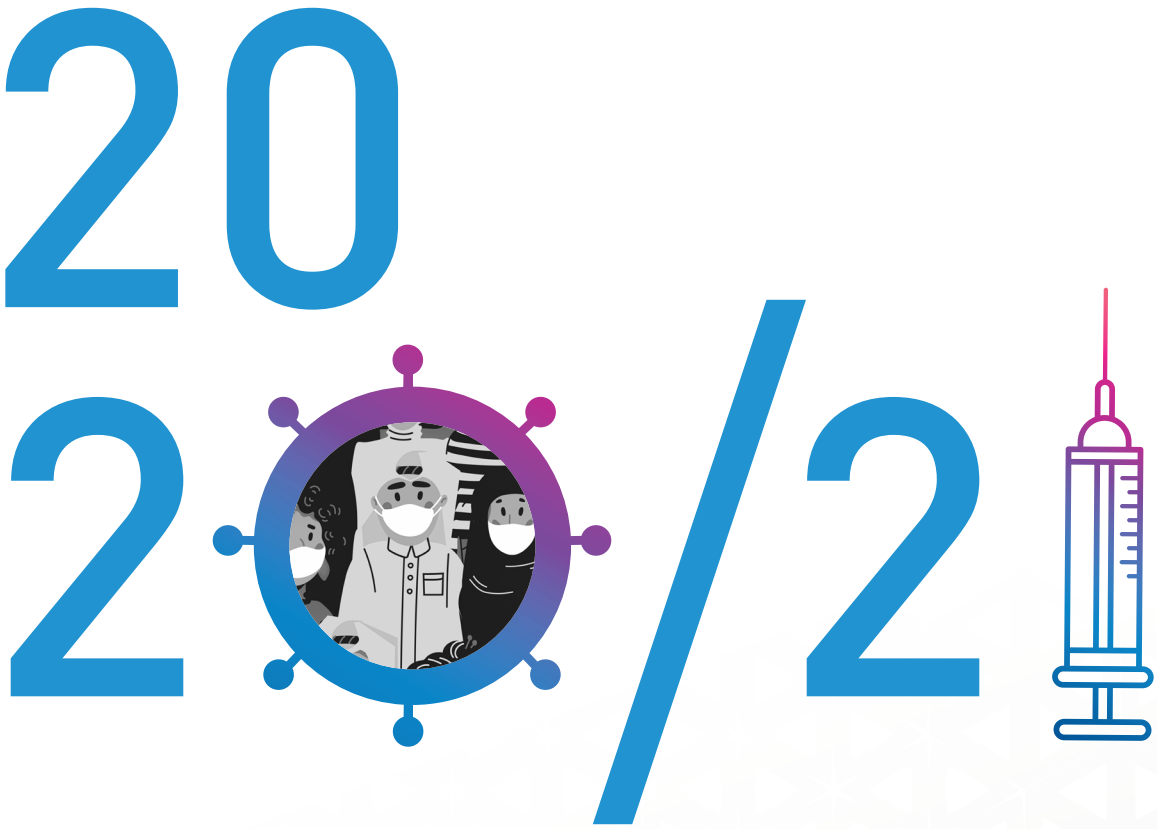
قطر بيوبنك
qatarbiobank
for medical research للبحوث الطبية
عضو في مؤسسة قطر
Member of Qatar Foundation



BIOBANK
REPORT 2020/2021

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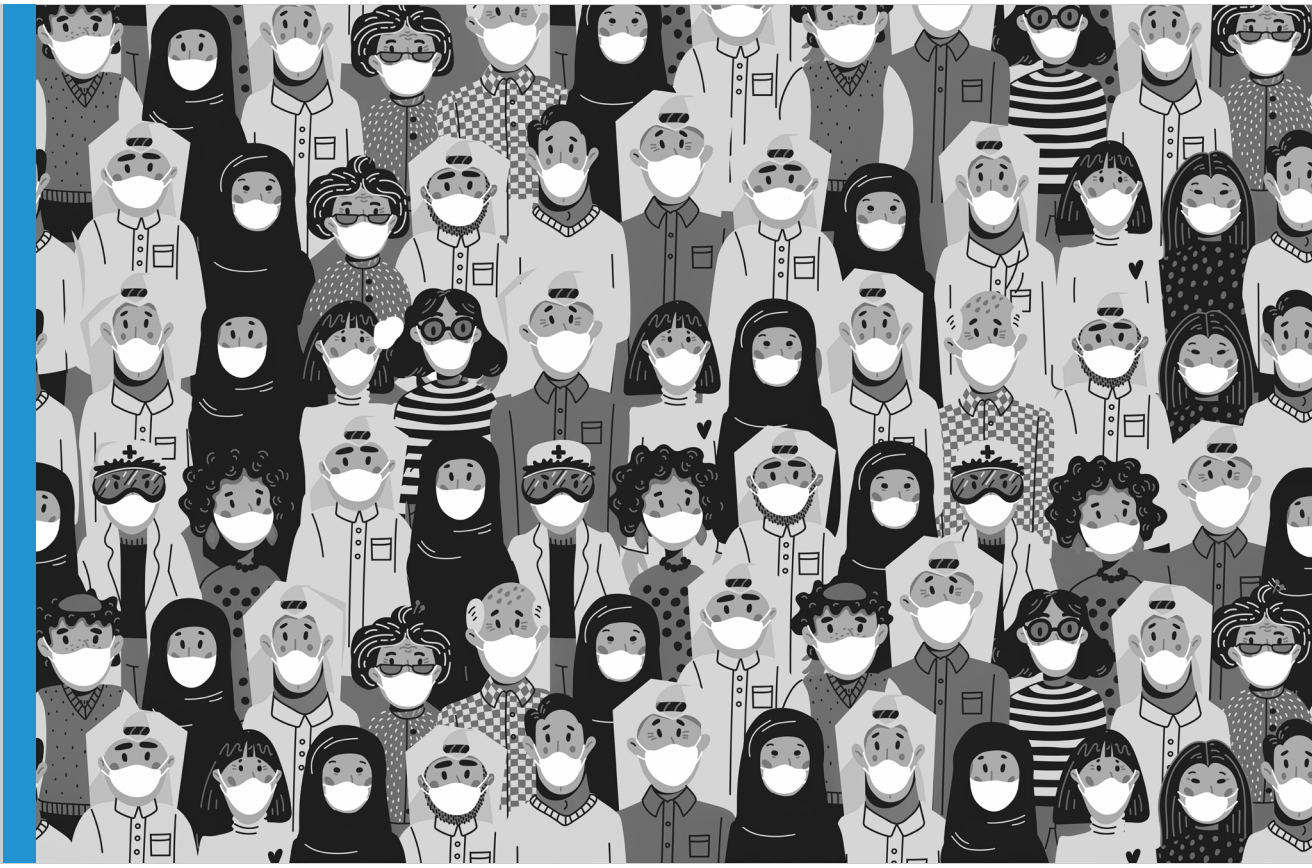

BIOBANK
REPORT 2020/2021

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LETTERS FROM OUR LEADERS

DR RICHARD O 'KENNEDY

Vice Principle of Research, Development and Innovation at Qatar Foundation (QF RDI)

Qatar Foundation Research, Development and Innovation (QF RDI) aims to place Qatar at the forefront of scientific research and innovation while producing sustainable solutions to national and global challenges. Qatar Biobank (QBB) has a crucial role in achieving this goal and building more adaptable and sustainable healthcare solutions.

QBB has made significant contributions to the local and international biomedical community by enabling vital medical research on prevalent health issues in Qatar and the region using the data it has collected. Its collaboration with Qatar Genome Program is advancing genomics research and precision medicine in Qatar, which can significantly enhance risk assessment, detection, and treatment of diseases.

These advances create opportunities for governments and policymakers to develop consumer-centered healthcare programs focused on wellness and prevention. This new way of delivering healthcare can help curb costs for both individuals and healthcare systems, and thus builds healthier societies with a better quality of life.

DR ASMAA AL THANI

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

Qatar Biobank makes vital health research possible through its collection of samples and information on health and lifestyle from large numbers of members of the Qatari population to help the scientists to conduct research and address some of the greatest health challenges facing Qatar and the rest of the world. And the biggest challenge this year was COVID-19. Qatar Biobank as a part of QF-RDI, has collaborated with MOPH, HMC, PHCC and the Virology lab to start a project and collect the necessary samples and data from COVID-19 patients in the State of Qatar with the aim of conducting medical research to study the virus, its impact on the human body and immunity, and help in the discovery of the vaccinations and medications. These samples have been used by Qatar Genome Programme as the first and only active participant from the Middle East in the COVID-19 Host Genetics Initiative to contribute with over 13,000 genomic results and help in studying the role of the human genome in explaining this pandemic's susceptibility and severity.

Qatar Biobank has been, in parallel with their work in the frontlines against Covid-19, re-accredited successfully the two International Organization for Standardization (ISO) certifications by the British Standards Institute Group Middle East (BSI) for Quality Management Systems Standards - ISO 9001 and Information Security Management Systems - ISO 27001. And Qatar Biobank's laboratories, in collaboration with HMC laboratories, has been granted the accreditation of the College of American Pathologists (CAP) which assures the achievement of the highest quality standards in the field of laboratory practices.

And we will continue working at Qatar Biobank to achieve extra-ordinary improvement in diagnostic and prognostic intelligence required to deliver personalized health care for the benefits of people not only in Qatar, but worldwide

PROFESSOR NAHLA AFIFI

Director of Qatar Biobank

We have been collecting samples from patients in Qatar to help in conducting the research required for the researchers to better understand this virus and help them to tailor healthcare and personalized medicines required to fight COVID-19 locally and globally. Samples collection was conducted in collaboration with the MOPH and HMC to recruit COVID-19 patients and with the virology lab to collect the required data about the patients that scientists can benefit from to conduct further tests and research on the virus. We have successfully managed to recruit 2000 participants and do all the required sequencing and analysis of their samples and data.

And despite the tough times the whole globe has been passing through, Qatar Biobank team has been working day and night to keep the achievements on. Hence, Qatar Biobank was re-accredited successfully the two International Organization for Standardization (ISO), ISO 9001 and ISO 27001, as well as the CAP accreditation for our laboratories.

Qatar Biobank will always support the development of a customized genetic screening microarray tailored to the Qatari population that will be used in research as well as for the screening of variants of medical relevance, promoting precision medicine in Qatar's health care system.

QATAR BIOBANK SUPPORTING QUALITY IN RESEARCH

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 over fifty entities.

Qatar Biobank is a member of Qatar Foundation Research, Development and Innovation and is working towards achieving specific initiatives, and priorities within the research, development and innovation national strategy. Through a range of dedicated centres and initiatives Qatar Foundation aims to achieve sustainable and tangible improvements both locally to develop a healthier future for the population of Qatar and internationally.

Qatar Biobank 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, Qatar's long-term medical health initiative, was created to give Qatar's people better chances of avoiding serious illnesses, and to promote better health for our future generations. Qatar's long-term science and research initiatives are supported through the work of Qatar Biobank. Our goals remain aligned with the strategic goals of Qatar Foundation for Research, Development and Innovation to enable quality research in Qatar.

It has now been eight years since Qatar Biobank opened the doors and started welcoming participants. Founded in 2012 in collaboration with the Ministry of Public Health Qatar, Hamad Medical Corporation and scientific support from Imperial College London. Over the years the biobank has seen significant growth, starting with one study, the Qatar Biobank Cohort Study, and approximately 100 participants a month to now having 5 studies nested in Qatar Biobank and over 1,200 participants per month.

Qatar Biobank is contributing to the shape of future health in Qatar at a national level through its contributions to the National Committee for Dementia, the National Committee for Diabetes and Cardiovascular disease and the National Committee for Diabetes.

QATAR BIOBANK

ANNUAL REPORT 2020 / 2021

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.

MEET QATAR BIOBANK TEAMS

PR and Communication Team and Research Access Office

The IT (Information Technology) Team

The Imaging Team

The Clinic Team

The Medical Office
and Imaging Team

The Laboratory Team

THE YEAR IN REVIEW

As we reflect on the year, 2020 has been a very busy and challenging year for the biobank with many highs and lows. The successes of this year would not have been possible without the hard work and dedication of the Qatar Biobank team and the ongoing support from the Qatar Biobank management, our stakeholders and the wider community.

- **The year started** with great intensity and focus as our laboratory department prepared for application for the College of American Pathologists Laboratory Accredited Program.

- **In early March 2020,** the CAP inspectors came to visit Qatar Biobank for the first time. The inspection was a great success with no deficiencies identified and now Qatar Biobank is proud to be part of the CAP laboratory accredited Program. The program is based on rigorous accreditation standards that are translated into detailed and focused checklists of regulatory requirements that laboratories must meet or exceed. The success of the accreditation is due to the unwavering support of the management, laboratory team and the wider internal and external multidisciplinary team who provided invaluable support and expertise.

- Just as we thought we had time to catch our breath and focus on other planned projects for the year the COVID 19 pandemic hit Qatar. We initially started to work from home on the **12th of March 2020** and all operations were paused. This did not last long at Qatar Biobank, the management team started to create a plan for a COVID 19 Biorepository in collaboration with the Ministry of Public Health and several Hamad Medical Corporation entities to help support the national fight against the virus. While this was one of the biggest successes of the year it was also one of the biggest challenges, however as always the talent and versatility of the Qatar Biobank team was evident with the speed at which they were able to adapt to a changing environment and restart sustainable operations to support the local research community in the face of great unknowns as the COVID 19 pandemic took hold in Qatar and across the world.

- **In April 2020,** while adapting to a new virtual way of working and unsure how successful we would be, we conducted our first ever virtual ISO internal audit in preparation for our

2020

ISO recertification external audits in June 2020. The virtual audit proved to be a great success and a very popular way of working.

- **In May 2020** the COVID 19 Biorepository Study was launched with the aim of collecting samples and data from 2,000 COVID 19 positive patients from the designated treatment and isolation sites.

- **In June 2020,** we successfully achieved recertification for our ISO 9001: 2015 Quality Management System and ISO 27001: 2013 Information Security Management System with no nonconformities for either standard identified. This was a great success and again testament to the hard work, dedication and adaptability of Dr Nahla Afifi and the Qatar Biobank team as we navigate these challenging times.

