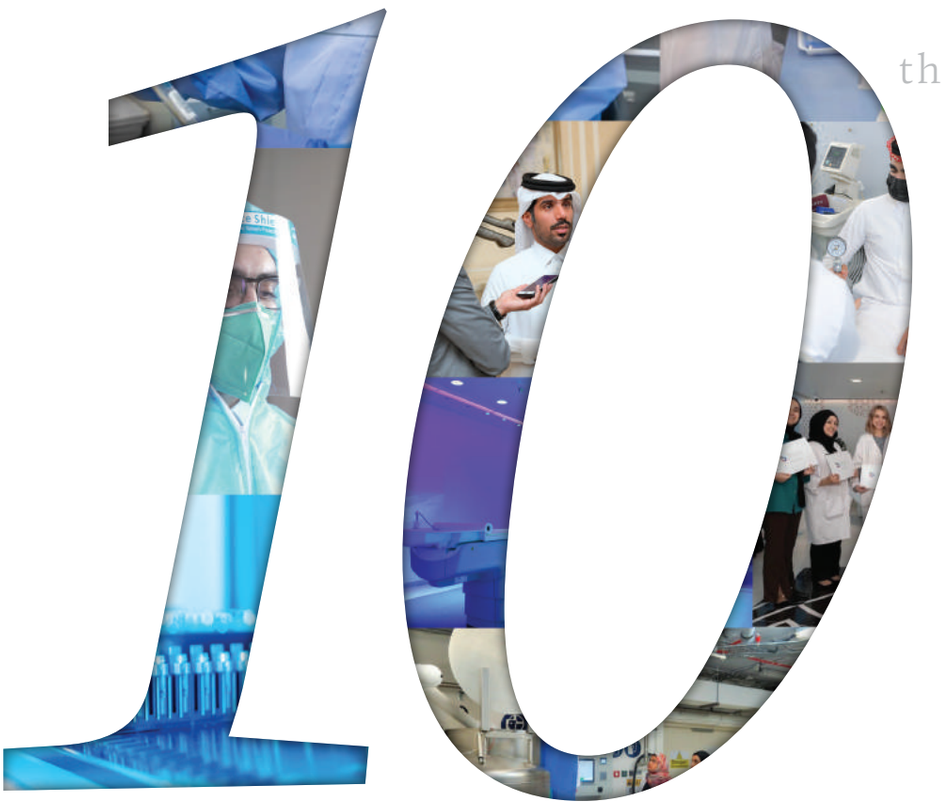
قطر بيوبنك
qatarbiobank
for medical research للبحوث الطبية
عضو في مؤسسة قطر
Member of Qatar Foundation



ANNIVERSARY

A HEALTHIER FUTURE STARTS WITH YOU

REPORT 2022/2023

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LETTERS FROM **OUR LEADERS**

Dr Richard O 'Kennedy

Vice-President for Research at Hamad Bin Khalifa University

For Qatar Foundation, Precision Health (and its implementation) is one of its key themes. Therefore, the merger between Qatar Biobank (QBB) and Qatar Genome Project (QGP) will play a crucial role in achieving sustainable healthcare solutions for national and global challenges by advancing genomics research and precision health in Qatar, thus significantly enhancing risk assessment of disease and its detection and treatment.

To date, more than 37,000 members of the community have participated at Qatar Biobank by donating their biological samples and data, with this number increasing every day. The richness of this information from those thousands of samples is already providing significant insights into crucial health issues facing the local population.

QBB received the Outstanding Award in Biobanking, at the ISBER 2022 yearly conference in Atlanta, USA, due to the major contributions it has made to the local and international biomedical community, enabling vital medical research on prevalent health issues in Qatar and the region, using the data it has collected.

The generation of a much-improved quality of life for society is the aim of governments and policymakers. The advances and opportunities that QBB enables will greatly assist the development of patient-centered healthcare programs focused on wellness and prevention thus fulfilling its role for Qatar and the international community.

Dr Asmaa Al Thani

Board Vice Chairperson of Qatar Biobank and Chairperson of Qatar Genome Committee

Qatar Biobank was established in 2012 as a research center that aims to improve the health of the future generations. This year we are celebrating 10 years of success. Congratulations to Qatar Biobank team on this monumental occasion, without our staffs' endless efforts and research contributions we wouldn't be here today.

"The continued prosperity of any country mainly depends on the positive signs of its population's well-being." The data collected by Qatar Biobank for the research community and scientists offers a unique insight into the causes, thus, enabling prevention of these diseases by way of personalized treatments in line with the genetic coding of an individual.

In those past years, we have developed a study of mothers and newborns in Qatar, which ranks as the first birth cohort study of its kind "QBIC". In collaboration with National Centre for Cancer Care and Research at Hamad Medical Corporation and Qatar Genome Programme, Qatar Biobank participated in the BRCA gene testing confirmation and referral process, which will create a mainstream gene testing for prevention and implementation of precision health.

Qatar Biobank strives to diversify and improve the service with a potential future merger that goes beyond providing specialized programs across its innovation focus. The new mission is to spearhead national efforts to translate cutting-edge genomic and multi-omics research outcomes into a new era of healthcare services as well as help accelerate the country's adoption of personalized healthcare, and we are very proud that Qatar Biobank was elected to become the first observer for Biobanking and BioMolecular resource research infrastructure European Research Infrastructure Consortium (BBMRI-ERIC) outside of the European continent. This will take us to a new era and synergize our efforts to become a more efficient research, development, and innovation center for the population of Qatar and the region.

Professor Dr Nahla Afifi

Director of Qatar Biobank

Modern biobanking has grown over the last years and it became an essential part of biomedical research, predictive, preventive, and personalized healthcare. The mission of QBB is to provide and distribute high quality biospecimens with accurate clinical and/or research annotation and the associated phenotypic data to its stakeholders. Moreover, QBB is linked with Qatar's national healthcare system by Cerner to exchange information either by receiving medical data or by referring participants to the Hamad General Hospital and Primary Healthcare Centers.

This year marks the 10th anniversary at Qatar Biobank, and we're privileged to be witnessing and celebrating this special occasion. Looking back at Qatar Biobank's journey, we vividly remember the desire to build a strong medical research center that supports improving the health of Qatar's population, preventing illnesses which places Qatar at the forefront of innovation and scientific research.

Since initiating Qatar biobank, we embarked on a journey full of achievements and successes in the field of precision medicine and we're delighted that 37,000 have participated in our research, of whom more than 80% were Qataris. Those participants have rated the quality of our services with 99% which shows how positive Qatar Biobank is perceived by our local population.

Qatar Biobank is contributing and expanding the focus on many research and projects. This year we have Published 24 articles and contributed to 28 research projects. One of the projects we're currently working on is the CAP accredited Q-chip. We have facilitated 30,000 genetic analyses which will be used to help in identifying patients and mutation carriers. In addition, we need to acknowledge the efforts and the hard work of scientists and students who had an important role taking part in the COVID 19 Bio-repository study, achieving a new milestone this year with a total of 3940 participants.

We have also built an inhouse solution for lab operation management. This system completely automates the lab operation starting from inventory management to sample collection and receiving, processing, storing, sample retrieval and dispatch for researchers. Moreover, we are in the final stages of building our Data Warehouse that offers daily updates for subject information in a centralized, curated system that will be available for researchers in 2023.

We are proud to announce that this year Qatar Biobank was awarded the ISO for Biobanking 20387 along with the already existing ISO 9001 and ISO 27001, and soon we will shed the light on future collaborations that will allow us to grow organically for a healthier population in Qatar.

QATAR BIOBANK SUPPORTING QUALITY IN RESEARCH

Vision

The vision of Qatar Biobank is to establish a research enterprise platform across Qatar to achieve extra-ordinary improvement in diagnostic and prognostic intelligence required to deliver personalized health care for the benefits of people in Qatar, the region and worldwide.

Mission

The mission of Qatar Biobank is to act as the Qatar National Centre for biological samples and health information to enable research towards the discovery and development of new healthcare interventions.

Qatar Foundation for Education, Science and Community Development is a private non-profit organization that serves the people of Qatar by supporting and operating programmes in three core mission areas: education, science, and research and community development, through a range of dedicated centres and initiatives. Qatar Foundation aims to achieve sustainable and tangible improvements both locally and internationally to develop a healthier future for the population of Qatar.

Qatar Biobank is a member of Qatar Foundation Research, Development and Innovation and is a platform that will make vital health research possible through its collection of biological samples and information on health and lifestyle from large numbers of the Qatari population. Qatar Biobank is Qatar's long-term medical health initiative, it was created to give Qatar's population a better chance of avoiding serious illnesses, and to promote better health for our future generations. Our goals are aligned with the strategic goals of Qatar Foundation for Research, Development, and Innovation to enable quality research in Qatar. We are a key component of Vision 2030, the road map to transforming the country into an advanced society capable of achieving sustainable development and securing a high standard of living for its people for generations to come (Qatar Vision 2030).

Founded in 2012 in collaboration with the Ministry of Public Health, Qatar, Hamad Medical Corporation (HMC), and scientific support from Imperial College London. We are contributing to the shape of future health in Qatar at a national level through our continued contributions to the National Committee for Diabetes and Cardiovascular disease and the National Committee for Diabetes.

The Growth Of Qatar Biobank

2012

- Qatar Biobank inaugurated

2013-2014

- Pilot phase launched
- 4 participants per day recruited
- ISO certification for ISMS and QMS.
- Incubation of Qatar Genome Program
- Total 12 research projects registered

2015-2016

- Moved to new premises
- Launch of inhouse bespoke clinical information system
- End of 2016, 5000 participants recruited
- 16 participants per day recruited over 2 shifts
- Total research projects registered 62
- 1 publication from Qatar Biobank samples/data

2017-2018

- Qatari Gene Chip v1 launched
- Incubation of Qatari Birth Cohort Study
- Recertification for ISO ISMS and QMS achieved
- 15,000 participants recruited
- 36 participants per day recruited over 3 shifts
- Total research projects registered 139
- Total 5 publications from Qatar Biobank samples/data

2019-2020

- Creation of MRI and Cognitive study
- Creation of COVID 19 National Biorepository
- CAP accreditation and recertification for ISO ISMS and QMS achieved
- 13,000 DNA samples sequenced
- 25,000 participants recruited
- Total research projects registered 255
- Total 32 publications from Qatar Biobank samples/data

2021

- Expansion of COVID 19 National Biorepository
- Qatari Gene Chip v2 released
- 25,000 DNA samples sequenced
- Total research projects registered 315
- Total 55 publications from Qatar Biobank samples/ data

2022-2023

- ISO 20387 certification achieved
- BBMRI ERIC Observer status awarded
- 37,000 participants recruited
- Expanding imaging scope in MRI visit
- Total research projects registered 315
- Total 86 publications from Qatar Biobank samples/data

The Future

QATAR BIOBANK **CELEBRATING 10 YEARS**

Qatar Biobank or Biobank Qatar as we were originally known, quietly opened to the public in December 2012, the presence of a Biobank in the State of Qatar was an achievement that promised many new research opportunities locally and internationally. The availability of a reference data base focused on Arab populations to help push the vision of precision medicine in Qatar forward was exciting with the promise of many collaborations resulting in more accurate and targeted medical treatments and diagnoses to come.

Qatar's observership makes the State, and Qatar Biobank, the first non-European country, and biobank, to join BBMRI-ERIC. Qatar Biobank will have access to BBMRI's specialised knowledge in Quality Management, ELSI, IT tools, and tailor-made guidance that will strengthen the State's medical research capabilities and support reaching a common goal of precision medicine development.

In turn, BBMRI-ERIC will benefit from fostering an international exchange of knowledge and human biosamples collected and stored in Qatar Biobank, enabling the global research society to better deal with future global health threats and develop treatments for a healthier future.

This is another great achievement for our biobank, and we are very proud to be part of such a research infrastructure.

This report will look back at some of the achievements over the past 10 years. The success of Qatar Biobank would not have been possible without the dedication and commitment from our hardworking team. We now have 62 permanent staff members and many of them can be seen celebrating the successes of 10 years of Qatar Biobank below.

Accreditations and Certifications

Over the past 10 years, Qatar Biobank has worked endlessly to continue to improve our processes and services provided both internally and externally.

In October 2022 Qatar Biobank completed the process for certification of the ISO 20387 standard for Biotechnology. We are very proud to have achieved this standard in addition to our ISO 9001:2015 and ISO 27001: 2013. We continue to work with Hamad Medical Corporation for the continued accreditation of our Qatari Chip laboratory process through the College of American Pathologists (CAP).

BBMRI ERIC Map

In late 2022 Qatar was officially confirmed as an observer member of the Biobanking and BioMolecular resources Research Infrastructure - European Research Infrastructure Consortium (BBMRI-ERIC).


بسم الله الرحمن الرحيم
تحت رعاية
صاحبة السمو الشيخة موزا بنت ناصر رئيس مجلس إدارة مؤسسة قطر
تم افتتاح قطر بيوبنك للبحوث الطبية
وذلك يوم الاثنين ٩ فبراير ٢٠١٥ ميلادية الموافق ٢٠ ربيع الثاني ١٤٣٦ هجرية
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qatarbiobank
for medical research
البحوث الطبية
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Qatar Biobank Celebrating 10 Years

As this review is prepared it seems we have been incredibly busy and achieved a lot for our small team. It continues to be a credit to the hard work and dedication of the Qatar Biobank staff and the continued support from our internal and external stakeholders who continue to make our dreams of better health for all a reality..... we thank you!

2012

The first large scale long term medical research initiative not only in Qatar but within the region was launched for the population of Qatar. The aim was to recruit 60,000 Qatari nationals and long-term residents of more than 15 years, over the age of 18, with 5 year follow up visits. The aim to understand how the health of the long-term residents and nationals are affected by their lifestyle, environment, and genes.

Unlike many other Biobanks we are not attached to a hospital or university, so our recruitment strategy focused on the local population. Word of mouth was our biggest success.

The pre-pilot phase commenced and ran until 2013, during this time on average 4 participants per day were recruited.

At the start of the pre-pilot phase the clinic visit included comprehensive and diverse set of physical measurements in addition to the different questionnaires asked and the collection of biological samples.

Biological samples were collected for analysis and storage and recruited participants were able to receive a report about the information collected during their visit with the results of approximately 66 biomarkers. Participants were very enthusiastic about this feature and the word-of-mouth reputation of Qatar Biobank started to grow with a waiting list of over 1,000 participants.

We were working 2 shifts with 6 clinic rooms, 1 laboratory and 11 Qatar Biobank staff and 7 support staff from Imperial College London.

2013-2014

The pilot phase was launched with an increase in participants, recruitment rates were gradually increased to 28 and then 50 per week, we were at full capacity, and we desperately needed a new larger building.

During 2014, Qatar Biobank achieved certification for ISO standards 9001-2008 (now 9001: 2015) for Quality Management and ISO 27001: 2013 for Information Security Management Systems.

In 2014, a new national population-based research project that aimed to study the genetic makeup of the Qatari as well as other Arab populations and generate large scale genomic databases for researchers with the aim of introducing precision medicine and personalized healthcare to the national health care system was launched and incubated by Qatar Biobank, The Qatar Genome Programme began.

By the end of 2014, Qatar Biobank had grown, the number of staff had increased to 26, this was mainly from the recruitment of more clinic staff to support the participant visit requirements. Over 3,000 participants had been recruited and we were eagerly awaiting the completion of our new renovated luxurious building.

2015-2016

As Qatar Biobank expanded, we moved in early 2015 into our new premises that provided double the capacity for participants. The new facility was opened by Her Highness Sheikha Moza bint Nasser. Suddenly the name Qatar Biobank was on the lips of every Qatari national, who was excited to participate and be part of shaping the future of healthcare in their own country. We were inundated with requests to take part and our waiting list grew. With the new facility, there were new staff to be trained, new equipment to be purchased and new opportunities for the analysis and storage of our biological samples. This new space had allowed for an additional 5 laboratories to be created. Exciting equipment allowing for the automation of many laboratory processes were introduced to facilitate the processing of samples (blood fractionation), extraction of DNA was included. A laboratory dedicated to the long-term storage of biological samples using Liquid Nitrogen was included as well as an automated robotic -80 °C degree freezer which made sample location, retrieval, and distribution to researchers much easier.

Early in 2015 Qatar Biobank hosted its first regional conference 'Biobanking in the Context of Personalised Healthcare' inaugurated by Dr Hanan Al Kuwari Minister for Public Health, Qatar and focused on the importance of regional medical research collaborations. This conference not only brought the regional and international research community together in Qatar, but it also highlighted the increasingly important work being done by Qatar Biobank to support the advancement of precision and personalised medicine. This conference set the benchmark for future events.

Plans were made, and renovations started for the installation of a new MRI suite within the Biobank. The addition of this equipment

held the promised of increasing the catalogue of data available to researchers

A new bespoke clinical information system was being developed and launched by the Biobank's own IT department. This system would communicate with many of the clinic measurement devices to allow for transfer of the participant data collected directly, reducing manual data entry. This system was the first of many new developments that started the journey towards paperless participant visits.

As the bank of biological samples and associated data developed the research community became more interested in accessing our resources. An Institutional Review Board to formalise the process of research application review in line with national and international policies, guidelines, and regulations was established.

2017-2018

Early in 2017 we organised a successful conference titled 'The Impact of Biobanking on Precision Medicine Initiatives'. The conference drew over 40 national and international speakers from around the world who are widely recognised as experts in the field of Biobanking.

Qatar Biobank provides clinical analysis to our participants on blood samples collected as part of the visit. We expanded the biomarker panel to introduce new clinical markers taking the total number of markers in the participant report to approximately 77.

ISO recertification for ISO 9001: 2015 and 27001: 2013 was achieved.

The development of the Qatari Chip or QChip Lab. This exciting project in collaboration with Qatar Genome Programme, Hamad Bin Khalifa Medical Centre, Weil Cornell Medicine - Qatar and Qatar Biobank was the first in the region to offer a diagnostic tool designed to use a whole genome grid from a reference panel of 6,000 whole genome that could be used in the design of whole genome genotyping arrays.

MRI procedures started as part of a 5 year follow up visit for eligible participants. A brain and whole-body sequence were available with radiologist report and medical referral for abnormal findings. In addition to MRI scanning a cognitive function test was being trialled with 4 tests.

2018 also saw the incubation of the Qatari Birth Cohort Study. The aim of the Qatar Birth Cohort project is to assess the synergetic role of environmental exposures and genetic factors in the development of chronic disease of woman and child health and/or obstetric characteristics with high prevalence in the state of Qatar. The first study of its kind to examine how environmental, genetic, nutritional, and social factors may affect a baby's health.

Qatar Biobank continues to grow, now with 6 laboratories, 56 permanent staff, 3 shifts recruiting 36 participants per day and over 15,000 participants recruited.

Towards the end of 2018, at the World Innovation Summit for Health conference the first version of The Qatari Gene Chip "Q Chip"

Qatar Biobank had extracted DNA to provide 13,000 DNA samples to the Qatar Genome Programme.

Towards the end of 2018, at the World Innovation Summit for Health conference the first version of The Qatari Gene Chip or Q Chip was presented to Her Highness Sheikha Mosa Bint Nasser by Her Excellency Dr Hanan Al Kuwari, Minister for Public Health. The first version of the Q Chip contained over half a million DNA mutations and variants that would be used to diagnose various diseases as well as support national screening programmes. The Q Chip highlighting the achievement of Qatar Genome Programme and Qatar Biobank in developing the first local Gene Array designed based on data from thousands of Qatari genomes sequenced during the past three years.

2019-2020

In early 2019 , following the success of our 2017 conference and looking to engage a wider international audience the 1st International Biobanking Conference titled 'Quality Matters: A Global Discussion in Qatar', was hosted in partnership with our colleagues at the European, Middle East and African Society for Biopreservation and Biorepository (ESBB), and in collaboration with the International Society for Biological and Environmental Repositories (ISBER) and Biobanking and BioMolecular resources Research Infrastructure. European Research Infrastructure Consortium (BBMRI ERIC). This conference was a great success with leading industry experts discussing the contributions that biobanks are making to global health improvements. This conference was an opportunity to showcase our work to our industry peers.

The IT department launched another bespoke development, this time the medical review system. All participant data collected could now be reviewed electronically by the clinical data interpretation specialists, allowing for referrals to be generated automatically.

We started participating in a proficiency testing programme for RNA and DNA samples.

In March 2020 as the COVID 19 pandemic took hold, we went into lockdown, but this did not last for long at Qatar Biobank. We were asked by the Ministry of Public Health to develop the COVID 19 Biorepository study for the collection of vital information about this virus that was affecting people around the world. Most of 2020 was taken with activities related to the creation of the COVID 19 Biorepository. The disease arm of this study was launched in early May 2020 and our brave staff recruited participants with a laboratory confirmed positive test from the many testing and treatment sites that were dedicated across the country to the care of people diagnosed with this virus.

