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Applying Comprehensive Model of Information Seeking to Hepatitis B and C Patients' Information Seeking in the South African Context: A Scoping Review

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Abstract

The continuous spread of Hepatitis B and C Viral diseases have affected over 248 million people worldwide. Despite the frustrations expressed regarding patients information needs, awareness and knowledge about the mode of contact of the disease, information access and use, studies addressing hepatitis B (HBV) and C (HCV) patients information needs and seeking behaviour is lacking. This paper examines the relevance of comprehensive model of information seeking (CMIS) in addressing hepatitis B and C patients' information behaviour, to ascertain the trend of use to inform the future applications of the model. Four databases were searched for articles published between 1993 and 2020. Findings indicated that out of 571 documents identified, 66 full texts documents were eligible while 19 articles were included for the scoping review. Contrary to the opinion of some critics regarding the inability of CMIS to predict information seeking, majority of CMIS users found the antecedent factors suitable to influence information-seeking behaviour, followed by the likelihood of information carrier factors to predict information seeking. Majority of studies used quantitative method while a limited number of studies applied mixed-methods for investigations. The scoping review identified gaps in the literature addressing HBV and HCV patients' information seeking, scarcity of African researchers using CMIS model and a limited number of CMIS publications in LIS source and subject domain. Nevertheless, the scoping review presents practical and theoretical implications. The information specialists need to explore the variables of CMIS model in further studies, the African region, specifically in the South African context.

Keywords: Comprehensive model of information seeking, Hepatitis B and C patients, Patients' information, Information Seeking, South Africa.

INTRODUCTION

Recent studies showed that Hepatitis B Virus (HBV) and Hepatitis C Virus (HCV) diseases are well established major health threat among the people worldwide, specifically in South Africa (Scheibe, *et al.*, 2019:37; Hecht, *et al.*, 2018:528). The diseases have affected over 248 million people globally, while many people “are still living with chronic HBV and HCV diseases today” (Mason, *et al.*, 2019:5). In 2017 alone, information revealed that “approximately 60 million people are chronically infected with HBV and 10.2 million people are chronically infected with HCV” (Scheibe, *et al.*, 2019:28). Given the frustrations expressed regarding information by patients, meeting patients information needs, information provisions and communications concerning the mode of contact of the disease, preventive and management strategies (WHO, 2019:1), it

has become imperative that study examines the information needs, seeking and use by either patient, healthcare providers or managers of health facilities and the general public. Information seeking refers to “activities” or “actions” engaged by individuals such as searching, finding and using information related to disease, health-threatening factors and health-related activities (Lalazaryan & Zare-Farashbandi 2014:193). According to Wilson (1997:7), “need” is a subjective experience that occurs only in the mind of the person in need”, which implies that information need arose out of the desire to fill a knowledge gap as well as to improve on understanding of the relationship between identifying information needs of HBV and HCV patient and filling the information gap. In the context of HBV and HCV patients, the first step for preventing the spread of such diseases is by encouraging them to search for health-related information (Lalazaryan & Zare-Farashbandi, 2014:193). Knowledge of patient information-seeking behaviour can provide good health, and health information experts with valuable information can be used to improve the patients' health. Lambert and Loiselle, (2007:1006) maintain that seeking and using appropriate information about one's health is a key coping strategy in health-promotive activities and psychosocial adjustment to illness. On one hand, Studies revealed that information seeking and use must follow a specific pattern or different approaches, whether the theoretical use, methodological or conceptually used depending on the contexts of the study (Kaur, 2016:93; Zhang & Creswell, 2013:51; Peterson, *et al.*, 2013:217; Hayes, *et al.*, 2013:8).

Based on the opinion of scholars, theories are either used to predict, understand or explain the relationship between constructs and variables in a study (Case 2012:134). The theories in this scoping review are used to explain the link between information needs, seeking and use as well as understand the challenges faced by HBV and HCV patients regarding the pattern of their information seeking (Case 2012:134). Some related studies have applied various models to understand and predicts ways by which challenges with information seeking can be better understood in different contexts of studies specifically in the health contexts. Such approaches can as well be applied in the context of HBV and HCV challenges with information seeking and use. Many CMIS related articles have examined information seeking contexts such as Facebook, Twitter, healthcare workers, cancer patients or survivors, kidney failure or transplant, strokes, and other associated diseases (Reifegerster *et al.*, 2020; Bernadas and & Jiang, 2019; Basnyat, *et al.*, 2018; Van Stee, *et al.*, 2018). In the South African context, the researchers focus investigations on the prevalence and epidemiological impact of HBV and HCV infections on the inhabitants in urban centres, rural areas and communities to determine the level of widespread and epidemiological impact on the populace (Scheibe, *et al.*, 2019; Hecht, *et al.*, 2018; Gencay, *et al.*, 2018), through experimental and investment case approach (Hecht, *et al.* 2018:528). However, applications of CMIS model were rarely applied in the African contexts especially in the South African context. This scoping review focuses on applications of CMIS to HBV and HCV patient’s information needs and seeking in the South African context to predict or explain the pattern of their information seeking.

PURPOSE AND OBJECTIVES OF THE STUDY

The broad aim of the review was to identify and analyse knowledge gaps in the literature addressing applications of CMIS to HBV and HCV patients information needs and seeking behaviour. The suitability, the trend of use, methods and variables of CMIS adopted by previous studies to inform future applications to a South African study context.

The research questions are as follows:

- What are the features of articles that applied CMIS that are suitable for HBV and HCV patients information-seeking behaviour?
- What are the antecedent factors that influence individuals information seeking in the articles written on CMIS model?
- What are the information carrier factors that influence sources of information used in the previous studies that applied CMIS?
- What are the implications of applying CMIS model to HBV and HCV patients information needs and seeking behaviour?

LITERATURE REVIEW

A group of European researchers traced the evolution of HBV and HCV and its association with human from the Bronze Age to the Medieval period, found out that the genotype that exists today is a typical example of Africa and Asia and a sub-genotype from India, and consequently both have evidence of an early Eurasian presence (Mühlemann, *et al.*, 2018:418). (Mason, *et al.*, 2019:5; Gish, *et al.*, 2015:1339; Inyang-Etoh, & Udonkang, 2018; Bhate, *et al.*, 2015:321). The concern of the rise in an epidemic of HBV and HCV were noted in the recent investigation by many researchers (Singal, *et al.*, 2020:250; Mason, *et al.*, 2019:5; Katamba, *et al.*, 2019:1004; Inyang-Etoh, *et al.*, 2018:18; Gish, *et al.*, 2015:1339; Bhate, *et al.*, 2015:2381) as the “highest in East Asia and Africa, although the incidence and mortality are rapidly rising in the United States and Europe”. Okeke, *et al.*, (2020:111) noted that “hepatocellular carcinoma (HCC) is now the sixth most common cancer worldwide, fifth in males, and ninth in females”. The major health implications as a result of HBV and HCV remain “acute and chronic liver diseases, hepatic decompensation, hepatocellular carcinoma (HCC), cirrhosis and primary liver cancer (WHO, 2020:1; Onyekwere, *et al.*, 2016:1), while the mode of contact or transmission remains “contact with infected blood, body fluids of infected persons through sexual transmission, transfusion of unscreened and infected blood as well as the mother to child at birth sexual transmission and among others” (WHO, 2020:1; Onyekwere, *et al.*, 2016:1).