- **Throughout the summer,** all efforts were focused on the new biorepository until October 2020 when national restrictions were eased to a level where we could slowly restart some of our other activities, including the Qatar Biobank cohort study as well as continuing the COVID 19 study activities while maintaining the safety of our staff and participants.

- **Late October** saw the introduction of a new nested study, the Qatar Cardiovascular Biorepository-Atrial Fibrillation study. The study aims to recruit Qatari nationals and middle eastern people who have been diagnosed with Atrial Fibrillation and their relatives.

- **Mid November 2020,** Qatar Biobank participated in the virtual World Innovation Summit For Health (WISH) 2020 in collaboration with our biobanking society colleagues from the European and Middle Eastern Society for Biopreservation and Biobanking (ESBB), the International Society for Biological and Environmental Repositories (ISBER) and the Biobanking and BioMolecular Resources Research Infrastructure (BBMRI ERIC). A panel discussion was presented which focused on Ethical, Legal and Social Implications (ELSI) in research with vulnerable populations. It was a great honour to be part of this prestigious event and the collaboration was a great success.

- **In early December 2020** the long-awaited Participant Recruitment Management System was installed and went live. This bespoke system will revolutionize the way Qatar Biobank is able to interact with our local population, allowing the participants greater freedom of choice for visit appointments and results feedback.

- **December 2020** saw the release of the first version of the new Qatar Biobank online data catalogue. This catalogue aims to help the research community have a better understanding of the data available at Qatar Biobank and how it is collected.


Cryo-
Apron
TEMPSHIELD
Cryo-
Gloves

THE YEAR AHEAD 2021

- **January 2021** will see the launch of a new online researcher portal. The portal will streamline the procedures for query management, requesting information and data, from the Qatar Biobank Research Access Office, to reviewing the data catalogue.

- **March 2021** will see Qatar Biobank in partnership with the European, Middle East and Africa Society for Biopreservation and Biobanking (ESBB) and collaboration from the International Society for Biological and Environmental Repositories (ISBER) and the Biobanking and BioMolecular Resources Research Infrastructure (BBMRI ERIC) host their second International Biobanking conference. Following the great success of the first collaboration in 2019, both organizations were eager to repeat. The conference originally planned to be held in Qatar was moved to a completely virtual event as an ongoing response to the COVID 19 pandemic. The conference titled 'Biobanking for Precision Care; Lessons Learned from Global Crisis will be hosted across 3 days, 8-10th March 2021 and will feature over 40 international and local experts.

- **In April** we hope to expand further and take management of another building to support an ever-growing biobank and fulfil the needs of an increasing number of studies nested under Qatar Biobank

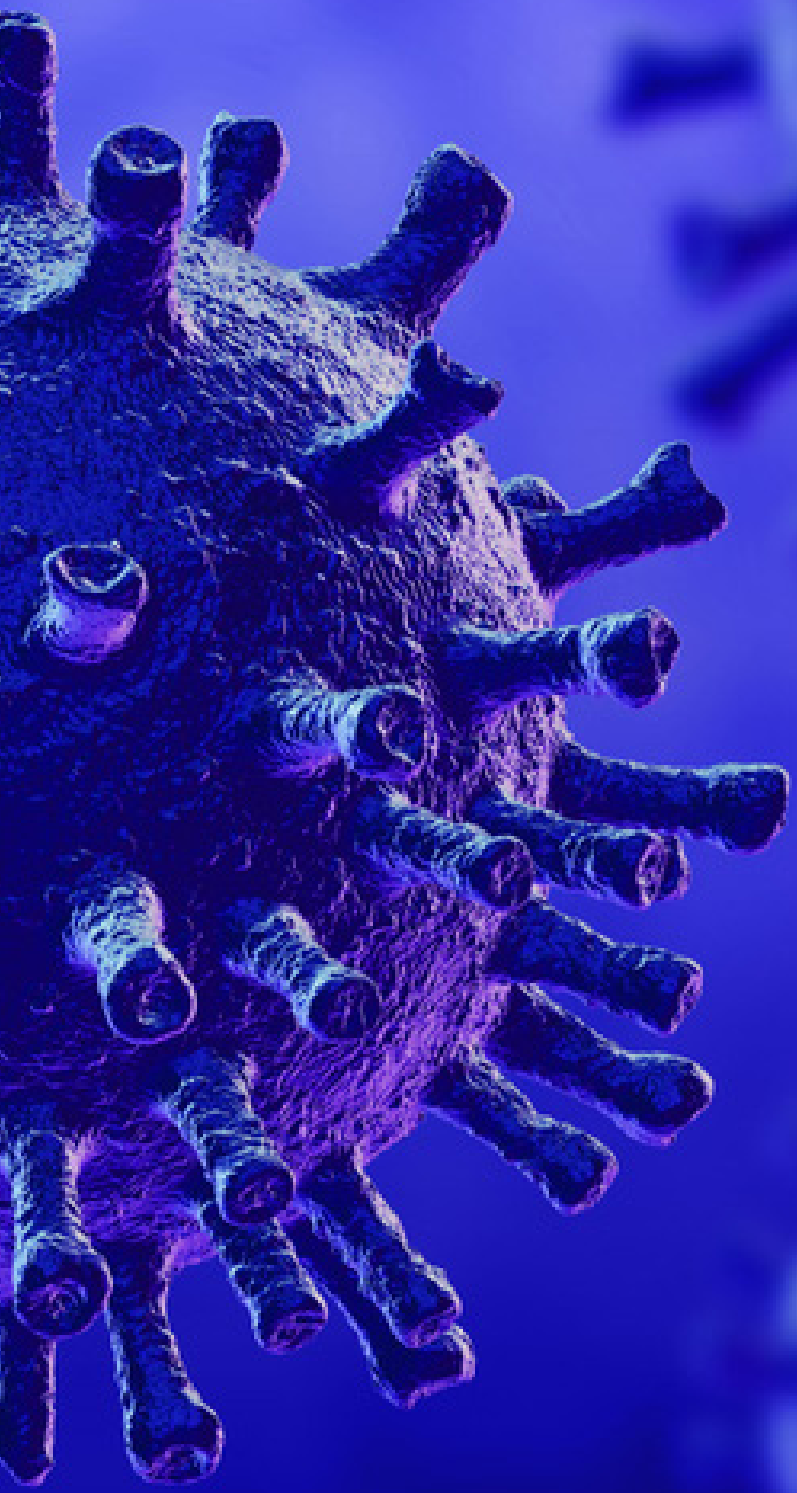
- **In 2021,** we are very excited to move forward with the Qatar Precision Medicine Institute – a new initiative by Qatar Foundation that will bring all research initiatives into alignment. The institute will act as a catalyst for research into precision medicine. It will focus on the translation and implementation of precision medicine in healthcare and public health while developing a repeatable process for the introduction of precision medicine services within the Qatari health system.

Quality research is only possible through a well-educated research community and the institute will focus on supporting the education of current and future researchers and health professionals in the field of precision medicine.

Other areas of interest will include implementing a policy and ethics programme for all aspects of precision medicine and the development of a reference dataset for research and clinical decision support.

2021

THE COVID 19 PANDEMIC **AND QATAR BIOBANK**



The World Health Organization announced in March 2020, that the COVID-19 virus was a pandemic. Qatar, like most countries was affected with over 165,000 people testing positive to date. The country responded with great leadership and vision, with the aim of protecting the population through several precautionary measures including social distancing, the mandatory wearing of face masks in public and the closure of schools, universities, parks, mosques, shops and restaurants.

Qatar biobank staff were quick to respond to the crisis and support the local community, initially many of our staff volunteered as part of a nationwide programme set up by The Ministry of Public Health, 'For The Sake of Qatar' in a call for additional healthcare professionals to support Qatar's fight against COVID 19.

A national response action plan was released which set out Qatar's response to the pandemic, it included provisions for data collection for the purposes of research and development. Qatar Biobank was very proud to be able to support this plan with the development of a new nested study, called the COVID - 19 Biorepository. The study aimed to advance research into the virus outbreak in Qatar, through the collection of data and biological samples from large numbers of infected residents, while hopefully contributing to the development of treatments and vaccines and providing valuable information to researchers to compare the prevalence of the virus in different countries.

THE COVID 19 BIOREPOSITORY

The idea for the COVID-19 biorepository project started in April by Dr. Asmaa Al-Thani, Vice Chairperson of the Qatar Biobank Board, and Chairperson of the Qatar Genome Programme Committee and Dr. Nahla Afifi, Director of Qatar Biobank. The project was prepared in around one month and the study obtained the required Institutional Review Board approvals and went live in early May 2020.

In just a few weeks our inhouse IT department had created a new temporary study data collection platform designed to capture data remotely from the different hospitals and isolation sites designated to the treatment of COVID 19 positive patients. While the temporary platform allowed data collection to start, a more long-term data platform that could link with our existing clinical information systems was also being created. Our in-house IT team also created a new sample management module for our Laboratory Information Management System.

More than 25 nurses, doctors, radiographers and research assistants were dispatched to the treatment and isolation centres, and after receiving extensive trainings to ensure that their safety was maintained while in close contact with COVID 19 positive patients more than 2,000 participants were recruited. The nursing team also collected environmental samples at COVID 19 treatment sites to support a study being led by the Ministry of Public Health and in collaboration with many local research entities.

Our laboratory team were trained in the safe handling and processing of COIVD 19 biological samples and some laboratory staff were seconded to the virology laboratory at Hamad General Hospital and the National Reference Laboratory to help support the efforts in fighting the virus. The laboratory department also provided additional assistance to these entities by loaning equipment for sub aliquoting and storage.

As a result of our existing accreditations Qatar Biobank was able to quickly adapt our existing processes and work instructions for this study. Consent forms and questionnaires were devised in Arabic, English, Hindi and Urdu to support the languages spoken by the largest number of COVID 19 positive participants.

The study was designed to recruit COVID 19 positive (laboratory diagnosis) children and adults with initial data collected at the point of diagnosis if possible or recruitment into the study. At the point of recruitment into the study, consent/assent was gained, a short questionnaire was asked if the participant was able and a nasopharyngeal/oral swab and blood samples obtained. The ability to obtain a retrospective consent was built into the study for intubated participants. Follow up samples were collected at recognized time intervals of 1-week post recruitment/diagnosis, and weekly until hospital discharge. Further follow up samples were collected at 1-month, 3-month and 6-month intervals. Each participant recruited into the COVID 19 study was given the opportunity to visit Qatar Biobank to complete a full participant visit for the collection of anthropometric data and additional clinical measurements at 3 months postdate of diagnosis/recruitment and again at 6 months which also included the opportunity to perform MRI scanning of the brain and whole body if eligible.

All participants were offered feedback on the data collected during their visit from the inhouse medical team. A report on the clinical analysis of their blood tests was provided along with a full explanation of these results. If needed a referral was made for further investigations to the Primary Health Care Corporation (PHCC) or Hamad Medical Corporation (HMC).

As lockdown restrictions were slowly lifted in phases and preparations were made to welcome participants back to the Qatar Biobank building, several enhancements were made to our facilities to ensure we remained compliant to national safety requirements. These included the installation of a high definition face sensing thermal camera. The camera will monitor the temperatures of up to 20 people entering the premises at once. Handheld infrared thermometers are also available. Automated hand sanitizers were installed in all corridors as well as the elevator, more than thirty UV Air Re-Circulators were installed and social distancing, room and lift capacity signs placed throughout the building. A Covid-19 Facility Risk Assessment was performed by Qatar Foundation HSSE and the building was found to be compliant.

COVID 19 BIOREPOSITORY FACTS AND FIGURES

Since the project started, 2258 COVID 19 positive participants have been recruited.

Table 1 Population Distribution Per Age Group

Age Range (Years)	Population Distribution Per Age Group					
	Male		Female		Total	
	N	%	N	%	N	%
0-10	9	0.8%	7	0.6%	16	0.7%
11-20	51	4.5%	111	9.8%	162	7.2%
21-30	108	9.5%	264	23.4%	372	16.5%
31-40	272	24.0%	312	27.7%	584	25.9%
41-50	261	23.1%	215	19.1%	476	21.1%
51-60	252	22.3%	159	14.1%	411	18.2%
61-70	124	11.0%	48	4.3%	172	7.6%
71+	54	4.8%	11	1.0%	65	2.9%
Total	**1131**	**100%**	**1127**	**100%**	**2258**	**100%**

Table 1 shows the age range in years. The greatest number of COVID 19 positive participants were from the 31-40 and 41-50 age range. With children in the 0-10 years and the over 70's making up the lowest percentages of recruited participants.

Table 2 - Nationalities of COVID 19 Positive Patients

Nationality	Female	Male	Grand Total
Qatar	708	344	1052
India	49	204	253
Philippines	90	92	182
Bangladesh	6	101	107
Nepal	2	95	97
Pakistan	33	60	93
Egypt	37	48	85
Sudan	26	24	50
Yemen	19	26	45
Sri Lanka	8	25	33
Jordan	14	17	31
Iran	14	17	31
Syria	16	13	29
Palestine	12	15	27
Saudi Arabia	22	4	26
Oman	6	3	9
Kenya	8	1	9
Cuba	8	1	9
Others	49	41	90
Totals	**1127**	**1131**	**2258**

Table 2 shows the breakdown of nationalities of the COVID 19 positive participants recruited into the study between May 2020 and December 2020.

Table 3 - Gender Distribution

Gender	N	%
Male	1131	50.1%
Female	1127	49.9%
Total	2258	100%

The table 3 shows that an almost even number of males and females were recruited into the study with 1131 males and 1127 females participating.

The study design included the follow up of recruited participants, and the participants were invited back at regular intervals for follow up visits and table 4 shows the uptake of revisits.

676 participants returned for a month 1 COVID visit which includes blood sample collection, a rapid antibody test and the collection of data through a series of questionnaires.

Table 4 - The Uptake of Revisits

Month-1 COVID-Visit - Total Count			
COVID-19 1-Month Follow-up	FEMALE	MALE	Grand Total
QATARI	201	73	274
ARAB	62	72	134
OTHER	68	200	268
Grand Total	331	345	676

Month-3 COVID-Visit - Total Count			
	FEMALE	MALE	Grand Total
QATARI	146	59	205
ARAB	40	51	91
OTHER	59	141	200
Grand Total	245	251	496

Month-3 COVID + QBB Cohort Full Visit - Total Count			
	FEMALE	MALE	Grand Total
QATARI	143	57	200
ARAB	40	49	89
OTHER	56	135	191
Grand Total	239	241	480

We have now reached the stage where a few participants have reached the 6-month post diagnosis point, during the six month visit participants complete a full 3 hour visit and if eligible can complete a brain and whole body MRI scan.

