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PROGRESS OF MOBILE HEALTH: USES AND BENEFITS

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Abstract

Due to rapid raise in phone-enabled technologies, demand for faster process of data and access to medical records, use of mobile health technologies increased and became a necessity of life for individuals. The term "mobile health" or "m-Health", also written as m-health, stands for mobile-based or mobile-enhanced health solutions. It describes the use of mobile telecommunication integrated within mobile and wireless health care delivery systems. M-Health can be used in different purposes like fitness, wellness, disease management. Mobile applications assist to healthcare professionals in management of information, time organizing, health records maintenance and access, communications and consulting, clinical decision making, medical education and training. This study emphasized current state of mHealth applications, development and progress in last five years. As mHealth applications market is still at the beginning many great opportunities are still waiting ahead. In this study statistics like number of mHealth Apps, total downloads of m-Health Apps, mHealth Apps developers and mHealth Apps by category is analyzed for last five years. Data were retrieved from different surveys, reports and scientific studies and combined in order to provide meaningful data about mHealth technologies for researchers.

1. INTRODUCTION

As the adoption of phone-enabled technologies has increased widely and rapidly, the mobile internet technologies became a necessity of life for all individuals. Like other sectors, in health sector, people began to use tens of thousands of online medical applications in last years. The term "mobile health" or "m-Health", also written as m-health, stands for mobile-based or mobile-enhanced health solutions. It describes the use of mobile telecommunication integrated within mobile and wireless health care delivery systems (Istepanian and Lacal, 2003). M-Health improves consumers' health and helps them to access their health data by mobile applications. According to Wallace et al. (2012), mobile apps are defined as software programs that have been developed to run on a computer or mobile device to achieve a specific purpose.

Wyne (2015), says that the following three factors have contributed to the growth of m-Health:
Demand for faster processes and access to information; growing mobile usage around the globe; opportunity for entrepreneurs to create new solutions to lasting problems. With the help of mobile applications individuals can record their data about diseases, health status, daily exercise, total calorie gained and amount of water drunk. On the other hand, telemedicine and telemonitoring systems provide patients to communicate with health staff without going out from home by the help of internet. It works by an early warning sign from the patients or a family member of them. Additionally, by the help of improved technologies such as microsystems, nanotechnologies, textile fibers, biomedical sensors, wireless technology, mobile communications integrated with tele medicine, patients can improve their health (Kiser,2011).

A Deloitte report defines that m-Health reaches to its full potential by four critical dimensions such as people, places, payment and purpose. The reports indicate that demographics like gender, age and income may affect preferences of mHealth users. Place can be important in the supplementation of local networks, wireless download speeds and etc. Also, mHealth decreases payment of patients by the help of delivering health service outside the hospital anytime and anywhere. mHealth can be used in different purposes like fitness, wellness, disease management. (https://www2.deloitte, 2017)

The trends emerging throughout the m-Health can be defined as increase in mobile usage, and mobile health applications, personalized mobile experience about habits, likes or dislikes, enhancements in wearables and new mobile devices such as online videos. Also increase in data and analytics and electronic health records, led m-Health recording of this big data (www.businessinsider.com/, 2014).

The most common use of wearable devices are smart watches for fitness, glucose monitors for diabetic patients, diagnostic wearables with sensors measuring very small concentrations of metabolite gassers which are emitted through human skin and breath. Also, cardiac monitors measuring heart rates are used in different forms such as watches and arm bands (Faridi,et.al, 201;Gröschel et al.2004; Hundert et al.2014).

Wearable devices allow physicians to gather information used for following-up and treatment purposes. From the practitioners' side, it can be said that they utilize from mobile health applications very often. Mobile applications assist to healthcare professionals in management of information, time organizing, health records maintenance and access, communications and consulting, clinical decision making, medical education and training. Practitioners require access to many types of records in clinical settings. They expect

communication capabilities, voice calling, video conference, access to hospital information technologies, electronic medical records and laboratory information systems from medical applications (Nasır,2015; Kalem, 2015; Arsand et al.,2012).

