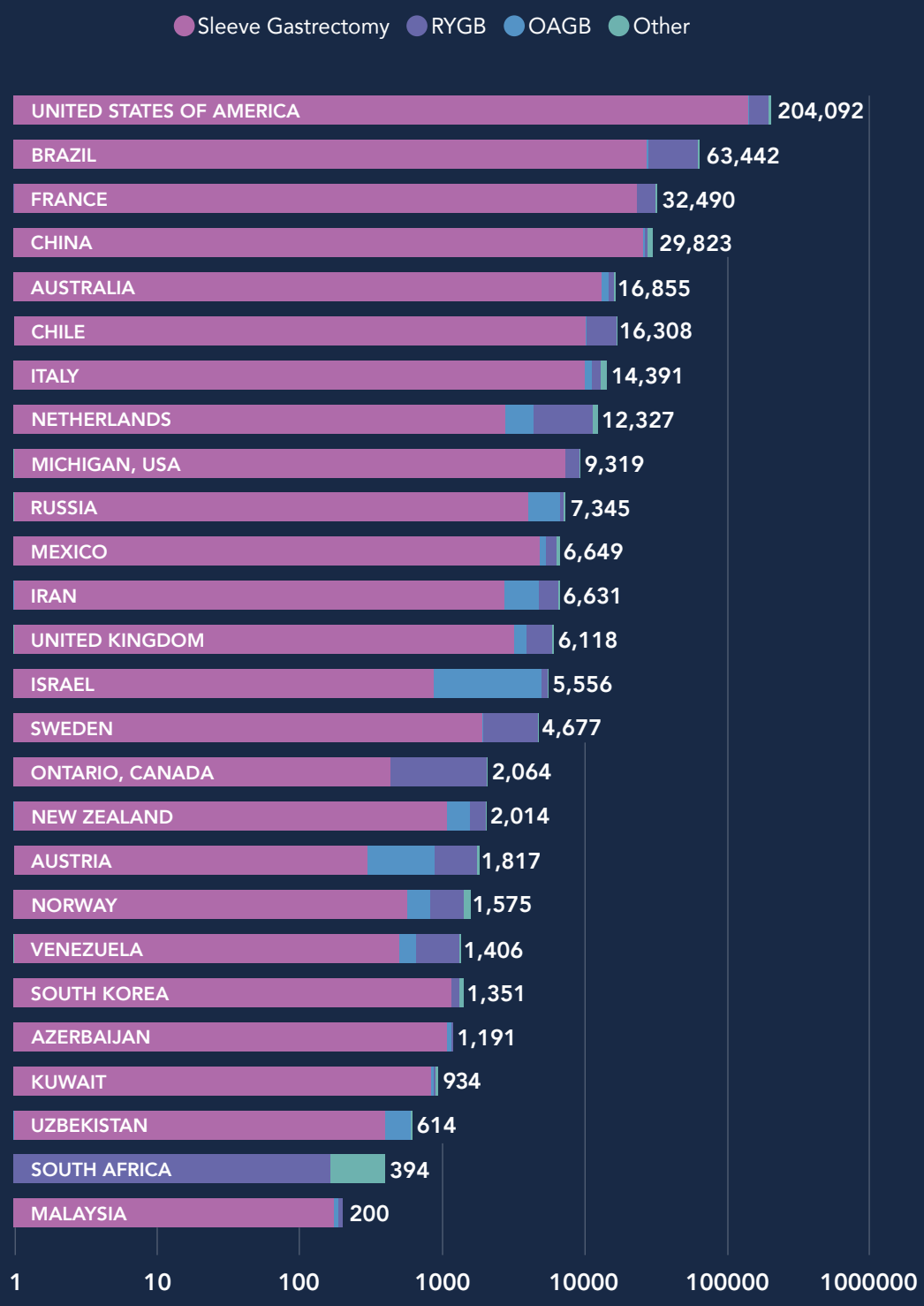
Primary metabolic bariatric procedures are defined by the IFSO registry *as the first procedure a person with obesity undertakes as treatment for their obesity.* There were 449,583 primary procedures recorded by the contributing registries.

Sleeve Gastrectomy is the most commonly performed primary procedure in the majority of reporting countries. Procedures labelled as "other" procedures are emerging as popular primary procedures in some countries. It is difficult to change data that is recorded in national registries, but moving forward it will be important to differentiate emerging procedures.



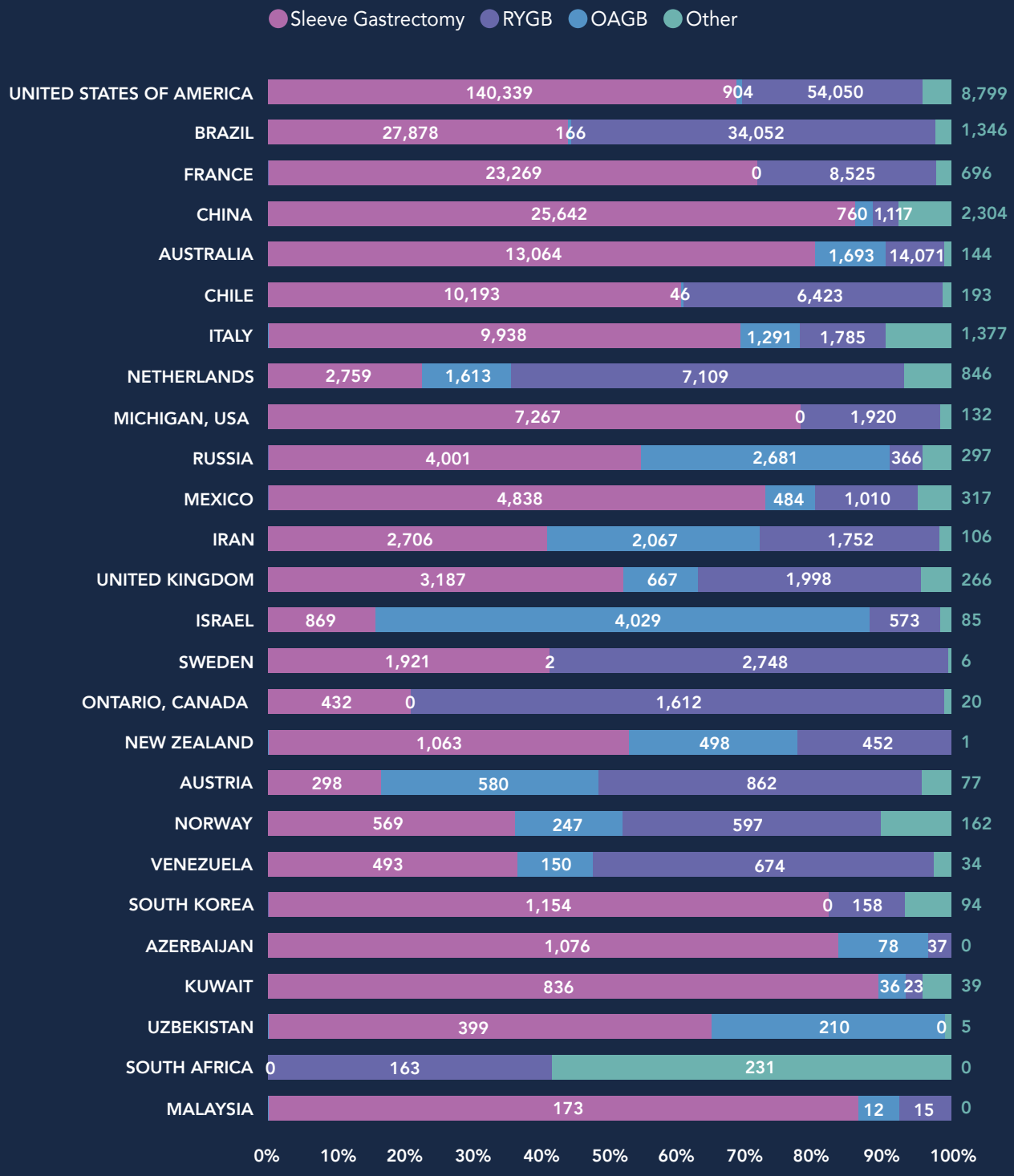
Primary procedure types (n=449,583).

*potential for procedures to be represented twice due to possible overlaps with the datasets of USA and Michigan.



Types of primary procedures by country or region.

*potential for procedures to be represented twice due to possible overlaps with the datasets of USA and Michigan.



Types of primary metabolic bariatric procedures by country or region.

Revisional procedures

Revisional metabolic bariatric procedures are defined by the IFSO registry *as those procedures performed to change one type of metabolic bariatric procedure to a different metabolic bariatric procedure.* Another term commonly used is *conversional procedures.* Changing to a different type of metabolic bariatric procedure may be required for weight increasing, side effects of the initial procedure or recurrence of metabolic disorders, reflecting the chronic nature of the disease of obesity.

Revisional metabolic bariatric procedures may also be undertaken to purely to correct side effects or complications of the initial procedure, for example reduction of an internal hernia or dilatation of a stricutre. These are often termed *corrective procedures.*

Not all registries collect reasons for revisional procedures, so in this report the numbers likely reflect any subsequent procedure after an initial metabolic bariatric procedure.

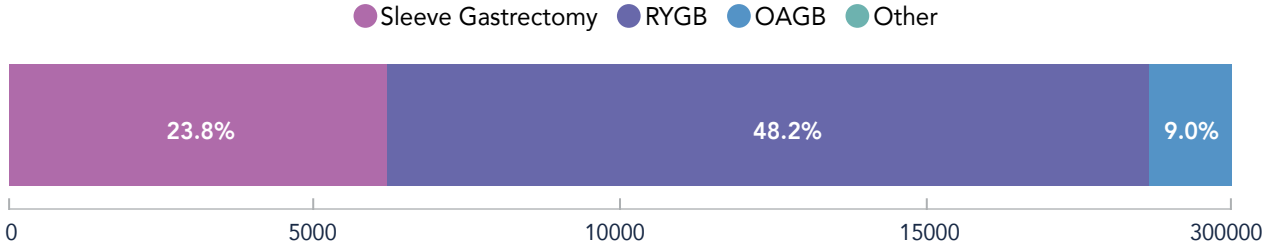
There were 25,592 revisional procedures reported by contributing registries. The USA reported an additional 5,435 revisional procedures but were not able to provide a breakdown of their revisional procedures at the time of reporting, therefore, their data is not included in the sub-analysis of procedure type.

Rates of revisional procedures ranged from 16.5% in France, 19.4% in Australia and 16.1% in Israel, to 4.5% in New Zealand, 4.6% in Sweden and 2.6% in USA. Overall rate of revisional surgery was 6.5%. For countries/regions other than the USA, the rate of revisional surgery was 10.0%.

It is possible that the higher revisional rates in some countries reflects previous metabolic bariatric surgery practice that included a higher proportion of primary gastric bands and gastric sleeves. The ASMBS have previously reported revisional rates of 11-22% (https://asmbs.org/resources/estimate-of-bariatric-surgery-numbers). Notably, the rate of revisional surgery in the Michigan Registry was 11.4% in this current report. The USA do not finalise their data until October 2023. If the rate of revisional surgery is confirmed to have fallen, it may reflect a major change in practice.

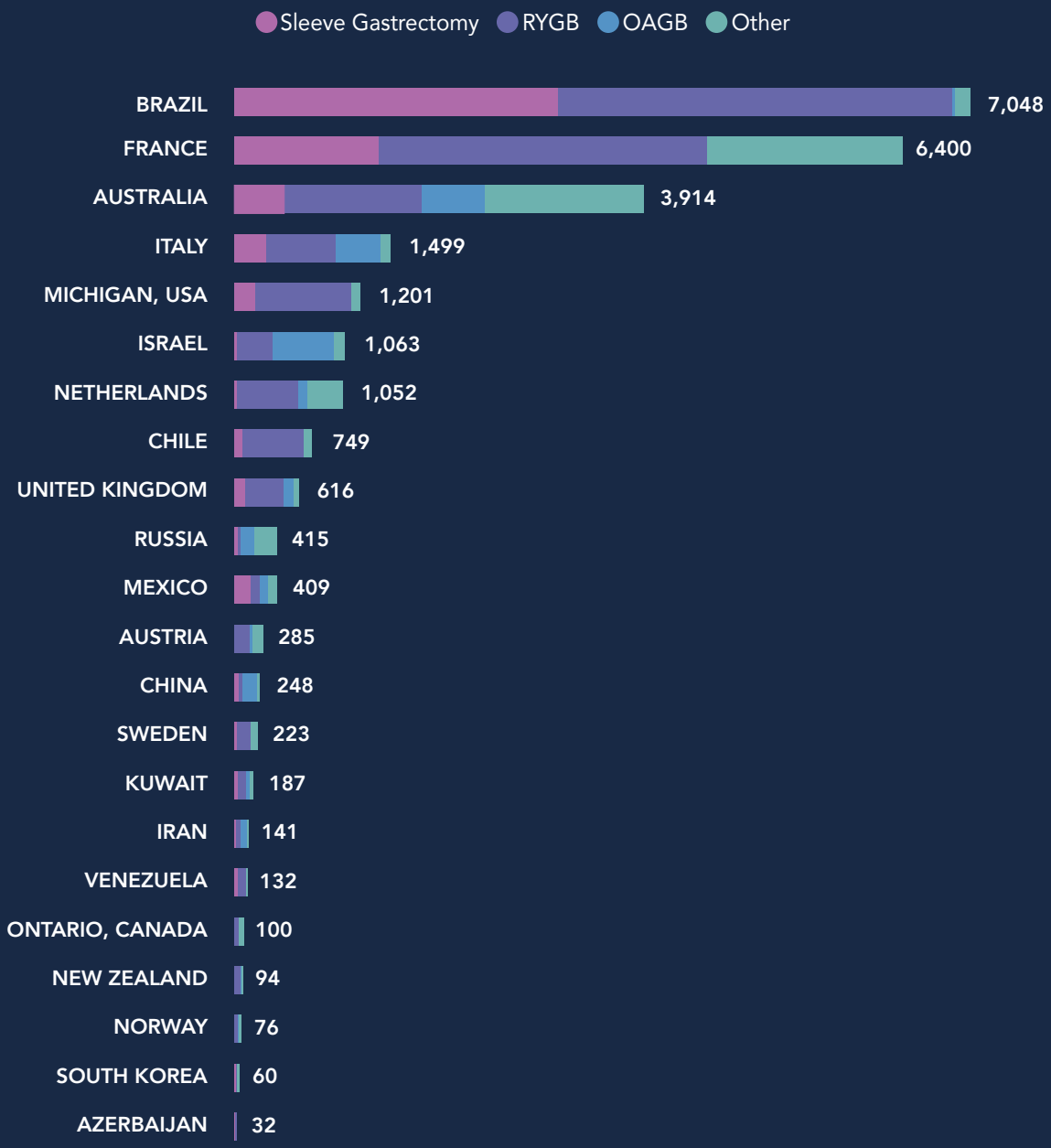
RYGB are the most commonly performed revisional metabolic bariatric procedures, with sleeve gastrectomy being undertaken less than 25% of the time.

Ideally, we would collect reasons for revision, as well as be able to document the "journey" some of our patients undertake over the years and decades after their original procedure. This is something that we aspire to report upon as our national registries continue to mature.



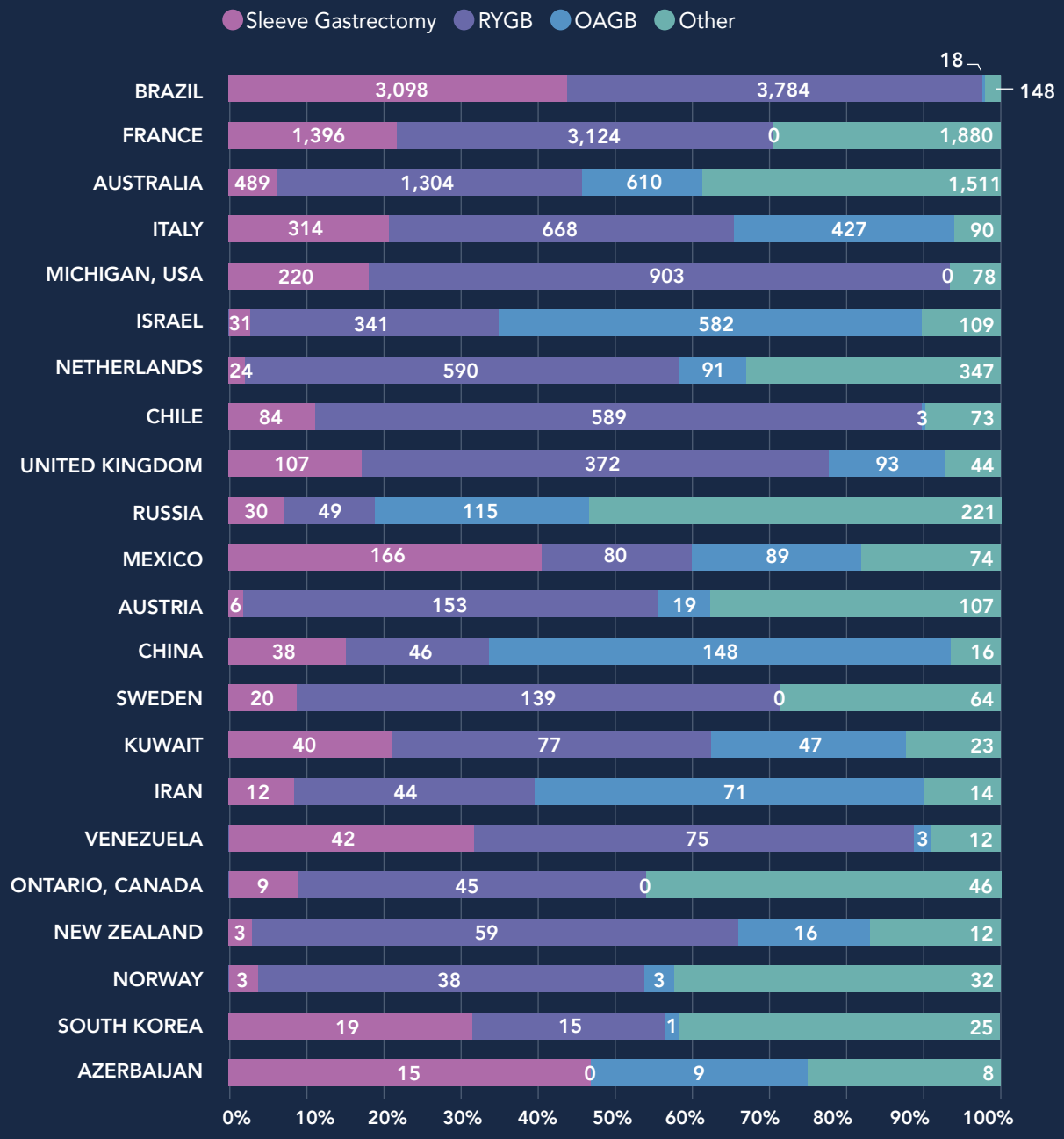
Revisional procedures (n=19,814).

