Aging
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Diabetes Industry in the GCC

Case Study

2023

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Introduction

This case study provides a brief description of the diabetes epidemiological situation in Gulf Cooperation Council (also known as the GCC and comprising United Arab Emirates, Saudi Arabia, Oman, Kuwait, Qatar, and Bahrain).

Despite dedicated nationwide efforts to raise awareness against the harmful effects of fast-food consumption and sedentary lifestyle, the Arab population continues to struggle with an increased risk for metabolic disorders.

The International Diabetes Federation (IDF) has reported that GCC countries have one of the highest prevalence of diabetes and obesity in the world, given the sedentary lifestyles and increased consumption of foods that are high in calories and sugar. Of the 149,600 deaths in the GCC during 2020, nearly 73% were due to noncommunicable diseases (NCDs).

In this report, we reviewed genetic background of diabetes among Arab populations, analysed healthcare market and key market players that offer service for diabetes patients.

Executive Summary

Gulf Cooperation Council is the economic and political union of six major Arab countries that are located in the Persian Gulf. Its member states are Bahrain, UAE, Saudi Arabia, Oman, Kuwait, and Qatar. Founded in 1981, the union holds a vital position in the world for its military and diplomatic role. With a combined GDP of more than $1.6 trillion, it consists of some of the most prosperous and rapidly developing economies in the world.

Discovery of oil reserves in the Arabian Gulf since the 1930s increased overall wealth in these countries. Rapid socioeconomic transitions in the Arab countries in the rich post-oil era marked changes in the nutritional patterns and food habits, including a shift from locally grown natural products to a Western diet and change from nomadic way to urbanized life. These resulted in an increasingly sedentary lifestyle, widespread obesity, and an increased prevalence of diabetes and metabolic syndrome in the last few decades.

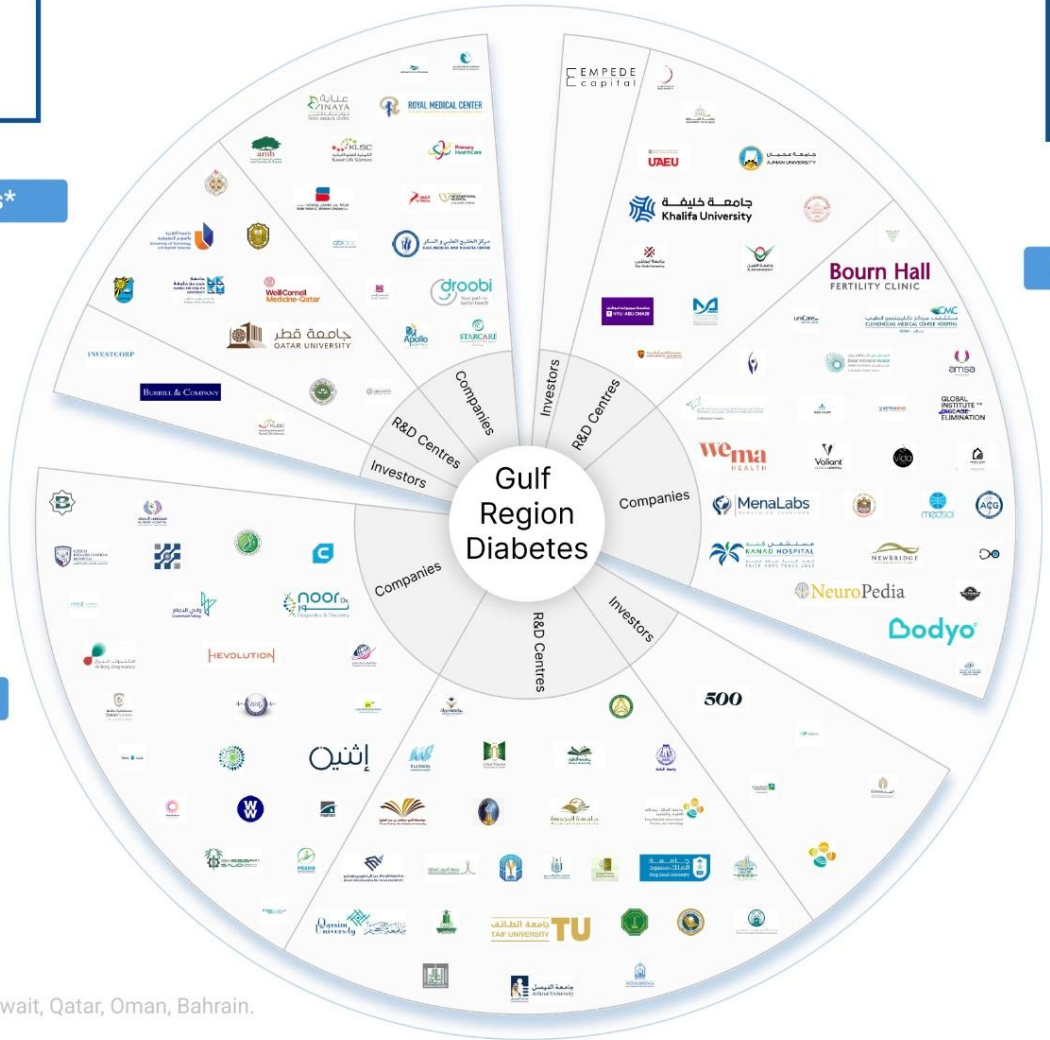
GCC

Diabetes Industry in GCC 2023

Companies - 63
Investors - 9
R&D Centres - 46

Others*

United Arab Emirates



Saudi Arabia

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*Others: Kuwait, Qatar, Oman, Bahrain.

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Diabetes Categorisation

Four Main Types of Diabetes	
Type 1 diabetes	historically known as juvenile diabetes
Type 2 diabetes	historically known as adult-onset diabetes
Gestational diabetes	when nondiabetic pregnant women develop high blood sugar levels
MODY*	relatively uncommon, dominantly inherited diabetes with at least 13 subtypes

** **MODY** – maturity-onset diabetes of the young*

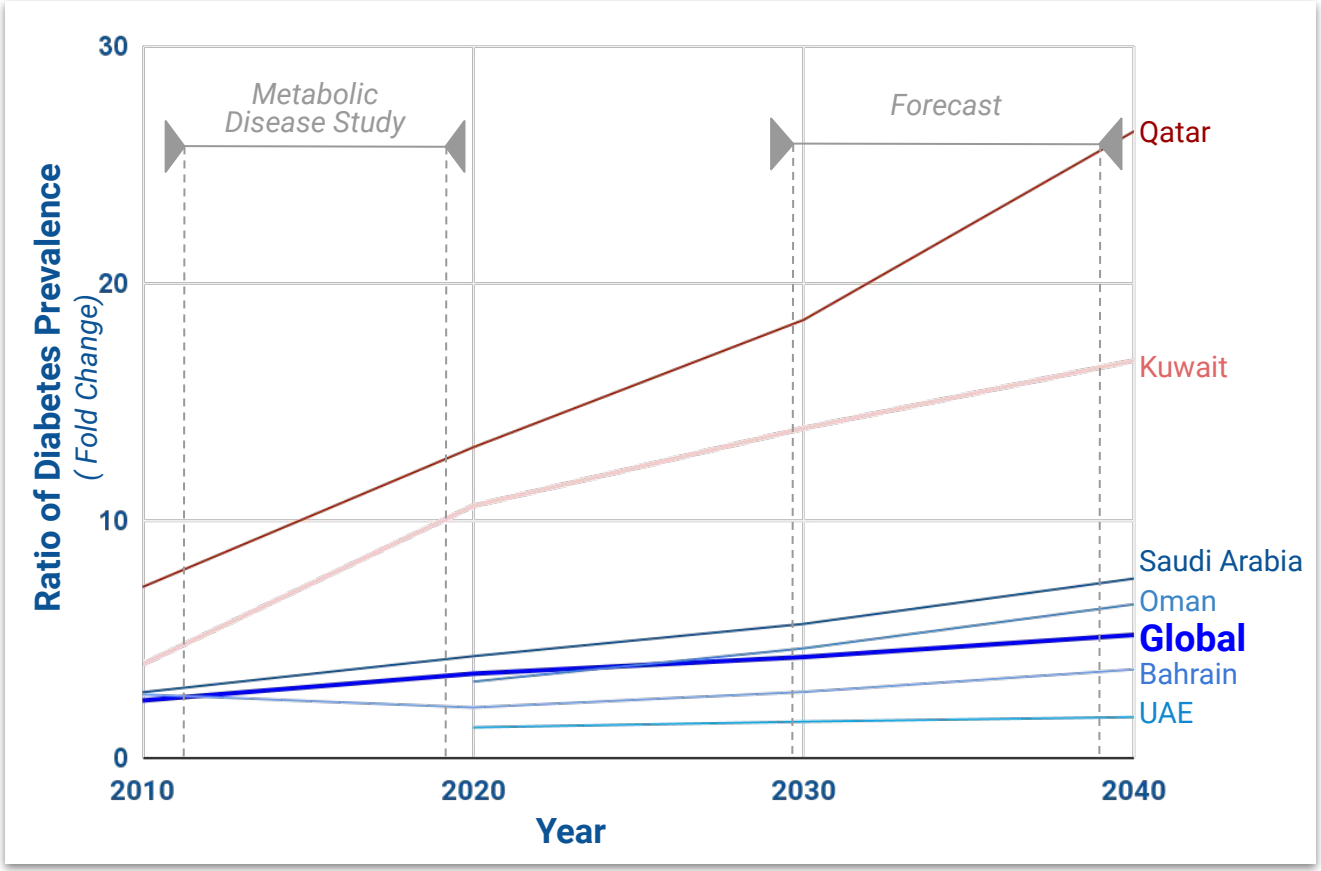
Diabetes, or diabetes mellitus, is a chronic health condition that affects how your body uses food for energy. Your body is not able to move sugar, or glucose, from your bloodstream into your cells, so you end up with a surplus in your bloodstream.