There are five main types of viral hepatitis such as; A, B, C D and E, but type B and C is the focus of this scoping review due to the dangerous effect on the health of the populace as well as a threat to human existence worldwide. (WHO, 2020:1; Chen & Yang, 2011:628; Maddrey, 2000:362). Researchers emphasised on the need for and awareness, education, counselling, prevention and vaccination programs to be organised for HBV and HCV patients, the general populace, and to be taken to cities or urban population in many countries for reduction or elimination of the spread of the diseases (Villar, *et al.*, 2018:420; Mast, *et al.*, 2006:1; Bosch, *et al.*, 2005:191). The prevalence of HBV and HCV disease were noted to have affected the African continent and Sub-regions such as; West Africa, East Africa, Middle-Eastern Africa, North Africa and southern Africa, countries. The burden affected both adult and children (Omran, *et al.*, 2018:4330; El-Shabrawi & Hassanin, 2014:473). Scheibe, *et al.*, (2019:29) reported that “approximately 60 million people were chronically infected with the hepatitis B virus (HBV) and 10.2 million people were chronically infected with hepatitis C virus (HCV) in sub-Saharan Africa”. The situation required urgent public health interventions and strategic policy directions to control the spread of the disease to avert any potential future explosions.

The widespread of HBV and HCV diseases in South Africa is a serious concern to the researchers, patients, healthcare providers and the general populace as noted by some authors (Babatunde, *et al.*, 2018:389; Semugoma, *et al.*, 2017:1116; Mdlalose, *et al.*, 2016:1; Mphahlele, *et al.*, 2006:14). According to Botha, *et al.*, (2010:20), “the prevalence of HCV infection in South Africa is not known but has been estimated to be

between 0.1 and 1.7 %”. Studies examine the spread of the HBV and HCV found out that various mode of transmission includes infants through mother and child transmission (Scheibe, *et al.*, 2019:28; Babatunde, *et al.*, 2018:389; Semugoma, *et al.*, 2017:1116; Mdlalose, *et al.*, 2016:1), men having sex with men (Semugoma, *et al.*, 2017:1116; Mphahlele, *et al.*, 2006:14), among people who inject drugs in both rural and urban centres specifically among adults and youths raises serious concern (Scheibe, *et al.*, 2019:28). The prevalence of hepatitis B virus infection among health care workers in a tertiary hospital were also reported (Vermulden, *et al.*, 2017:1115; Mueller, *et al.*, 2015:386). Lack of training, poor knowledge, complex process, and excessive workload were among factors responsible for poor notification of viral hepatitis as noted by Mathatha, *et al.*, (2018:5).

Apart from the awareness of the dangerous effect of HBV and HCV on the health, social, psychological and economic lives of the people, the mode of transmission and spread should be made available to the people (Mathatha, *et al.*, 2018:5). It is also important that both health care workers and the patients are educated, counselled about the preventive strategies, which is an important aspect in the control of the spread of the disease (Mueller, *et al.*, 2015:386). The study further maintains that “knowing facts, having proper awareness, and proper behaviour and attitude toward clinical aspects of the infection and toward the patients are critical to prevent the spread of these infections”. Besides, Mathatha, *et al.*, (2018:1) suggested adequate training on viral hepatitis, notification process, roles and responsibilities of healthcare professionals to notify and the implication of notification for improvement in reporting, notification and referrals, to increase access to care.

In the South African context, previous studies focused on HBV and HCV prevention, prevalence, burden, men having sex with men, management of the disease by healthcare providers and among others. Others focused on the attitude of workers in the tertiary health facilities in South Africa as well as epidemiological reports and guidelines for the management of diseases (Al-Sadeq, *et al.*, 2019:63), however, limited studies examine the information needs and seeking behaviour of HBV and HCV patients by applying CMIS as a theoretical framework to guide the study specifically in the South African context.

Theoretical Foundation of the Study

Theories and models were designed by scholars to guide information-seeking behaviour studies in various contexts (Case 2012:49). Models of information seeking are used to provide the understanding with the information needs and pattern of information seeking behaviour of individuals engaged in information seeking, as well as to predict relationships between constructs or variables in a given phenomenon (Case 2012:70). Given the challenges faced by millions of people living with the chronic HBV and HCV diseases worldwide, studies must apply model such as CMIS to guide patients’ information-seeking to enable healthcare providers and information specialists understand the best methods of information provision for the patients and the general public. This study examines previous studies that applied CMIS to studies in various contexts so to establish the suitability of applying the variable to guide the study of HBV and HCV patients information needs and seeking behaviour.

A Brief highlight of CMIS Applications to Previous Studies.

A comprehensive model of information seeking (CMIS) is “characterised by seven factors grouped under three headings which includes antecedent factors, information carrier factors and information-seeking factors” (Case & Given, 2016). The antecedent factors are those that “influence the opinion of individual information users, the

usefulness of information carriers or sources and also motivates information-seeking actions by information users” (Johnson & Case, 2012). According to Johnson and Meisckhe (1993:343), the model claims that “four health-related factors—demographics, direct experience, salience, and beliefs—determine two information carrier factors—perceptions of information carrier characteristics and utility—which, in turn, determine information-seeking actions”. The antecedent portion of the CMIS was drawn heavily from the health belief model (HBM), which was in turn drawn from the work of Lewin and another social psychologist (Johnson & Case, 2012; Kegeles, 1980; Mikhail, 1981). In support of health information seeking in health contexts, Bandura (2004:143) argued that human health is a social matter, not just an individual one and therefore requires a comprehensive approach to health to health information seeking (p.143). Bandura (2009:110) recognises the role of mass media in the society as a medium of information carrier, as well as a means by which individuals’ meets psychological needs. Psychosocial influence of communication on human thought cannot be underestimated specifically in the way by which it affects and motivates information-seeking actions from individuals. Bandura holds the view of self and society, personal factors such as cognitive, affective and biological events, behavioural patterns, and environments that influence each other bidirectional (p.110).

Also, Griffin, *et al.*, (1999:230) in “Risk Information Seeking Processing Model (RISPM)” support the beliefs of individuals about the usefulness of information sought from various channels, which might, in turn, influence the extent to which a person will seek out the risk information”. Health Information Acquisition Model (HIAM) by Freimuth, *et al.*, (1989:9), focussing on cancer information services (CIS), heavily influenced by Lenze model as well as Atkin’s (1973:205), also supporting CMIS information-seeking actions, (active information seeking and information acquired passively). Also, the expanded conceptual model of information-seeking behaviour (ECMISB) by Longo (2005:189) was designed to understand nature, source and usage of health information related to chronic diseases such as Cancer, HIV, Diabetics and HBV and HCV diseases. The expanded model comprises of variables influencing patients and consumers information-seeking behaviours, behaviours and information use (contextual and personal), health information-seeking behaviour (an active and passive receipt of information as well as patients or consumers outcomes (Lalazaryan & Zara-Farashbadi, 2014:193; Longo, 2005:189; Lambert & Loiselle, 2007:1006; Longo, *et al.*, 2001:413). Besides, the model has been empirically tested in many contexts such as “health communication studies”, cancer patients information seeking and other health-related contexts (Bernadas, *et al.*, 2018; Basnyat, *et al.*, 2018; Kim, *et al.*, 2017; Ruppel, 2016; Sheng & Simpson, 2015; Han, *et al.*, 2010), and therefore can also be applied to the context of this scoping review.

