



Literature Review

The role of social media in preventing and managing non-communicable diseases in low-and-middle income countries: Hope or hype?



Sheikh Mohammad Shariful Islam^{a,b,c,1,*}, Reshman Tabassum^d, Yong Liu^{b,e}, Shiqun Chen^{b,e}, Julie Redfern^{b,f}, Sun-Young Kim^g, Kylie Ball^{a,1}, Ralph Maddison^{a,1}, Clara K Chow^{b,f,1}

^a Institute for Physical Activity and Nutrition (IPAN), Deakin University, Geelong, Australia

^b The George Institute for Global Health, UNSW, Australia

^c Sydney Medical School, University of Sydney, Australia

^d Faculty of Business, Deakin University, Australia

^e Guangdong Cardiovascular Institute, Guangdong Academy of Medical Sciences, China

^f Charles Perkins Centre (CPC) Westmead, University of Sydney, Australia

^g School of Public Health, Seoul National University, South Korea

ARTICLE INFO

Article history:

Available online 24 January 2019

Keywords:

Cardiovascular disease
Information and communication technologies
Self-management
Facebook
Twitter
Social media

ABSTRACT

Non-communicable diseases (NCDs) pose major challenges for health systems in low-and-middle income countries (LMICs). Social media may be a low-cost, powerful tool to support NCDs prevention and management in LMICs through its ability to reach a large population. However, data on the role of social media for NCD prevention and management in LMICs is scarce. This commentary paper explores the role of social media for prevention and management of NCDs and discusses how these may particularly have a role in supporting people in LMICs. We conducted a literature search using PubMed and Google Scholar to identify peer-reviewed articles using social media for NCDs in LMICs. Technology based interventions are increasingly being examined as a means to address healthcare gaps, especially in LMICs. The potential role of social media in NCD prevention and management includes patient health education and information sharing, psychological support, self-management, public health campaigns and health professional's capacity building. Nevertheless, there is little direct data on utilizing social media for NCD prevention and management in LMICs and thus a systematic review was not possible. However, social media may also have risks and challenges, such as conveying incorrect information, lack of data confidentiality, monitoring, and regulation, commercial interests, equity of access, and lack of standards. Regulatory guidelines and standards need to be developed and adhered to help avoid adverse consequences. Further research on effectiveness of social media for NCDs using robust methodologies in different population groups for short/long term impacts in LMICs is recommended.

© 2019 Fellowship of Postgraduate Medicine. Published by Elsevier Ltd. All rights reserved.

Introduction

Globally, the total number of deaths due to non-communicable diseases (NCDs) is increasing, resulting in major challenges for

health systems, particularly in low-and-middle income countries (LMICs) [1,2]. Approximately 80% of all NCD deaths occur in LMICs [3], and more than half of these deaths occur in people aged less than 70 years. Despite this, there is a relative lack of awareness about the diseases among patients and especially among the general population, limited services and resources available for NCDs in LMICs [4–6], which further contributes to the significant premature morbidity and excess mortality for these regions. Most of the NCDs share common risk factors such as physical inactivity, use of tobacco and alcohol, high blood pressure, high cholesterol, and unhealthy diet, which could be mitigated by appropriate preventive measures. In recent years, there has been an exponential increase in research to investigate the potential of new technologies to improve health of the general

* Corresponding author. Present address: Institute for Physical Activity and Nutrition (IPAN), School of Exercise & Nutrition Sciences, Faculty of Health, Deakin University, 221 Burwood Highway, Burwood, VIC 3125, Australia.

E-mail addresses: shariful.islam@deakin.edu.au (S.M.S. Islam), rtabassum@deakin.edu.au (R. Tabassum), yliu@georgeinstitute.org.au (Y. Liu), schen2@georgeinstitute.org (S. Chen), jredfern@georgeinstitute.org (J. Redfern), sykim22@snu.ac.kr (S.-Y. Kim), kylie.ball@deakin.edu.au (K. Ball), ralph.maddison@deakin.edu.au (R. Maddison), clara.chow@sydney.edu.au (C.K. Chow).