CAP Inspection and Accreditation in early 2020 we achieved CAP accreditation for our Q Chip laboratory, the laboratory team underwent a 9 month programme of preparation, trainings and competencies in preparation for this accreditation, and this achievement was possible through the continued support of the

team at Hamad Medical Corporation, Department of Laboratory Medicine and Pathology who guided and directed us through this challenging process.

2020 Qatar Biobank gain ISO recertification for our Quality Management System ISO 9001: 2015 and our Information Security Management System ISO 27001: 2013.

Another new electronic management system, the Participant Recruitment Management System (PRMS) was developed and implemented. The system allowed participants greater access to booking appointments information from our team including the option to download their participant visit report before meeting with our clinical data interpretation specialists.

We were now celebrated recruiting over 25,000 participants across all studies. We continue working at maximum recruitment of 36 participants per day with 15 MRI participants per week. 7 labs, 58 permanent staff. QBB baseline and follow up visits for cohort study, MRI follow up visits for cohort eligible participants were restarted in late 2020.

Supporting the Qatar Genome Programme with a total of 25,000 DNA samples for whole genome sequencing.

November 2020 Qatar Biobank participates in the WISH 2020 World Innovation Summit for Health, with a panel discussion titled 'Ethical, Legal and Social Implications (ELSI) in Research with Vulnerable Populations.' This panel discussion reunited the successful collaborations with ESBB, ISBER and BBMRI ERIC. The panel discussed the ethics and regulations in biobanking and research while using the data and samples, the challenges and risks in practice, and privacy, confidentiality, and discrimination along with linking all these points to the national vision of precision medicine in Qatar.

At the start of 2021 our Researcher Access Portal was launched streamlining the process from research query, application to sample and data preparation and delivery. The portal was another step in Qatar Biobanks efforts to a paperless working environment.

The 2nd International Biobanking conference titled 'Biobanking for Precision Care: Lessons learned from a Global Crisis', in partnership and collaboration again with our colleagues from ESBB, ISBER and BBMRI ERIC. This was our first virtual conference as our in-person event was cancelled due to the pandemic restrictions. Despite not being able to offer our Qatari hospitality in person the event was a great success with many countries sharing their experiences of how the COVID 19 pandemic was managed and the contribution their biobanks played.

The Qatar Wellness, Lifestyle and Genomic report was available Qatar Biobank participants whose DNA had whole genome sequence and interpretation data available, were offered the opportunity to meet with a genomic counsellor.

2021-2022

The talented Qatar Biobank IT team started the process of developing a bespoke Laboratory Information Management System that meets the very specific needs of Qatar Biobank Laboratory operations. The first phase of this new system 'Catalyst" was launched at the end of 2021 with a further release expected in late 2022.

The QBiC study restarted after the COVID 19 lockdown and restarted with a new team and included the introduction of fetal ultrasound scanning for both mother visit 1 and 2.

In late 2021 in collaboration with Weil Cornell Medicine Qatar the scope of the imaging data was extended with a new stage introduced to the MRI visit. The Corneal Confocal Microscopy and vibration perception threshold was introduced and implemented by our imaging team.

The Q Chip version 2 was released in 2021, following the release of the first version in 2018, the version 2, The QChip2PrecisionMedicine array: was designed with a representative set of pathogenic and likely pathogenic variants to be used after validation in the clinical diagnosis or screening of a large set of diseases.

Our very own Dr Nahla Afifi was awarded The ISBER Award for Outstanding Achievement in Biobanking which is designed to recognize individuals who have made outstanding contributions to the field of biobanking. This is a well-deserved recognition of her endless efforts to showcase the work of Qatar Biobank.

Familial Breast Cancer Project: A collaboration between the Qatar Genome, Qatar Biobank, Hamad Medical Corporation (National Center for Cancer Care and Research (NCCCR) and Diagnostic Genomics Division) and Weill Cornell Medicine-Qatar, aiming to use WGS data to identify and offer support to QBB participants deemed at risk of developing breast cancer, 32 participants have been identified that could potentially benefit from referral to the NCCCR breast cancer high risk clinic

In early 2022 we began the process of achieving certification for the Biobanking Standard ISO 20387. In October we completed the audit process successfully. The audit process allowed every member of staff to showcase their work and knowledge of their department processes and they did not disappoint. This achievement is only possible because of the hard work, knowledge and skills of the whole team at Qatar Biobank.

In October 2022, Qatar Biobank participated in the WISH 2022 conference with a plenary session titled 'Fulfilling the promise of precision medicine: The essential role of biobanks. This session followed the success of our 2020 collaboration with our biobanking partners in ISBER, ESBB, BBMRI ERIC

In late 2022 Qatar was accepted as an official observer member of the Biobanking and BioMolecular resource research infrastructure European Research Infrastructure Consortium (BBMRI-ERIC). Observer membership will last for 3 years.

COMMUNITY OUTREACH

'Our community outreach activities involve partnering and collaborating with the research community as well as activities that increase the awareness of our different studies for our participants. Feedback from our researchers and participants are extremely important as it helps us to improve and ensure we are meeting the needs of our valuable customers'.

Supporting the Research Community

Collaborations Partnerships and Associations

Qatar Biobank has been supporting the local research community through the research access application process and scientific data extraction with over 350 research applications and 210 data extractions enabling research by providing high quality deep phenotypic data, and as a result to date there have been 86 publications using data from Qatar Biobank studies with many more expected. Qatar Biobank scientific team offer consultation to the scientific community on the best use of the data relating to study design, study feasibility and recommendations. In addition, great work has been happening, focusing on data harmonization, normalization, and data formatting to increase the usage to meet the requirements of different studies and/or platforms.

Qatar Biobank is working with many national and international institutions in the field of precision health and the field of biobanking, bio preservation and precision health which will result in exciting outcomes from a research and a learning perspective.

National Institutions

- Ministry of Public Health Qatar
- Hamad Medical Corporation
- Qatar Biomedical Research Institute
- Hamad Bin Khalifa University
- Sidra Medicine
- Qatar University
- Texas A & M Qatar

International Institution Collaborations

- International Society for Biological and Environmental Repositories (ISBER)
- European, Middle Eastern and African Society for Biopreservation and Biobanking (ESBB)
- International Hundred Thousand Cohort Consortium (IHCC)
- Centre for the Development of Industrial Technology (CDTI), Spanish Agency of Innovation, Ministry of Science and Innovation of Spain". CTDI India, Cyprus and Spain
- Singapore Singenics

In addition to extending our network and collaborations another project focused on the harmonization of diagnosis codes from Hamad Medical Corporation to merge with Qatar Biobank data collected. There were 13 different Diagnosis Standards provided by Hamad Medical Corporation that need to be harmonized into one standard. ICD -10 CM (Clinical Modification) was the standard used for harmonization of the diagnosis codes. Of the 13 diagnosis standards, 5 were procedure standards, 2 were non-diagnoses, 1 was a drug standard, 1 was a prediction score for mortality, and 4 were diagnosis codes (SNOMED CT, ICD-10 CA, ICD-10 AM, and ICD-9 CM). Mappings files to ICD-10 CM were found for these diagnosis codes. Approximately 129,400 diagnosis codes were mapped to ICD-10CM which corresponds to the diagnoses of approximately 8,500 subjects.

Customer Satisfaction

As part of our continuous improvement culture our customer feedback is very important. We collect feedback from two key customers, our participants, and our researchers.

a. Participant Satisfaction

Our participants are asked to provide feedback at the end of their journey with the Biobank. Once a participant has finished with their clinic visits and have met with our medical team to receive their results feedback report, they are asked to give feedback on the services they received and offer some insight into their reasons for participating. All responses are anonymous and collated regularly. Consistently the feedback from the surveys is very positive and participants report being satisfied with our services.

Participants are asked to select their reasons for participating from a selection and they can choose more than one response.

The responses are based on the feedback received during 2022.

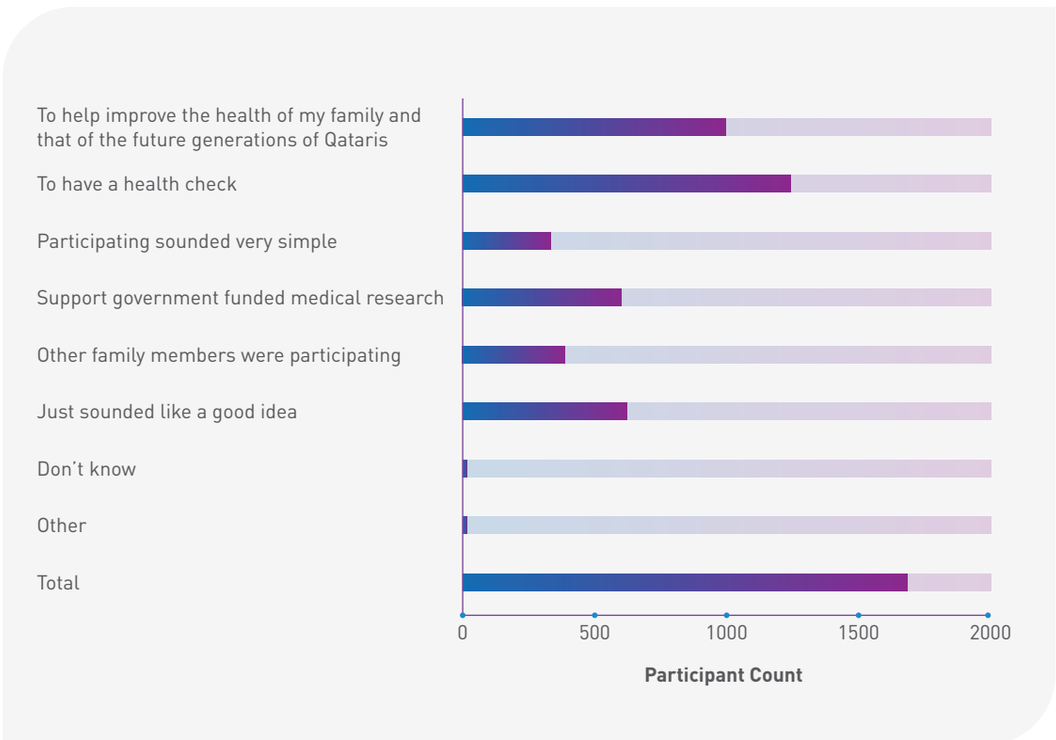


Figure 1: Reasons for Participating

When asked what their reason for participating was 73% (n=1238) of responses included to have a health check followed by 59% (n=996) to improve the health of their family and the Qatari population

Participants are also asked if they would participate again in the future if given the opportunity.

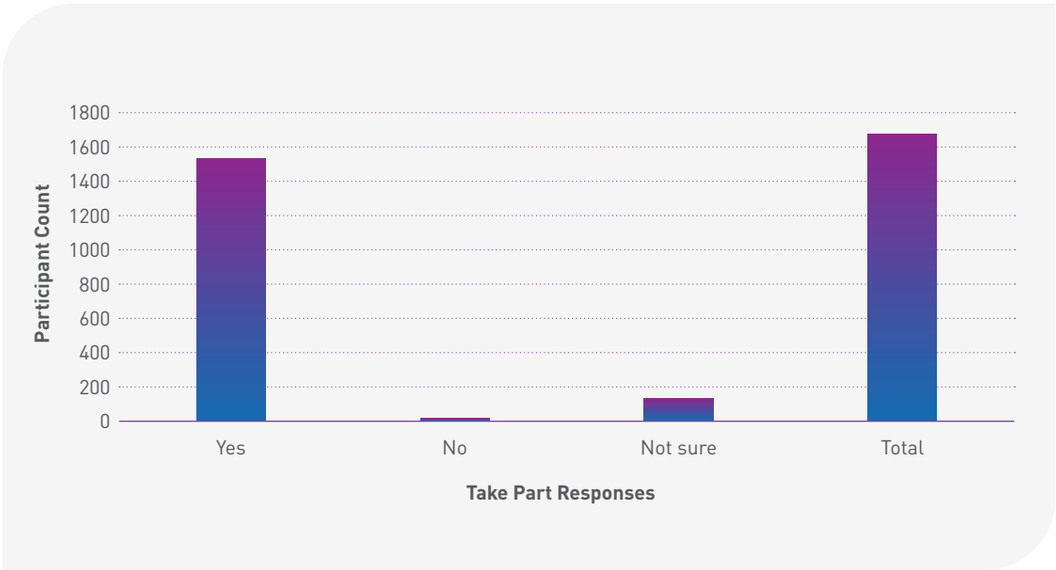


Figure 2: Responses of participants to whether they would participate again.

91% (n=1535) of participants stated yes they would take part again with 7%(n=131) stating they are not sure only 0.1% (n=15) stating no.

Participants are asked to give feedback on the quality of our services overall as well as their feedback on their interaction with the 3 different departments during their journey with Qatar Biobank, from recruitment and booking of visits, through to their clinic experience to the end of the visit and the medical feedback service.

Figure 3: Responses of participants to the quality of services provided by Qatar Biobank

93% (n=1195) of participants rated our services as excellent with a further 6% (n=78) providing a rating of very good, in addition the 3 departments, PR and Communications, Clinic/Imaging and Medical office services all received an overall rating of excellent.

b. Researcher Feedback

The research community feedback is very important to understand how we can serve them better, the research feedback survey asks a series of questions relating to the research application process, the quality of the data and samples received to the speed of the research process.

The feedback survey showed that 80% of researchers found the data of excellent quality with the further 20% finding the data of good quality.

Figure 4: Responses of researchers to the quality of the data received

Figure 5: Responses of researchers to the quality of the samples received from QBB

When asked about the quality of biological samples received as per their research request all researchers rated the sample quality as excellent.

Figure 6: Responses of researchers to the overall rating of the research access office, including the application process and speed of data delivery

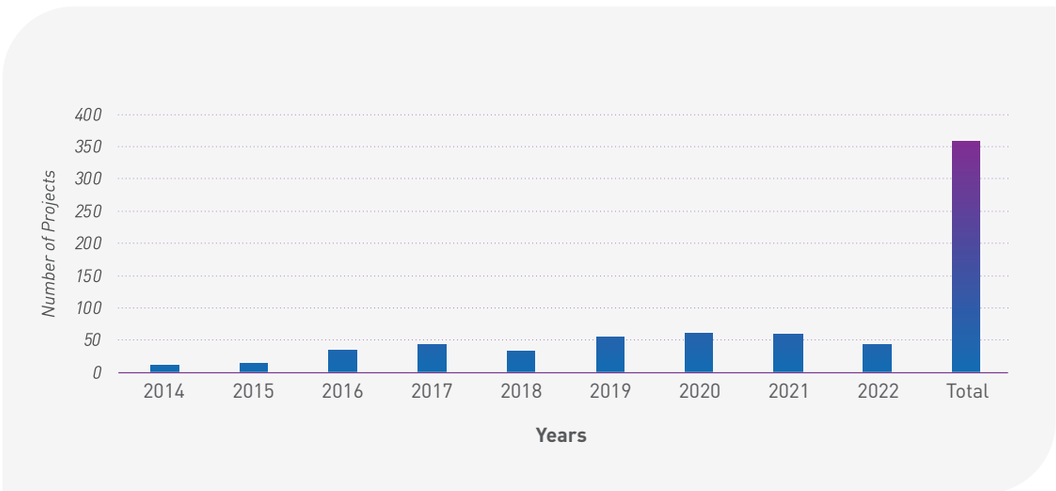


Figure 7: Number of projects registered from 2014 to 2022

To date 358 research projects have been registered with Qatar Biobank from over 20 research organisations, with the most projects registered from Qatar University, Sidra, Hamad Medical Corporation, Weill Cornell Medicine - Qatar and Hamad Bin Khalifa University.

QATAR BIOBANK **COHORT STUDY** KEY FINDINGS AND ANALYSIS

This section will introduce some of the results of the internal data analysis performed at the end of 2022. The results are based on the data collected from 30,742 cohort participants.

The Cohort Study was the first and is the longest running study managed by Qatar Biobank. It was established in 2012 and aimed to recruit 60,000 participants, Qatari nationals, and long-term residents of more than 15 years who were over the age of 18 by 2025. As this study was designed to collect reference data on the Arab population our recruitment strategy prioritised the Qatari nationals and Arabs living in Qatar for more than 15 years before reaching out to the long term non-Arab resident communities.

Demographic data is captured by our clinic staff during the registration and questionnaire stages of the participant visit. Data including age, gender, nationality and ethnicity, education, employment status are all recorded.

Recruitment by Gender and Age

Qatar Biobank has been supporting the local research community through the research access application process and scientific data extraction with over 330 research applications and 210 data extractions enabling research by providing high quality deep phenotypic data, and as a result to date there have been 72 publications using data from Qatar Biobank studies with many more expected. Qatar Biobank scientific team offer consultation to the scientific community on the best use of the data relating to study design, study feasibility and recommendations. In addition, great work has been happening, focusing on data harmonization, normalization, and data formatting to increase the usage to meet the requirements of different studies and/or platforms.

Qatar Biobank is working with many national and international institutions in the field of precision health and the field of biobanking, bio preservation and precision health which will result in exciting outcomes from a research and a learning perspective.

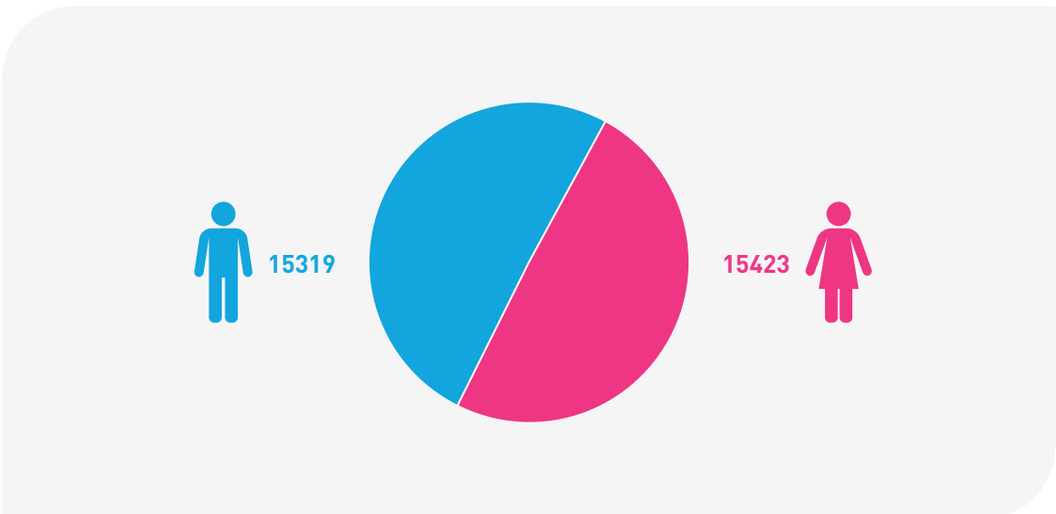


Figure 8 Qatar Biobank Cohort Recruitment by Gender

Our recruitment strategy aims to maintain a balanced recruitment rate for males and females.

To date 49.6% (n=15319) males and 50.4% (n=15423) females participating in the cohort study. From the total recruited 68% (n=10398) of the men and 84% (n=13024) of the women were Qatari nationals making up 76% of the total cohort population. Recruitment numbers have been greatly affected by the pandemic in 2020 and 2021 with activities being paused for nearly 10 months in total.