For all countries apart from the USA (n=5,435 excluded from analysis as no breakdown provided).



Revisional or conversion procedures by country (n=25,952).

Malaysia (n=1 RYGB), South Africa (n=2 other) and Uzbekistan (n=3 Sleeve; n=2 RYGB) had too few numbers to display graphically.



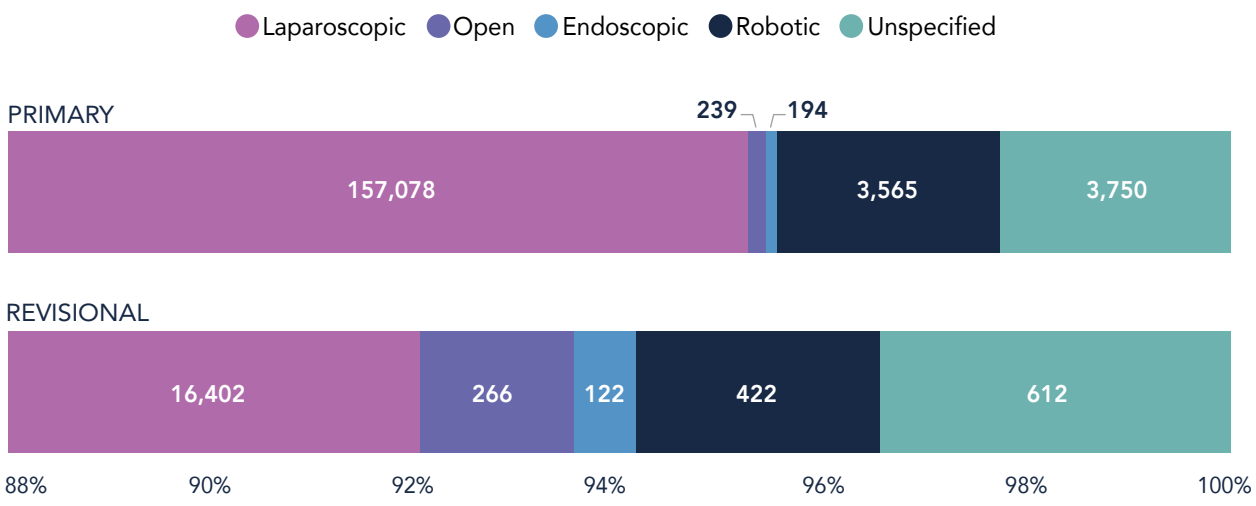
Revisional or conversion metabolic procedures by country or region.

Operative approach

The majority of metabolic bariatric procedures are undertaken via the laparoscopic approach. However, in the revisional setting it is notable that a higher proportion are undertaken either open or robotic approach. This probably reflects the complexity of the revisional procedures and the technical difficulty associated with revisional procedures.

Not all registries provided the operative approach in their data therefore the total numbers will be different to the over all numbers reported in chapter 1 and the section above.

Additionally, not all registries have complete data acquisition, and it is possible that some robotic or endoscopic cases were not captured, especially if they occurred in non-traditional hospital settings. Given these are emerging procedures, it will be important to ensure they are captured in future reports so that outcomes maybe monitored.



The operative approach taken for both primary and revisional procedures.
Not all registries provided this information, therefore, the total numbers are different to the overall number of procedures reported in the sections above.

	Laparoscopic	Open	Endoscopic	Robotic	Unspecified	Laparoscopic Rate	Robotic Rate
AUSTRALIA	16,151	2	1	117	37	99.0%	0.7%
AUSTRIA	1,738	4	1	42	32	95.7%	2.3%
ONTARIO, CANADA	2,050	13	0	0	1	99.3%	0.0%
FRANCE	32,408	82	0	0	0	99.7%	0.0%
IRAN	6,624	7	0	0	0	99.9%	0.0%
ISRAEL	5,548	6	0	0	2	99.9%	0.0%
ITALY	12,926	5	0	88	1,372	89.8%	0.6%
KUWAIT	900	0	32	2	0	96.4%	0.2%
MEXICO	6,526	13	112	11	1	97.9%	0.2%
NETHERLANDS	12,306	9	12	0	0	99.8%	0.0%
NEW ZEALAND	2,014	0	0	0	0	100.0%	0.0%
NORWAY	1,576	0	0	0	0	100.0%	0.0%
RUSSIA	7,249	73	3	0	0	99.0%	0.0%
SOUTH AFRICA	393	1	0	0	0	99.7%	0.0%
SWEDEN	4,665	7	0	0	5	99.7%	0.0%
UNITED KINGDOM	6,012	13	18	75	0	98.3%	1.2%
MICHIGAN, USA	6,369	3	0	2,947	0	68.3%	31.6%
UZBEKISTAN	614	0	0	0	0	100.0%	0%
VENEZUELA	1,484	0	0	0	0	100.0%	0%

Operative approach – Primary procedures.

*Not all countries provided this information.

	Laparoscopic	Open	Endoscopic	Robotic	Unspecified	Laparoscopic Rate	Robotic Rate
AUSTRALIA	3,769	21	78	35	11	96.3%	0.9%
AUSTRIA	271	10	0	1	3	95.1%	0.4%
ONTARIO, CANADA	98	2	0	0	0	98.0%	0.0%
CHINA	218	14	4	12	0	87.9%	4.8%
FRANCE	6,261	139	0	0	0	97.8%	0.0%
IRAN	141	0	0	0	0	100.0%	0.0%
ISRAEL	1,057	6	0	0	0	99.4%	0.0%
ITALY	884	14	4	2	595	59.0%	0.1%
KUWAIT	178	2	0	7	0	95.2%	3.7%
MEXICO	375	0	20	0	0	94.9%	0.0%
NETHERLANDS	1,039	10	3	0	0	98.8%	0.0%
NEW ZEALAND	93	0	0	0	1	98.9%	0.0%
NORWAY	74	2	0	0	0	97.4%	0.0%
RUSSIA	294	18	1	0	0	93.9%	0.0%
SWEDEN	218	4	0	0	1	97.8%	0.0%
UNITED KINGDOM	597	7	2	9	1	96.9%	1.5%
MICHIGAN, USA	828	17	0	356	0	68.9%	29.6%
UZBEKISTAN	5	0	0	0	0	100%	0%

Operative approach – Revisional procedures.

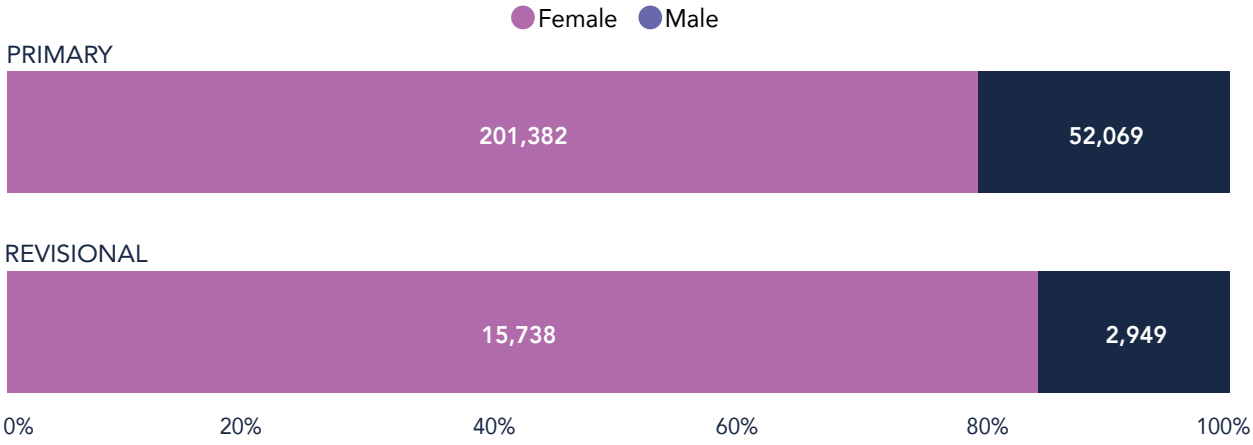
*Not all countries provided this information.

Demographics (Sex, Age and BMI)

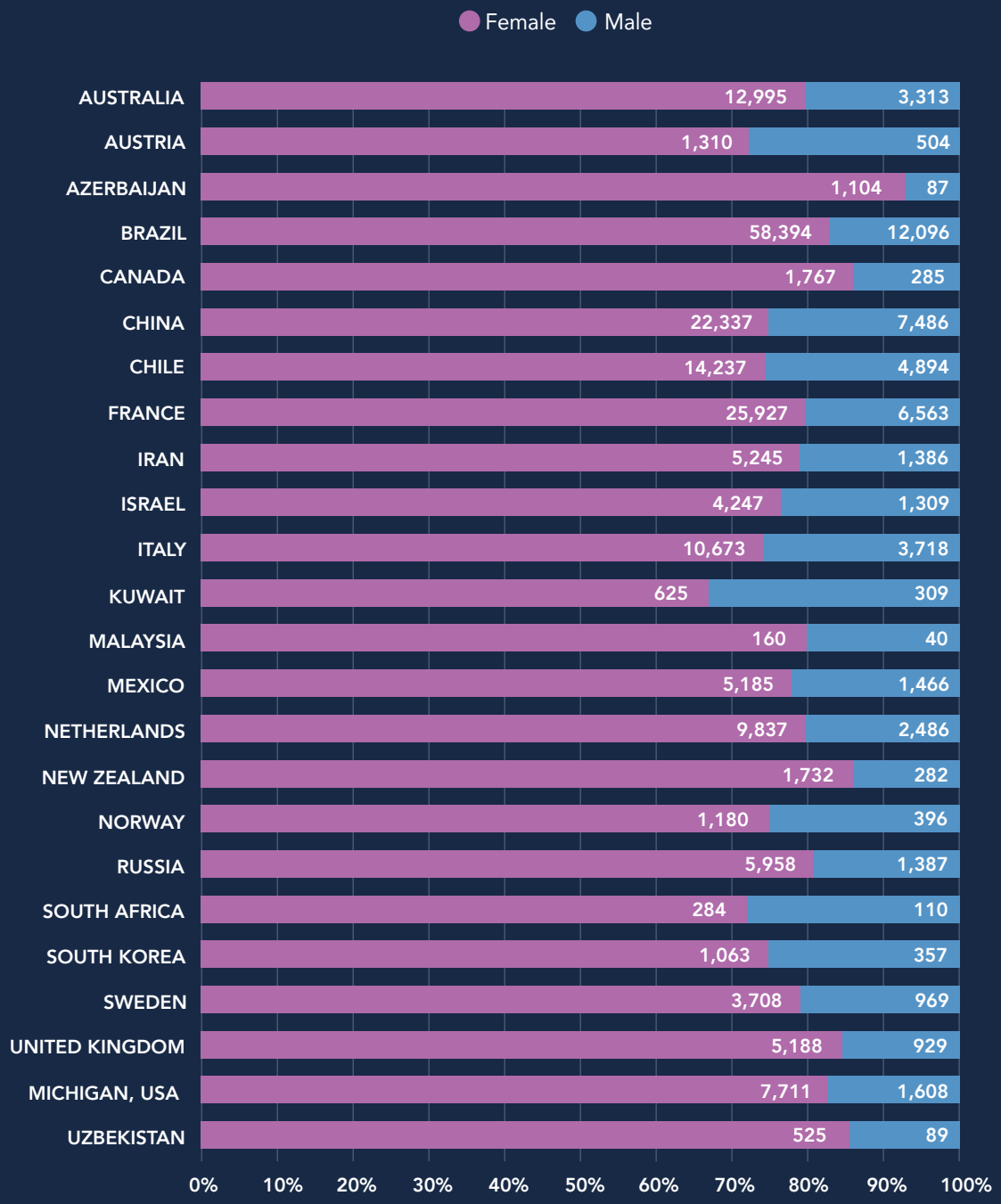
Sex

For the purpose of this report, participant sex is defined as "being based upon their sex characteristics, such as their chromosomes, hormones and reproductive organs at the time of undergoing a metabolic bariatric procedure".

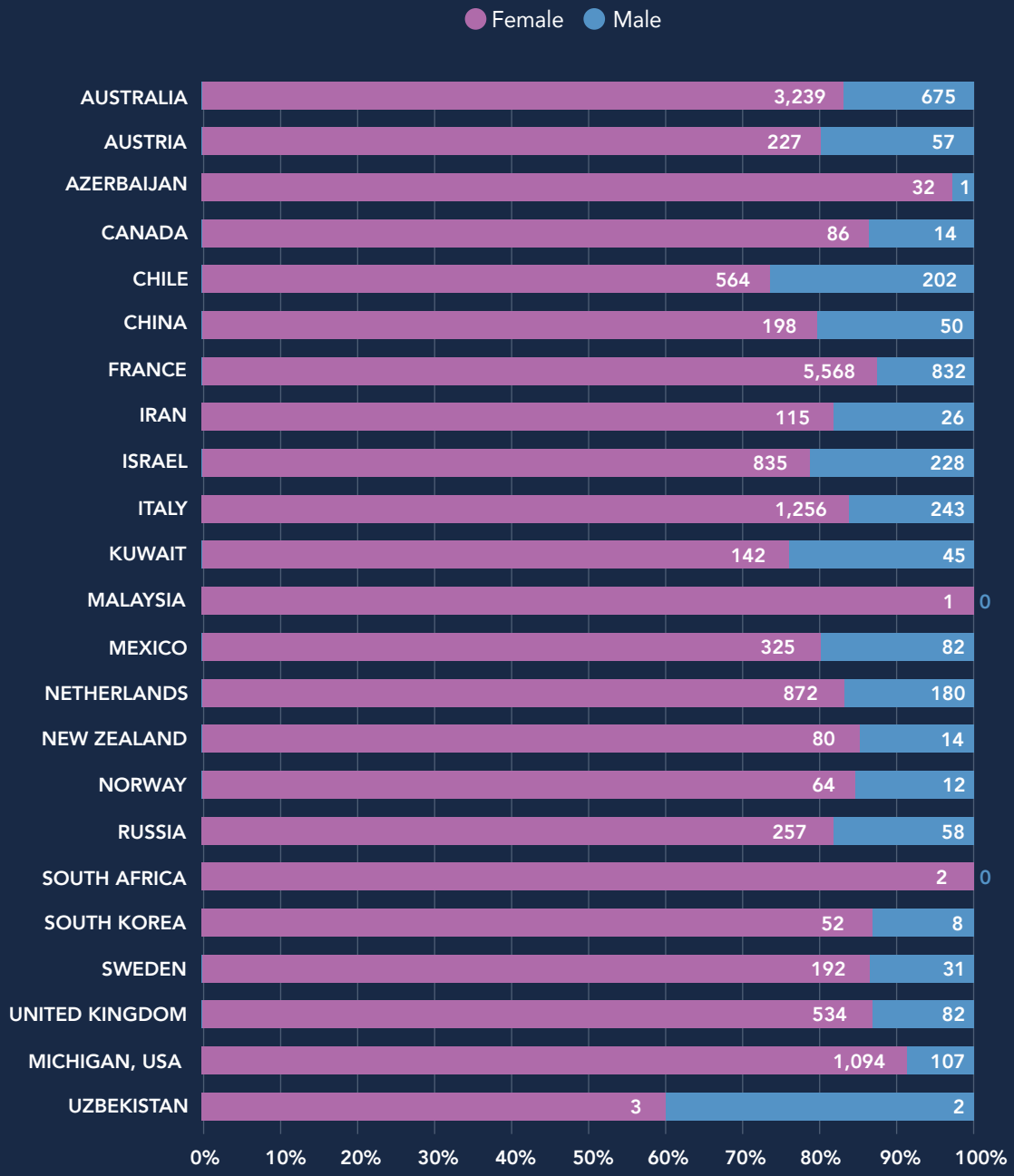
Data on sex was provided by 24 registries. More females than males are undergoing metabolic bariatric procedures in all contributing registries in both the primary and revisional surgical setting.



Proportion of males and females undergoing metabolic bariatric surgery.



Female to male distribution for primary procedure per country or region.



Female to male distribution for revisional procedures per country or region.

Age

The median age on the day of surgery varied from 31 years of age (China) to 45 years of age (Italy and Netherlands). As expected, the median age of primary patients is younger than revisional procedures.

