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Social Media Use for Healthcare in Developing Countries: A Systematic Review

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Abstract

Background: The application of SM in healthcare is increasing from time to time, which might highly benefit patients, professionals, and healthcare providers. Studies suggested that patients, professionals, and healthcare providers' use of SM for healthcare purposes could significantly benefit individuals and institutes to improve healthcare management. However, little is known about the use of social media in healthcare in developing countries, this systematic review is based on the objective of exploring the uses of SM in healthcare in developing countries and identifying effective SM platforms used in healthcare in developing countries.

Methods: We developed the search strategy, which includes five databases: PubMed, Science direct, ERIC, IEEE, and Google scholars. Searching on those databases included all English language studies published since 2018 and discussed SM use in developing countries for health care. Searching was conducted between October 2021 and July 2022.

Results: The search obtained 1535 article titles based on the search strings formed by the combination of keywords. Of the total searched article titles, each database has a share of Pubmed=241, ERIC=222, Science direct=995 and IEEE=77 of these 16 studies are identified as relevant. From studies included in the review the number of articles is in South Africa (4), Nigeria (4), Ghana (2), Cameroon (1), China (2), Pakistan (1), Colombia (1), and Indonesia (1). 37.5% of the included studies were focused on the use of SM for organizing healthcare campaigns and promotion, 18.75% of the included studies were focused on the application of SM for healthcare information sharing, of the included studies 18.75% of them discussed the use of SM for health communication, and 25% of the included studies focused on SM content analysis. It is identified that Facebook, Twitter, Youtube, Instagram, Wechat, Nairland, WhatsApp, Grindr, Wikipedia, Google Plus, and LinkedIn were the SM platforms used by the authors of the included studies as interventions to conduct their research.

Conclusion: This review gave a significant view on the uses of SM in developing countries for healthcare and identified SM platforms that are effective for healthcare. In doing so, in the review, we understand that the use of SM is not only limited to social and individual interactions for social affairs; it also has a great role in healthcare sectors. The use of SM in healthcare in developing countries improves healthcare activities such as campaign organizations, information sharing and healthcare communication by increasing the access and availability of relevant healthcare information.

Keyword: Social media • Healthcare • Developing countries

Introduction

Social Media (SM) is the youngest and most recent technology which is serving as a communication platform to satisfy people's information needs. Social Media (SM) is defined as a virtual network technology which is mainly based on computers for exchanging ideas, feelings and information [1]. Kaplan defined SM as "a group of internet based applications (apps) that allow the creation and exchange of user-generated content" the definition, argued that SM could have applications in different sectors such as agriculture, tourism, education, governance and healthcare.

The application of SM in healthcare is increasing from time to time, which might highly benefit patients, professionals and healthcare providers. The use of SM helps patients to obtain and provide information that they are interested in and highly contributes to fulfilling patients' need by providing emotional, esteem and information support [2]. SM platform also has feature to

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create opportunities for healthcare professionals to communicate and share information with other healthcare professionals and has contribute to advancing their profession, increasing their accessibility and giving opportunity to express their thought [3]. The uses of SM in healthcare institutes to create relationship between patients and the public is rapidly increasing [4]. The review by Algashaam found that, the application of Facebook significantly contributes to improving healthcare sectors in areas such as recruitment, patient ratings, launching of new products and emergency notices are the main contributions of SM for the healthcare sector as an industry. Studies suggested that patients, professionals and healthcare providers' use of SM for healthcare purposes could significantly benefit individuals and institutes to improve healthcare management nevertheless, little is known about the use of social media in healthcare in developing countries.

Although there are research and reviews on social media and healthcare, there are also limitations from the perspective of developing countries' experience. Regarding the uses of SM in healthcare in developing countries, no systematic review has been conducted. The systematic review by Sultana about social media in developing countries found that in Africa, only one research was done on the use of SM for healthcare. Recently studies have been conducted on the uses and applications of SM in healthcare in general, but most of them are from the perspective of developed countries. Similarly, a few studies have attempted to identify the application of SM for specific healthcare issues, but almost all of the studies focused on developed countries. A systematic study by William examined the use of SM intervention for diet and exercise behavior but many of the studies included in the review done in developed countries.

However, the previous studies are not enough to cover the issues related to SM and healthcare in developing countries. Thus, reviewing the use of SM in healthcare in developing countries briefly shows the experience of developing countries. As result governments of developing countries will consider policies that encourage the uses of SM in healthcare to improve healthcare management. Also, physicians and patients can understand the benefits and challenges of SM use in healthcare.

Objective

The review aims to investigate the uses of social media in healthcare in developing countries. Based on the purpose of this study, the following research questions were formulated.

- How is social media used in healthcare in developing countries?
- What are the effective SM platforms used in healthcare in developing countries?

Literature Review

This review was conducted and reported according to the PRISMA guidelines and, the protocol can be retrieved from the PROSPERO database (Registration ID: CRD42022352471).

