

HARNESSING SOCIAL MEDIA ALGORITHMIC TECHNOLOGY AS A TOOL IN PUBLIC HEALTH COMMUNICATION AWARENESS CAMPAIGNS ON HEPATITIS B IN SOUTH-EAST NIGERIA

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Abstract

Modern society relies on effective and efficient communication with the media informing the general public. This study evaluates the use of social media algorithmic technology as a tool for public health communication about hepatitis B Virus (HBV) awareness campaign in South East Nigeria using Enugu and Ebonyi states as study areas. The research utilized the survey method which is usually employed to assess attitudinal, demographic and psychographic underpinnings. The population of study is 7,709,813 from which a sample size of 385 was drawn using the Australian Calculator. The multi-staged sampling was utilized and the questionnaire served as the instrument of data collection. Findings indicate that majority of respondents agreed that campaigns on social media and algorithms enabled pop-ups on hepatitis B increased their knowledge and provided more information about hepatitis B virus than they previously had. The study recommends that challenges of cost of access and lack of dedicated public health communication sites should be handled by relevant government agencies and stakeholders to increase ease of access and to provide verified public health information sites. This

would help increase verified and supportive public health information sources to dispel information from unverified wrong information sources.

Keywords: Awareness, Algorithms, Hepatitis B, Public Health, Social Media,

Introduction

Our society relies on effective and efficient communication with the media at the epicentre of informing multiple aspects of individual lives including their access to health information. Communication is at the heart of who we are and has intrinsically become a vehicle for public participation and enlightenment. Ikhioya (2019); Abrams & Maibach, (2008) note that communication offers social support which may be linked to positive behaviours. This implies that the process of health behavioural change or development is hardly successful without communication (Mbaka, 2013). Communication as occasioned through the mass media play important roles in disseminating information and in creating health awareness that is of benefit to diverse members of the society.

Public health communication refers to creative messages or strategically assembled media symphonies purposely created to improve awareness, inform or cause behaviour change in the targeted audience (Atkinson, Vallely, Fitzgerald, Whittaker & Tanner, 2011). Thus, effective 'public health' communication utilizes various channels so that information and communication messages can be frequently disseminated to specific audiences. Petrescu, Raducu, Soare & Purcarea (2021) highlighted the importance of behaviour modification as the topmost preventive solution to the spread and control of diseases like hepatitis B (HBV). When the appropriate media are utilized, different audiences can be reached with certain kinds of media which will help to persuade and motivate them to be involved and improve health-behaviour. Invariably, the key to early detection of the disease may lie in the life-saving information disseminated to members through the mass media. Salvin & Maheema (2021) agree that the role of the mass media is encapsulated within its capacity and capability to instruct, manipulate, sensitize and mobilize people through information dissemination. Udoudo (2008) observes that frequent projection of issues about (hepatitis B) can become major health problem by the media can inculcate in the audience knowledge of all that cancer entails.

It is no news that the art of “old models” of journalism appears to be diminishing in the digital age which can be adduced to be a result of the fact that most old journalistic styles of gathering information and dissemination of news are expensive, time-consuming, potentially disappointing and unpredictable. Social media analytics help provide quantifiable measures of reach through digital campaigns which highlight contents that resonate with the target audience (Holloway 2019). Recently, most health educators are fast adopting social media platforms which allow for quick and easy dissemination of information from diverse stakeholders (NCCDH 2017). Abrougui (2016), notes that new media (social media) not only allow users to produce and distribute content easily, but also empowers them to access diverse viewpoints making them serve as the backbone of social, economic and cultural life in many societies.

Many social media sites, news, entertainment and information platforms and search engines utilize rank user generated content. In addition to making certain people and posts visible and others invisible to users, algorithms calculate public opinions by defining trends, suggesting friends and identifying products one may be interested in purchasing (Krikemeier, Boerman, Bol, 2021; Gillespie, 2014; Mager, 2012). Algorithms are the instructions embedded in social media comprised of software which are sets of instructions that direct a computer to do a specific task. They are components of software that make up information and communication infrastructures, (McKelvey, 2014). As a computational routine which involves issues of representation and inclusion, algorithms can define and control the circulation of information within the media, (Gagrcin, Naab & Grub, 2024). Public health communications send messages through social media to disseminate information which utilizes the new algorithmic technology to educate and inform people about health issues. This study will evaluate the need to harness social media as a tool in public health communication awareness campaign of hepatitis B (HBV) in South East Nigeria.