¹ These authors contributed equally to this work.

population and support NCD prevention and management in many LMICs [7–11].

With the proliferation of mobile phones, increased use of the internet and the worldwide web, social media has revolutionized communication, creating and intensifying social bonds through posting, sharing, and exchanging information [12]. Social media could play an important role in providing patient education, improving health literacy and supporting public health programs. The participatory, interactive nature of social media platforms allows for information to be generated and shared in a viral fashion, providing new mechanisms to foster engagement and partnership with consumers, to influence their behaviors and promote healthy lifestyles [4]. However, leveraging social media for NCDs in LMICs requires the consideration of several risks and challenges, including the costs of participation and implementation, data confidentiality, monitoring, regulation, technical competencies and capacity among others [13]. Although recent digital revolutions have generated much buzz to use social media in promoting health, little is known about the benefits of social media in NCD prevention and management in LMICs. The paper draws on the available evidence of the potential role of social media in preventing and managing NCD related health outcomes in LMICs, its risks and potential solutions.

Methods

We conducted a literature search using PubMed and Google Scholar to identify peer-reviewed articles using social media for NCDs in LMICs. The key search term used were ‘social media’ or ‘social network’ or ‘web-based tools’ or ‘Facebook’ or ‘Twitter’ or ‘web 2.0’ or ‘internet platform’ and ‘non-communicable diseases’ or ‘NCD’ or ‘chronic diseases’ or ‘cardiovascular diseases’ or ‘heart diseases’ or ‘diabetes’ or ‘cancer’ or ‘chronic obstructive pulmonary diseases’ or ‘COPD’ or ‘mental health’ and ‘low and middle-income countries’ or ‘LMIC’ or ‘emerging economics’ or ‘developing countries’. Articles using a social media intervention for NCD in any LMICs were eligible for inclusion.

What are social media?

“Social media” refers to a wide variety of internet-based tools and applications, allowing individuals and groups to communicate, share and gather information, messages, images, and other content, along with collaborating with other users in real time [14]. Social media includes social networking sites (e.g., Facebook, YouTube, Instagram, Twitter, LinkedIn), discussion forums, blogs and microblogs (e.g., wikis), and message or chat application (e.g., Facebook Messenger, WhatsApp, QQ, WeChat, Skype, Viber).

Results

Facebook offers varied communication mechanisms by allowing participants to receive and share information, opinion, and advice; create open or closed groups to help motivate other users; alert public in real-time to critical product or policy information; reach a more diverse audiences; raise public engagement and social mobilization aimed at the public at large [15,16]. YouTube can be used to promote health information using videos and dramas. Blogging is a useful platform where consumers can share experiences and learn from each other. LinkedIn can enhance healthcare professional network and information sharing. On the other hand, WhatsApp could be used to send out personalized reminders targeting specific patient populations, for example reminders for blood sugar monitoring and medication adherence in patients with diabetes.

Social media use has increased sharply across all ages and professions worldwide. The Global Digital Overview report 2017

estimated that there were 2.8 billion active social media users globally, which increased 21% (482 million) since 2016, representing more than one-third of the world’s population [17]. More than one billion people use Facebook every day with the majority of users based in LMICs [18,19]. A previous report showed that populations from 6 of the 10 largest countries using Facebook were from LMICs [19]. Furthermore, on a daily basis, 100 million Twitter handlers shared more than 65 million tweets, and 2 billion videos were viewed on YouTube [20]. The WeChat platform added 196 million monthly active accounts from last year [18]. Social media sites are currently among the top-most sites visited globally and their influence in our lives is pervasive.

Social media may have considerable potential for improving health communication in LMICs. In many rural areas in the LMICs, access to mobile phone networks exceeds 80%, whereas access to landline media channels remains limited [21,22]. Social media also offers low-cost opportunities for awareness building via disseminating health information and campaigns to large population [21], and great potential to influence knowledge, attitudes and behaviors of people for the prevention and management of NCDs in LMICs. A systematic review evaluating the clinical outcomes social media intervention for NCDs reported that of 17 contemporary social media technologies, only 5 technology platforms (Facebook, Blogs, Twitter, Wikipedia, and YouTube) were used, with about 70% studies using Facebook or Blogs [23]. The study concluded that Facebook and blogs were the most efficient media to provide social and emotional support for patient with NCDs to improve patient care.