Search strategy and information sources

The researchers developed the search strategy, which includes five databases: PubMed, Science direct, ERIC, IEEE and Google Scholars. The search on those databases was done for all English language studies published since 2018 and discussed SM use in developing countries for health care. Searching conducted between October 2021 and July 2022. Searching strings formulated by combining keywords of: "Social networking", "Internet", "Facebook", "Youtube", "social media" and "Health", "Healthcare", "Medicine", "Patients" and "Developing countries", "Africa", "African countries", "Asia", "Asian countries". The search also included studies that are scanned from relevant literature.

Eligibility criteria

Social media intervention of RCT in developing countries for the improvement of healthcare in the general population is considered eligible for this review. Searched articles entered into Mendeley library, and duplicate publications removed. Searching only included articles published since 2018. Eligibility criteria also assessed titles and abstracts for including the articles. Articles which show healthcare behaviour improving outcomes in the general population of developing countries considered for inclusion in this review. The exclusion was done on those articles which are not in English language and articles which are not possible to access the full text. Articles which are not relevant for the review such, as non-healthcare studies, studies have done different from developing countries, studies which magnify the negative impact of Social media on healthcare and studies which include reviews in their main body parts, are excluded.

Study selection

The assessments for eligibility were performed by two reviewers, independently screening titles and abstracts in an unblended standardized manner. Relevant articles evaluated by the two reviewers and those reviewers also resolved the disagreement on indefinite articles by consensus.

Data extraction

The data extraction process was done by one reviewer using a standardized form in Microsoft Excel 2007 (Microsoft Office Excel) and the second reviewer verified the data. Extracted data included author, year (Country), study design, target population, objectives, length of intervention, social media intervention, and comparator, result.

Categorization

After reading the full text the reviewer reached on consensus of categorizing the articles based on the key findings included into different themes of categorization. Hereafter the central idea of the articles reviewed falls into four themes. Campaign organizations and promotion is one of the interventions of social media in healthcare and is used to promote correct information in healthcare, used to support the targeted populations and argue for protecting the right of targeted populations. Information sharing is another categorization of the articles reviewed and it includes knowledge sharing of prevention and treatment of specific diseases and sharing experience and

discussion on issues. Health communication is also the identified intervention of SM in healthcare and it was applied to addressing the information gap on specific issues, changing social norms and promoting a positive attitude among the target audience. SM content analysis is also one of the categorizations of this review which targets literature on the use of SM for predicting the disease prevalence and identifying related factors.

Results

The search obtained 1535 article titles based on the search strings formed by the combination of keywords. Of the total searched article titles, each database has a share of PubMed=241, ERIC=222, Science direct=995 and IEEE=77. Mendeley reference manager excluded 34 article titles for duplication after combining all the title lists of searched articles and remains with 1501 article titles for screening of relevant studies. After performing a check-up of the eligibility of the articles, 16 articles were included for the final inclusion of the review. Flow diagram of the study selection shown in Figure 1.

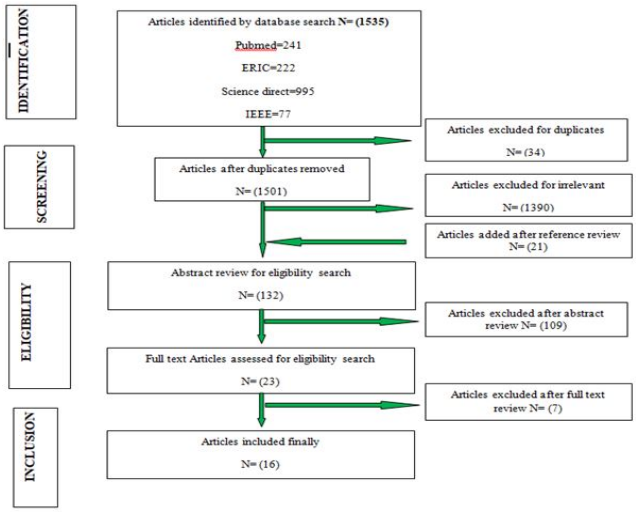

Figure 1. Diagram of study selection.

The included studies were conducted in South Africa (4), Nigeria (4), Ghana (2), Cameroon (1), China (2), Pakistan (1), Colombia (1) and Indonesia (1). Although the search for article reviews starts from the year 2018 to 2022 but due to the absence of an article, there is no included study which is published in the year 2018. Number of included articles according to their year is shown below in Figure 2, and the characteristics of included studies are shown in Table 1.

