EXECUTIVE SUMMARY

Three issues rank top among the health sector problems based on World Health Index (WHO, 2012):

- Spending on healthcare constitutes a significant portion of GDPs in majority of countries worldwide (it varies between 4 % and 12 % of the GDP of the countries – lowest one Timor-Leste with 1,3 % and highest on Tuvalu with 19,7 %) (Worldbank, 2014). It constituted 10,6 % of the GDP on average globally which is 7.2 trillion USD in 2013. The future outlook is not promising as well, with upward trend in annual spending in real terms. It is assumed that, world will spend 9.3 trillion USD in 2018 with an incremental raise of 5.2 % annually (Deloitte, 2015).
- Despite the high spending on healthcare, quality and reach is unfortunately below satisfactory levels. Satisfaction levels for both the healthcare professionals and patients are below average.
- Number of health professionals including doctors and nurses are not even close to where they should be for a good coverage and service quality.

These issues as well as the numerous others healthcare sector is facing today are beyond doubt unsolvable with the existing system and means. Innovation is desperately needed in how we approach to define the future healthcare ecosystem. Experts on this topic emphasize below concepts in their futuristic projections (WHO, 2011; Guillemin ve Benedict, 2013):

- Health conscious society with self-management and wellness awareness
- Healthy living oriented perspective over disease cure
- Lifelong health record system and health data processing for evidence based healthcare system
- Patient centricity
- Sustainable financial models for healthcare sector.

Mobile health has the most potential in addressing above issues and in bringing the solutions required.

Over the past 10 years and nowadays mobile health is being used for different purposes in developed and developing countries. In developed countries it is generally used for more technological purposes like remote disease management, as wellness / fitness and transfer of electronic patient data. In developing countries (African countries, India and the Far East countries) it is mostly used for giving information via cellular phone, raising awareness about diseases and preventing purposes.

Mobile health entails use of mobile devices to effectively collect health data and track patients in order to enable a faster and better treatment and to better preserve health.

Among the devices widely used for mobile health are cell phones, smart phones, tablets, PDAs, smart watches, smart glasses, smart TV, wearable technology solutions, as well as all kind of implants and sensors that can collect, measure and store healthcare data. Through use of all these devices, medical data can be remotely tracked, big data defining daily life quality and activities of patients can be collected, disease management and healthy life-style promoting alerts and notifications can be shared, diagnosis and treatment applications can be offered to wider audiences more effectively.

Data collected in mHealth assists doctors for a better quality diagnosis and best treatment planning. Individual access to health data on the other hand, improves the treatment's results through better adherence to treatment via reminders and such, and patient involvement in treatment.

Mobile healthcare is finding more ground and getting wider use everyday both in developed and developing countries. There is a wide range of applications such as Simple Text Messages (SMSs) alerting diseases, raising public awareness, and promoting healthy lifestyle; applications enabling video teleconsultations and televisitings, appointment systems using mobile phones and web pages; portable and wearable devices transferring health data, smart phone applications enabling oneself testing for color blindness; remote patient monitoring systems for chronic disease management, etc.

The expected impacts of mHealth can be summarized as below:

- Better diagnosis and treatment
- Building awareness for healthy living, building health conscious, more involved society
- Proactive, protective healthcare adoption
- Better management of chronic diseases
- More effective and sustainable health system
- Over 30 % efficiency in access to health data and processing time for healthcare professionals (Hoyt ve Yoshihashi, 2014)
- Reduction in healthcare costs through decrease in hospitalizations

Health community is encouraged for mobile healthcare given the enormous adoption of mobile technologies globally with over 6 billion cell-phone ownership and over 2 billion smart phone ownership. Mobile health sector is expected to reach 26 billion USD by 2017. Regionally, Asia, Europe and North America are expected to receive equal share in terms of sector size for (Research2Guidence, 2013).

More than 100.000 smart phone and tablet applications for healthcare were available in the market (Research2Guidance, 2014). 70 % of these applications were consumer centric applications such as fitness and wellness and 30 % were tailored for health

professionals. By 2017, it is expected that 3.4 billion people to own and use smart phones and half of them to have health applications running on their phones (Research2Guidence, 2013).

For mobile health market to grow and develop in a healthy way, and for mHealth applications become widespread and be an inherent part of the health ecosystem; legal framework and priorities need to be defined, mHealth solution developers and providers need to understand regulatory requirements, data security and privacy should be ensured, interoperability of health systems and products should be provided, highly secure and optimized solutions should be offered to end users.

When we have a look at barriers for mobile health; the most important issues seem to be, having no significant impact/benefit analysis as mHealth is a new area of application, insufficient number of pilot projects, need for serious behavior change among doctors and patients, the lack of a sophisticated ecosystem, the lack of standarts, data security and privacy issues and of course the financial aspects of the investments.

Moving from global scale to local, mobile health sector in Turkey is in its infancy and mobile health applications and market is yet to reach the level and scale to serve society's needs and offer sustainable business models and financing. In practice, today, for mobile healthcare, the Ministry of Health and the Social Security Administration are in the process of developing public sector solutions, local municipalities offer few wellness and disease management solutions within their region, and in the private sector, led by GSM operators, few mobile health organizations are in the market with offers.

Mobile healthcare has a huge promise in managing the ever-increasing healthcare spending for Turkey. With a wider adoption and realization of its potential,

- Mobile healthcare adoption can improve epidemic prevention, pregnant and infant care, vaccination and execution of awareness programs in rural areas.
- Locally produced smart phone applications and gamification solutions can improve health literacy of younger generations.
- More effective, sustainable healthcare solutions can be provided for the 22 million chronic care patients (Based on the Prevalence of Chronic Diseases and Risk Factors Report, The Ministry of Health, 2013) through mobile chronic disease management.
- Investment for local production of mobile and wearable healthcare technology, sensors and gadgets would mean scale reach, cost reduction in mobile healthcare solution adoption and a significant contribution to Turkey's economic goals for the year 2023.

Mobile health (mHealth) applications provide assistance and quality to healthcare on various levels through new business models. Turkey needs to promptly adapt these new business models into its health policies. Timely and effective adaptation can only be achieved through public and private sector collaboration. For the development of mHealth business models in Turkey, the expected roles of public and private sectors and non-governmental organizations can be summarized as follows:

- mHealth targets should take place in strategic plans. A road map should be developed and government support should be provided.
- Pilot projects should be spread and successful pilot projects should promptly be implemented as an application project.
- Public Private Partnerships should be enabled in mHealth.
- It is essential to develop mHealth business models, to introduce reimbursement phase for mHealth by the Social Security Institution and to draw private health insurance companies' attention to mHealth field.
- Incentives for portable and wearable health technologies in mHealth should be introduced, R&D projects should be supported and the use of smart phone applications should be encouraged.
- Not only illness-related but also health and wellness related technologies, applications and usage models should be promoted.
- The Ministry of Health should build National Electronic Health Record and Personal Health Record infrastructure, set standards and release data generation and storage conditions for the private sector.
- Security and privacy protection measures should be taken in mHealth solutions.
- While strengthening communication infrastructure in the country, awareness raising activities should be delivered both for health sector employees and the public at large.
- Health literacy should be improved via gamification apps.