COUNTRY	MEDIAN	LOWER IQR	UPPER IQR
AUSTRALIA	42.4	33.9	51.5
AUSTRIA	41	39.8	48
ONTARIO, CANADA	43.8	36.1	51.8
CHINA	31	25	37
FRANCE	41	32	51.1
IRAN	38	31	45
ISRAEL	37.2	28.2	47.2
ITALY	45	35	52
KUWAIT	34	25	42
MALAYSIA	41	35.5	47.5
NETHERLANDS	45	34	54
NEW ZEALAND	43.6	35.2	51.9
NORWAY	42	32.5	51.2
RUSSIA	40.8	34.4	48.8
SOUTH AFRICA	43	37	50
SOUTH KOREA	35	29	42
SWEDEN	41	32	50
UNITED KINGDOM	44.7	35.8	53.5
MICHIGAN, USA	43	35	52
UZBEKISTAN	41	34	45

Median age at surgery with interquartile range.

	FEMALE			MALE			OTHER		
	Median	Lower IQR	Upper IQR	Median	Lower IQR	Upper IQR	Median	Lower IQR	Upper IQR
CHINA	31	25	37	30	23	36	30	24.4	37
KUWAIT	33	24	41	31	22	39	32	23	42
SOUTH KOREA	36	29	43	33	29	40	35	29	42
ISRAEL	34.9	26.7	44.6	36.9	27.4	46.8	35.3	26.8	45.2
IRAN	38	31	46	36	30	42	38	31	45
UZBEKISTAN	36	28	43	44	30	49	40	29	46
AUSTRIA	39	40.4	48	43.2	41	50.5	40	40.7	48.7
SWEDEN	40	32	49	44	35	52	40	34	50
AUSTRALIA	39.9	32.2	49.4	42.6	34.8	51	40.5	32.7	49.8
RUSSIA	40.5	25.3	48.6	41.4	34.6	49.2	40.6	34.2	48.6
MALAYSIA	41	36	49	40	35	45.8	41	36	49
NORWAY	40.7	32	50.3	45.5	35	52.5	41.9	32.4	51
MICHIGAN, USA	42	34	51	45	38	54	42	34	51
SOUTH AFRICA	41	36	49	46	38	54	43	37	50
NEW ZEALAND	42.7	34.7	51.5	46.3	37.4	53.7	43.3	35.1	51.8
ONTARIO, CANADA	43.2	35.6	51.4	46.7	39.5	54.1	43.7	37.2	53.9
UNITED KINGDOM	43.3	34.7	52.5	47.6	38.5	55.4	43.9	35.2	53
NETHERLANDS	43	33	52	48	37	55	44	34	53
ITALY	44	34	52	36	45	52	44	34	52

Age at surgery for primary procedure per country or region.

Age Distribution (median and interquartile range) of all patients, and female and male patients separately.

	FEMALE			MALE			OTHER		
	Median	Lower IQR	Upper IQR	Median	Lower IQR	Upper IQR	Median	Lower IQR	Upper IQR
CHINA	38.5	34	43.3	41	30.8	48	39	33.8	43.3
KUWAIT	40	34	48	39	35	48	40	34	48
SOUTH KOREA	40	32	47	42	34	48	41	32	47
ISRAEL	38	36	40	46	44	48	42	40	44
IRAN	44.7	39.5	51.7	46.0	39.7	52.9	44.9	39.6	52
UZBEKISTAN	43.7	32.8	49.4	45.3	34.6	48.9	44.7	34.7	46.9
AUSTRIA	45	32	57	48	39	57	45	32	57
SWEDEN	44.8	37.7	51.3	48.3	40.4	52.9	45.5	37.8	51.8
AUSTRALIA	46	37	54	48	39.5	52	46	37.5	54
RUSSIA	46.3	35.2	54.2	45.9	36.4	56.6	46.3	35.8	55.4
MALAYSIA	46.2	37.18	54.2	48.7	38.2	55.3	46.8	37.4	54.4
NORWAY	48	40	55	52	43.5	61	48	41	56
MICHIGAN, USA	47.5	39.6	56.2	51.4	44.3	58.3	48.2	40.1	57
SOUTH AFRICA	48	27.5	40.9	54	29.4	44.6	49	27.6	41.7
NEW ZEALAND	50	50	50	48	48	48	49	48	50
ONTARIO, CANADA	49	0	0	0	0	0	49	0	0
UNITED KINGDOM	49.5	41.0	57	51.2	42.6	58.6	49.9	41.2	57.4
NETHERLANDS	50	41	56	52	47	59	50	42	57
ITALY	49.7	42.2	56.5	52.3	47.3	58.8	50.3	42.6	56.9

Age at surgery for revisional procedure per country or region.

Age Distribution (median and interquartile range) of all patients, and female and male patients separately.

BMI

The median BMI on day of surgery for those people with obesity undergoing a primary metabolic bariatric procedure ranged from 36.1 kg/m2 for females in China to 47.65 kg/m2 for males in South Africa. Overall, the lowest BMIs were seen in Asian populations who are more likely to have the diseases related to obesity at lower BMIs.

Pre-Surgery BMI for primary procedures per country or region

BMI distribution (median and interquartile range) of all patients as well as male and female separately.

	FEMALE			MALE			OTHER		
	Median	Lower IQR	Upper IQR	Median	Lower IQR	Upper IQR	Median	Lower IQR	Upper IQR
CHINA	36.1	32.1	41	40.4	35.9	46.1	37.4	33.1	42.9
SOUTH KOREA	37.3	34.3	41.2	41.0	36.5	46.4	38.1	35.0	42.6
SWEDEN	40.2	36.7	44.3	42.3	38.7	46.7	40.6	37.2	44.8
ISRAEL	41	38.5	44	42	39.1	45.7	41	38.7	44.5
NORWAY	40.6	37.4	44.6	42.9	39.3	47.5	41.1	37.7	45.2
NETHERLANDS	41.6	39.3	45	41.9	39	45.7	41.7	39.2	45.1
MALAYSIA	43.5	35.3	45.9	44	38.2	50.5	42	36	46
KUWAIT	41.5	38.8	46.1	43.1	40.1	49.8	42	39.2	47.1
IRAN	41	38	45	43	40	47	42	39	45
ITALY	41	38	45	43	39	48	42	38	46
AUSTRALIA	41.8	37.7	47.1	43.3	39.2	48.9	42.1	38	47.5
RUSSIA	41.5	37.1	47.3	45.3	41.0	51.1	42.2	37.4	47.8
UZBEKISTAN	42	38	44	44	40	46	43	39	45
NEW ZEALAND	43.0	38.9	48.5	44.6	40.2	51.6	43.3	39.1	48.8
AUSTRIA	43.7	40.4	48	45.1	41	50.5	44	40.7	48.7
MICHIGAN, USA	44.1	40.3	49.3	45.8	41.2	51.6	44.3	40.4	49.7
UNITED KINGDOM	45	40.6	50.4	46.5	41.5	52.3	45.1	40.8	50.7
ONTARIO, CANADA	45.5	41.8	51.2	47.5	42.4	53.2	45.6	41.8	51.4
SOUTH AFRICA	45.2	41.3	52.2	47.7	42	55.2	45.8	41.6	53

*France collects BMI information differently to other registries.
Their data is included for completeness below:

BMI (%)	FEMALE	MALE	OVERALL
30-40	29.6%	29.6%	34.4%
>40-50	51.8%	51.8%	48.7%
>50	12.8%	12.8%	8.4%
Not Stated	5.7%	5.7%	8.5%

Diseases related to obesity and improved with weight loss

Obesity causes or contributes to more ill-health and lack of well-being than any other disease. Weight loss has the potential to be one of the most effective and powerful health-giving tools available to health care professionals around the world. If we are to focus on person-based goals, conditions that will be improved with weight loss may be a better indication for metabolic bariatric surgery than BMI alone.

There are over 100 diseases and conditions that could potentially improve with weight loss, most registries focus on the impact on the more common conditions including Diabetes, Gastro Esophageal Reflux Disease (GERD), Obstructive Sleep Apnea (OSA), Dyslipidemia Hypertension and Depression. Not all registries collect information on each of these conditions, and therefore the data displayed is only from registries that have this information available.

A note on definitions

The definitions of the diseases of obesity varies between registries, making data comparison difficult.1,2 For the purposes of this report the data dictionary in appendix 2 is utilized, however, we need to acknowledge that established registries will use their own definition. A full range of definitions used by registries for the included diseases maybe found in appendix 3.

However, given these data are high-level aggregated data, it is reasonable to consider that trends noted are likely to be signals of important differences.

Diabetes

The definition of diabetes used for the IFSO registry (appendix) is "a person who identifies as a person with diabetes or is being treated for diabetes at the time of metabolic bariatric surgery". Information on the number of people with obesity undergoing a metabolic bariatric procedure with diabetes was available from 21 registries.

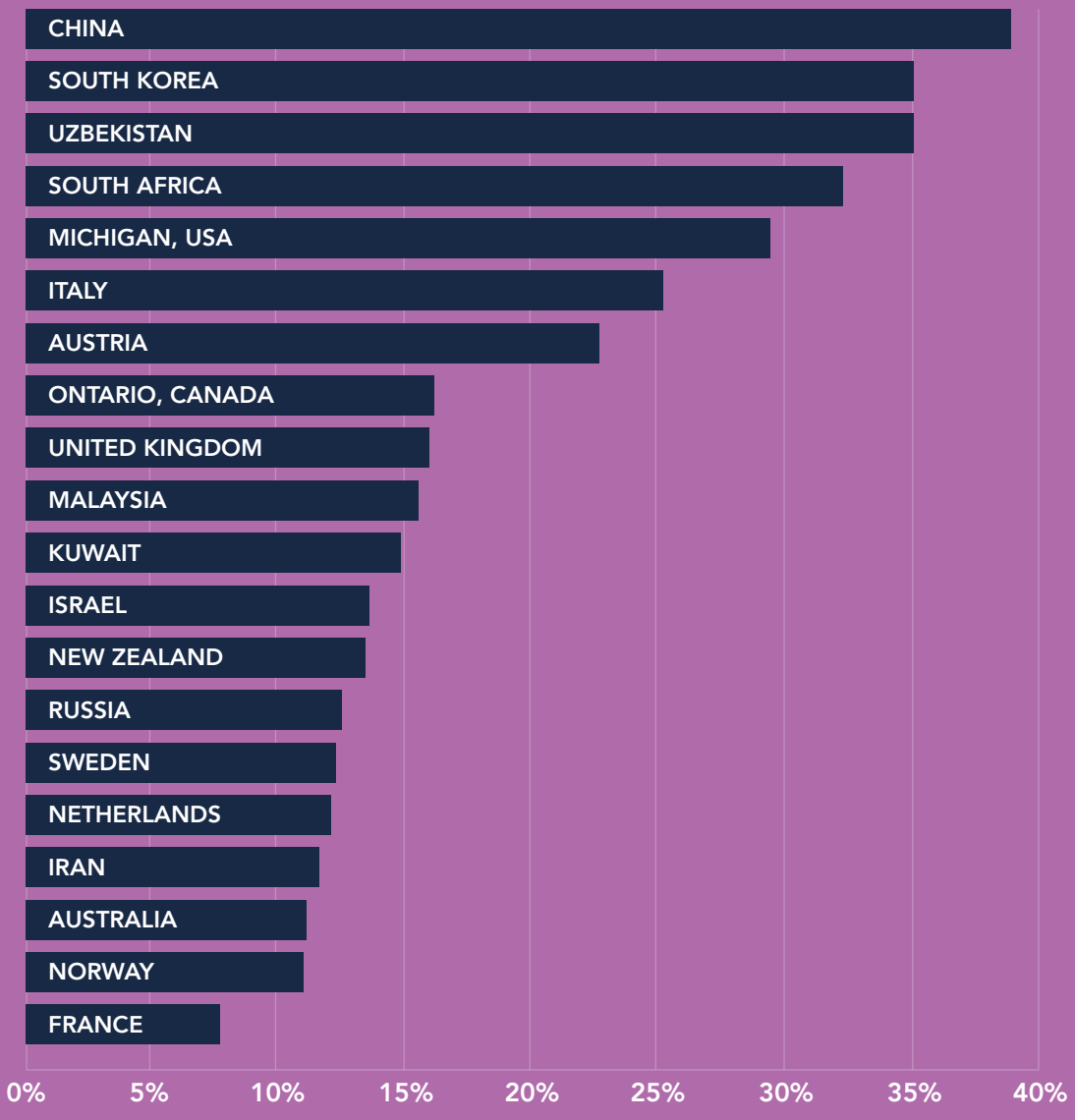
The proportion of people with obesity undergoing metabolic bariatric surgery who also have diabetes ranges from 47.4% for Azerbaijan to 7.7% for France and 11% for the Norwegian and Australian Registries.

Even though women are more likely to undergo a metabolic bariatric surgery than men in all countries, men are overrepresented in the proportion of people with diabetes undergoing a metabolic bariatric procedures.

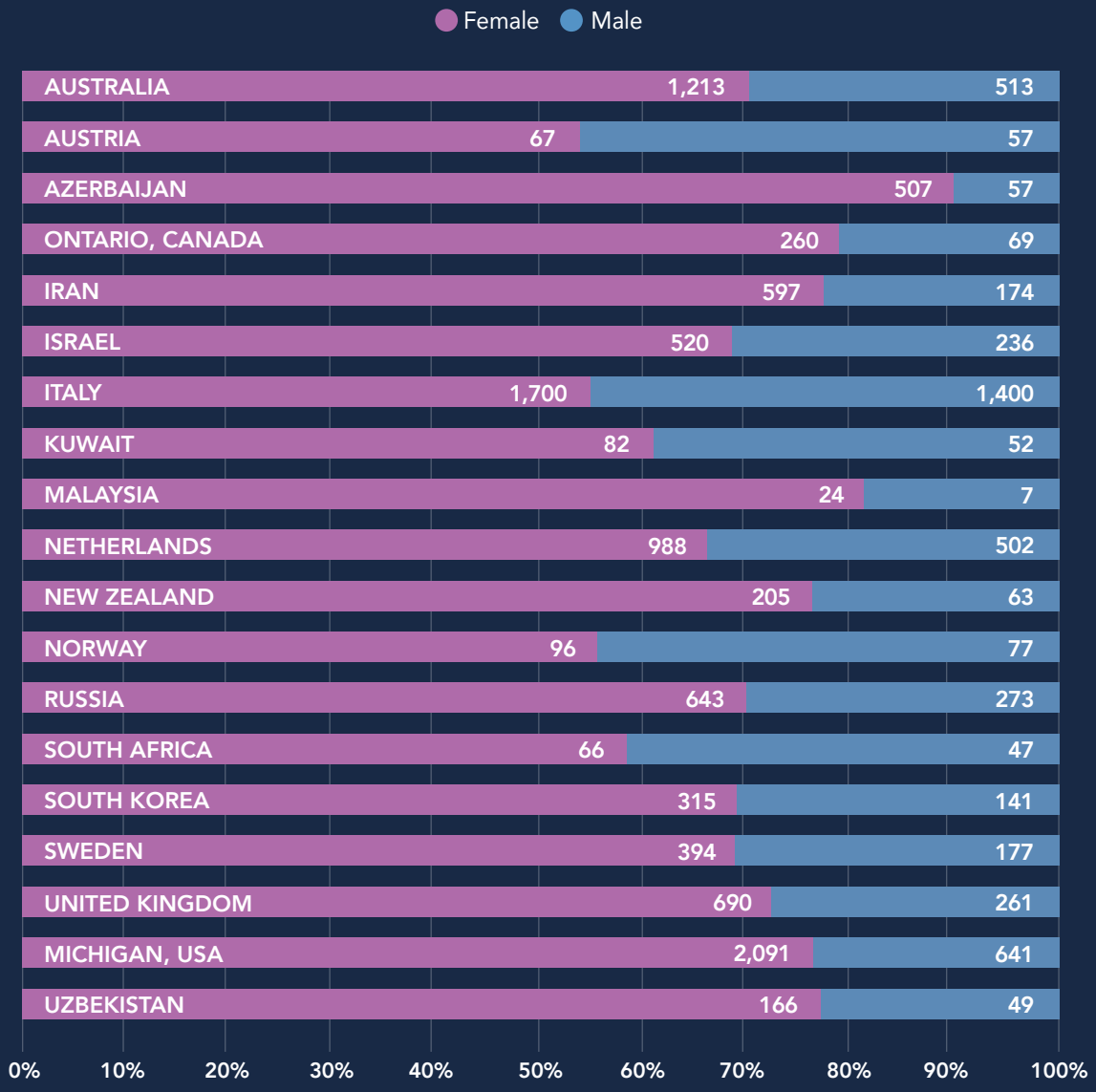
	FEMALE			MALE			ALL		
	Diabetes (n)	Total (n)	% with Diabetes	Diabetes (n)	Total (n)	% with Diabetes	Diabetes (n)	Total (n)	% with Diabetes
FRANCE	NA	NA	6.5%	NA	NA	13.1%	NA	NA	7.7%
NORWAY	96	1,180	8.1%	77	396	19.4%	173	1,576	11.0%
AUSTRALIA	1,213	12,341	9.8%	513	3,149	16.3%	1,726	15,490	11.1%
IRAN	597	5,245	11.4%	174	1,386	12.6%	771	6,631	11.6%
NETHERLANDS	988	9,815	10.1%	502	2,485	20.2%	1,490	12,302	12.1%
SWEDEN	394	3,665	10.8%	177	962	18.4%	571	4,627	12.3%
RUSSIA	643	5,944	10.8%	273	1,384	19.7%	916	7,328	12.5%
NEW ZEALAND	205	1,727	11.9%	63	279	22.6%	268	1,995	13.4%
ISRAEL	520	4,247	12.2%	236	1,309	18.0%	756	5,556	13.6%
KUWAIT	82	602	13.6%	52	305	17.0%	134	907	14.8%
MALAYSIA	24	160	15.0%	7	40	17.5%	31	200	15.5%
UNITED KINGDOM	690	5,054	13.7%	261	914	28.6%	951	5,969	15.9%
ONTARIO, CANADA	260	1,764	14.7%	69	284	24.3%	329	2,048	16.1%
AUSTRIA	67	399	16.8%	57	150	38.0%	124	549	22.6%
ITALY	1,700	9,236	18.4%	1,400	3,094	45.2%	3,100	12,330	25.1%
MICHIGAN, USA	2,091	7,711	76.5%	641	1,608	23.5%	2,732	9,319	29.3%
SOUTH AFRICA	66	258	25.6%	47	93	50.5%	113	351	32.2%
UZBEKISTAN	166	525	31.6%	49	89	55.1%	215	614	35.0%
SOUTH KOREA	315	947	33.3%	141	329	42.9%	456	1,303	35.0%
CHINA	NA	NA	NA	NA	NA	NA	11,571	29,823	38.8%
AZERBAIJAN	507	1,104	45.9%	57	87	65.5%	564	1,191	47.4%

Proportion of people undergoing primary metabolic bariatric surgery with diabetes.