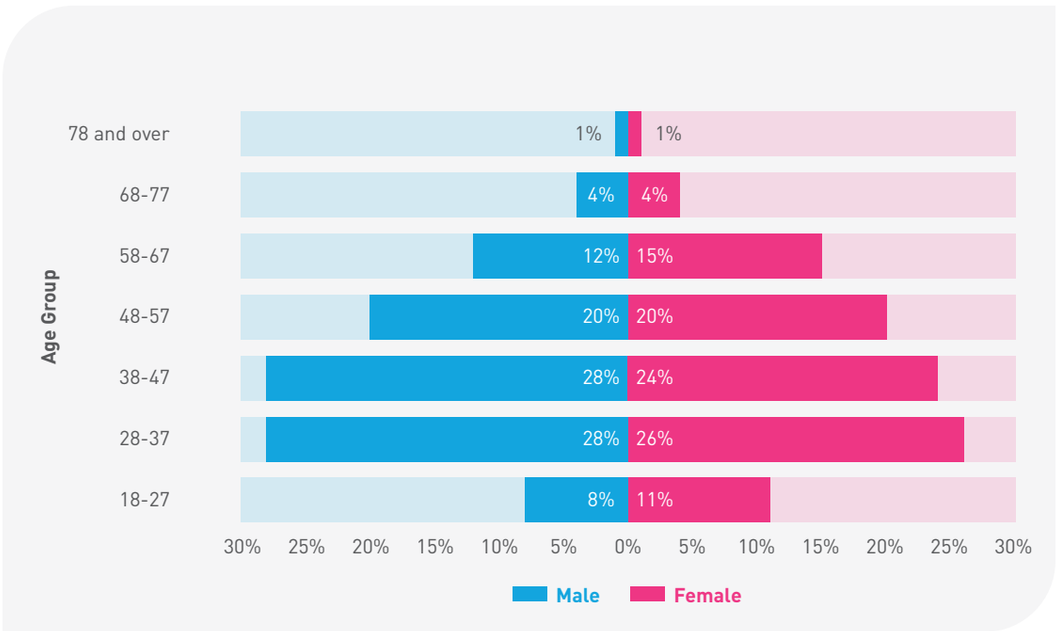


Figure 9 Age Distribution of Cohort Recruited Participants

The data shows that the mean age of a Qatar Biobank participant is 40 years old with the age ranges of 28-37 (n=8216) and 38-47 (n=7981) having the highest number of participants, men in both age ranges are slightly higher at 28% (n=4249; n=4267) respectively and women making up 26% (n=3967) and 24% (n=3790) respectively. Women in the 58-67 age category are more prevalent at 15% (n=2240) with men at 12% (n=1827).

Figure 10 shows recruitment statistics by nationality

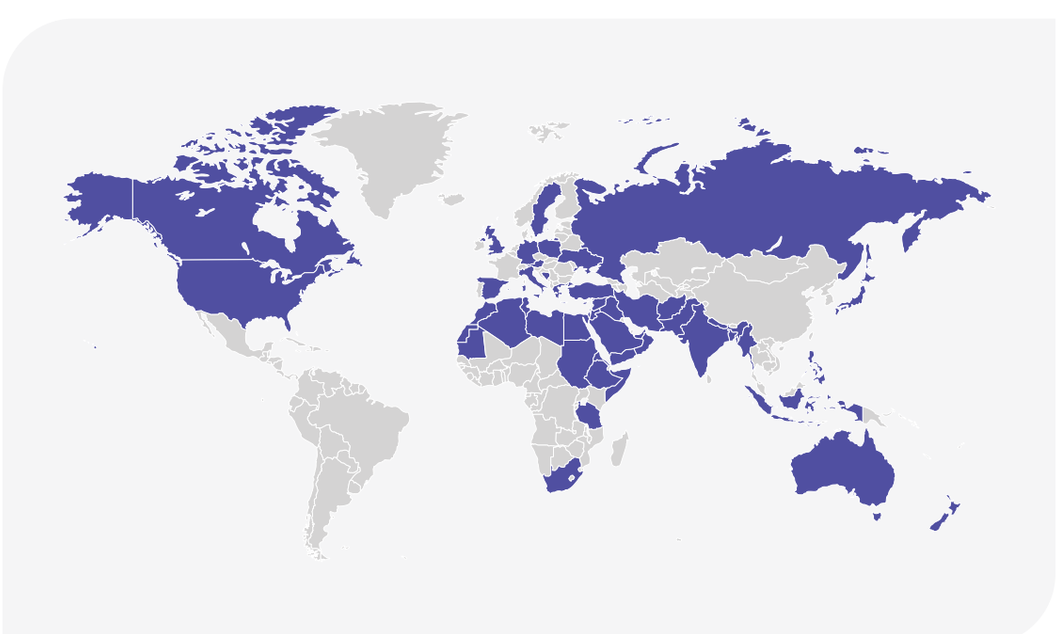


Figure 10 shows recruitment statistics by nationality.

Nationality	Count	%	Nationality	Count	%
Qatar	23422	76	Austria	6	0.02
Yemen	1132	4	Afghanistan	5	0.02
Jordan	1109	4	Bosnia-Herzegovina	5	0.02
Palestine	1063	3	Mauritania	5	0.02
Egypt	982	3	Ethiopia	4	0.01
Iran	603	2	Indonesia	4	0.01
Sudan	459	1	Sweden	4	0.01
Syria	397	1	Djibouti	2	0.01
Pakistan	191	1	Netherlands	3	0.01
Lebanon	151	0.5	Saint Kitts and Nevis	3	0.01
Saudi Arabia	143	0.5	Armenia	2	0.01
India	137	0.4	Greece	2	0.01
Oman	128	0.4	Italy	2	0.01
Somalia	127	0.4	Libya	2	0.01
Bahrain	109	0.3	Nepal	2	0.01
Iraq	93	0.3	South Africa	2	0.01
United Arab Emirates	80	0.3	Croatia	1	<0.01
Canada	59	0.2	Dominican Republic	1	<0.01
Tunisia	54	0.2	Germany	1	<0.01
United States	29	0.1	Japan	1	<0.01
Algeria	30	0.1	Liberia	1	<0.01
Bangladesh	29	0.1	Myanmar	1	<0.01
Morocco	29	0.1	New Zealand	1	<0.01
United Kingdom	28	0.1	Poland	1	<0.01
Philippines	26	0.1	Russia	1	<0.01
Kuwait	21	0.1	Singapore	1	<0.01
Cyprus	14	0.04	Spain	1	<0.01
Eritrea	8	0.02	Sri Lanka	1	<0.01
Turkey	8	0.02	Tajikistan	1	<0.01
Tanzania	7	0.02	Ukraine	1	<0.01
Australia	6	0.02			

Table 1: Recruitment Statistics by Nationality

Participants were recruited from 61 countries with 76% (n=23422) being Qatari nationals.

Yemeni and Jordanian nationals who are long term residents in Qatar make up 8% in total (Yemeni n=1132 and Jordanian n=1109). Our regional brotherly neighbours of Saudi Arabia, Oman, Bahrain, United Arab Emirates and Kuwait make up 2% (n=489) of the recruited population.

Figure 11 shows the total number of participants recruited into the cohort study by ethnicity since 2012. As a study based in Qatar, for the population of Qatar, the project aims to create a reference database for use in future research. A total of 30742 participants have been recruited and 76% (n=23422) are Qatari's.

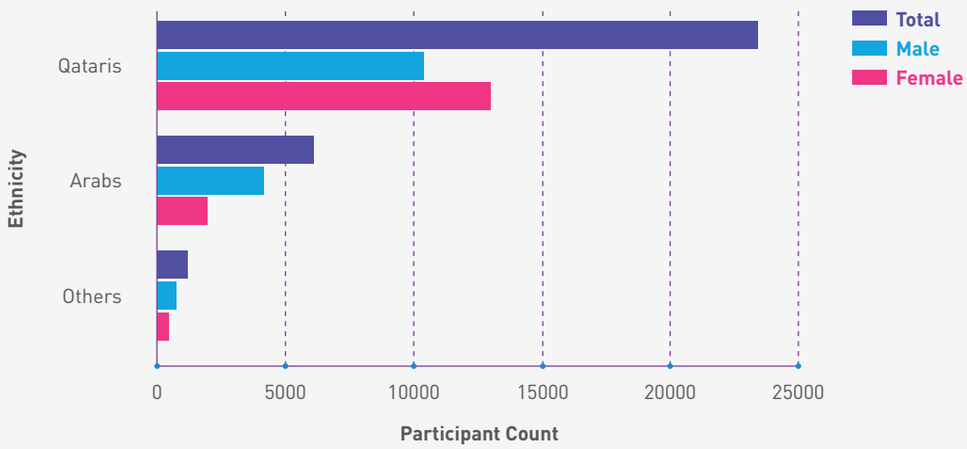


Figure 11 Cohort Study Recruitment by Ethnicity

Marital Status

The marital status of our cohort population is recorded at the point of registration. This data is important to ensure that participants receive the correct questionnaires throughout their clinic visit. The questionnaires vary slightly for married and single females to ensure the correct data is captured without asking questions that may be considered inappropriate.

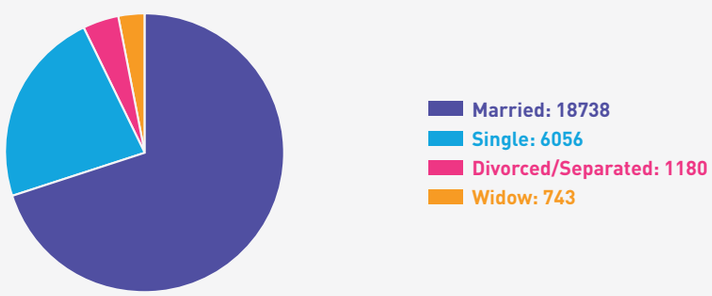


Figure 12 Qatar Biobank Cohort Marital Status

70% (n=18738) of participants registered their marital status as married, with 23% (n=6056) registering as single. 7% (n=1923) are either widowed or divorced/separated.

Education

Education is a priority in the vision and development of Qatar and its population, with many local and esteemed international schools and universities establishing campuses in Qatar and offering a wide range of academically reputable educational opportunities for the population. During the main questionnaire participants are asked to identify their highest level of education completed.

Figure 13 shows the self-reported highest level of education completed by the cohort population.

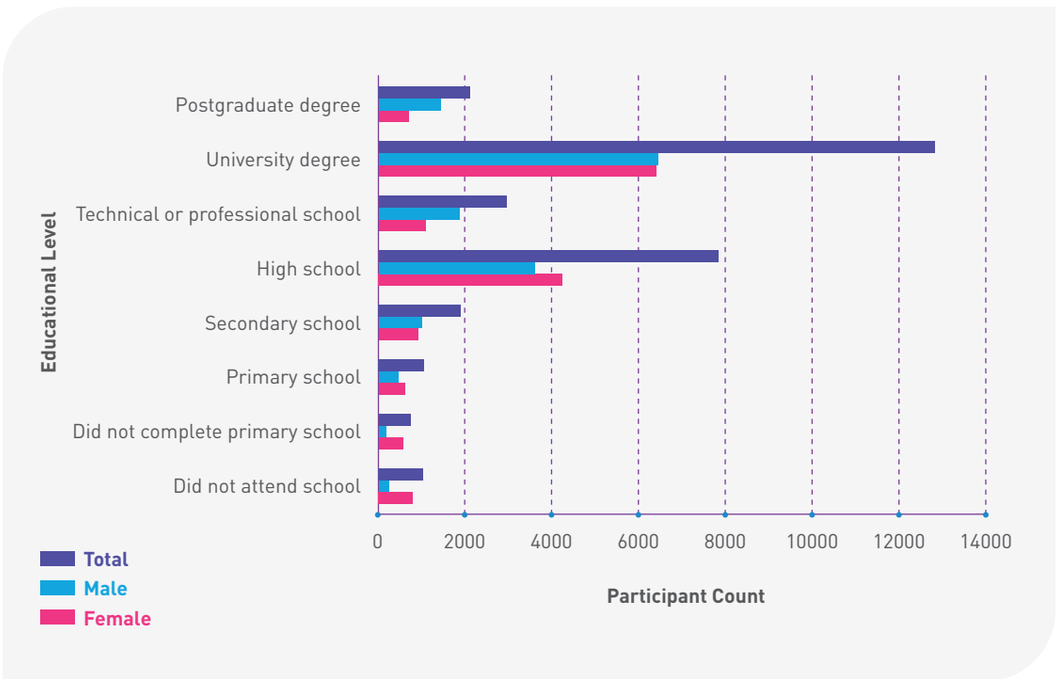


Figure 13 shows the self-reported highest level of education completed by the cohort population.

The figure shows that 26% (n=7812) of participants reported completing high school (grade 10-12) with a further 43% of men (n=6422) and 42% of women (n=6381) going on to complete a university degree and a further 9% of men (n=1413) and 5% (n=690) of women continuing their education to gain a postgraduate qualification.

Employment Status

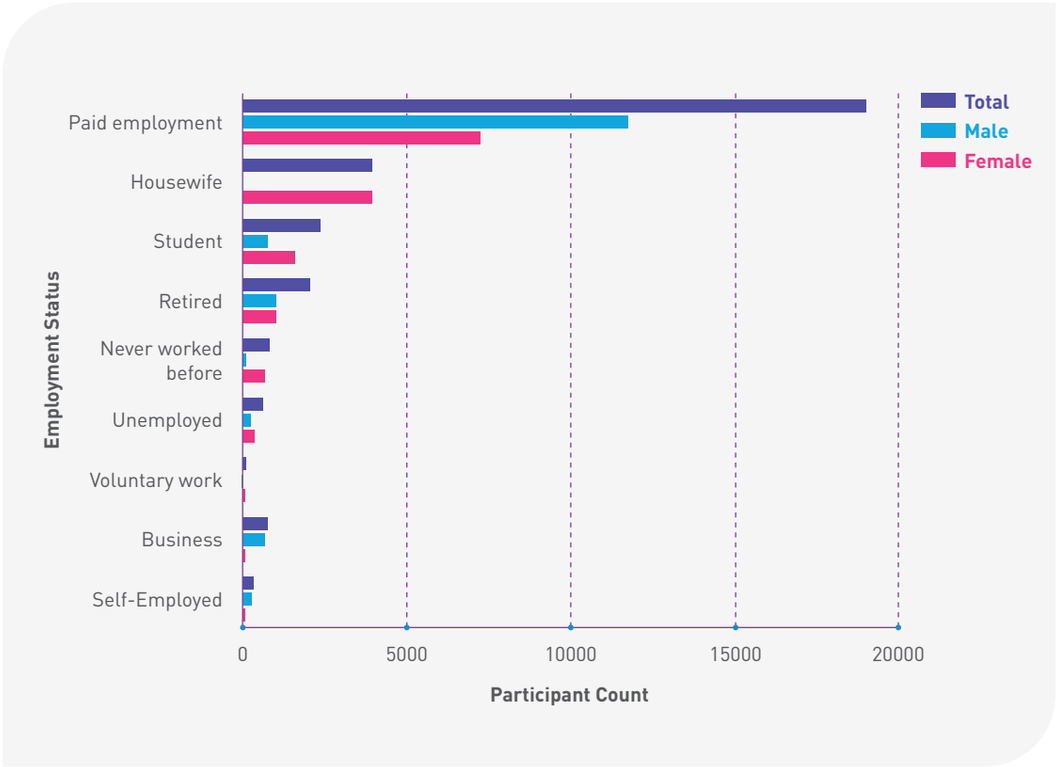


Figure 14 Employment Status

Overall, 63% (n=19054) of participants reported being in paid employment, with 62% of men (n=11781) and 38 % of women \ (n=7273) reporting this. A further 4% of participants (n=1156) reported being either a business owner or self-employed.

Diet, Health, and Lifestyle Data

Health and Lifestyle data is captured through different questionnaires and is self-reported. Metabolic conditions are known to affect the long-term health of a population and are common within the population of Qatar. Physical activity, smoking, diet as well as waist to hip ratio can impact the prevalence of metabolic disorders. Figures 15 – 21 show the self reported lifestyle habits of the cohort participants.

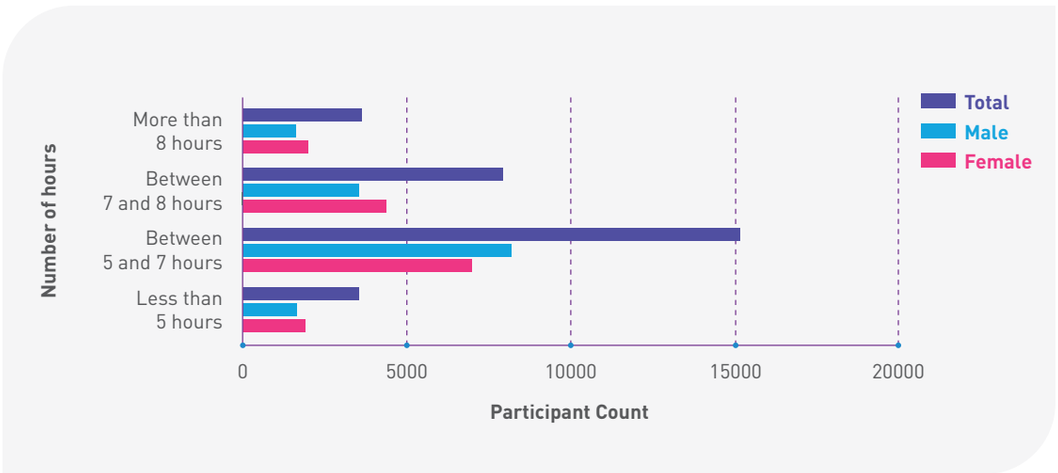


Figure 15 Self Reported Lifestyle Habits – Hours of Sleep

Sleep plays an important role in an individual's health; the data shows that 54% of men (n= 8205) and 46% (n=6984) of women reported having been 5 and 7 hours of sleep per night with a further 24% of men (n=3562) and 29% (n=4390) of women averaging between 7 and 8 hours sleep per night.

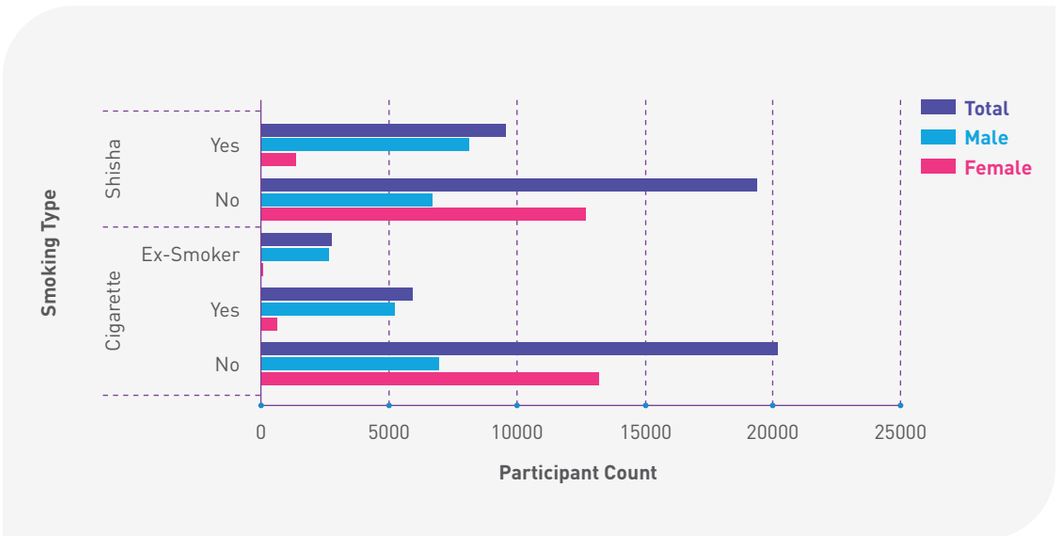


Figure 16 Self Reported Smoking Status

Participants are asked to self report their smoking status during a lifestyle questionnaire. These questions are often self-administered allowing the participants privacy to answer honestly and accurately. Smoking of shisha is more common than smoking cigarettes in the cohort population. Shisha is a heated tobacco usually flavoured with fruit or molasses sugar and is a pastime enjoyed in the Qatari culture. From the responses received 21% of men and women (n=5970) reported smoking cigarettes and 33% (n=9606) reporting smoking shisha. More men reported smoking across both types with 89% of men (n=5301) smoking cigarettes and 85% of men (n=8208) smoking shisha.

Physical Activity

The International Physical Activity Questionnaire (IPAQ) was used to assesses physical activity across different types of activity including walking, moderate-intensity activities, and vigorous intensity activities. The frequency (measured in days per week) and duration (time per day) were collected separately for each specific type of activity.

Metabolic Equivalent Score (METS) was used as a measure of volume of activity and was computed by weighting each type of activity by its energy requirements (Walking = 3.3 METs, Moderate PA = 4.0 METs and Vigorous PA = 8.0 METs). Physical activity was then categorized into three categories, inactive, moderately active, and highly active.