Discussion

The potential role of social media in NCD prevention and management includes patient health education and information sharing, psychological support, self-management, public health campaigns and health professional’s capacity building.

Social media offers the potential to support the prevention and management of NCDs in LMICs through different mechanisms. First, social media can play a significant role in improving *health education and information sharing* [24]. Disease-specific knowledge obtained through social media can support people to understand their health conditions and take preventive measures. A recent study showed that combining social media resources and in-person education helped to increase public awareness and disseminate health information for Alzheimer’s Disease in Puerto Rico [25]. Another study among 187 hypertension-related Facebook groups containing 8966 members reported that these groups helped to create awareness about hypertension among the members [26]. The Healthcare Hashtag Project analyzed the group influence and growing role of Twitter in health care, which exceeded the threshold of 100-million tweets, equating to 100 million individual pieces of healthcare information shared. Redfern and colleagues showed that cardiovascular health information and education can be disseminated quickly, efficiently, and on a worldwide scale using Twitter [27]. Medpedia, furthermore, is an open platform (initiated by the Harvard, Stanford, University of Michigan and UC Berkley) that helps sharing and advancing knowledge about health, medicine, and the body with a verification process of author’s credentials and a restrictive editorial process [28], which could be an useful model for social media platforms. A review paper identified patient-tailored information, interactivity, content credibility, clear presentation of content, use of multimedia and interpretability were the essential design features of online patient education websites for NCD management [29].

Second, social media may improve *social, peer or psychological support*, which refers to contact between two or more people with the similar illness and giving each other emotional or influential support. Social networking sites are one of the most popular forms

of peer support for patients. For example, Diabetes Support is an online patient community that provides important information, tips, motivational quotes and healthy recipes for patients with diabetes using Facebook. The Diabetes Support program managed by a private media company has received more than 1.3 million likes in Facebook since its inception in 2016. Similarly, PatientsLikeMe.com is a virtual patient network of more than 521,000 people reporting their experience on 2700 conditions with 40 million data points, creating one of the largest repositories of patient-reported, multi-condition data [30]. Through the network, participants with similar health conditions and diseases connect with each other and can track and share their experiences. PatientsLikeMe was founded by Heyword in 2004 as a for-profit company and has amassed more than 2.6 million likes in Facebook and has led to more than 60 peer-reviewed research studies as at 2017. Tudiabetes is an online program of the Diabetes Hands Foundation which uses social media for recruiting and training volunteers [30]. These sites inspire people to use social media while discussing and enquiring about specific diseases to connect with other sufferers who are going through the similar phase of condition and treatment and give a feeling of “you are not alone”. A previous study using internet based self-management programs for patients with arthritis reported beneficial effects of the intervention in improving depression score, health related distress, and self-efficiency [14]. A global online survey reported that participants with chronic pain reported positive impact on psychological, social, and cognitive health from social media use [31]. A previous study among breast cancer patients participating in online communities showed significant improvements in psychological and depressive symptoms, as well as anxiety through ‘active’ participation on online discussion forums and peer support [32].

Third, social media can promote essential *self-care and self-management*, emphasizing preventive and curative measures for NCD in LMICs [33]. An online self-management program for diabetes provided disease-specific knowledge and supported patients to better manage their health [34]. DailyStrength, a social platform for breast cancer, diabetes and fibromyalgia communities, has triggered discussions about experiential knowledge on NCDs and provided participants with better self-management ideas through active interactions on this platform [35]. Social media may facilitate participants becoming more activated in self-care, including engaging patients in communities of patients with similar conditions or with healthcare providers where they are unable to attend face-to-face consultations [24]. Technology embedded with social platforms can support individuals to recognize NCD related health risk issues and support self-management [36]. Thus, social media can help patients to be in charge of their chronic conditions.