*NA= data not available.



Percentage of primary participants with diabetes.



Proportion of primary patients with diabetes who are female and male.

Numbers inside bars are the actual numbers of people with diabetes in each country by sex, Not all registries provided this information. No data on the numbers of males and females was available from China or France.

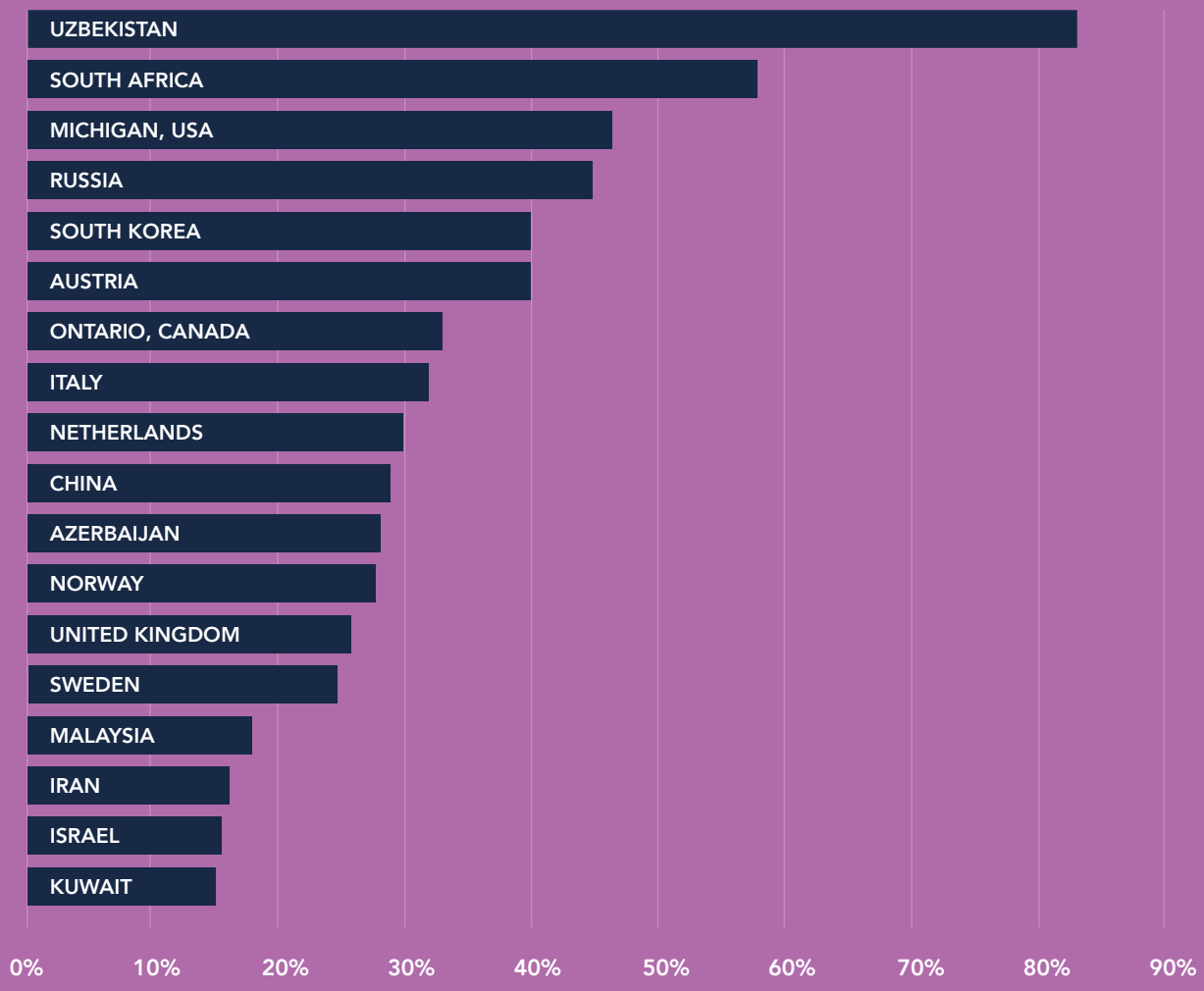
Hypertension

Information on the proportion of patients undergoing a metabolic bariatric procedure who also have hypertension was available from 18 registries. The highest proportion was seen in the Uzbekistan registry with 83.2% of patients who underwent a primary metabolic bariatric procedure also being recorded as having hypertension. The lowest rates of hypertension were seen in Kuwait (15.1%). Males were relatively overrepresented in the registries who reported on this co-morbidity.

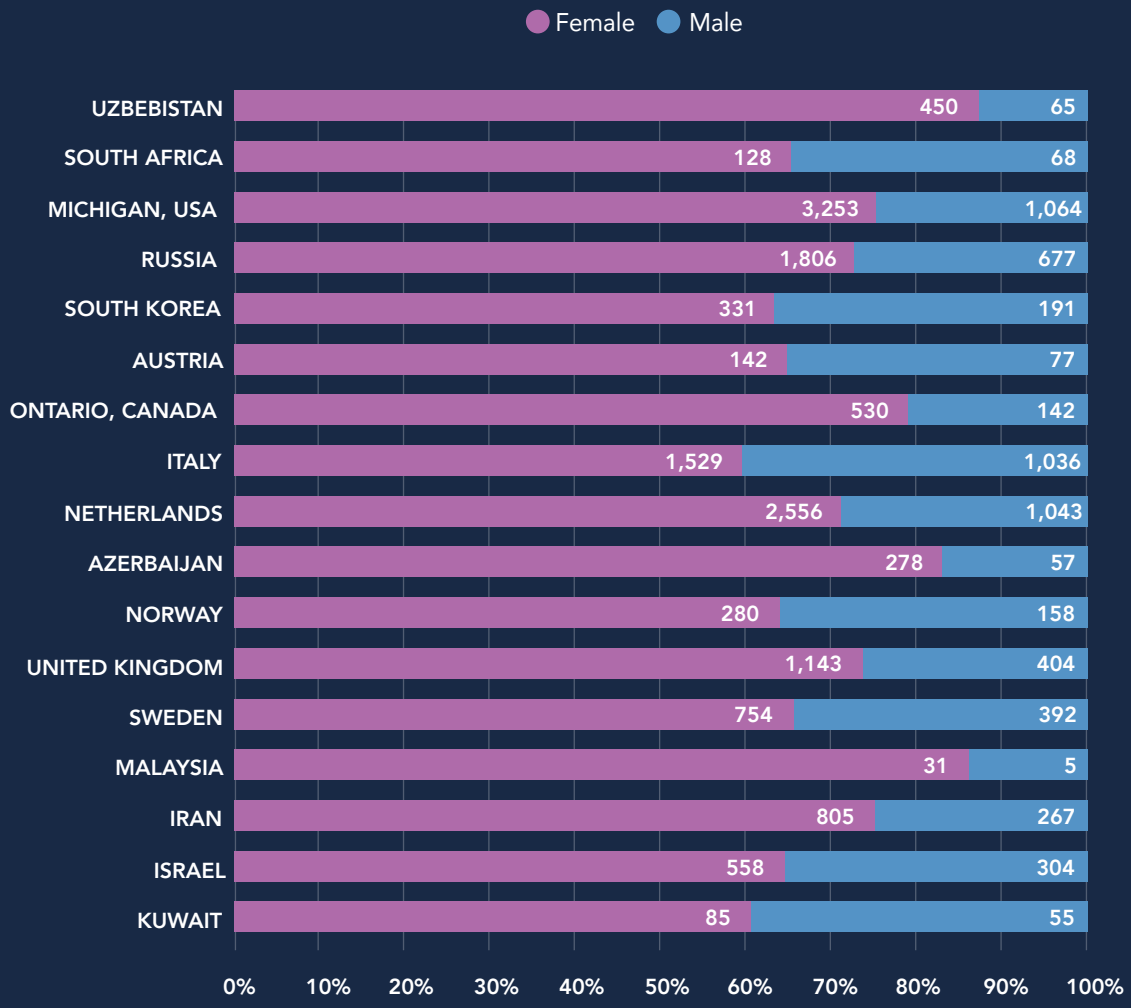
	FEMALE			MALE			OTHER		
	Median	Lower IQR	Upper IQR	Median	Lower IQR	Upper IQR	Median	Lower IQR	Upper IQR
KUWAIT	85	622	13.7%	55	305	18.0%	140	927	15.1%
ISRAEL	558	4,244	13.1%	304	1,307	23.3%	862	5,551	15.5%
IRAN	805	5,245	15.3%	267	1,386	19.3%	1,072	6,631	16.2%
MALAYSIA	31	160	19.4%	5	40	12.5%	36	200	18.0%
SWEDEN	754	3,665	20.6%	392	962	40.7%	1,146	4,627	24.8%
UNITED KINGDOM	1,143	5,070	22.5%	404	916	44.1%	1,547	5,987	25.8%
NORWAY	280	1,180	23.7%	158	396	39.9%	438	1,576	27.8%
AZERBAIJAN	278	1,104	25.2%	57	87	65.5%	335	1,191	28.1%
CHINA	NA	NA	NA	NA	NA	NA	8,648	29,823	29.0%
NETHERLANDS	2,556	9,638	26.5%	1,043	2,453	42.5%	3,600	12,095	29.8%
ITALY	1,529	4,313	35.5%	1,036	3,718	27.9%	2,565	8,031	31.9%
ONTARIO, CANADA	530	1,764	30.0%	142	284	50.0%	672	2,048	32.8%
AUSTRIA	142	399	35.6%	77	150	51.3%	219	549	39.9%
SOUTH KOREA	331	975	33.9%	191	333	57.4%	522	1,308	39.9%
RUSSIA	1,806	4,409	41.0%	677	1,137	59.5%	2,483	5,546	44.8%
MICHIGAN, USA	3,253	7,711	42.2%	1,064	1,608	66.2%	4,317	9,319	46.3%
SOUTH AFRICA	128	245	52.2%	68	94	72.3%	196	339	57.8%
UZBEKISTAN	450	528	85.2%	65	91	71.4%	515	619	83.2%

Proportion of people undergoing primary metabolic bariatric surgery with hypertension (HT).

*Not all registries provided this information.



Percentage of patients undergoing a primary metabolic procedure with a diagnosis of hypertension.



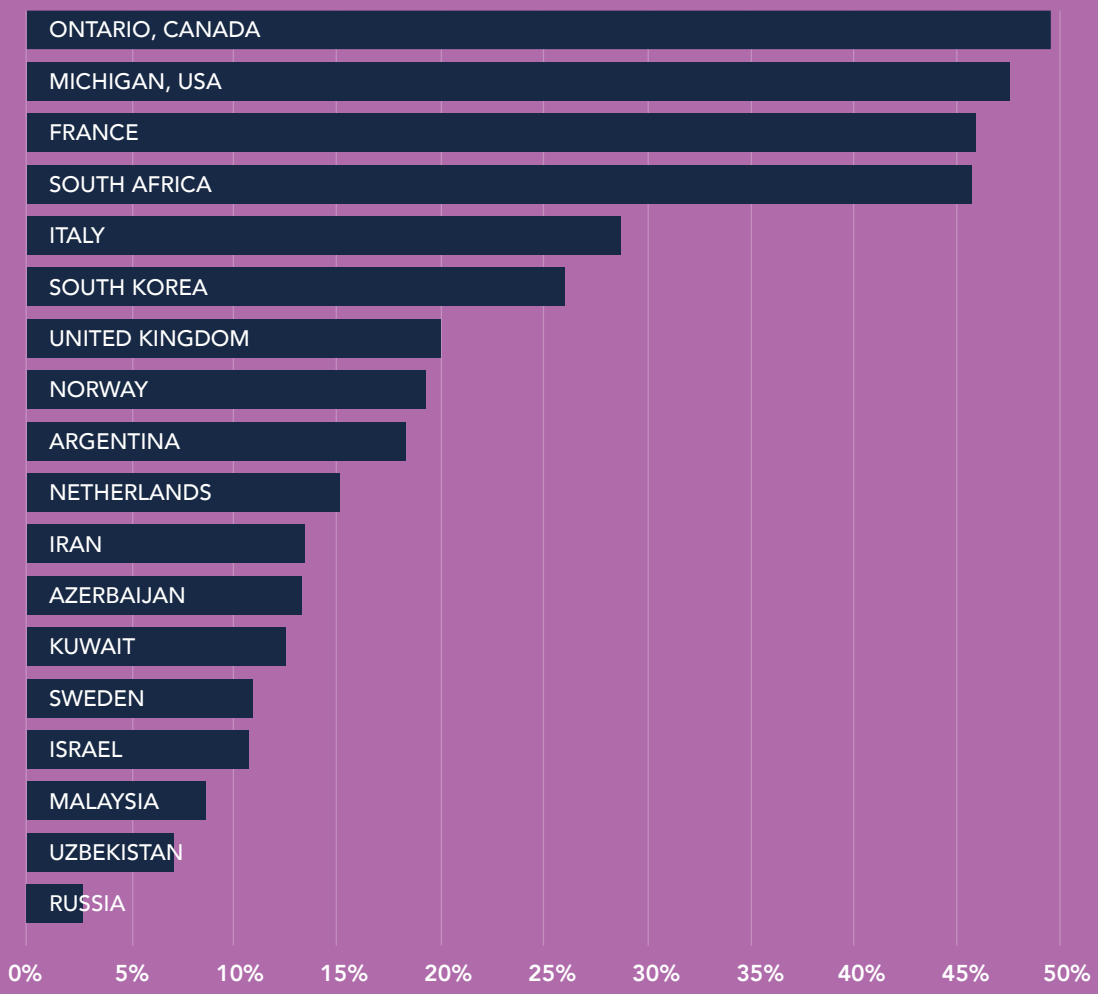
Proportion of primary patients with hypertension who are female and male.

Numbers inside bars are the actual numbers of people with hypertension in each country by sex. Sex information was not available from China.

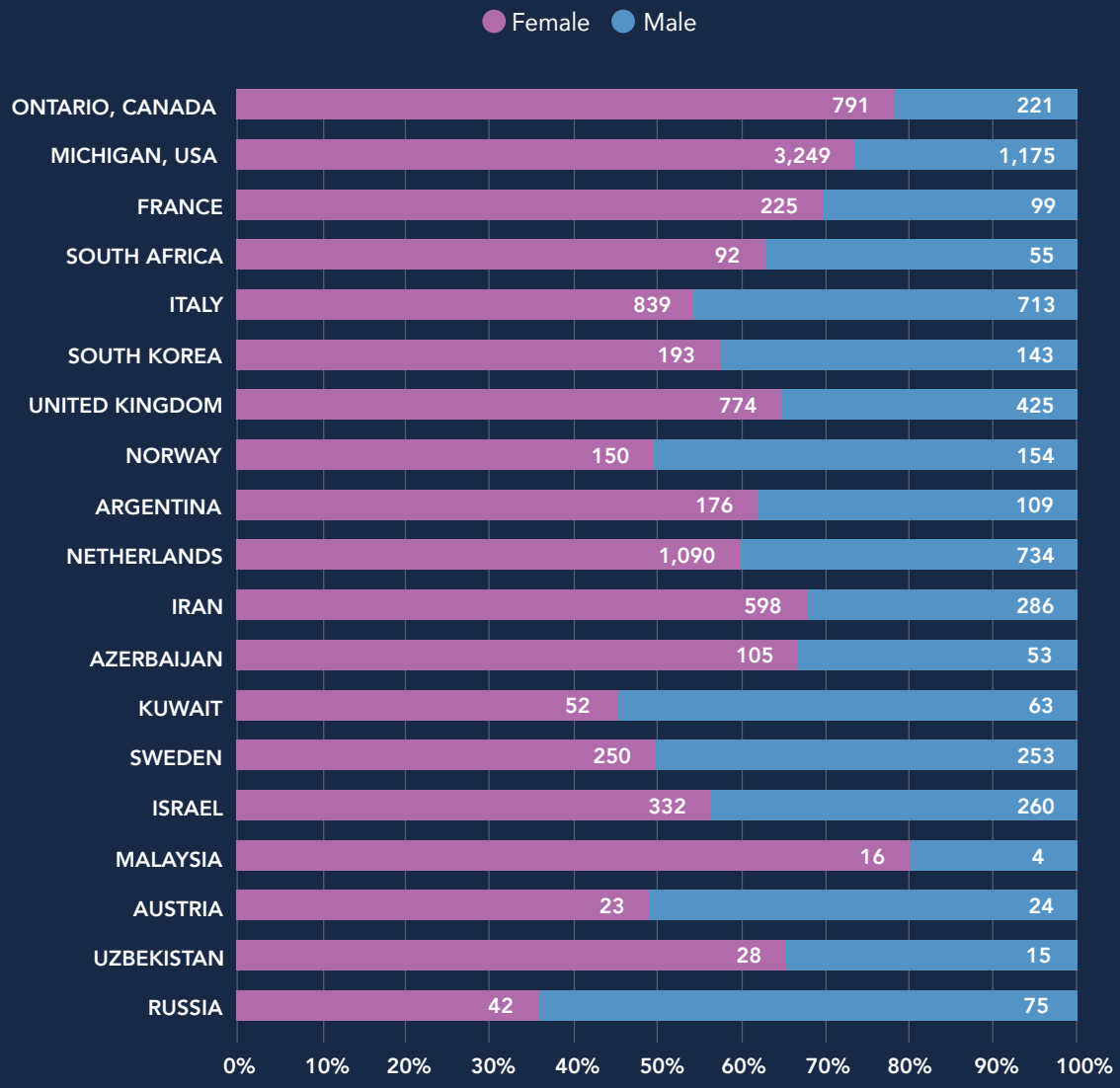
Obstructive Sleep Apnea (OSA)

Information on the number of people undergoing a metabolic bariatric procedure who had Obstructive Sleep Apnea (OSA) at the time of surgery was available from 18 registries. The highest rates of OSA were seen in Canada - Ontario (49.5%) with the lowest rates in Russia (2.7%). Males were relatively overrepresented in the registries who reported on this co-morbidity.