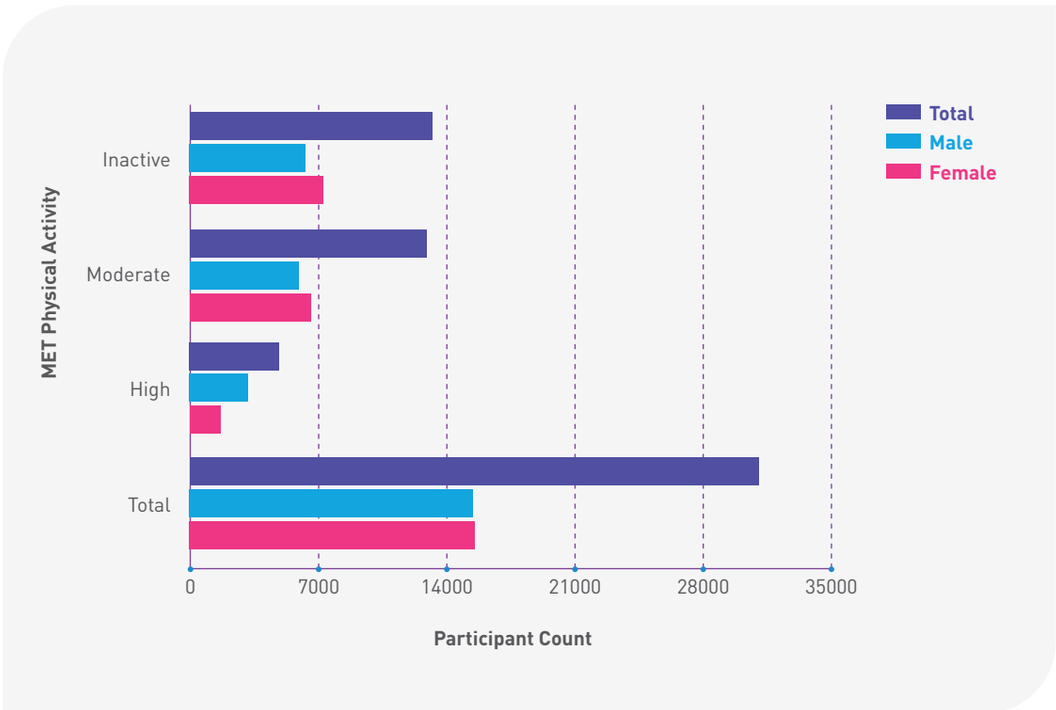
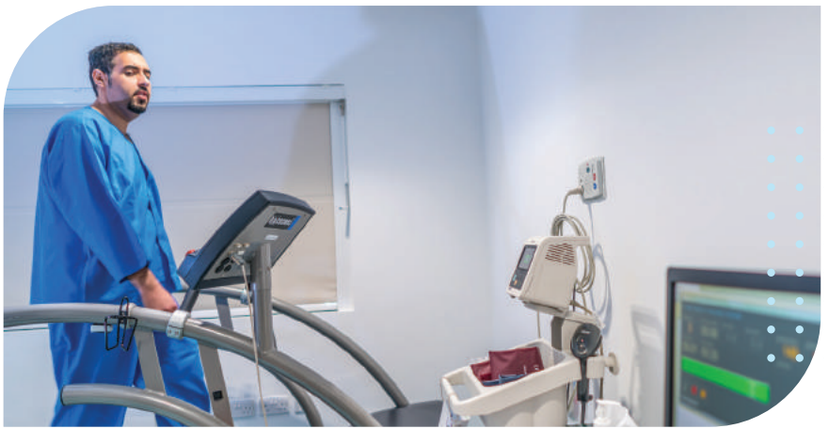


Figure 17 Physical Activity MET Score



41% (n=6267) of men and 47% (n=7230) of women recorded a Metabolic Equivalent of Task (MET) score within the inactive category, however 42% (n=6529) of women recorded a moderate MET score with 38% (n=5891) of men recording the same.

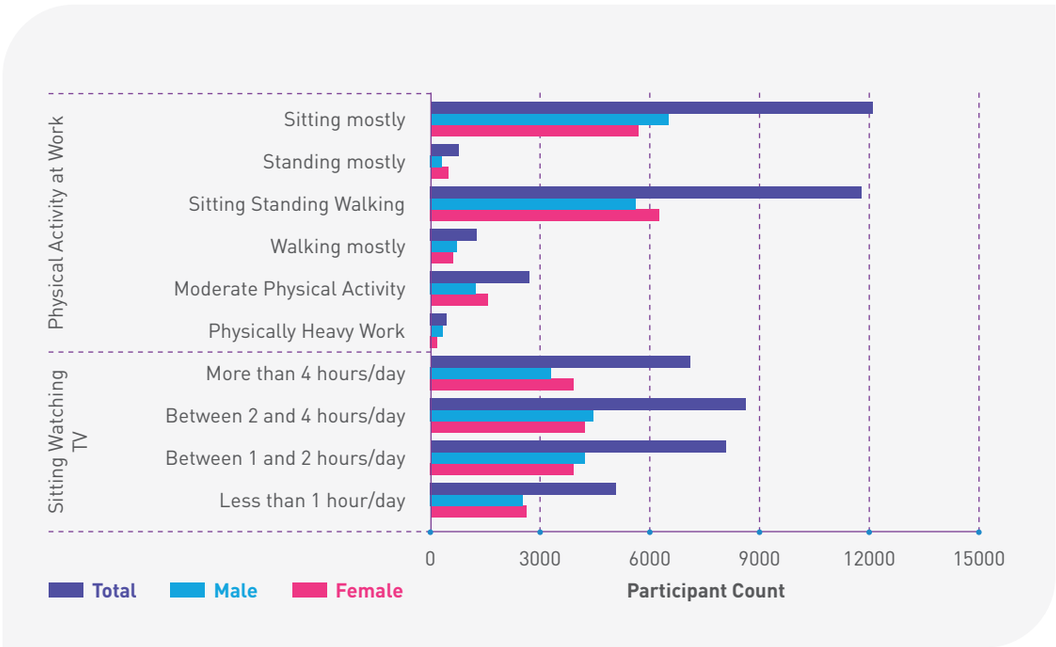


Figure 18 Sedentary Lifestyle

Sedentary lifestyles can be linked to an increased risk of developing diabetes, obesity and many other conditions. Physical activity in the workplace is recorded and the data shows that women were reported as slightly more active than men, 10% (n=1485) of women and 8% (n=1149) of men described their work as moderately physical. 42% (n=12094) of participants reported their physical activity level at work as mostly sitting. Only 2% (n=244) of men and 1% (n=102) of women rated their work activity as physically heavy.

The data also shows that 17% of men and women (n=2444 and n=2502 respectively) watch television for less than 1 hour per day, however 23% of men (n=3222) and 27% of women (n=3831) reported watching 4 or more hours of television per day.

Dietary Habits

Food preferences are influenced by the availability of the multi-ethnic cuisines which reflects the diverse population in Qatar.

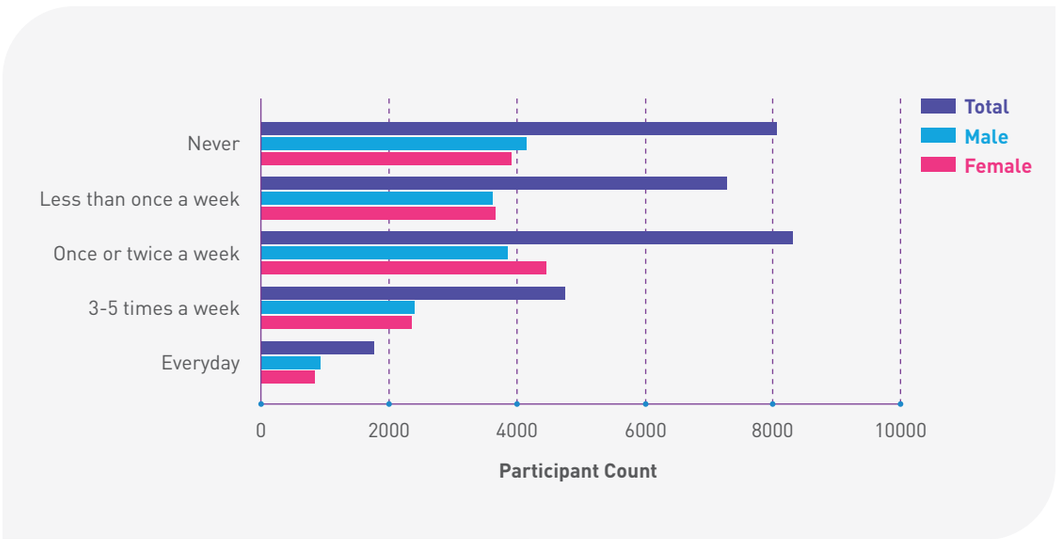


Figure 19 Self Reported Frequency of Fast Food Consumed

Fast food remains a popular food choice with both men and women reporting eating fast food regularly, 29% (n=4450) women and 26% (n=3857) of men eating once or twice a week.

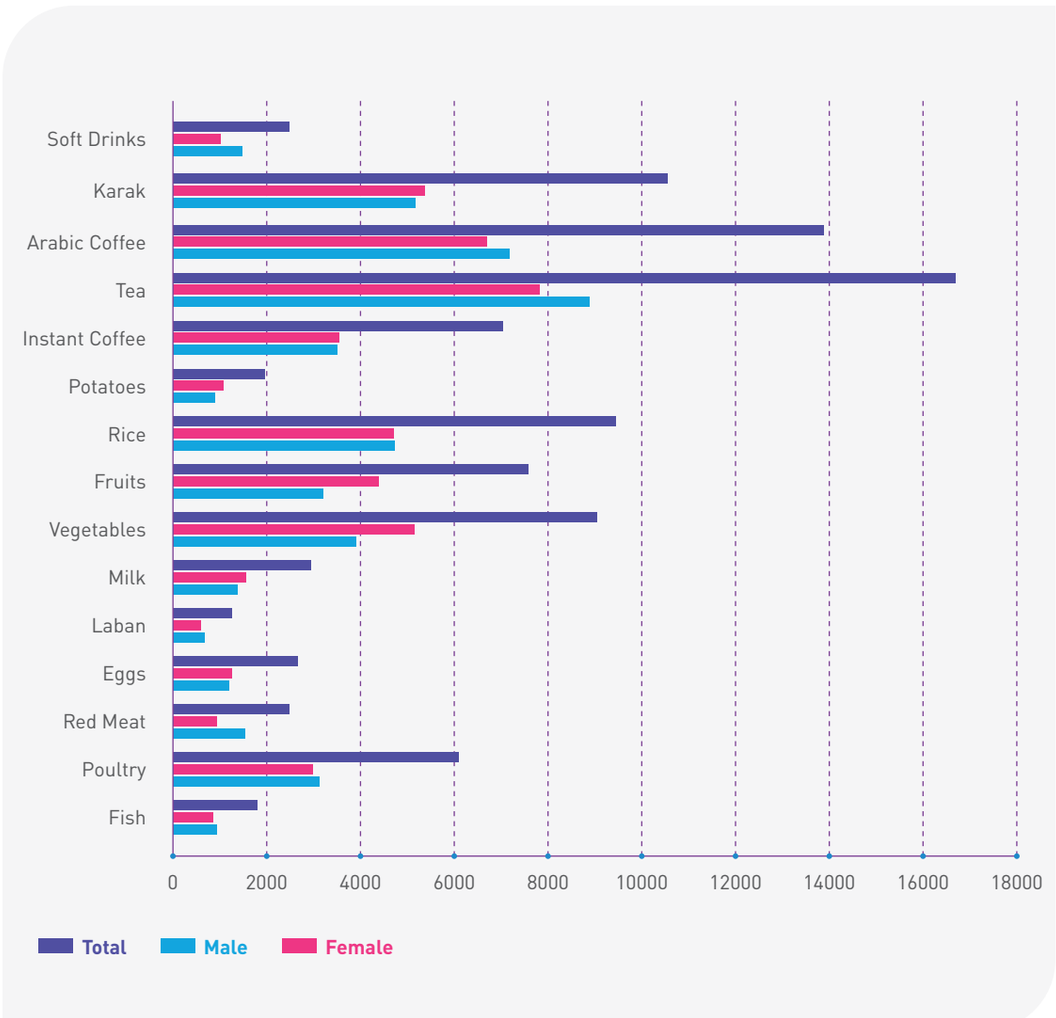


Figure 20 Most Commonly Reported Food and Drinks Consumed

Arabic coffee and the sweet, spiced tea Karak are two of the most popular reported drinks consumed at least once per day for both men and women. 44% (n=6703) of women and 48% (n=7176) of men reported drinking Arabic coffee with a further 35% of men and women (n=5165 and n=5376 respectfully) drinking Karak at least once per day. Poultry is the most popular protein consumed daily with 20% (n=2979) of women and 21% (n=3122) of men eating this. 8% (n=2475) of participants reported eating red meat daily, with fish being eaten daily by 6% (n=1789) of participants.

Participant Self Reported Medical History

Medical history and cancer diagnosis are reported through the questionnaire stages with the assistance of the clinic team.

The participants are asked to select from the list the conditions that they have been clinically diagnosed with and can select as more than one condition if applicable.

Self Reported Medical Conditions	Women	%	Men	%
High Cholesterol	3993	25	4399	28
Diabetes	2692	17	2220	14
Hypertension	2300	14	2480	16
Thyroid disease	2174	14	449	3
Asthma	1567	10	1200	8
Arthritis (including Osteoarthritis and Rheumatoid Arthritis)	1215	8	561	4
Diabetes Gestational	1039	7	0	0
Prediabetes	503	3	340	2
Fatty liver	400	3	527	3
Osteoporosis	321	2	66	0
Gastric/duodenal ulcer	235	1	275	2
Emphysema	183	1	196	1
Benign breast_diseases	151	1		
Kidney diseases other than stones	147	1	131	1
Ulcerative colitis	137	1	137	1
Vein Thrombosis	107	1	49	<1
CVD	79	<1	186	1
Enlarged Prostate	0	0	361	2

Table 2 Most Commonly Reported Medical Conditions for Men and Women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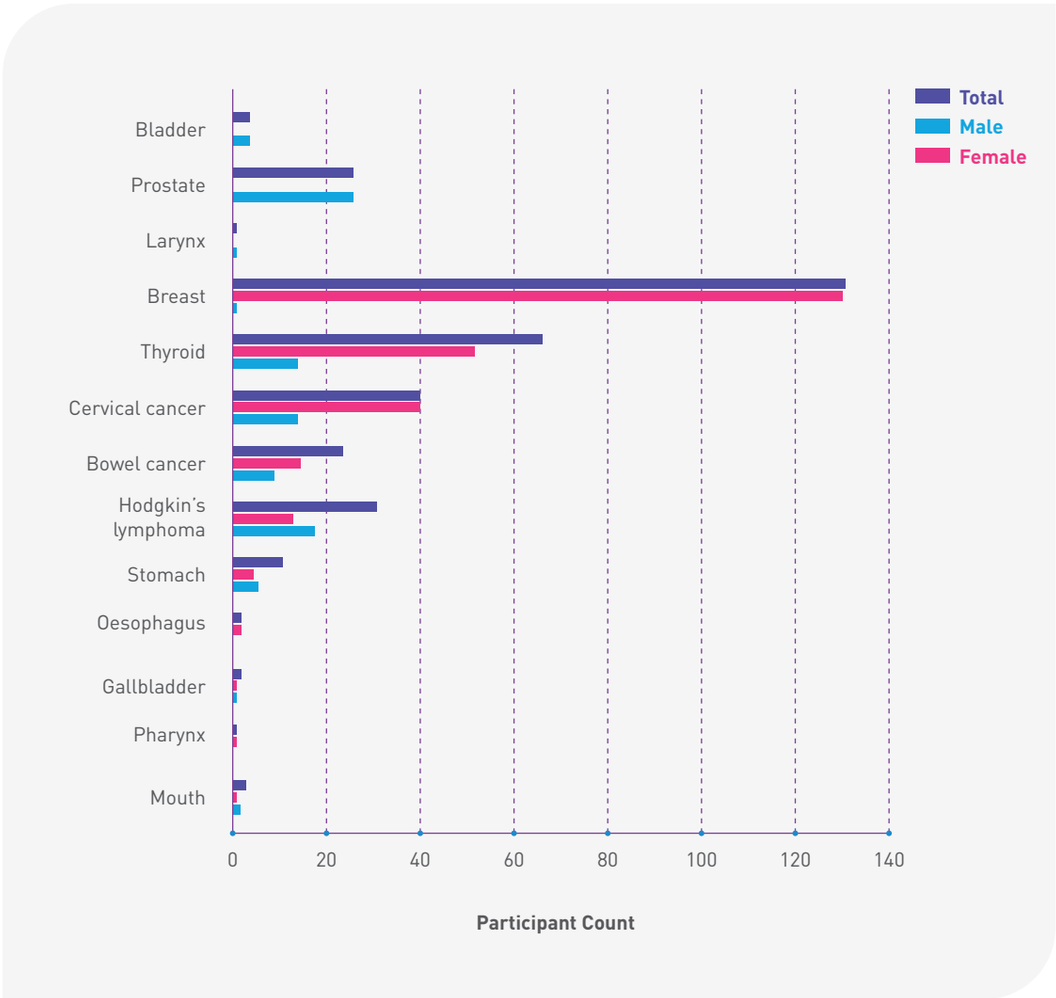


Figure 21 Reported Cancer Diagnosis by Type

The questions related to cancer diagnosis are captured during the nurse interview stage of the visit. The data shows that for women the most reported cancer is breast at 130 cases, followed by thyroid at 52 cases and cervical at 40 cases. For men the most reported cancer was prostate with 26 cases followed by Hodgkin's lymphoma at 18 and thyroid with 14 cases.

Medical Screening

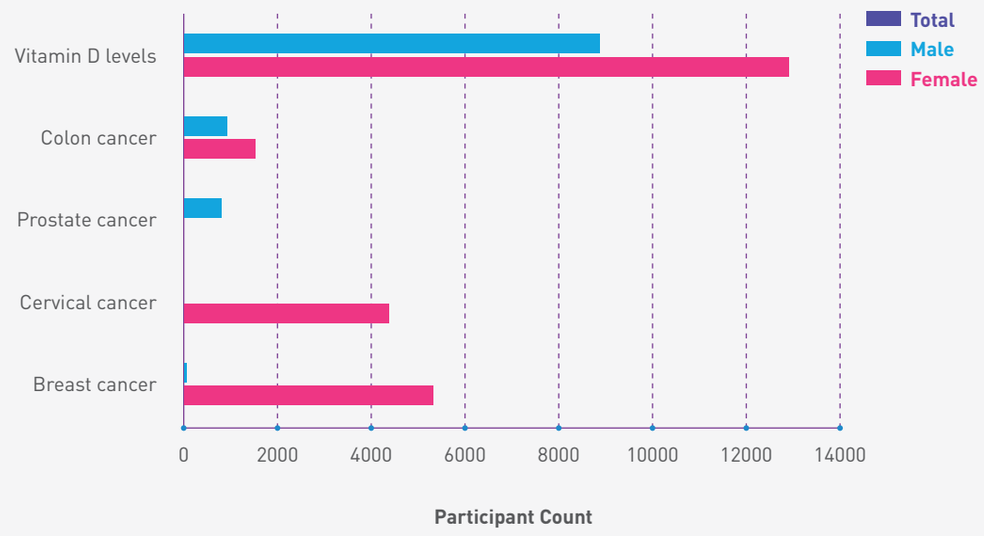
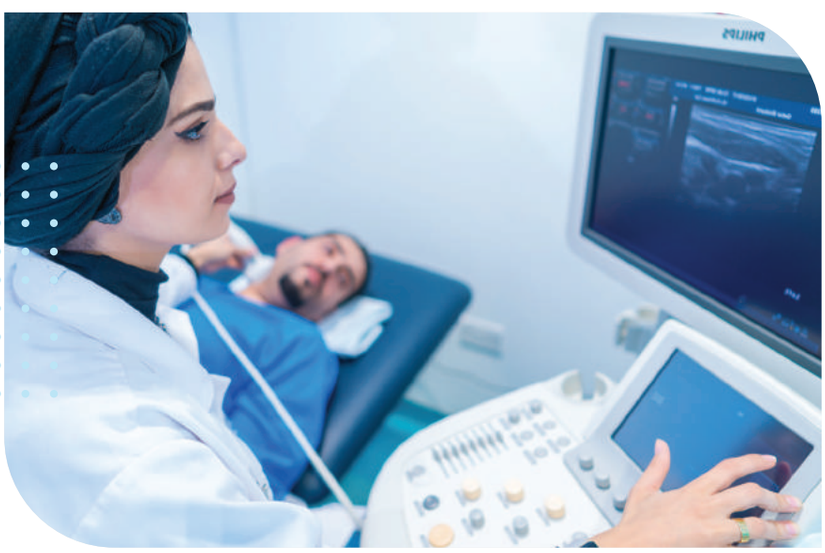


Figure 22 Self Reported Medical Screening Uptake

Medical screening for some of the more commonly diagnosed conditions in the State of Qatar are recorded and the results show that 81% (n=12940) of women and 57% (n=8894) of men have had their vitamin D levels checked. After vitamin D screening for women, breast cancer was most reported 33% (n=5320) and for men colon cancer followed by prostate cancer were recorded (n=930 (6% and n=805 5%) men respectively.