Apart from antecedent factors, information carrier factors and information-seeking factors that are variables of CMIS, CMIS is a very flexible model that gives room for improvement, and addition, through a feedback loop between actions and antecedents, CMIS can be improved in the context of this scoping review by adding awareness, education, counselling, information provision policy, access and use of information, information needs, psychological preparedness of patients especially during the period of an epidemic such as COVID-19.

Criticisms against CMIS

Despite the success recorded by researchers that applied CMIS to various study contexts across disciplines, subjects, contexts, geographical distributions and continents including Africa, the models were received with many criticisms by authors (Reifegerste Blech &

Dechant 2020:9; Bernadas & Jiang, 2019:7; Basnyat, *et al.* 2018:563). CMIS was Criticised by some scholars based on “not providing a modification influence of predictors on other information carriers such as online health information source for family caregivers through the internet” (Basnyat, *et al.*, (2018:564; Oh, 2015:948). Basnyat, *et al.*, (2018:564) claim that “originally CMIS primarily included health-related antecedent variables, ignoring factors at the media level”. Another researcher suggested that the extension of CMIS is required to investigate specialized health information seeking in health context such as in “patients’ portals, emails, for lab results, appointments with doctors” are all very essential (Van Stee & Yang, 2018:1590).

This current scoping review examines CMIS variables to identify a gap in the literature on HBV and HCV patients information seeking in South African context, to ascertain the antecedent factors influences individuals information seeking in the previous studies that applied CMIS model, information carrier factors that influence sources of information used in the previous studies that applied CMIS and establish the theoretical implications of applying CMIS model to HBV and HCV patients information needs and seeking behaviour in the South African context as well as in the future studies.

Specific Areas of Suitability of CMIS to HBV and HCV Patients’ Information Seeking

CMIS factors focused on the “antecedent factors, information carrier factors and information-seeking factors” that are relevant to the context of this study. This scoping review drew from the antecedent factors, information carrier factors and information-seeking actions of CMIS model by Johnson and Meischke (1993:343) given that these factors can measure the objectives outlined for this scoping review, in other to guide HBV and HCV patients’ information seeking.

Antecedent factors: CMIS antecedent factors adapted to predict the “information-seeking” behaviour of HBV and HCV patients, includes the demographics or bio-data such as age, gender, health status, economic and educational status, also, experiences of the patients with the shock of disease diagnosis, strategies used for coping with pain and adherence to medication for effective treatment, as well as recovery. Saliency factors and patients beliefs in the prevention, treatment and self-efficacy can not be underestimated [Fig.2].

Information carrier factors: The information carrier factors by Johnson and Meischke (1993:343) were selected to establish various sources of information prepared for use by HBV and HCV patients, to establish the influencing factors motivating the use of information sources by patients, as well as the utility of information carrier or sources used by HBV and HCV patients. CMIS variables were selected to establish the outcome of information seeking actions which might likely promote emotional, social and psychological supports. In addition to the establishment of outcome of information seeking, CMIS was selected to determine the theoretical implications of use in the health contexts.

Information seeking actions: The variable of “information seeking actions” was selected to “predict factors motivating information seeking” by HBV and HCV patients. “Information seeking actions” and strategies were employed to predict motivating factors behind information seeking by HBV and HCV patients in this scoping review.

Patients information needs: Patients’ information needs has to do with the “recognition of inadequacies in knowledge” of a particular disease dangerous to human health which can be avoided if well informed in advance. In line with the aim of this study, patient information includes demographic information (age, gender, health status, educational level, economic status and place of origin), test results, laboratory test results, health

status, and other related information that are available for the treatment of diseases, through the health forum and health information exchange or the websites (Kamran 2015:15). To satisfy information needs, it is important that “knowledge gap” is bridged (Case & Given, 2016:6; Dervin, 1999:727). In general, Ford (2015:35) agreed that information is needed to solve a particular problem and achieve a particular goal. The need for patients information regarding screening for transmission risk behaviour, testing, vaccination against various types or group of viruses is very important for both the healthcare givers and the patients (Edlin, *et al.*, 2005:276).

Counselling and education: CMIS were improved with the role of counselling and education by healthcare professionals in providing information for HBV and HCV patients regarding the management of the disease. Education contributes to the improvement in the quality of life of patients. It is also regarded as an important strategy used to improve the knowledge of people regarding preventive methods, pain management, and adherence to medications about chronic diseases such as HBV and HCV and cure. Education helps to effect changes in attitude regarding health practices in the life of individual HBV and HCV patients (Haq, *et al.*, 2014:807; Sha, 2013:922; Raza, 2013:1127). Counselling for patients is equally very important for HBV and HCV patients given that many have suffered depression and anxiety due to the effect of the disease (Buller-Taylor, *et al.*, 2018:1095). In such a situation, there is a need for emotional and psychological support through special intervention to allow patients to have reliefs from pain as well as reduce emotional tension and anxiety (Lee & Hawkins, 2010).

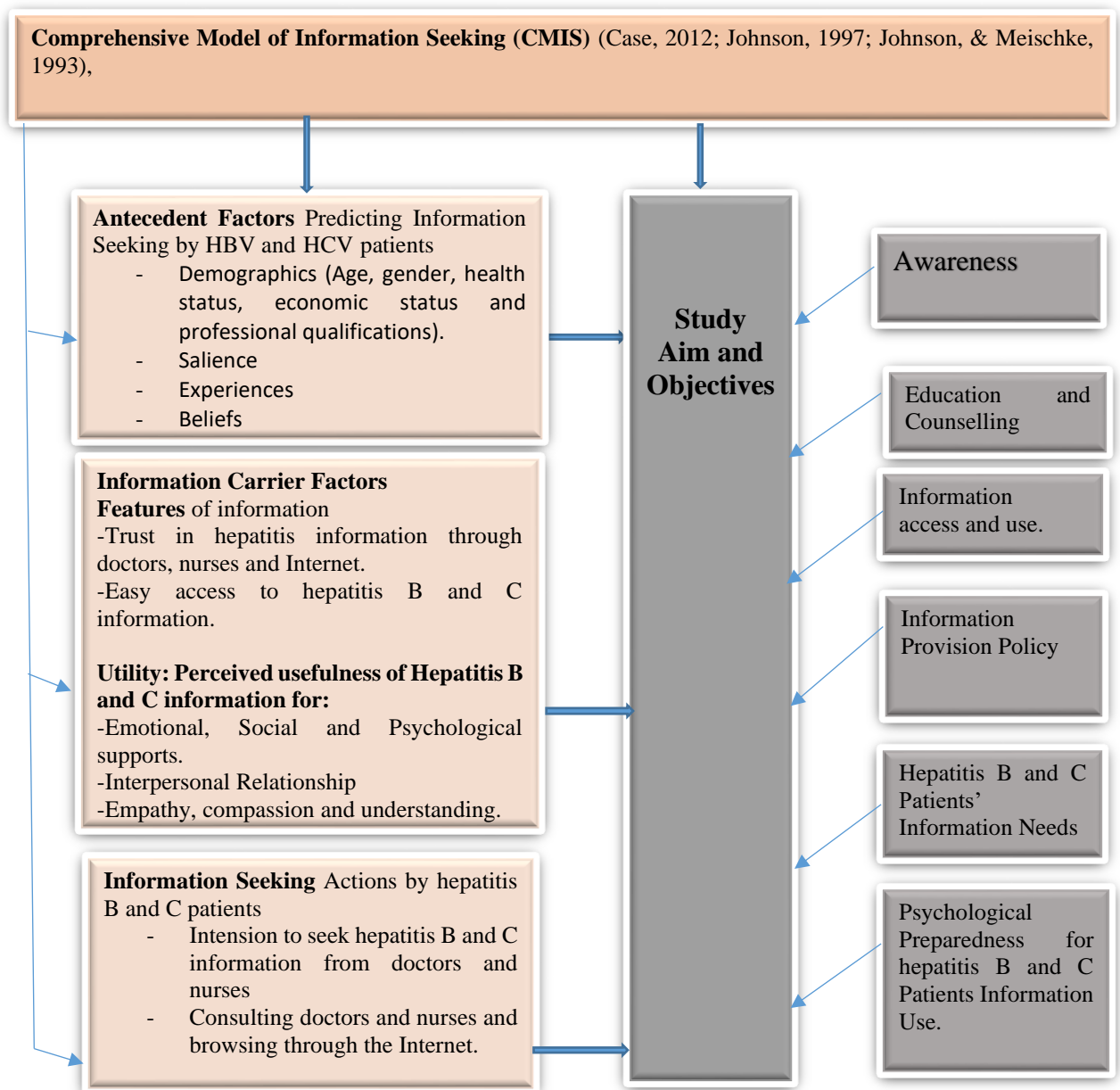
Information access and use: Access to information is very important for both patients and healthcare providers are given that access to adequate information is linked to the prevention of endemic HBV and HCV, patient self-care, adherence to prescribed medication, timely diagnosis, emotional and psychological well-being, coping with anxiety and the anticipation for a speedy recovery from the disease (Howel, 2017:21; Cros, *et al.*, 1998:51). A study by Cros, *et al.* (1998:51) revealed that “a vast majority of the patients affected by HBV and HCV have a deficient level of information concerning the means of transmission, which informed why the interfamily infection cases are very high”. The variables of access and use of HBV and HCV information was added to establish the channels of information where HBV and HCV patients can find access to information such as lab results, fixing of doctors and patients appointments using their mobile applications, and access to patients portal to facilitate effective information communication and provisions between patients and doctors, and between patients and nurses as well, like other health care professionals (Van Stee & Yang, 2018:1590).