	FEMALE			MALE			ALL		
	OSA (n)	Total (n)	% with OSA	OSA (n)	Total (n)	% with OSA	OSA (n)	Total (n)	% with OSA
RUSSIA	42	3,498	1.20%	75	915	8.20%	117	4,413	2.7%
UZBEKISTAN	28	525	5.30%	15	89	16.90%	43	614	7.0%
AUSTRIA	23	399	5.80%	24	150	16.00%	47	549	8.6%
MALAYSIA	16	160	10.00%	4	40	10.00%	20	200	10.0%
ISRAEL	332	4,240	7.80%	260	1,304	19.90%	592	5,544	10.7%
SWEDEN	250	3,665	6.80%	253	962	26.30%	503	4,627	10.9%
KUWAIT	52	620	8.40%	63	307	20.50%	115	927	12.4%
AZERBAIJAN	105	1,104	9.50%	53	87	60.90%	158	1,191	13.3%
IRAN	598	5,245	11.40%	286	1,386	20.60%	884	6,631	13.3%
NETHERLANDS	1,090	9,637	11.30%	734	2,453	29.90%	1,824	12,090	15.1%
ARGENTINA	176	1,169	15.10%	109	391	27.90%	285	1,560	18.3%
NORWAY	150	1,180	12.70%	154	396	38.90%	304	1,576	19.3%
UNITED KINGDOM	774	5,070	15.30%	425	916	46.40%	1,199	5,986	20.0%
SOUTH KOREA	193	965	20.00%	143	328	43.60%	336	1,293	26.0%
ITALY	839	3,828	21.90%	713	1,579	45.20%	1,552	5,407	28.7%
SOUTH AFRICA	92	235	39.10%	55	87	63.20%	147	322	45.7%
FRANCE	225	574	39.20%	99	132	75.00%	324	706	45.9%
MICHIGAN, USA	3,249	7,711	42.10%	1,175	1,608	73.10%	4,424	9,319	47.5%
ONTARIO, CANADA	791	1,761	44.90%	221	284	77.80%	1,012	2,045	49.5%



Percentage of people undergoing a primary metabolic bariatric procedure with OSA.



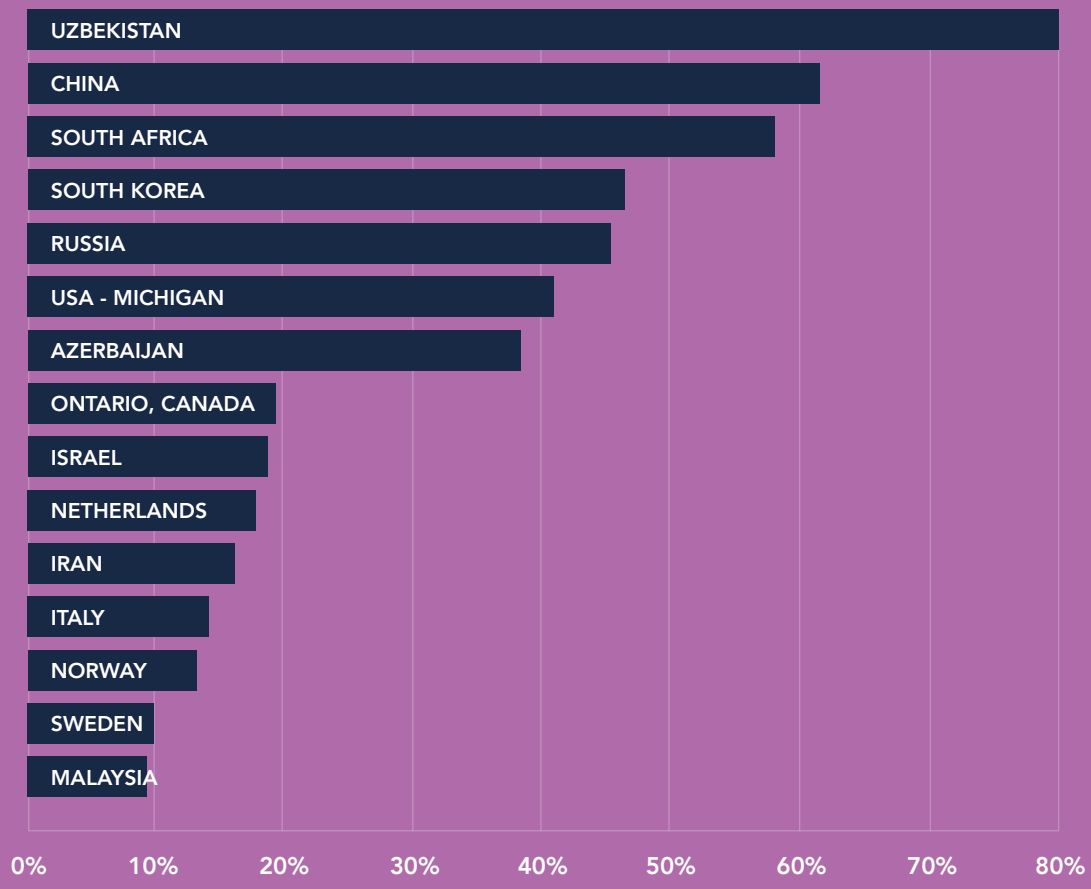
Proportion of primary patients with OSA who are female and male.

Numbers inside bars are the actual numbers of people with OSA in each country by sex. Information on participant sex was not available from China or France.

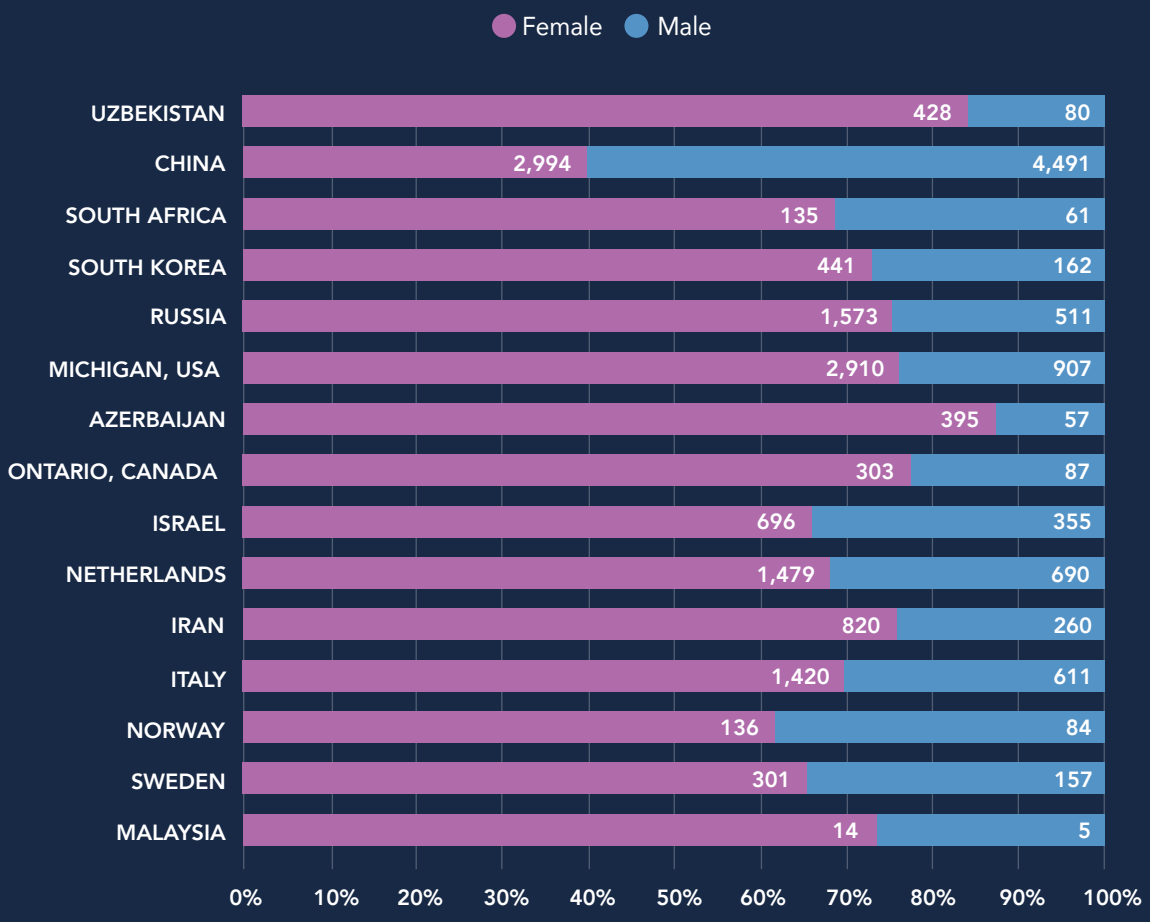
Dyslipidemia

Treatment for dyslipidemia (DL) was most frequently reported in Uzbekistan (82.1%) and least frequent in Malaysia (9.5%). Males were relatively overrepresented in the 15 registries who reported on this comorbidity.

	FEMALE			MALE			OTHER		
	DL (n)	Total (n)	% with DL	DL (n)	Total (n)	% with DL	DL (n)	Total (n)	% with DL
MALAYSIA	14	160	8.8%	5	40	12.5%	19	200	9.5%
SWEDEN	301	3,665	8.2%	157	962	16.3%	458	4,627	9.9%
NORWAY	136	1,180	11.5%	84	396	21.2%	220	1,576	14.0%
ITALY	1,420	10,187	13.9%	611	3,547	17.2%	2,031	13,734	14.8%
IRAN	820	5,245	15.6%	260	1,386	18.8%	1,080	6,631	16.3%
NETHERLANDS	1,479	9,637	15.3%	690	2,453	28.1%	2,169	12,094	17.9%
ISRAEL	696	4,240	16.4%	355	1,308	27.1%	1,051	5,548	18.9%
ONTARIO, CANADA	303	1,764	17.2%	87	284	30.6%	390	2,048	19.0%
AZERBAIJAN	395	1,104	35.8%	57	87	65.5%	452	1,191	38.0%
USA - MICHIGAN	2,910	7,711	37.7%	907	1,608	56.4%	3,817	9,319	41.0%
RUSSIA	1,573	3,667	42.9%	511	923	55.4%	2,084	4,590	45.4%
SOUTH KOREA	441	973	45.3%	162	330	49.1%	603	1,303	46.3%
SOUTH AFRICA	135	249	54.2%	61	91	67.0%	196	340	57.6%
CHINA	2,994	22,337	13.4%	4,491	7,486	60.0%	18,281	29,823	61.3%
UZBEKISTAN	428	528	81.1%	80	91	87.9%	508	619	82.1%



Percentage of people undergoing a metabolic bariatric procedure who are treated for dyslipidemia per country.



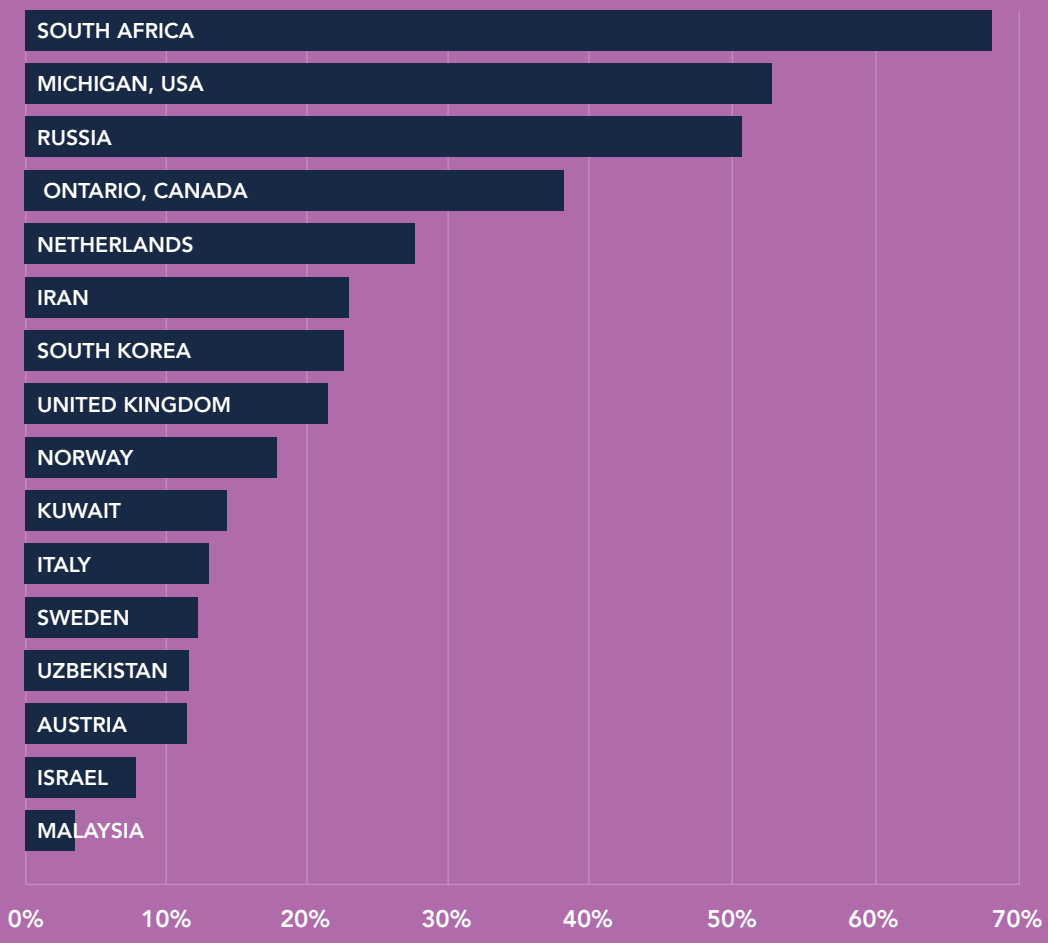
Proportion of people with dyslipidemia that are male and female.

Gastroesophageal Reflux Disease (GERD)

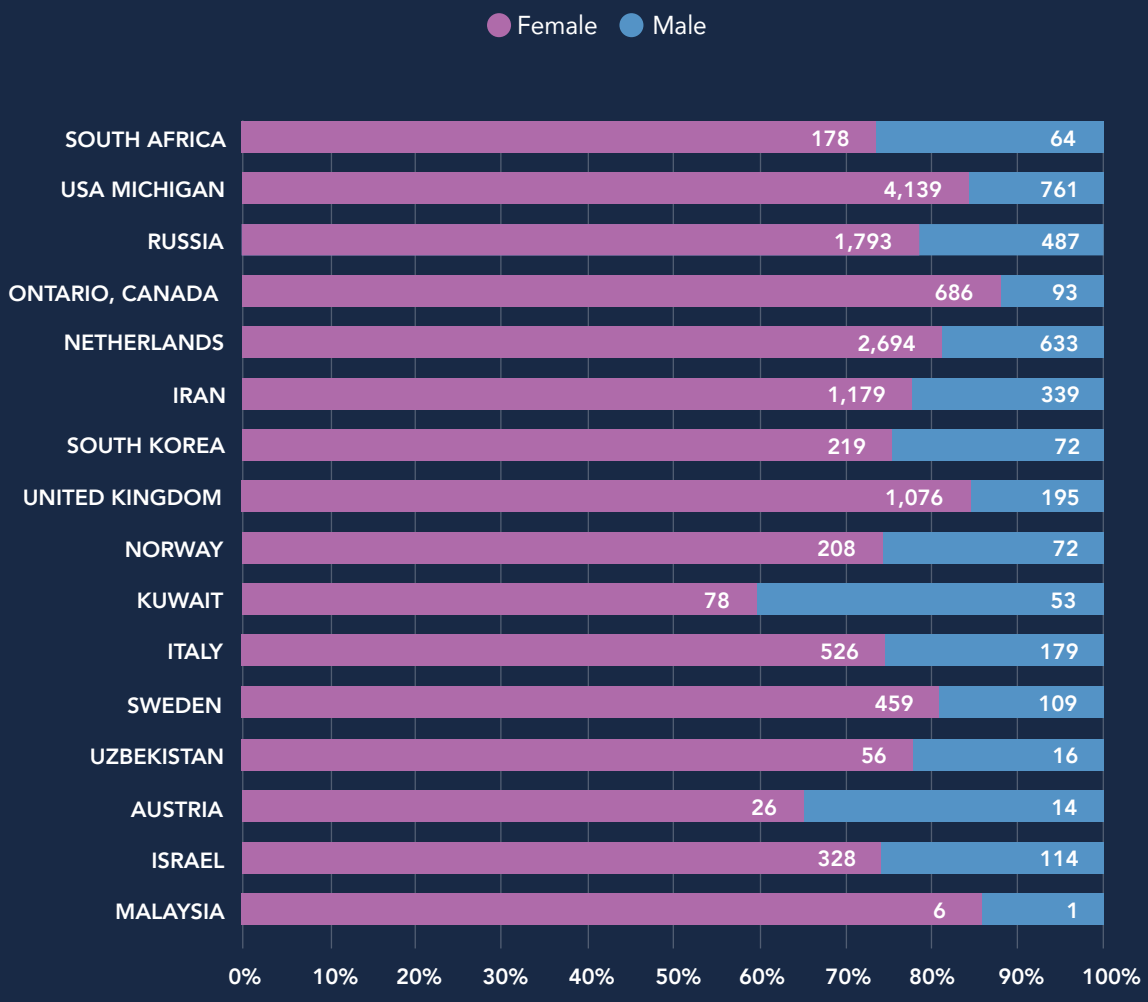
The proportion of patients undergoing metabolic bariatric surgery with GERD was highest in South Africa (68.2%) and lowest in Malaysia (3.5%). The difference between males and females varied by country.