Vitamin D Data

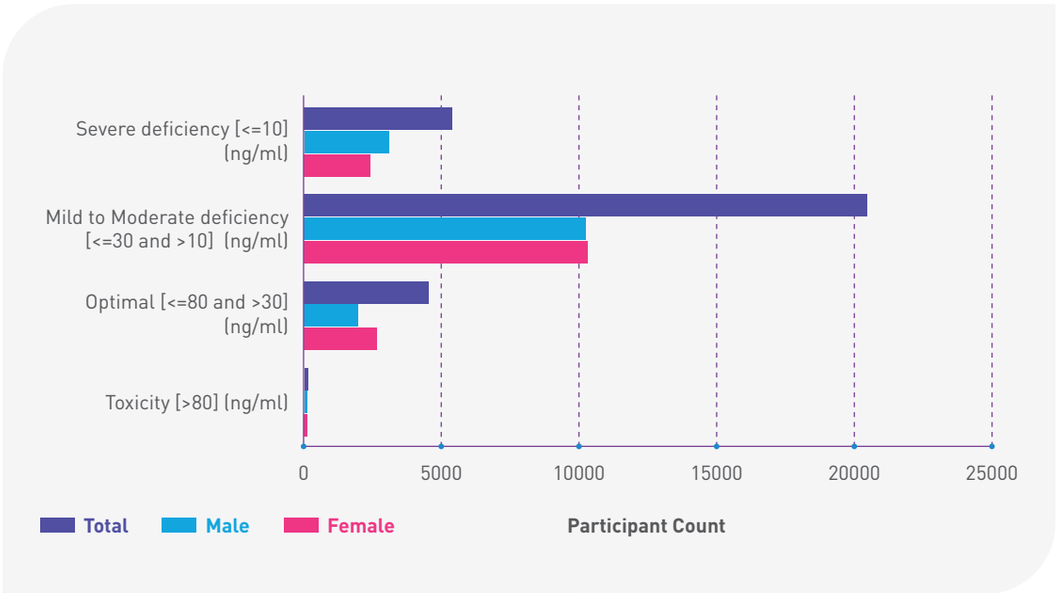


Figure 23 Vitamin D Levels from Qatar Biobank Clinic Analysis

Vitamin D deficiency is a chronic burden on health services in Qatar. Serum Vitamin D levels are recorded from the biological samples that are sent for clinical analysis. 18% (n=5342) of cohort participants results showed severe deficiency <=10ng/ml. A further 67% (n=20506) showed mild to moderate deficiency >10 and <=30 ng/ml.

Vitamin D supplements are commonly taken to improve vitamin D levels

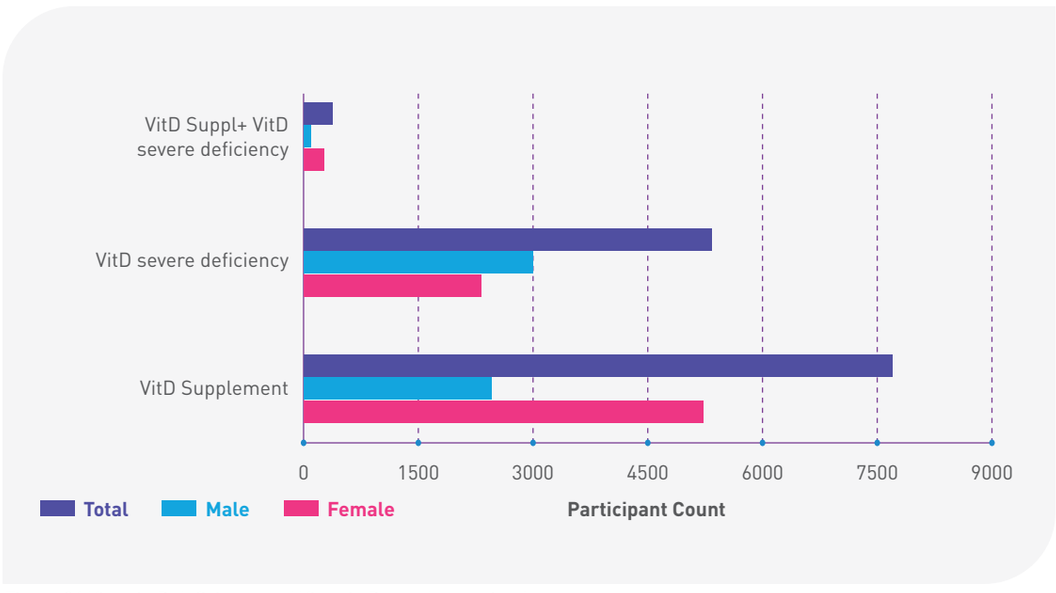


Figure 24 Vitamin D deficiency and Vitamin D supplement intake

Clinical analysis of biomarkers showed that 7% (n=391) of participants who had reported taking vitamin D supplements were still severely deficient.

Anthropometric Data

A series of anthropometric measurements are performed as part of the participant clinic visit. These include, sitting and standing height, weight, blood pressure, waist/hip circumference and body composition. The data is collected by our highly skilled and trained clinic staff following standardised procedures to ensure consistency, and the data is captured using our own in house bespoke clinical information systems. Many of the clinical measurement data captured is transferred from device to clinical information system with minimal human data input required to minimise data entry errors.

Hypertension is one of the medical conditions frequently referred for further investigations and treatment. The data in Table 3 shows the average diastolic and systolic blood pressure recorded by men and women during the participant visit. During the visit 3 blood pressure readings are taken with a short rest interval between each recording. The average of the 3 readings are shown in Table 3 .

AVERAGE DIASTOLIC BLOOD PRESSURE (mm Hg)			
GENDER	**COUNT**	**MEDIAN**	**IQR**
FEMALE	15405	65.0	[59.0-71.0]
MALE	15302	71.0	[64.0-78.0]
TOTAL	30707	68.0	[61.0-75.0]
AVERAGE SYSTOLIC BLOOD PRESSURE (mm Hg)			
GENDER	**COUNT**	**MEDIAN**	**IQR**
FEMALE	15405	109.0	[101.0-121.0]
MALE	15302	116.0	[109.0-125.0]
TOTAL	30707	113.0	[105.0-124.0]

Table 3 Blood Pressure Measurement

WAIST SIZE (cm)			
GENDER	**COUNT**	**MEDIAN**	**IQR**
FEMALE	15391	84.0	[75.0-94.0]
MALE	15273	94.0	[85.0-103.0]
TOTAL	30664	89.0	[79.0-99.0]
HIP SIZE (cms)			
GENDER	**COUNT**	**MEDIAN**	**IQR**
FEMALE	15391	107.0	[100.0-116.0]
MALE	15272	104.0	[98.0-111.0]
TOTAL	30663	105.0	[99.0-113.0]
WHR (Waist/Hip Ratio)			
GENDER	**COUNT**	**MEDIAN**	**IQR**
FEMALE	15391	0.8	[0.7-0.8]
MALE	15272	0.9	[0.8-0.95]
TOTAL	30663	0.8	[0.8-0.9]

Table 4 Waist/Hip Measurement

BMI (kg/m²)			
GENDER	**COUNT**	**MEDIAN**	**IQR**
FEMALE	15140	29.3	[25.26-33.8]
MALE	15052	28.3	[25.3-31.8]
TOTAL	30192	28.7	[25.3-32.8]

Table 5 Body Mass Index (IQR: the Interquartile Range)

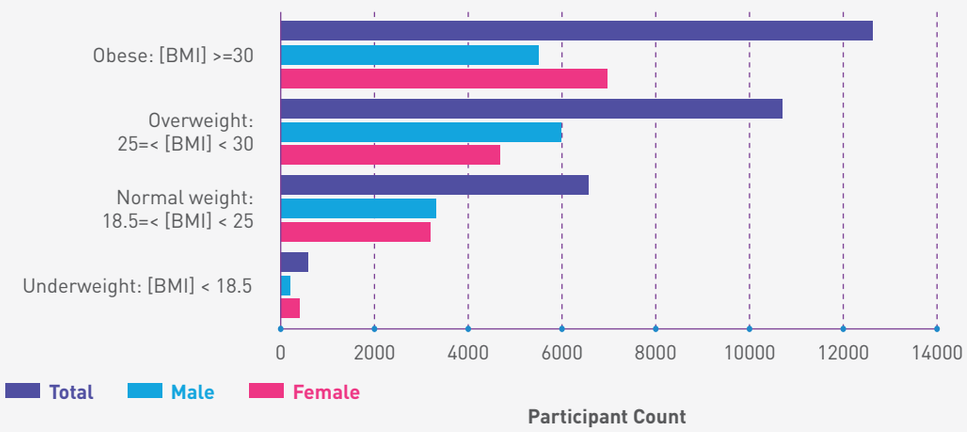


Figure 25 Body Mass Index Recorded

The data shows that 20% (n=5975) of men were recorded as being in the overweight category with a BMI of 25 or more compared to 15.5% (n=4681) of women. A further 18% (n=5493) of men recorded a BMI above 30 placing them in the obese category compared with 23% (n=6959) of women. Within the normal weight BMI between 18.5 and 25 category 10.5% (n=3184) of women and 11% (n=3290) of men were recorded.

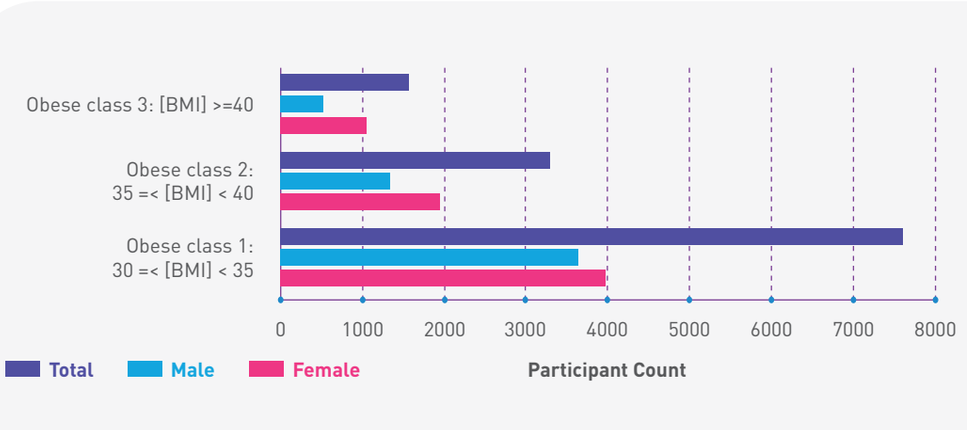


Figure 26 Breakdown of Participants by Obesity Class

A closer look at the breakdown of obesity categories shows that 32% (n=3965) of women and 29% (n=3629) of men had a BMI between 30-35. In class 2 16% (n=1948)) of women and 11% (n=1339) of men were recorded, and in class 3, 8% (n=1046) of women and 4% (n=525) of men recorded a BMI ⩾ to 40.

Bariatric Surgery

Bariatric surgery has become a popular weight loss surgery in the State of Qatar with many different options available locally.

Self Reported Bariatric Surgery by Type

Figure 27 shows the number of cohort participants self reported bariatric surgery by type.

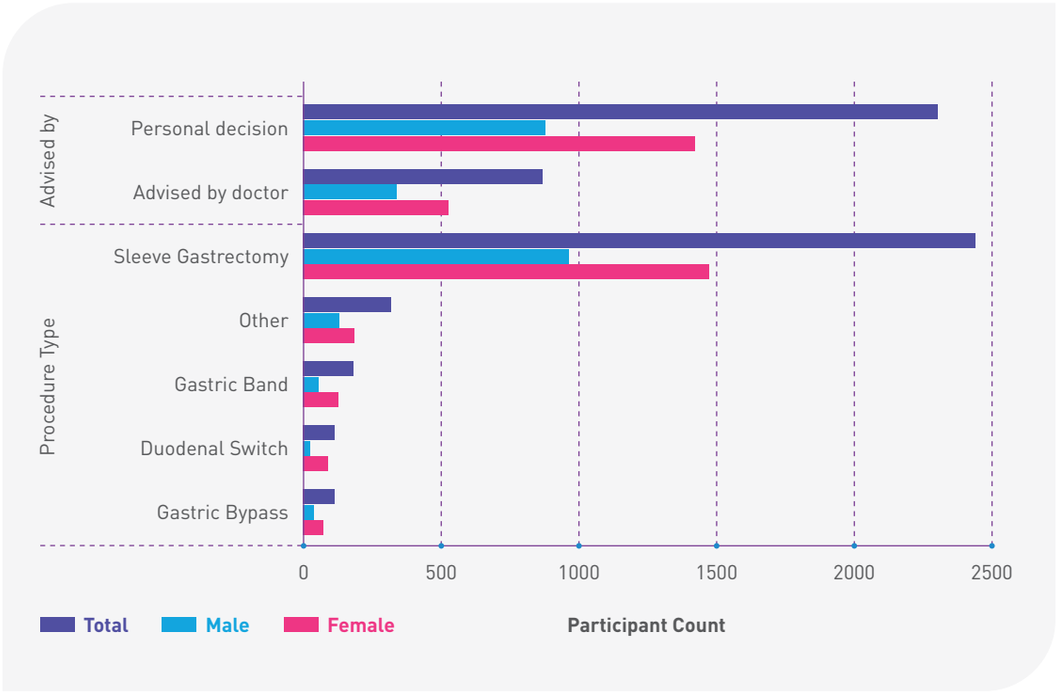


Figure 27 Self Reported Bariatric Surgery

Bariatric surgery is an increasingly popular method of weight loss surgery, 26280 responses were recorded and 12% (n=3169) of the total participants reported having had this type of surgery. 15% of women (n=1949) and 9% of men (n=1220) reported having had a bariatric procedure with the most common being the sleeve gastrectomy procedure for both. The procedure was advised by a doctor in a total of 27% (n=868) of surgeries reported. 72% (n=880) of men and 73% (n=1421) of women took the personal decision to have bariatric surgery.

Additional information recorded showed that most procedures were performed within the State of Qatar (47% of men (n=576) and 65% of women (n=1273)) other Arab countries outside of the Gulf states being the next most popular destination with 41% of men (n=495) and 24% of women (n=471) travelling regionally. Figure 28 Self Reported Bariatric Surgery by Country.

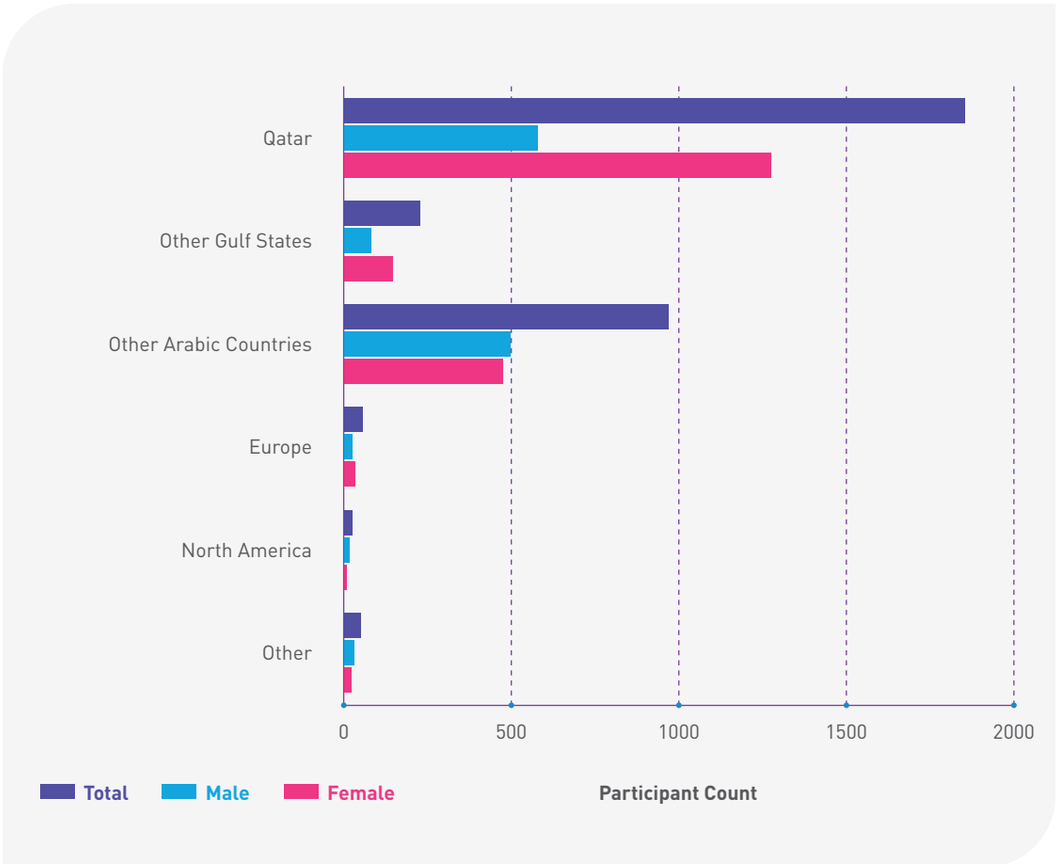
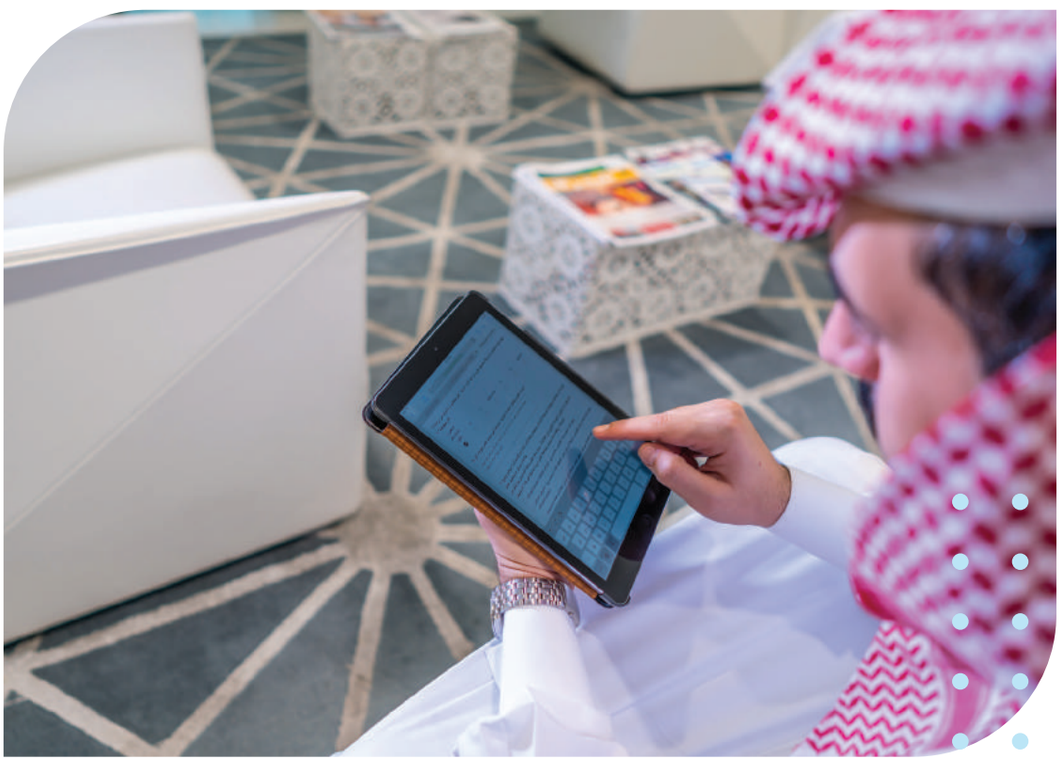


Figure 28: Self Reported Bariatric Surgery by Country



Biomarker Data

Biological samples are collected from all participants. The samples are sent for clinical analysis and results on approximately 77 biomarkers are available. These are interpreted by our clinical data interpretation specialists who use this in addition to the other data collected during the participant visit to determine if a medical referral is required. This data is also used to prepare a participant feedback report which will provide an overview of their health at the point of data collection and allow our clinical data interpretation specialist to offer lifestyle advice if required.