There are four main types of diabetes: Type 1 diabetes, Type 2 diabetes, gestational diabetes, and a maturity-onset diabetes of the young – relatively uncommon, dominantly inherited diabetes with at least 13 subtypes.

With all four, prompt diagnosis is critical, and so is compliance with your diabetes treatment. Over time, high blood sugar levels can damage your blood vessels and raise risk of you developing certain health problems (some life-threatening), so it's important to begin treatment — and stick with it faithfully — as soon as you get diagnosed.

This report investigates to what degree genetic determinants influence the well-known regional differences in incidents. We also identify genetic risk factors that may initiate the autoimmune process or promote already ongoing β-cell damage in Gulf countries.

Dynamics of Diabetes Prevalence Ratio in the GCC (age 10-79 years)

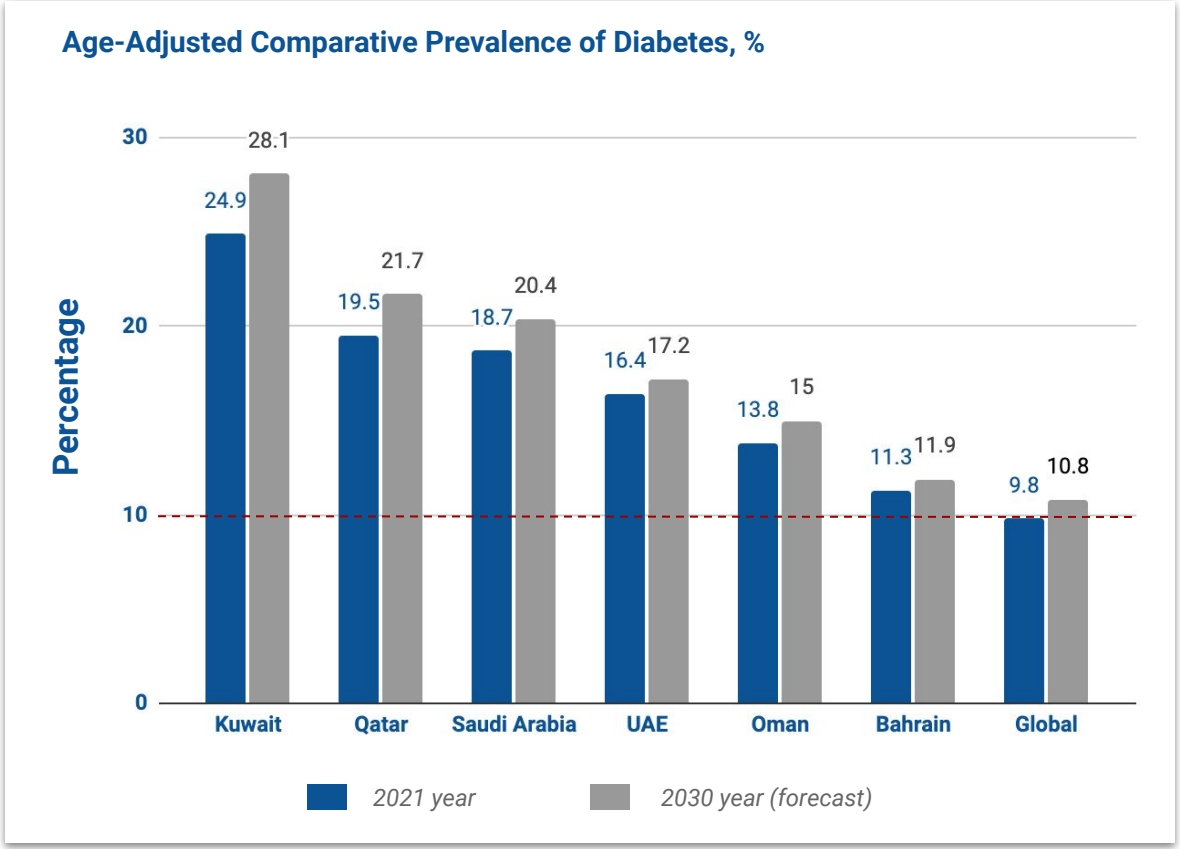


The global prevalence of diabetes continues to rise. The prevalence of diabetes is estimated by the **International Diabetes Federation (IDF)** to be **9.3% in 2019**, increased from **4.6% in 2000** in adults aged 20-79 years. The GCC appears to have a higher prevalence of diabetes than the global average. Five of the top 10 countries with the highest prevalence of diabetes (in adults aged 20 to 79 years) are in the Persian GCC: Kuwait (21.1%), Qatar (20.2%), Saudi Arabia (20.0%), Bahrain (19.9%) and the UAE (19.2%).

We calculated growth ratio of diabetes prevalence in Gulf countries (according 2000 year) from 2010 to 2040. As shown in the chart, the highest prevalence growth rate is in **Qatar** (15-25 fold vs. 2000 year) and **Kuwait** (10-15 fold vs. 2000 year). That is **five and three times faster than the global changes of this parameter for the same period.**

Source: International Diabetes Federation

Comparison of Age-Adjusted Prevalence in the GCC vs. Global



Age-adjusted comparative prevalence (AAP), also referred to as comparative prevalence, is the prevalence calculated by adjusting to the age structure of a standard population.

The **Global AAP** of adult diabetes was **9.8% in 2021** and expected to increase to 10.8% by 2030.

AAP of adult diabetes in the **Middle East and North Africa region**, which includes Gulf countries, is **12.2%,** the highest estimated prevalence of all the IDF regions. Prevalence in the this region is expected to increase to 13.9% by 2030.

The highest AAP is in **Kuwait (24.9%), Qatar (19.5%), and Saudi Arabia (18.7%)**. The forecast in 2030 predicts AAP in these countries of **more than 20% (28% in Kuwait)**.

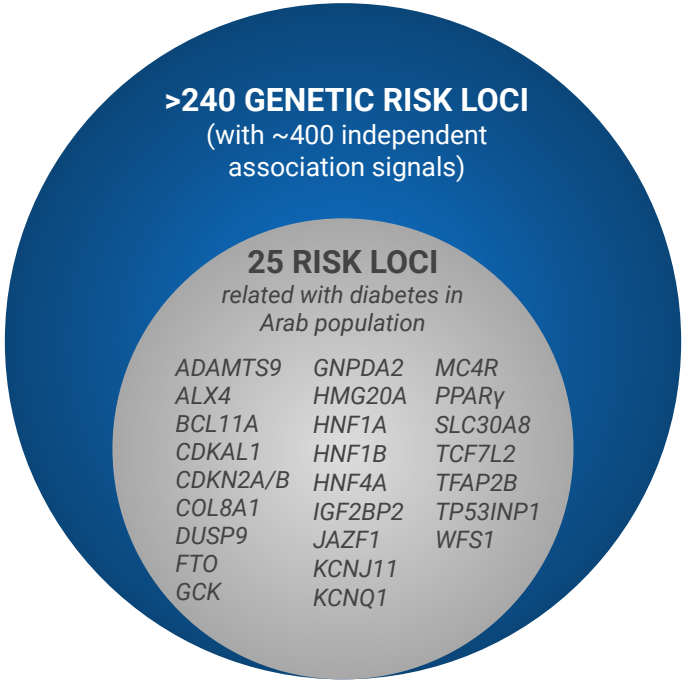
Taken together, such marked variation in incidence trends is consistent with an etiologic understanding of diabetes as a disease that involves environmental triggers acting with genetic susceptibility to initiate autoimmune destruction of pancreatic β-cells.

Source: International Diabetes Federation

Diabetes Genetic Background Among Arab Population

Genetic Background of Diabetes Among the Arab Population

Genetic Background in Arab Population



The genetic architecture of the population, the applicability of genetic models based on recessive mode of inheritance, the presence of genetic signatures of inbreeding due to the practice of consanguinity, and the pleiotropic effects of rare disorders on complex metabolic disorders provide a background for a high level of diabetes among the Arab population.

Unlike the European population, the Arab population lacks well-established genetic risk determinants for metabolic disorders, and the transferability of established risk loci to this population has not been satisfactorily demonstrated.

The most recent findings have identified over 240 genetic risk loci (with ~400 independent association signals) for Type 2 diabetes, but thus far, only 25 risk loci (as shown in the figure) have been replicated in the Arab population. To our knowledge, large-scale population- or family-based association studies are nonexistent in this region.

We conducted an analysis of literature on the Arab individuals from Gulf countries and delineated the genetic determinants for quantitative traits associated with anthropometry, lipid profile, insulin resistance, and blood pressure levels.

Source: Frontiers Endocrinology, 2019

Diabetes Family-Based Genetic Association Studies in the Arab Population

Novel Risk Loci Identified in Arab Individuals

METABOLIC TRAITS

OBESITY TRAITS

TCN2/rs9606756

BLOOD PRESSURE

MC3R/rs3827103

GLUCOSE

ZNF106/rs12440118

OTX2-AS1/rs7144734

HIGH-DENSITY LIPOPROTEIN

CETP/rs3764261

CETP/rs1864163

CETP/rs1800775

TOTAL CHOLESTEROL

[RPL32P9,LINC01213]/rs10935794

LIPID TRAITS

TRIGLYCERIDE

RPS6KA1/rs1002487

LAD1/rs11805972

OR5V1/rs7761746

PGAP3/rs2934952

ST6GALNAC5/rs10873925

NPY1R/rs10033119

SPP2_ARL4C/rs4663379

LINC00911_FLRT2/rs17709449

CDK12-NEUROD2/rs11654954

STARD3/rs9972882

BUD13/rs9326246

PLGRKT/rs17501809

LOC105376072/rs11143005

IGF1/rs10860880

IMPAIRED CELL FUNCTION

BETA-CELLS

KCNJ11 *HNF1A*

TCF7L2 *HNF1B*

WFS1 *GCK*

IGF2BP2 *CDKN2A/B*

CDKAL1 *ALX4*

SLC30A8 *BCL11A*

KCNQ1 *HMG20A*

JAZF1 *TP53INP1*

INSULIN FUNCTION

PPAR-gamma *ADAMTS9*

DUSP9 *HNF1B*

ADIPOCYTE

MC4R *FTO*

GNPDA2 *TFAP2B*

Published reports on diabetes genetics in the Arab population originate from Kuwait, Lebanon, Saudi Arabia, Qatar, UAE, and Oman.

