

NASHVILLE HEALTH CARE COUNCIL

2019 International Health Care Study Mission to Israel: Importing Health Care Innovation From the “Start-Up Nation” to the Health Care Hub

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Introduction

In nearly a decade since Dan Senor's and Saul Singer's influential book "Start-Up Nation" was published, the nation of Israel has burnished its reputation as a hotbed of innovation fueled by entrepreneurs seeking to solve the world's most pressing issues. Senor and Singer credit a number of factors for fostering innovation in Israel – immigration, mandatory military conscription, and security concerns top the list. But there are also crucial differentiators such as individual chutzpah and a culture of acceptance that values risk-taking and doesn't penalize failure that have driven Israel's successes. In fact, entrepreneurs who have a failed start-up are highly valued among Israel's venture capitalists because they are more likely to be successful in their subsequent enterprises.

Throughout the Nashville Health Care Council's Study Mission to Israel, delegates witnessed how a culture of innovation pervades every part of the Israeli health care system – from the development of cutting-edge medical technology to efficient delivery of care by health care providers and forward-thinking Healthcare Maintenance Organizations. The scrappiness of Israel's entrepreneurs, the innovation focus of its health care systems and the desire to partner with US-based health care companies provide an immense opportunity for Nashville Health Care Council member companies.

About the Nashville Health Care Council

The Nashville Health Care Council is the premier association of health care industry leaders working together to inspire global collaboration to improve health care by serving as a catalyst for leadership and innovation. The Council is supported by more than 300 member companies, including Nashville-based and national health care companies and professional services firms that serve the health care industry.

Every two years, the Council brings together key health care policy leaders and business executives for trans-Atlantic learning, high-level networking and global dialogue. In 2019, the Nashville Health Care Council selected Israel for the international study mission. The purpose of this mission was to establish relationships with key government and industry leaders in Israel and to learn first-hand about Israel's health care delivery system and start-up community.

The Israel mission is the 13th international health care study mission hosted by the Council. To date, more than 275 health care leaders representing nearly 100 companies have participated in the executive-level mission trips to gain first-hand knowledge of health systems and develop business opportunities abroad. Previous trip locations have included Argentina, Austria, Chile, Cuba, France, Germany, Italy, Sweden and the UK, among others.

"Previous NHCC international study missions have focused on the delivery of a one-payer system of health care in a socialist or communist environment. Israel was very different from previous trips --- the main focus was on health care innovation. We met with a number of start-ups to learn their ideas, funding, and implementation. We also met with providers to learn how they are incorporating new technology to better provide care."

– Scott Mertie, president, Kraft Healthcare Consulting, LLC.

Why Israel?

“Israel is the most promising investment hub outside the US... The determination, motivation, intelligence and initiative of its people are remarkable and extraordinary.”

– Warren Buffett

Israel, with its one-of-a-kind innovation ecosystem and well-funded research and development (R&D) infrastructure, is quickly becoming a meaningful global leader in health care. In particular, the strength of Israel’s digital health, medtech, and biotech sectors provide unique opportunities for Nashville Health Care Council member companies.

According to the Organisation for Economic Co-operation and Development (OECD), Israel leads the way in total expenditure (including public and private investments) on R&D. As a percentage of its total gross domestic product (GDP), Israel invested 4.545% on R&D in 2017 --- more than any other country and nearly double the United States (2.788%). According to Jeffries’ 2019 report, “Momentum Economies for the Digital Age: The Case for Israel,” more than 250 global firms, including Microsoft, Intel, Google, Cisco, Samsung, GE, 3M, Facebook, and Apple, have established local R&D hubs in Israel. In 2017, the Israeli digital health sector attracted investments totaling \$333 million, and these numbers are expected to continue to grow.

As a country, Israel ranks sixth overall in Bloomberg’s 2018 Health-Efficiency Index, behind only Hong Kong, Singapore, Spain, Italy, and South Korea. This annual Health-Efficiency Index was created to rank countries with average lifespans of at least 70 years, GDP per capita exceeding \$5,000, and a minimum population of 5 million. According to the index, Israel’s per capita spending on health care is \$2,700 and life expectancy is 82 years. In comparison, the United States ranks 54 on the index with per capita spending on health care of \$9,536 and average life expectancy of 78.7 years.

Israeli Innovation: Helping Solve Global Health Care Challenges

“There’s a thriving start-up culture here. The DNA of the Israeli entrepreneur is one that is constantly looking for problems to solve in other countries. The combination of the Israeli culture and innovative health care ecosystem makes Israel a special place.”

– Wendy Singer, executive director, Start-Up Nation Central

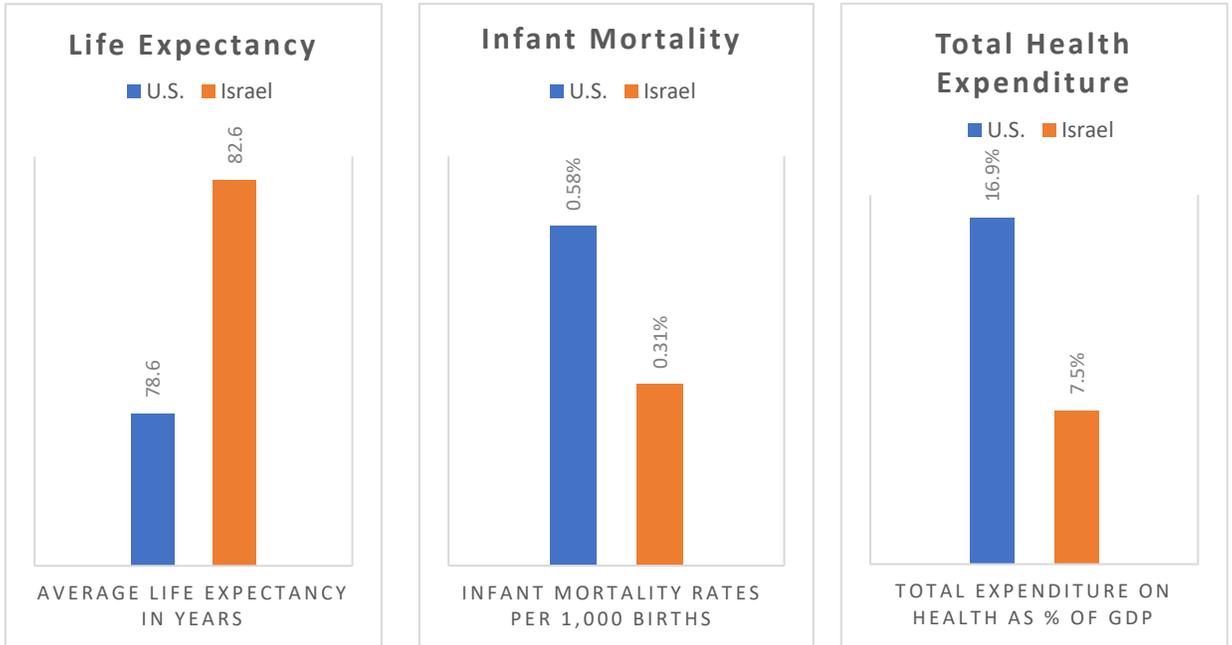
In the past 70 years, Israeli entrepreneurs have launched more than 6,000 companies, allowing their nation to boast the highest density of start-ups in the world. In the 2017-2018 World Economic Forum Global Innovation rankings, Israel ranked third. And, according to Wendy Singer, executive director of Start-Up Nation Central, venture capitalists have taken notice. Venture capital (VC) funding in Israel is \$545 per capita whereas in the US, it is \$256 per capita.