Statement of Problem

Research evidence indicates that the mass media have long been used in the promotion of good health practices and the prevention of various social and health problems (Saraf & Malamurugan, 2018). The problems of health sensitization in a diverse, heterogeneous developing society like Nigeria can pose several challenges to health specialists.

Invariably, the intentional use of new technology, more precisely social media with its algorithms could be a key strategy in helping to solve or reduce these challenges. Interventions incorporating social media channels hold considerable potential for health promotion and address some of the limitations observed by traditional media by helping to increase individual participation and customization (Kite, et al 2023; Levac & Sullivan, 2010). This portends that more and more consumers will turn to the internet (social media) for health-related information. However empirical evidence does not show any significant relationship between social media use in public health and actual preventive outcomes in health promotion messages in Nigeria. To this end, this study seeks to ascertain the use of social media as a tool in public health communication awareness campaigns for hepatitis B (HBV) in South East Nigeria.

Objectives of the Study

- i. Examine the level of exposure to public health social media algorithmic messages on hepatitis B among residents of South-East Nigeria.
- ii. Ascertain if social media has increased knowledge of public health social media algorithmic messages on hepatitis B prevention and control among residents of South-East Nigeria.

Review of Related Literature

The Centre for Disease Control (2016) defines hepatitis disease as a situational inflammation of the liver organ while Hepatitis-B is a *Hepadnavirus* that infects the liver cells which can be classified into 6 distinct types namely A, B, C, D, E and G with different modes of transmission, affecting different people. Hepatitis B virus (HPV) attacks the liver cells and can lead to liver failure, cirrhosis (scarring) or cancer of the liver. The liver processes nutrients, filters blood, stores energy and fights against infections. Hepatitis therefore connotes the infection or inflammation of the hepatocytes, as evidenced by abnormal liver Function Tests (LFT'S) (Hall, 2007). The virus is transmitted through contact with blood, semen, vaginal secretions and bodily fluids (Ajuwon, Yujuico, Roper, Richardson, Sheel & Lidbury, 2021). On other hand alcohol, prescription medications and drug abuse are predominant non-infectious causes, while viruses and bacteria are key infectious casual factors (Adesina, Oyero, Adeyeye & Oyesomi, 2017). Hepatitis B virus is 100 times more infectious than Acquired Immune Deficiency Syndrome (AIDS) virus and patients can present with acute symptomatic disease or

have an asymptomatic disease that is identified during screening for the (Tripathi & Mousa, 2023).

Ajuwon, et al (2021) concur that hepatitis infection is referred to as a silent killer because many infected persons may not realize that they are carriers for as much as 10 years. Also like in the case of Human Immunodeficiency Virus (HIV), there are healthy carriers who show no symptoms of hepatitis B who are also unaware of their health status thereby making them potential risk to others (Eredoro & Egbochukwu, 2017). The degree of HBV endemicity often correlates with predominant mode of transmission with very low minimum infectious dose that practices such as sharing toothbrushes or razor blades can transmit infection. Thus awareness, willingness and early identification of health status can help reduce the transmission through treatment with anti viral medication.

The incidence of the disease is increasing with 254 million people living with chronic hepatitis B infection in 2022, also approximately over 5% of the world's population positive carriers of the surface antigen of hepatitis B (WHO, 2024). This implies that the disease has enormous impact on health and the national economy of many countries with highly variable and unpredictable disease severity. Odusanya, Alufohai, Menrice, Wells, Weil & Ahohkhai (2005), submit that studies revealed that HBV is common in developing countries. Critically, Sub-Saharan Africa has high endemicity with more than 50 million people affected by the disease (Burnett, Francios & Kew, 2005). Agada (2016) also notes that the pandemic nature of the disease indicates that it is fast getting out of control with one in ten Nigerians being infected. Related studies like; Adesina, Okorie, Oyero, Adeyeye & Oyesomi (2017); Abdullahi, Sani, Umar & Yusuf (2016); indicate that hepatitis B infection remains a major public health concern in Nigeria with a carrier rate of between 9% to 39%.