Marriages in the Arab populations are traditionally often consanguineous. An increased risk of diabetes has been observed among the offspring of such consanguineous marriages in Saudi Arabia and Qatar. The familial clustering of diabetes has been reported in the Arab populations from Morocco, Tunisia, Oman, and Qatar. Additionally, the Arab populations exhibit many rare, Mendelian, and familial genetic disorders.

Thalassemia, cystic fibrosis, Huntington's disease, and Friedreich's ataxia are examples of rare disorders that increase patient's predisposition to diabetes.

Source: Frontiers Endocrinology, 2019

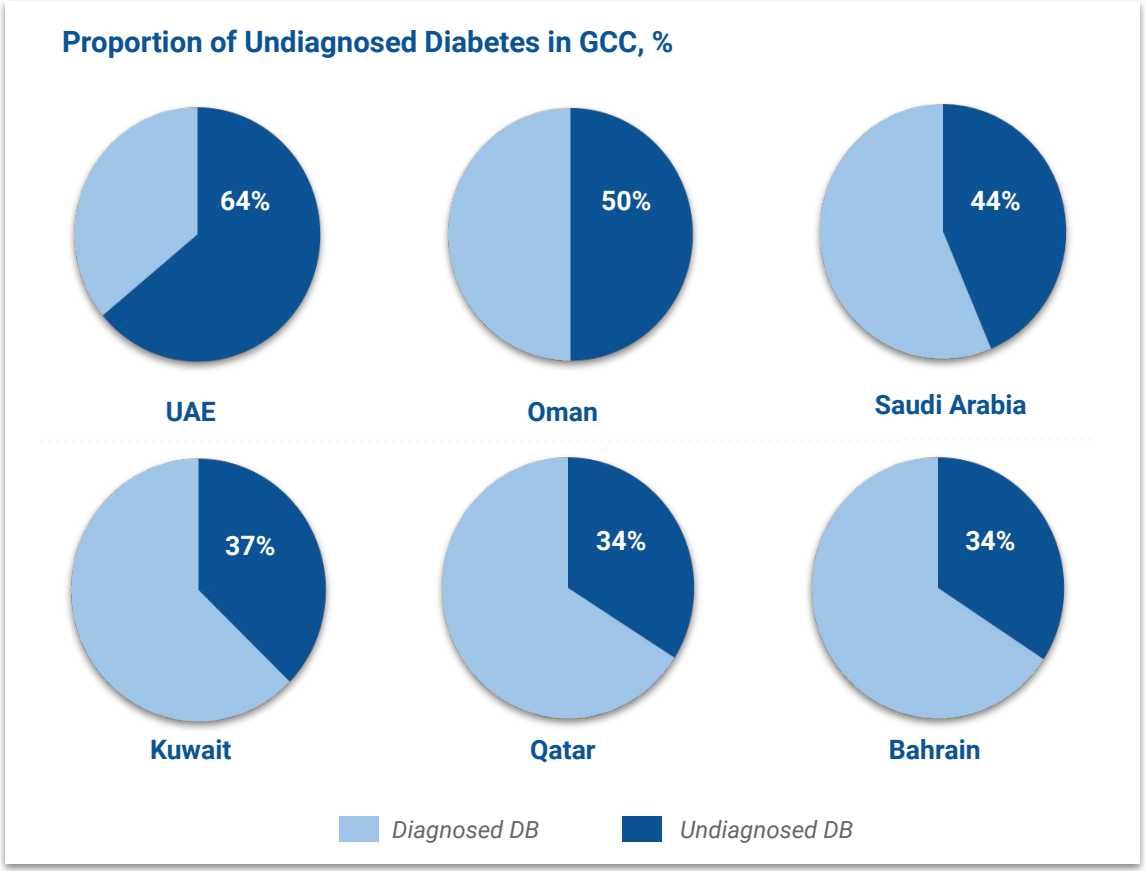
Monogenic Diabetes and the Genes Implication

NAME	GENE	LOCUS	CLINICAL FEATURES
MODY 1	***HNF4A***	*20q12–q13.1*	Mild-severe fasting and postprandial plasma glucose (PG) respond well to sulphonylurea agents.
MODY 2	***GCK***	*7p15–p13*	Mild fasting hyperglycemia. Less than 50% of carriers have overt diabetes, and microvascular complications of diabetes are rare. Treatment is not needed except in pregnancy (see below).
MODY 3	***HNF1A***	*12q24.2*	Same as MODY 1.
MODY 4	***IPF1/ PDX1***	*13q12.1*	Pancreatic agenesis.
MODY 5	***HNF1B***	*17cen–q21.3*	Overt diabetes in association with renal and genitourinary abnormalities.
MODY 6	***NEUROD1***	*2q32*	Rare, with phenotype characterised by obesity and insulin resistance.
MODY 7	***KLF11***	*2p25*	Very rare. Phenotype ranges from impaired glucose tolerance or impaired fasting glucose to overt diabetes.
MODY 8	***CEL***	*9q34.3*	Very rare. Associated with both exocrine and endocrine pancreatic deficiency and with demyelinating peripheral neuropathy.
MODY 9	***PAX4***	*7q32*	Very rare. Crucial transcription factor for beta cells development.
MODY 10	***INS***	*11p15.5*	Very rare. Usually associated with neonatal diabetes. < 1 % cases.
MODY 11	***BLK***	*8p23–p22*	These adapter proteins' nucleate formation contributes to the qualitative and quantitative control of beta cell signaling.
MODY 12	***ABCC8***	*11p15.1*	Very rare. Usually associated with neonatal diabetes. < 1 % cases.
MODY 13	***KCNJ11***	*11p15.1*	Very rare. Usually associated with neonatal diabetes. < 1 % cases.
MODY 14	***WFS***	*4p16.1*	Rare. Usually associated with DIDMOAD syndrome. Also, seen with early onset of diabetes.< 1 % cases.

Source: Clinical Diabetes and Endocrinology V.2, 18 (2016)

Diabetes Diagnostics in the GCC

Quality of Diabetes Diagnostics in the GCC



Diabetes can be detected easily during a **routine screening exam and blood test**. However, it frequently **can go undiagnosed for years** unless a physician draws a blood sample to check the blood glucose.

The diagnostic biomarkers for diabetes as established by the WHO and includes **2-hour glucose level** and **fasting glucose level**. The Revisions for the 2010 Clinical Practice Recommendations now include the use of **glycated hemoglobin (HbA1c)** as a diagnostic criterion for diabetes, with HbA1c values ≥6.5% being diagnostic.

Children and adolescents with diabetes are more likely to go along with **symptomatic hyperglycemia** (polyuria, polydipsia, and weight loss) than are **adults**, who are often **asymptomatic** at the time of diagnosis.

Among Gulf countries, the highest level of undiagnosed diabetes is in the UAE (64%), Oman (50%), and Saudi Arabia (44%).

Kuwait, Qatar, and Bahrain show better level of diagnostics, and estimate level of undiagnosed diabetes in these countries is less than 40%.

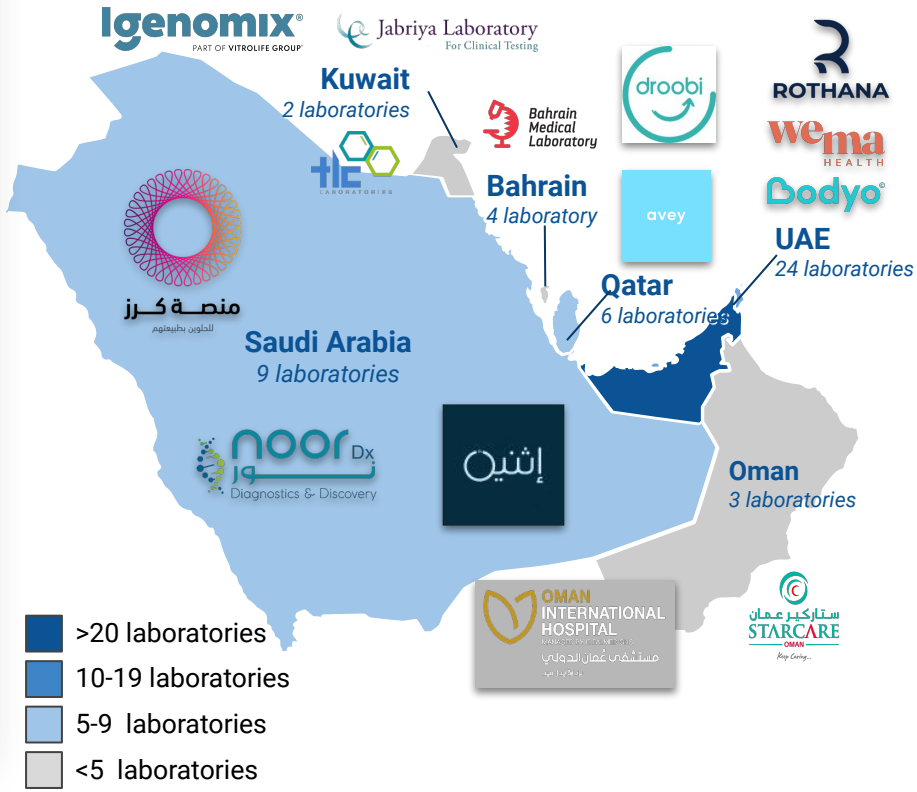
Source: International Diabetes Federation

Number of Healthcare Companies in the GCC by Country

Advanced medical devices used for the early diagnosis of the diseases, along with growing advancement in the pathological tests, diagnostic tests, and imaging techniques support the growth of the Gulf diagnostic labs market in the upcoming 5 years. The leader on the market of diabetes diagnostics and treatment are the UAE and Saudi Arabia.