Table 5 - Month-6 COVID Visit

Month-6 COVID-Visit - Total Count			
COVID-19 6-Month Follow-up	FEMALE	MALE	Grand Total
QATARI	1	1	2
ARAB	1	1	2
OTHER	2	7	9
Grand Total	4	9	13

To date 11 participants have completed their 6 month follow up visit.

Month-6 COVID MRI Visit - Total Count			
COVID-19 6-Month Follow-up	FEMALE	MALE	Grand Total
QATARI	1	1	2
ARAB	1	1	2
OTHER	2	5	7
Grand Total	4	7	11

During data collection the participants are asked about the symptoms they had experienced, and Figure 1 Participant Self-Reported COVID 19 Symptoms shows the responses provided by 2212 participants. The most common symptoms experienced were headaches, cough, fatigue and a fever greater than 38 C, closely followed by muscle aches.

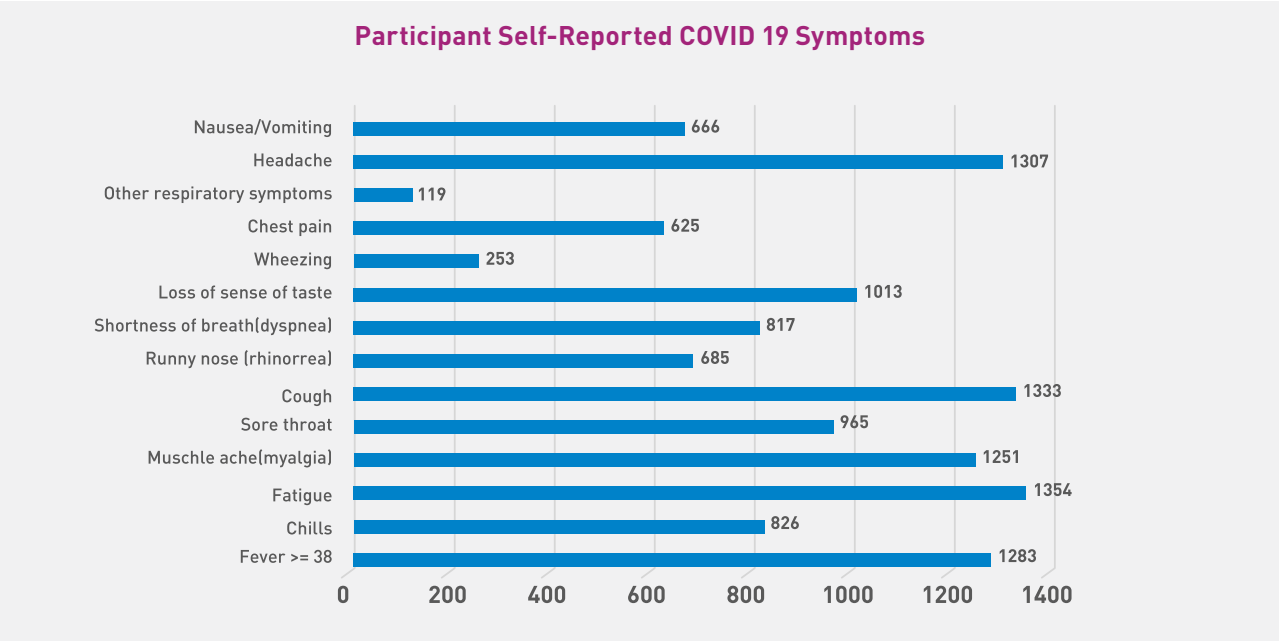


Figure 1 - Participant Self-Reported COVID 19 Symptoms

At present Qatar Biobank is supporting 2 COVID 19 projects by providing biological samples to researchers. Total number of COVID 19 samples distributed to these projects is 2594. Project 1 has received 1561 samples and project 2 has received 1033 samples to date.

Table 6 - Sample Storage

Sample Type	Nasal/Oral	Serum	EDTA	Pag Gene	Plasma (from trace tubes)	Total Number of Samples Stored
No of Samples Collected	250,439	21,024	41,376	5,194	18,336	336369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COVID 19 MEDICAL REFERRALS

The COVID 19 biorepository physician can refer participants for further investigations if abnormal findings are found during their visit. Referrals can be made for existing conditions or new findings. Figure 2 shows the number of COVID 19 participants who required a referral to either their own medical physician or to our medical partners at Hamad Medical Corporation.

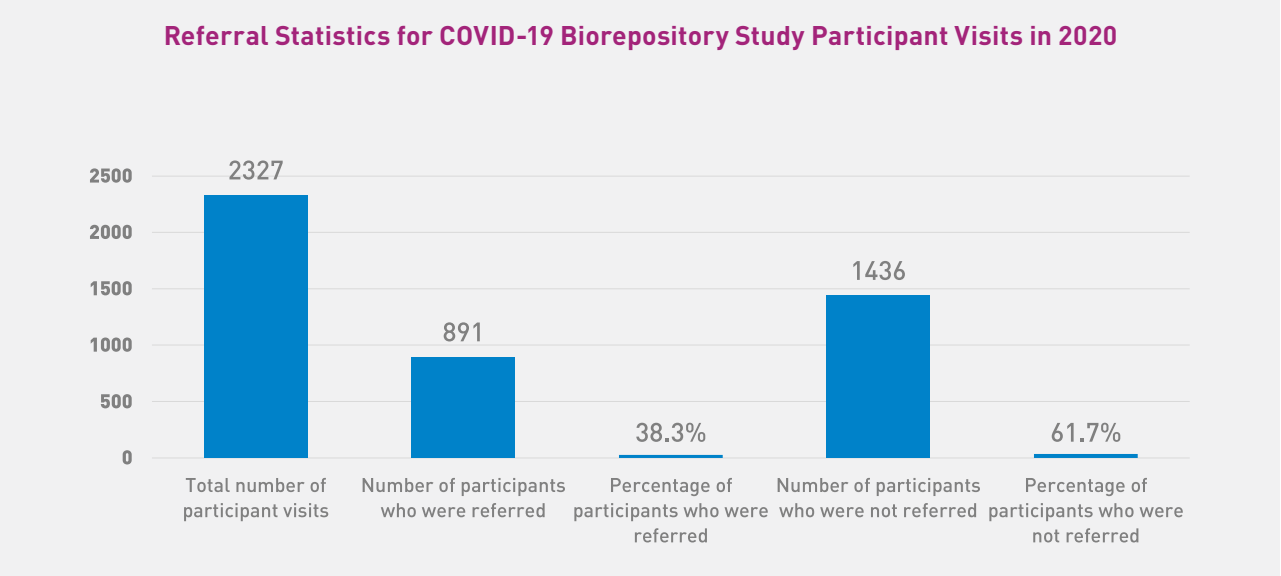

Figure 2 - Figure Referral Statistics for COVID 19

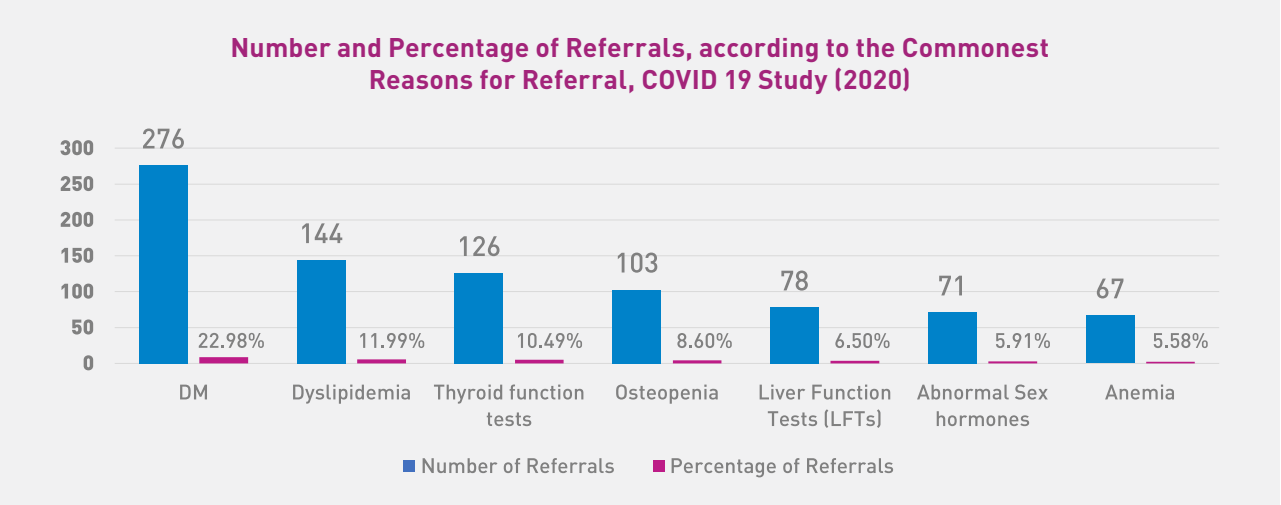

Figure 3 - Common Reasons for Medical Referral

Of the 891 participant referrals made, the most common was 276 for diabetes mellitus not associated with pregnancy, followed by 144 referrals for dyslipidemia and a further 126 referrals for abnormal thyroid function tests.

QATARI BIRTH **COHORT STUDY QBIC**

This is Qatar's first mother-child birth cohort study that aims to examine how environmental, genetic, nutritional, and social factors may affect a baby's health in the first stages of life and into childhood. It is an epidemiological study that examines the impact of multiple exposures on health-related outcomes such as birth outcomes, neurodevelopment, obesity, asthma and allergies that appear in early life and is likely to perpetuate into late childhood or adulthood. The uniqueness of the study comes from the environmental protocols that have been set up to understand gene-environment interactions associated with health impact. No other study has done this before in the region, specifically for birth cohort studies. One of the main strengths of the study will be the large number of participants. The data collected from this large study sample will allow for research on multiple outcomes.

The Qatari Birth Cohort (QBiC) study is now in pilot phase and aims to recruit 3,000 triads (mothers, fathers and children). The study will follow the journey of the newborn child until they are five years old. In the next phase, the team is expected to collect data from newborns and toddlers, such anthropometric measurements, biological samples, breastfeeding patterns, introduction to solid foods and various clinical assessments. Mothers will also be tracked with their babies in the first month after delivery. The QBiC study was ready to move to the second phase, however this study has paused as a result of the COVID-19 pandemic.

The study recruits Qataris and long-term residents – those who have been living in Qatar for 15 years or more. Qataris represent 28 percent of the sample population, while long-term Arab residents are at 54 percent, and other nationalities stand at 18 percent.

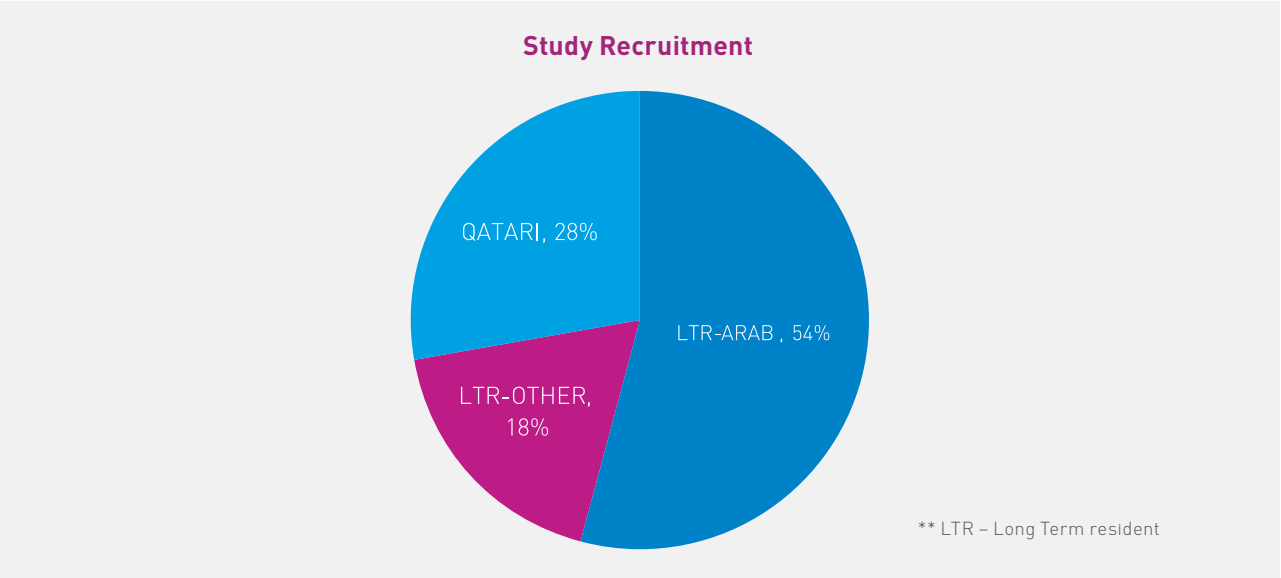

Figure 4 - Recruitment

To date a total of 243 pregnant women have visited Qatar Biobank and provided information on sociodemographic and lifestyle factors, anthropometric measurements, clinical measurements and biological samples.

Table 7 - Total Number of Mother and Father Visits

	FEMALE (MV1)*	FEMALE (MV2)**	MALE (FV)***	Grand Total
QATARI	67	23	8	98
ARAB	129	71	36	236
OTHER	47	24	12	83
Grand Total	243	118	56	417

*MV1 – Mother Visit 1 between 12-15 weeks gestation
**MV2 Mother visit 2 at approximately 32 weeks gestation
***FV Father visit can take place at any time

Figure 5 shows a breakdown of findings from preliminary results, the self-reported results show 70% of pregnant females have been found to be overweight; 37% have gestational diabetes; 20% have a thyroid dysfunction; 10% have reported a psychological illness; and 9% were diagnosed with hypertension.