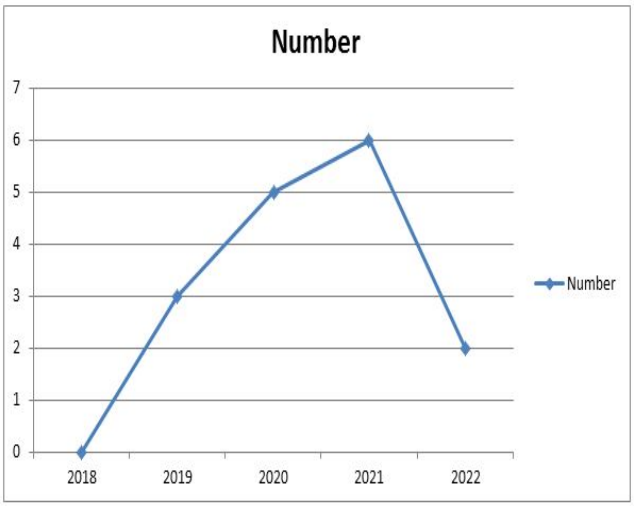

Figure 2. Number of included articles per year.

Author, Year (Country)	Study design and target population	Objectives (Length of intervention)	Social media intervention	Result
Bartels et al., 2021 (Colombia)	Quantitative survey patient age 18 and older N=1580	To assess predictors of patients in Colombia's use of social media to search for health and mental health information (searching behaviour)	Analysis of SM use for the search of health information. SM platform used: Facebook, Youtube, Instagram, Twitter	44.4% of respondents are social media users. 35.7% of the 44.4% SM users use SM for searching health-related information, and 6.6% use it to search for mental health related information.
Dulli et al., 2020 (United satates)	Quantitative intervention, pre and post survey young living with HIV in Nigeria (15-25) N=349	To test the effectiveness of SM in promoting Adherence and Retention in Treatment (SMART). Approximately 6-9 months after enrollment.	Facebook intervention to promote retention in HIV care by leveraging social support and improving HIV-related knowledge and treatment literacy. SM platform used: Facebook	Retention was high at the end line, with 75.7% and HIV-related knowledge was significantly better in the intervention group.
Harding et al., 2020 (USA)	Quantitative intervention, an online mid-time and post survey general Ghana population N=4,832 followers	To determine the feasibility of implementing a breastfeeding social media campaign in Ghana based on campaign reach, acceptability, and	Sixty core materials that promote breastfeed, support and protect women's right to breastfeed in workplace posted on breastfeed 4 Ghana pages	Campaign exposure among survey participants was 42.3%and 48.7% at midline and end lines, respectively. Campaign acceptability was high (>90%),

		understanding and evaluate the impact of exposure to the campaign on self-reported breastfeeding knowledge (24 weeks).	on Facebook and Twitter. SM platform used: Facebook and, Twitter	and >44% of those exposed to the campaign also shared the campaign with others. However, 61.0% of those exposed did not know or could not remember campaign's purpose.
Qian and Mao, 2021 (USA)	Qualitative content analysis, The WeChat group consists of 253 Chinese immigrant mothers	To examine health information sharing *via* WeChat among Chinese immigrant mothers in the U.S.	Qualitative content analysis was used to analyses the health-related discussions in an overseas Chinese immigrant mothers' WeChat group. SM platform used: WeChat	More than one-third (N=38) of the discussions are about children's health. More than half (n=52) of the discussions involve information exchange between doctors and patients. More than one-third (n=35) of the discussions are related to health insurance and cost. Around 25% (n=22) of the discussions are on alternative healthcare
Oyebode, 2019 (Canada)	Social media content analysis	To detect factors responsible for diabetes prevalence in Nigeria, and then suggest some design features that could be employed to design effective diabetes technological intervention targeted at Nigerians.	Applying machine learning techniques to detect those factors responsible for diabetes prevalence in Nigeria. SM platform used: Nairaland	Weight, food, and diet are the major factors responsible for diabetes prevalence in Nigeria. Other factors, though less prominent, contribute to diabetes, including pregnancy, age, sleep, and others
Fayoyin, 2020 (South Africa)	Qualitative case study. The interventions target different population groups	To examine the utilization of social media for health communication in Africa.	Dissemination of health information on Ebola and HIV SM platform used: Facebook and Twitter	
Garofalo et al., 2022 (Nigeria)	Quantitative intervention pre and post survey young men aged 15 to 24 years in the city of Ibadan, Nigeria, and surrounding areas.	To promote HIV testing and linkage to care among high-risk youths and young men, including predominantly young MSM (12-month).	Social media outreach promoting sexual health and guiding individuals to HIV counselling and rapid testing in clinical, community, or home-based settings. (WhatsApp, Facebook, Grindr)	Among individuals undergoing testing (N=339), 283 (83.5%) referred through social media. Three hundred fifty-eight participants undergoing testing (98.6%) would recommend iCARE to a friend.
Lamptey et al.,2021 (Nigeria)	Quantitative cross-sectional online survey Africa is a target population	To explore the perceived myths about the safety of vaccines and the impacts of these myths on acceptance in Africa through SM.	A web-based survey in English was developed using Google Docs. The Google Forms database for collecting responses. SM platform Facebook, WhatsApp, Instagram, Twitter, YouTube	A total of 2500 individuals give responses to the survey.
Nisar and Shafiq, 2019 (Pakistan)	Quantitative survey 254 participants	To design a framework for the efficient utilization of social media in the healthcare sector.	A survey to analyses the usage of SM for healthcare sectors information sharing behaviour.	Suggest that internet and social media can help empower patients through expanded information. Facebook (55.10%), YouTube (46.90%), Wikipedia (38.60%), and Google Plus (30.30%)
Duh and Dabula, 2021 (South Africa)	Quantitative cross-sectional survey young adult South African 650 (18-35 years old)	To examine the extent to which social media communication about blood donation and intention to donate blood in South Africa.	Analysis of SM Communication impact on the donation of blood. SM platform used: Facebook and Twitter, LinkedIn, YouTube and Instagram.	All the respondents (100%) prefer and are using social media. SM communication significantly impacts awareness of blood donation.
Martin-Yeboah et al., 2022 (Ghana)	Quantitative case study. The study population entails health personnel stationed at CHPS compounds within CHPS Compound	Examine how social media could be incorporated into healthcare delivery at the community level	Analysis of SM for incorporation of healthcare and investigating the impact on community health workers. SM platform used: Facebook Whatsapp, Instagram.	WhatsApp, Facebook, and Instagram are increasingly used by healthcare workers for health communication. Social media has not been formally considered resource in healthcare delivery at the CHPS level. Social media come with both prospects and obstacles.
Kavota et al., 2020 (Cameroon)	Quantitative component-based Partial Least Squares Structural Equation Modelling	To examine the adoption factors of social media and the	To analyses social media usage for disaster management	Social media platforms are perceived to be easy to use, use with a perceived relative