“In Israel, they culturally look for problems to solve as a practice, rather than starting with an idea and trying to make it work.”

– Sandra Morgan, senior vice president, Provider Relations, HCA Healthcare

Fast Facts:

- Fueled by advanced health care IT, Israel offers better care at a lower price.
 - Israel has a higher average life expectancy, lower infant mortality rates and spends less on health care as a percentage of its annual GDP than the U.S.



Source: OECD Data, April 2019

Digital Health

- In 2018, Israel start-ups raised more than \$60 million in digital health funding in 67 rounds.
- 500+ Innovative Digital Health Companies
 - Digital Therapeutics – 25%
 - Remote Monitoring – 20%
 - Clinical Workflow – 16%
 - Decision Support – 15%
 - Diagnostics – 12%
 - Patient Engagement – 7%
 - Assistive Devices – 5%

Innovation infrastructure

- As of April 2019, Israel was home to:
 - 150 VC funds
 - 19 incubators
 - Approximately 85 accelerators
 - Nine public universities

For more information and to connect with Israel’s start-ups, please visit:

Startupnationcentral.org

Where you can find helpful resources on how to benefit from the Israel innovation ecosystem and access the Start-Up Nation Finder which connects to more than 6,200 companies, 400 investors, 350 multinationals and 1,500 academic technologies.

Healthtech

“Nearly half of the 20 most competitive economies, as measured by the World Economic Forum in 2018, require compulsory military service in some form. Forbes estimated that companies launched by alumni of the Israeli military’s internal intelligence group, called Unit 8200, exceed 1,000 – which would make it the largest entrepreneurial incubator on earth, arguably producing more talent than even the most high-profile US incubators and accelerators.”

– Jeffries: Momentum Economies for the Technology Age

Digital health start-ups are thriving in Israel. According to Start-Up Nation Central, there are almost 400 companies in Israel working in the digital health sector. Israel is also home to the medical technology R&D centers of prominent international companies such as GE, Microsoft, Philips, and Samsung.

Today, more than 400 digital health start-ups exist in Israel. Approximately 100 of these have raised significant capital to begin product research and development. In the last three years alone, digital health start-ups in Israel have raised a total of approximately \$800 million. This reflects a global trend of investing in health care start-ups. The digital health sector raised \$2.8 billion worldwide in 2018 Q1, making it the top performing quarter ever in terms of digital health funding.

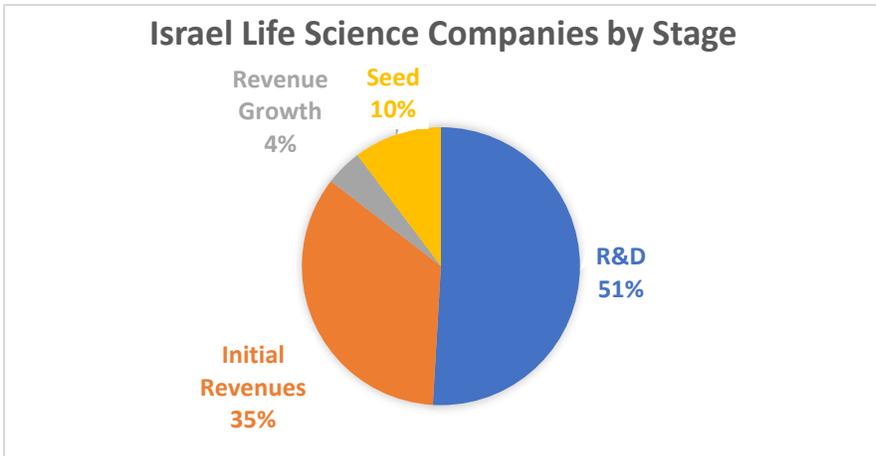
Israeli start-ups that are active in digital health are spread over a relatively large number of categories. A few dozen Israeli companies have raised more than \$10 million and dozens more that are still in their early stages.

The two sectors which have attracted the highest amounts of capital to date are AI-based solutions (mainly in the fields of imaging and predictive analytics) and data platforms which collect, present, and contextualize data.

Patient self-care and personalized medicine are new areas with tremendous potential. New technology, like smartwatches, has enormous potential to diagnose and continuously monitor patients. Coupling this technology with big data and insights is driving many of the Israeli start-ups focused in medtech.

Elderly care is also a burgeoning opportunity. Globally, around two-thirds of health care system expenses are used for treating the senior population and this field presents a significant need and opportunity.

“Digital health is at the crossroads of several mega-trends, led by big data and artificial intelligence, which permeate a range of solutions, from genome research to wearable devices. At the same time, the need to share massive amount of data across different networks in real time has spurred the development of health information exchange systems.” – Vertex Ventures

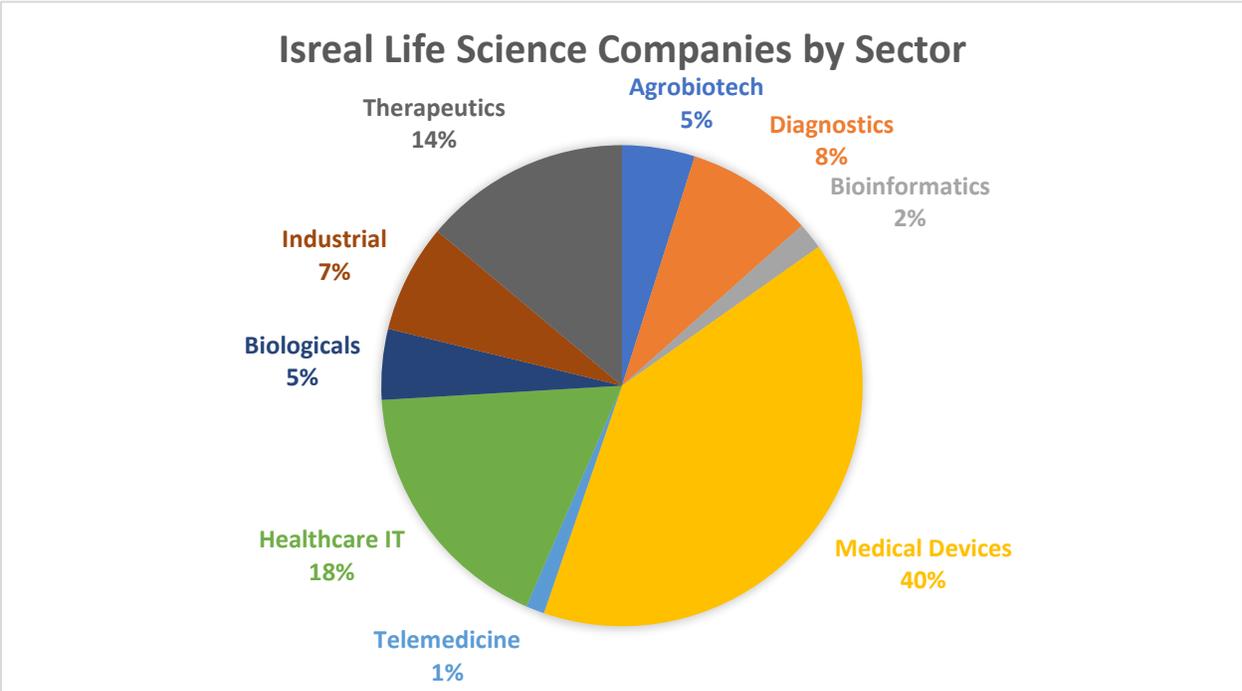


Approximately 1,450 life science companies, employing more than 85,000 people, are active in Israel, according to the 2018 Israel's Life Sciences Industry report issued by Israel Advanced Technology Industries. Nearly half of the Israel life science companies are in R&D stage.