Bessinger, Katende & Gupta (2004) also sought to examine the influences of behaviour change communication on campaigns on knowledge and use of condoms for prevention of HIV/AIDS and other sexually transmitted infections in target areas in Uganda. Results indicated that individuals who reported being exposed to media messages were at least twice likely as those with no exposure to condoms as a means to avoid HIV/AIDS.

Omerigwe (2012) researched on the influence of breast cancer campaigns on knowledge, attitude and practice among women in Benue State, Nigeria. Findings revealed high level awareness of the campaign

and superficial knowledge about breast cancer causes, symptoms and genetic testing. Also, attitude is noted to be influenced by strong emotional and psychological beliefs. However, findings explain that awareness about campaign programmes does not guarantee exposure to the programmes rather individual dispositions and credibility of sources do. The study recommends the need for preventive rather than curative measures in breast cancer management.

Some health media campaigns identified cultural practices as hampering the effectiveness of media campaigns. Kehinde, Mohd & Mustafa (2014) conducted a study on HIV/AIDS Cultural Practices in Nigeria: An Implication for HIV/AIDS Preventive Communication Campaign. The study sought to examine the subtle links between cultural practices and beliefs and the high prevalence rate of HIV/AIDS in Nigeria. The study found that socio-cultural environment and structural contexts are responsible for the prevalence of HIV/AIDS in Nigeria. The study advocates that campaign planners should try to make culturally acceptable programmes that relate to the people's behaviour and practices.

In a related study, Ghahramani, de Courten, & Prokofieva (2022) on the potential of social media in health promotion beyond creating awareness: an integrative review. Findings indicate that results showed that 10 studies (55.5%) adopted quantitative methods and five studies (27.7%) used mixed methods and three studies (16.6%) used qualitative methods. Facebook and YouTube were used more for intervention purposes to change health behaviour. Twitter and Instagram were used more to observe the trend of changes in health behaviour. Overall, the results show that though social media has potential in promoting behaviour change, the estimation of this change in the long term lies outside the scope of social media health campaigns. The employed measures usually target immediate behaviour or social media engagement rather than addressing the change on a behavioural level.

The transformation in technology especially regarding information and communication generation, processing, storage and dissemination witnessed in the 21st Century has been unprecedented (Peng & Wang, 2023; McQuail 2005). The advent of social media represents a change from a unidirectional model of communication to a multidirectional model of communication, where audience members are actively engaged in communication and are not just receivers of information, (Thackeray, Beiger, Smith & Wagenen, 2012). These innovations have opened up new social media platforms and today social

media contents are no longer created by only individual software developers, but made through collaboration and participation where users combine to contribute (Kaplan & Haenlein, 2010). For instance, all the content on YouTube and Facebook is not made by developers but by users of the sites.

Social media are considered the most interactive of all social communication media because it is engineered to support modes of interpersonal, mass and computer-mediated communication (Spurgeon, 2008). Furthermore, he notes that interactivity is a major criterion of comparison between “old” mass media and “new” digitally networked media. Although social media networking sites cannot be said to have replaced “old” media, they have enhanced the functioning of existing means of communication (Petrescu, Raducu, Soare, & Purcarea, 2021; Cranston & Davies, 2009). Social media can take the form of message boards and forums; podcasts; wikis; video; blogs; photograph hosting sites; music hosting sites; news sites, articles, debates, tagging, microblogs or a combination of most or all of these (Lefebvre, 2011). Since information breaks almost at the speed of light and audience members depend on the media to get the scoop importantly, many social media houses, especially the online media have devised a means to match up the speed with modern technology that can enhance their production. Hence, the deployment of automated algorithmic filter bubbles that assist social media sites in sorting, sifting and content in the digital space (Odongo, 2024).