	(PLS-SEM). North and South Kivu, in the Eastern region of the DRC, those using SM.	impact of their use in managing the disaster.	based on different models and theories.	advantage, and are therefore essential for disaster management, the use of social media impacts information accessibility, adaptability, pro-activeness and resilience.
Wiyeh et al., 2019 (South Africa)	Qualitative inductive thematic analysis approach. 157 comments to the Facebook post survey	To examine the determinants of vaccine hesitancy arising from social media users who commented on the posts. From February 4, 2019 to March 8, 2019.	Campaign on Facebook about the HPV vaccine for grade 4 girl students. Analyze the data. SM platform used: Facebook	An overwhelming majority (636/659 *i.e.* 97%) of reactions were favourable to the HPV vaccination campaign. Out of the 157 comments, 52 (33%) were 'hesitant' about the HPV vaccine.
Achanyi et al., 2020 (South Africa)	Qualitative case study. TB Proof South Africa's Facebook page was selected to serve as the sample for the study	To explore the use of social media (TB Proof South Africa's Facebook page) to create awareness on Tuberculosis (TB). Five month (from February 1 to June 30, 2017).	The analysis of TB Proof South Africa's Facebook page was conducted in order to determine the use of social media for health promotion. SM platform used: Facebook	Common themes are identified, including TB medication, TB patients and healthcare workers raising awareness of TB. The findings have potential implications for health promotion efforts using social media.
Rahmanti et al., 2022 (Taiwan)	Qualitative (Drone Emprit Academic) DEA sentiment analysis used Naive Bayes (Adaptive Multiple Model) methods to classify the words. Indonesian	The study aims to identify the correlation between COVID-19 vaccine sentiments expressed on Twitteer and COVID-19 vaccination coverage, case increase, and case fatality rate in Indonesia. 90 days	Sentiment of analysis COVID-19 vaccination campaign. SM platform used: Twitter	374,180 (49%), were clas-sified as neutral sentiments, while 140,798 (25%) tweets expressed negative sentiments and 140,624 (25%) were accounted for positive sentiments COVID-19 toward the vaccine.
Zha et al., 2021 (China)	Quantitative RCT intervention, pre and post survey 120 university students	To evaluate a WeChat-based HIV and AIDS educational intervention to enhance knowledge, improve attitudes and reduce stigma among college students in China. Eight weeks of interventions.	A WeChat-based educational intervention. SM platform used: WeChat	Both HIV- and AIDS-related knowledge (p<.001) and attitudes (p<.001) significantly changed in the intervention group.

Table 1. Characteristics of included studies.

Discussion

Social media for campaign organizations

The terminologies campaign and promotion were used interchangeably by authors of the included studies in this review. Most of the studies included under this sub-topic used the two terminologies for expressing the usage of SM for education purpose and promoting the right healthcare issues. Here in, after the word campaign used to express the two ideas. Of the studies included in this review, 6 (37.5%) of them are focused on the use of SM for the organizations of healthcare campaign [5-8]. Those studies used Intervention designs, survey, case study and Inductive thematic analysis approaches. The number of targeted populations in the included studies ranged from 120 to 4832 for four of the studies, and one of the studies included used all Facebook users of South Africa, and the other study used youths of 15 to 24-year-old Nigerian social media users as population.