Source: Israel's Life Sciences Industry IATI Report 2018

According to the IVC Research Center, 124 Israeli life sciences companies have been acquired since 2008 for a total of \$10 billion. In 2017, the acquisition of Israeli life sciences company NeuroDerm Ltd. by Mitsubishi Tanabe Pharma for \$1.1 billion was the second largest Israeli M&A acquisition of the year (the largest was Gilead's acquisition of Kite Pharma, a pharmaceuticals company, for \$11.9 billion).

Israeli life science companies lead the direction of where health care is going in the near to mid-term. Previously, medical devices and health IT were the only two important sectors in Israel R&D. Today, the map looks somewhat different. As evidenced in the chart below, therapeutics, diagnostics, and agrobiotech are growing sectors.

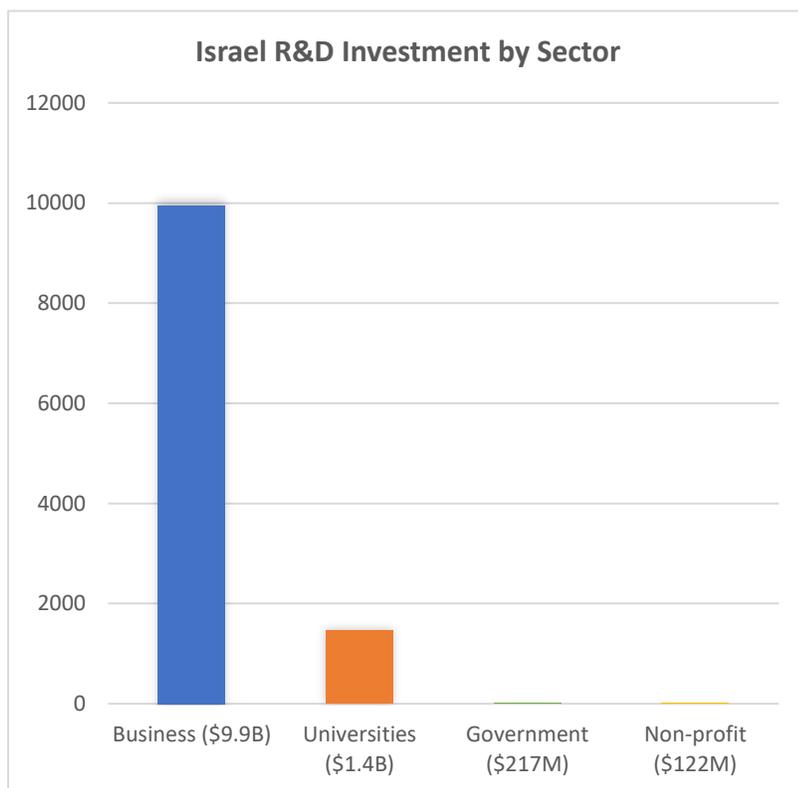


Source: Israel's Life Sciences Industry IATI Report 2018

Research & Development

It is not an exaggeration to claim Israel is the world leader in R&D. According to the OECD Main Science and Technology Indicators in 2019, this tiny country has the highest number of researchers per 1,000 employed people at 17.43%. By comparison, the U.S. has 8.93 researchers per 1,000 employed people. Israel's innovation is even more remarkable when you consider that it is no longer only driven by domestic need. During the international study mission, delegates heard from many Israeli entrepreneurs who are creating products that solve problems of foreign, well-developed countries, like the U.S.

Nearly all R&D in Israel is carried out by the private sector and universities. According to the UNESCO Institute for Statistics, \$9.9 billion is invested by private businesses and \$1.4 billion is invested by universities. Government and the non-profit sector investment is much less significant \$217 million and \$122 million, respectively.



Source: UNESCO Institute for Statistics, April 2019

"Israel has tremendous intellectual capacity and entrepreneurs are driven not only from need, but a desire to change the world." – Rusty Holman, chief medical officer, LifePoint Health

Venture Capital

"Given the breadth of providers, payers, and health care services companies in Nashville, there are many opportunities to engage with Israeli companies to pilot and deploy very interesting solutions to solve issues we are facing, as well as work with these companies to shape their innovative solutions." – Diane Seloff, chief operating officer, Aspire Health

VC investment in Israel's health care start-ups has shown consistent growth over the past decade, according to the 2019 IATI Life Sciences Annual Report. In 2009, Israeli VC firms invested about \$68 million in the life sciences sector. By 2018, that number had jumped to \$190 million. However, other investors still make up the majority of funding for life sciences companies in Israel. In 2018, more than \$1.3 billion was invested in the sector outside of VC firms.¹

¹ Source: Israel's Life Sciences Industry IATI Report 2019: Connecting Israel's Tech Ecosystem

Some of the most active VCs in the Israeli market are:

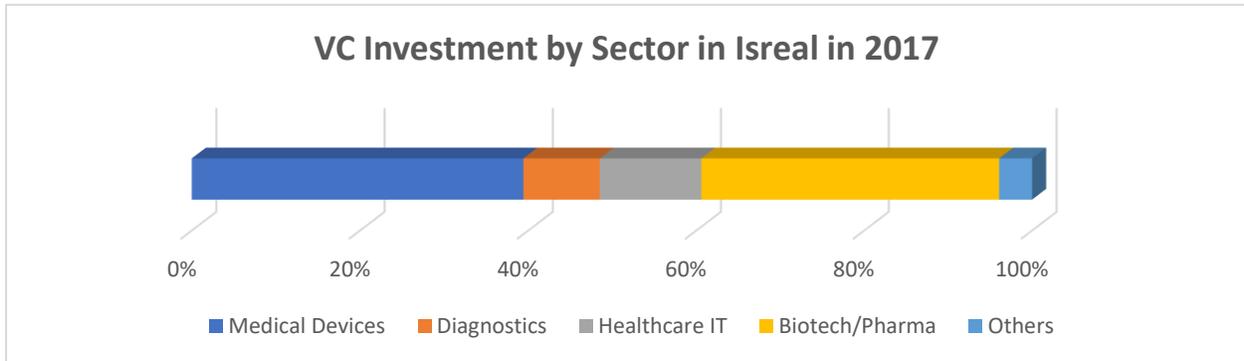
- aMoon Partners
- Alon Medtec
- eHealth Ventures
- Gefen Capital
- Israeli Biotech Fund
- Johnson & Johnson Innovation
- Orbi-Med
- OurCrowd (a global crowdfunding platform)
- Pitango
- Pontifax
- Sanara Ventures
- Takwin (invests in companies run by Arab entrepreneurs in Israel)
- Triventures

“The aMoon Fund is focused on creating specific relationships with providers and C-level executives who would like for us to vet talent and connect them with start-ups. I want to extend an invitation to any Nashville executive to visit Israel. A few days here will change your perspective, open horizons, and help you create new connections. Come for a few days and we’ll take care of everything.” – Yair Schindel, M.D., founder and managing partner, aMoon Partners