Unarguably social media has become an integral part of the public health conversation. How social media can best be harnessed to achieve effective public health outcomes is a topic of much discussion and study. Ghahramani, de Courten, & Prokofieva (2022); Korda & Itani, (2013), Chou, Prestin, Lyons & Wen (2013); Lefebvre & Bornkessel, (2013), all examined the effectiveness of and implications of using social media and other digital media in health promotion and disease prevention endeavours and found mixed and evidences of the efficacy of its impact on public health communication. Studies by He, Cao, Liu, Wu & Zhang (2022); Fox & Duggan (2013) found that over 60% of US older adults reported using the internet stating that they have looked online for health information in the past year. With the number of social media users steadily growing, social media present an opportunity to reach audiences who may prefer to receive health information through these channels (Park, Rodgers & Stemmie, 2011).

Theoretical Framework

The Health Belief Model (HBM) attempts to explain and predict health behaviours by focusing on the attitude and beliefs of individuals. This theory was propounded by Geoffrey Hochbaum in the 1950s and notes that individuals are likely to accept health interventions if they believe that they may be susceptible to that particular health condition, if the condition is noted to have serious consequences and if the gains of taking positive action would reduce individual or general susceptibility to the health condition. Health Belief Model postulates that the individual's beliefs about health problems (prostate cancer), perceived gains of action (treatment) and obstacles to action (problems/poor diagnosis, management or treatment) and self-efficacy (knowledge) explain engagement of its lack thereof in health-promoting behaviour. The core assumptions of the HBM theory rest on the fact that an individual's health-related behaviour relies on the individual's perception and compliance in the following critical areas, severity of the potential disease, individual's susceptibility to the disease, gains of carrying out recommended health action, costs and obstacles in carrying out the recommended health action. The Health Belief Model is related to this study because the theory helps to predict changes in human behaviour and assumes that individuals are likely to accept health interventions if they are exposed to factors like hepatitis B public health communication that hold positive health benefits (National Cancer Institute, 2005).

Methodology

The survey research was adopted for this study. This is given to its suitability to a research of this nature. Singh (2006), notes that survey is concerned with attempts to determine the status of a phenomenon under investigation. The survey was considered most suitable for this study because surveys are highly useful in the field of social/behavioural science and areas that involve human action (Okoro, 2004).

Population

The population of this study comprised of all Nigerians in South East Nigeria. However, all states in the region cannot be studied, therefore the researcher conveniently selected Enugu and Ebonyi States. According to the 2006 population census, the population of the two states was 5,444,784 – Enugu 3,267,837 and Ebonyi 2,176,947. To arrive at an accurate population that could reflect the current size of the two states,

the researcher adopted the prediction of the National Population Growth Rate which is 3.2% as espoused by the National Bureau of Statistics. Therefore in 2018, the projected population of Enugu is 4,627,260 and Ebonyi is 3,082,553; bringing the total of the population under study to 7,709,813.

Table 1: Breakdown of the population under study

State	2006 Population	Growth rate per year	Growth rate in 13 years	Total population
Enugu	3,267,837	104,571	1,359,423	4,627,260
Ebonyi	2,176,947	69,662	905,606	3,082,553
Total				7,709,813

Sample Size

The sample size of this study was 385. The sample size arrived at using the Australian Calculator to determine the appropriate sample for the study. Therefore having cued in the external figure a sample size of 385 was obtained from the calculation at a confidence level of 95% and a confidence interval of 5.0%.

Sampling Technique

The sampling technique utilised is the multistage sampling. Two states in the South East region (Enugu and Ebonyi) and the capital of each state were purposively selected as the area where the copies of the questionnaire were administered. The capitals of both states were chosen because they may have more internet penetrations/social media use than other areas of their respective state. This made them better chanced to give more information that could help solve the research questions raised in the study.

In stage two to ensure proportional representation in assigning copies of the questionnaire based on projected population of the selected states, the Bowley Proportional Method was utilized. The formula is $nh = (Nh/N) \cdot n$ Where nh is the sample size stratum: nh is the population size for stratum h ; Nh is total population size; n is the total sample size. The calculations were thus Enugu 231 and Ebonyi 154 total 385. At the fourth stage, households/buildings in the registration areas were visited and random sampling was used in sharing copies of the questionnaire to any adult (asked to complete the questionnaire).