2. MATERIAL AND METHOD

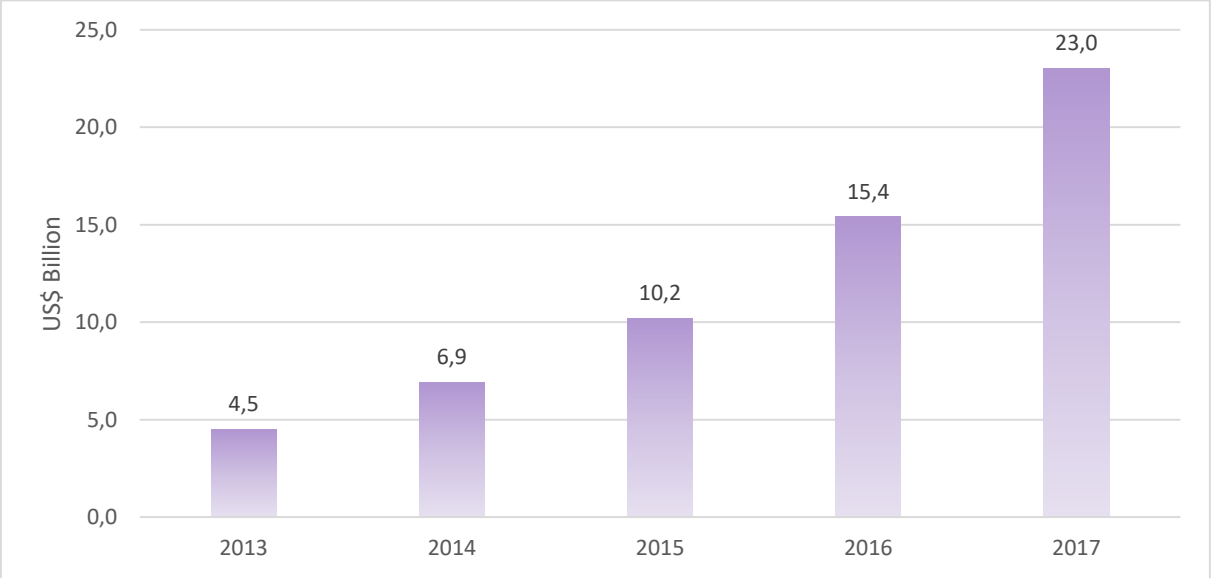
In this study, adoption, progress, opportunities and challenges in mobile health is introduced. In order to examine the fact, reports and statistics, articles, scientific results, surveys related to mobile health applications data were investigated. Graphics including of mHealth Apps, total downloads of m-Health Apps, m-Health Apps developers and mHealth Apps by category were retrieved from various resources according to different years and combined in order to provide meaningful data. Data of the graphics were gained from PwC analysis and HIT Consultant "Touching Lives through Mobile Health: Assessment of Global Opportunity PWC report",2015 and 2016 data from Norwegian Centre for E-health Research, 2013-2014 data from IQVIA Institute, 2017 data from Research2Guidance, m-Health App Developer Economics study 2017, IQVIA AppScript Database, Allied Market Research; Transparency Market Research; Statista All data were summarized, categorized and converted in order to compare according to years. Findings of the study can be followed in results.

3. RESULTS

The market of mobile health applications is about to ten years old. The first application was launched in 2008. The traditional healthcare industry is slow paced. For example, the average time to develop a new drug is ten years. But, digital industry is fast paced. Digital industry has brought disruptive change to the market since entered to healthcare industry.

The market for mobile health has been growing steadily over the last years. Worldwide mobile health revenue (US$ Billion), for 2013 -2017 years and percentage of overall market,2017 is presented in Figure 1.