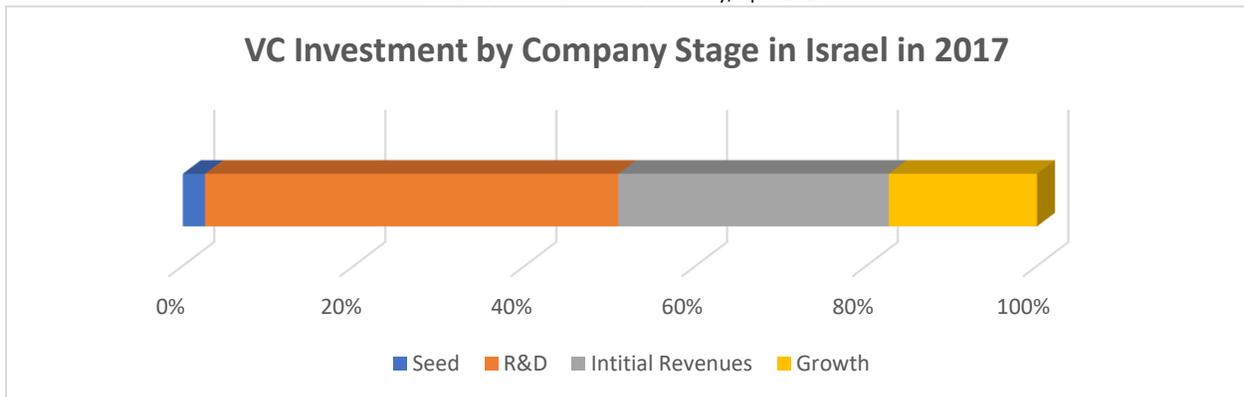
Where are VC funds going?

By sector, more than a third of VC funding in 2017 for Israeli start-ups was invested in companies developing medical devices. Approximately another third went to start-ups in the biotech/pharma space. The remaining third was split between other sectors in healthcare, including diagnostics and IT.

Start-ups in the R&D and initial revenue stages attracted the vast majority of VC funding in 2017.



Source: Israel Innovation Authority, April 2018



Source: Israel Innovation Authority, April 2018

In the last decade, the Israel Innovation Authority, an independent, publicly funded agency, has invested more than \$100 million annually in Israel's life sciences sector through incubators and programs for early-stage entrepreneurs and growth companies².

The growing Israeli digital health ecosystem is boosted by the government's \$300 million National Digital Health Plan, which aims to support tech start-ups that are active in the digital health space³.

Israeli companies are active in five digital health subsectors:

- Health Analytics
- Telemedicine
- Clinical Workflow
- Wearables & Sensors
- Personal Health Tools (45% of all Israeli digital health firms)

"For investors, Israeli digital health firms are a win-win proposition. For example, although 77.5% of Personal Health Tools companies are in early stages of funding (40% in pre-seed, 37.5% in seed-stage), over 80% of these companies' products are fully-developed or in advanced stages of development. Similarly, 53.8% of Health Analytics Companies have fully developed products, although most companies have raised only seed (24.3% of companies) or A-round (24.3% of companies)." – Start-Up Nation Central

Incubators and Accelerators

Today, there are 18 technology incubators and one designated biotech incubator throughout Israel. The incubators are privately owned by seasoned and experienced groups such as venture capital funds, multinational corporations, and private investors.

The Israel Innovation Authority has two separate funding tracks and budgets for life sciences and health care projects: a technology incubators track, in which the total project budget is up to NIS 3.5 million (approximately \$1 million) for a period of up to two years; and a dedicated biotech track, in which the total project budget is up to NIS 8.1 million (approximately \$2.3 million) for a period of up to three years. For both tracks, 85% of the total budget is financed by the government as a grant which is only paid back if the start-up is successful. The remaining 15% is financed by the incubator.

"There is a lot of innovation going on here. And, there is a big appetite for collaboration with entities and health care providers in the U.S. We are not only innovative in technology, but we are also innovative in structuring collaborations." – Dan Schwartzman, CEO, MindUP

² Source: Israel's Life Sciences Industry IATI Report 2019: Connecting Israel's Tech Ecosystem

³ Source: Vertex Ventures

Spotlight Israel: MassChallenge Israel

Launched in 2015, MassChallenge Israel has accelerated more than 150 companies. Its selective program aims to bring the best cutting-edge technologies from Israel to a global community of multinational businesses, innovators, philanthropists, and public sector stakeholders. Start-ups that are selected to participate in the MassChallenge program receive up to NIS 500,000 (\$143,500) in cash prizes; introductions to top mentors, corporate partners, and investors; four months of free office space; and the opportunity to participate in a business trip to Boston or New York. Nearly 90% of the start-ups which have completed the MassChallenge program are still running. Collectively, these start-ups have raised more than \$156 million and have created more than 7,000 jobs.

“Israel is very risk-tolerant. Failure is good. At MassChallenge, we’re helping start-ups build the skills that aren’t taught in classrooms.” – Yonit Golub Serkin, managing director, MassChallenge Israel

Notable MassChallenge start-ups include EyeControl, Vicarius, and Genetika+.

EyeControl

EyeControl is an AI-powered, wearable, screenless device used for assistive communication. It is the first communication device for locked-in individuals that does not have a screen, making it less expensive and more mobile. The product was initially designed to benefit people with ALS or paralysis who have lost their ability to speak and instead communicate through eye movements. Now, the company is exploring other uses for the technology, including for patients on ventilators and non-health care applications like gaming.

EyeControl was selected as the 2016 Israel Gold Winner by MassChallenge and was one of three companies showcased in *Israel’s Top Life Changing Technologies* by the Israel Ministry of Foreign Affairs.

The first sales for the device in 2019 have been in Israel and the UK. EyeControl is CE marked, listed with the FDA and has reimbursement codes for Medicare and Medicaid. For more information, visit: www.eyecontrol.co.il/.

Vicarius

Vicarius is the first solution to detect vulnerabilities in software before a hack occurs. By uncovering yet-to-be-discovered threats, the system can prioritize them based on the business context and automatically protect the software without installing security patches. Vicarius’ innovative approach to software security means that it does not need access to software source code and businesses do not have to wait for software vendors to release security patches. In 2018, Vicarius raised \$2.5 million and recently signed distribution agreements with worldwide partners. For more information, visit: <https://vicarius.io/>.

Genetika+

Early-stage start-up Genetika+ is developing a personalized medical testing tool to help physicians determine the best drug therapy for patients with depression. Using a blood test, Genetika+ looks at genetics, patient history, and neuro biomarkers to identify the most effective antidepressant medication. Genetika+ is currently in a retrospective clinical trial. For more information, visit: www.genetikaplus.com.

Spotlight Israel: Pitango Venture Capital

Founded more than 25 years ago, Pitango is one of the largest Israeli VC firms. Currently, Pitango has more than \$2 billion under management and investments in over 250 companies. Pitango is one of the largest VC investors in Israel's health care sector.

EarlySense

Established in 2004, EarlySense offers contact-free, continuous monitoring solutions worldwide in hospitals, post-acute care facilities, and homes to assist clinicians in early detection of patient deterioration. EarlySense's FDA-cleared solutions leverage Artificial Intelligence and big data analytics to provide actionable health insights and improve clinical outcomes. Through a sensor placed under a patient's mattress or in a chair, EarlySense can accurately monitor cardiac, respiratory, and motion parameters without ever touching the patient. Hundreds of thousands of datapoints are analyzed daily and clinicians can be notified at the earliest sign of a health risk. Alerts can be viewed on mobile devices and patented algorithms reduce the occurrence of false alerts.

The company has partnered with leading global technology companies including Samsung, Welch Allyn, iFit and Beurer. Last year, EarlySense and Hill-Rom partnered to include the technology on general care hospital beds. In 2018, specific outcomes of continuous monitoring by EarlySense included:

- 9% reduction in length of stay – saving 140,000 days
- 43% reduction in number of patient falls – saving 3,000 falls
- 45% reduction in the number of ICU days on patients transferred from medical/surgical unit – saving 21,000 ICU days
- 64% reduction in the number of pressure ulcers – preventing 13,000 pressure ulcers
- 86% reduction in the number of Code Blue events – saving over 2,000 lives

For more information, visit: www.earlysense.com.

