

Depiction of global trends in publications on mobile health

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Abstract

Background: Variety of mobile health initiatives in different levels have been undertaken across many countries. Trends of these initiatives can be reflected in the research published in m-health domain.

Aim: This paper aims to depict global trends in the published works on m-health topic.

Materials and Methods: The Web of Science database was used to identify all relevant published papers on mobile health domain worldwide. The search was conducted on documents published from January 1898 to December 2014. The criteria for searching were set to be “mHealth” or “Mobile health” or “m health” or “m_health” or “m-health” in topics.

Results: Findings revealed an increasing trend of citations and publications on m-health research since 2012. English was the first most predominant language of the publication. The US had the highest number of publication with 649 papers; however, the Netherlands ranked first after considering publication number in terms of countries population. “Studies in Health Technology and Informatics” was the source title with highest number of publications on mobile health topics.

Conclusion: Trend of research observed in this study indicates the continuing growth is happening in mobile health domain. This may imply that the new model of health-care delivery is emerging. Further research is needed to specify directions of mobile health research. It is necessary to identify and prioritize the research gaps in this domain.

Keywords: mHealth, mobile health, publication trend, research trend, scientometrics.

Introduction

Mobile health is “medical and public health practice supported by mobile devices, such as mobile phones, patient monitoring devices, personal digital assistants, and other wireless devices [1].” M-health as the biggest technology breakthrough of our time [2], is an umbrella term for describing the use of mobile telecommunication technologies to deliver health-care and to support population health [3,4]. Although mobile technologies cannot carry drugs and health-care providers, they can transfer health information in different ways [5]. Particularly m-health technologies have potential to be used for responding in both communicable and non-communicable disease burden in developing countries [4].

M-health technologies have proved to have benefit for both health-care professionals and patients. Health-care professionals can use m-health for patient monitoring, access to references, communication and consultation, clinical decision-making, information management, time management, health record

access and maintenance, and medical education [6]. When mobile health initiative are used by public and patients, they can facilitate self-care and self-management [7].

Evidence shows an explosion of m-health activities worldwide [8]. Variety of mHealth initiatives in different levels have been undertaken across many countries. Some but not all of these countries are UK, Ghana, Senegal, France, Mexico, Estonia, Bangladesh, Bhutan, Malta, Greece, Vietnam, and Germany [1]. Therefore, trace of these initiatives can be reflected in the research published in m-health domain. As the mobile health technologies continue to grow, it seems inevitable to examine the research published in the literature in this field for characterizing its trend. This paper aims to depict global trends in the published works on m-Health topic.

Materials and Methods

Source of data

The Web of Science database was deployed to identify all relevant published papers on mobile health domain worldwide. The reason for selecting the Web of Sciences was the fact that its coverage in science is sufficiently comprehensive and it also includes the cited references for each paper.

Study selection and data analysis

Articles on topics of mobile health originating from different countries across the world were used for examining their scientific production in this field. The

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search was conducted on documents published from January 1898 to December 2014. Data collection was conducted in June 10, 2015. The criteria for searching were set to be “mHealth” or “Mobile health” or “m health” or “mHealth” or “m-health” in topics. The papers retrieved from query were filtered in terms of year, frequency of citations, country of origin, source title, and languages.

Results

Temporal trend of evidence on mobile health

Figure-1 shows overall number of publications on topics of mobile health worldwide by year. As it is evident there has been an increasing trend, in publishing on mobile health topics since 2010. This rise has occurred much more sharply since 2012.

Top 10 productive countries

As the statistics in Table-1 [9] indicate the United States is the most productive country in publishing research on topics of mobile health. The United Kingdom was ranked the second most productive country followed by China.

8 out of 10 top productive countries in m-health topics are among higher income countries except for China and India that are categorized as upper middle income and lower middle-income countries, respectively. Considering the number of publications per number of countries population, Netherlands holds the first rank followed by Australia and UK.

Top 10 dominant languages

Top 10 leading languages used for publications on topics of mobile health are English (5304), French (204), Russian (190), German (142), Swedish (32), Spanish (30), Korean (22), Japanese (22), Danish (21), and Norwegian (17). As it can be seen English is the most dominant language among the top 10 leading languages. Papers published in the English language (as the one holding the first place) is about 26 times higher than in French (placing in second place).