This is potentially an important metric for other registries to consider including in their dataset given that the side effect of some of the commonly performed metabolic bariatric procedures is GERD. It is also a suggested data element in the IFSO Data Items for Registries.

	FEMALE			MALE			ALL		
	GERD (n)	Total (n)	% with GERD	GERD (n)	Total (n)	% with GERD	GERD (n)	Total (n)	% with GERD
MALAYSIA	6	160	3.8%	1	40	2.5%	7	200	3.5%
ISRAEL	328	4,245	7.7%	114	1,309	8.7%	442	5,554	8.0%
AUSTRIA	26	399	6.5%	14	150	9.3%	40	349	11.5%
UZBEKISTAN	56	528	10.6%	16	91	17.6%	72	619	11.6%
SWEDEN	459	3,665	12.5%	109	962	11.3%	568	4,627	12.3%
ITALY	526	3,814	13.8%	179	1,572	11.4%	705	5,386	13.1%
KUWAIT	78	618	12.6%	53	306	17.3%	131	924	14.2%
NORWAY	208	1,180	17.6%	72	396	18.2%	280	1,576	17.8%
UNITED KINGDOM	1,076	5,044	21.3%	195	907	21.5%	1,272	5,952	21.4%
SOUTH KOREA	219	966	22.7%	72	327	22.0%	291	1,293	22.5%
IRAN	1,179	5,245	22.5%	339	1,386	24.5%	1,518	6,631	22.9%
NETHERLANDS	2,694	9,638	28.0%	633	2,453	25.8%	3,330	12,095	27.5%
ONTARIO, CANADA	686	1,764	38.9%	93	284	32.7%	779	2,048	38.0%
RUSSIA	1,793	3,599	49.8%	487	915	53.2%	2,280	4,514	50.5%
MICHIGAN, USA	4,139	7,711	53.7%	761	1,608	47.3%	4,900	9,319	52.6%
SOUTH AFRICA	178	261	68.2%	64	94	68.1%	242	355	68.2%



Proportion of people undergoing a primary metabolic bariatric procedure with GERD symptoms or treatment at the time of surgery.

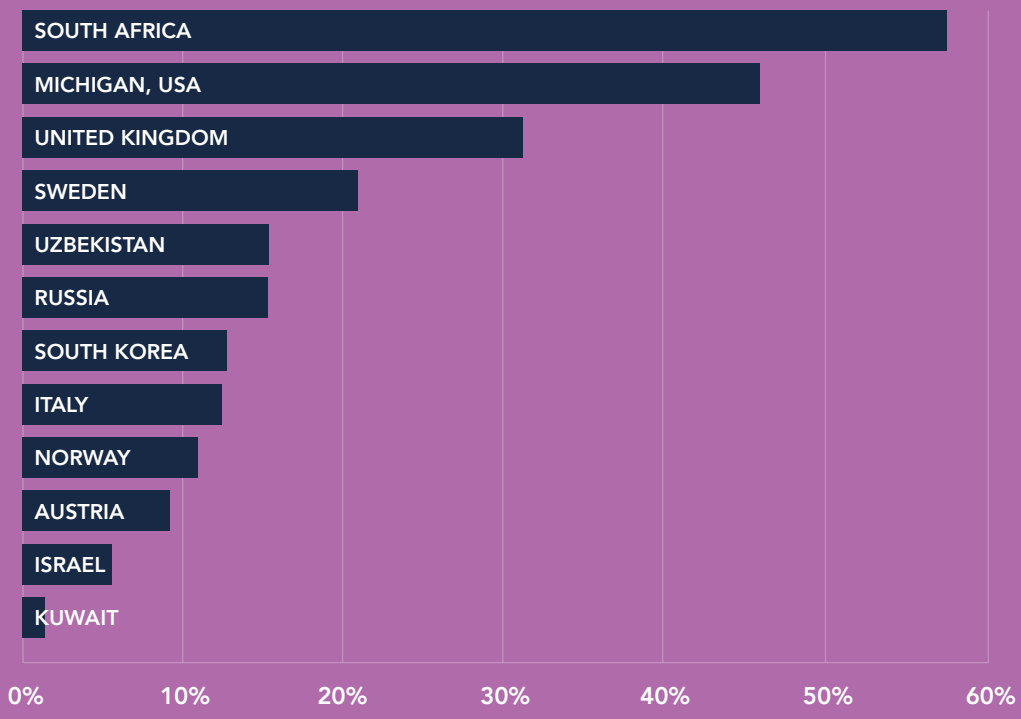


Proportion of people with GERD that are male and female.

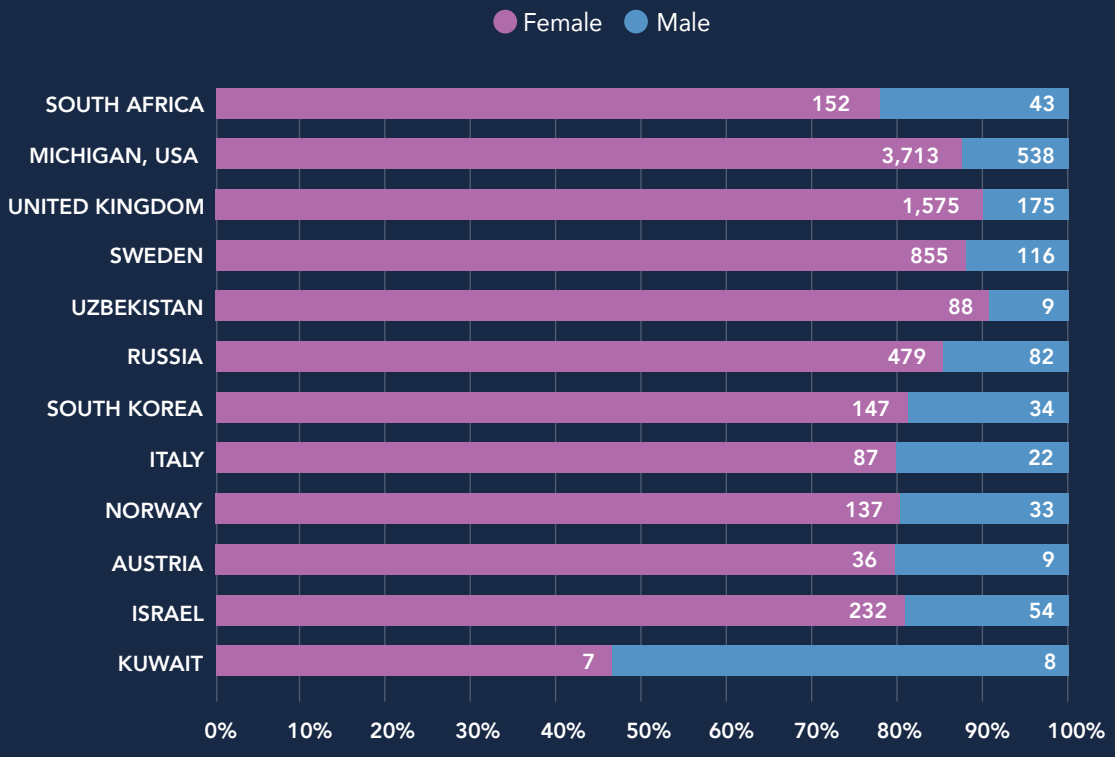
Depression

Depression (DSN) was most commonly reported in South Africa (57%) and least in Kuwait (1.6%). Women were more likely than men to report depression prior to metabolic bariatric surgery in the 11 of the 12 countries that measure this co-morbidity, with the only exception being Kuwait who have very small numbers (15 total) meaning there is a high risk of error.

	FEMALE			MALE			ALL		
	DSN (n)	Total (n)	% with DSN	DSN (n)	Total (n)	% with DSN	DSN (n)	Total (n)	% with DSN
KUWAIT	7	616	1.1%	8	303	2.6%	15	919	1.6%
ISRAEL	232	4,244	5.5%	54	1,307	4.1%	286	5,551	5.2%
AUSTRIA	36	399	9.0%	9	150	6.0%	45	549	8.2%
NORWAY	137	1,180	11.6%	33	396	8.3%	170	1,576	10.8%
ITALY	87	550	15.8%	22	282	7.8%	109	832	13.1%
SOUTH KOREA	147	969	15.2%	34	328	10.4%	181	1,297	14.0%
RUSSIA	479	2,957	16.2%	82	682	12.0%	561	3,639	15.4%
UZBEKISTAN	88	528	16.7%	9	91	9.9%	97	619	15.7%
SWEDEN	855	3,665	23.3%	116	962	12.1%	971	4,627	21.0%
UNITED KINGDOM	1,575	4,870	32.3%	175	855	20.5%	1,751	5,726	30.6%
MICHIGAN, USA	3,713	7,711	48.2%	538	1,608	33.5%	4,251	9,319	45.6%
SOUTH AFRICA	152	251	60.6%	43	91	47.3%	195	342	57.0%



Proportion of people undergoing a primary metabolic bariatric procedure with depression symptoms or treatment at the time of surgery.



Proportion of people with Depression that are male and female.

REFERENCES

1. Brethauer SA, Kim J, el Chaar M, et al. Standardized outcomes reporting in metabolic and bariatric surgery. Surg Obes Relat Dis 2015; 11(3): 489-506.

2. Akpinar EO, Marang-van de Mheen PJ, Nienhuijs SW, Greve JWM, Liem RSL. National Bariatric Surgery Registries: an International Comparison. Obes Surg 2021; 31(7): 3031-9.

Peri-operative outcomes

There are currently only a few registries able to provide longer term data on weight loss and comorbidity change. For this reason, the IFSO Global Registry has decided to concentrate on Peri-operative outcomes as these are indicators of procedural safety.

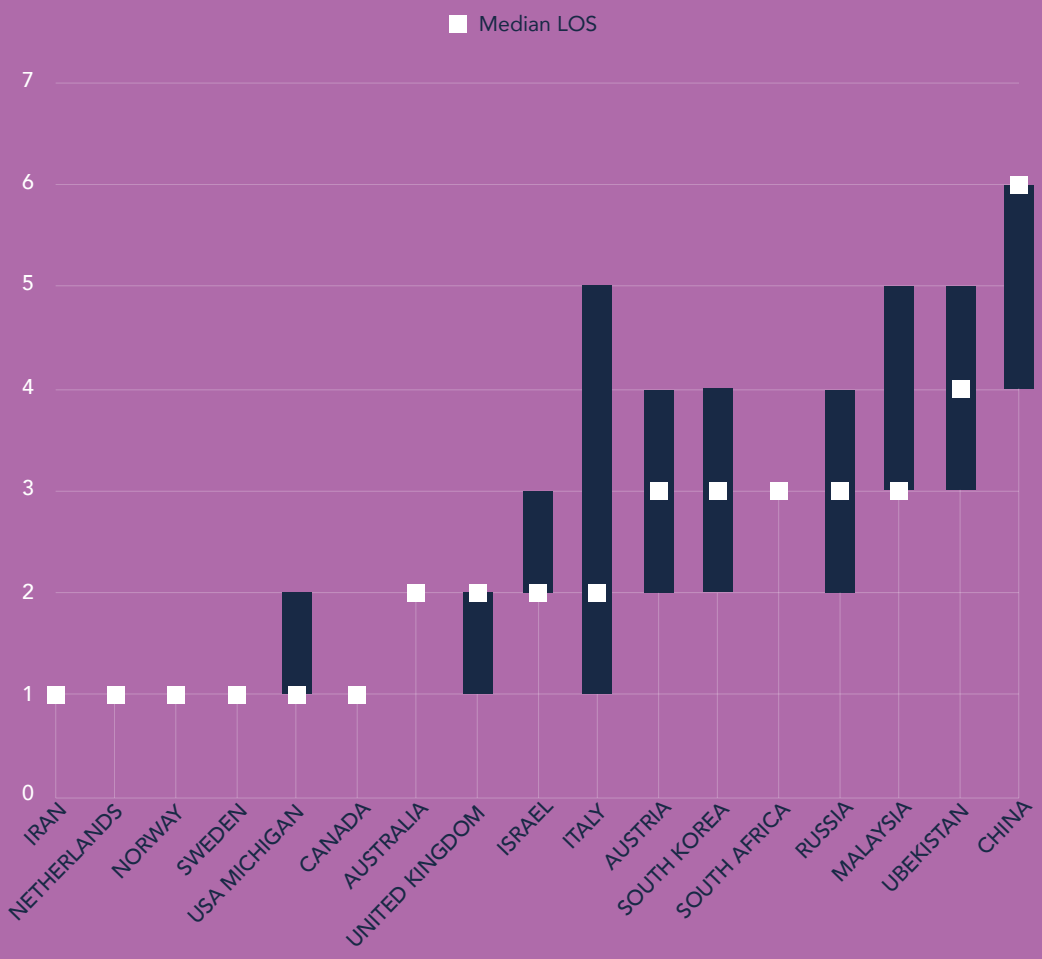
Length of stay (LOS)

Whilst there is no accepted international standard for LOS for each metabolic bariatric procedure, these data suggest that there is a relatively tight range of days in hospital for most procedures.

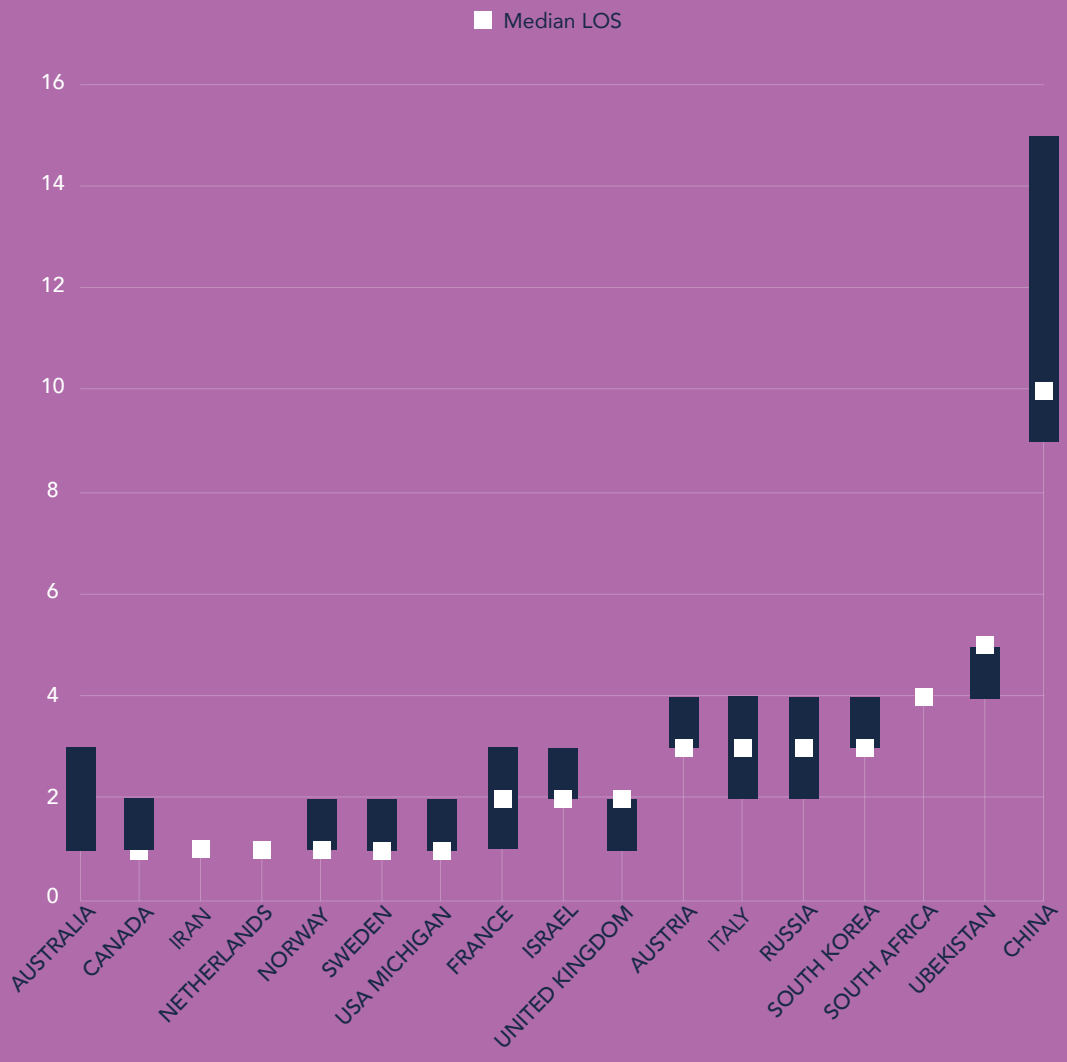
The median LOS varies between countries and regions, probably affected by health system factors and cultural expectations.