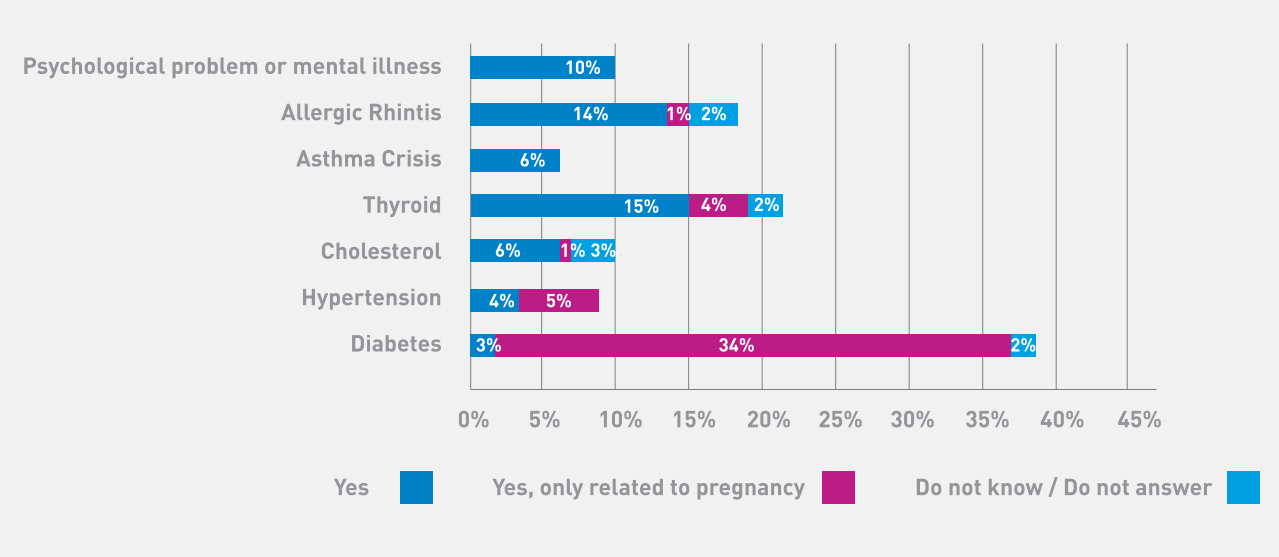

Figure 5 - Self-reported Medical Conditions of Pregnant Females (n=209)

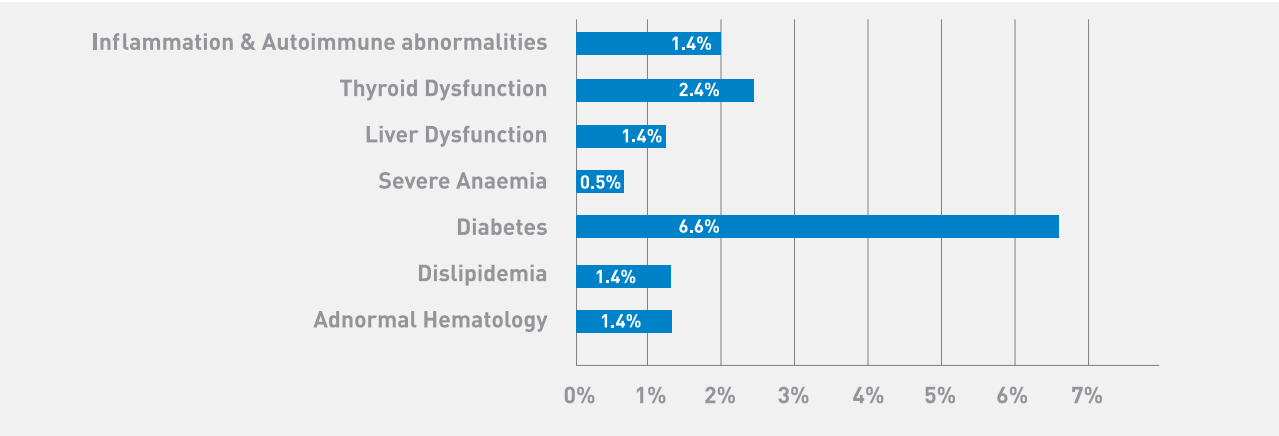

Figure 6 - Participants' Referrals to Health Care System

The research team has put a lot of effort to develop well designed protocols for the data collection; with a focus to collect harmonized data for future collaborations with other international birth cohorts. Although there are multiple birth cohort studies in Europe, the United States, or Australia, the Arab population is a minority in these studies. Unfortunately, Arab genomes are severely under-represented in genomic studies globally but Qatar, through its various initiatives, is putting Arab genome on the map of genomic research and science.


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QATAR BIOBANK **COHORT STUDY**

The first study under Qatar Biobank was launched in 2012. It aims to recruit 60,000 members of the local population, Qatari nationals and long-term residents of 15 years or more. A participant visit collecting personal data and biological samples is repeated after 5 years. Normal Qatar Biobank Cohort operations paused in March 2020, however, in late October we restarted our cohort activities with reduced participant numbers as we try to maintain a safe working environment for our staff, participants and visitors.

Table 8 shows the total number of participants recruited into the study at the end of 2020. 13,150 females and 13,129 males have all participated in Qatar Biobank Cohort study and we thank them for their support.

Table 8 - Total number of participants recruited into the study at the end of 2020

Total Count			
	FEMALE	MALE	Grand Total
QATARI	11309	9019	20328
ARAB	1520	3515	5035
OTHER	321	595	916
Grand Total	13150	13129	26279

As the cohort study has been running for over 8 years we have now started 5 year follow up visits. Participants who first participated more than 5 years ago are returning to repeat the clinic visit. To date 392 participants have returned to complete this visit.

Table 9 - Total Number of Follow up Visits

Total Count			
	FEMALE	MALE	Grand Total
QATARI	153	138	291
ARAB	22	61	83
OTHER	5	13	18
Grand Total	180	212	392

Our participant satisfaction rate remains very high with 91% of participants stating if given the opportunity they would take part again.

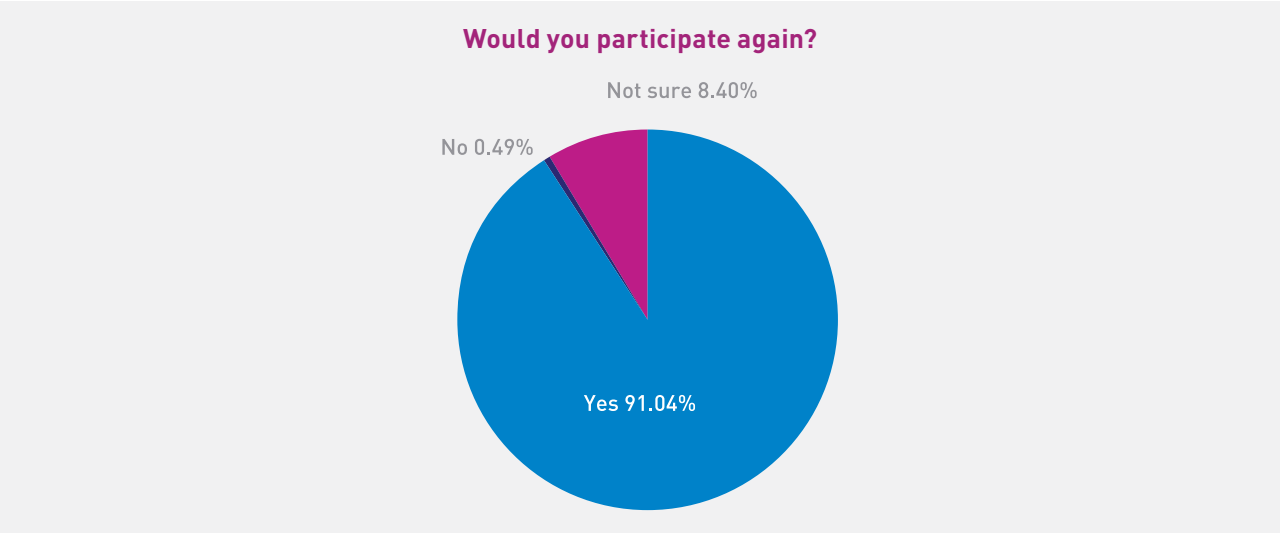

Figure 7 - The participant satisfaction rate

The most common response when asked the reason for participating in Qatar Biobank Cohort Study was to have a health check at 73% followed by 'to help improve the health of my family and that of the future generations of Qataris at almost 61%.

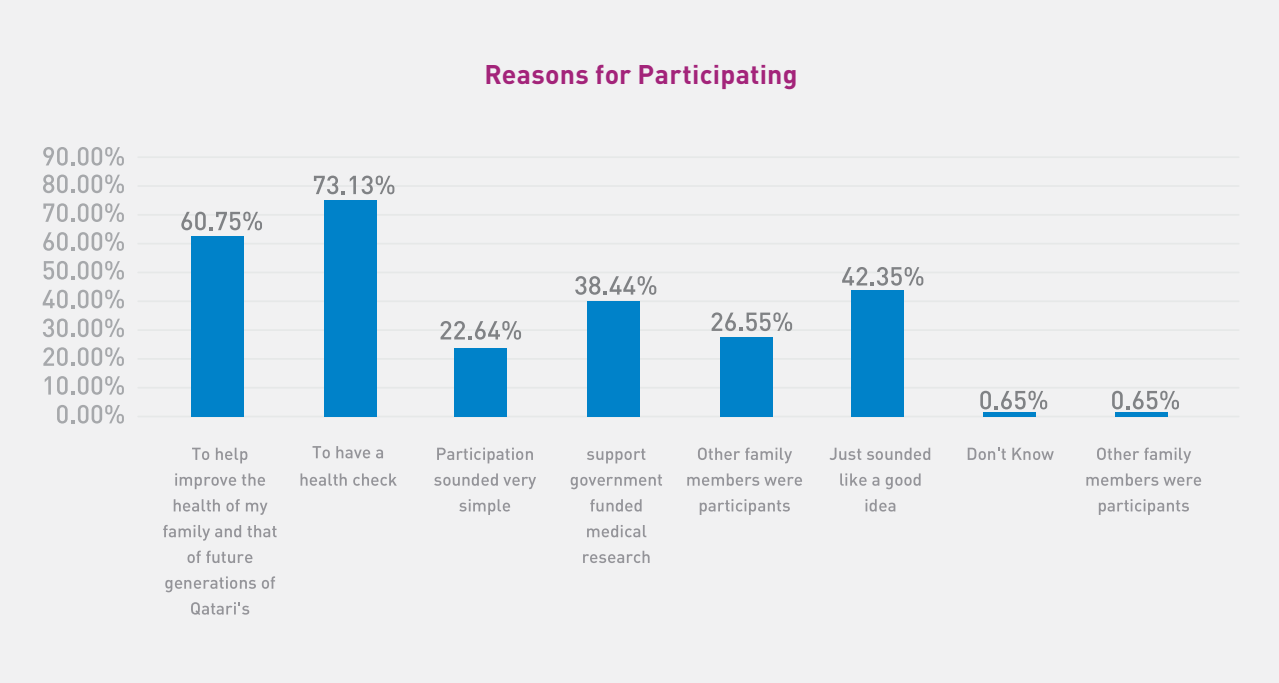

Figure 8- Reasons for Participating

When lockdown started, the participants who had already visited Qatar Biobank and were awaiting their results feedback appointments had to be postponed. A nationwide lockdown and working from home resulted in a challenge for the medical team as participants were still eager to receive their visit results feedback, however we could not offer face to face appointments. A solution was quickly found, and the medical and IT teams worked together to implement some advanced security features that would allow participants to receive a telephone appointment and speak directly with one of our clinical data interpretation specialists.

Over 600 participants have successfully received their feedback during this time with 3230 feedback results being given to date in 2020 and figure 9 shows that 1955 medical referrals were made.

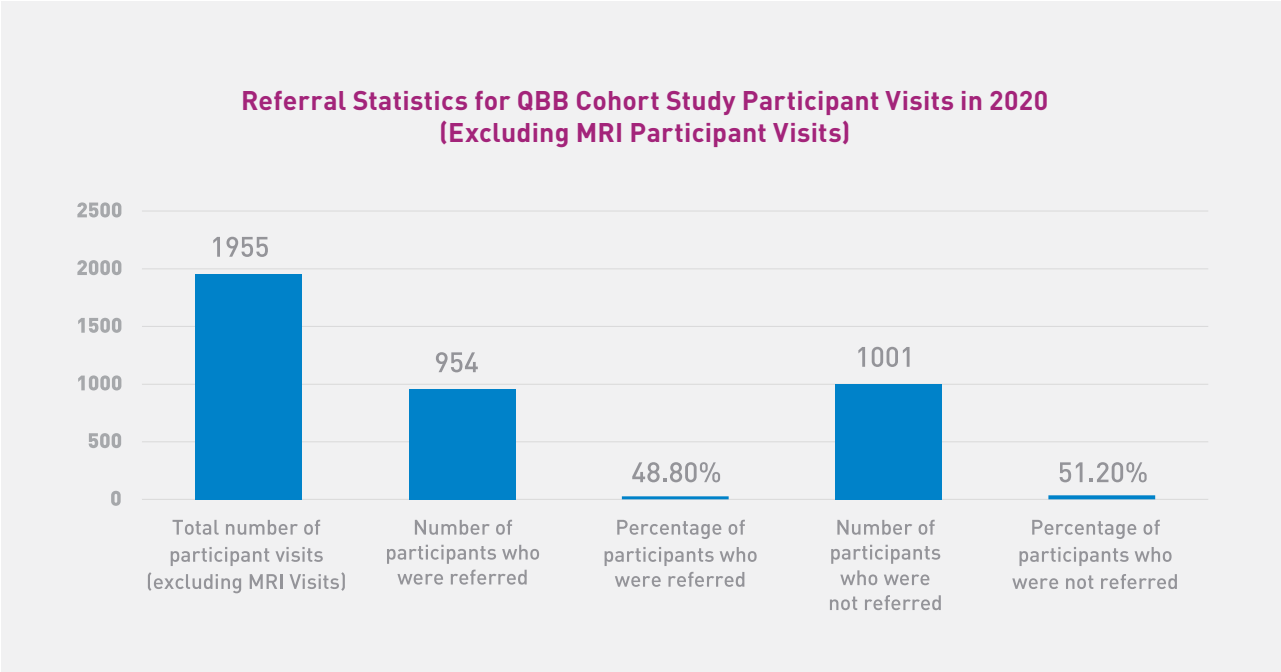

Figure 9 - Referral Statistics for QBB Cohort Study Participant Visits in 2020 (Excluding MRI Participant Visits)

Referrals for osteopenia at 403 is the most common condition referred, followed by dyslipidemia at 154 and abnormal thyroid function at 134 referrals.