Figure 1. Worldwide Mobile Health Revenue



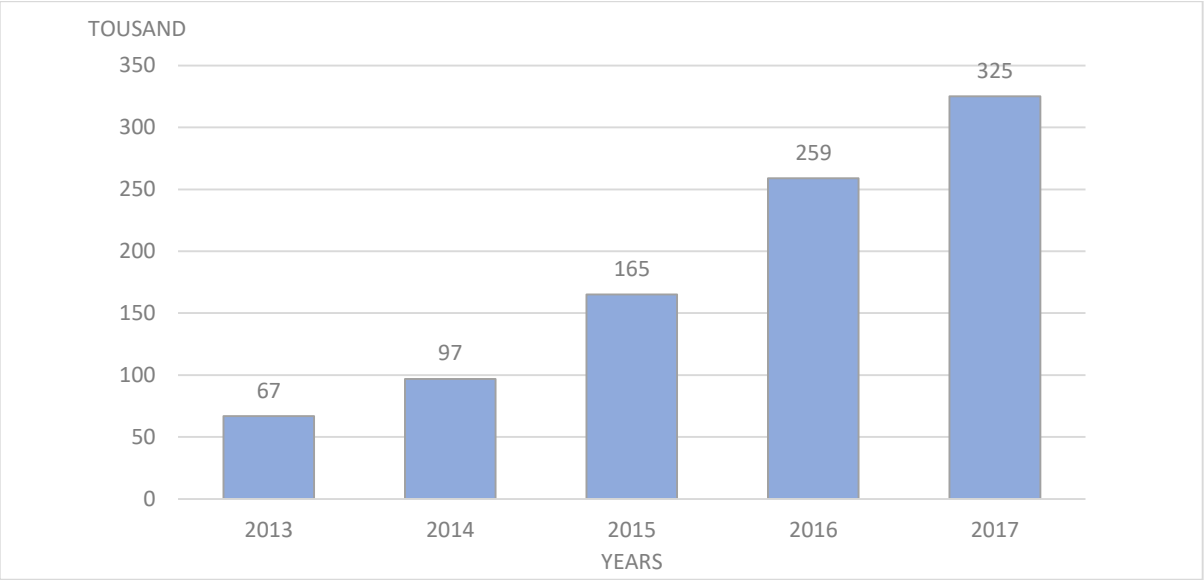
Source: PwC analysis and HIT Consultant "Touching Lives through Mobile Health: Assessment of Global Opportunity PWC report".

In 2013, mobile health revenue was 4.5 billion US$, in 2017 this value has reached 23 billion US$. Mobile health revenue has increased more than five times in last four years. These results indicate that there is great improvement in mobile health industry.

mHealth applications have seen a considerable growth over the past few years. The number of mobile healthcare applications are presented in Figure 2. According to latest data of applications number, there has been 485% growth in the number of mhealth applications for four years. Application data consist of published m-health applications in different applications' platforms such as Apple App Store, Google Play Store, Windows Phone Store, Amazon App Store and Blackberry World.