Table 2 showing selected INEC Registration Areas

SELECTED TOWNS/REG AREAS
Ebonyi State
Abakiliki, Ebonyi
Ezillo I, Umuhuali
Akaeze Ishiagu, Obinagu
Enugu State
Abakpa I, Trans- Ekulu
Oduma I, Okpanku
Amala, Ezimo Agu

Instrument for Data Collection

The instrument for data collection is the questionnaire guide. The use of this instrument was made necessary as a result of the nature of the data required for a justifiable and empirical treatment of the research. The survey instrument was the questionnaire which contained both open-ended and close-ended question, allowing the respondents options to provide and express their opinions and responses. 385 copies of the questionnaire were administered by the researcher and two other research assistants while applying the rule of self report (which allows the respondent to indicate whether they use social media) while administering the questionnaire. The instrument was also subjected to face validation by 3 other experts in health communication. In addition the instrument was subjected to test-retest method with respondents who were not part of the original sample and 5 errors were observed and modified. Data gathered from the pilot testing were analyzed and certified reliable for the study with the Guttman scale of co-efficiency of reproducibility at 0.87 (87%) which was considered high as proof of reliability. The study was conducted in cities where people were always on the move which may have hampered respondent’s objective responses to the questionnaire. However, because of the sensitivity of the subject under research and depth of this study, qualitative data could have added to offset the shortfall of the instrument. To elicit information from the respondents, 385 copies of the questionnaire were distributed in the selected states and 350 copies were recovered. Below are the analyses from the 350 recovered questionnaires.

Research Question 1: What is the level of exposure to social media public health social media algorithmic messages on hepatitis B among residents of South-East Nigeria?

Table 3: Access to social media algorithmic messages

Response	Frequency	Percentage (%)
Yes	350	100
No	0	0
Total	350	100.0

Table 3, question 1 represents the respondent’s access to social media algorithmic messages on hepatitis B virus. The table shows that all respondents 350 (100%) had access to the social media algorithmic messages.

Table 4: Social media platform that carried the most algorithmic messages about hepatitis B

Variable	Frequency	Percentage (%)
Facebook	160	45.7
Twitter	52	14.8
WhatsApp	80	22.8
Instagram	11	3
YouTube	3	1
Non	45	12.7
Total	350	100.0

Table 4 indicates that Facebook 160 (45.7%) carried the most algorithmic messages on hepatitis B).

Table 5: Frequency of exposure to social media algorithmic campaigns

Variable	Frequency	Percentage (%)
Very Frequent	155	44.2
Frequent	122	34.9
Sometimes	23	6.6
Not Frequent	5	1.4
Not at all	45	12.9
Total	350	100.0

From Table 5, question 3 above there is clear indication that majority of the respondents 155 (44.2%) stated Very Frequent and 122 (34.9%) respondents stated Frequently agreed that they have been exposed to hepatitis B through social media algorithmic campaigns and respectively.

Table 6: Awareness of hepatitis B social media algorithmic campaigns

Response	Frequency	Percentage (%)
Yes	305	87.1
No	45	12.9
Total	350	100.0

Table 6, question 4 revealed that majority of respondents 305 (87.1%) respondents were aware of the hepatitis B social media algorithmic campaign.

Table 7: Types of messages exposed on social media

Variable	Frequency	Percentage(%)
News on the outbreak	84	24
Spread of the disease	78	22.3
Contractions/suspicious statistics and news	105	30
Online gossip and rumours	12	3.4
Online broadcast about prevention and control	18	5.1
Intervention news	8	2.3
Non at all	45	12.9
Total	350	100.0

Table 7, question 5 sought to find out the types of messages respondents were exposed to on social media. Majority of respondents 105 (30%) were exposed to contractions/suspicious statistics. While 8 (2.3%) saw the messages on intervention news.

Research Question 2: Ascertain if social media algorithmic media has increased knowledge of hepatitis B prevention and control among residents of South-East Nigeria.

Table 8: Do you know about social media algorithms?