Private labs with higher investments and financial supports can afford the inexpensive medical devices with latest technology, thereby supporting the growth of the market. The private sector is also playing an important part in the development of the healthcare industry, encouraged by mandatory health insurance and other reforms. Private players are now being incentivised through public–private partnerships (PPP) to invest and manage operations while the public sector becomes the regulator. For example, in Dubai, the "PPP Law" governing public–private partnerships (Law No.22 of 2015), which came into force in November 2015, seeks to encourage the private sector to be innovative and creative in identifying and funding projects for Dubai. Similarly, in Saudi Arabia: Although the framework for large-scale PPP projects in the Kingdom is yet to be developed, and PPP-style procurement will require careful consideration of some key issues. It is expected to pick up, encouraged by wide-raging institutional changes to the country's fiscal policy.

Number of Diagnostic Centres by Country



Source: International Diabetes Federation

Case Study: Saudi Arabia

NoorDx specialises in genomics, innovation, targeted gene panels, molecular diagnostics, and bioinformatics. NoorDx harnesses the power of knowledge, data, technology, and innovation to create solutions designed to diagnose, guide treatment, and enhance the practice of Precision Medicine in Saudi Arabia and the wider MENA region.

Karaz Health is dA Diabetes ecosystem and infrastructure using Artificial Intelligence (AI) and Data Science. This continuous monitoring app syncs with your continuous glucose monitor to engage in fun and supportive gamified community. Karaz Health offers personalised support.

Ithnain is an app that features a diabetes coach and an integrated medical team that develop an integrated plan to balance a user's life. More than 4,000+ diabetic patients use this product. Whether patients have Type 1 or Type 2 diabetes, gestational diabetes, prediabetes, or one of the rare types, daily education and follow-up sessions are essential to reduce complications.

Case Study: United Arab Emirates

Bodyo combines a revolutionary integrated AiPod, a multilevel web platform, and app. The AiPod and Health Lounge can perform 26 physiological measurements in 6 minutes. These measurements are biometrics, body composition, metabolism, oximetry, hydration, blood pressure. Bodyo is part of a voluntary approach to prevention and prediagnosis of chronic diseases (obesity, diabetes, heart and vascular diseases, osteoporosis), undernutrition, and soon neurodegenerative diseases such as Parkinson and Alzheimer.

WEMA Health is a HealthTech start-up focused on weight loss and diabetes. Rooted in science and founded by an industry leading team of doctors and health coaches, the programme takes an innovative approach to whole body health and weight loss.

Rothana cares about your health by selling, promoting, and distributing new technology, featuring unique products which will help patients, doctors, and nurses have new ways of managing, treating, and diagnosing health conditions. Rothana provides medical, cosmetic, and nutritional products for wound care and diabetic foot care.

Case Study: Qatar

Droobi Health is a digital behavioural company that empowers people with chronic conditions through healthier lifestyle. The company offers virtual-first care programmes for common and costly chronic conditions. Droobi helps patients improve their blood sugar control with a combination of the smart AI-enabled platform and dedicated healthcare team. The platform provides personalised medical service and diagnostics. Droobi members following the diabetes programme showed 0.91% HbA1c reduction on average, a 33% decrease in glycemic variability, a 30% increase in the frequency of in-range readings, and a 10% decrease in the frequency of hyperglycemic readings.

Avey is a mobile application that enables users to self diagnose, connect with doctors, and order medicines online. Avey serves more than 1 million users. This digital platform covers ~80% of common chronic diseases, as well as diabetes.
By simply asking a couple of questions, Avey provides patients with the proper diagnosis with 90% accuracy. It also connects with the right doctors physically or virtually, delivers the prescribed medicine directly to patient's door. Patients can also shop for all kinds of health and wellness products and consult with experienced pharmacists at any time from the comfort of their home.

Case Study: Bahrain

Bahrain Medical Laboratory (BML) provides a full range of medical testing for patients, public and private doctors, and to outpatients in both private and public hospitals. Bahrain Medical Lab works in collaboration with two international medical laboratories for more advanced testing. BML is committed to quality and fast services for examining biomarkers of diabetes and blood insulin level.

BIO Lab offers whole genome sequencing (WGS) for adults and newborns. WGS is a comprehensive method for analysing the entire genome. Genomic information has been useful in identifying genetic disorders, characterising mutations that drive chronic disease development, and tracking disease outbreaks. This method predicts risks of diabetes developments in children whose parents have pathogenic allele. Additionally, Biolab provides genetic examination of ideal weight.

ExpressMed Laboratories is a pathology laboratory based in the Kingdom of Bahrain that provides services to hospitals, clinics, private practices, and research facilities. Its main laboratory is located in Zinj area. ExpressMed Laboratories offers WGS for adults and newborns for prediction cardiovascular and diabetes risks.

Case Study: Kuwait

Jabriya Laboratory for Advanced Clinical Testing was established in November 1997 by joining Central Gulf Medical Company and Gulf Laboratory. The provision of high-quality clinical laboratory testing services to all customers, regardless of their socio-economic status, and empowering them to make better healthcare decisions to live a healthier lifestyle and safeguard their health for a prosperous future.

Igenomics offers pioneering tests to help reproductive health professionals diagnose and treat their patients. Diagnostics is based on Next Generation Sequencing (NGS) of multiple genes associated to a disease, condition, or phenotype. For diagnostics of endocrine system and diabetes, Igenomics provides two panels: Monogenic and Syndromic Obesity Precision Panel (the heritability of obesity), maturity-onset diabetes of the young and Neonatal Diabetes Mellitus.

TLC Laboratories is united by a set of core values that reflect the care and expertise required to consistently deliver exceptional medical services. TLC offers a wide range of diagnostic tests in biochemistry, haematology, microbiology, immunology, serology, histology, and cytology. TLC is committed to advancing scientific and clinical practice through innovation, research, and development.

Medical Facilities for Diabetes Treatment

Major Diabetes Clinics in the GCC, 2023

The total number of medical centres and clinics specialised on diabetes counts more than 70 facilities.

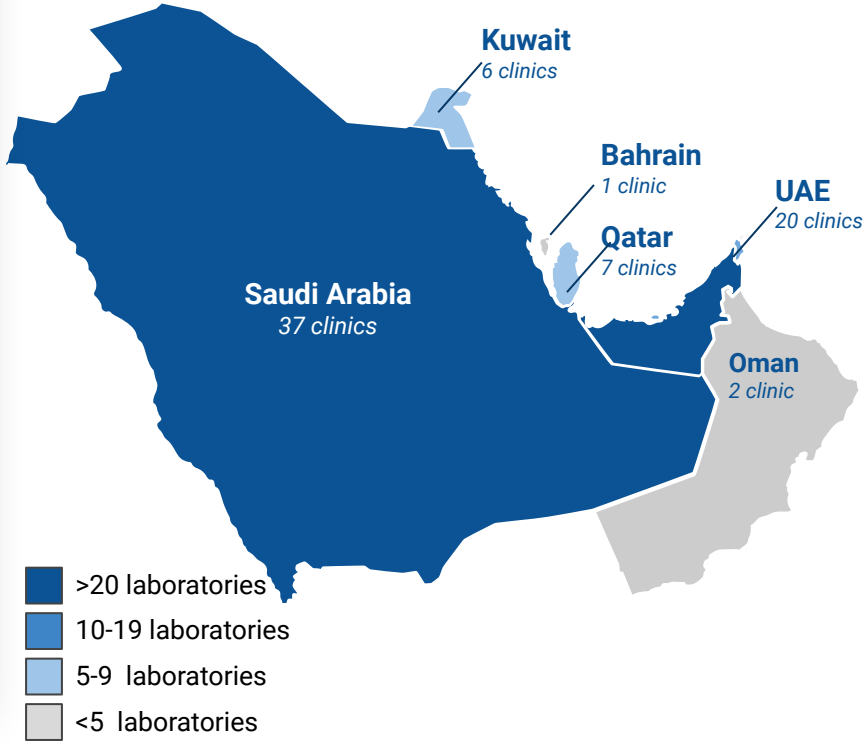
Over 50% of clinics are located in Saudi Arabia (37 clinics) and 28% – in the United Arab Emirates (20 clinics). The most important medical centres are Diabetic Centre of King Faisal Specialist Hospital and Research Centre (Saudi Arabia) and Jazan Diabetes Centre (UAE).

Another key medical facility in the GCC are Hamad Medical Corporation (Qatar) and Dasman Diabetes Institute (Kuwait).

Dasman Diabetes Institute (Kuwait) develops research projects, educational programmes and awareness-raising initiatives. More than 15 clinical trials for diabetes are ongoing in this medical centre.

Overall, the number of the advanced medical centres is shifted to western part of the region and correlates with the size of the city and the local budgets. Since 2015 the local government is responsible for medical facilities. As a result, the richest cities have the most developed medical services.

Number of Medical Centres by Countries



Source: International Diabetes Federation

Case Study: Saudi Arabia

King Khaled Eye Specialist Hospital (Riyadh, Saudi Arabia) provides the best patient experience and clinical outcomes in ophthalmology clinical practices by enhancing high-performance culture, patient engagement, training and education, community support, business-partner collaboration, cutting-edge technology adoption and international-accredited research publications. This medical centre is involved into clinical trials for treatment of ophthalmologic complications in diabetic patients.