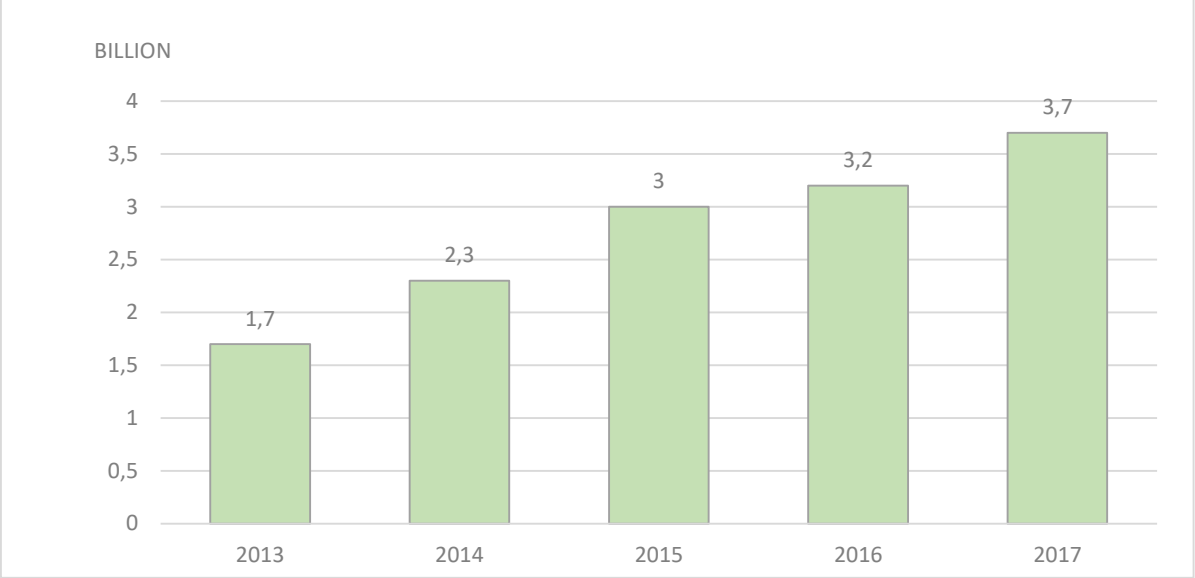
Estimated total downloads number of mobile healthcare applications is presented in figure 3. 3.7 billion health applications were downloaded in 2017. The biggest share of these is android applications. Growth rates of downloads decreased compared to previous years. While In 2014, download number increased 36% compared the previous year, this rate decreased 16% in 2017.

Figure 2. Number of Mobile Healthcare Applications 2013-2017



Source: 2015 and 2016 data from Norwegian Centre for E-health Research, 2013-2014 data from IQVIA Institute, 2017 data from Research2Guidance.

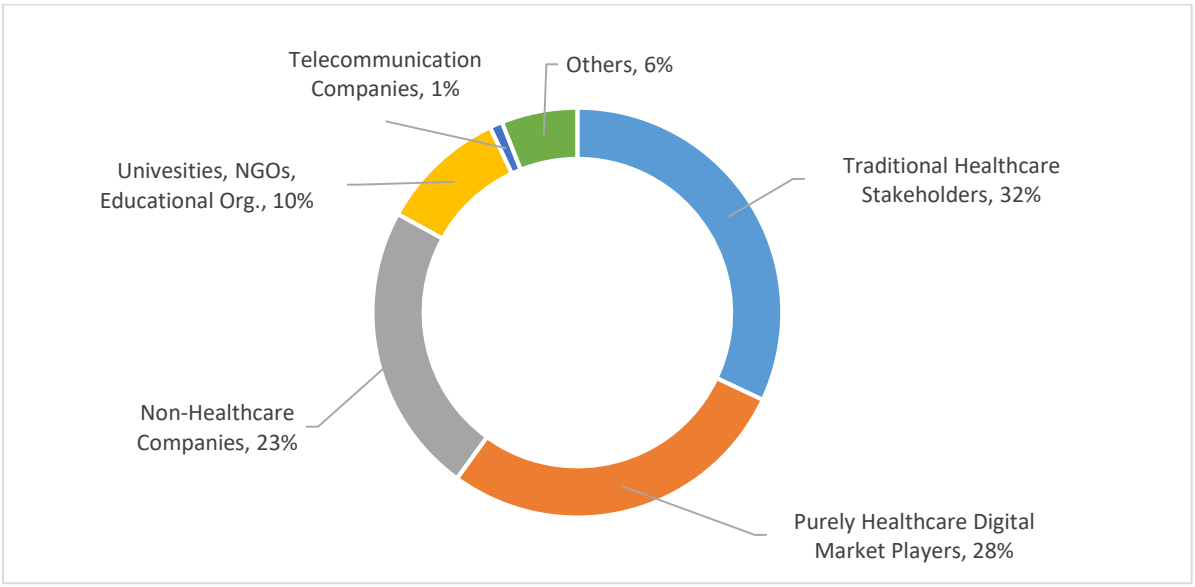
Figure 3. Total Downloads of m-Health Applications 2013-2017



Source: Research2Guidance m-Health App Developer Economics study 2017.

mHealth application developers' origin for 2017 is shown in Figure 4. Most of applications are developed by traditional healthcare stakeholders with 32%. Purely healthcare digital market players are second largest group with 28%. Application developers those are non healthcare companies are third largest developer with 23%.