Information provision policies: Health information policy is very essential to facilitate effective use of health information, information security, the confidentiality of patients’ information, as well as efficiency in health service delivery (Elven, *et al.*, 2020:1). There is a growing need for health information policy for guiding the implementation and prevention of deadly diseases infections globally (Buntin, *et al.*, 2011:464; Tunis, *et al.*, 2003:1624; Lohr, *et al.*, 1998:1). Tunis, *et al.*, (2003:1624) highlighted the need for “clinical and health policy decision-makers to become more involved in all aspects of clinical research, including priority setting, infrastructure development, and funding” to increase the value of the use of health information policy.

Psychological awareness for patients information use: Research shows that the incidence of psychological distress in patients receiving treatment for chronic diseases such as HBV and HCV diseases are very common (Agarwal, *et al.*, 2020; Fontana, *et al.*,

2002:401). Consequently, patients suffering from chronic diseases such as HBV and HCV who are at the end-stage receiving care are likely to suffer from psychological and emotional distress and perhaps may find it difficult to engage in open discussions, attend to queries or interviews, visit doctors for treatment or adhere to medications. It is imperative that patients in such circumstances are psychologically prepared in advance to deal with the emotional trauma, communication challenges, and responses in a discussion forum to receive supports. This scoping review addresses areas of applications of CMIS to HBV and HCV patients information needs and seeking behaviour. It also examine the trend of use, methods and approaches adopted by previous studies to inform future applications. The theoretical framework for hepatitis b and c patients' information seeking in South African context is hereby illustrated in figure 1.

Fig. 1. Theoretical Framework for Hepatitis B and C Patients' Information Seeking



Source: Adapted from Johnson (1997); Johnson and Meischke (1993), and findings from literature by the researcher.

METHODS AND MATERIALS:

This study followed scoping review guidance by Grant and Booth (2009:91), although a flow diagram of Preferred Reporting Items for Systematic Reviews and Meta-analysis (PRISMA by Liberati, 2009:4) was adopted to ensure rigour and transparency to achieve the broad aim of the study. The originality of the scoping review was ensured by strictly following the inclusion and exclusion criteria in table 1. The study protocol was not registered in PROSPERO. Figure 2 illustrate the flow diagram of PRISMA and the steps followed by the researcher to identify and extract the relevant articles during the search process from the four databases.

Search process and eligible criteria: A comprehensive literature search was performed by the author with the assistance of a professional e-librarian, to search four databases, which include Ebsco host, Scopus, Web of Science and Library and Information Science Source, to identify studies that applied CMIS to HBV and HCV patients information in the South African context. The initial search was performed March 11, 2020, and was updated between 10th and 15th of December, 2020. The author did the final crosschecking by December 28th, 2020, with the assistance of an expert and researcher in the information science field. Four (4) multidisciplinary databases were searched, while limits were set for articles published between 1993 to 2020. The main focus was on articles focusing on CMIS applications to human or health contexts. Library and Information Science Source was searched as a key subject specialised database, to ensure relevance to the topic of discussion, other interdisciplinary databases searched include Ebsco Discovery Services for wider subject coverage and scholarly peer-reviewed, full-text articles that are up to date. Web of Science was searched for high-quality standard and scholarly work, document analysis and cover to cover indexing. Scopus was added as a peer-reviewed scientific source and document analyses. The search elements include articles and conference papers that focus on “CMIS” AND HBV and HCV in South Africa, “CMIS” AND patients’ information”, “CMIS” AND health. Eligible documents include published articles and conferences in English language, open-access and priced documents.

A search for “CMIS” wider applications in both Scopus and Web of Science (WOS) produced the same results (29 +29). However, when used in Library and Information Science Source (LISS) yielded only 2 results. The use of “CMIS” AND health and “CMIS” AND health information as a search strategy in Scopus and Web of Science also produced the same outcome (27 + 27). When used as “CMIS” AND patients information, the search produces 9 documents, and when used in LISS, it produces 4 documents related to health information but no documents for CMIS articles. All the 9 documents were already included in the wider applications. However, a search through Ebsco Discovery Services (EDS) produced 495 of which the majority of the documents contained irrelevant, duplicates, and documents discussing different subjects. Also, when searched for CMIS AND hepatitis B and C AND South Africa, it produces 16 completely irrelevant documents, not related to the topic of discussions and not useful. Table 1 illustrates the search terms used for the scoping review.