LOS is likely to be a good surrogate marker of a complication within a registry as it is likely that if a person who has undergone a metabolic bariatric procedure whose stay exceeds the average for their country or region has had a complication.

Length of stay for primary procedures per country.
Length of stay distribution (median and interquartile range) in days.



Length of stay for revisional procedures per country.
Length of stay distribution (median and interquartile range) in days.



Peri-operative indicators of complications

There are a range of quality indicators that can be measured to document the quality and safety of any procedure. Typically these measures have been taken at 30 days, but increasingly they are being measured at 90 days recognizing that not all important peri-operative complications occur in the early time frame after surgery.

There are a number of ways to measure peri-operative complications. Peri-operative mortality is the most feared complication, however fortunately these events are rare in metabolic bariatric surgery. Whilst the death (or mortality) is critical to measure so that events leading to this tragic outcome can be analyzed and lessons learnt for the future, morbidity or non-fatal complications are equally important as they also provide opportunity for practice improvement.

Three common ways used by clinical quality registries include unplanned return to theatre, unplanned readmission and unplanned admission to ICU. These are chosen because they are events in the patient journey that flag that an unwanted complication has occurred.

It is important to note when interpreting these data that the lower the follow up rate ("known cases" in the tables below), the less certain it is that the data are actually representative of the safety of a procedure as there is a higher risk of missing events that may have occurred but were not reported. Some countries achieve 100% follow-up for most metrics: USA-Michigan, France, Israel, Russia, Netherlands, Norway, Sweden and South Africa. This excellent follow up provides a great opportunity for other countries to learn from their experience and implement local mechanisms that minimize lost data.

The rate of overall case acquisition of eligible patients on to the registry at baseline will also influence how these data are interpreted. The more patients that undergo a metabolic bariatric procedure and are not included in the registry, the higher the risk of selection bias. The rate of case acquisition is not known by many registries, and can be difficult to calculate as it requires multiple sources to verify true metabolic bariatric surgery activity in a given country/region. This is a key metric that needs to be actively sought in future reports to enable better understanding of the presented data.

Noting these limitations is important, however, it is reassuring that the data on safety is relatively consistent across the contributing registries, meaning that the presented data is likely to be offering a reasonable understanding of the safety outcomes for these procedures.

Unplanned return to theatre.

Registries variably collect Return to Theatre at either 30 or 90 days as indicated in the table below. The rates of unplanned return to theatre tend to be higher for revisional procedures, reflecting the technical difficulty of these operations.

			PRIMARY				REVISIONAL			
	Country or Region	Definition	RTT (n)	Total (n)	RTT rate	Known cases	RTT (n)	Total (n)	RTT rate	Known cases
30 days	SOUTH KOREA	Unplanned return to theatre occurring in the peri-operative phase (up to 30 days) in the healthcare setting	3	1,241	0.2%	87.4%	0	38	0.0%	63.3%
	SWEDEN	All Clavien IIIb	77	3,887	2.0%	83.1%	13	157	8.3%	70.4%
	FRANCE	All Clavien IIIb	831	32,490	2.6%	100.0%	635	6,400	9.9%	100.0%
	MICHIGAN,USA	All reoperations occurring within 30 days of the bariatric procedure	72	9,319	0.8%	100.0%	45	1,201	3.7%	100.0%
	RUSSIA	Return to OT reported by the surgeon within 30 days from the index operation	72	7,345	1.0%	100.0%	7	315	2.2%	100.0%
	NETHERLANDS	Return to theatre within 30 days (exclusion of endoscopic and/or radiologic interventions)	129	12,327	1.0%	100.0%	25	1,052	2.4%	100.0%
	UNITED KINGDOM	Return to theatre within 30 days of the patient's index operation	21	5,629	0.4%	92.0%	11	543	2.0%	88.1%
	SOUTH AFRICA	Surgery - elective or emergency - for complications directly related to the primary procedure. eg. lengthening of common channel for BPD -DS procedure	4	394	1.0%	100.0%	0	2	0.0%	100.0%
	NORWAY	Clavien IIIb (all complications rated according to Clavien)	26	1,576	1.6%	100.0%	4	76	5.3%	100.0%
	ITALY	Unplanned return to the operating room occurring in the Peri-operative phase (only up to 30 days) to resolve post-operative complications	80	13,022	0.6%	90.5%	14	1,210	1.2%	80.7%
90 days	NEW ZEALAND	Unplanned re-admission to hospital occurring in the peri-operative phase (up to 90 days) in the healthcare setting.	14	1,881	0.7%	93.4%	10	88	11.4%	93.6%
	AUSTRALIA	Unplanned re-admission to hospital occurring in the peri-operative phase (up to 90 days) in the healthcare setting	146	15,044	1.0%	92.2%	351	3,703	9.5%	94.6%
	ISRAEL	All patients who were readmitted within 90 days only to the surgical department	264	5,556	4.8%	100.0%	126	1,063	11.9%	100.0%

LEGEND

Total = Number of procedures with known unplanned RTT status.

RTT rate = Percentage of patients with an unplanned RTT out of all procedures where RTT status is known.

Known cases = Percentage of procedures where RTT status is known out of the total number of procedures. Excludes unknown/missing values.

Unplanned ICU admission.

There is a low unplanned use of ICU in all reporting registries perhaps indicating that ICU Is appropriately being utilized in a planned fashion.

	Country or Region	Definition	PRIMARY ICU (n)	PRIMARY Total* (n)	PRIMARY ICU rate	PRIMARY Known cases	REVISIONAL ICU (n)	REVISIONAL Total (n)	REVISIONAL ICU rate	REVISIONAL Known cases
30 days	ONTARIO, CANADA	A defined adverse event can be indicated by the presence of a particular event (unplanned ICU admission) occurring immediately after bariatric surgery	7	2,062	0.3%	99.9%	1	100	1.0%	100.0%
30 days	FRANCE	Clavien Dindo Grade IV	114	32,490	0.5%	100.0%	88	6,400	1.4%	100.0%
30 days	SOUTH KOREA	Unplanned ICU admission occurring in the peri-operative phase (up to 30 days) in the healthcare setting	3	1,240	0.2%	87.3%	0	38	0.0%	63.3%
30 days	SWEDEN	Clavien grade IV	4	3,887	0.1%	83.1%	1	157	0.6%	70.4%
30 days	ITALY	ICU admission after surgery	308	9,682	3.2%	67.3%	43	1,076	4.0%	71.8%
30 days	UNITED KINGDOM	Unexpected admission to the ICU in the patient's admission for surgery	21	5,762	0.4%	94.2%	6	560	1.1%	90.9%
30 days	NETHERLANDS	Unplanned ICU for single or multi-organ failure	22	12,327	0.2%	100.0%	5	1,052	0.5%	100.0%
90 days	NEW ZEALAND	Unplanned ICU admission occurring in the peri-operative phase (up to 90 days) in the healthcare setting	2	1,881	0.1%	93.4%	0	88	0.0%	93.6%
90 days	AUSTRALIA	Unplanned ICU admission occurring in the peri-operative phase (up to 90 days) in the healthcare setting	7	15,044	0.0%	92.2%	18	3,703	0.5%	94.6%
90 days	ISRAEL	All patients who were readmitted within 90 days to the intensive care unit	9	5,556	0.2%	100.0%	13	1,063	1.2%	100.0%
90 days	IRAN	In case of hospitalization in the ICU based on the diagnosis of the treatment team	678	6,631	10.2%	100.0%	28	141	19.9%	100.0%

LEGEND

Total = Number of procedures with known unplanned ICU status.

ICU rate = Percentage of patients with an unplanned ICU out of all procedures where ICU status is known.

Known cases = Percentage of procedures where ICU status is known out of the total number of procedures. Excludes unknown/missing values.

Unplanned readmission to hospital.

This is again fairly constant between countries, however, it is notable that readmission rates are consistently higher after revisional procedures, most likely reflecting the complexity and higher risk of these procedures.

			PRIMARY				REVISIONAL			
	Country or Region	Definition	read (n)	Total* (n)	read rate	Known cases	read (n)	Total (n)	read rate	Known cases
30 days	SOUTH AFRICA	A patient who is admitted at any time for a condition (medical/surgical) related directly to a surgical procedure.	10	394	2.5%	100.0%	0	2	0.0%	100.0%
30 days	SWEDEN	All readmissions to any clinic for any reason	144	3,890	3.7%	83.2%	19	158	12.0%	70.9%
30 days	UNITED KINGDOM	Any re-admission to hospital within 30 of the patient's operation	8	2,597	0.3%	42.4%	1	208	0.5%	33.8%
30 days	UZBEKISTAN	In cases where there was bleeding	10	614	1.6%	100.0%	0	5	0.0%	100.0%
30 days	NORWAY	Readmission to any hospital within 30 days after surgery.	106	1,576	6.7%	100.0%	13	76	17.1%	100.0%
30 days	NETHERLANDS	Readmission to the ward within 30 days	246	12,327	2.0%	100.0%	28	1,052	2.7%	100.0%
30 days	MICHIGAN, USA	Was readmitted to either the index hospital or another hospital within 30 days of bariatric procedure. *If readmission starts within 30 days and extends past 30 days, all details, potential complications, etc. occurring within that readmission MUST be captured (even though occurrence extends past 30 days)*.	219	9,319	2.4%	100.0%	77	1,201	6.4%	100.0%
90 days	AUSTRALIA	Unplanned re-admission to hospital occurring in the peri-operative phase (up to 90 days) in the healthcare setting.	180	15,044	1.2%	92.2%	108	3,703	2.9%	94.6%
90 days	NEW ZEALAND	Unplanned re-admission to hospital occurring in the peri-operative phase (up to 90 days) in the healthcare setting	52	1,881	2.8%	93.4%	7	88	8.0%	93.6%
90 days	ISRAEL	All patients who were readmitted within 90 days only to the surgical department	264	5,556	4.8%	100.0%	126	1,063	11.9%	100.0%
90 days	IRAN	In case of hospitalization based on the diagnosis of the treatment team.	50	6,631	0.8%	100.0%	6	141	4.3%	100.0%

LEGEND

Total = Number of procedures with known readmission status.

readm rate = Percentage of patients who were readmitted out of all procedures where readmission status is known.

Known cases = Percentage of procedures where readmission status is known out of the total number of procedures. Excludes unknown/missing values.

Deaths after metabolic bariatric surgery

The mortality rate following metabolic bariatric surgery is low in all 18 registries that report this variable. Mortality rates are lower for primary than revisional procedures.

It is important to consider both the overall number of patients in the registry as well as the rates of follow-up ("known cases") when interpreting the data. Countries with low overall numbers (eg Iran) may seemingly be reporting higher mortality rates, but this may just reflect the very low denominator. Data is more likely to be accurate in countries with follow up rates ("known cases") of over 90%.

The rate of overall case acquisition of eligible patients on to the registry at baseline will also influence how these data are interpreted. The more patients that undergo a metabolic bariatric procedure and are not included in the registry, the higher the risk of selection bias.

	PRIMARY				REVISIONAL			
	Deaths (n)	Total* (n)	Mortality rate	Known cases	Deaths (n)	Total* (n)	Mortality rate	Known cases
AUSTRALIA	6	15,044	0.04%	92.2%	2	3,703	0.05%	94.6%
AUSTRIA	0	1,023	0.00%	56.3%	0	197	0.00%	69.4%
ONTARIO, CANADA	0	2,064	0.00%	100.0%	0	100	0.00%	100.0%
CHINA	3	NS	NS	NS	3	NS	NS	NS
FRANCE	22	32,490	0.10%	100.0%	16	6,400	0.30%	100.0%
IRAN	9	6,631	0.14%	100.0%	2	141	1.42%	100.0%
ISRAEL	1	5,556	0.02%	100.0%	2	1,063	0.19%	100.0%
ITALY	2	14,391	0.01%	100.0%	3	1,499	0.20%	100.0%
MALAYSIA	0	200	0.00%	100.0%	0	1	0.00%	100.0%
NETHERLANDS	4	12,327	0.03%	100.0%	3	1,052	0.29%	100.0%
NEW ZEALAND	0	1,881	0.00%	93.4%	0	88	0.00%	93.6%
NORWAY	0	1,576	0.00%	100.0%	0	76	0.00%	100.0%
RUSSIA	2	7,345	0.03%	100.0%	1	315	0.32%	100.0%
SOUTH AFRICA	1	394	0.25%	100.0%	0	2	0.00%	100.0%
SOUTH KOREA	0	1,303	0.00%	91.8%	0	38	0.00%	63.3%
SWEDEN	0	4,677	0.00%	100.0%	0	223	0.00%	100.0%
UNITED KINGDOM	2	2,747	0.07%	44.9%	1	224	0.45%	36.4%
MICHIGAN, USA	2	9,319	0.02%	100.0%	3	1,201	0.25%	100.0%

LEGEND

Total = Number of procedures with known death status.

readm rate = Percentage of patients who were readmitted out of all procedures where death status is known.

Known cases = Percentage of procedures where death status is known out of the total number of procedures. Excludes unknown/missing values.

NS = Not Stated

Conclusion

This is the eighth report of the IFSO global registry and the second to contain only data from national or regional registries. Aggregated rather than individual level data was collected to ensure that IFSO were compliant with both GDPR as well as local jurisdictional privacy regulations governing each regional and national registry.

The aim of this report is to compare the demographics of people with obesity undergoing bariatric surgery, the types of surgery they chose and the safety of their chosen procedures across the globe. A relatively lean data dictionary has been used based upon the items that were identified through the Bristol University/IFSO collaboration on metabolic bariatric surgery registry minimum dataset. Whilst outcome measurements such as weight change and comorbidity resolution would be ideal, few registries reliably collect this information. It is our aspiration to be able to include these critical data in the future.

Information from reports such as these are only as useful if the data presented is of the highest quality. It is pleasing that more registries have contributed their data this year and is more representative of the global practice of metabolic bariatric surgery than previous reports, particularly those reports where information from single centers representing an entire country was included. Ideally, all registries will report their data acquisition rates as well as their audit processes. This will be a focus of future reports.

Our aim is to include information from all 72 member societies of IFSO, and we look forward to working with member societies who currently do not have a registry to achieve this goal.

A coordinated global registry effort will not only enable us to properly document the uptake and safety of metabolic bariatric surgery but will also enable us to inform important research questions that will drive innovation and progress in our field. This is our future.

Registry Contacts

To contact any contributing Registry please email secretariat@ifso.com

Australia

SOCIETY PRESIDENT

Jacob Chisholm

CONTRIBUTORS

- Dianne Brown
- Wendy Brown
- Angus Campbell
- Jenifer Cottrell
- Jennifer Holland
- Robin Thompson

Austria

SOCIETY PRESIDENT

Philipp Beckerhinn

CONTRIBUTOR

- Felix Langer

Azerbaijan

SOCIETY PRESIDENT

Taryel Omerov

CONTRIBUTOR

- Taryel Omerov

Brazil

SOCIETY PRESIDENT

Antonio Carlos Valezi

CONTRIBUTORS

- Ricardo Cohen
- Karina Otani

Ontario, Canada

SOCIETY PRESIDENT

Stephen Glazer

CONTRIBUTORS

- Mehran Anvari
- Karen Barlow

Chile

SOCIETY PRESIDENT

Rodrigo Muñoz

CONTRIBUTORS

- Camilo Boza
- Amalia Villasecav

China

SOCIETY PRESIDENT

Cunchuan Wang

CONTRIBUTORS

- Wah Yang

France

SOCIETY PRESIDENT

Vincent Frering

CONTRIBUTORS

- Adeline Moriot
- Francois Pattou

Iran

SOCIETY PRESIDENT

Mohammad Kermansaravi

Israel

SOCIETY PRESIDENT

Moti Shimonov

CONTRIBUTOR

- Nasser Sakran

Italy

SOCIETY PRESIDENT

Marco Antonio Zappa

CONTRIBUTOR

- Mario Musella

Korea

SOCIETY PRESIDENT

Sang Kuon Lee

Kuwait

SOCIETY PRESIDENT

Mohammed Al-Jarallah

CONTRIBUTOR

- Salman Al-Sabah

Malaysia

SOCIETY PRESIDENT

Nik Ritza Kosai

CONTRIBUTORS

- Ismail Ahmed Ali
- Nik Mahmood
- Guhan Muthkumaran
- Teh Shunxing
- Nursuhadah Mohamed Yusof

Mexico

SOCIETY PRESIDENT

José G. Rodríguez Villarreal

Netherlands

SOCIETY PRESIDENT

Marloes Emous

CONTRIBUTORS

- Floris Bruinsma
- Ronald Liem

New Zealand

SOCIETY PRESIDENT

Jacob Chisholm

CONTRIBUTORS

- Dianne Brown
- Angus Campbell
- Jenifer Cottrell
- Jennifer Holland
- Andrew MacCormick
- Robin Thompson