Fourth, social media can provide the platform to support *public health campaigns*. This can be achieved through empowerment of participants to communicate and share information, encourage participant engagement and mobilization, build online communities by tapping into existing networks, and develop engaging content with a clear call to action. For example, anti-tobacco campaigns on Facebook 2.0 TAPS (www.change.org). The Campaign for Tobacco-Free Kids is a leading force in the global fight to reduce tobacco use and utilizes Facebook to promote its mission. A recent analysis suggested that mobile technology could be used to motivate and empower people to reduce their risk of CVD, can help to reduce CVD burden across the globe and open up a new, ‘motivational population-wide’, universally accessible and effective strategy for prevention of other NCDs [37]. With increasing penetration of mobile phones and willingness to receive health-related short message services (SMS) globally and across LMICs, this presents an opportunity for promoting NCD services intended for younger adults and those in higher socioeconomic groups [38].

Different types of social media may suit different populations and hence be suited to diverse health and/or disease promotion. These tools may encourage participation in the campaigns by driving web traffic through differing channels enabling a low-cost continuous promotion of public health campaigns. To illustrate, the World Lung Foundation used moderated Facebook pages and ads to promote anti-smoking campaigns reaching 5444 members, received the widest media coverage and only costed US\$5000, including US\$3000 for Facebook ads [21]. However, there are some smoking fetish videos in YouTube and pro-smoking characters in social media games that might promote smoking in adolescents. A systematic review reporting clinical outcomes on social media use in 10 NCDs showed that the overall impact of social media on NCDs was variable, with 48% of studies indicating benefit, 45% neutral or undefined, and 7% suggesting harm. Among studies that showed benefit, 85% used either Facebook or blogs, and 40% were based within the domain of support [23].

Finally, social media can promote *health professional's capacity building* by enhancing professional networks and influencing the mainstream media in LMICs. Health professionals use social media for networking, communicating with colleagues, obtaining and sharing medical knowledge, organizing online journal clubs, identify research opportunities and sharing clinical information [39]. Social media may facilitate patient-physician communication and effective translation of evidence into practice to improve delivery of healthcare services. For example, the Brooklyn-based primary care practice “Hallow Health” employed social media tools, such as weblogs, instant messaging platforms, video chat, and social networks to improve patient management [33]. A recent systematic review of 90 studies on social media for health communication reported that social media increased interactions with others, supported shared and tailored information, increased access to health information, reinforced public health surveillance and had potential to *influence health policy* [39]. Table 1 shows the potential roles and risks of social media.

Risks to the use of social media

The use of social media for NCD prevention and management, however, is considered controversial due to several potential risks to participants and healthcare professionals [40]. These include:

- (i) Lack of evidence: The value of social media as a persuasive mechanism remains unproven. Another overlooked assumption is that, social media would have the same effects on behavioral changes in LMICs as in high-income countries; this is unknown, as most supporting empirical work has been conducted in high-income countries.
- (ii) Low-quality information: A major drawback of health information originated from social media is the lack of reliability. Information maybe unreferenced, inadequate or misleading. Social media often focuses on individual participant stories and may amplify certain controversial issues, since anyone can upload contents [41]. ‘Bad stories’ or misinformation on issues may be magnified and widely circulated creating chaos and challenges for healthcare professionals and organizations [42]. Misinformed consumers may have heightened concern and/or expectations, which may in turn lengthen medical consultations, and possibly result in ‘sub-optimal’ medicines use with unnecessary costs and avoidable adverse effects.
- (iii) Participant confidentiality: A risk associated with the use of social media is violations of participants confidentiality and privacy. Social media platforms are widely accessible and personal information can be transmitted without user’s

Table 1
Potential roles and risks of using social media.

Potential roles	Potential risks
Patient health education and information sharing	Lack of high quality evidence of effectiveness in LMICs
Provide social, peer or psychological support	Low quality information
Encourage self-care and self-management	Patient confidentiality and privacy
Support public health campaigns	Risks to professional reputation
Promote health professional's capacity building	Commercial interests and conflicts of interests
Endorse and support policy making	Lack of regulation and equity of access

Table 2
Recommendations for social media.