Table 1. Search Approach for CMIS Documents

S/N	CMIS Search Strategies	No. of documents
1.	“Comprehensive Model of Information Seeking”. (Scopus)	29

2.	“Comprehensive Model of Information Seeking”. (WOS)	29
4	“Comprehensive Model of Information Seeking” AND hepatitis B and C (Scopus)	0
5	“Comprehensive Model of Information Seeking” AND hepatitis B and C (WOS)	0
6	“Comprehensive Model of Information Seeking”. (Ebsco Discovery Services)	495
7	“Comprehensive Model of Information Seeking” AND hepatitis B and C AND South Africa. (Ebsco Discovery Services)	16
8	“Comprehensive Model of Information Seeking” AND hepatitis B and C AND South Africa. (Library and Information Science Source)	0
9	“Comprehensive Model of Information Seeking” AND health information AND South Africa. (Library and Information Science Source)	4
10	“Comprehensive Model of Information Seeking” AND patients information AND South Africa. (Library and Information Science Source)	0
11	“Comprehensive Model of Information Seeking”	2

Source: *Generated by the researcher.*

Study range: The first stage involves identification of studies focusing on CMIS information needs and seeking behaviour in the four (4) databases, followed by screening for titles and abstracts after the removal of duplicate articles, and to ensure that inclusion and exclusion criteria were followed. Eligibility was ensured to include only articles published in English language focusing on CMIS applications to various health contexts while only articles that met the final criteria were included for scoping review. Scholarly peer-reviewed and full-text articles included were up to date. Articles not focusing on health contexts were excluded.

Data collection process: The author selected the eligible articles published in English language focusing on CMIS applications to various health contexts. To avoid risks of bias, individual studies that were included in the review were selected based on inclusion and exclusion criteria. After the eligible data has been extracted, the author focused assessment of review on study methods of data collections, author and year of publications, country, study participants, variables of CMIS applied and findings of the studies. Following the methodology section are the presentations of results and discussions of the reviewed documents.

RESULTS

This section presents the total number of studies identified, selected and screened for eligibility. Reasons for exclusion were also summarized with a flow diagram in the section. Characteristic of the extracted data and citations in the individual studies reviewed were also presented. The four databases were used to analyses documents produced per year, and to identify specific areas by which CMIS were applied between 1993 and 2020. Table 2 [T2] presents the total number of identified documents from each database.

Presentations of results of identified documents from four databases

Table 2 provides the total number of documents identified in the four databases searched for studies that applied CMIS variables in the study contexts. It was revealed that a total

of 571 CMIS articles were identified from four multidisciplinary databases; Ebsco Discovery Services [511], Scopus database identified 29 documents, with 20(68.97%) documents published in social science subject area, others were published in medicine [12], computer science [4], Art and Humanity [3], psychology [3]. Only one article was published in Library and Information Science Research by Johnson, *et al.*, (2001). Web of Science identified 29 documents, among which 22(75.86%) articles were published in the social science domain. Others [7(24.14%)] were published in science technology and Art and Humanity. Library and Information Science Source (LIS) database comprises of open-source and other priced sources produced 2(0.35%) documents which were the lowest among the number of documents that applied CMIS variables to the study contexts and were identified from the four databases (Ginossar, 2016:2; Pang, 2014:1). Amongst the two authors identified in LIS database, only one author published article in Journal of Information Research, article focusing on CMIS applications to crisis-based information seeking (Pang, 2014:1), while the second author published in Journal of Medical Information Research (Ginossar, 2016:2), context focusing on CMIS applications to cancer prevention information seeking. The search results comprise of “CMIS” wider applications to various contexts. Specific searches were also made to streamline the area of focus of the study to “CMIS” applications to health or human contexts, which eventually produced limited results, to identify the gap in the health literature. From the wider application shown in the table 1, out of 571 records identified, a total of 552 documents were removed with reasons, while only 19 articles were included in the review. Table 2 illustrates the total number of documents identified from each databases [table 2].

Table 2. Type of databases searched for articles focusing on CMIS applications from 1988 to 2020

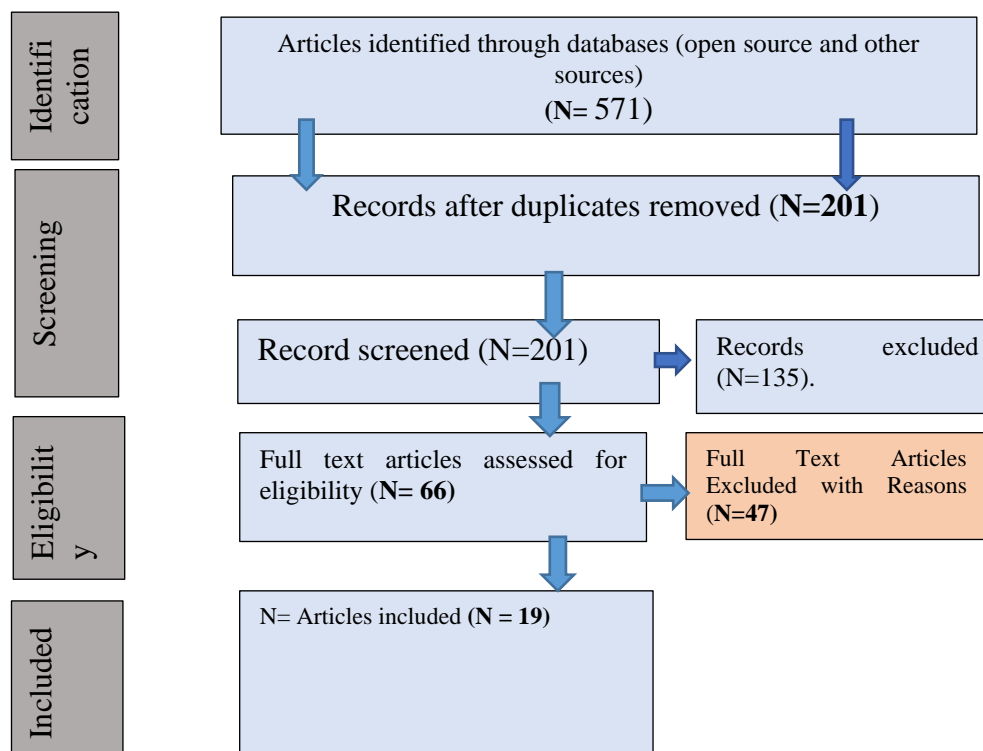
Databases searched	Number of documents identified	Number of studies excluded	Reasons for exclusion:
Ebsco Discovery Services	511	552	Studies that did not use qualitative, quantitative and mixed methods or survey experimental designs. Articles not published in the English Language. Articles that did not feature “CMIS” AND human information seeking. Non-human centred or health contexts. Irrelevant articles, not full text, Not peer-reviewed.
Scopus	29		
Web Of Science	29		
Library And Information Source	2		
Total	571		

Source: Searched results identified from Databases by Researchers

Figure 2 provides the summary of a total number of documents identified and extracted from the four multidisciplinary databases (Library and Information Science Source, Web of Science, Scopus and Ebsco Discovery Services). A total of 201 documents were screened after 204 duplicates removed and 47 full texts and peer review articles were excluded. In summary, the full-text articles assessed for eligibility was 66 documents.

Out of 66 full-text articles assessed for eligibility, 47 full texts articles were excluded with reasons. The reasons for exclusion was because many full texts articles were irrelevant, not related to health or information seeking context, book review and articles discussing different subjects. Eventually, only 19 articles were included for review. Figure 2 illustrates the flow diagram of the identified documents.

Fig. 2. A flow Diagram of (Preferred Reporting Items for Systematic Reviews and Meta-analysis)



Source: Adapted from Liberati, *et al.* 2009:4.

Findings in this section are organised according to the research questions.