"Today, more than one million patients have enjoyed the benefit of monitoring and health analytics with EarlySense technology that empowers health care professionals to achieve better clinical and economic outcomes." – Avner Halperin, former CEO, EarlySense

CLEW Medical

Using artificial intelligence and data science, CLEW has developed models of predictive clinical analytics, which enables providers to make more informed clinical decisions about patient care and staffing resources.

CLEW can connect with any electronic health record (EHR) system to mine vast amounts of clinical and patient data and deliver highly accurate predictive clinical analytics. CLEW's analytics engine identifies relationships between physiological data and latent medical conditions, recognizing – in real-time – any changes in the patient's condition that may indicate the possibility of life-threatening situations. The platform uses innovative prediction models derived from big data analysis and advanced high-dimensional analytics, to provide hospital leaders and medical personnel with the pre-emptive information they require to better manage their resources. The models, which started with ICU, are now being extended to all care settings. CLEW's models are being used by health care systems including UMass Memorial Health Care, WakeMed, and the Mayo Clinic. For more information, visit: www.clewmed.com.

Overview of the Israeli Health Care System

“It’s not only new high-tech start-ups here in Israel, it’s also innovative thinking on the part of our health care system. We [Israel Ministry of Health] are very adaptive because the landscape is changing.” – Dr. Itmar Grotto, associate director general, Israel Ministry of Health

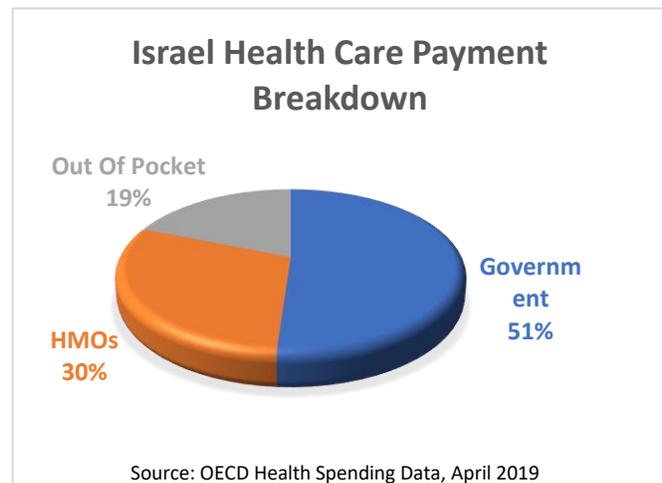
Israel has a general socialized medical system comprised of public and private hospitals, private clinics, commercial medical operations (such as providers who perform cosmetic procedures), private medical services, dental, rehabilitative, geriatric, invalid/nursing care, and infant/child preventative care.

The budget for health services is supplied and controlled by the Ministry of Health and allocated through four primary Healthcare Maintenance Organizations (“HMOs”).

Health Care Spending

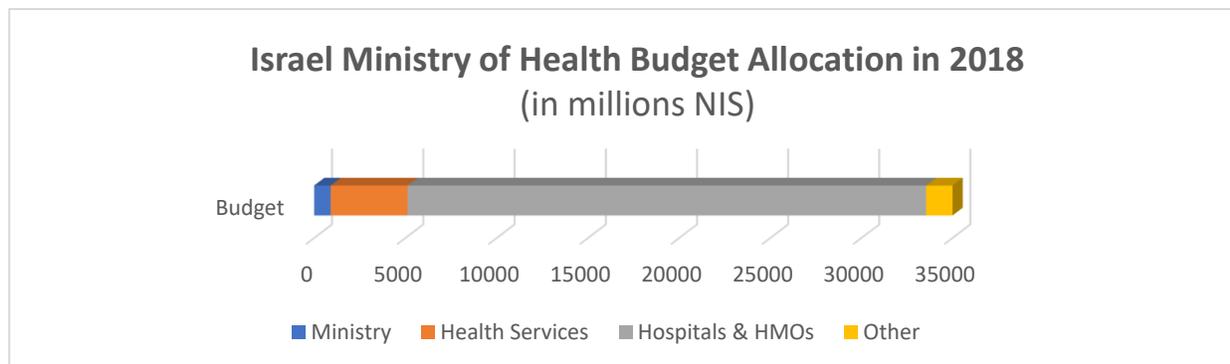
As a nation, Israel’s spends \$2,780 per capita⁴ on health care, ranking 26th out of the 35 OECD countries. By comparison, the U.S., which spends the most on health care of any of the OECD countries, is nearly four times as much at \$10,586 per capita.

Israel’s total health care spending as a percentage of GDP is 7.5%, placing Israel 28th on the list of OECD countries. The U.S. is first on the list with health care spending at 16.9% of GDP.



In 2018, the overall budget for the Israel Ministry of Health (MOH) was NIS 35 billion (\$9.72 billion). By a nearly 5:1 ratio, the majority of MOH’s budget goes to hospitals and HMOs.

The MOH also subsidizes drugs and procedures in cases when treatments are financially out of reach for individuals or they have insufficient income.



⁴ OECD (2019), Health spending (indicator). doi: 10.1787/8643de7e-en

In 2018, the MOH authorized NIS 460 million (\$128 million) for the “Medical Services Basket” which encompasses the entire range of services, drugs, medical equipment and devices that the insured public has a right to receive. The “basket” covers some 106 medicines and technologies and reaches about 70,000 patients⁵.

Some of the experimental treatments covered by the “basket” are not yet fully approved for use in Israel, yet the MOH is willing to fund them in cases where no other lifesaving or life-extending treatment is available.

Spotlight Israel: Mosaic Initiative for Personalized Medicine

The Israel Digital Health Initiative was launched in 2018 to create a 3D database of clinical, behavioral, and genetic health data. It will anonymize and share a vast data trove with companies and researchers to help Israel lead the global charge to find innovative treatments and cures for a diverse body of illnesses. Since passing the cabinet in March 2018, tens of thousands of citizens have volunteered to join the initiative. A primary objective is to use analytics to identify pre-emptive personalized health care, beyond a self-reported “this runs in my family.”

Establishing the initiative was more of a bureaucratic lift than a technology challenge which happened because policy makers were able to eliminate barriers across agencies and professional disciplines to facilitate the change. They passed two bills (on cybersecurity and privacy) to make this database possible.

The five-year project has a nearly \$300 million budget – and the “Mosaic Initiative,” as it is called, will help to connect Israeli biotech start-ups with multinational firms. It sits squarely at the center of big data, artificial intelligence, sensors and wearables, and human intelligence.

“We are doing something of historic significance. We are developing the industries of tomorrow. They are based on a combination of three things: Very large databases, artificial intelligence, and connectivity. Israel has a gigantic database that embraces almost the entire population... almost nine million people. This is a focused databank of the health records over the last two decades. This is a great asset and we want to make it available to researchers, developers and companies in order to receive two things: Preventive medicine and personal medicine, personally calibrated for each person.” – Benjamin Netanyahu, prime minister, Israel

Source: 2019 Jeffries Momentum Economics for the Digital Age: The Case for Israel report and Israel Ministry of Health

⁵ Israel Ministry of Health

Health Maintenance Organizations (“HMOs”)

Most treatment outside of emergency or in-patient care is carried out in the clinics of HMOs, which can be found in almost every city, town, and village in Israel. There are four major HMOs: Clalit, Maccabi, Meuhedet, and Leumit. Approximately 98% of Israeli citizens belong to one of the HMOs and physicians are employed directly by the HMO, although specialists may be employed by more than one.