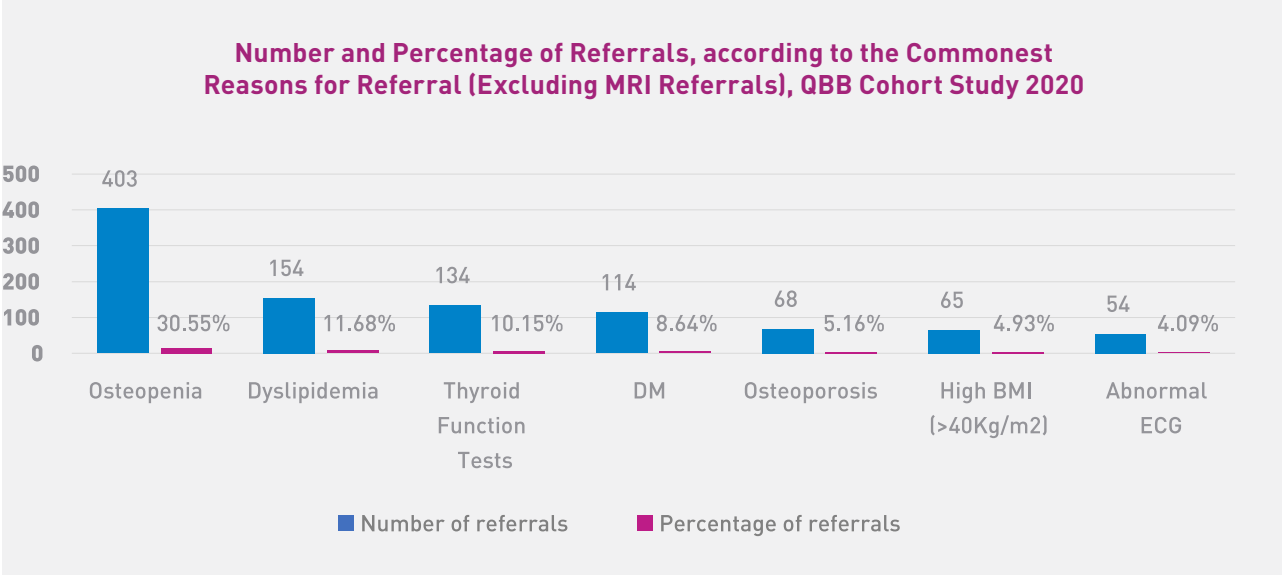

Figure 10 - Most Common Referrals excluding MRI

A new addition in 2020 is the ability to refer participants who have abnormal findings identified in the MRI report and 98 participants were referred for further investigations

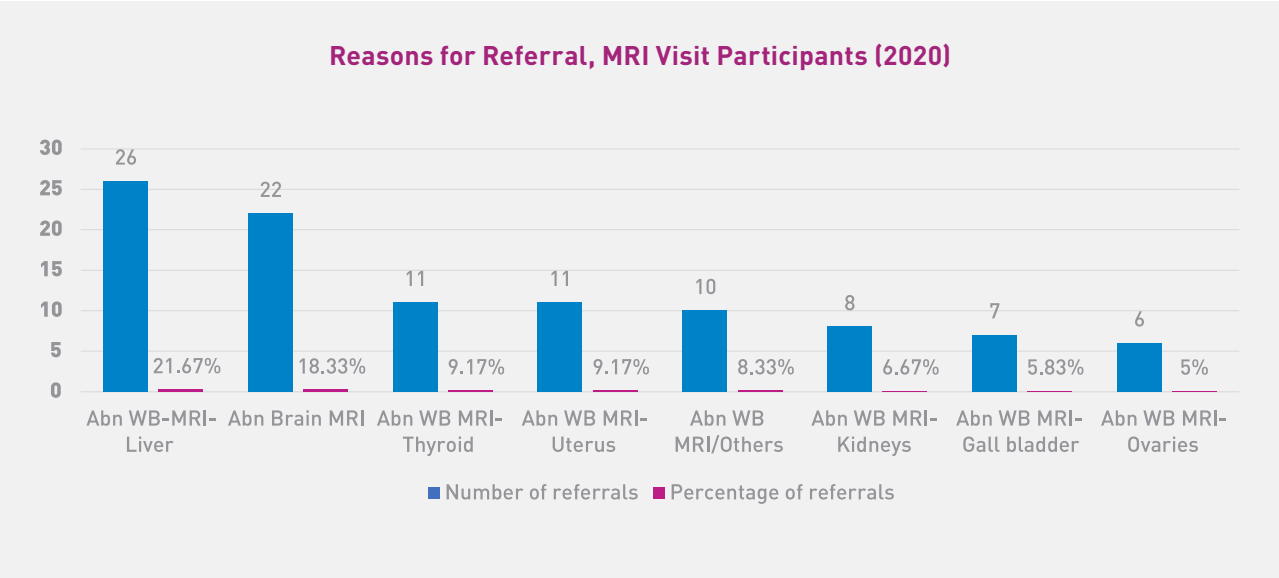

Figure 11 - MRI Referrals

Research Using Qatar Biobank Data

By the end of 2020, 232 projects have been registered to use Qatar Biobank Cohort data, however some projects have not progressed to date.

37 new research projects were registered and approved in 2020. The total number of projects now approved to use Qatar Biobank cohort data and biological samples is 164.

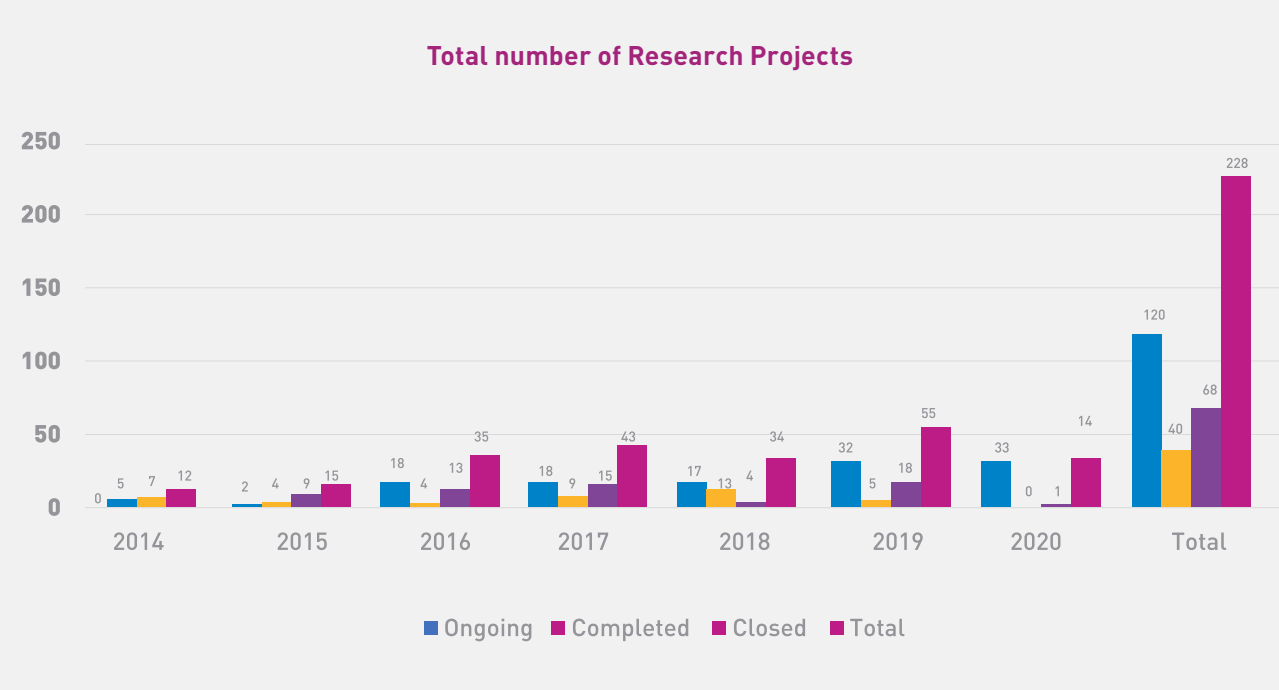

Figure 12 - Total number of Research Projects

Qatar Biobank continues to support local students research projects, through memorandum of understandings with several academic institutions offering access to biological samples and data.

KEY FINDINGS AND ANALYSIS

This section will introduce some of the results of the internal data analysis performed at the end of 2020. The results are based on the data collected from 20,000 participants

Demographic Data

Qatar Biobank collects demographic data on all participants through the registration process and the questionnaire stage. The questionnaire stage consists of a series of questionnaires which gathers information about health, lifestyle, family health and mental health and includes the main and dietary questionnaires which are designed to be self-reporting with the contraindication questionnaire and nurse interview being conducted directly by the trained clinic staff.

In October 2020 cohort operations restarted and to date the age distribution shows that for men and women the highest number of participants are in the 28-37 age group closely followed by the 38-47 age group.

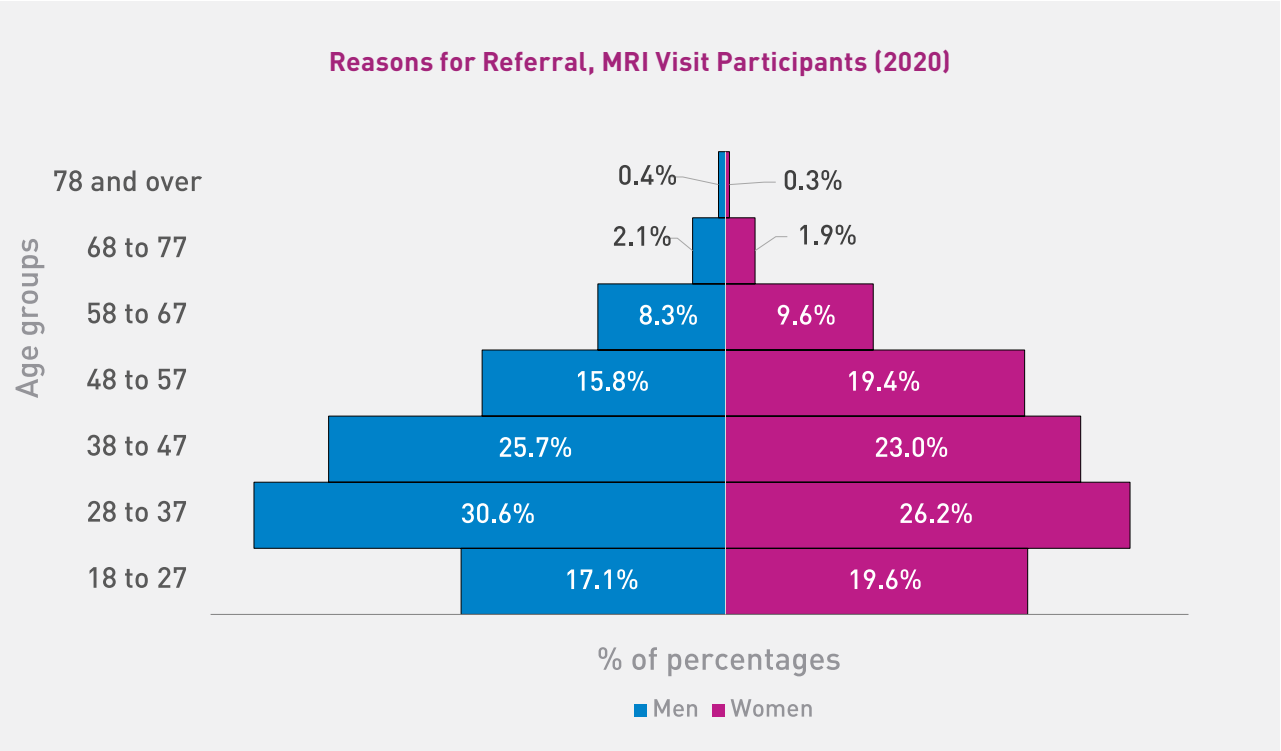

Figure 13 - Age Distribution of Qatar Biobank Cohort Study

Eligibility to participate in the Qatar Biobank cohort study is identified as Qatari nationals over the age of 18 and long-term residents over the age of 18. The analysis of demographic data shows that 81% of participants registered were Qatari nationals Figure 14

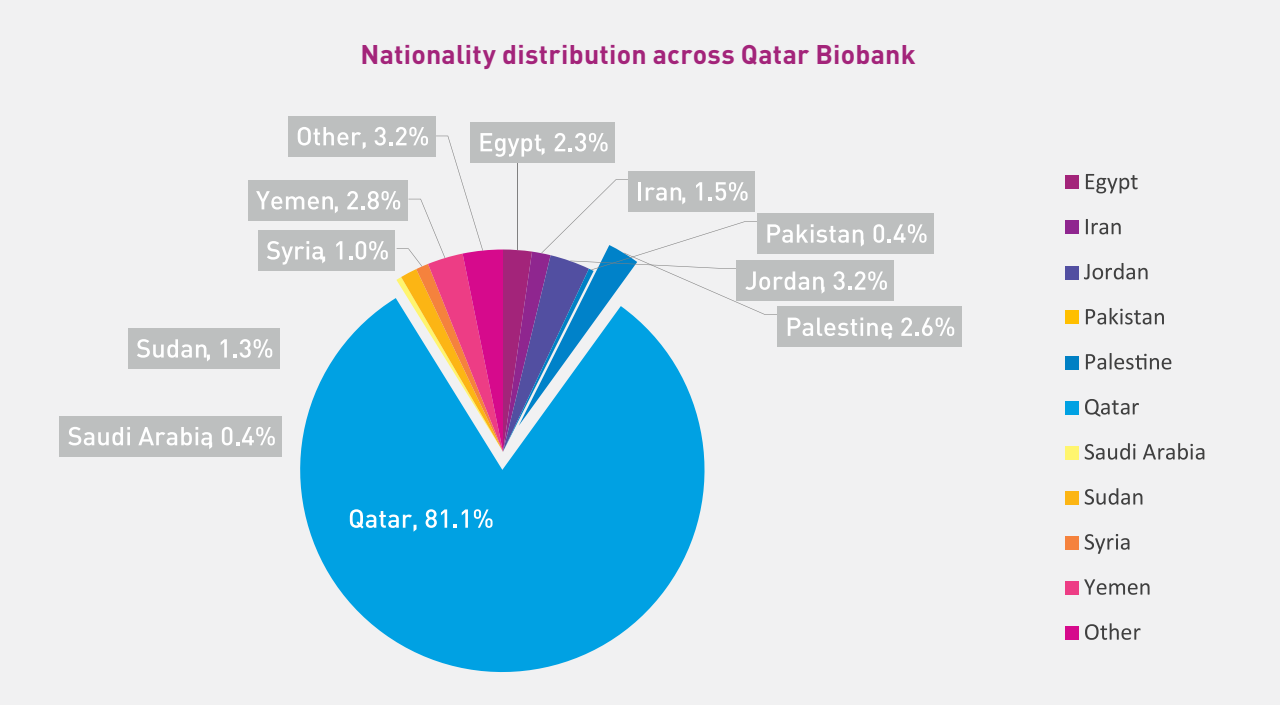

Figure 14 - Nationality distribution across Qatar Biobank

During the main questionnaire of the cohort visit, participants are asked to identify their highest level of education and current employment status. The data shows that 42% of men and 41% of women had completed university. More men than women reported being in paid employment with 78% of men and 47% of women and a further 6% of men and 1% of women reported being self-employed or owning their own business Figure 15.