Norway

SOCIETY PRESIDENT

Jon Kristinsson

CONTRIBUTORS

- Hannu Lyyjynen
- Vily Vage

Russia

SOCIETY PRESIDENT

Bekkhan Khatsiev

South Africa

SOCIETY PRESIDENT

Tess van der Merwe

CONTRIBUTOR

- Eugene van Zyl

Sweden

SOCIETY PRESIDENT

Torsten Olbers

CONTRIBUTOR

- Johan Ottosson

United Kingdom

SOCIETY PRESIDENT

James Byrne

CONTRIBUTOR

- Andrew Curry
- Kamal Mahawar

United States of America

SOCIETY PRESIDENT

Teresa LaMasters

CONTRIBUTORS

- Benjamin Clapp
- John Morton
- Scott Shikora

Michigan

CONTRIBUTORS

- Aaron Bonham
- Amir Ghaferi

Uzbekistan

SOCIETY PRESIDENT

Oktyabr Teshaev

CONTRIBUTOR

- Nozim Jumaev

Venezuela

SOCIETY PRESIDENT

Luis Level

CONTRIBUTOR

- Pedro Monsalve

Data Dictionary (abbreviated)

LABEL	DEFINITION	PURPOSE
Country	Country designation as per IFSO specifications	To distinguish between countries
Primary or Revisional Surgery Designation	Designation of the bariatric procedure as primary - ie on a virginal stomach that has never had a bariatric procedure performed - or revisional - ie a conversion procedure that is changing the bariatric procedure from one type to another	To stratify outcomes according to the risk profile of the surgery
Sex	Sex is the biological distinction between male and female.	To identify differences between sexes
Body mass index prior to surgery	Body mass index prior to surgery is a measure of an adult's weight (body mass) relative to height before their bariatric surgery, to two decimal places.	To identify differences in morbidity between countries, prim/rev and sexes
Age at surgery	The age of the patient at the time of the operation in years	To identify differences in age at which patients come for treatment between countries, prim/rev and sexes
Type 2 Diabetes	The prevalence of patients who have a history of pharmacotherapy for type 2 diabetes mellitus and/ or clinical evidence of high blood glucose levels over time	To identify the differences in the prevalence of Type 2 Diabetes in those having bariatric surgery between countries and sexes
Hypertension	The prevalence of patients who have a history of pharmacotherapy for hypertension and/ or clinical evidence of high blood pressure	To identify the differences in the prevalence of Hypertension in those having bariatric surgery between countries and sexes
Depression	Patient has a history of pharmacotherapy for depressive disorder and/ or has received a diagnosis of depressive disorder	To identify the differences in the prevalence of Depression in those having bariatric surgery between countries and sexes

LABEL	DEFINITION	PURPOSE
Sleep Apnoea	Patient has a history of sleep apnoea syndrome	To identify the differences in the prevalence of Sleep Apnoea in those having bariatric surgery between countries and sexes
GERD	Patient has a history of pharmacotherapy for gastroesophageal reflux disease and/ or clinical evidence of disease	To identify the differences in the prevalence of GERD in those having bariatric surgery between countries and sexes
Dyslipidemia	Patient has a history of pharmacotherapy for dyslipidemia and/ or clinical evidence of high blood cholesterol/ triglycerides	To identify the differences in the prevalence of Dyslipidemia in those having bariatric surgery between countries and sexes
Sleeve Gastrectomy	The number of sleeve gastrectomies completed	To understand the different procedure types undertaken in primary vs revisional context by country
One Anastomosis Gastric Bypass	The number of One Anastomosis Gastric Bypass completed (also none as Single Analstomosis Gastric Bypass or Mini Gastric Bypass)	To understand the different procedure types undertaken in primary vs revisional context by country
Roux en Y Gastric Bypass	The number of Roux en Y Gastric Bypass completed	To understand the different procedure types undertaken in primary vs revisional context by country
Other Procedures	The number of all other bariatric procedures completed (excluding Sleeve, OAGB, RYGB) including but not limited to Gastric Band, Duodenal Switches, Bilio-pancreatic diversions, Single Anastomosis Duodeno-ileostomy, Stomach intestinal Pylorus Sparing, Gastric imbrication, Gastroplasty	To understand the different procedure types undertaken in primary vs revisional context by country
Laparoscopic	The number of completed procedures where the operative approach was just laparoscopic	To understand the different surgical approaches used in primary vs revisional context by country

LABEL	DEFINITION	PURPOSE
Laparotomy (Open)	The number of completed procedures where the operative approach was open (including those that began laparoscopically, endoscopically or with robotic assistance)	To understand the different surgical approaches used in primary vs revisional context by country
Endoscopic	The number of completed procedures where the operative approach was just endoscopic	To understand the different surgical approaches used in primary vs revisional context by country
Robotic	The number of completed procedures where the operative approach included the assistance of a robot to perform the surgery	To understand the different surgical approaches used in primary vs revisional context by country
Unplanned readmission rate	The prevalence of unplanned readmission into hospital in the perioperative period (between 30-90 days) as a consequence of the bariatric procedure	To understand the outcomes in primary vs revisional context by country
Unplanned return to theatre rate	The prevalence of unplanned return to theatre in the perioperative period (between 30-90 days) as a consequence of the bariatric procedure	To understand the outcomes in primary vs revisional context by country
Unplanned ICU rate	The prevalence of unplanned admission to ICU in the perioperative period (between 30-90 days) as a consequence of the bariatric procedure	To understand the outcomes in primary vs revisional context by country
Death Rate	The prevalence of mortality (between 30-90 days) after the bariatric procedure	To understand the outcomes in primary vs revisional context by country
Length of Stay	The number of days the patient was in hospital for the episode of care	To understand the outcomes in primary vs revisional context by country

REDCap database used for data collection

IFSO Data Collection

Data Access Group:

Editing existing Record ID **25**.

Event: **2022**

Record ID	25 To rename the record, see the record action drop-down at top of the Record Home Page.

Country and Year

Country	
Year of Patient Operations	2022 I.e. data in this form should be for all patients who had a bariatric operation in the specified year
Do the operations you are reporting cover all of calendar year 2022? * must provide value	○ Yes ○ No reset

Procedures and Sex

	Female	Male	All (Include procedures where patient sex is unknown or sex is recorded using a term other than female or male)
Primary			
Revisional			

*Please enter values as **procedure counts** - this means for revisional procedures that the same patient may be counted twice*

Auto Calculated Totals

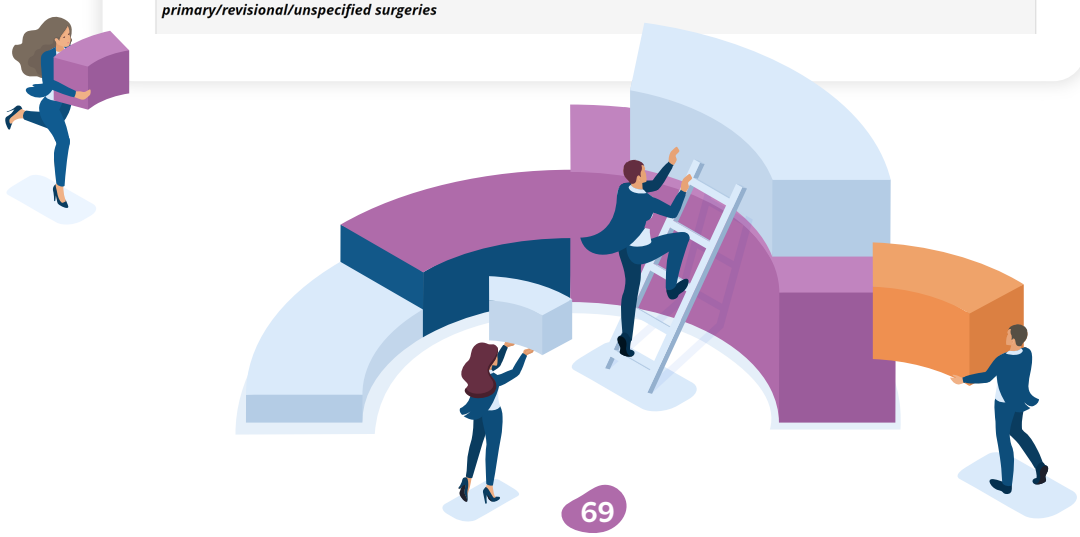
	Female	Male	All
Total procedures	View equation	View equation	View equation

Total Procedures Other/Unknown Sex: View equation

Procedure Type

	Sleeve gastrectomy	One anastomosis gastric band (OAGB)	Roux-en-Y gastric bypass (RYGB)	Gastric band	Other / Unknown
Primary					
Revisional					
Unspecified					

*Please enter values as **procedure counts where the primary procedure type was one of the above, for primary/revisional/unspecified surgeries***



Definitions used by various registries for co-morbidities

Diabetes

Australia	Diabetes Status at Baseline is determined by the patient identifying themselves as having diabetes at the time of the operation and having a treatment for their diabetes.
Ontario, Canada	Diabetes status at baseline is determined by the patient's primary care physician at baseline.
China	T2DM was defined as fasting blood glucose> 7.0 mmol/L, or/and random blood glucose >11.1 mmol/L, or/and 2-h blood glucose after a 75-g oral glucose tolerance test > 11.1 mmol/L, or/and the use of antihyperglycemic drugs.
Iran	Diabetes status at baseline is determined by the history of the previous diabetes diagnosis, receiving diabetes treatment or diagnosis based on lab tests (FBS> 126 or HbA1C>6.5) at the time of operation.
Israel	Self-reported by the patient before surgery.
Italy	Diabetes status is determined according to ADA (American Diabetes Association) Diabetes Care 2014; 37(S 1): S81-90.
Kuwait	Patients with type 2 diabetes.
Netherlands	> 42 mmol HbA1c/ mol HbA.
New Zealand	Diabetes Status at Baseline is determined by the patient identifying themselves as having diabetes at the time of the operation and having a treatment for their diabetes.
Norway	Treated with medication.
Russia	Diabetes status at baseline is determined by the patient self-reporting as having diabetes at the time of the operation or having a treatment for diabetes.
South Africa	ADA criteria for DM/pre-diabetes and gestational DM.
South Korea	Diabetes status at baseline is determined by the patient identifying themselves as having diabetes at the time of the operation and having a treatment for diabetes.
Sweden	Patients with diagnose of type 2 diabetes and with medication for hyperglycemia.
United Kingdom	Patients with type 2 diabetes at surgery that are treated with diabetes medication.
Michigan, USA	Type I or Type II diabetes: (Disease marked by high levels of sugar in the blood that occurs because the body does not respond correctly to insulin, a hormone released by the pancreas) non-insulin-dependent diabetes mellitus (NIDDM), adult-onset diabetes mellitus treated with (please check all that apply): Diet, Oral Medications, Insulin-dependent, Non-Insulin Injectables.
Uzbekistan	Established type 2 diabetes mellitus before surgery, who are treated with diabetes medications.

Hypertension

Ontario, Canada	Hypertension at baseline is determined by the patient's primary care physician at baseline.
China	Hypertension was defined as systolic pressure > 140 mmHg, or/and diastolic pressure > 90 mmHg, or/and the use of antihypertensive drugs.
Iran	Hypertension status at baseline is determined by the history of the previous hypertension diagnosis or receiving treatment for hypertension at the time of operation.
Israel	Self-reported by the patient before surgery.
Italy	Hypertension status is determined according to AHA (American Heart Association) Journal of the American Heart Association, 2020;9:e017546.
Kuwait	Hypertension.
Netherlands	Systolic blood pressure >120 mmHg and/or diastolic blood pressure > 80 mmHg.
Norway	Use of medication.
Russia	Hypertension status at baseline is determined by the patient having antihypertensive treatment.
South Africa	WHO criteria of > 130/85 with Karotkoff 1 and 4 sounds.
South Korea	Hypertensive status at baseline is determined by the patient identifying themselves as having hypertension at the time of the operation and having a treatment for hypertension.
Sweden	Patients under medication for hypertension.
United Kingdom	Patients with hypertension at surgery that are treated with anti-hypertensive medication
Michigan, USA	Treated hypertension (HTN): Clinical diagnosis of elevated BP, BP, HBP, HCVD (hypertensive cardiovascular disease), or HASHD (hypertensive arteriosclerotic heart disease) AND treatment with daily anti-hypertensive medication (listed below). If patient is on 0 anti-hypertensive meds, then they do not have treated HTN and the box for "Treated HTN" should not be checked. Please specify the number of different anti-hypertensive agents the patient is currently prescribed.
Uzbekistan	An established diagnosis, and when the patient takes pills for hypertension.

Obstructive Sleep Apnoea

Ontario, Canada	Sleep Apnoea at baseline is determined by the patient's primary care physician at baseline or following the presurgical sleep study.
China	Polysonography：AHI greater than 5.
Iran	Sleep apnea status at baseline is determined by the patient identifying themselves as having frequently stops breathing during his or her sleep or confirmed by polysomnogram at the time of the operation.
Israel	Self-reported by the patient before surgery.
Italy	Sleep apnoea status is determined according to The Lancet 2002;360(9328):237-45.
Kuwait	Sleep Apnoea.
Netherlands	Symptoms with postive poly(somno)graphy (PSG), with or without a apnea-hypopnea index (AHI) of >5.
Norway	Use of CPAP.
Russia	Sleep apnoea status at baseline is determined by the patient self-reporting having sleep apnoea or using CPAP/BPAP therapy.
South Africa	Official PSG testing by sleep laboratory.
South Korea	Confirmed sleep apnea at the time of the operation.
Sweden	Patients using CPAP or BiPAP.
United Kingdom	Patient has a diagnosis of sleep apnoea at the time of surgery.
Michigan, USA	Sleep apnea, nocturnal upper airway obstruction, or sleep disordered breathing.
Uzbekistan	Patient using CPAP mask.

Dysplipidemia

Ontario, Canada	The Ontario Bariatric Registry records hyperlipidemia. Hyperlipidemia at baseline is determined by the patient's primary care physician at baseline.
China	Hyperlipemia was defined by serum triglycerides > 1.70 mmol/L, or/and serum total cholesterol > 5.7mmol/L, or/and serumlow-density lipoprotein (LDL) cholesterol > 3.76 mmol/L, serum high-density lipoprotein (HDL) cholesterol < 0.91 mmol/L, or/and the use of lipid lowering agents.
Iran	Dyslipidemia status at baseline is determined by the history of the previous dyslipidemia diagnosis or having treatment for dyslipidemia or diagnosis based on lab tests (Total Colestrol>200 or Triglyceride>150) at the time of operation.
Israel	Self-reported by the patient before surgery.
Italy	Dyslipidemia status is determined according to New England Journal of Surgery 2004;351:2683-2693.
Netherlands	An abnormal lipid spectrum (LDL, HDL, Triglycerides) LDL >8.0mmol/L HDL < 1.1 mmol/L Triglycerides > 2.2 mmol/L Primary hypercholesterolemia, with a mean total cholesterol of at least 6.5 mmol/L, based on measurements in three samples with intermittent period of taking blood of approximately 1 week.
Norway	Use of lipid-lowering medication.
Russia	Dyslipidaemia status at baseline is determined by the patient having abnormal lipid blood tests or taking antilipid drugs.
South Africa	Framingham Risk Assessment tool.
South Korea	Having a treatment for dyslipidemia at the time of the operation.
Sweden	Patients under medication for dyslipidemia.
United Kingdom	Not collected by UK NBSR.
Michigan, USA	Clinical diagnosis of hypercholesterolemia, hypertriglyceridemia, dyslipidemia, elevated lipids, or high cholesterol, OR treatment with one or more of the four major classes of prescription medications that are used to treat hyperlipidemia; HMG-CoA reductase inhibitors or statins which lower LDL cholesterol, nicotinic acid or niacin which increases HDL, fibric acids or fibrates which lower triglycerides, and bile acid sequestrants or cholesterol absorption inhibitors or CAIs which affect absorption of dietary cholesterol.
Uzbekistan	A blood test for a lipid profile when receiving a pill for dyslipidemia.

Gastroeosophageal Reflux Disease (GERD)

Ontario, Canada	GERD at baseline is determined by the patient's primary care physician at baseline.
Iran	GERD status at baseline is determined based on the patient report as having a Heartburn sign or the Endoscopy report as Esophagitis at the time of operation.
Israel	Self-reported by the patient before surgery.
Italy	GERD status at baseline is determined according to Lyon Consensus Conference Gut 2018;67:1351-1362.
Kuwait	GERD.
Netherlands	Anamnestic signs of GERD, with or without a positive 24-48uurs pH-measurement and/or gastro-duodenoscopy.
Norway	Use of medication.
Russia	GORD status at baseline is determined by the patient self-reporting symptoms of GORD or having an antireflux therapy
South Africa	Gastroscopy and histological evidence.
South Korea	Confirmed GERD at the time of the operation.
Sweden	Patients under medication with PPI (proton pump inhibitor).
United Kingdom	Patient receiving anti reflux medication at the time of surgery.
Michigan, USA	Chronic heartburn, acid regurgitation, acid reflux disease, acid dyspepsia, esophageal reflux, esophagitis, reflux laryngitis, Barrett's esophagus, reflux-induced cough or asthma.
Uzbekistan	Established diagnosis endoscopically and the patient took pills for GERD.

Depression

Israel	Self-reported by the patient before surgery.
Italy	Depression status at baseline is determined according to peri-operative psychiatric counseling.
Kuwait	Depression.
Norway	Use of medication.
Russia	Depression status at baseline is determined by the patient taking antidepressants.
South Africa	Beck Depression Inventory (BDI), multiple face to face interviews with advanced psychologist and psychiatrist.
South Korea	Having a treatment for depression at the time of the operation.
Sweden	Patients under medication for depression.
United Kingdom	Patient receiving antidepressant medication at the time of surgery.
Michigan, USA	Including clinical depression and depressive disorder, treated with medication, electroconvulsive therapy, and/or psychotherapy.
Uzbekistan	Patient taking pills for depression.

IFSO HEADQUARTER

Rione Sirignano, 5 - 80121 Naples, ITALY
Ph: +39 (0)81 7611085
Fax: +39 (0)81 664372
ifso.secretariat@gmail.com
www.ifso.com