Lipid Profile			
Cholesterol total (mmol/L)			
GENDER	**COUNT**	**MEDIAN**	**IQR**
FEMALE	15319	4.8	[4.2-5.4]
MALE	15229	4.8	[4.2-5.5]
TOTAL	30548	4.8	[4.2-5.5]
High Density Lipoprotein HDL-cholesterol (mmol/L)			
GENDER	**COUNT**	**MEDIAN**	**IQR**
FEMALE	15319	1.5	[1.3-1.8]
MALE	15223	1.2	[1.0-1.4]
TOTAL	30542	1.3	[1.1-1.6]
Low Density Lipoprotein LDL-cholesterol calc (mmol/L)			
GENDER	**COUNT**	**MEDIAN**	**IQR**
FEMALE	15287	2.7	[2.2-3.3]
MALE	15046	3.0	[2.4-3.6]
TOTAL	30333	2.9	[2.3-3.4]
Triglyceride (mmol/L)			
GENDER	**COUNT**	**MEDIAN**	**IQR**
FEMALE	15319	1.0	[0.7-1.4]
MALE	15228	1.2	[0.9-1.8]
TOTAL	30547	1.1	[0.8-1.6]

Table 6 Biomarker Data

Thyroid Function			
Free Triiodothyronine-FT3 (pmol/L)			
GENDER	**COUNT**	**MEDIAN**	**IQR**
FEMALE	14988	4.3	[3.8-4.8]
MALE	14799	4.8	[4.2-5.3]
TOTAL	29787	4.5	[4.0-5.0]
Free Thyroxine - FT4 (pmol/L)			
GENDER	**COUNT**	**MEDIAN**	**IQR**
FEMALE	15274	14.0	[12.7-15.7]
MALE	15173	14.5	[13.0-16.4]
TOTAL	30447	14.3	[12.8-16.1]
Thyroid Stimulating Hormone – TSH (mlU/L)			
GENDER	**COUNT**	**MEDIAN**	**IQR**
FEMALE	15243	1.8	[1.2-2.8]
MALE	15150	1.6	[1.1-2.4]
TOTAL	30393	1.7	[1.1-2.6]
Diabetes Related			
HbA1c			
GENDER	**COUNT**	**MEDIAN**	**IQR**
FEMALE	15193	5.4	[5.1-5.8]
MALE	15124	5.5	[5.2-5.8]
TOTAL	30317	5.4	[5.2-5.8]
Glucose (mmol/L)			
GENDER	**COUNT**	**MEDIAN**	**IQR**
FEMALE	15304	4.9	[4.6-5.5]
MALE	15215	5.1	[4.7-5.6]
TOTAL	30519	5.0	[4.6-5.6]
Insulin (mcunit/mL)			
GENDER	**COUNT**	**MEDIAN**	**IQR**
FEMALE	15252	10.0	[6.9-15.2]
MALE	15144	10.9	[7.1-17.1]
TOTAL	30396	10.4	[7.0-16.1]

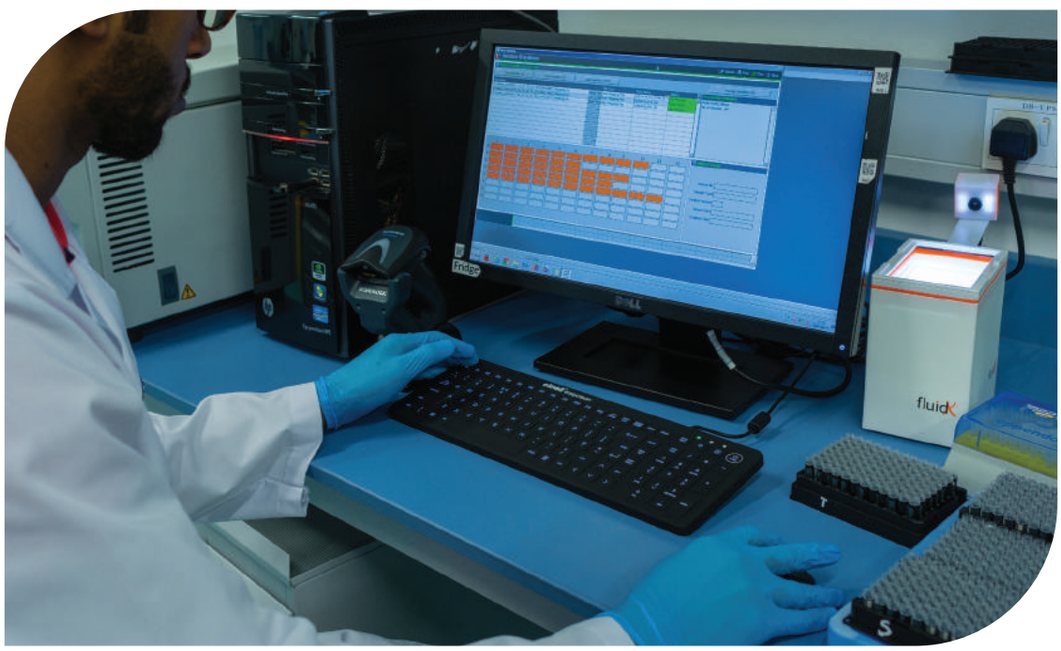
Table 6 Biomarker Data

Liver Function			
Alkaline Phosphatase (U/L)			
GENDER	**COUNT**	**MEDIAN**	**IQR**
FEMALE	15314	68.0	[56.0-82.0]
MALE	15222	70.0	[59.0-82.0]
TOTAL	30536	69.0	[57.0-82.0]
Alanine Transaminase - ALT (U/L)			
GENDER	**COUNT**	**MEDIAN**	**IQR**
FEMALE	15265	14.0	[11.0-20.0]
MALE	15212	24.0	[18.0-34.2]
TOTAL	30477	18.8	[13.0-27.7]
Aspartate Transaminase - AST (U/L)			
GENDER	**COUNT**	**MEDIAN**	**IQR**
FEMALE	15307	16.0	[14.0-19.0]
MALE	15213	20.0	[17.0-24.0]
TOTAL	30520	18.0	[15.0-22.0]
Bilirubin Total (umol/L)			
GENDER	**COUNT**	**MEDIAN**	**IQR**
FEMALE	14553	6.0	[4.7-8.1]
MALE	15034	8.3	[6.0-11.8]
TOTAL	29587	7.0	[5.1-10.0]
Total Protein (gm/L)			
GENDER	**COUNT**	**MEDIAN**	**IQR**
FEMALE	15321	73.0	[71.0-76.0]
MALE	15230	74.0	[71.0-77.0]
TOTAL	30551	74.0	[71.0-76.0]
Albumin (gm/L)			
GENDER	**COUNT**	**MEDIAN**	**IQR**
FEMALE	15322	41.0	[38.0-44.0]
MALE	15232	43.0	[40.5-46.0]
TOTAL	30554	42.0	[39.2-45.0]
Gamma-Glutamyl Transferase – GGT (U/L)			
GENDER	**COUNT**	**MEDIAN**	**IQR**
FEMALE	14316	16.0	[11.0-23.0]
MALE	14327	26.0	[19.0-39.0]
TOTAL	28643	20.0	[14.0-32.0]

Table 6 Biomarker Data

Renal Function			
Urea(mmol/L)			
GENDER	**COUNT**	**MEDIAN**	**IQR**
WOMEN	15320	3.7	[3.1-4.5]
MEN	15232	4.6	[3.9-5.5]
TOTAL	30552	4.2	[3.4-5.1]
Creatinine (umol/L)			
GENDER	**COUNT**	**MEDIAN**	**IQR**
WOMEN	15321	57.0	[51.0-62.0]
MEN	15231	77.0	[70.0-85.0]
TOTAL	30552	66.0	[56.0-78.0]
eGFR (ml/min)			
GENDER	**COUNT**	**MEDIAN**	**IQR**
WOMEN	297	60.0	[52.0-82.0]
MEN	452	74.0	[56.0-84.0]
TOTAL	749	69.0	[55.0-84.0]
Vitamin D			
DihydroxyVitamin D Total (ng/ml)			
GENDER	**COUNT**	**MEDIAN**	**IQR**
WOMEN	15237	19.0	[13.0-27.0]
MEN	15143	16.0	[12.0-24.0]
TOTAL	30380	18.0	[12.0-25.0]

Table 6 Biomarker Data



Qatar Biobank Cohort Follow Up Visit

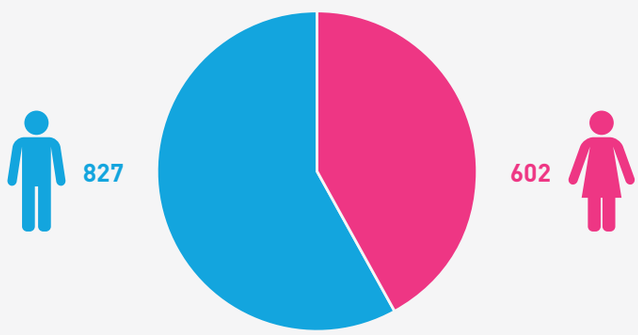


Figure 29 Qatar Biobank Cohort Follow Up Visit by Gender

Follow up visits are offered to participants who completed their baseline visit over 5 years ago. To date 1429 participants have returned to complete their 5 years follow up visit.

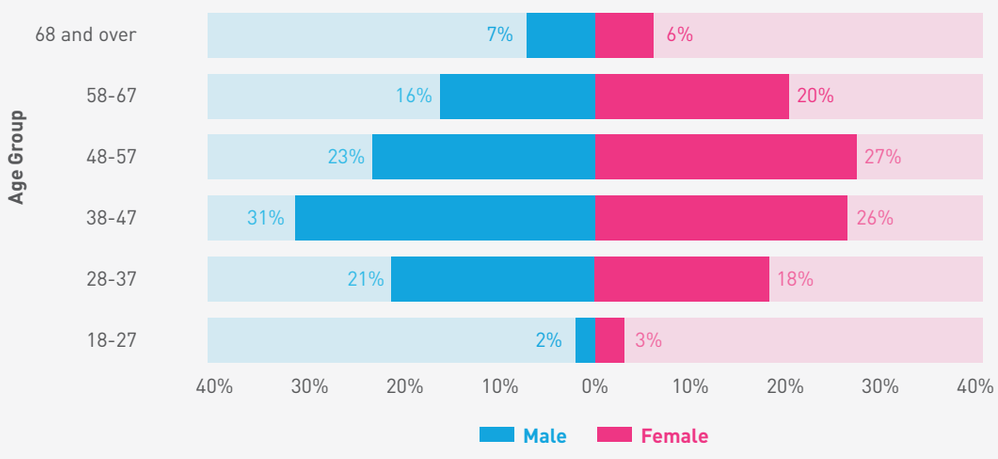


Figure 30 Qatar Biobank Cohort Follow Up Visit Age Distribution

35% (n=514) of follow up participants are from the 38-47 age group followed by 29% (n=422) from the 48-57 group. 58% (n=827) of all follow up participants are men.

Magnetic Resonance Imaging (MRI)

The MRI visit is available to eligible participants in the Cohort, and COVID 19 studies. Participants who have completed their baseline visit and are now eligible for a 5 year follow up visit in the cohort study and participants who have completed their 6 month follow up visits for both COVID 19 disease arm and vaccination arm are offered the opportunity to participate in this visit. The MRI visit consists of cognitive function testing, corneal confocal microscopy, and vibration perception threshold as well as MRI scanning of the brain and whole body. For participants accessing this visit through the COVID 19 Biorepository study some additional questions were introduced related to their infection if applicable and symptoms.

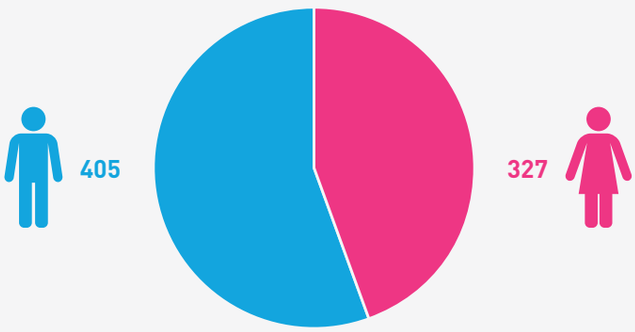


Figure 31 MRI Visits by Gender

A total of 732 MRI vists have been completed for cohort participants .

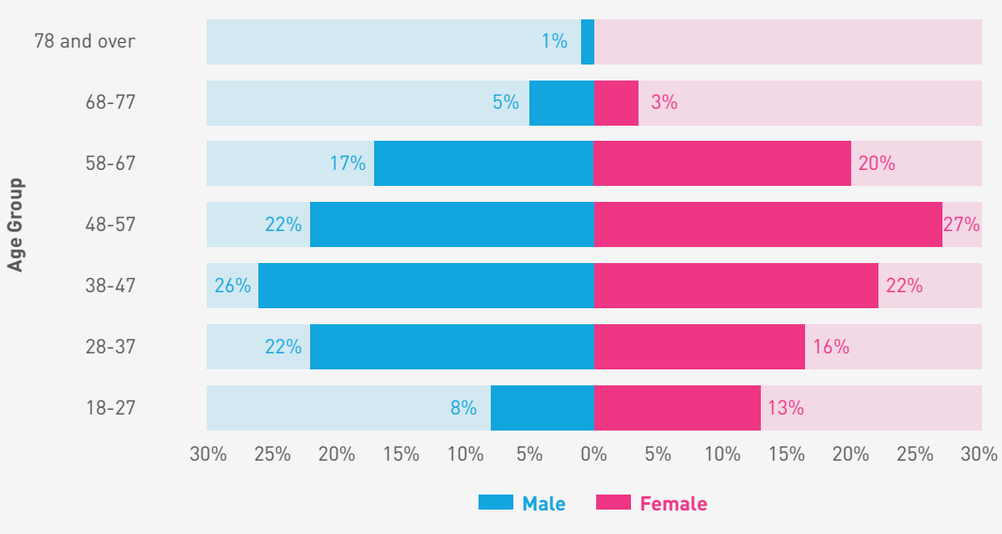


Figure 32 MRI Visits Age Distribution

More men than women have participated in the MRI visit. Most men who attended were from the age group 38-47,26% (n=99) while for females it was 48-57 age group with 27% (n=. 91).

The MRI screening has 2 sequences a whole body sequence and a brain sequence. Medical referrals are available for both sequences if a finding requiring further investigation is identified.

Qatar Biobank Cohort Medical Referrals

Qatar Biobank has agreements with Hamad Medical Corporation (HMC) and the Primary Health Care Corporation (PHCC) to accept medical referrals for further investigations for participants whose findings show results out with normal reference ranges. In addition to the internal medicine clinic at Hamad General Hospital a new clinic for obesity has opened and accepts referrals from our visit findings. Participants can also choose to take the referral to their own doctor if they do not wish to use the services of the governmental facilities. Qatar Biobank has 4 categories of referral from routine to emergency. Emergency referrals are given on the day of the visit when the abnormal findings are collected and the participant is transferred via ambulance to the general hospital, through to routine referrals where the participant can take the referral to their preferred physician as part of a routine booking.

Referral Reason	Number Of Referrals (n=21221)	%
Osteopenia	7635	36
Dyslipidaemia	3136	15
Diabetes Mellitus	2528	12
Thyroid Function Tests TFTs	2205	10
Osteoporosis	1102	5
Liver Function Tests LFTs	732	3
Anaemia	609	3
Abnormal ECG	442	2
BMI >= 40	391	2
Abnormal CBC	339	2
High CK	305	1
Renal function tests RFTs	263	1
Heigh Blood Pressure	251	1
Abnormal Sex Hormones	250	1
High Pro BNP	153	1
Abnormal Immunology	137	1
Pre Diabetes Mellitus	123	1
BMI >= 35 (Qatari)	91	<1
Homocysteine	72	<1
Low Vit D <=5	63	<1
Abnormal Electrolytes	59	<1
Celiec Disease	48	<1
Others	287	1

Table 7 Cohort Population Medical Referrals

From the cohort baseline visit data, a total of 21221 referrals were made with the most common reason identified for osteopenia followed by dyslipidaemia, diabetes, and abnormal thyroid function tests.

Referral Reason	Number Of Referrals (n=1038)	%
Osteopenia	316	30
Dyslipidaemia	136	13
Diabetes Mellitus	117	11
Osteoporosis	73	7
Thyroid function tests TFTs	69	7
Abnormal ECG	44	4
BMI >= 40	44	4
Abnormal CBC	33	3
Abnormal Sex Hormones	32	3
Liver function tests LFTs	28	3
Anaemia	19	2
High Pro BNP	19	2
Renal function tests RFTs	18	2
Abnormal Immunology	16	2
Pre Diabetes Mellitus	13	1
High CK	12	1
Low Vit D <=5	10	1
BMI >= 35	8	1
High Pro BNP	7	1
Abnormal Electrolytes	5	0.5
Homocysteine	5	0.5
Celiac Disease	1	0.1
Others	13	1

Table 8 Cohort 5 Year Followup Referrals

The cohort 5 year follow up data shows that a total of 1038 referrals were made with Osteopenia followed by dyslipidaemia; diabetes remains the most common reasons for medical referrals.

Referral Reason	Number Of Referrals	%
Abnormal WB MRI-Liver	91	23
Abnormal WB MRI-Kidneys	32	8
Abnormal WB MRI-Uterus	32	8
Abnormal WB MRI-Thyroid	29	7
Abnormal WB MRI-Gallbladder	24	6
Abnormal WB MRI-Ovaries	16	4
Abnormal WB MRI-Lungs	12	3
Abnormal WB MRI-Pancreas	10	2.5
Abnormal WB MRI-Prostrate	10	2.5
Abnormal WB MRI-Adrenals	9	2
Abnormal WB MRI-Bowel	6	1
Abnormal WB MRI-Spleen	6	1
Abnormal WB MRI-Mesenteric	5	1
Abnormal WB MRI-Testicles	4	1
Abnormal WB MRI-Abdominal wall	2	0.5
Abnormal WB MRI-Knees	2	0.5
Abnormal WB MRI-Urinary Bladder	1	0.2
Abnormal WB MRI/Others	41	10

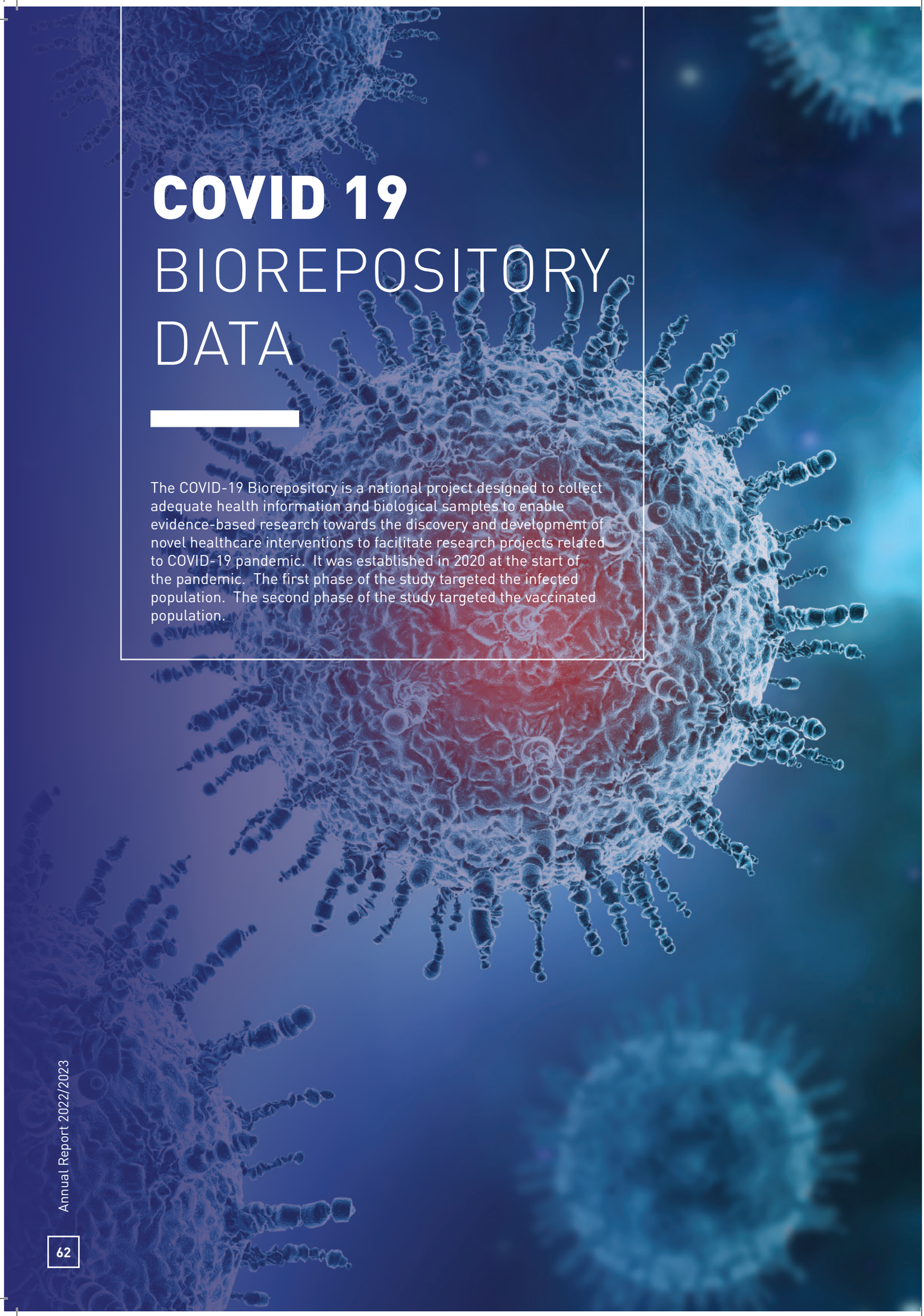
Table 9: MRI Referrals

A total of 405 referrals were made for findings requiring further investigation. 332 were related to whole body scans with abnormal liver (n=91) being the most common referral followed by kidney and uterus both with 32 referrals each.