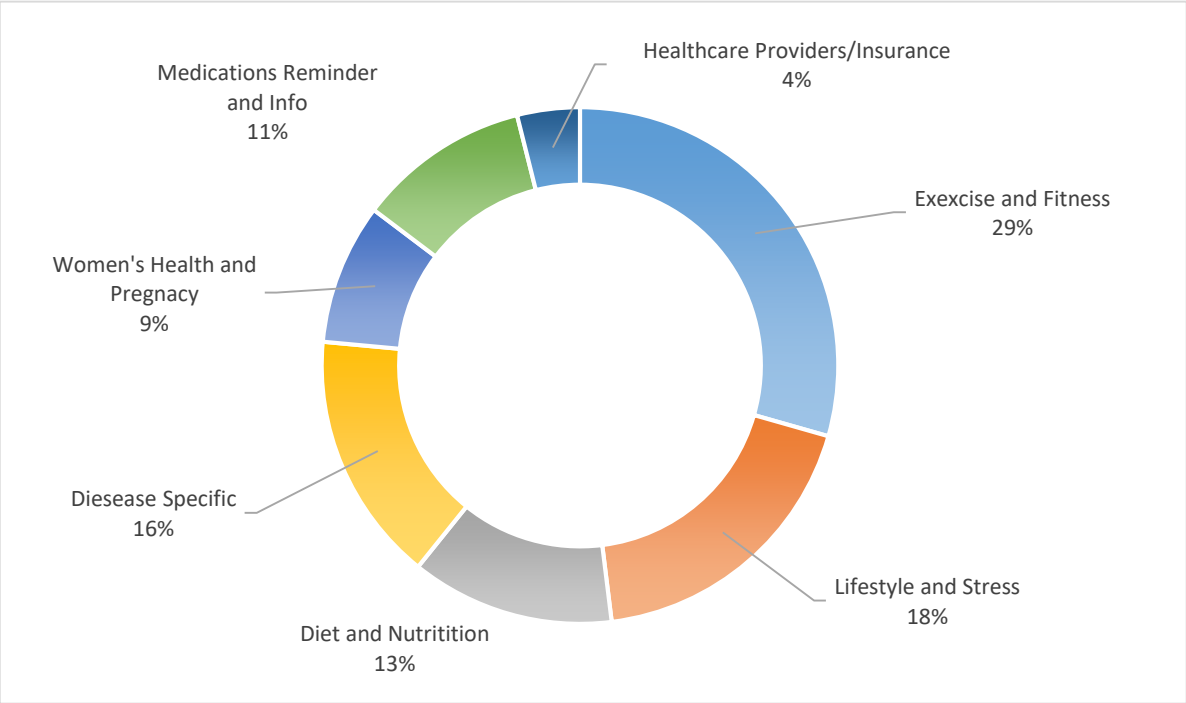
Figure 4. m-Health Application Developers in 2017.



Source: Research2Guidance m-Health App Developer Economics study 2017, 2013-2014 data from IQVIA Institute

Most widely used mobile health applications by consumers were analyzed by using category. Mobile health applications can be divided into two main categories as wellness management and health condition management. Wellness management consists of three category which are exercise and fitness, lifestyle stress, diet and nutrition. The other categories belong to health condition management. These categories is presented in Figure 5. Since 2015, consumer mobile health applications targeting wellness management have dropped as a proportion of total applications from 73% to 60%. In contrast, health condition management applications have rised as a proportion of total applications from 27% to 40%.