Trend of citations

Figure-2 depicts trend of citation to the published work in topics of mobile health. As it is evident from this graph, there has been growing increase in number of citations over time. In addition, number of citation has been increased sharply since 2012.

Top 10 productive journals

Journals with the largest share in publishing m-health topics are the journals such as studies in Health Technology and Informatics, JMIR, Voenno Meditsinsko Zhurnal, Lancet, Telemedicine and eHealth, and JMIR M-health and U-health (Figure-3).

Discussion

Temporal trend observed in research published in the field of mobile health implies a growing increase in this domain. The citations to these articles have been increased as well. Since 2012, the rise has occurred in

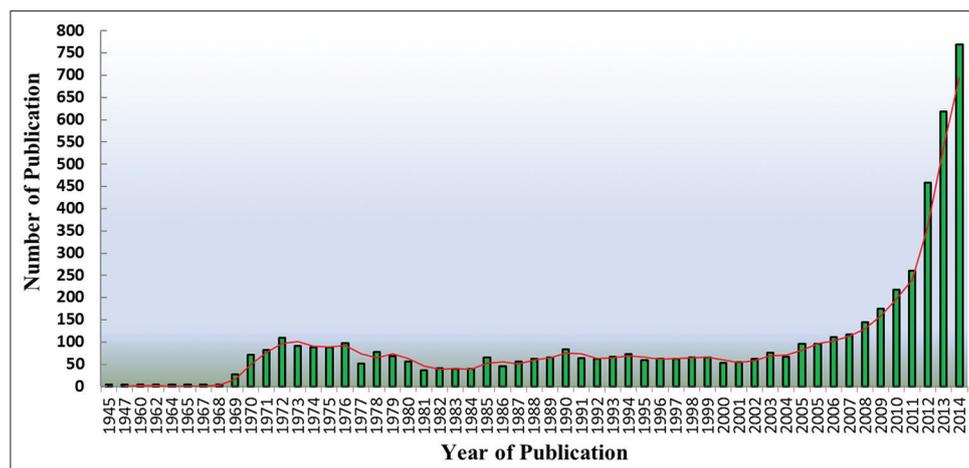


Figure-1: Temporal trend of publication on mobile health topic.

Table-1: Top 10 productive countries with publication on topics of Mobile Health.

Country	Number of documents	Population [9]	Number of papers per 1 million population	Economic rank	Optimized rank
USA	649	322,582,006	2.01	High income, OECD	5
UK	202	63,489,234	3.18	High income, OECD	3
China	129	1,393,783,836	0.09	Upper middle income	9
Canada	107	35,524,732	3.01	High income, OECD	4
Australia	85	23,630,169	3.6	High income, OECD	2
Spain	76	47,066,402	1.6	High income, OECD	6
India	65	1,267,401,849	0.05	Lower middle income	10
Netherlands	63	16,802,463	3.75	High income, OECD	1
Germany	61	82,652,256	0.73	High income, OECD	8
South Korea	54	49,512,026	1.09	High income, OECD	7