Referral Reason	Number Of Referrals	%
Cerebral White Mater changes including Ischaemia	39	53
Mass/Lesion	6	8
Intracranial HTN	3	4
Pituitary Abnormality	2	3
Cavernoma	2	3
Meningioma	1	1
Haemorrhage	1	1
Multiple sclerosis	3	4
Other	16	22
Total	73	

Table 10 MRI Brain Referrals

A total of 73 brain MRI referrals were made with 39 referrals for cerebral white mater changes including ischaemia, followed by mass/lesion with 6 referrals.



COVID 19 BIOREPOSITORY DATA

The COVID-19 Biorepository is a national project designed to collect adequate health information and biological samples to enable evidence-based research towards the discovery and development of novel healthcare interventions to facilitate research projects related to COVID-19 pandemic. It was established in 2020 at the start of the pandemic. The first phase of the study targeted the infected population. The second phase of the study targeted the vaccinated population.

COVID 19 Disease Arm

The first phase of the COVID 19 Disease Arm study recruited participants from COVID treatment and isolation sites, who had a laboratory confirmed diagnosis of COVID 19 and were residents in the State of Qatar. Their health status was monitored during their treatment phase and then for 1 year post infection.

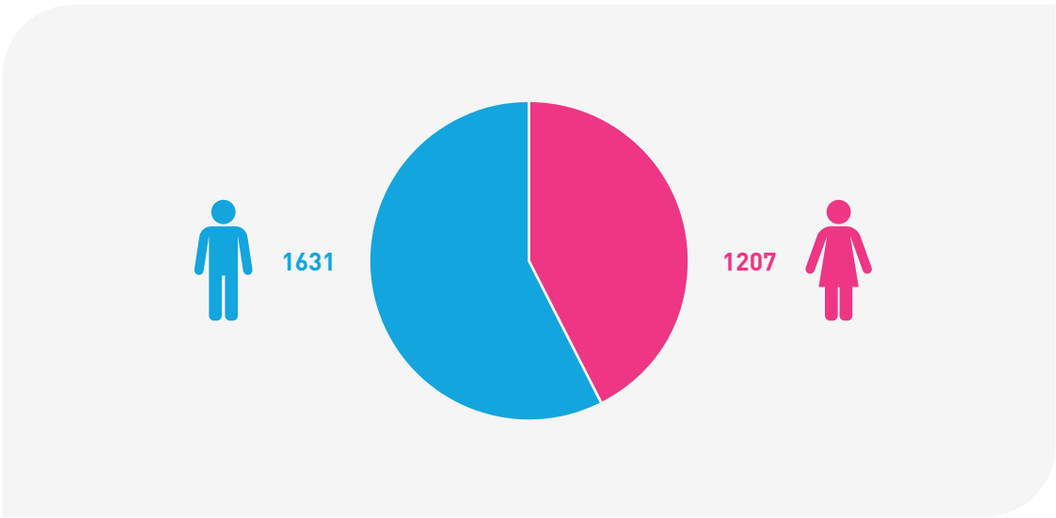


Figure 33 Covid 19 Disease Arm Recruitment by Gender

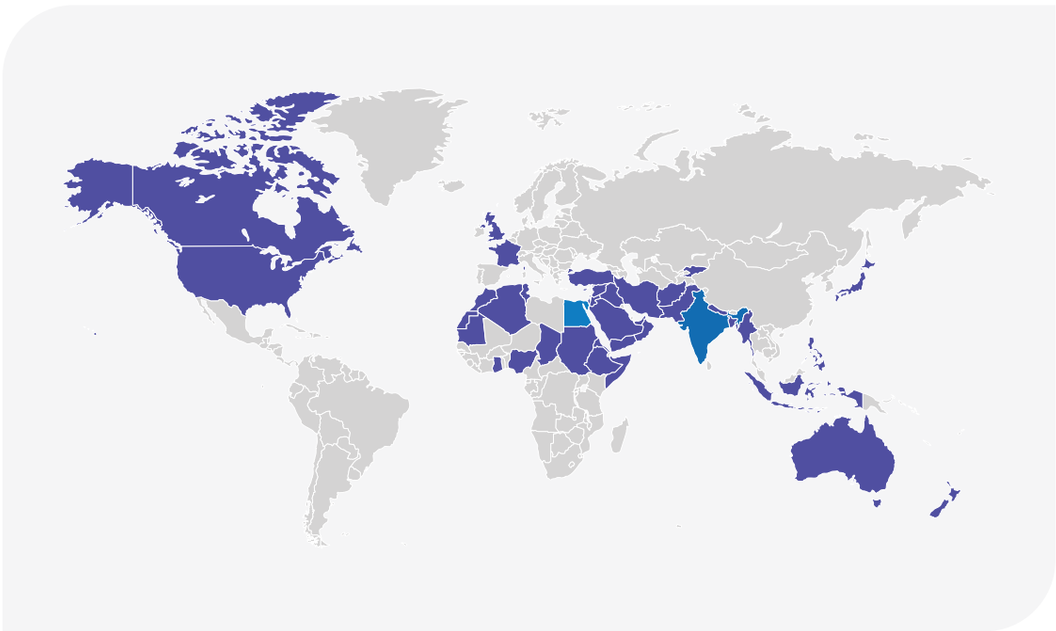


Figure 34 COVID 19 Recruitment by Nationality

Nationality	Total Count	%	Nationality	Total Count	%
Qatar	**1,105**	39	Ethiopia	**6**	0.2
India	**380**	13	Indonesia	**6**	0.2
Philippines	**257**	9	Afghanistan	**4**	0.1
Nepal	**173**	6	Canada	**4**	0.1
Bangladesh	**170**	6	United Kingdom	**4**	0.1
Pakistan	**134**	5	Greece	**3**	0.1
Egypt	**110**	4	Kuwait	**3**	0.1
Sudan	**72**	2	Eritrea	**2**	0.1
Sri Lanka	**60**	2	Morocco	**2**	0.1
Yemen	**50**	2	Nigeria	**2**	0.1
Jordan	**43**	2	Turkey	**2**	0.1
Syria	**42**	1	Algeria	**1**	<0.1
Iran	**40**	1	Australia	**1**	<0.1
Palestine	**38**	1	Belgium	**1**	<0.1
Saudi Arabia	**26**	1	Chad	**1**	<0.1
Iraq	**10**	0.4	Fiji	**1**	<0.1
Kenya	**10**	0.4	France	**1**	<0.1
Oman	**10**	0.4	Ghana	**1**	<0.1
Cuba	**9**	0.3	Kyrgyzstan	**1**	<0.1
Lebanon	**9**	0.3	Malaysia	**1**	<0.1
United States	**9**	0.3	Mauritania	**1**	<0.1
Tunisia	**8**	0.3	Myanmar	**1**	<0.1
United Arab Emirates	**8**	0.3	Portugal	**1**	<0.1
Somalia	**7**	0.2	Puerto Rico	**1**	<0.1
Bahrain	**6**	0.2	Uganda	**1**	<0.1

Table 11 COVID 19 Disease Arm Recruitment by Nationality

Most participants recruited 39% (n=1105) of participants were registered as Qatari nationals followed by Indian nationals with 13% (n=380).

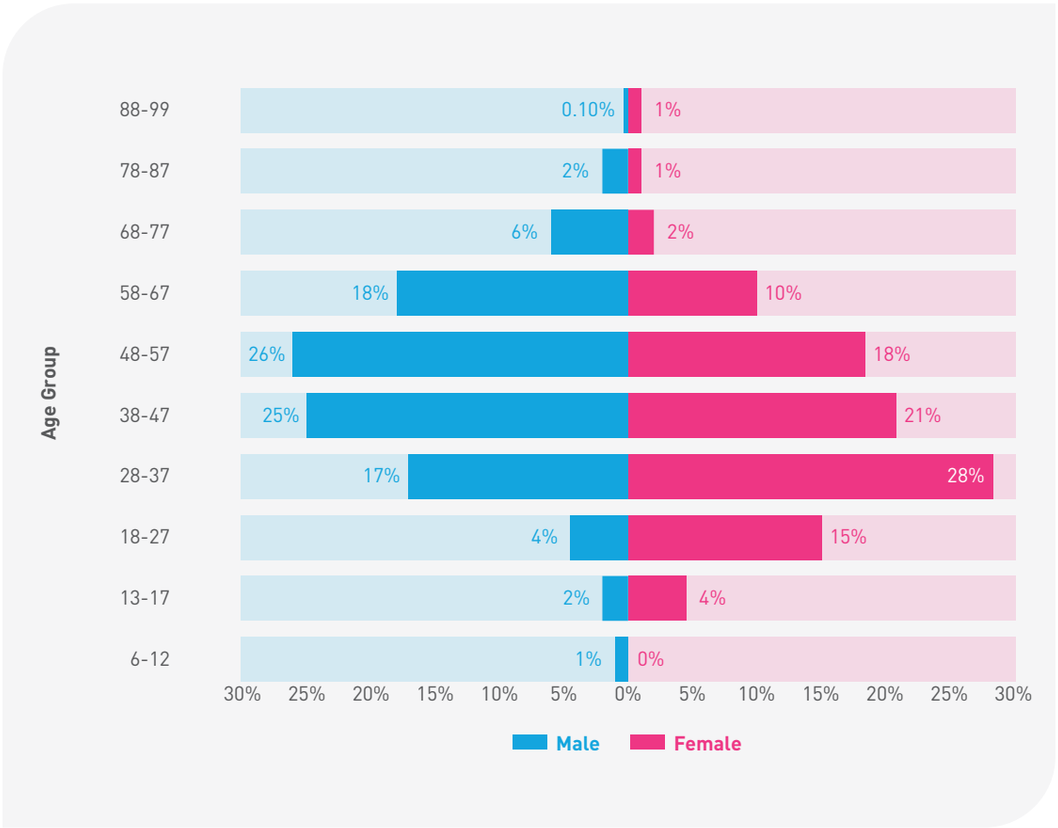


Figure 35 COVID 19 Disease Recruitment Age Distribution

While children were eligible to be recruited into the study only 3% (n=87) participants under the age of 18 were included. 24% (n=670) participants were recruited from the 38-47 age group, closely followed by 22% (n=636) from the 48-57 age group. Overall, more men (n=1631) were recruited than women (n=1207).

The study was designed to recruit participant from treatment sites and then follow their recovery at intervals at Qatar Biobank. The 3rd and 6th month follow up visits were 3 hour visits that followed the structure of a cohort visit. At 6 month visits eligible participants were offered the opportunity to complete an MRI visit.

Visit	Total Count	FEMALE	MALE
1 Month	722	335	387
3 Month	674	269	405
6 Month	123	56	67
9 Month	58	19	39
12 Month	137	61	76

Table 12: COVID 19 Disease Arm Follow Up Rate

From 2838 positive cases recruited initially 1714 follow up visits were conducted as shown in table 13

Symptom	Total Count	%
Cough	1672	59
Fever	1623	57
Fatigue	1627	57
Headache	1497	53
Muscle ache	1499	53
Loss of sense of smell/taste	1216	43
Sore throat	1126	40
Shortness of breath	1103	39
Chills	998	35
Runny nose	759	27
Chest pain	754	27
Nausea/vomiting	761	27
Wheezing	315	11
Other respiratory symptoms	146	5

Table 13 COVID 19 Disease Arm Self Reported Symptoms

Participants were asked to list their symptoms from a list and more than one option was available. The most common symptoms reported were cough with 59%, fever and fatigue with 57%, closely followed by headache and muscle ache at 53% each.

COVID 19 Disease Arm Medical Referrals

A total of 1892 medical referrals were made for participants in the COVID 19 disease arm

Referral Reason	Number of Referrals	%
Diabetes	434	23
Dyslipidaemia	241	13
Thyroid function tests TFTs	184	10
Osteopenia	138	7
Liver function tests LFTs	133	7
Abnormal Sex Hormones	119	6
Abnormal CBC	101	5
Renal function tests RFTs	94	5
Anaemia	88	5
High Pro BNP	56	3

Referral Reason	Number of Referrals	%
Abnormal Electrolytes	37	2
Abnormal ECG	31	2
Abnormal Immunology	28	1.5
Heigh Blood Pressure	19	1
BMI ⩾ 40	18	1
High CK	17	0.9
Osteoporosis	14	0.7
Homocysteine	7	0.4
Celiec Disease	5	0.3
Low Vit D ⩽5	4	0.2
Diabetes Mellitus (Pregnant)	2	0.1
Others	57	3

Table 14 COVID 19 Disease Arm Medical Referrals

23% (n=434) of referrals were made for diabetes, with a further 13% (n=241) for dyslipidaemia.

COVID 19 participants at their 6 month visit if eligible can participate in the MRI scanning and a total of 65.

Referral Reason	Number of Referrals	%
Abnormal WB MRI-Liver	25	1.3
Abnormal WB MRI-Kidneys	5	0.3
Abnormal WB MRI-Gallbladder	3	0.2
Abnormal WB MRI-Lungs	3	0.2
Abnormal WB MRI-Ovaries	3	0.2
Abnormal WB MRI-Uterus	3	0.2
Abnormal WB MRI-Adrenals	2	0.1
Abnormal WB MRI-Pancreas	2	0.1
Abnormal WB MRI-Prostrate	1	0.1
Abnormal WB MRI-Thyroid	1	0.1
Abnormal WB MRI/Others	7	0.4
Abnormal Brain MRI	10	0.5

Table 15: Covid 19 Disease Arm MRI Referrals

From the whole body sequencing, 25 referrals were made for abnormal liver findings and 10 referrals were made for the brain sequencing. 23% (n=434) of referrals were made for diabetes, with a further 13% (n=241) for dyslipidaemia.

COVID 19 Vaccination Arm

The second phase of the study was established in early 2021 as the national COVID 19 recruitment programme was implemented. The aim of this phase was to recruit participants as they attended the vaccination sites for their first does of vaccines. These participants were then followed as they received their second vaccine dose and then for 1 year.

During the active recruitment phase of the vaccination population, the only eligibility restrictions were that participants must be recruited before they took their first dose of the vaccine and were expected to remain in Qatar for their second dose.

A total of 975 participants were recruited from the different vaccination sites including the drive through sites.

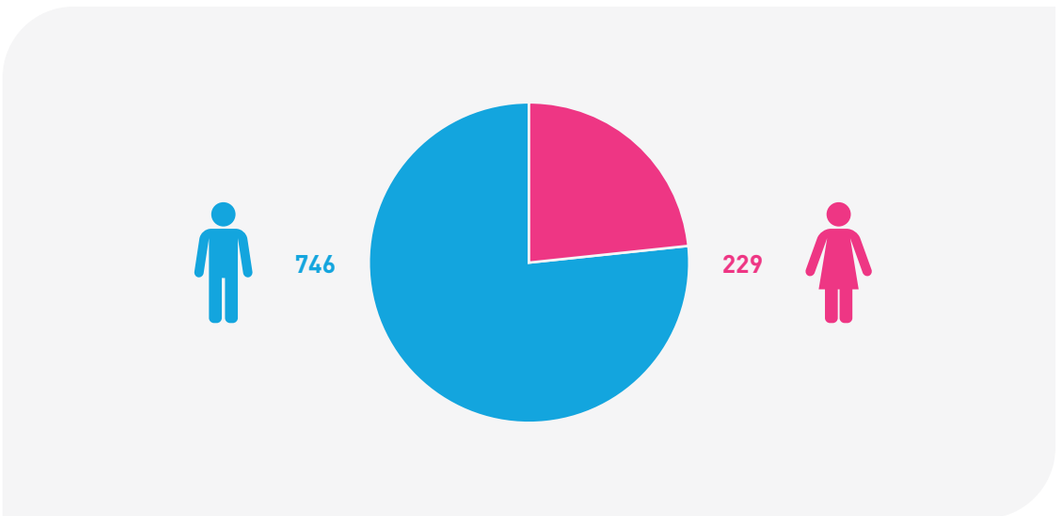


Figure 29 COVID 19 Vaccination Population Recruitment Phase by Gender

Most participants were recorded. Indian nationals 25% (n=239), followed by Bangladeshi 21% (n=206) and Filipino nationals at 15% (n=143).

Nationality	Total Count	%
India	239	25
Bangladesh	206	21
Philippines	143	15
Nepal	87	9
Qatar	66	7
Sri Lanka	46	5
Egypt	29	3
Pakistan	25	3
Sudan	17	2
Jordan	13	1
Ethiopia	11	1
Syria	11	1
Morocco	10	1
Tunisia	9	1
Kenya	8	1
Yemen	8	1
Iran	7	1
Palestine	6	1

Nationality	Total Count	%
Eritrea	5	1
Nigeria	5	1
Uganda	5	1
Lebanon	3	0.3
Ghana	2	0.2
Malaysia	2	0.2
Algeria	1	0.1
Brazil	1	0.1
Cameroon	1	0.1
Canada	1	0.1
Iraq	1	0.1
Myanmar	1	0.1
Oman	1	0.1
Portugal	1	0.1
Saudi Arabia	1	0.1
Somalia	1	0.1
Turkey	1	0.1
Vietnam	1	0.1

Table 16 COVID 19 Vaccination Population Recruitment Phase by Nationality

Follow up Visits

Visit Type Name	Total Count	%	FEMALE	MALE
COVID Vaccine Visit 1	975	100	229	746
COVID Vaccine Visit 2	506	52	112	394
COVID Vaccine-Week 2	154	16	32	122
COVID Vaccine-Month 3	133	14	27	106

Table 17 COVID 19 Vaccine Visits

Visit 1 refers to the recruitment before the first dose at the vaccination site, visit 2 refers to the 2nd vaccination dose and visit week 2 refers to a follow up visit at Qatar Biobank after the 2nd vaccination dose has been administered.

Self Reported Symptoms

Participants are asked if they had any adverse reaction to the vaccination in 4 categories, site specific, systemic, allergic reaction, or COVID-19 adverse events of special interest after the vaccine. Participants are asked to select symptoms from a list provided as well as to record whether they required medical consultation, hospital, or emergency care. Multiple symptoms can be selected.

Adverse Events	Post 1st Dose	Post 2nd Dose
Systemic fever	57	46
Rash	2	3
Nodule	2	0
Itching, Fever, Hematoma	1	0
Cellulitis	0	1
Pain, Redness, Swelling	369	130
Redness, Swelling, lasting 4 days	7	1
Severe Vomiting Diarrhea	1	0
Other systemic events	17	22
Other adverse events	12	6

Table 18 Adverse Events recorded

Participants are asked to record any reactions as part of their vaccination. Most recorded adverse reaction was pain, redness and swelling at the injection site which lasted less than 4 days with a total of 499 reactions recorded 369 after the first dose and 130 reported after the second dose.

Adverse Events	Post 1st Dose	Post 2nd Dose
Medical Consultation	0	3
Emergency Department	0	2
Hospital Admission	0	1

Table 19 Medical Care received post COVID 19 vaccinations.

Vaccination study participants are also asked if they have previously tested positive for COVID 19, and if they did what symptoms they experienced. They can select multiple symptoms from the list below.

Symptoms	Count	%
Fever	74	8
Chills	40	4
Fatigue	58	6
Muscle ache	54	6
Sore throat	46	5
Cough	57	6
Runny nose	32	3
Shortness of breath	29	3
Loss of sense	56	6
Wheezing	11	1
Chest pain	18	2
Headache	49	5
Nausea vomiting	19	2
Other respiratory symptoms	4	0.4
Hospitalization	31	3
Symptomatic COVID 19	100	10

Table 20 COVID Vaccination Participants Symptoms Reported

The most reported symptoms were fever followed by fatigue and coughs.