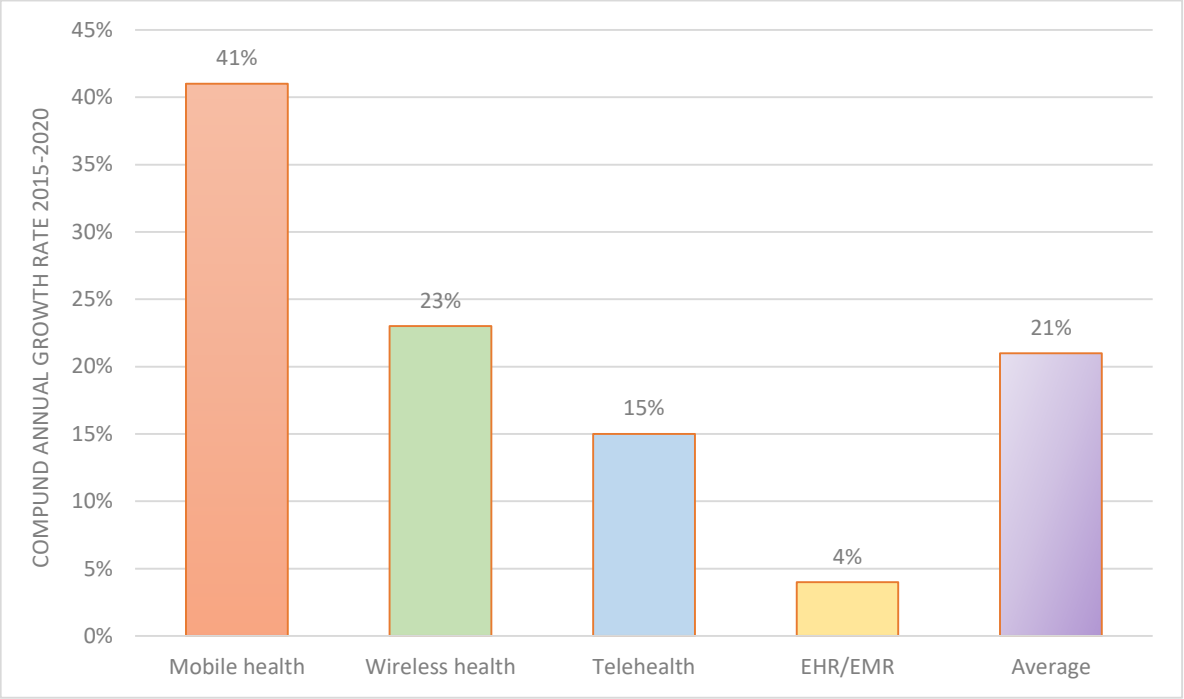
Figure 5. Mobile Health Applications by category for 2017



Source: IQVIA AppScript Database. 2017 data includes unique 11,216 applications. Data categorized by author from IQVIA Institute report.

According the future projection, digital health market grows average 21% rate annually. It is envisaged that mobile health which is one of major components of digital health will grow by 41%. Projected compound annual growth rate for global digital health market in the period 2015-2020 by major segment is shown in Figure 6.

Figure 6. Projected compound annual growth rate for global digital health market in the period 2015-2020 by major segment



Source: Allied Market Research; Transparency Market Research; Statista

4. DISCUSSION

A lot of scientific researches and surveys are found in order to state relationships between mHealth use and demographics, most used mHealth applications, benefits and conflicts about mHealth applications, security problem and patient privacy. While some researches dealt with patients the others dealt with health professionals' opinions about mHealth applications.