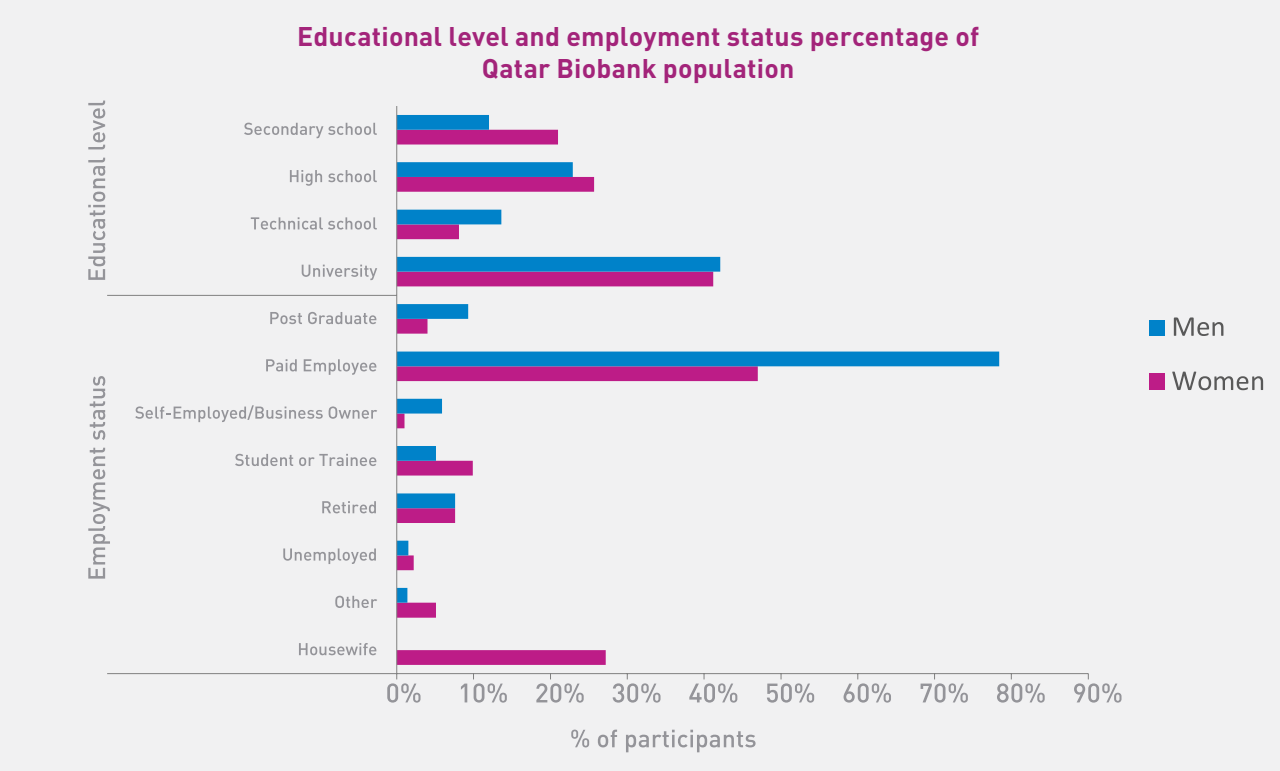

Figure 15 - Educational level and employment status percentage of Qatar Biobank population

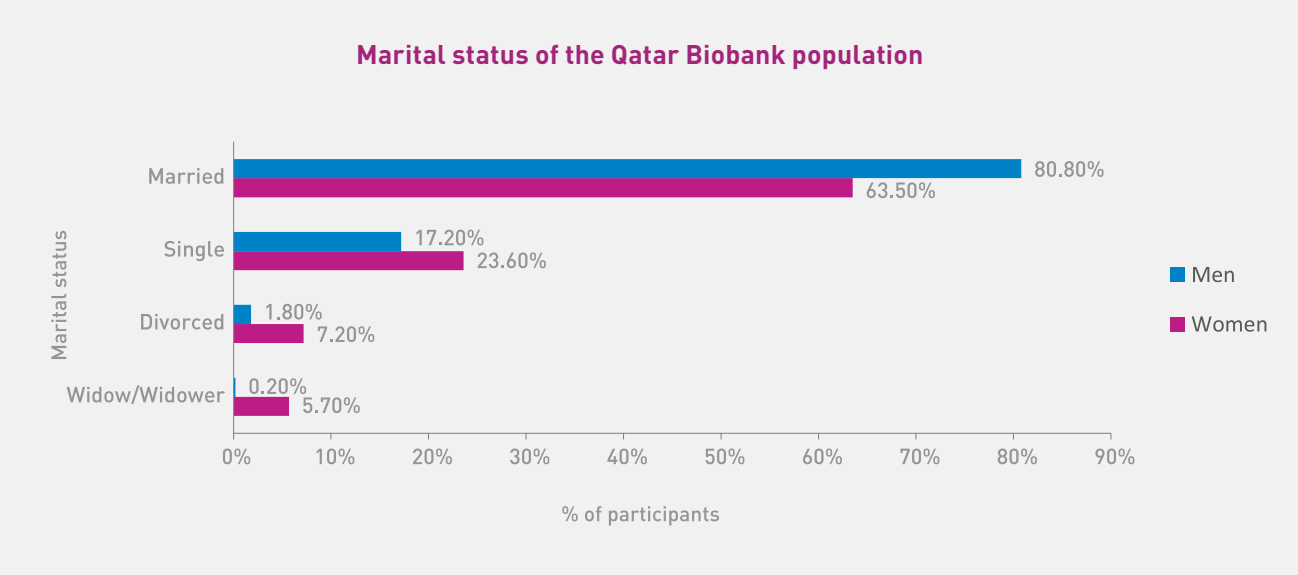

Figure 16 - Marital Status Reported

The data shows that almost 81% of men and 64% of women were registered as married with 17% of men and 24% of women registering as single.

Health and Lifestyle of Qatar Biobank Participants

Obesity and diabetes mellitus are two conditions that greatly affect the long-term health of the population of Qatar. The cohort visit comprises of 6 different questionnaires which include a dietary and a main questionnaire and ask participants about their health, lifestyle and the types of foods and drinks they consume on a regular basis. In this region local delicacies such as the sweet tea drink Karak and Arabic coffee are commonly consumed with 50% of men and 47% of women drinking Arabic coffee at least once a day. 35% of men and 37% of women drink Karak at least once a day.

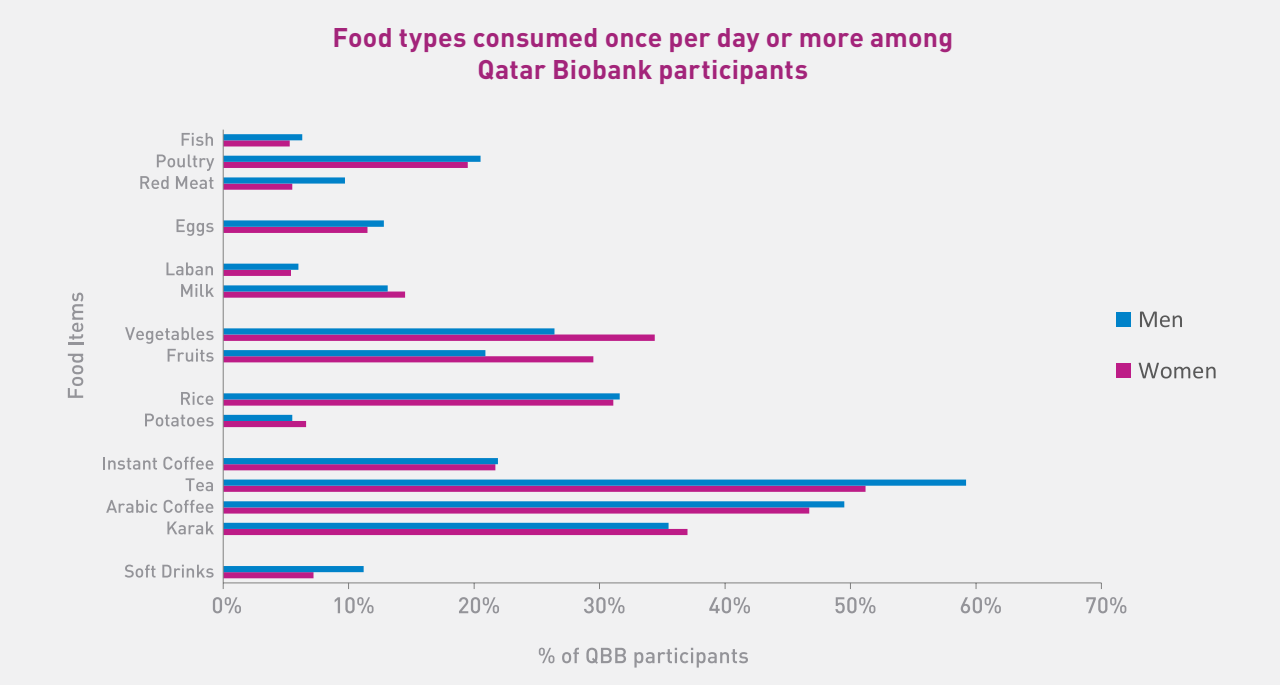

Figure 17 - Dietary Habits

Poultry is the most commonly reported protein eaten on a daily basis with 21% of men and 20% of women. Women report eating more fruit and vegetables than men on a daily basis with 34% eating vegetables and 30% eating fruit with only 26% of men eating vegetables and 21% eating fruit.

Figure 17 also shows that 15% of men and 13% of women reported eating fast food 3 to 5 times per week.

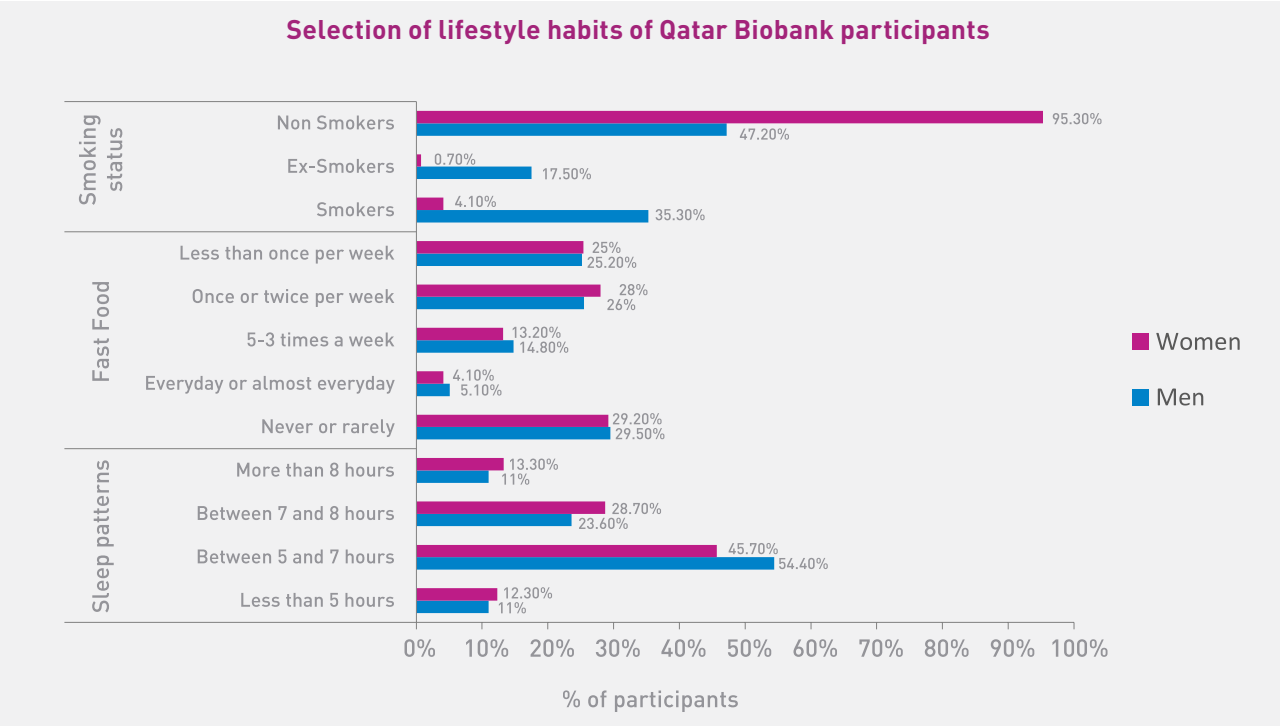

Figure 18 - Self reporting smoking data show that 35% of men, but only 4% of women smoke.

A sedentary lifestyle can contribute to many chronic conditions, lifestyle habits are self-reported, 54% of men and 46% of women reported having between 5 and 7 hours sleep per night.