Al Noor Specialist Hospital is a Saudi governmental hospital. It offers the highest modern medical technologies in diagnosis and treatment with high levels of medical competencies, nursing staff with scientific qualifications, in addition to medical services in its outpatient clinics, which cover all specialties, as well as emergency services, medical laboratory, and radiology.

Diabetes and Endocrinology Centre in Buraidah provides integrated medical services for diabetics. It is a highly gratifying experience, as is the effort that has been made during the last period with positive results, which also confirms the achievement of its objectives set to launch the operation of the centre on time.

Case Study: United Arab Emirates

Imperial College London Diabetes Centre provides personalised service built on an effective diabetes management system that allows the patients to undergo all necessary tests, receive results, and meet with the treating physician in the same appointment, ensuring a seamless patient experience. The Centre offers a comprehensive range of diabetes services, including endocrinology, cardiovascular, eye, kidney, and foot care, as well as antenatal/gestational and juvenile diabetes care, nutritional advice, and radiology.

Rashid Centre for Diabetes and Research (RCDR) is a JCI-accredited unique centre of excellence that combines compassionate and modern diabetes, obesity, and endocrine care with high-quality research and professional education. RCDR aims to be the leading all-inclusive comprehensive diabetes care centre in the region. As part of this goal, RCDR has partnered with Cerner to develop the first electronic health record (EHR) registry in the Middle East and a guided workflow focusing on patient-centred care.

Abu Dhabi Stem Cells Centre is the biggest research hub for chronic disease and regenerative medicine in the UAE. Now the centre is providing clinical trials of therapies to treat two of the biggest chronic health issues facing the UAE: diabetes and multiple sclerosis. It will explore therapeutic alternatives and analyse the efficacy of intervention.

Case Study: Qatar

Hamad Medical Corporation (HMC) is the main provider of secondary and tertiary healthcare in Qatar and one of the leading hospital providers in the Middle East. For more than four decades, HMC has been delivering the safest, most effective, and compassionate personalised care to its patients. HMC manages 12 hospitals – nine specialist hospitals and three community hospitals – as well as the National Ambulance Service and home and residential care services.

Sidra Medicine is a 400-bed women's and children's hospital, medical education, and biomedical research centre in Doha, Qatar. Sidra Medicine Research Branch collaborates with numerous educational and research institutions. The research centre has created partnerships with these organisations to carry out specific research projects and activities, continuing the advancement of world-class healthcare and medical research.

Weill Cornell Medicine-Qatar (WCM-Q) is the first American medical school established outside the United States, is at the forefront of medical education, biomedical research, and population health in the Middle East. WCM-Q's Population Health Programmes, with their focus on wellness of the entire population, are inspiring all ages, ranging from school children to adults, to take an active part in self-care and perform at their peak. WCM-Q's researchers investigate the essential role played by a protein called Sirtuin1 in the metabolism of fat, and how depletion of this protein is related to obesity and Type 2 diabetes.

Case Study: Oman

The Oman International Hospital (OIH) adopts the highest international quality standards, combining the skills of renowned local medical teams and international medical doctors to provide excellent healthcare services and the most sophisticated technological solutions available. OIH ensures an integrated clinical information between multidisciplinary teams to produce the best diagnoses and therapeutic solutions. The comprehensive, cutting-edge technology, along with communication features, safety alerts, reporting capabilities, and accessibility from remote locations has improved our ability to take action on critical patients in ways that would be impossible otherwise.

Starcare Hospital is a multispecialty hospital that offers 24-hour emergency care, outpatient, day-care, and inpatient services. Starcare Hospital runs an exclusive clinic for diabetes, endocrine, and metabolic disorders. The department is committed to early diagnosis and evidence based management of Type 1 and Type 2 diabetes, gestational diabetes and long term and short term complications arising from the various kinds of diabetes. They are competently treated thanks to state-of-the-art diagnostic facilities and a team of committed doctors. The hospital is also fully equipped to handle other endocrine and metabolic issues like thyroid disorders, obesity, and osteoporosis. The department also offers surgical treatment, which improve Type 2 diabetes in nearly 90 % of patients.

Case Study: Bahrain

مركز الخليج الطبي و السكر
GULF MEDICAL AND DIABETES CENTER

Gulf Medical and Diabetes Centre (GMDC) offers diabetes, endocrinology, and ophthalmology treatments.The Centre offers a comprehensive range of medical and diabetic services supported by state-of-the-art radiology, laboratory, and pharmacy. Gulf Medical and Diabetes Centre is located in Manama, next to the Salmaniya Medical Complex and Arabian Gulf University.

GMDC's team of highly trained and skilled endocrinologists, diabetologists, nurses, and clinical dietitians offer a holistic approach to the treatment of diabetes and other endocrine diseases.

GMDC provides a comprehensive range of services for the evaluation, treatment, and management of diabetes and other endocrine conditions for both adults and children.

Registered dietitian works with individuals and their physicians to help develop personalized diabetes care plans that teach them how to plan meals, monitor glucose levels, manage medications, and adopt beneficial lifestyle habits, such as diet and exercise.

The department offers recent advanced endocrine and diabetes treatments along with highly efficient monitoring systems, such as continuous glucose monitoring devices, instant HbA1c checks, 24 hour blood pressure monitoring systems, managing insulin pump patients, comprehensive thyroid checks and detecting early thyroid cancer, comprehensive dynamic endocrine tests and interpretations, along with bone health, such as osteoporosis prevention and treatment.

Case Study: Kuwait

مركز الخليج الطبي و السكر
GULF MEDICAL AND DIABETES CENTER

Dasman Diabetes Institute (DDI) Dasman Diabetes Institute (DDI) was established under the patronage of His Highness Sheikh Jaber Al Ahmed Al Sabah, the late Amir of the State of Kuwait, and the Kuwait Foundation for the Advancement of Sciences (KFAS) to combat the prevalence of diabetes in Kuwait.

Since its inauguration in 2006 by His Highness Sheikh Sabah Al Ahmed Al Sabah, the Institute has strived to address the diabetes epidemic in Kuwait through focused diabetes research, integrated prevention, training, and education.

Through its sectors, DDI aims to create a platform that applies its knowledge from basic sciences to clinical trial point of care applications, scientific findings, and drug discoveries or from bench-to-bed.

DDI's operations sector manages service performance, technological proficiency, data management, and employee performance to achieve organizational transformation and financial sustainability.

DDI's research sector applies knowledge and expertise to further understand diabetes in the Arab population and improve health outcomes. By identifying gene variants, clinically relevant biomarkers, dietary components, and other risk factors, they strive to define new medical approaches to diabetes care.

The medical sector utilises the highest standards of medical care and the latest research findings to tackle all aspects of diabetes prevention, treatment, and management.

Diabetes Clinical Trials in the GCC

Clinical Trials in One Sight, 2010-2022

~188
clinical trials ongoing in the GCC

>110
clinical trials are on the active stage in 2023

Saudi Arabia
showed the highest proportion, contributing with 66.6% of the clinical trial from the region

6 countries
collaborate with GCC countries clinical sites that provide research of new therapies