Within the domain of campaign organizations, we found that some of the studies used multiple SM platforms for study interventions. Studies used Facebook for social media intervention in their studies and a study by Zha et al., exclusively used WeChat for intervention [9-11]. WhatsApp and Grindr were used as SM platform intervention with a combination of Facebook in the study of Garofalo et al., Similarly, Twitter was used with a combination of Facebook in the study of Harding et al., based on the above data, one can argue that the usage of Facebook as SM intervention for the included studies under SM campaign organizations is the top listed from the available SM platforms.

The objectives and interventions of SM platforms used under SM for campaign organizations differ for each study. Dulli et al., used Facebook intervention to promote retention in HIV care by leveraging social support and improving HIV related knowledge and treatment literacy. At the same time, Harding et al., used Facebook and twitter for promoting breastfeed in Ghana based on the objective of determining the feasibility of implementing a breastfeeding social media campaign in Ghana. Studies by Zha, Achanyi; Wiyeh; Garofalo used SM intervention to increase knowledge, attitude and perceptions of different diseases such as HIV, TB, and HPV. The above studies stand on the objectives of promoting testing of HIV, examining the determinants of vaccine hesitancy arising from social media users, exploring the use of social media (TB Proof South Africa's Facebook page) to create awareness on Tuberculosis (TB) and evaluating a WeChat-based HIV and AIDS educational intervention [12,13].

One of the findings of the included studies showed that retention was high at the end line, with 75.7%, and HIV related knowledge was significantly better in the intervention group. Another study found that campaign exposure among survey participants was 42.3% and 48.7% at midline and end line, respectively, campaign acceptability was high (>90%), and >44% of those exposed to the campaign also shared the campaign with others. Garofalo et al., found

in their study that among individuals undergoing testing (N=339), 283 (83.5%) referred through social media 358 participants undergoing testing (98.6%) would recommend iCARE to a friend. The study by Wiyeh et al., found that an overwhelming majority (636/659, *i.e.* 97%) of reactions were favorable to the HPV vaccination campaign and identified that out of the 157 comments, 52 (33%) of them to be 'hesitant' to the HPV vaccine. In comparison, another study found that TB Proof South Africa's Facebook page increased TB patients' and healthcare workers' awareness of TB [14]. Similarly, study by Zha et al., showed that both HIV and AIDS related knowledge (p<.001) and attitudes (p<.001) significantly changed in the intervention group [15]. Based on the findings obtained in the included studies, it is possible to argue that SM platform intervention for campaign organizations is highly effective regarding in achieving the objectives they are standing for.

Sharing of healthcare information through social media

Of the included studies, 3 (18.75%) Bartels; Qian and Mao; Nisar and Shafiq, are a survey conducted to study the application of SM for healthcare information sharing. Bartels et al., conducted a quantitative survey study on 1580 patients ages 18 years and older in Colombia to assess the use of social media for searching the health and mental health information. The study survey was conducted in six primary care Colombians rural and urban cities hospitals on those patients who were willing to fill the questionnaires prepared on self-monitoring tablets.

The authors of the study used *chi-square* and T-test for the analysis of the association of variables such as demography, SM use and searching behaviour. In their study, they found that a significant percentage of patients use SM for healthcare from those patients who use SM. They argue that when an individual gets sick with mental health disorder, he/she would prefer to use SM for obtaining mental healthcare solutions because SM could be an ideal tool for mental healthcare disorders in Colombia.

Another study included in this review by Qian and Mao, also conducted a qualitative content analysis of the WeChat group consisting of 253 Chinese immigrant mothers living in US. Study's objective was to examine the use of SM for healthcare information sharing and their behaviour. In their study, the authors analysed the WeChat conversations of overseas Chinese immigrant mothers' which they made to cope with the healthcare cultural difference they face in the US. Authors' findings showed that more than one third (N=38) of the discussions were about children's healthcare issues and half of the discussions involved information exchange between doctors and patients. They also found that most of the discussions were concerned with health insurance and cost, a discussion on medicine and treatment and alternative healthcare issues. The authors argued that the use of WeChat in healthcare helped Chinese mother to adapt to the health culture of the US and to share their experiences.

Similarly, Nisar and Shafiq, conducted a quantitative Survey on 254 Pakistanis young participants to design a framework for the efficient utilization of social media in the healthcare sector. The author surveyed to analyses the usage of SM for healthcare sectors information-sharing behaviour, and the demographic variables surveyed included age, gender, region, educational qualification and internet access. The survey indicated that most of the respondents have Internet Access which they can use for SM [16].

In their studies, the authors used the descriptive methods of analysis for analyzing the data. The study found that almost all patients (98.8%) use at least one type of social media platform 90.2%, 83.5%, 78.3%, 47.6%, 33.9%, 33.5%, 33.3%, 23.2% respectively for Facebook, YouTube, Email, Wikipedia, LinkedIn, Skype, Twitter, and Google Plus in their daily routine. Additionally, the result of their study showed that of the users of SM, 79.1% of them use SM platforms for healthcare information sharing activities. From the available platforms, the most highly utilized are Facebook (55.10%), YouTube (46.90%), Wikipedia (38.60%), and Google Plus (30.30%). In the meantime, the authors identified that information about diseases, type of health facilities, location of nearby healthcare services and hospital services are the issues patients get awareness of from sharing information using SM. Based on their study they suggest that the internet and social media can help in empowering patients through expanded information [17].