<ul style="list-style-type: none"> • National and local health authorities can use social media to improve access to reliable and quality health information for its citizens. • Sharing information from credible sources, i.e., National Heart Foundations, Cancer Councils, Diabetes Associations and other health professional associations and organizations. • Social media sites could be reviewed by independent experts for quality, information sources required to be referenced and verified [28]. • Develop regulatory approval and monitoring process for health-related social media sites as undertaken for medical apps and software in the UK, USA and elsewhere. • Training of healthcare professionals in the use of social media [44]. • Developing a framework to describe the reach, efficacy, adoption, implementation, and maintenance of social media interventions for NCD management [45]. • Promote different social media to suit the needs of individual participants, which may lead to better self-management of health conditions, and improve overall health outcomes [15]. • Integrating social media with other technological models, such as evidence based mobile health programs [46]. • Identify appropriate media and message types for individual behavior change, determine whether the long-term effectiveness of social media programs is sustainable among larger, more diverse people. • Finally, development of appropriate policies for content sharing as per national privacy laws and monitoring user privacy. Participants demographic information and social identities should be anonymized to address security and privacy concerns [47].
--

consent. Social media can convey messages about an individual's personality, values, and priorities, and can generate long lasting impressions [43].

- (iv) Professional reputation: Unethical behavior such as the negative comments about patients, use of discriminatory language; sharing of immoral contents, images of sexual suggestiveness or intoxication can reflect negatively on the reputation of health care professionals and entities [20,40]. Such violations or infringements can risk exposing healthcare bodies to liability under national privacy laws.
- (v) Commercial interests: Social media can be misused by industry to promote harmful products. For example, food and beverage marketing on Facebook and apps are designed to capitalize on user's social network to promote unhealthy food (digital junk).
- (vi) Monitoring and regulation: Social media sites often remain unmonitored and lacks regulatory approval from any national authorities in LMICs.
- (vii) Digital divide: There is also the risk around digital divide, and questions as to whether social media is accessible to people in rural, regional, disadvantaged areas of LMICs, may need consideration. However, technology is continuing to evolve and with more people gaining access to internet, social media might be considered to reach a large section of the population in LMICs.
- (viii) Social media preferences: Participants perceived value, expectations and use of different social media, preferred structure and contents of social media for NCD prevention and management in LMICs are poorly understood.

Potential solutions

The imminent scope of social media to advance healthcare cannot be undervalued. Social media can be customized and tailored based on the necessities of diverse NCD audiences, including according to specific disease conditions, treatments, and medications. Risks could be addressed by the proposed measures highlighted in Table 2.

Future needs

Promoting social-media-based communication for NCD prevention and management in LMICs requires the consideration of several constraints and challenges, as well as careful planning and developing strategies. These include understanding of the economics and sociocultural equity of participation, privacy and surveillance, regulation and information quality, and technical competencies and capacity of healthcare professionals [13]. While the cost of stand-alone social media campaigns might be small, the likelihood of large population impact is also minor; viral sharing at scale is difficult to achieve and campaigns that depend on sharing for growth have a very difficult goal. Therefore, rather than being an alternative to traditional media, social media may have a different role to play as an efficient engagement and mobilization mechanism, and may be more effective in NCD prevention [16]. In recent years, smart phone technologies such as mobile phone apps and decision support tools have shown promise to improve NCD outcomes especially for diabetes [48] and hypertension [49], however further investigation is necessary before its recommendation in general practice. The effective translation of new knowledge, social technologies, and engagement techniques will likely result in novel approaches for empowering, engaging, and educating people for NCDs in LMICs [50]. Future collaboration between government, non-government, social media companies and academics in social media research is likely to generate evidence of the impact of social media for NCDs in LMICs.

Conclusion

Social media is rapidly emerging as a popular source of healthcare information, communication and networking. Social media may be a low-cost means of addressing the healthcare gaps and promoting public health campaigns, but currently its impact is not well known in LMICs due to lack of high quality studies in these countries. Risks associated with the quality and accuracy of health information, data privacy, monitoring, regulation, commercial interests and equity of access are key concerns. Regulatory guidelines and standards are needed to avoid adverse consequences. Further research on effectiveness of social media for NCDs using robust

methodologies in different population groups for short/long term impacts in LMICs is recommended.