Response	Frequency	Percentage (%)
Yes	180	51.4
No	109	31.1
Can't say	61	17.5
Total	350	100.0

Table 8, question 6 shows that majority 180 (51.4%) respondents noted 'Yes' while 109/31.1% and 61/17.5% stated 'No' and 'Can't say' respectively.

Table 9: Respondents knowledge about hepatitis B before seeing any social media algorithmic media campaigns

Response	Frequency	Percentage (%)
Yes	36	10.3
No	314	89.7
Total	350	100.0

Table 9, question 7, data indicates that majority 314 (89.7%) respondents stated ‘No’ that they had no knowledge before seeing media campaigns on social media.

Table 10: Has social media algorithms increased knowledge of preventing hepatitis B?

Response	Frequency	Percentage (%)
Yes	305	87.1
No	45	21.9
Total	350	100.0

Table 10, question 8 shows that majority 305 (87.1) respondents indicated that they had received more information and increased their knowledge through social media.

Table 11: Has social media algorithms increased knowledge on the control of hepatitis B?

Response	Frequency	Percentage (%)
Yes	224	64
No	71	20.3
Can’t say	55	15.7
Total	350	100.0

Table 11, question 9 shows that majority of respondents 224 (64%) noted ‘Yes’

Discussion of Findings

The main contribution of this study is to evaluate the use of social media as tools of public health communication. The research used awareness and knowledge about hepatitis B awareness media campaigns as a case in point to measure social responsiveness.

Research question one sought to examine the level of exposure to social media public health algorithmic messages on hepatitis B among residents of South-East Nigeria tables 1, 2, 3, 4 & 5 were used to answer

the question. Findings indicate that majority of respondents were exposed to hepatitis B public health algorithmic campaign messages through social media. This implies that a large percentage of respondents made use of social media to get health news and information. Findings are in tandem with the conclusion of Senam & Okonji (2021) study which affirmed that social media has become an important part of people's lives. The conclusion on awareness finds fulfilment in Wogu, Chukwu, Orekyeh, Anorue, Nwokedi & Chukwu (2021) study which concluded that people now depend on social media for health information and orientation using a more interactive platform.

Research question two ascertained if social media algorithms have increased knowledge of public health messages on hepatitis B prevention and control among residents of South-East Nigeria. To ascertain this, the researcher used questions 6, 7, 8 & 9 were used to answer the question. A considerable number of respondents agreed that the social media messages increased their knowledge and provided information about the virus. These findings agree with the views of Pourkarim, Van Espen, Thijssen, Van Ranst, & Pourkarim, (2019); Greene & Kasselheim (2010); Lane & Twaddell (2010) who noted that as much as 60% of internet users seek health information from the internet before going elsewhere for information. Additionally, Alaridah, J. et al (2023); Kim, Eng, Deering & Maxfield (1999) found that quality health information sources improved the user's accuracy in answering health related questions.

Conclusion

Despite the problems occasioned by issues in the use of social media in Nigeria, it has been revealed that awareness and knowledge about hepatitis B were relatively high. Inherent in most of the results across board was that algorithmic media has the potential to enhance speed, reduce editorial burdens, engender content appeals and remove human sentiments in news propagation. That is to say that, the future of public health communication in Nigeria will increasingly become more effective with the use of social media by stakeholders in the health sector. Critically, there exists the need for health stakeholders to harness algorithmic technology to ensure that they get credible, genuine, and even more sensitive information into circulation to ensure behavioural change. Majority respondents were optimistic that social media can be more effective in this regard. Findings also noted that majority of the respondents use health information they source from social media. In the case of hepatitis B awareness and knowledge and the degree to which

respondents use social media constantly to prevent the spread of the virus gave a lot of credence to the usefulness of social media in health communication. Information on disease prevention and control should direct specific actions and also be strategically designed and not left to the mercy of purveyors of user-generated content. The study notes that it is also important for social media users to bear in mind that health information on social media is not an alternative to face-to-face medical consultations. Therefore it is equally important to always confirm the health information one gets on social media with offline medical professionals before application to avoid harmful effects that can lead to death.

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