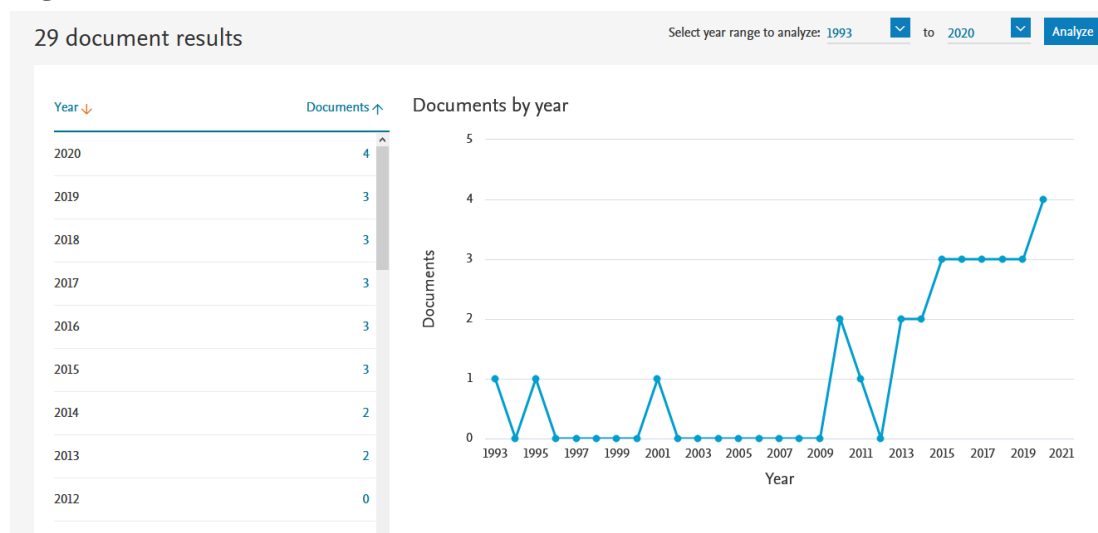
- ***What are the features of articles that applied CMIS variables that are suitable for HBV and HCV patients information-seeking behaviour?***

This scoping review highlights the features of the articles that applied CMIS variables in related studies that are suitable for measuring HBV and HCV patients' information seeking behaviour. The features were organised into six different sections such as authors, year of publications, country of origin, method of data collection tools, study participants, variables of CMIS applied to various study contexts and findings of the studies.

The trends of CMIS articles written between 1993 to 2020: Findings revealed that a total of 29 articles written on CMIS were published between 1993 and 2020 in Scopus and Web of Science database. Meanwhile, out of 19 included articles for scoping review, 13(68.42%) articles were published between 2014 and 2020, while 6(31.57%) articles were published between 1993 and 2013. Interestingly, the year 2020 witnessed the highest rate of publications from social science subject area, with 5(25%) articles published in Journal of Health Communication (Reifegerste, *et al.*, 2020); 4(20%)articles in Health Communication (Zhang, *et al.*, 2020); Health and Social Care in The

Community (Sun & Jiangm, 2020) and Journal Of Applied Communication Research (Stanly, *et al.*, 2019). The 2 articles published in Library and Information Science subject domain emerged from Johnson, Andrew and Allard (2001), focusing on cancer genetic information. Other subject area includes medicine, computer science, and psychology among others. The analysis revealed that the rate of CMIS publications was extremely low between 1996 and year 2000, because no record of articles that applied CMIS was published by authors from African region or South Africa till date, revealing a knowledge gap in the literature addressing applications of CMIS to HBV and HCV patients information needs and seeking behaviour. The trends of publications between 1993 and 2020 reveals that there is a gap in CMIS research output between 1993 and 2013. Although the progress was very slow between 2014 and 2019, the year 2020 witnessed an increase in research outputs. The trend indicated that there is a need for more contributions of CMIS articles from authors not only from African continent, but also authors from Southern Africa origin. More articles applying CMIS is also expected from LIS subject domain. Figure 3a illustrate the trend of articles published between 1993 to 2020.

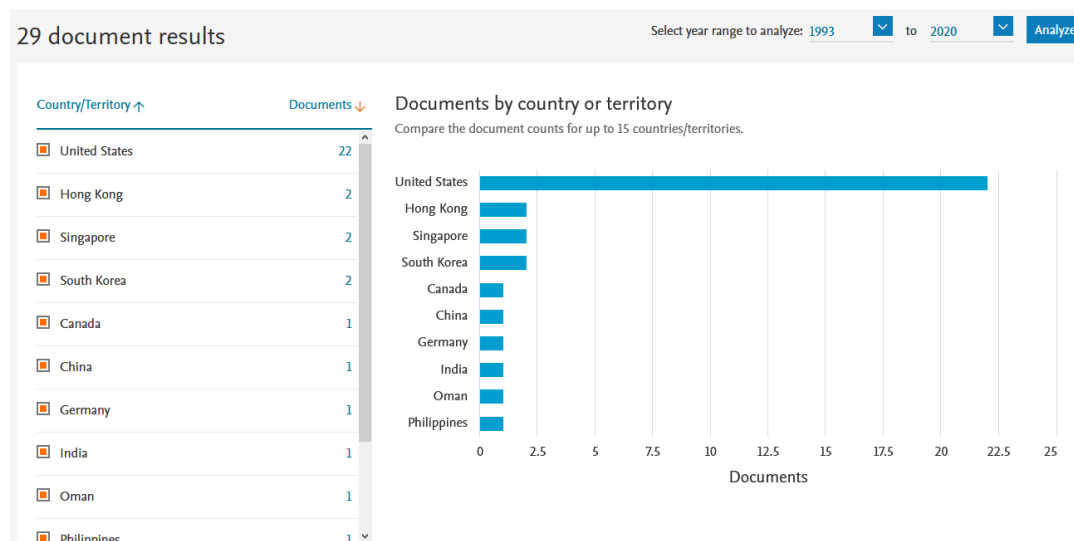
Fig. 3 a. Trends of CMIS articles written between 1993 to 2020



Source: generated by researcher using Scopus Database

Documents by countries of origin: Out of 29 documents produced in Scopus database, 22(75.86) were published by authors from USA, while the remaining 7 documents were produced by authors from other European and Asian countries. On the other hand, among the included articles for the scoping review, majority of the articles were published by authors from USA with 10(58.8%), while the other 7 articles were published in countries like Singapore (2), Hong-Kong (2), and South Korea (2). Surprisingly, country like Canada managed to publish only one CMIS article. Perhaps these countries have not discovered the immense values and contributions of CMIS variables in information behaviour studies. Consequently, no article applying CMIS were produced in African contexts nor from South Africa was reported. One may wonder if lack of awareness might be responsible for the low turnout of research output featuring CMIS variables in African continent.

Fig.3 b. Articles written on CMIS applications by countries between 1993 and 2020



Source: generated by researcher from Scopus Database

Methods of data collections applied: The result further indicated that the majority of the reviewed studies used cross sectional data from Hints, using stratified random sampling and a self-administered questionnaire, survey by telephone, emails with 13(68.42%), Structural equation modelling 5(26.31%), focus group interview 1(5.26%), and mixed methods 1(5.26%) as method of data collection tools. The high rate of use of survey method by researchers might be due to the fact that the methods was very popular and the high number of quantitative data can be generalised in a study.

Study participants: The majority of the studies that applied CMIS variables used cancer patients as participants, with 6(31.58%) out of 19 articles reviewed. Other articles included used diabetic patients 1 (5.26%), cigarette smokers 1 (5.26%), online health information users 1 (5.26%), domestic workers 1 (5.26%), cancer patients, multiple sclerosis patients 1(5.26%), drug users 1(5.26%) and among others.