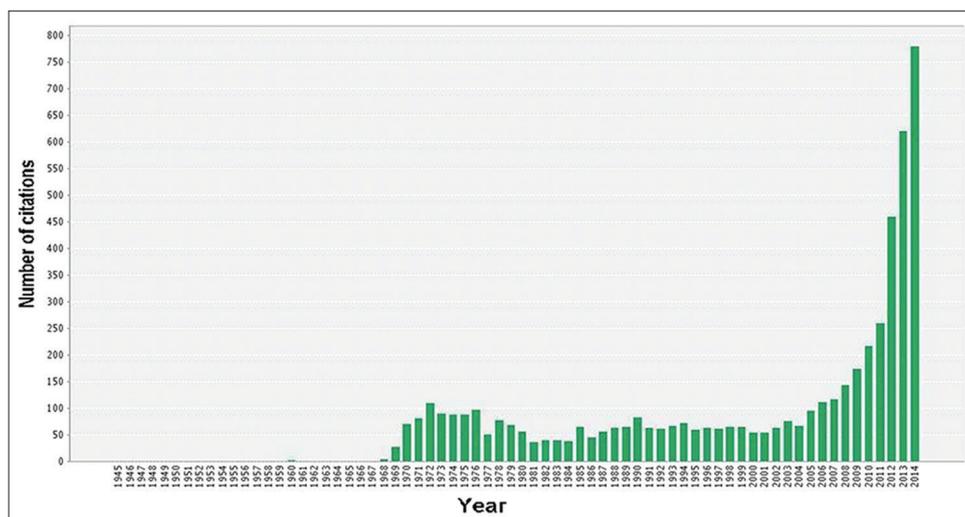


Figure-2: Number of citations to the papers published on m-health topics by year.

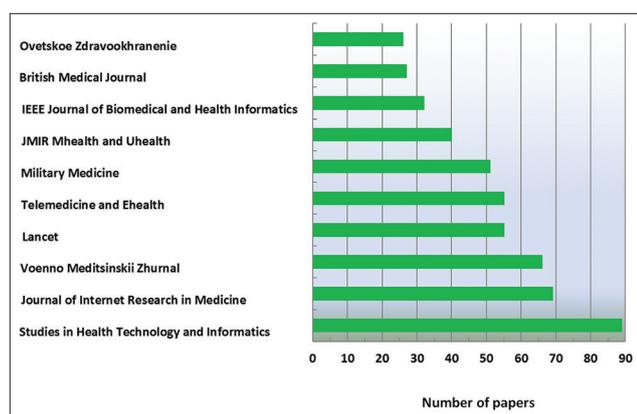


Figure-3: Top 10 productive journals in topic of mobile health.

both publications and citations much more sharply than before. This publication growth is consistent with an increasing growth of m-health app market. As highlighted by the director of mHIMSS, “the mobile health market is experiencing one of the fastest growing areas in the health IT space” [10]. Evidence shows that mobile health market has a year-over-year growth rate of around 17% since 2010 [11]. This growth has happened in all health-care areas including diagnostics, telemedicine, research, education, and interventions [12]. In fact, scope of mHealth applications has been expanded [13]. For instance, while growth in wearable technology is accompanied the m-health rise, m-health apps are used as an equipment supplement [14] for wearable that will soon become the cornerstone of future health-care strategies once the notion of smart healthy cities comes into the reality [15]. Moreover, attempts to integrate m-health with electronic health records have been reported [16]. Mobile apps are also considered as one of the main platforms for empowering a broad spectrum of patients [17] and even some researchers have highlighted the necessity of developing strategic approach for making m-health solutions sustainable [18]. These are due to the fact that

mobile devices support various technical functions and provide possibility of synchronized and asynchronous communication and services [19].

English was the predominant language of publication on m-health topic as it has been reported in other domains [20-23]. This is in accordance with the fact that English is the dominant language of Science [24].

As it is evident from the statistics, North America (US and Canada), Australia, and Europe (UK, Netherlands, and Germany) have made the most contributions to this field. This is in line with the predominant language observed among papers as English is the primary language of science used among authors from those countries.

An increase observed in a number of citations may indicate greater acknowledgement of papers on mobile health topic. This may be attributed to the increasing interest emerged in m-health domain [25] as well as the increasing quality [26] of papers published in m-health domain. In fact, m-health has been recognized as an independent research interest among academics and researchers. This is somehow reflected in a number of the papers published in the prestigious journals such as Journal of Internet Research in Medicine, Studies in Health Technology and Informatics, and Lancet.

Conclusion

Trend of research observed in this study indicates the continuing growth is happening in mobile health domain. Research on m-health appears to evolve as the field evolves. Further research is needed to specify directions of mobile health research worldwide and its evolution toward identifying the research and knowledge gaps in this domain.

Authors' Contributions

LRK and SF conducted the observations at the mobile health. SF reduced the data, and LRK performed the global trends in publications on mobile

health analysis. LRK and SF drafted and revised the paper. Both authors discussed the results and implications and commented on the manuscript at all stages. Both authors read and approved the final manuscript.

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Competing Interests

The authors declare that they have no competing of interest.

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