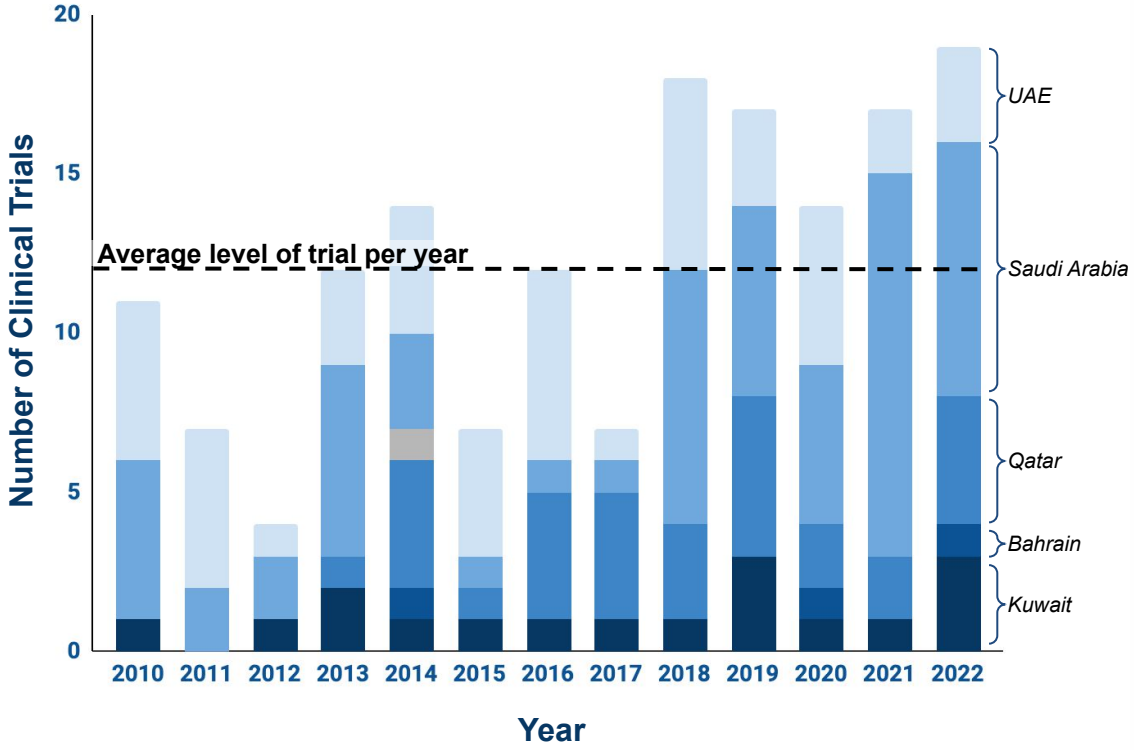
0.37%
of the trials conducted globally

38
local clinical trial sponsors with 113 active trials

Source: Aging Analytics Agency analysis

Diabetes Clinical Research Activity in the GCC

Dynamic of Clinical Trial in the GCC, 2010-2022



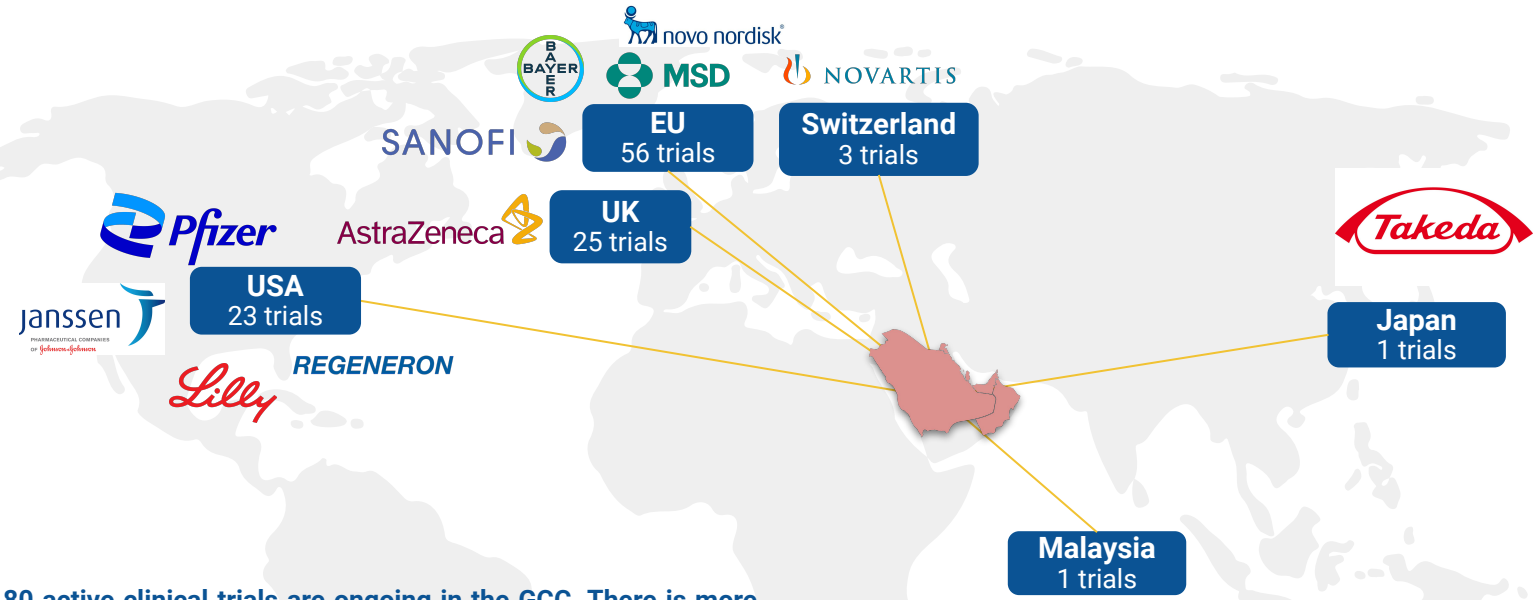
Since 2010, **ClinicalTrials.gov** listed some **188 trials** with sites i**n countries from the GCC**. These countries have attracted pharmaceutical companies from around the world that want to conduct clinical trials of their products. The **average level** of clinical studies until 2022 was pretty stable: **around 12 trials per year**.

At the **beginning of 2022**, **19 new trials** were registered. The total number of trials in 2022 is almost **twice higher** than 10 years ago (2010-2011).

The leaders in clinical research are Saudi Arabia (60 clinical trials), the UAE (48 clinical trials), and Qatar (30 clinical trials). The lowest number of clinical trials was founded in Oman. There was only one clinical research during last decade.

Source: Clinicaltrials.gov

Geography of Collaboration for Ongoing Clinical Trials, 2023

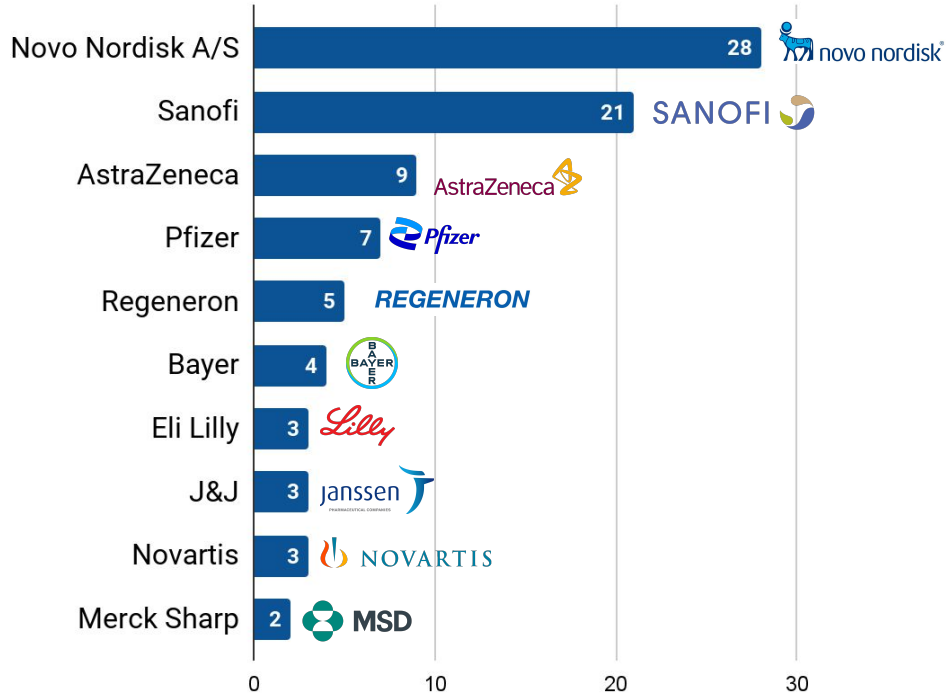


Over 180 active clinical trials are ongoing in the GCC. There is more than 100 collaborations from 25 countries in the whole world. The GCC has the most robust cooperation with the European Union (25% of trials), the United Kingdom (11%), the USA (10%), and Switzerland (1%). Saudi Arabia showed the highest proportion, contributing with 66.6% of the clinical trials from the region.

Source: Aging Analytics Agency analysis

Top International Companies Provided Clinical Trials, 2023

Companies by the Number of Active Clinical Trials in the GCC



GCC attracts the pharmaceutical companies to conduct clinical trials. Most international companies had one to three active trials in this region in 2022. The major players on the market that have **trials in the GCC are** Novo Nordisk (Denmark), Sanofi (France), AstraZeneka (UK), Pfizer (USA), and others.

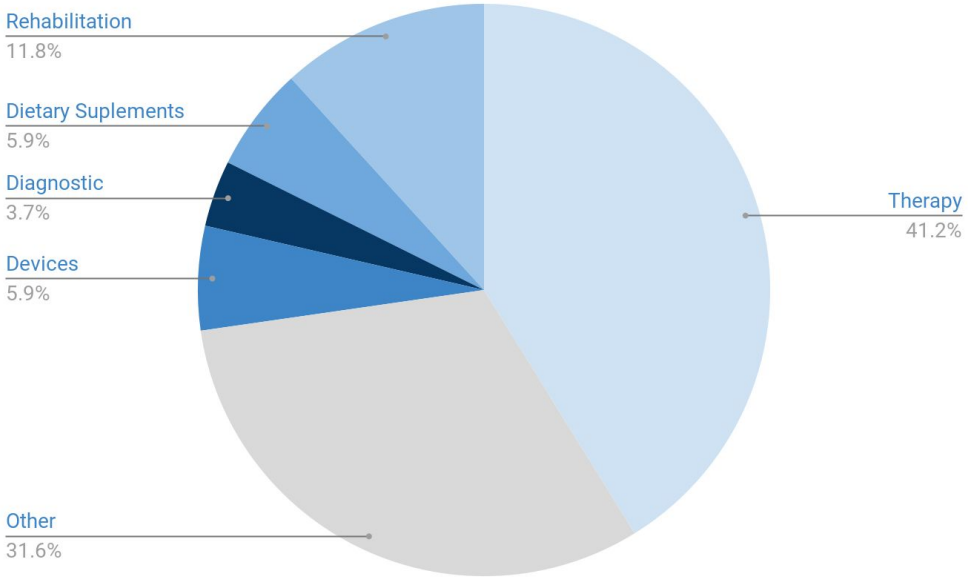
They provide their clinical research in cooperation with arabic medical facilities in **Phase III-IV**, which is toward the end of the process where safety and effectiveness are measured against existing standard treatments.

Two of the pharmaceutical companies with the most clinical trials in the GCC – Novo Nordisk and Sanofi – have more than 20 clinical trials underway.