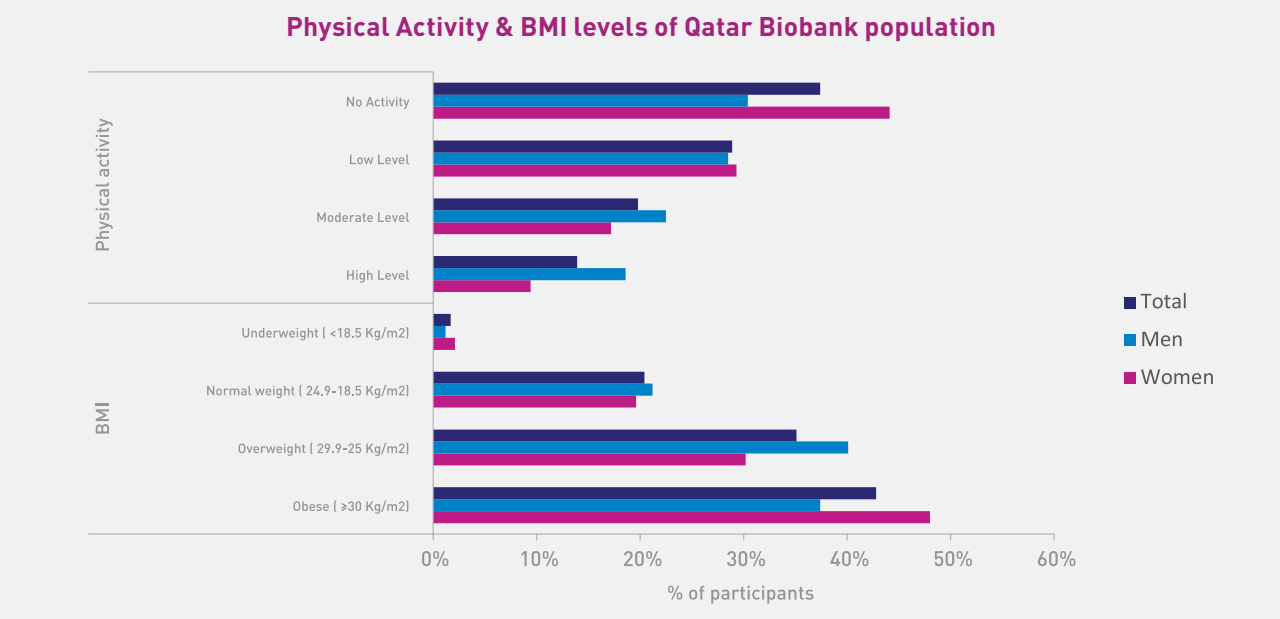

Figure 19 - Physical Activity and BMI levels

30% of men and 44% of women reported doing no physical activity and 37% of men and 48% of women were recorded as being obese as per the weight collected during the height and weight measurement stage. Physical activity levels were calculated using an International Physical Activity Questionnaire (IPAQ) scoring system. The definitions of the levels of activity used for analysis are No Activity, Low Level are classified as not meeting categories of moderate or high level. Moderate Level is 3 or more days of vigorous-intensity activity of at least 20 minutes per day or 5 or more days of moderate-intensity activity and/or walking of at least 30 minutes per day OR 5 or more days of any combination of walking, moderate-intensity or vigorous intensity activities achieving a minimum Total physical activity of at least 600 MET-minutes/week. High Level activity is classified as vigorous-intensity activity on at least 3 days achieving a minimum Total physical activity of at least 1500 MET-minutes/week OR 7 or more days of any combination of walking, moderate-intensity or vigorous-intensity activities achieving a minimum Total physical activity of at least 3000 MET-minutes/week.

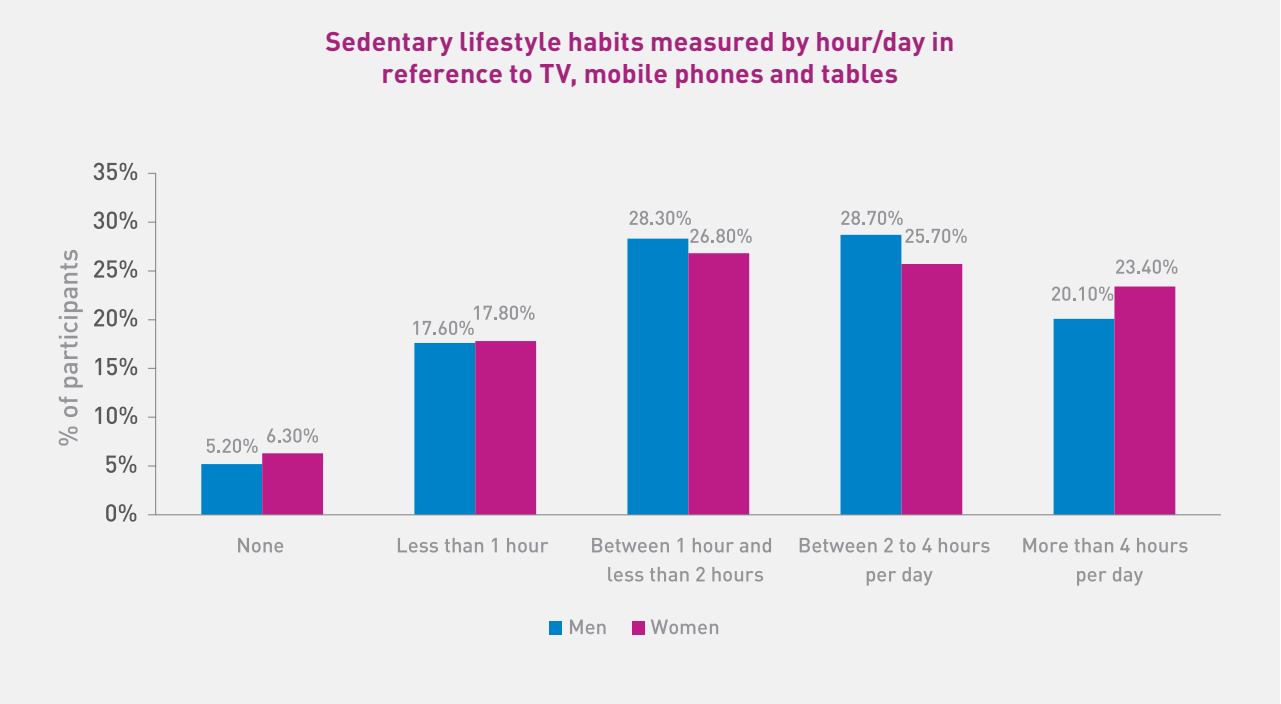

Figure 20 - Sedentary lifestyle habits

Mobile phone, tablet use and watching TV is self-reported and 29% of men and 26% of women reported 2-4 hours of use per day with a further 20% of men and 23% of women reporting more than 4 hours a day.

Table 10 - Bariatric Surgery

Participants response to bariatric surgery are collected and the data shows that more women than men have recorded having bariatric surgery. 12% of all participants in Qatar Biobank cohort study have reported having a form of bariatric surgery. The most popular type of bariatric surgery reported is the sleeve gastrectomy with 77% of men and 76% of women who had reported bariatric surgery reporting having had this procedure. Most participants who have had bariatric surgery 47% of men and 65% of women reported having the surgery performed locally in Qatar.

Table 10: Bariatric surgery

	Total		Men		Women	
Bariatric Surgery	Number	%	Number	%	Number	%
	1900	12.2	715	9.6	1185	14.7
Bariatric Surgery Types						
Gastric Band	105	5.5	30	4.2	75	6.3
Gastric Bypass	62	3.3	21	2.9	41	3.5
Sleeve Gastrectomy	1467	77.2	569	79.6	898	75.8
Duodenal Switch	64	3.4	17	2.4	47	4.0
Other	202	10.6	78	10.9	124	10.5
Location (bariatric surgery performed)						
Qatar	1105	58.2	337	47.1	768	64.8
Other Gulf State	150	7.9	52	7.3	98	8.3
Other Arabic Country	578	30.4	290	40.6	288	24.3
Europe	31	1.6	13	1.8	18	1.5
North America	16	0.8	10	1.4	6	0.5
Other	20	1.1	13	1.8	7	0.6

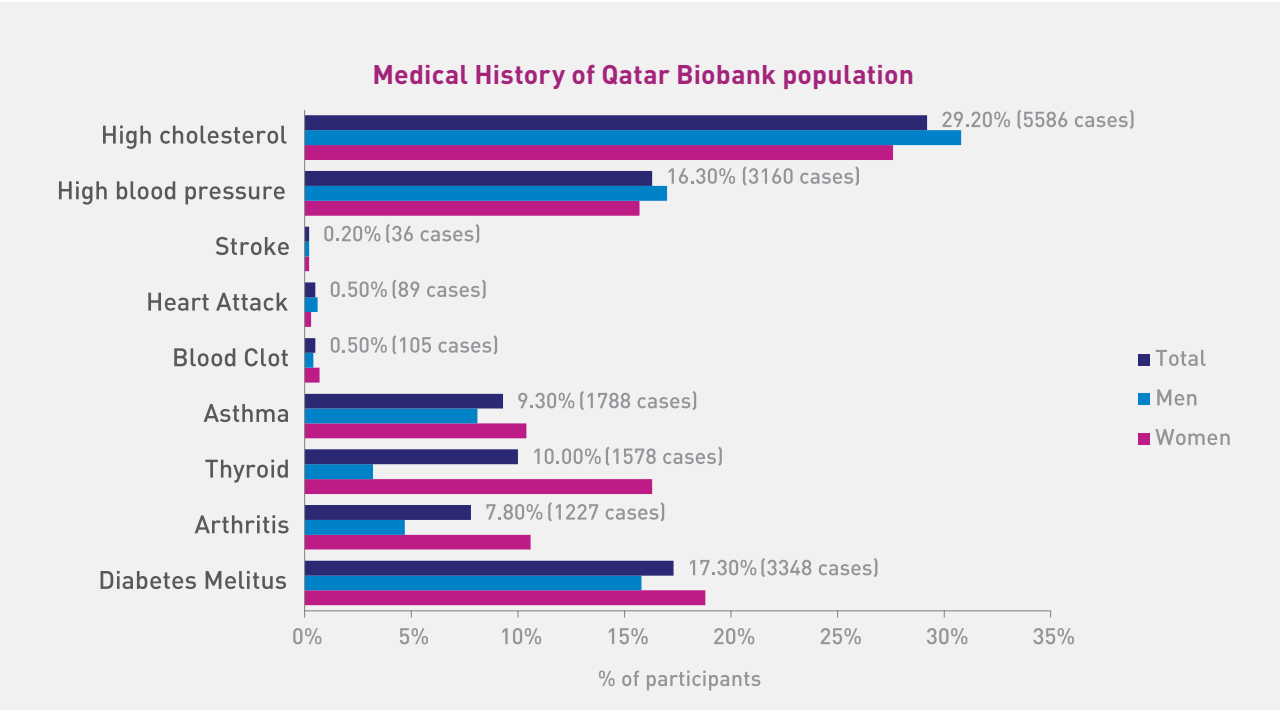

Figure 21 - Self-Reported Medical Conditions

Metabolic disorders are common amongst the local population. The most commonly self-reported medical conditions are high cholesterol with 31% of men and 28% of women having the condition, high blood pressure with 17% of men and 16% of women and diabetes with 16% of men and 19% of women reporting they have the condition.

Cancer diagnosis is captured during the nurse interview and the most reported diagnosed cancer types are breast cancer (49%) and cervical cancer (17%) for females and prostate cancer for men at 36%. Bowel cancer was reported by 15% of men but only 5% of women and thyroid cancer was higher in women with 20 % and only 9% of men.

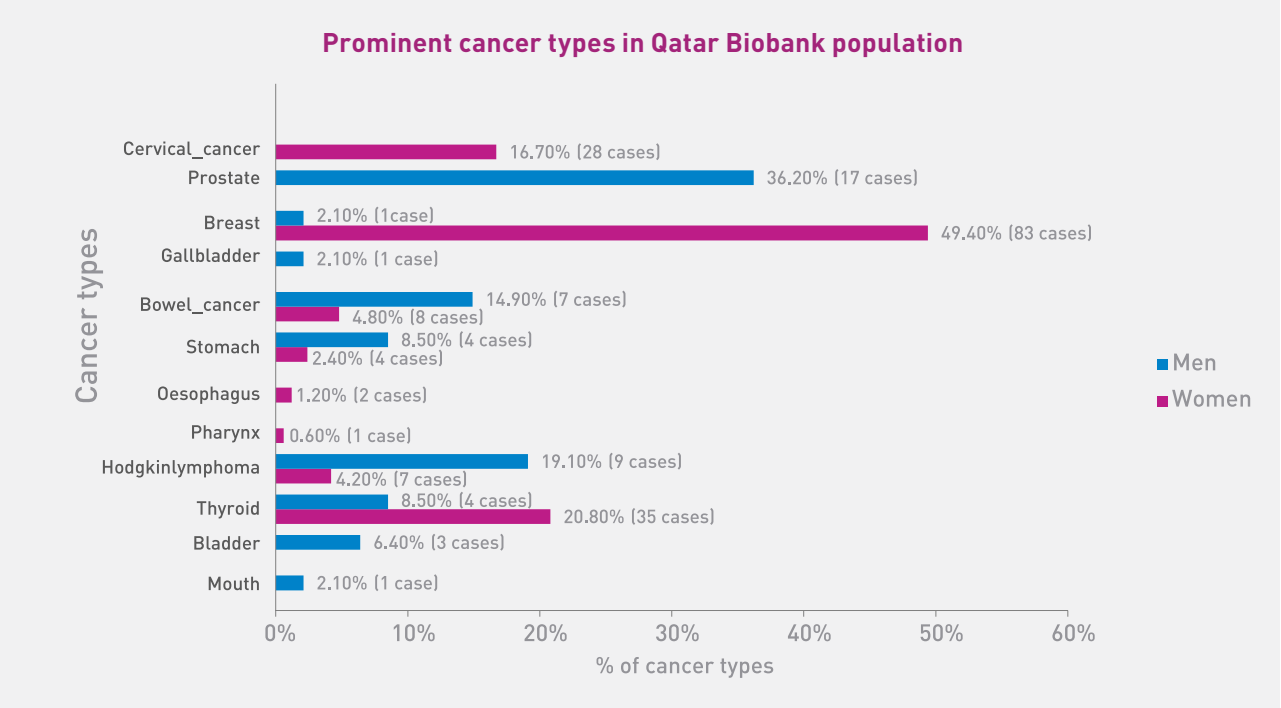

Figure 22 - Prominent Cancer Types

Despite the sunny climate in Qatar, vitamin D levels remain low in the local population, the analysis of laboratory results of Qatar Biobank cohort participants show that 74% of men and 74% of women have mild to moderate deficiency, and a further 16% of men and 12% of women have a severe deficiency.