From the studies' explanation of the arguments and the findings of the above authors, it is possible to suggest that the use of SM for healthcare purposes is observed visibly in countries like China, Colombia and Pakistan. After understanding, the arguments raised by the above scholar one can say that the use of SM in developing countries could significantly benefit the healthcare service by providing necessary information for patients [18].

Social media based health communication

Most of the studies included in the review used the term health communication for activities of addressing the information gap on specific issues, changing social norms and promoting a positive attitude among the target audience. Of the included studies, 3 (18.75%) discussed the use of SM for the purpose of health communication. A study by Fayoyin used a qualitative Case study design, which has interventions targeting different population groups. A quantitative cross-sectional survey of participants of the young adults in South African (18-35 years old) used in the study [19]. The third study used a quantitative case study design with the study population entailing health personnel stationed at CHPS compounds within CHPS compound. Studies' objective was to examine the use of SM for general health related purposes and specifically for blood donation.

Of these studies, Facebook, (n=3), Twitter and Instagram, (n=2), Linkedin and Youtube, (n=1 for each platform), Whatsapp, (n=1) were the platforms used for intervention in the studies. The interventions of Facebook and Twitter in the dissemination about health information of Ebola and HIV were significantly impacted, the targeted population. A study by Duh and Dabula examined the extent to which social media communication about blood donation and intention to donate blood through the interventions of Facebook, Twitter, LinkedIn, YouTube and Instagram. The above study identified from the survey that all the respondents (100%) prefer and are using social media and SM communication significantly impact awareness of blood donation.

Another study examines how social media could incorporate into healthcare delivery at the community level in Ghana; the study used

SM platforms of Facebook, Whatsapp and Instagram an interventions to the case study. The study's intention was to analyse the incorporation of SM in healthcares and investigate the impact on community health workers. From the study, they identified that WhatsApp, Facebook, and Instagram are increasingly used by healthcare workers for health communication. However they identified that social media had not been formally considered as a resource in healthcare delivery at the CHPS level, and also social media come with both prospects and obstacles.

SM content analysis for healthcare

SM content analysis could help the healthcare sector for predicting the prevalence of disease and identify related factors. In this systematic review, 4 (25%) of the studies included are focused on SM content analysis [20]. A study by Oyebode, on SM content analysis to detect factors responsible for diabetes prevalence in Nigeria and to suggest design features that could be employed to design effective diabetes technological intervention targeted at Nigerians. In their study, they applied different machine learning techniques to the contents of a specific SM platforms found in Nigeria and widely used by them called Nairaland to detect those factors responsible for diabetes prevalence in Nigeria. The authors found from the content analysis that weight, food, and diet are the major factors responsible for diabetes prevalence in Nigeria. On the other hand, they also found that pregnancy, age, sleep, and others do not contribute significantly for the prevalence of diabetes.

Lamptey et al., conducted a quantitative cross-sectional online survey on the contents of the myth of COVID-19 in Africa. In their study, they aimed to explore the perceived myths about the safety of vaccines and the impacts of these myths on acceptance in Africa through SM platforms of Facebook, WhatsApp, Instagram, Twitter and YouTube. In the study 2500 African individuals gave their myth response on the vaccine promotion of COVID-19. The result of the authors' study explored that most of the contents were a disagreement on the vaccination of the pandemic that they doubt there is no vaccine for HIV and COVID. Moreover, the majority of the contents showed that people disagree with wearing masks after they get vaccinated.

Similarly, Rahmanti et al. perform a qualitative sentiment analysis called (Drone Emprit Academic) DEA using a method of Naive Bayes (adaptive multiple model). In their study, they aimed to identify the correlation between COVID-19 vaccine sentiments expressed on Twitter and COVID-19 vaccination coverage, case increase, and case fatality rate in Indonesia. A 90 days Twitter based vaccination promotion intervention was done, and the sentiment on those tweets was collected. The result of the analysis showed that 374,180 (49%), were classified as neutral sentiments, while 140,798 (25%) tweets expressed negative sentiments and 140,624 (25%) accounted for positive sentiments toward the COVID-19 vaccine.

Another study by Kavota et al., performed a quantitative analysis of social media usage for disaster management based on Component based Partial Least Squares Structural Equation Modelling (PLS-SEM). They aimed to examine the adoption factors of social media and the impact of their use in managing disasters in North and South Kivu, in the Eastern region of the DRC, those using SM. The result of their analysis showed that social media platforms are perceived to be easy to use, use with a perceived relative advantage, and are, therefore, essential for disaster management.