Variables of CMIS applied in the study contexts: Variables of CMIS used in the articles included in the scoping review were: antecedent factors 17 out of 19, information carrier factors were 13 out of 19. Other variables applied include; information seeking actions, salience and trustworthiness (Bernadas and Jiang 2019); health information scanning (Ruppel, 2016); interpersonal factors, patient-centred communication, social support and, self-efficacy (Sun & Jiang, (2020).

▪ ***What antecedent factors influences individuals information seeking in the previous studies that applied CMIS model?***

The result shows that CMIS antecedent variables include: demographic, direct experience, salience, and beliefs, with 17(89.5%) out of 19 studies included in the scoping review (Xiao, *et al.*, 2020; Bernadas & Jiang 2019; Paek *et al.*, 2017; Ruppel 2016; Hartoonian *et al.* 2014), followed by 13(68.42%) articles out of 19 included articles applied information carrier factors. The findings indicated that the antecedent factors applied by authors' influences information seeking behaviour of participants in majority of included articles. The commonest CMIS variables applied were demographic, direct experience, salience, and beliefs, with 17(89.5%) out of 19 studies included in the scoping review (Xiao, *et al.*, 2020; Bernadas & Jiang 2019; Paek *et al.*, 2017; Ruppel 2016;

Hartoonian *et al.* 2014), followed by 13(68.42%) articles out of 19 included articles applied information carrier factors. Study by (Paek, *et al.*, 2017) maintained that demographic, psychological antecedents and health literacy significantly predicted the degree to which people would perceive health programs to be useful.

▪ ***What information carrier factors influences sources of information used in the previous studies that applied CMIS?***

Findings revealed that the information carrier factors that influences sources of information used by participants in the reviewed studies comprises of “believes in efficacy” and “authoritative source” (Zhang, *et al.*, 2020); trust in the source of information, perceived usefulness and internal locus of control (Sheng and Simpson, 2015). Some information seekers considered “social determinants and disease prevention orientation” as the motivating factors behind eHealth information seeking (Featherstone, 2017; Hartoonian, *et al.*, 2014; Ginossar, 2016). Others include “health-related factors and proxy health information seeking intentions, as well as support intentions” (Reifegerste, *et al.*, 2020); as well as “interpersonal factors, patient-centered communication and social support” as factors influencing their use of information source (Sun & Jiang, 2020; Bansyat, *et al.* 2018). Table 3 illustrates the summary of articles included in the scoping review.

Table 3. The summary of CMIS articles included in the scoping review

No.	Authors and year of publication	Country	Methods/data collection tools	Study participants	Variables Applied	Findings
1.	Xiao, <i>et al.</i> , (2020).	USA	Cross-sectional data drawn from HINTS-FDA 2015, stratified random sampling, self-administered, questionnaire and Path analysis	3,738 cigarette smoking	Demographics, direct experience, salience, and beliefs, and utility of information.	Age, income, education, sexual orientation, beliefs, salience are significant predictors of perceived utility of information.
2.	Zhang, <i>et al.</i> , (2020)	Singapore	A pilot-tested online survey	60 diabetic patients	Health and information carriers	The most frequently used sources of health information were doctors/nurses, pamphlets/leaflets from hospitals/clinics.
3.	Reifegerste <i>et al.</i> 2020.	Germany	Structural equation modelling.	Individual health information seekers [N=607]	Health-related factors and proxy health information seeking intentions, as well as support intentions.	A modified CMIS helps to better meet surrogate seekers' needs for supporting patients.
4.	Sun, and Jiang, (2020).	China	Survey and Structural equation modelling.	965 eHealth users.	Interpersonal factors patient-centred communication, social support and, self-efficacy.	Incorporating interpersonal factors in health interventions may enhance the targets' self-efficacy in self-management and indirectly motivates eHealth behaviours.
5.	Bernadas and Jiang 2019.	Hong Kong	a survey	female foreign domestic workers [N=300]	Salience and trustworthiness	Salience and trustworthiness positively influenced utility.

6.	Basnyat, <i>et al.</i> 2018.	India	Structural equation modelling analysis.	Online health information users [N=990]	Antecedent factors, information-carrier factors, and their direct effects on online information seeking.	A significant relationship between length and frequency of media use and self-efficacy to engage in preventive behaviour to the information carrier utility.
7.	Van Stee, <i>et al.</i> 2018.	USA	A survey from the Health Information National Trends Survey 4 Cycle 4	Cancer patients [N=980]	Socio-economic status, beliefs, interest and utility.	Socio-economic status, beliefs, and interest predicted utility of online health information seeking. However, there was, a direct relationship between cancer worry and online cancer information seeking.
8.	Paek, <i>et al.</i> , 2017.	South Korea	Structural equation modelling with survey	1,020 adults health information TV users.	Demographic, psychological antecedents, health literate information carrier factors and utility.	Demographic, psychological antecedents and health literacy significantly predicted the degree to which people would perceive health TV programs to be useful.
9.	Featherstone, 2017.	USA	Survey/Questionnaire.	College student [N=.88]	CMIS; information seeking; career preparation	CMIS a good fit to the model, with Internet experience exerting the strongest influence on participants'.
10.	Ginossar, 2016	New Mexico	Survey methodology	Cancer patients [254]	eHealth information-seeking factors, information carrier factors.	Education, ethnicity, age, and prevention orientation made significant contributions to the model. Social determinants to health have a profound influence on eHealth CPI seeking.
11.	Ruppel, 2016.	Wisconsin, USA	Mail surveys.	Cancer patients 3,315 respondents.	Antecedents of demographics, Information-carrier factor, health information scanning.	Health-related factors were associated with the information-carrier factor of trust. Some of these associations differed between entertainment-oriented sources, information-oriented sources, and the Internet.
12.	Hartoonian, <i>et al.</i> 2014	USA	Survey. Structural equation modelling.	Cancer Survivors [N=459]	Health-related factors, information-carrier factors, and information-seeking behaviour.	The result shows the direct effects of direct experience, salience, and information-carrier characteristics on information-carrier utility.
13.	Pang, 2014	Singapore	Survey	339 Students	CMIS four antecedent factors and four	Age, experience salience and beliefs were significant and

					information sources.	have some direct influence on information seeking from mainstream media sources, personal networks, and healthcare professionals.
14.	Sweet, <i>et al.</i> , (2013).	Canada	Focus groups or telephone interviews	Multiple sclerosis patients [N=21].	Information-carrier factors, trust and beliefs	Participants had positive beliefs toward physical activity and a clear preference for a time when physical activity messages would be relevant.
15.	Delorme, <i>et al.</i> 2011.	USA	Mixed-methods: qualitative, quantitative	Adults drug information users [N=234]	Demographic and health-related characteristics	The result shows that influencing factors vary by information source types examined, suggesting that the model is more complex than predicted.
16.	Han, <i>et al.</i> 2010.	USA	Statistical analyses correlated pre-test survey.	Breast cancer patients [N=294]	Demographics, disease-related factors, and psychosocial factors.	Patterns of online cancer information seeking differed according to the patients' characteristics, among the less educated and low-income earners.
17.	Johnson, <i>et al.</i> , (2001).	USA	Literature review	Cancer patients' Genetic Information-Seeking Skills.	Information-seeking actions, demographics, experience, salience, and beliefs.	CMIS can be used as a framework for creating intervention strategies that information professionals can use to help coach people toward being more self-efficacious information seekers.
18.	Johnson, <i>et al.</i> , (1995)	USA	Questionnaire/survey	Governmental agencies employees [380].	Antecedents, factors, information Carrier Characteristics, and Information Seeking Actions.	The CMIS variables were supportive.
19.	Johnson and Meischke (1993)	Mid-Western City, USA.	Survey by telephone	366 adult women.	Demographics, direct experience, salience, and beliefs—information carrier factors—information carrier characteristics and utility.	The model resulted in an excellent fit to the data received.