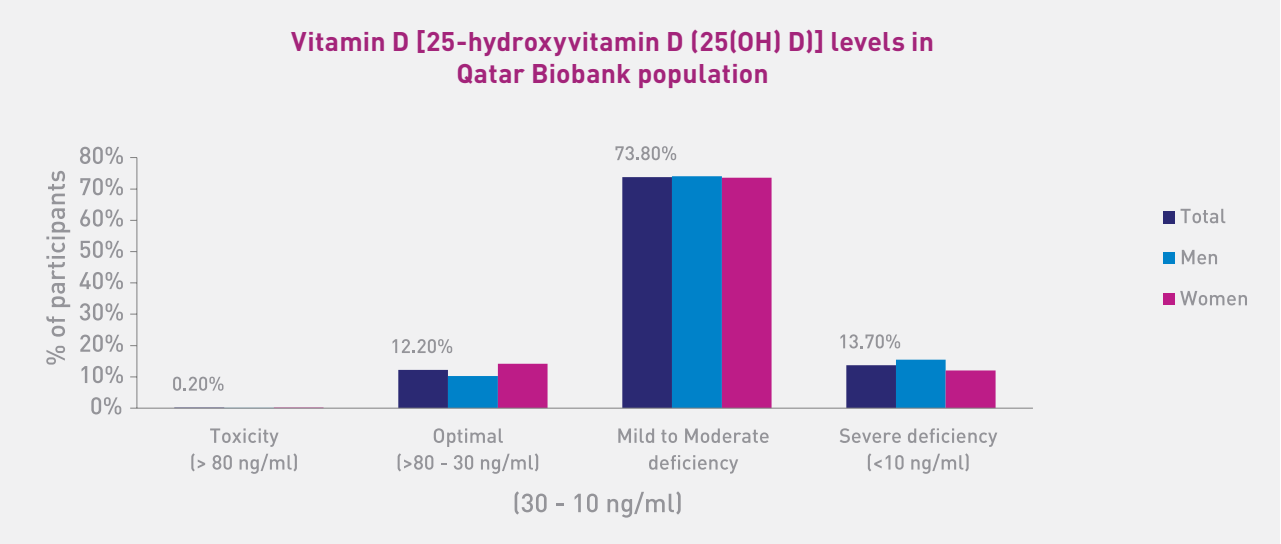

Figure 23 - Vitamin D levels in Qatar Biobank participants

The questionnaire stage collects participants responses to the use of vitamin D supplement and vitamin D de(ciency. The data shows that 31% of men and 48% of women take vitamin D supplements but the laboratory analysis shows they remain de(cient.

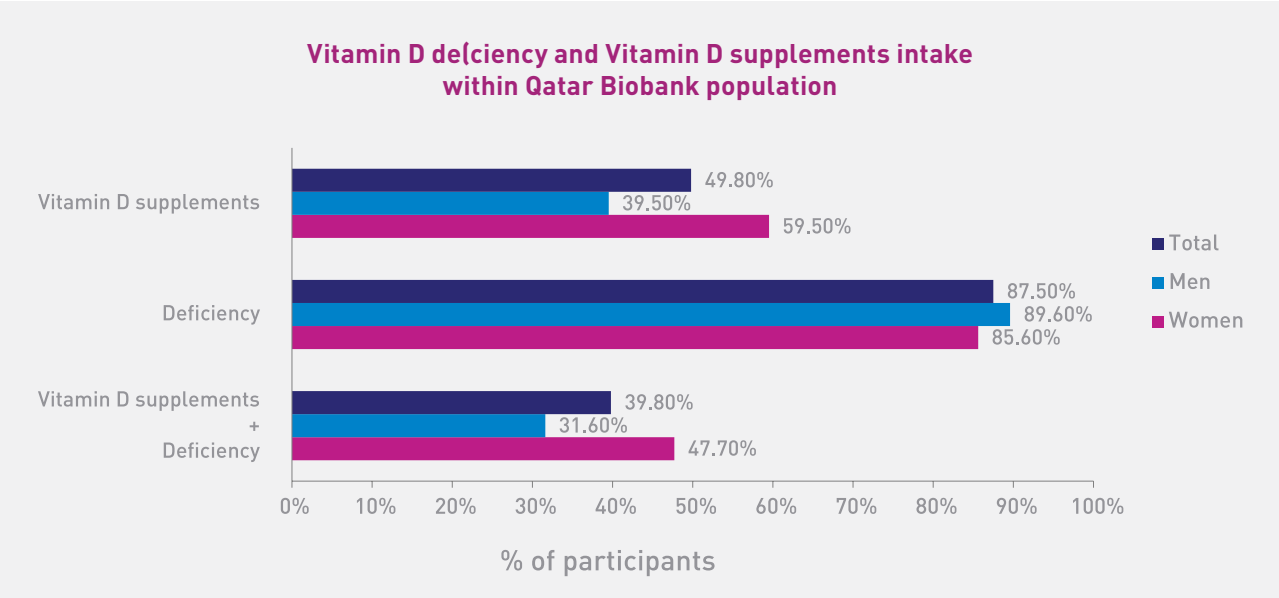

Figure 24 - Vitamin D de(ciency and Vitamin D supplement intake

Anthropometric Data Analysis

During the 3-hour clinic visit, Qatar Biobank participants are asked to complete a series of anthropometric measurements, assisted by our trained clinic staff. Standardized procedures are used, and all data is collected using our bespoke clinical information system. The tables below show the breakdown of the data for men and women. The data shows the average height for men is 172.6 cm, with a body mass index of 29kg/m2 and waist circumference of 94.9cm.

Table 11 - Anthropometric measurements

Men	Number	Mean	SD	Min	Max
Height (cm)	9577	172.6	6.7	126.2	203.4
Weigh (Kg)	9574	86.5	18.0	36.3	199.7
Waist Circumference (cm)	9562	94.9	13.6	55.0	192.0
Hip Circumference (cm)	9561	105.3	10.7	72.0	189.0
Systolic Blood Pressure (mmHg)	9577	118.3	13.7	83.0	210.0
Diastolic Blood Pressure (mmHg)	9577	71.8	10.4	33.0	134.0
BMI (kg/m2)	9574	29.0	5.5	13.4	68.3

Women	Number	Mean	SD	Min	Max
Height (cm)	9931	157.8	6.0	120.3	187.1
Weigh (Kg)	9925	75.1	16.6	30.1	178.9
Waist Circumference (cm)	9919	85.6	13.9	50.0	158.0
Hip Circumference (cm)	9919	108.9	12.2	65.0	191.0
Systolic Blood Pressure (mmHg)	9930	112.9	16.5	77.0	209.0
Diastolic Blood Pressure (mmHg)	9930	65.3	9.9	34.0	128.0
BMI (kg/m2)	9924	30.2	6.6	14.1	70.2

The data shows that for women the average height recorded was 157.8cm with a body mass index of 30.2kg/m2 and a waist circumference of 85.6cm.

During the clinic visit, the participant will provide around 60mls of blood which is collected for clinical analysis and the participant will receive feedback on the results from the clinical data interpretation specialists on approximately 76 different biomarkers.

Table 12 - Biomarkers pro(le of Qatar Biobank participants associated with different biological systems

	Men			Women		
Lipid profile	**Number**	**Mean**	**SD**	**Number**	**Mean**	**SD**
Cholesterol (mmol/L)	9541	4.9	1.0	9880	4.9	0.9
High Density Lipoprotein - HDL (mmol/L)	9535	1.2	0.3	9880	1.5	0.4
Low Density Lipoprotein - LDL (mmol/L)	9439	3.1	0.9	9859	2.8	0.8
Triglycerides (mmol/L)	9540	1.5	1.0	9880	1.2	0.7
Thyroid Function						
Free Triiodothyronine - FT3 (pmol/L)	9139	4.5	0.9	9556	4.1	0.8
Free Thyroxine - FT4 (pmol/L)	9494	14.1	2.4	9844	13.8	2.4
Thyroid Stimulating Hormone - TSH (mlU/L)	9477	2.0	2.6	9815	2.2	3.1
Diabetes Related						
Glycated Hemoglobin A1C%	9463	5.8	1.2	9873	5.7	1.2
Fasting Glucose (mmol/L)	5825	5.6	2.0	6484	5.5	2.0
Fasting Insulin (mcunit/mL)	5796	13.2	15.0	6460	11.9	11.8
Liver Function						
Alkaline Phosphatase - Alk Phos (U/L)	9537	71.8	19.7	9875	71.0	22.9

Alanine Transaminase - ALT (U/L)	9534	29.5	17.7	9853	17.6	12.6
Aspartate Transaminase - AST (U/L)	9536	22.4	16.9	9850	17.8	7.8
Bilirubin Total (umol/L)	9405	9.7	5.5	9303	7.1	3.7
Total Protein (gm/L)	9542	74.1	4.0	9853	73.5	4.0
Albumin (gm/L)	9544	44.0	3.7	9853	42.0	3.8
Gamma-Glutamyl Transferase (U/L)	9246	36.4	39.6	9712	22.6	24.8
Renal Function						
Urea (mmol/L)	9544	4.8	1.4	9881	3.9	1.3
Creatinine (umol/L)	9543	78.4	20.3	9881	57.4	16.1
eGFR (Ml/min)	Number	(%)	Number	(%)		
(>60 Ml/min)	4710	98.2	5481	98.7		
(≤60 Ml/min)	85	1.8	75	1.3		

Diabetes Mellitus has been identi(ed as a national health challenge in Qatar. The laboratory analysis of blood samples from Qatar Biobank participants show that almost 14% have HbA1c of ≥ 6.5%). 17% of participants self-reported as being diagnosed diabetic from the information gathered during the questionnaire stages and a further 2% had an HbA1c level of ≥ 6.5% but self-reported as not being diagnosed as diabetic. Familial history of diabetes was reported with 44% reporting a father, 48% reporting a mother and 31% reporting a sibling as being diabetic.

Table 13 - Diabetes Mellitus status within Qatar Biobank population

	Total		**Men**		**Women**	
Qatar Biobank Screening – HbA1c Levels	Number	%	Number	%	Number	%
Diabetes (HbA1c ≥ 6.5%)	2662	13.8	1369	14.5	1293	13.2
Pre-Diabetes (HbA1c: 5.7 - 6.4%)	3768	19.6	1928	20.4	1840	18.8
Normal (HbA1c < 5.7%)	12816	66.6	6166	65.2	6650	68.0
Medical History - Self-Reported Status						
Self-Reported Diabetic	3348	17.3	1489	15.8	1859	18.8
Self-Reported Diabetic (No) & HbA1c≥6.5	401	2.1	264	2.8	137	1.4
Self-Reported Diabetic (Yes) & HbA1c≥6.5	2220	11.6	1074	11.5	1146	11.8
Family History of Diabetes Mellitus						

Diabetic Father	8091	44.0	3918	43.5	4173	44.5
Diabetic Mother	9009	48.2	4219	46.5	4790	49.8
Minimum of One Diabetic Sibling	4863	30.9	2213	29.4	2650	32.2

QATAR GENOME **PROGRAMME**

The Qatar Genome Programme (QGP) is an ambitious population-based project that aims to position Qatar among the pioneering countries in the implementation of precision medicine.

- Qatar Genome participates in the COVID-19 Host Genetics Initiative, a global initiative to elucidate the role of host genetic factors in the susceptibility and severity of the SARS-CoV-2 virus pandemic. HGI included 190 studies from 46 countries and more than 1,100 researchers.

- A total of 22,000 whole genomes are sequenced, forming a substantial statistically representative sample for research.

- Empower Generations Consortium (EGC): Qatar Genome sponsored the 9th cycle of the "Genomics and Precision Medicine Track" for building local capacity in healthcare through Qatar University`s consortium, the track attracted over 60 students, from school grades 11 and 12. The students attended the virtual internship, and mentoring sessions with specialists in different discipline in precision medicine.

- Genome Heroes: Qatar Genome produces "Genome Heroes" series of stories, in Arabic, with 12 issues published, the stories are specially designed to educate children aged between 6-10 years about genomics.

- Path towards Personalized Medicine (PPM) awards: The 4th cycle of the Path Towards Precision Medicine was launched in partnership between Qatar Genome and the Qatar National Research Fund (QNRF) with 5 winning projects. PPM aims at supporting research that utilizes the genomic data to understand disease phenotype/genotype correlations, translating research (ndings into medically relevant outcomes and promoting engagement of healthcare providers and community in Qatar towards a better understanding of precision medicine. The cycles were launched with the following focus areas: Immunogenomics and precision immunotherapeutic approach, clinical implementation of pharmacogenomics, Multi-omics analysis of common chronic diseases such as cardiovascular diseases, neurological disorders and cancer, and Precision medicine digital e-solutions and applications.

- Pharmacogenomics: QGP aims to provide pharmacogenomic clinical implementation of widely prescribed medications in Qatar that may have impact on the patient's health care. The studies include personalizing statin prescription in Qatar in collaboration with HMC general hospital, HMC pharmacy department and QBB. Other studies focus on clinical implementation of Clopidogrel-PGx -guided therapy, reactive PGX testing for personalizing warfarin therapy in patient with prosthetic heart valve, and the impact of candidate pharmacogenes on clinical outcome of breast cancer patients using neoadjuvant antineoplastic therapy, which is a research study proposed in collaboration with the National Center for Cancer Care and Research (NCCCR).

- The Q-Chip:

- The QChip2PrecisionMedicine array: 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.

- The QChip2Research array: designed using a whole genome grid from a reference panel of 6,000 whole genome that can be used in the design of whole genome genotyping arrays.

- Familial Breast Cancer Project: A collaboration between QGP, QBB, HMC (NCCCR and DGD) 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 identi(ed that could potentially bene(t from referral to the NCCCR breast cancer high risk clinic.