Based on their studies, they argued that SM content analysis using machine learning could have significant importance on the preventing of diabetes in the individual and societal and also could help the government to prepare health education and campaign on prevention and lifestyle change. Content analysis about the COVID-19 vaccines could significantly help to identify the major Myths which could impact on the acceptance of the vaccines. Analyzing contents could help the government and ministry of health in Africa to provide accurate information to promote vaccination campaigns, education, and acceptance. Social media sentiment analysis utilization could help governments to build strategic communication platform which could increase the public trust and affect individual willingness to get vaccinated. They declare that SM sentiment analysis is useful for governments to identify and develop strategies for speed up the vaccination rate by monitoring people's sentiment on vaccination and COVID in general. The use of SM impacts information accessibility, adaptability, pro activeness and resilience in order to manage disasters. Based on the results and arguments raised by the above authors one can possibly say that SM content analysis using different machine learning techniques or survey methods could significantly help countries and governments to identify important myths, sentiments and attitudes of peoples which need the attention of governments to improve healthcare sectors.

SM platforms used in healthcare in developing countries

In this review it is identified that Facebook, Twitter, Youtube, Instagram, Wechat, Nairland, WhatsApp, Grindr, Wikkipedia, Google Plus and LinkedIn were the SM platforms used by the authors of the included studies as intervention to conduct their research. Of those platforms Facebook, Twitter, Youtube, Instagram, Wechat and WhatsApp was used by more than two authors in the included studies and the rest was used by single authors. Therefore the discussion hereinafter will be on those platforms those have been raised multiple times will be discussed separately, and those single stated will be discussed altogether.

Facebook

The use of Facebook is not only limited to social interactions and business firms; it has also been used in healthcare sectors to improve healthcare sector quality. In their study's authors included the SM platform called Facebook as intervention for their study. In the authors study Facebook was used for the purposes of healthcare utilities which were mentioned in the above discussions such as campaign and promotion organizations, sharing of healthcare information, and analysis users' content for healthcare purpose.

Bartels et al., conducted a quantitative survey analysis in Colombian youth patients aged between 18 years and above to assess the searching behaviors of healthcare information. In their assessment they found that Facebook have the highest rank of searching tool for searching healthcare related information especially mental health information. Retention was high at end line, with 75.7% and HIV related knowledge was significantly better in the intervention group who got healthcare promotion using Facebook. A breastfeeding social media campaign organized in Ghana using Facebook was found that Campaign acceptability was high

(>90%), and >44% of those exposed to the campaign also shared the campaign with others.

A study by Nisar and Shafiq, which is conducted in Pakistan to analyze the efficient utilization of social media in the healthcare sector found that Facebook uses for healthcare was (55.10%) of the available platforms. Another study by Achanyi et al., which was aimed to explore the use of social media (TB Proof South Africa's Facebook page) in creating Tuberculosis (TB) awareness, found that the Facebook page promotion significantly improved the TB medication awareness on TB patients and Healthcare workers. Campaign on facebook about HPV vaccine for grade 4 girl students was found that an overwhelming majority (636/659 *i.e.* 97%) of reactions were favorable to the HPV vaccination campaign. Based on the result of their studies they argued that Facebook have significant importance on implementing SM utilities for healthcare.

Twitter

The utility of twitter for healthcare sector is becoming increasing. Authors used twitter for studying the use of SM for healthcare as intervention platform. In their studies they explored that the use of Twitter for healthcare intervention significantly improved the application of SM for healthcare. Healthcare information search and sharing behavior among patients using Twitter has increased. A Twitter campaign organized to promote breast feeding in Ghana increased the acceptability of the campaign.

A study by Fayoyin, which was aimed to examine the utilization of social media for health communication in Africa using case study method, found that the use of Twitter as communication platform for the dissemination of Healthcare information of Ebola and HIV is very effective. Another study by Duh and Dabula, Twitter is used for communication purpose to increase the awareness of blood donation in South Africa, from the study authors found that the use of SM using Twitter platform created significant impact on blood donation awareness.

Twitter was used to analyze the content of people's myth in Nigeria vaccine acceptability in general and the result of the analysis found that it needs the government's hard work to shape the perceptions of peoples on vaccine. The sentiment analysis conducted using Twitter data on the vaccination program which was held at Taiwan for 90 days found that 374,180 (49%), were clas-sified as neutral sentiments, while 140,798 (25%) tweets expressed negative sentiments and 140,624 (25%) were accounted for positive sentiments toward the COVID-19 vaccine. From the findings and arguments of studies those used Twitter as intervention platform one can argue that the use of Twitter for healthcare sector can help for campaign organizations, healthcare information communication and for analysis of sentiment of people on different healthcare issues.

Youtube and Instagram

The uses of Youtube and Instagram are not limited on the entertainment industry only, they are also important for healthcare sector. In their studies described the use of Youtube and Instagram for healthcare sector. The studies of those authors found that Youtube and Instagram are used for the purpose of healthcare information sharing. Instagram and Youtube were used to analyze the content of people's myth in Africa about vaccine.