Author contributions

SMSI and RT designed the study and developed the first draft. All authors contributed to provide scientific inputs and technical improvement. CKC, RM and KB guided the revisions. All authors read and approved the final version for publication.

Author statements

Funding

None.

Competing interests

None declared.

Ethical approval

Not required.

Acknowledgments

Dr Islam is funded by a Senior Research Fellowship by the Institute for Physical Activity and Nutrition (IPAN), Deakin University and received career grant from the High Blood Pressure Research Council of Australia. Dr Redfern is funded by a [National Health and Medical Research Council \(NHMRC\) Career Development Fellowship \(1061793\)](#) co-funded with a [National Heart Foundation Future Leader Fellowship \(G160523\)](#). Prof Chow is funded by a Career Development Fellowship co-funded by the [NHMRC \(1033478\)](#) and [National Heart Foundation \(11S6016\)](#) and Sydney Medical Foundation Chapman Fellowship. Prof Ball is supported by a [NHMRC Principal Research Fellowship \(1042442\)](#). The contents of this manuscript are the responsibility of the authors and do not necessarily reflect the views of the funding bodies.

Supplementary material

Supplementary material associated with this article can be found, in the online version, at doi:[10.1016/j.hlpt.2019.01.001](https://doi.org/10.1016/j.hlpt.2019.01.001).