Source: Aging Analytics Agency analysis

Clinical Trials Structure by Type of Investigation, 2023

Proportion of Clinical Trials by Approach



61% — ***Biologics***
- *Human Insulin*
- *anti-PCSK9 antibodies*
- *anti-VEGF antibodies*
- *GLP1 antagonists*

28% — ***Small Molecules***
- *SGLT2 inhibitors*
- *PPAR-γ inhibitors*
- *DPP-4 inhibitors*
- *CACNA2D1 inhibitors etc.*

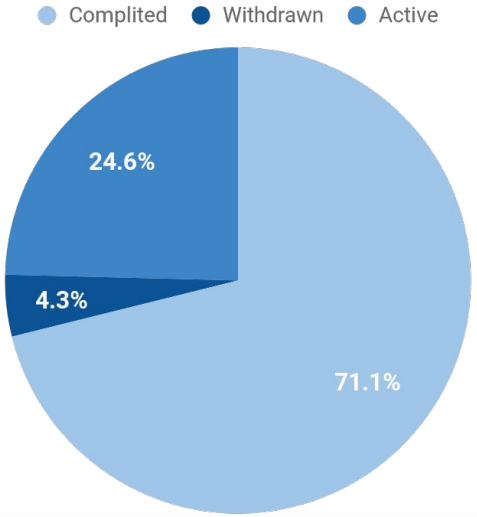
9% — ***Biosimilars***
- *Glucagon analogues*
- *VEGF inhibitors*
- *Vitamin D derivatives*

3% — ***Natural Products***

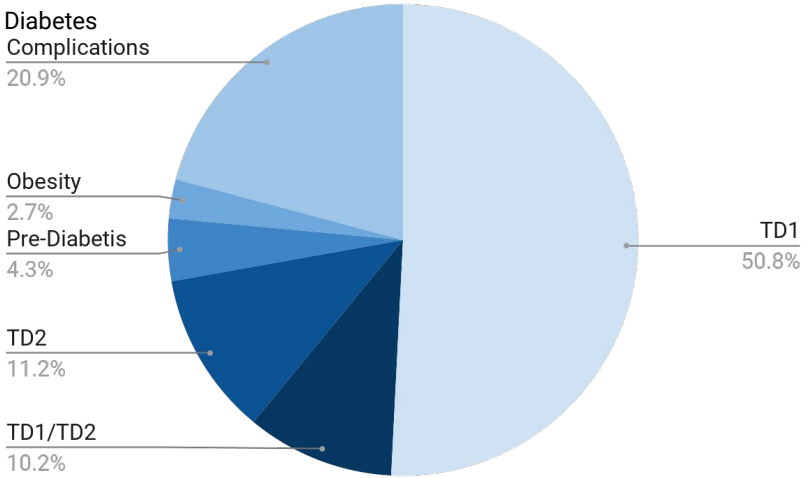
Investigation of new therapeutic approaches share 41% of the total number of clinical trials. More than half of them study a new biologics that includes recombinant human insulines and antibodies against PCSK9, VEGF, and GLP1. Small molecules share 28% of clinical trials and other approaches – less than 10% (biosimilars and natural products).

Structure of Clinical Trials in the GCC, 2023

Proportion of Clinical Trials by Activity, 2010-2022



Proportion of Clinical Trials by Indication



Since 2010, more than 70% of clinical trials in the GCC are completed (133 trials); almost 25% are active (46 trials), and around 4% are withdrawn (eight trials).

Among diabetic clinical trials the first place take Type 1 diabetes (TD1) (95 trials, >50% of total number of clinical trials). The second place takes diabetes complications (39 clinical trials) that includes pathologic conditions related with diabetes: diabetic foots, diabetic nephropathies, macular edema, arthropathies, gestational diabetes in pregnancy, etc.

Source: Aging Analytics Agency analysis

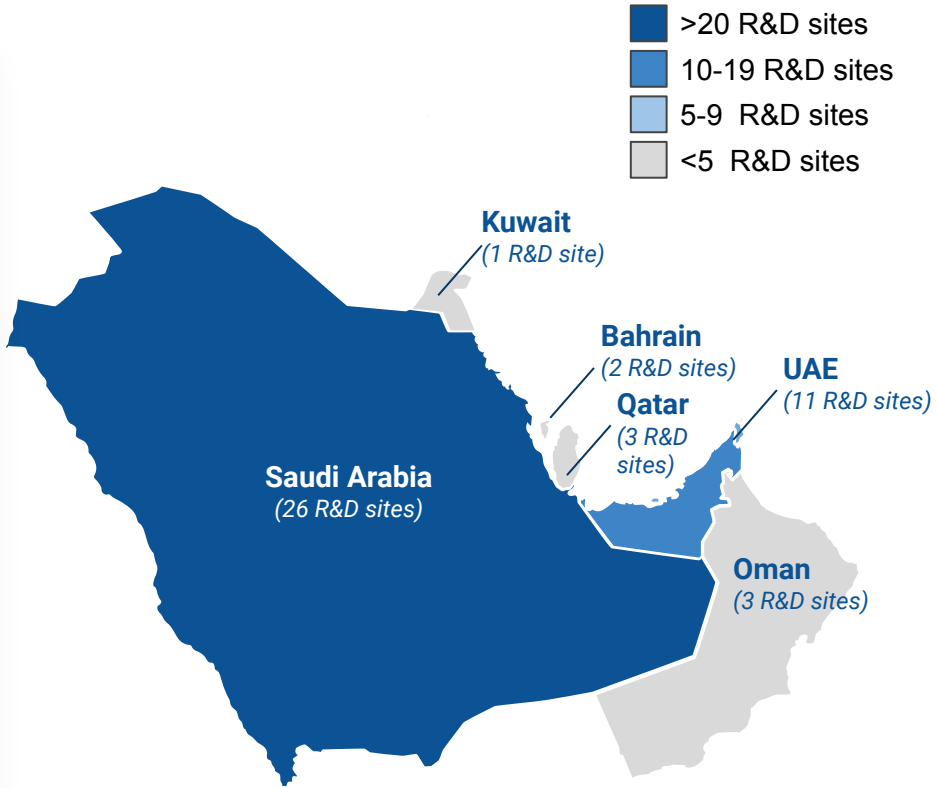
R&D Hubs for Diabetes Research

Geography of R&D and Scientific Labs in GCC, 2023

The total number of R&D sites in the GCC is more than 45. The major scientific hub is **Saudi Arabia** where **26 research centres** that investigate diabetes are placed. The most important are **Umm Al-Qura University**, **King Abdulaziz University**, **King Saud University**, **King Abdullah University of Science and Technology, Alfaisal University, King Saud bin Abdulaziz University for Health Sciences, Imam Abdulrahman Bin Faisal University, Taif University,** etc.

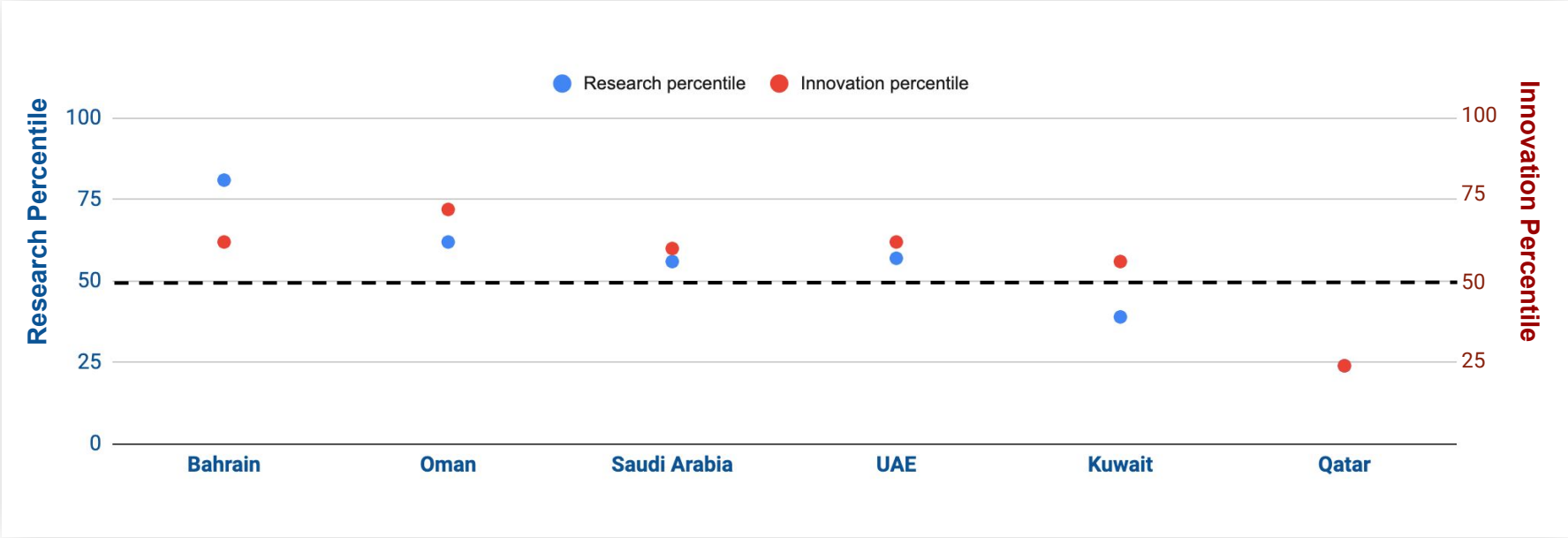
The second hub is **UAE** with more than **10 research centre**. The major diabetes studies are in **United Arab Emirates University**, **Zayed University**, **Abu Dhabi University**, **New York University in Abu Dhabi,** etc.

Oman and Qatar also have scientific laboratories and research centres, but their number is less than five in each country.