HMO Payment Models

HMOs determine annual membership subscription fees on a sliding scale based on age. Basic HMO services include a visit with a physician, lab work, or even dental care (for those under 16). Members also pay a small fee for certain procedures and services such as podiatry or imaging. The HMO covers emergency room visits, hospital stays, maternity, in-home nursing visits, and hospice care.

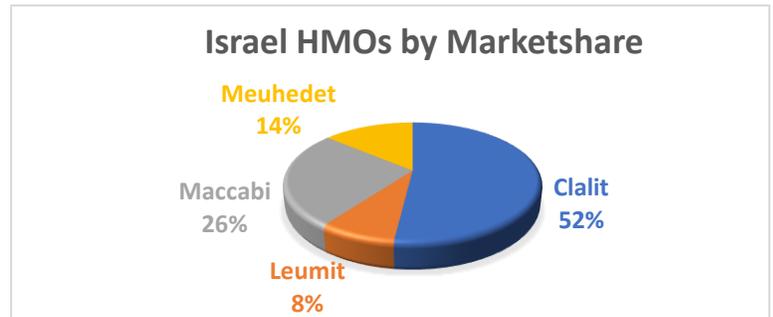
HMOs subsidize many medications and there is a monthly cap on how much HMO members will pay out of pocket for medicines obtained at an HMO pharmacy. Any medication expenditures beyond that cap are essentially free. This is especially beneficial for the elderly or disabled who generally require more medications and have limited incomes. Membership fees are a small portion of HMO income as a whole – ranging between 5-7% between the four HMOs.

“Additional Health Services” are services, treatments, and medications that are not covered by the government within the "basket" and are paid for by HMO membership subscriptions. Although these are additional services, the HMOs often sell packages as upgraded "insurance" and include drugs and services not available in the "basket" such as health consulting services, sports medicine, dental care, therapeutic massage, and more.

Despite heavy subsidies, HMOs are run as for-profit businesses, yet three of the four HMOs had significant losses in 2017. The following table outlines the gross income figures for the four HMOs for 2017⁶:

	Clalit	Maccabi	Meuhedet	Leumit	Total
Total Income (in NIS millions)	31,017	14,138	7,060	4,549	56,764
Total Income (in \$ millions)	\$8,592	\$3,916	\$1,956	\$1,260	\$15,724
profit (in NIS millions)	(-404)	128	(-67)	(-226)	

⁶ Israel Ministry of Finance, 2017 Summary report on HMO Activity, July 2018



Source: Israel Ministry of Finance Summary Report on HMO Activity, July 2018

	Clalit	Maccabi	Leumit	Meuhedet
Other	871	240	91	383
Additional Health Services	2193	1450	399	658
Medications & Equipment	2093	1006	269	461
Membership Fees	305	178	57	103
Government Transfers	25555	11264	3733	5455

Source: Israel Ministry of Finance Summary Report on HMO Activity, July 2018

Spotlight Israel: Maccabi Healthcare Services

Maccabi is the second largest of the Israel HMOs with approximately 25% market share, and is the only HMO increasing its membership and running profitably. With 10,000 employees and 5,000 physicians, Maccabi's network includes the largest private chain of hospitals and rehabilitation clinics in Israel. Additionally, Maccabi has several subsidiary companies delivering in-home care. Maccabi General Director, Ran Saar, estimated that in the next several years, 20% of the HMO's internal medicine patients would be hospitalized at home, rather than in a Maccabi facility.

Driving innovation at Maccabi is its extensive information database. Every physician in the Maccabi network has been on an EMR platform since 1993, and its teams "collect data from the cradle to the grave." The quarter century of data is housed in a central hub that automatically updates medical records of all patients in real time. Maccabi keeps a comprehensive record with medical and pharmacological history of each and every Maccabi member. The availability of members' medical records ensures rapid and effective medical treatment.

*"We believe in partnerships, in having friends all over the world, that's how we operate."
– Ran Saar, general director, Maccabi Health Services*

The research and innovation wing of Maccabi, the Research and Innovation Institute, was developed to provide knowledge-based solutions for caregivers, insurers, research centers, and pharmaceutical companies. Through big data analytics, the Institute is accelerating precision medicine and increasing the volume of quality medical research. In one such example, Maccabi researchers discovered that nearly a third of its patient population did not follow through with regular colon screenings. Based on this fact, and data culled from the extensive medical records database, Maccabi developed colonscore – an algorithm to detect colorectal cancer in patients who were not adhering to the occult fecal blood screening tool. By monitoring small trends in a patient's hemoglobin levels, Maccabi was able to identify patients at high risk of colorectal cancer. The result? Maccabi identified a group of high-risk patients within their membership. When tested, nearly 70 patients in the high-risk group were found to have cancer, and another 254 were found to have pre-cancerous colon polyps.

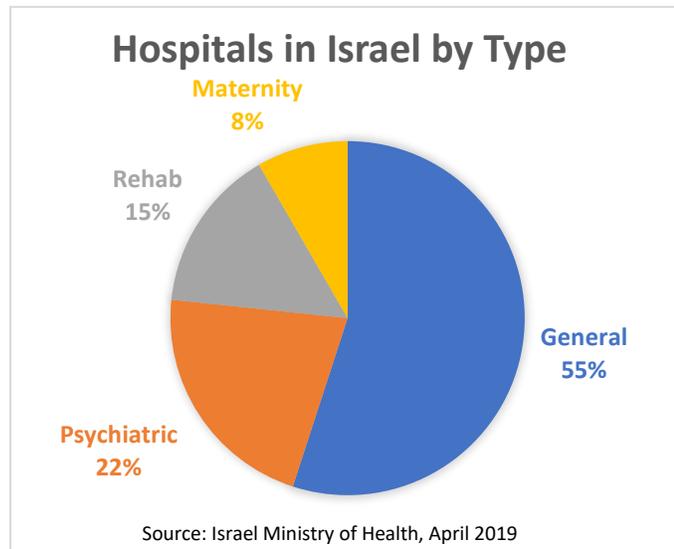
*"Innovation is a must. If we want to disrupt, we must think differently, and we must take risks. To do this we must be open, open, open. We need open code, open data, and open innovation."
– Dr. Varda Shalev, CEO, Morris Kahn and Maccabi Research & Innovation Institute*

To further research around the globe, Maccabi's Research & Innovation Institute also runs MaccabiTech, a user-friendly platform which enables researchers to access to Maccabi's comprehensive databank of more than 2.5 million patient files. For more information on MaccabiTech, visit: www.maccabitech.com.

Public Hospitals

There are 33 general hospitals throughout Israel. The six largest are Sheba-Tel Hashomer (Tel Aviv), Hadassah (Jerusalem), Rabin (Petach Tikva), Soroka University Medical Center (Beersheba), Soraski-Ichilov (Tel Aviv-Yafo), and Rambam (Haifa). Most of the hospitals are public (funded and run under the auspices of the MOH) while five are private, such as the Jerusalem Hadassah hospitals or the Assuta chain. There are also 13 psychiatric hospitals, nine rehab centers, and five maternity hospitals.

According to the OECD, there are 3.0 hospital beds/1000 inhabitants⁷ (27th of 44 OECD countries). The average hospital stay (“acute care days”) is 5.2 days⁸, placing Israel 28th in out of 35 countries ranked by the longest hospital stays. Looked at another way, Israel is ranked 5th for the *shortest* hospital stays. For childbirth, the average stay is 3.0 days (14th longest out of 35 OECD countries). One factor that may affect the length of stays is that hospitals in Israel do not discharge patients on the Sabbath (Saturday) or religious holidays.