References

- [1] Naghavi M, Abajobir AA, Abbafati C, Abbas KM, Abd-Allah F, Abera SF, et al. Global, regional, and national age-sex specific mortality for 264 causes of death, 1980–2016: a systematic analysis for the Global Burden of Disease Study 2016. *Lancet* 2017;390(10100):1151–210.
- [2] Biswas T, Islam A, Rawal L, Islam S. Increasing prevalence of diabetes in Bangladesh: a scoping review. *Public Health* 2016;138:4–11.
- [3] Islam SMS, Purnat TD, Phuong NTA, Mwingira U, Schacht K, Fröschl G. Non-communicable diseases (NCDs) in developing countries: a symposium report. *Glob Health* 2014;10(1):81.
- [4] Chow CK, Teo KK, Rangarajan S, Islam S, Gupta R, Avezum A, et al. Prevalence, awareness, treatment, and control of hypertension in rural and urban communities in high-, middle-, and low-income countries. *JAMA* 2013;310(9):959–68.
- [5] Peer N, Kengne AP. Has There been adequate progress in addressing the NCD epidemic in LMIC? *Glob Heart*. 2016;11(4):433–5.
- [6] Islam SMS, Mainuddin AKM, Islam MS, Karim MA, Mou SZ, Arefin S, et al. Prevalence of risk factors for hypertension: a cross-sectional study in an urban area of Bangladesh. *Glob Cardiol Sci Pract* 2015;2015(4):43.
- [7] Islam SMS, Tabassum R. Implementation of information and communication technologies for health in Bangladesh. *Bull World Health Organ* 2015;93(11):806–9.
- [8] Shariful Islam SM, Niessen LW, Ferrari U, Ali L, Seissler J, Lechner A. Effects of mobile phone sms to improve glycemic control among patients with type 2 diabetes in Bangladesh: a prospective, parallel-group, randomized controlled trial. *Diabetes Care* 2015;38(8):e112–e1e3.
- [9] Bloomfield GS, Vedanthan R, Vasudevan L, Kithe A, Were M, Velazquez EJ. Mobile health for non-communicable diseases in sub-Saharan Africa: a systematic review of the literature and strategic framework for research. *Globalization and health* 2014;10(1):49.
- [10] Tuijn CJ, Hoefman BJ, Van Beijma H, Oskam L, Chevrollier N. Data and image transfer using mobile phones to strengthen microscopy-based diagnostic services in low and middle income country laboratories. *PLoS One* 2011;6(12):e28348.
- [11] Shariful Islam SM, Lechner A, Ferrari U, Seissler J, Holle R, Niessen LW. Mobile phone use and willingness to pay for SMS for diabetes in Bangladesh. *J Public Health* 2015;38(1):163–9.
- [12] Griffiths F, Cave J, Boardman F, Ren J, Pawlikowska T, Ball R, et al. Social networks – the future for health care delivery. *Soc Sci Med* 2012;75(12):2233–2241.
- [13] Pimmer C, Tulenko K. The convergence of mobile and social media: affordances and constraints of mobile networked communication for health workers in low-and middle-income countries. *Mob Media Commun* 2016;4(2):252–269.
- [14] Merolli M, Gray K, Martin-Sanchez F. Health outcomes and related effects of using social media in chronic disease management: a literature review and analysis of affordances. *J Biomed Inform* 2013;46(6):957–69.
- [15] Menefee HK, Thompson MJ, Guterbock TM, Williams IC, Valdez RS. Mechanisms of communicating health information through Facebook: implications for consumer health information technology design. *J Med Internet Res* 2016;18(8).
- [16] Thackeray R, Neiger BL, Hanson CL, McKenzie JF. Enhancing promotional strategies within social marketing programs: use of Web 2.0 social media. *Health Promot Pract* 2008;9(4):338–43.
- [17] Kemp S. 2017 Digital Yearbook. 2017.
- [18] Internet World Stats. Facebook subscribers and world population statistics June 30, 2017 - update 2017.
- [19] Bakers S. Facebook statistics by country URL <http://www.socialbakers.com/facebook-statistics/-abgerufenam>; 2011. 2011.
- [20] Peck JL. Social media in nursing education: responsible integration for meaningful use. *J Nurs Educ* 2014;53(3):164–9.
- [21] Hamill S, Turk T, Murukutla N, Ghamrawy M, Mullin S. I 'like' MPOWER: using Facebook, online ads and new media to mobilise tobacco control communities in low-income and middle-income countries. *Tob Control* 2015;24(3):306–312.
- [22] Mullin S, Prasad V, Kaur J, Turk T. Increasing evidence for the efficacy of tobacco control mass media communication programming in low-and middle-income countries. *J Health Commun* 2011;16(sup2):49–58.
- [23] Patel R, Chang T, Greysen SR, Chopra V. Social media use in chronic disease: a systematic review and novel taxonomy. *Am J Med* 2015;128(12):1335–50.
- [24] Sarasohn-Kahn J. The wisdom of patients: health care meets online social media. Oakland, CA: California HealthCare Foundation; 2008.
- [25] Friedman DB, Gibson A, Torres W, Irizarry J, Rodriguez J, Tang W, et al. Increasing community awareness about Alzheimer's disease in Puerto Rico through coffee shop education and social media. *J Community Health* 2016;41(5):1006–1012.
- [26] Al Mamun M, Ibrahim HM, Turin TC. Peer reviewed: social media in communicating health information: an analysis of Facebook groups related to hypertension. *Prev Chronic Dis* 2015;12:E11.
- [27] Redfern J, Ingles J, BBIomedSci G, Neubeck L, Semsarian C. Tweeting our way to cardiovascular health. *J Am Coll Cardiol* 2013;61(15):1657–8.
- [28] Grajales FJ III. Social media: a comprehensive knowledge synthesis and case studies of applications in medicine and health (care). University of British Columbia; 2012.
- [29] Win KT, Hassan NM, Oinas-Kukkonen H, Probst Y. Online patient education for chronic disease management: consumer perspectives. *J Med Syst* 2016;40(4):88.
- [30] Young C. Community management that works: how to build and sustain a thriving online health community. *J Med Internet Res* 2013;15(6):e119.
- [31] Merolli M, Gray K, Martin-Sanchez F, Lopez-Campos G. Patient-reported outcomes and therapeutic affordances of social media: findings from a global online survey of people with chronic pain. *J Med Internet Res* 2015;17(1):e20.
- [32] Setoyama Y, Yamazaki Y, Namayama K. Benefits of peer support in online Japanese breast cancer communities: differences between lurkers and posters. *J Med Internet Res* 2011;13(4):e122.
- [33] Hawin C. Take two aspirin and tweet me in the morning: how Twitter, Facebook, and other social media are reshaping health care. *Health Aff* 2009;28(2):361–8.
- [34] Lorig K, Ritter PL, Laurent DD, Plant K, Green M, Jernigan VBB, et al. Online diabetes self-management program. A randomized study. *Diabetes Care* 2010;33(6):1275–81.
- [35] Chen AT. Exploring online support spaces: using cluster analysis to examine breast cancer, diabetes and fibromyalgia support groups. *Patient Educ Couns* 2012;87(2):250–7.
- [36] Blaga OM, Vasilescu L, Chereches RM. Use and effectiveness of behavioural economics in interventions for lifestyle risk factors of non-communicable diseases: a systematic review with policy implications. *Perspect Public Health* 2017;138(2):100–10.
- [37] Feigin VL, Norrving B, Mensah GA. Primary prevention of cardiovascular disease through population-wide motivational strategies: insights from using smartphones in stroke prevention. *BMJ Global Health* 2017;2(2):e000306.