Source: Aging Analytics Agency analysis

Average Research and Innovation Ranking of Universities in the GCC

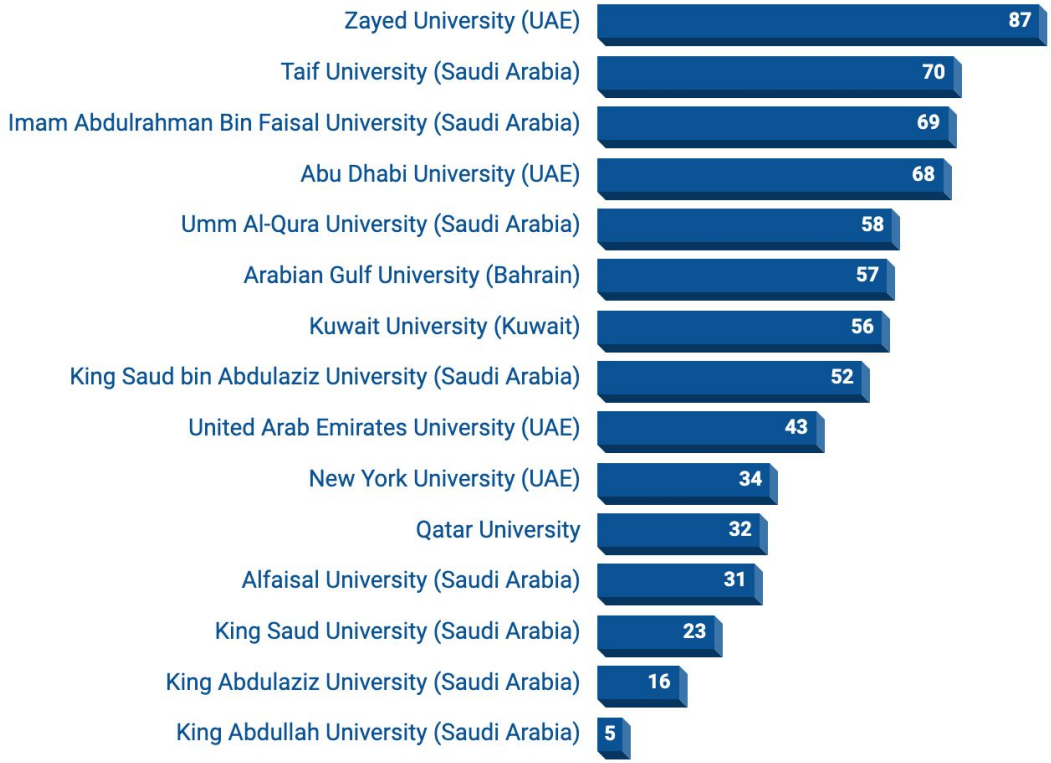


The **SCImago Institutions Rankings (SIR)** is a classification of academic and research-related institutions ranked by a composite indicator that combines three different sets of indicators based on research performance, innovation outputs, and societal impact measured by their web visibility. For comparative purposes, the value of the composite indicator has been set on a scale of 0 to 100.

Source: SCImago Institution Ranking

Top 15 Universities that Conduct Diabetes Research

Ranking of Innovativeness for Universities from the GCC



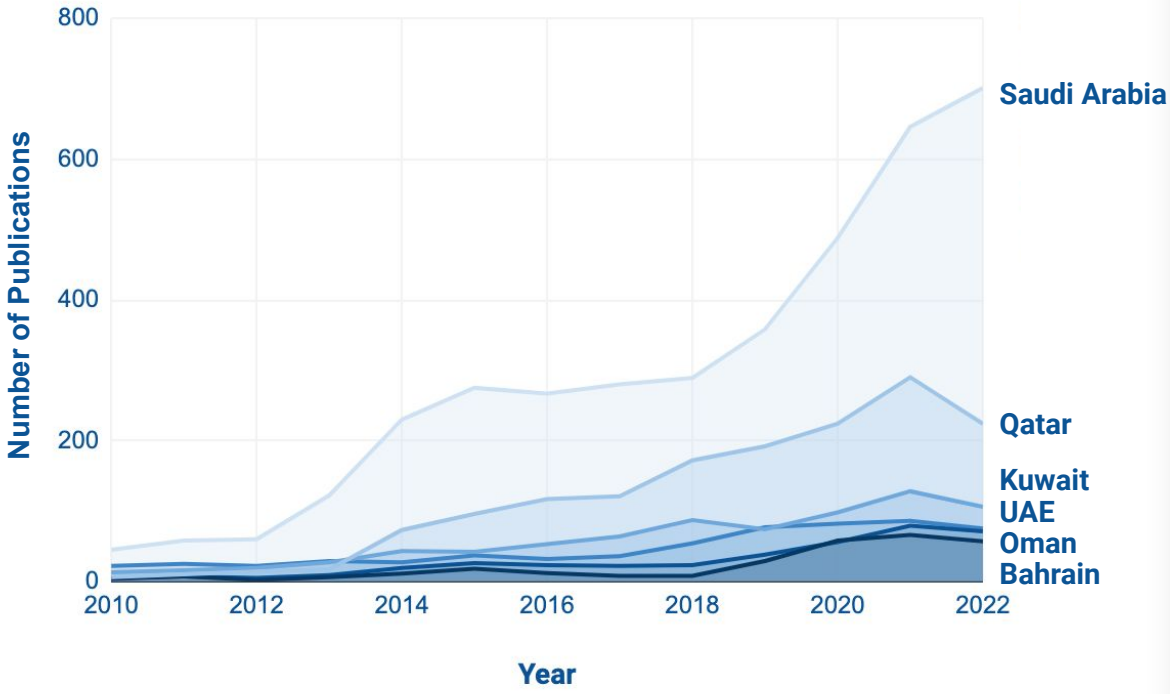
We selected universities that have patents in area of diabetes treatment and evaluated them by Innovativeness Ranking proposed by **SIR**.

The leader among universities is **Zayed Universities** (UAE) and **Taif University** (Saudi Arabia). They have the biggest number of patents for diabetes and diabetes-related disorders, as well as the highest activity in cooperation with international organisations and universities. The specialisation of these organisations is optimisation of insulin delivery and new therapeutics for diabetes treatment.

Source: SCImago Institution Ranking

Diabetes Research Activity in the GCC

Dynamic of Publication Number, 2010-2022



The publication activity of R&D in countries from the GCC in the period from 2010 to 2022 is on a high level – 740 articles per year. It was on the same level even during the COVID-19 pandemic.

As shown in the chart, during the period of 2010-2012, the total number of articles published was as low as 340 articles. Gradually, the number of publications increased in the next 3 years and has shown a drastic rise to 1,107 articles in the period of 2013-2015. Interestingly, in 2015 alone, 494 articles were published.

The highest number of publications are about diabetes in Saudi Arabia (more than 700 articles in 2022).

Source: PubMed

Methodology of Publication Analysis

The present cross-sectional study has been designed to investigate the growth in diabetes research based on the published studies. The analysis was made using three main internet databases, including **PubMed**, **Google Scholar,** and **Sciencedirect**. These databases were chosen due to their ease of access, free availability of full texts, and extensive coverage of medical, biomedical, and life sciences.

Inclusion criteria:

1. research related to diabetes and conducted by an **institution based in listed Gulf countries**;
2. research related to diabetes conducted **on population of listed Gulf countries**;
3. articles related to diabetes and the **authors (principal investigators or co-investigators)** are from listed Gulf countries.

The keywords used to carry out these searches were: "*Name of country* + Diabetes," "Diabetes and *Name of country,*" "Diabetes in *Name of country,*" and "Diabetes Research in *Name of country.*"

Exclusion criteria:

1. studies that had been **conducted outside listed of Gulf countries**;
2. studies that were conducted by **authors from outside than listed Gulf countries**;
3. articles which mentioned the listed Gulf countries only in text but **had no research done in the listed countries** or **had no specific results**.

Diabetes Industry in the GCC: Conclusions

Diabetes in the GCC: Conclusions

- Diabetes in Gulf countries appears to have a higher prevalence of diabetes than the global average. Five of the top 10 countries with the highest prevalence of diabetes (in adults aged 20 to 79 years) are in the Persian GCC: Kuwait (21.1%), Qatar (20.2%), Saudi Arabia (20.0%), Bahrain (19.9%), and the UAE (19.2%).
- The familial clustering of diabetes has been reported in the Arab populations due to consanguineous marriages. But only 25 risk loci have been replicated in the Arab populations.
- Among the GCC, the highest level of undiagnosed diabetes is in the UAE (64%), Oman (50%), and Saudi Arabia (44%). Kuwait, Qatar, and Bahrain show higher level of diagnostics, and estimate level of undiagnosed diabetes in these countries is less than 40%.
- GCC diagnostic companies seems to be the most successful among the whole healthcare market, providing highly technological solutions for an diabetic population with an increased interest in quality healthcare. The market attracts domestic companies, as well as international investors. The UAE and Saudi Arabia have the most developed system of diagnostic laboratories that provide diabetes testing.
- The total number of medical centres and clinics specialised on diabetes is more than 70 facilities. More than 50% of clinics are located in Saudi Arabia (37 clinics), and 28% – in the United Arab Emirates (20 clinics). The most important medical centres are Diabetic Centre of King Faisal Specialist Hospital and Research Centre (Saudi Arabia) and Jazan Diabetes Centre (UAE).
- The leaders in clinical research are Saudi Arabia (60 clinical trials), the UAE (48 clinical trials), Qatar (30 clinical trials). The lowest number of clinical trials was found in Oman. There was only one clinical research during last decade.
- The total number of R&D sites is more than 45. The major scientific hub is Saudi Arabia where are placed 26 research centres that investigate diabetes.

Aging Analytics Agency: Value Proposition

Visit Website

Aging Analytics Agency is the only specialised analytics agency that focuses exclusively on the emerging Longevity Industry. They are recognised internationally as the premier analytics agency for advanced data analysis, industry reports, and next-generation infographics on Ageing and Longevity.

Aging Analytics Agency is focusing on three key activities:

Providing Commercial Services

Conducting customised case studies, research, and analytics for internal (organisational) use, tailored to the precise needs of specific clients.

Preparing Open Access Reports

Producing regular open access and proprietary analytical case studies on the emerging topics and trends in the Longevity Industry.

Building Big Data Analytics Platforms

Offering customised analysis using specialised interactive industry and technology databases, IT-platforms, and Big Data Analytics Dashboards.

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AGING ANALYTICS AGENCY

E-mail: info@aginganalytics.com | Website: www.aginganalytics.com

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