Kathooria summarized various researches about m-Health and presented interesting ratios and statistics. According to the article, wellness applications including fitness, lifestyle and nutrition comprise 2/3rd of m-Health applications space. 40%of physicians believe that m-Health Technologies can decrease number of visits of patients to hospitals. Additionally, 75% of them believe that ER visits can be handled over phone or video. On the other hand, 74% of hospitals who use technologic devices to record data of patients work more efficiently (Kathooria, 2016) An other article combined results of different researches and implemented that mobile devices are being used for access to drug information such as dosage calculations, side effects, interactions,etc), communicate with health staff, access to medical research, access to evidence based clinical reference tools at the point of core with patients (Referrel,2015). As we have mentioned that since 2015, consumer mobile health applications targeting wellness management have dropped as a proportion of total applications from 73% to 60%.but health condition management applications have rised as a proportion of total applications from 27% to 40%, these findings are compatible with the results of this study.

Carroll reported a survey conducted with 3677 people in 2014. According to the findings of the survey participants who used m-Health applications were younger, had more education, reporting excellent health and had higher income. Also participants who used m-Health applications lived more healthy and more active (Carroll et al.,2017). Merrel reported that, 58% of smartphone users downloaded a health application. Moreover, 41% downloaded more than five applications (Merrell,2016). McCarthy summarizes a report conducted by 2597 participants in 2017 and says that 64% of patients use medical applications to manage their health. 71% of them believe it is useful for their doctor to access their information (McCarthy,2017). In this study it was found that number of applications downloaded in recent years have been increased, findings of the study are compatible with these results.

Ventola reports that 24% of m-Health applications are used as medical information, 22% are dedicated to the monitoring of physical parameters, 18% to track disease, 16% for education and management, 6% for diagnosis (Ventola,2014). Ventola's findings are similar to this study.

Sahaidah implements that m-Health applications for individual prevention diseases focus mostly on diabetes, stroke, flu, gout and bowel disease. Author says that current mHealth applications can be categorized in terms of individual prevention disease, personal health safety, improving health, improving well being and giving advice on response treatment (Shaidah, 2017). These findings are compatible with the findings of the study.

5. CONCLUSION

It is obvious that medicine is one of the disciplines that has been profoundly affected by the avaibility of mobile devices. This is evident in many studies conducted on physicians that reveal a high ownership rate of these tools, which physicians use in both clinical practice and education. Smartphones and tablets have been even replaced desktop systems as the prefferred computing devices for physicians who need fast access to information at the point of care. On the other hand it is a necessity for health care users to use mHealth applications in order to manage their health.

We know that world's population is getting older and coronary heart disease, hypertension, diabetes and obesity will the main problems of health professionals and individuals in the future. Additionally, the amount of money spent on healthcare will rise. By the help of wearable technologies and mHealth applications patients will be able to monitor and maintain their health and wellness.

In this study the status of mHealth applications is stated for last five years by statistics. It is obviously seen that market has developed very fast and it will continue to grow in the future.This study emphasized current state of mHealth applications, development and progress in last five years. As mHealth applications market is still at the beginning many great opportunities are still waiting ahead. If all healthcare stakeholders such as physicians, institutions, healthcare workers, software publishers, researchers and individuals can be involved in mHealth market, success of the market will be inevitable.

REFERENCES

Årsand, E., Frøisland, D. H., Skrøvseth, S. O., Chomutare, T., Tatara, N., Hartvigsen, G., & Tufano, J. T. (2012). Mobile Health Applications to Assist Patients with Diabetes: Lessons Learned and Design Implications. Journal of Diabetes Science and Technology,6,5,87-99

Aitken, M., Brian C., & Deanna N. (2017). The Growing Value of Digital Health. New Jersey.

Businessinsider,10 ways mobile is transforming health care, Available at: https://www.businessinsider.com/10-ways-mobile-is-transforming-health-care-2014-6 Access date: 10/09/2018

Carroll, J. K., Moorhead, A., Bond, R., LeBlanc, W. G., Petrella, R. J., & Fiscella, K. (2017). Who Uses Mobile Phone Health Apps and Does Use Matter? A Secondary Data Analytics Approach. Journal of Medical Internet Research, 19, 4, 125. http://doi.org/10.2196/jmir.5604

Deloitte Life Sciences and Health Care, Available at: https://www2.deloitte.com/us/en/pages/life-sciences-and-health-care/articles/center-for-health-solutions-four-dimensions-effective-mhealth.html Access date : 11/09/2018

Faridi, Z., Liberti, L., Shuval, K., Northrup, V., Ali, A., & Katz, DL. (2008). Evaluating the impact of mobile phone technology on type 2 diabetic patients' self-management: the NICHE pilot study. Journal of Evaluation Clinical Practice14,3, 465-469.