Youtube was found the second rank or (46.90%), of the platforms used for information sharing purpose in the study which was aimed to analyzed the utilization of social media in the healthcare sector in Pakistan. Duh and Dabula, and Martin-Yeboah et al., identified that Youtube and Instagram were successfully used for the purpose of healthcare communication such as blood donation and Healthcare workers communication tool with patients in South Africa and Ghana respectively.

From their analysis of the studies they argued that the uses of Youtube and Instagram are shown visible in the sector of healthcare for healthcare information sharing, communication and analysis of contents. Therefore it is possible to conclude that Youtube and Instagram can possibly apply to healthcare sector for the above mentioned purposes rather than entertainments.

WeChat and WhatsApp

The application of Wechat and WhatsApp is also shown in the sector of healthcare. The studies of explored the uses of those platforms for Healthcare sector. Garofalo et al., identified that WhatsApp significantly used to address stigmatized group of MSM youth to promote sexual health and guiding individuals to HIV counseling and rapid testing in clinical, community, or home-based settings. Chinese immigrant mothers in the U.S. used WeChat for healthcare discussion and to coup up the cultural difference conflict they face when they live abroad. In the previous study the author found that the chine's people most of the time used the platform for the discussion of children's health, information exchange on doctors and patients, and insurance and cost. WhatsApp also used in the study of Lamptey et al., to analyze the content of the myth of African people on the acceptance of vaccine. The examination of how social media could incorporate in healthcare delivery at the community level in Ghana identified that the use of WhatsApp is increased in Healthcare workers for health communication purpose. A study by Zha et al., conducted randomized control trial intervention on 120 university students aimed to evaluate a WeChat based HIV and AIDS educational intervention to enhance knowledge, improve attitudes and reduce stigma among college students in China. The findings of the above WeChat based educational intervention showed that both HIV and AIDS related knowledge ($p<.001$) and attitudes ($p<.001$) significantly changed in the intervention group. Authors of the above studies argued that the use of SM platforms WeChat and WhatsApp have significance important for the improvement of personal healthcare managements of individuals. The findings and arguments of the above studies could lead one to conclude that applying WeChat and WhatsApp in healthcare management will result a positive outcome.

Nairland, Grindr, wikipidia, GooglePlus and LinkdIn

SM platforms those are not mostly used as a communication tools also used for the management of Healthcare. Authors used Nairland, Grindr, wikipidia, GooglePlus and LinkdIn as intervention platforms in their studies. Oyebode, 2019 performed a content analysis to detect factors responsible for diabetes prevalence in Nigeria, and then suggest some design features that could be employed to design effective diabetes technological intervention targeted at Nigerians. Oyebode, used Nairland by applying machine learning

technique todetect those factors responsible for diabetes prevalence in Nigeria, the result of the study showed that Weight, Food, and Diet are the major factors responsible for diabetes prevalence in Nigeria.

A study by Garofalo et al., also used a platform called Grindr to promote HIV testing and linkage to care among high-risk youths and young men including predominantly young MSM. The study resulted that maximum number of the participants were referred by SM tool usage, and among them high numbers were tested. Another study by Nisar and Shafiq, identified that the use of Wikipedia and Google Plus were significantly helped in empowering patients through expanded information. A study of Duh and Dabula, to examine the extent to which social media communication about blood donation and intention to donate blood in South Africa used LinkedIn as one of the platforms in the study. The result of the study identified that the respondents of the study preferred to use SM for healthcare communication and their communication using the listed platforms in the study significantly impact blood donation in South Africa. Authors of the included studies in this sub topic explored that the uses of Nairland, Grindr, wikipidia, GooglePlus and LinkdIn highly contribute to healthcare for the purpose of detecting factors, healthcare communication, and information sharing and campaign organizations. From the authors result it is possible one can argue that those platforms have significant importance on healthcare.

Conclusion

The reviewers conducted this systematic review to investigate the uses of social media in healthcare in developing countries. This review gave significant view on the uses of SM in developing countries for healthcare and identified SM platforms those are effectively for healthcare. In doing so, in the review we understand that the use of SM is not only limited in social and individual interactions for the purpose of social affairs, it has also great role in healthcare sectors. The use of SM in healthcare in developing countries improves activities of healthcare such as campaign organizations, information sharing and healthcare communication by increasing the access and availability of relevant healthcare information. Additionally healthcare sectors also benefited from SM by using its data and performing content analysis for predicting the prevalence of disease and identifying related factors was successful. Regarding the platforms those applied for healthcare purposes Facebook, Twitter, Youtube, Instagram, Wechat, Nairland, WhatsApp, Grindr, Wikkipedia, Google Plus and LinkedIn were used as tool of communication. Even though Facebook took the leading number of users but also the rest platforms have a capability to create a room for communication. However SM has significant uses for healthcare in developing countries it lacks adequate research on it, therefore the area needed further research. Moreover further research is needed to identify an appropriate platform for healthcare purpose.

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