- [38] Yepes M, Maurer J, Viswanathan B, Gedeon J, Bovet P. Potential reach of mHealth versus traditional mass media for prevention of chronic diseases: evidence from a nationally representative survey in a middle-income country in Africa. *J Med Internet Res* 2016;18(5):e20.
- [39] Moorhead SA, Hazlett DE, Harrison L, Carroll JK, Irwin A, Hoving C. A new dimension of health care: systematic review of the uses, benefits, and limitations of social media for health communication. *J Med Internet Res* 2013;15(4):e85.
- [40] George DR, Rovniak LS, Kraschnewski JL. Dangers and opportunities for social media in medicine. *Clin Obstet Gynecol* 2013;56(3):453–62.
- [41] Moorhead SA, Hazlett DE, Harrison L, Carroll JK, Irwin A, Hoving C. A new dimension of health care: systematic review of the uses, benefits, and limitations of social media for health communication. *J Med Internet Res* 2013;15(4):e85.
- [42] Aase SDaL. https://www.huffingtonpost.com/shannon-dosemagen-/how-social-media-is-shaki_b_9090102.html.
- [43] Bernhardt JM, Alber J, Gold RS. A social media primer for professionals: digital dos and don'ts. *Health Promot Pract* 2014;15(2):168–72.
- [44] Antheunis ML, Tates K, Nieboer TE. Patients' and health professionals' use of social media in health care: motives, barriers and expectations. *Patient Educ Couns* 2013;92(3):426–31.
- [45] Merolli M, Gray K, Martin-Sanchez F. Developing a framework to generate evidence of health outcomes from social media use in chronic disease management. *Med* 2013;2(2):e3.
- [46] Chow CK, Ariyaratna N, Islam SMS, Thiagalingam A, Redfern J. mHealth in cardiovascular health care. *Heart, Lung Circ* 2016;25(8):802–7.
- [47] Fatima I, Halder S, Saleem MA, Batool R, Fahim M, Lee Y-K, et al. Smart CDSS: integration of social media and interaction engine (SMIE) in healthcare for chronic disease patients. *Multimed Tools Appl* 2015;74(14):5109–5129.
- [48] Lunde P, Nilsson BB, Bergland A, Kværner KJ, Bye A. The effectiveness of smartphone apps for lifestyle improvement in noncommunicable diseases: systematic review and meta-analyses. *J Med Internet Res* 2018;20(5):e162.
- [49] Sarala AV. Development of a smartphone-enabled hypertension and diabetes management package to facilitate evidence-based care delivery in primary healthcare facilities in India: a formative research to inform intervention design. *London School of Hygiene & Tropical Medicine*; 2014.
- [50] Stollefson M, Chaney B, Barry AE, Chavarria E, Tennant B, Walsh-Childers K, et al. Web 2.0 chronic disease self-management for older adults: a systematic review. *J Med Internet Res* 2013;15(2):e35.