Spotlight Israel: Sheba Medical Center

Established in 1948 on a former U.S. military hospital site, Sheba Medical Center is now the leading medical center in the Middle East and an internationally recognized health care facility. In 2019, *Newsweek* ranked Sheba as one of the top ten hospitals worldwide. It was also the first Israeli hospital to earn the Joint Commission International (JCI) Gold Seal as an academic and clinical medical center.



Photo courtesy of Sheba Medical Center via <https://eng.sheba.co.il>

⁷ OECD (2019), Hospital beds (indicator). doi: 10.1787/0191328e-en

⁸ OECD (2019), Length of hospital stay (indicator). doi: 10.1787/8dda6b7a-en

Two years ago, Sheba launched the Accelerate, Redesign, Collaborate (ARC) program, led by Dr. Eyal Zimlichman, Sheba's Chief Innovation Officer, and Dr. Nathalie Bloch, director of the Sheba Innovation Center, to bring new technologies into the hospital and community ecosystem to further improve patient care. Sheba strives for seamless integration between innovators, scientists, start-ups, high-level developers, large corporate companies, investors, and academia on campus. The ARC program focuses on digital health technologies including precision medicine, big data and predictive analytics, telemedicine and mobile health. Eventually, Sheba hopes to have 200 start-ups on campus, working side-by-side with its physicians and researchers to transform the delivery of care. Sheba does not take IP or stock options in the start-ups that it approves to work on campus, rather it hopes to facilitate an "open innovation campus." Globally, other hospitals are adopting the ARC program, including the Ottawa Hospital and there is growing interest from other facilities in Canada and the U.S.

Sheba Medical Center:

- 150-acre campus near Tel Aviv
- 159 medical departments and clinics
- Seven major facilities
 - The Acute Care Hospital
 - The Rehabilitation Hospital
 - The Edmond and Lily Safra Children's Hospital
 - The Josef Buchman Gynecology and Maternity Center
 - The Olga & Lev Leviev Heart Center
 - The Cancer Center
 - The Israel Center for Disaster Medicine and Humanitarian Response
- 1,700 total beds
- 33 laboratories
- 12,000 employees
- 1.5 million outpatient encounters annually
- 430,000 inpatient encounters annually
 - 177,476 ER visits
 - 45,163 surgical procedures
 - 10,000 maternal deliveries
 - 4,000,000 medical tests

Sheba Innovation Center:

- 18 full-time staff dedicated to fostering innovation at Sheba, including:
 - Data scientists
 - Programmers
 - IT Specialists
- Annually, the innovation center seeks internal projects from physicians, researchers, and staff to improve the delivery of care
 - Sheba has launched 25+ internal innovation projects, most involve advanced machine learning and artificial intelligence
- Engaged in strategic partnerships with companies including Boston Scientific and Google
- In April 2019, there were 17 start-up companies based at Sheba, with 20 more companies discussing the possibility of coming onsite

Spotlight Israel: Rambam Health Care Campus

Rambam Health Care Campus is a 1,000-bed academic hospital in Northern Israel. Providing comprehensive medical services in all medical specialties, Rambam is the tertiary referral center for 12 district hospitals. In addition to the citizens of Northern Israel, Rambam serves the Israel Defense Forces Northern Command, UN Peacekeeping Forces, and the US 6th Fleet.

Rambam Hospital started as a British government hospital with a mandate to serve all residents – whether British, Arab, or Jewish – making it the first institution in Israel to provide medical services regardless of nationality. This legacy continues today. The hospital frequently takes on humanitarian cases with patients from neighboring countries.

Given Haifa's proximity to the Lebanon and Syrian borders, security is a constant concern. After the 2006 Israel-Lebanon War, Rambam sought ways to provide emergency medical services when the city is under rocket fire. The solution? Rambam built an underground parking garage that can turn into a fortified 2,000-bed emergency hospital in just 72 hours. The underground hospital can be completely cut off from the outside world and has enough water, oxygen, power, and supplies to sustain itself for three days in the case of a large-scale emergency like a chemical or biological attack.

When construction on the underground hospital began in 2011, Dr. Rafael Beyer, the hospital's CEO and director general told *Jewish Week*, "You can't predict what will happen in terms of the Middle East and Rambam is in the center of those who could be under attack. There are small underground facilities but nothing of this magnitude. This is a regional solution."



Photo courtesy of Rambam via washingtonjewishweek.com

Private Hospitals

Private hospitals are a growing phenomenon within Israel as the residents become more affluent and medical tourism expands. These hospitals employ the best specialists and the facilities are equipped far and above what public hospitals have to offer, with premium day- or extended-hospitalization. Patients at private hospitals often pay higher fees for superior services.

Among services offered at private hospitals are:

- Surgery (including plastic, cosmetic, and non- or minimally-invasive)
- Rehabilitation and Orthopedics
- IVF
- Gastroenterology
- Dialysis
- Oncology
- CT and imaging, consulting
- Maternity
- An array of other medical treatments

And, they are profitable. In 2016, Assuta had revenues of over NIS 1.5 billion (\$416 million), with NIS 900 million (\$250 million) of that from external patients (“medical tourists”). Their reported profit margin is 4-6%⁹.

Health Care Services in Israel

The Israeli health system offers the same variety of services as found in any modern country: emergency medical care, in-patient and out-patient treatments, dentistry, public health, and elective procedures. The Israeli system does have a few “quirks” which differentiate it from other systems:

- **Primary Emergency Care: MDA/Terem** – It is not customary for patients to just “show up” to emergency rooms in Israel (although none are turned away). First, they must arrive through triage channels such as ambulances or emergency medicine clinics.
- **Israel Defense Forces (IDF)** – The IDF is the primary provider of basic medical services to soldiers and also emergency medical services in the form of ambulances, medics, paramedics for the military and civilians. Many physicians do reserve duty within the IDF, and within elite military units. As part of the recruitment process for the IDF, all teenagers, regardless of whether they will eventually be drafted, undergo a complete physical. Frequently conditions, which would otherwise have been unnoticed, are diagnosed during these exams.
- **Private Medical Service (“Sharap”)** – This is a parallel option within public hospitals in which patients choose their physician and pay for services independently. While this is an added out-of-pocket cost, service is often better. It is often easier and faster for patients to get an appointment with a senior physician or specialist by paying the Sharap fee, which makes the service controversial.

⁹ Source: Globes Newspaper

- **In Vitro Fertilization (IVF)** – Israel is the only country in the world that funds fertility treatments for women up to age 45. IVF treatments are free for couples unable to conceive or women who want to be single mothers.
- **Neonatal and Early Childcare Clinics (Tipot Chalav)** – These clinics, found in most MOH facilities, provide care for newborns up to three years old. The clinics administer vaccinations (child vaccination rates are 94% for Diphtheria-Tetanus-Pertussis, and 97% for Measles, Mumps, and Rubella¹⁰), provide wellness visits and track general childhood health and development. The infant mortality rate in Israel was around 0.22%¹¹, although it is almost 0.64% for the Arab population in 2018.
- **Palliative and Hospice Care** – There are very few hospice facilities in Israel. Most palliative care is home-based or in elderly care facilities. As the population ages, lack of proper hospital-based palliative care is expected to become an acute problem in the nation.