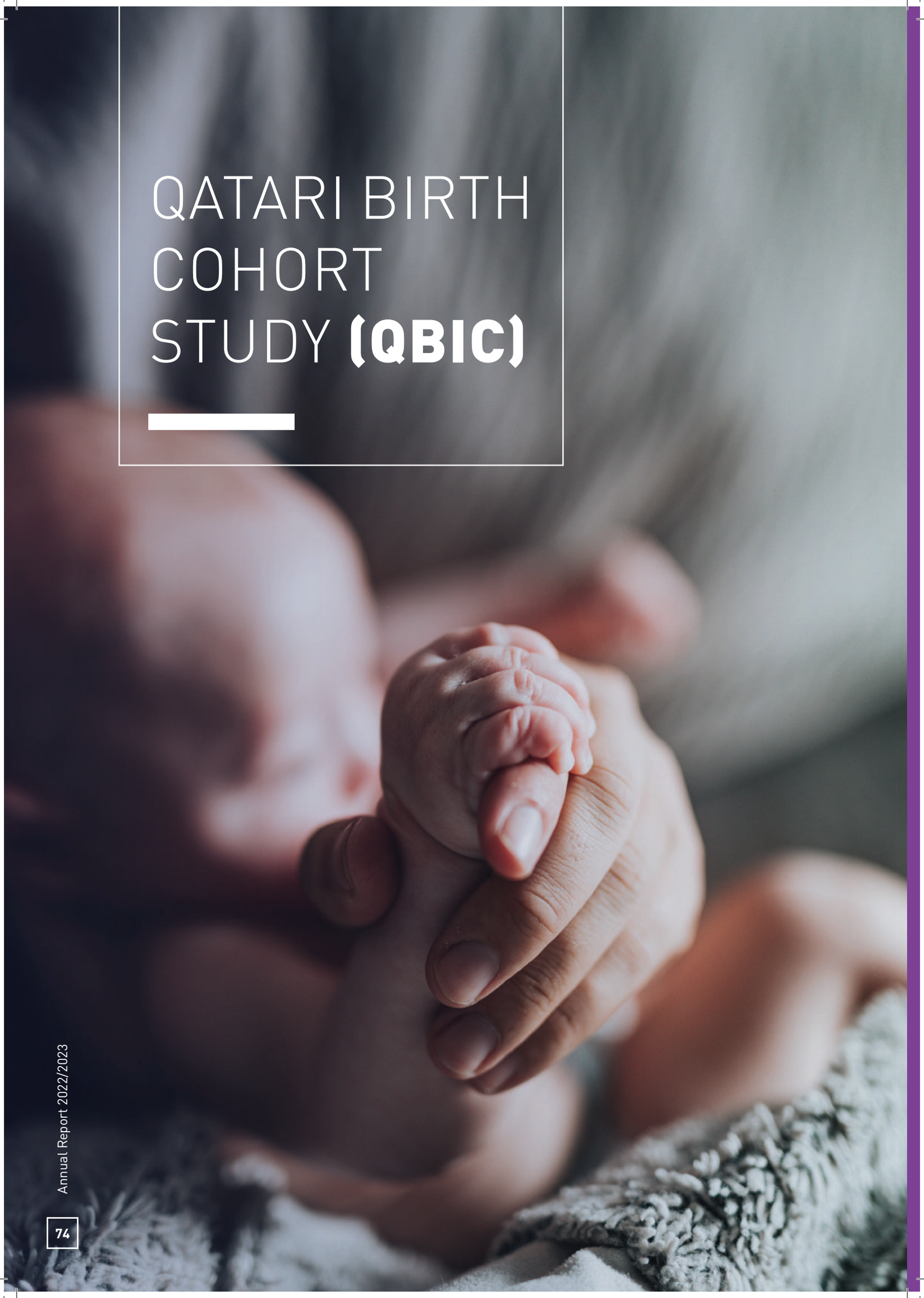
The COVID 19 biorepository is currently not recruiting new participants for either the disease or vaccination arm, however the infrastructure remains in place in the event we should have to revisit this study in the future.

Referral Reason	Number of Referrals (n=37)
Abnormal CBC	19
Anaemia	15
Dyslipidaemia	1
Heigh Blood Pressure	1
Liver function tests	1

Table 21 COVID 19 Vaccination Arm Medical Referrals

A total of 37 referrals were made from the data collected from the COVID 19 vaccination arm participants. 19 referrals were made for abnormal CBC results and a further 15 for anaemia.

QATARI BIRTH COHORT STUDY **(QBIC)**



The Qatari Birth Cohort Study is one of the first mother-childbirth cohort studies and the only environmental birth cohort study in the Middle East. It is one of Qatar Foundation's precision medicine projects. The main aim of the study is to assess the synergistic role of environmental exposure and gene variation on maternal and childhood health. We are interested in chronic diseases such as diabetes, cardiovascular disease, hypertension, and mental illness, which are more prevalent among Qataris than in the rest of the world.

The goal is to recruit 3,000 pregnant women along with their families. During the initial time point at 12–15 weeks of pregnancy, the women complete a 3-hour visit to the Qatar Biobank, during which they undergo a comprehensive clinical assessment, including having blood and other biological samples collected and completing several questionnaires about various aspects of their lifestyle. The women are followed up again in their third trimester and at delivery. The children are assessed at 1 month, 6 months, 1 year, 2 years, and 4 years. Fathers are also invited to participate.

The data collected from this large study sample will allow researchers to address a broad range of hypotheses. The environmental protocols that have been set up to understand gene-environment interactions associated with health impact make this study unique as there are no birth studies that have done this before in the region.

In the last twenty years, birth cohort studies research has gained high recognition in Europe, United States, Canada, and Australia with numerous cohorts being established in these countries. Limited number of birth cohort studies in the Middle East. In a region that shares a set of unique characteristics in terms of landscape, climate, population, culture, lifestyle, and economics. QBiC study is an excellent opportunity to address a broad range of research questions tailored to the Arab population in terms of lifestyle, the climate, the social exposures, type of food eaten—there are lots of environmental differences between the Middle East and the Western world.

The QBiC study was paused for 2 years due to the COVID-19 outbreak in Qatar but has now resumed participant recruitment and follow up activities. The study recruits Qataris and long-term residents who have lived in Qatar for 15 years or longer. As of the second (2nd) quarter of 2022 we have recruited a total of 416 participants: pregnant women 79%, (n=328) and their husbands at 21% (n=88).

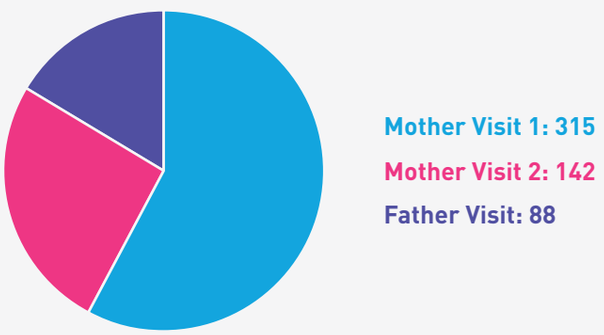


Figure 38 QBiC Population by Visit Type

To date 142 women have completed their Mother Visit 2 which takes place during the 3rd trimester. The recruited fathers are welcome to complete their visit at any point during the pregnancy.

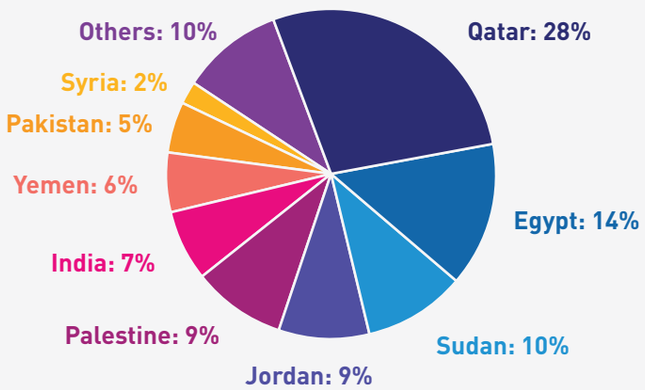


Figure 39 Recruitment by Nationality Groups

Qataris represent the 28% (n=119) of the recruited population while 54% are other Arabs nationalities and 17% are Other Non-Arab nationalities.

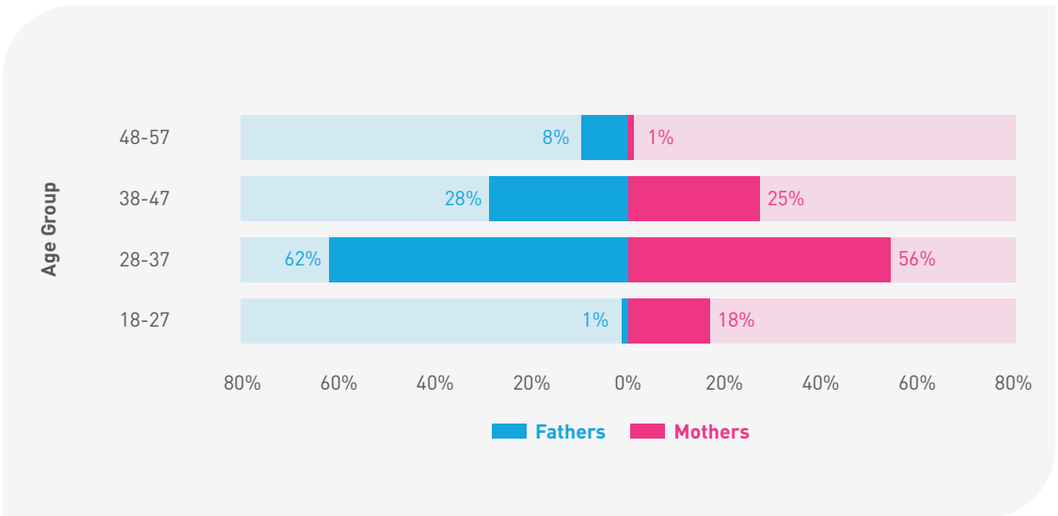


Figure 40 QBiC Recruitment by Age

The average age of the population is 31.5 years.

The QBiC study gathers information through a series of research assistant lead interviews. Despite the relatively young age of QBiC population we have observed that pregnant women are suffering from diabetes (gestational diabetes, 30%; diabetes 3%), and Thyroid disfunction 19%.

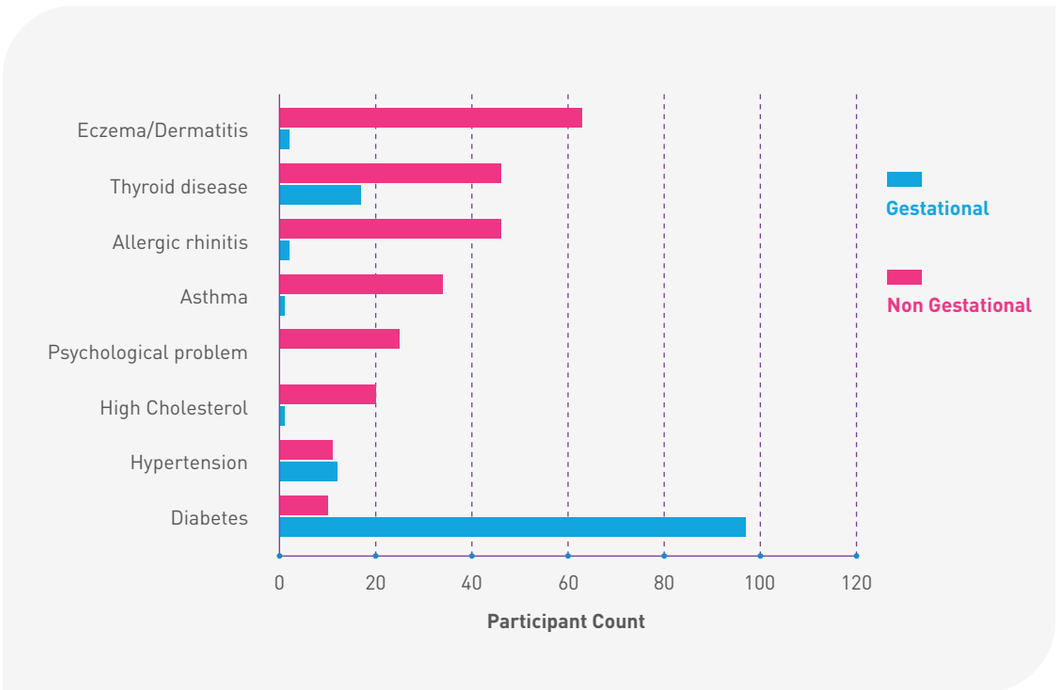


Figure 41 Maternal Most Common Medical Conditions

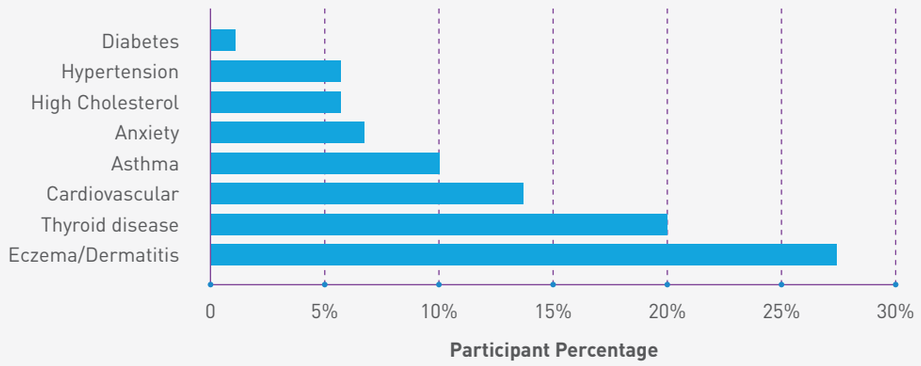


Figure 42 Self Reported Medical Conditions by Fathers

The fathers most common medical conditions are eczema/dermatitis, thyroid disease, and cardiovascular disease.

QBiC Medical Referral Data

A total of 210 medical referrals were made from the QBiC data collected which includes referrals for mothers and fathers.

Referral Reason	Number Of Referrals	%
Dyslipidaemia	59	28
Diabetes Mellitus (Pregnant)	51	24
Thyroid Function Tests TFTs (Pregnant)	21	10
Anaemia	20	10
Osteopenia	12	6
Abnormal CBC	9	4
Liver function tests LFTs	8	4
Thyroid function tests TFTs	5	2
Abnormal Sex Hormones	4	2
Low Vit D <=5	4	2
Abnormal ECG	3	1
Osteoporosis	3	1
Diabetes Mellitus	2	1
Abnormal Electrolytes	1	0.5
Abnormal Immunology	1	0.5
High CK	1	0.5
Renal function tests RFTs	1	0.5
Others	5	2

Table 22 Percentage of Mother and Father Referrals

Dyslipidaemia was the most common referral made (n=59) followed be referrals for diabetes (n=51), and abnormal thryroid function tests (n=21) for pregnant females.

QATAR **BIOBANK RESEARCH** SAMPLES AVAILABLE

Biological samples are collected from participants for all studies. Table 23 lists the samples available for research purposes. Qatar Biobank has liquid nitrogen storage facilities as well as -80 degree freezer storage.

SPECIMEN TYPE NAME

- Buffy Coat
- DNA
- Erythrocytes
- Nasopharyngeal secretions
- PAXgene Whole Blood
- Plasma
- RNA
- Saliva
- Saliva + RNA Later
- Serum
- Urine
- Viable Cells

Table 23 samples available for all Qatar Biobank studies.

Further information about all the samples held by Qatar Biobank can be found by contacting our research access office at **qbbresearch@qf.org.qa**

QATAR **GENOME**

Increasing the awareness of the work of Qatar Genome has been very successful in 2022. A series of workshops were developed for secondary school biology teachers and biology supervisors in the Ministry of Education and Higher Education, entitled "Precision Medicine and Genomics". The aim of the workshops is to increase teachers' knowledge of sciences related to precision medicine, with over 50 local schools participating. In addition to the workshops, we are part of the Empowering Generations consortium which is an internship consortium from Qatar University that gives high school students in grades 11 and 12, the opportunity to learn more about our work through the Genomics and Precision medicine track and guide students on study and career choices in precision medicine.

Another projected for younger school children was piloted with Qatar Academy, Doha, 30 students from grades 3 and 4, were involved in an exercise to test check "Genome Heroes" a new game, developed to take children on a journey to learn about DNA and provide feedback and suggestions.

In 2020 Qatar Genome and Qatar Biobank developed a genomic wellness and lifestyle report which would be delivered to Qatar Biobank Cohort participants by our genomic counsellor. In 2022 the pilot phase was completed successfully with a satisfaction rate of more than 94% among the study respondents.

Qatar Genome and Qatar Biobank in collaboration with National Center for Cancer Care & Research identified eight participants carrying BRACA mutations. The participants have been referred to the NCCCR for further investigations.

We have also undertaken the initiative to establish clinical implementation of pharmacogenomics that aims to develop a process to perform pharmacogenetic testing and use the results in routine clinical care according to the latest clinical guidelines and therapeutic recommendations.

Memorandum of Understandings were signed with the Primary Health Care Corporation to collaborate in delivering genome related services through the Smart Health Screening and the Wellness Program. Qatar Genome and the Smart Health Screening have recruited 100 samples to investigate the risk of non-communicable diseases among Qatari adults.

Qatar Genome and the Wellness Program established the necessary pipelines to deliver genomic wellness and lifestyle reports to the patients attending the PHCC wellness clinic.

As Qatar Genome will become part of the Qatar Precision Health Institute in 2023 a Memorandum of Understanding has been signed with Thermo Fisher to advance research and development projects.

To date whole genome sequencing reached 32,400 samples.

The 5th cycle of the Path towards Precision Medicine (PPM) which is a grant scheme to support and advance research that aims to guide healthcare decisions toward the most effective prevention, diagnosis and/or treatment for a given patient based on their genetic profile, the awards are completed for the 5th cycle, with 4 winning proposals

Qatar Genome presented a keynote speech at the Festival of Genomics – for the 5th year in a row, to discuss the role of leading nations in genomics.

Implementation of the QChip2PM as a diagnostic tool in collaboration with Hamad Medical Corporation

Design of the first Pan-Arab array and its reference panel for establishing large genome-wide association studies in the region

Qatar Genome and Qatar Biobank contributed to The Flagship paper of the Global Biobank Meta-analysis Initiative (GBMI) which was published in the prestigious journal Cell Genomics in October 2022. GBMI is a collaborative network of 24 biobanks from 4 continents representing >2.2 million participants. Qatar is the first country from MENA and West Asia representing the Arab Middle Eastern Ancestry along with five other major ancestries increasing thus the sample diversity and representativeness leading to higher discovery power." https://www.cell.com/cell-genomics/fulltext/S2666-979X(22)00141-0#%20

The Qatar Genome Program Research Consortium (QGPRC) has published 9 publications in 2022 in prestigious journals. The consortium researchers, affiliated within several institutions and universities in Qatar and their international collaborators, have worked on cancer, familial hypercholesterolemia, hearing loss as well projects that constitute the groundwork to understand the landscape of genetic variation related to health and disease of the Qatari population.

THE **FUTURE**

The future continues to look very promising for Qatar Biobank, with an expanding scope of service and a growing team we hope to expand into a second building which will allow for our existing building to cover all the operations allowing for more participants to be recruited and given feedback with all administration activities in the neighbouring new facility.

In April 2023, The Qatar Precision Health Institute will be launched which will house Qatar Biobank and Qatar Genome to support the advancement of Precision medicine and precision medicine research initiatives in Qatar and regionally. This is an exciting milestone that will contribute to the development of new diagnostic tools and treatment options.

In February 2023 we will present in collaboration with the International Hundred Thousand Cohort Consortium (IHCC) a series of webinars about building a biobank and showcase Qatar Biobank from conception until today as we celebrate our 10 year anniversary. We are very much looking forward to sharing our experiences, successes, and challenges that has elevated the reputation of Qatar Biobank on an international level as well as the recognition we have received from our industry peers.

We continue to develop our information systems with a new phase of our inhouse developed laboratory management system due to be released in early 2023 and we will hopefully implement a new learning management system to help streamline the learning and competency framework for our staff.

We are continuing to expand the scope of the imaging service with the introduction of thyroid scanning in addition to the carotid ultrasound scanning currently performed.

We will continue the recertification and accreditation cycle for our integrated management system and our CAP accredited laboratory.

We hope to have our 3rd International Biobanking conference, and we hope to offer this later in 2023, with another exciting line up of international and local industry experts.

It seems 2023 is going to be another busy year with lots of exciting things to look forward to, but we hope to welcome many friends back to Qatar to help us celebrate the future of Qatar Biobank.