Gröschel, J., Philipp, F., Skonetzki, St., Genzwürker, H., Wetter, Th., & Ellinger, K. (2004). Automated speech recognition for time recording in out-of-hospital emergency medicine – an experimental approach. Elsevier, Resuscitation, 60, 205-212.

Guidance, Research 2.(2017) mHealth App Economics 2017/2018 Current Status and Future Trends in Mobile Health. Berlin. Available at: https://research2guidance.com/wp-content/uploads/2017/11/R2G-mHealth-Developer-Economics-2017-Status-And-Trends.pdf. Access date:2/9/2018

Hundert, A. S., Huguet, A., McGrath, P. J., Stinson, J. N., & Wheaton, M. (2014). Commercially Available Mobile Phone Headache Diary Apps: A Systematic Review. JMIR Mhealth Uhealth.2,3,142-152

Institute, PwC Health Research (2015). Primary care in the New Health Economy: Time for a makeover. New York

Istepanian R and Lacal J (2003) Emerging mobile communication technologies for health: Some imperative notes on m-health. In: Engineering in Medicine and Biology Society:
The 25th annual international conference of the IEEE, Cancun, Mexico, 17–21 September, 2, 1414–1416.

Kalem G., Turhan Ç.,(2015) Mobile Technology Applications in the Healthcare Industry for Disease Management and WellnessProcedia - Social and Behavioral Sciences 195 ,2014 – 2018

Kathrooia, M., (2016). mHealth: 40 Statistics to know, Available at: https://www.healthitoutcomes.com/doc/mhealth-statistics-to-know-0001 Access date: 12/9/2018

Kiser K.(2011) 25 ways to use your smartphone. Physicians share their favorite uses and apps. Minn Med 94,4,22-29

McCarthy, J.(2017) Healthcare Information and Management Systems Society, Available at: https://www.mobihealthnews.com/content/survey-64-percent-patients-use-digital-

device-manage-health Access date: 1/9/2018

Meller J. M.(2016) Five Essential Mobile Healthcare statistics, Available at: https://carestarter.co/blog/five-surprising-statistics-in-mobile-healthcare-mhealth

Nasir S., Yurder Y.(2015), Consumers' and Physicians' Perceptions about High Tech Wearable Health Products ,Procedia - Social and Behavioral Sciences 195 ;1261 – 1267

Referrel M.D. (2017) 30 Amazing Mobile Health Technology Statistics for Today's Physician, Available at: https://getreferralmd.com/2015/08/mobile-healthcare-technology-statistics/ Access date: 1/9/2018

Shaidah, J. (2017) A Survey on Trend, Opportunities and Challenges of mHealth Apps, iJIM 11, 6, 73-85

Statista. "e-health | Statista Market Forecast".(2017) Available at: https://www.statista.com/outlook/312/100/ehealth/worldwide Access date:2/9/2018

Ventola, C. L. Mobile Devices and Apps for Health Care Professionals: Uses and Benefits (2014) . Pharmacy and Therapeutics, 39, 5, 356–364

Vishwanath, S. (2012). Touching lives through mobile health Assessment of the global market opportunity. Mumbai.

Wyne, M. F. (2015). Merging mobile learning into traditional education, 2013–2016. The International Conference on E-Learning. New York: USA.

Wallace S, Clark M and White J (2012) 'It's on my iPhone': Feelings to the use of mobile computing devices in medical education, a mixedmethods study.2,4,131-156.