Issues Affecting the Israel Health Care System

In Israel, you can “get the medical care you need, not necessarily the medical care you want” is a sentiment often heard about the public medical system. With the “basket” only covering select procedures and a significant shortage of hospital beds, there is some dissatisfaction with the health care system. Common complaints are overcrowding, understaffing, oversubscription, lack of diagnostic equipment, and lack of invalid/elderly care.

According to the Israel Medical Association Ethics Bureau, Israel is short at least 6,000 hospital beds, During peak flu season, public hospitals can reach 150-160% and even 220% of their capacity. This results in patients being placed in hallways or in overcrowded wards and rooms and can make routine, non-urgent, and preventative care difficult for patients to schedule.

Internal medicine departments are chronically overfilled and understaffed. On average, bed turnover is seven times per month¹² (more than 100 times a year). In these departments, doctors may also be responsible for 11 patients or more. Frequently, the ICUs in most hospitals report 100% occupancy or more¹³. Diagnostic exams such as CTs and MRIs are often oversubscribed with out-patients sometimes waiting weeks or months for an appointment.

Palestinian Authority (PA)

The 1993, Oslo Accords established the Palestinian Authority (PA) as the mechanism for civil governing and local security in the areas designated A & B, and the Gaza Strip. The PA, functioning through its Ministry of Health, was given responsibility for the administration of health care in the region. PA hospitals are not as advanced as hospitals within Israel, and often cannot provide imaging services or

¹⁰ OECD (2019), Child vaccination rates (indicator). doi: 10.1787/b23c7d13-en

¹¹ Source: The World Bank Group

¹² Israel Society of Internal Medicine

¹³ Israel Medical Society

access to specialists. Doctors practicing in the PA have limited opportunities for local training and continued professional development.

Patients who can not receive proper treatment in PA hospitals are often treated in Israeli hospitals¹⁴. In 2018, nearly 180,000 Palestinian citizens entered Israel to receive treatment. There were also more than 3,000 emergency patients who were transferred from Palestinian to Israeli ambulances using the “back to back” method (where the patient is transferred from a Palestinian ambulance to an Israel ambulance and then taken to an Israeli hospital for treatment¹⁵).

Need for access to quality medical care is so great, there is even a volunteer organization, The Road To Recovery, whose volunteers drive Palestinians undergoing medical treatment in Israeli hospitals to and from the crossings into Israel. Most of them are children with severe ailments for whom medical treatments and procedures are unavailable in the West Bank or Gaza.

Non-Governmental Organizations (NGOs)

A bright spot globally, is how Israel exports its expertise to developing nations and places in crisis. Well known are the IDF field hospitals established after major earthquake disasters such as Haiti (2010) and Nepal (2015). Lesser known are the private efforts of Israeli aid organizations, such as Save A Child’s Heart or Natan.

Save A Child’s Heart is an international non-profit organization founded in 1995 at the Wolfson Medical Center in Holon, Israel, whose mission is to improve the quality of pediatric cardiac care for children in developing countries and to create centers of competence in these countries. Save a Child’s Heart’s goal is to improve the health and welfare of all children, regardless of the child’s religion, gender or nationality. To date, Save a Child’s Heart has saved the lives of more than 5,000 children from 59 countries in Africa, South America, Europe, Asia, and throughout the Middle East and trained more than 120 medical team members from these countries¹⁶.

In 2018, Israeli medical specialists from the Sheba Medical Center at Tel Hashomer Hospital, in collaboration with Natan, engaged in a humanitarian mission to Papua New Guinea and restored the eyesight of more than 80 visually impaired people¹⁷. Sheba established the Israel Center for “Disaster Medicine and Humanitarian Response” whose volunteer members are experts in preparation for and response to global humanitarian crises and emergencies.

¹⁴ Source: nih.gov

¹⁵ Source: standwithus.com

¹⁶ Source: saveachildsheart.org

¹⁷ natan-iha.org

Strengthening Bonds Between Israel and Nashville

“From the very beginning, the Nashville Health Care Council International Study Missions have uncovered new ideas and partnerships for Nashville’s vibrant health care industry. This trip was eye-opening for health care leaders from both countries, and we’re already seeing the impact in the form of follow-up visits and partnerships between Nashville and Israel.” – Senator William Frist, M.D., former U.S. Senate Majority Leader and partner at Cressey & Company

The purpose of the Nashville Health Care Council’s International Study Mission is to inspire global collaboration to improve health care. In keeping with that goal of forging international bonds, the 2019 mission to Israel also sought to shine a light on innovation. Delegates on the mission gained new perspectives and connections with leading Israel VC funds, accelerator programs and entrepreneurs. The opportunities to partner with and host groups from Israel in Nashville began to emerge immediately following the mission. Delegates from the mission also recognized an immediate need to elevate Nashville’s reputation as the epicenter for health care in the U.S.

*“As a sponsor of this trip, the greatest takeaway I saw was a tremendous increase in awareness of the potential benefits of investing in Israel and creating international collaborations between American and Israeli companies and entrepreneurs.”
– Neil de Crescenzo, president and CEO, Change Healthcare*

Perhaps one of the most surprising findings from the mission, was the lack of knowledge the Israeli health care start-up community had about the Nashville’s influence on health care in the U.S. Cities like Boston, New York, and Silicon Valley were the most commonly cited U.S. markets targeted by Israeli start-ups and many entrepreneurs had not considered Nashville at all.

Although Nashville is home to more than 500 health care companies that operate on a multistate, national and international basis, Israeli entrepreneurs in health care were primarily focused on entering the U.S. market through major academic medical centers. There is enormous opportunity to illustrate how Nashville can not only offer partnerships in academic medicine, but also operational scale that is unmatched anywhere else in the U.S.

*“I would like to see the Nashville Health Care Council send out a monthly or quarterly update on start-ups that are ready to enter the U.S. market with brief descriptions and contact information to the Council members. So, we can engage with those companies we find interesting.”
– Diane Seloff, COO, Aspire Health*

Following the mission, members of the Nashville Health Care Council have been tasked with determining how to keep the momentum going and continue to strengthen the relationships that this trip began to cultivate. Without a doubt, this mission highlighted the potential and opportunities that exist between the Israel and Nashville to improve health care on a global scale.

Why Nashville?

Nashville's health care community is recognized as the health service capitol of the United States, home to many of the largest health care services companies in the country.

One aspect that sets the region apart is the 16 publicly traded health care companies headquartered in Nashville as of November 2018. Internationally, these companies contribute to more than 570,000 jobs and more than \$92 billion in revenue. These companies include Acadia Healthcare, Brookdale Senior Living Inc., Community Healthcare Trust, Inc., Community Health Systems, Inc., Cumberland Pharmaceuticals, Diversicare Healthcare Services Inc., HCA Inc., Healthcare Realty Trust Inc., HealthStream Inc., IMAC Holdings Inc., National Health Investors Inc., National Healthcare Corp., MedEquities Realty Trust Inc., Quorum Health Corp., Surgery Partners Inc., Tivity Health Inc.

Another unique factor of Nashville's health care cluster is sector diversity. In addition to being known as a center of excellence for health care services, Nashville is also home to world leaders in behavioral health, ambulatory services, senior living, population health, academic medicine, and health IT.

As of 2015, more than 500 health care companies have operations in Nashville. An additional 400 professional service firms operate in the city, providing deep health care expertise in areas of accounting, law, communications, architecture, consulting and more. The reach of the community extends to all 50 states in the U.S. and internationally to more than five countries in which Nashville-based companies have operations.

With a rich tradition of entrepreneurship and executive talent, Nashville has helped shape the United States health care landscape over the past five decades and continues to improve the quality of patient care internationally.

Nashville Health Care Council
Nashville, Tennessee, U.S.

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