Source: *Findings from databases by the researcher.*

▪ ***What are the implications of applying CMIS model to HBV and HCV patients information needs and seeking behaviour?***

The scoping review presents theoretical, practical, social and psychological implications for research and clinical practices (Reifegerste *et al.*, 2020:1; Van Stee, *et al.*, 2018:1583; Hartoonian *et al.* 2014; 1308; Johnson, *et al.*, 2001:335; Johnson & Meischke, 1993:343). Out of 19 articles reviewed, 10(52.63%) found out that CMIS variables of antecedents factors have influence on information seeking, while 9(47.37%) agreed that information carrier factors have influence on the utility of information sources, and as well could be used as an excellent fit model for a theoretical framework for any studies (Johnson & Meischke, 1993:343. Reifegerste *et al.*, (2020:1) pointed out that “apart from being a good fit model for human and health information seeking in various contexts, CMIS can be improved or modified to measure support needs” especially in the area of health education and special intervention in a digital era. Fetherston, *et al.* (2017:1) believes that CMIS have theoretical implications and can also be applied beyond health information seeking. Bernadas and Jiang (2019) study suggested that CMIS have “theoretical and programmatic implications for communication and technology” regarding positive health behaviours among information users. Paek, *et al.*, (2017:526) argued for theoretical implications, although, further conceptual and operational refinement of CMIS was suggested. For practical implications, this scoping review demonstrated how characteristics and utility factors have been able to influence and predict people's intention to view health information programs through media and other viable sources. CMIS variables have been stressed as a piece of viable health information seeking model that can contribute to the literature in health information seeking behaviour globally, in the African context and specifically reducing information gaps identified in this scoping review.

DISCUSSIONS

This scoping review sought to ascertain the suitability of CMIS to HBV and HCV patients information needs and seeking behaviour, the trend of use to inform the future applications of the model. This review identified knowledge gaps in the literature addressing applications of CMIS to HBV and HCV patients information needs and seeking behaviour between 1993 to 2020. Findings were revealed in the aspects of huge scarcity of African researchers using CMIS model in various context, limited number of CMIS articles produced in LIS source and the subject domain, and limited applications of mixed methods approach for investigations in CMIS written articles.

It is noteworthy that the prevalence of HBV and HCV reported worldwide in various contexts, countries, regions and by authors from different subject background also noted challenges with information use (Hoffmann, *et al.* 2012:10). An example is a study that reported the slow response to HBV and HCV intervention, blamed it on the paucity of robust data and information showing the awareness of the epidemic of HBV and HCV (Hecht, *et al.*, 2018). To address the epidemic situation, it is important that the pattern of information seeking of individual patients and healthcare providers be investigated to understand how best to proffer solutions or find strategies for elimination. To achieve the goal of this study, a model-based approach was recommended to address the information-seeking pattern of patients, information sources previously used and factors influencing the information seeking as well as the outcome of information seeking (Scheibe *et al.*, 2019). Even though CMIS has been applied to other areas of study, the applications to HBV and HCV patients' information seeking in the South African context was non-existing.

Other findings revealed scarcity of African researchers exploring CMIS model in various contexts. This indicates that African researchers need to consider the use of CMIS in other

study contexts to improve the research outputs. An example is figure 2b showing that USA produced CMIS documents with 10(58.8%), while the other 7 articles were published in countries like Singapore (2), Hong-Kong (2), South Korea (2). No evidence of CMIS document emerged from the African continent including South Africa. A similar gap was revealed due to the limited number of CMIS produced in LIS source and the subject domain. The scoping review found out that the percentage of research output applying CMIS was very low specifically in the LIS subject domain. The search result shows that only 2 CMIS articles published was found in Library and Information Science Source from 1993 till date. One article published in LIS subject domain (Pang, 2016) and the other was published in Journal of Medical Internet Research (Ginossar, 2016), one article was identified in Scopus but published in Journal of Library and Information Science Research by Johnson, *et al.*, (2001). It is very important that African researchers and information science researchers wake up and embrace the use of CMIS model, explores the variables to develop further studies especially in the African continent. A brief look at the methodological applications of CMIS in related studies shows that majority of the reviewed articles followed positivists pattern of enquiry with 13(68.42%) out of 19 articles, used quantitative method for investigations using survey instruments for data collections. This outcome might not be a surprise given that a public health researcher such as Kaur (2016:93) claimed that “public health has followed largely a positivist approach based on epidemiological nature”. More so, the “positivists’ researchers believes in numerical fact and knowledge that is derived from the verified data through the empirical evidence” (Comte, 2014). Primarily in public health and social science research, numerical data are used to determine the magnitude of health or epidemiological problems such as HBV and HCV (Anderson, 2013). The findings shows that structural equation modelling was also used with 5(26.31%) of the CMIS articles, and focus group interview with just 1(5.26%), as well as only 1(5.26%) mixed methods approach applied. Mixed methods approach may not be a popular approach among the health and social science research or in an epidemiological research.

Despite criticisms from previous studies, findings indicated that the majority of included articles found out that antecedent factors of CMIS influence information-seeking behaviour of participants, followed by information carrier factors to determine information-seeking actions. It was also revealed that the antecedent factors appeared to be more prominent than information carrier factors. Perhaps the researchers found the demographic data highly important in health or epidemiological and social research such as HBV and HCV. Antecedent factors in the health and social science research help to provide basic and important information of the participants in a study. Surprisingly, articles applying CMIS focus more attention on the antecedent aspects of the model more than the information carrier and information-seeking aspects of the model. Perhaps the researchers considered the antecedent factors (socioeconomic status, beliefs) more important to the context of their study than the information carrier factors (Van Stee, *et al.*, 2018:1583), while the interest of users was more influential in predicting the utility of online health information seeking. Ruppel (2016) believes that “health-related factors were associated with the information-carrier factor of trust because some of these associations differed in the rate of influence between entertainment-oriented sources, information-oriented sources, and the Internet”. Regarding methods data collections, it was revealed that the majority of CMIS articles applied the use of survey methods for data collections while researchers using mixed-methods were very limited and hardly used (Delorme, *et al.* 2011). It is hoped that future CMIS researcher will consider the use of CMIS to further studies. This scoping review considered applications of CMIS relevant

to HBV and HCV patients' information as well as improving the model in the aspects of counselling and education, access to patients' information, patients' information needs and policies guiding the use of patients' information. This study completes the gap in the literature by addressing the theoretical framework of HBV and HCV patients' information-seeking behaviour in the South African context.

CONCLUSION

The applications of CMIS emerged ever since 1993 and have been able to influence information seeking in various contexts. This scoping review reveals that understanding HBV and HCV patients' information-seeking pattern by the healthcare providers, policymakers and researchers are very important to figure out the best methods of information provision and effective communication methods for the patients and the general public. Given the low research outputs in articles applying CMIS variables especially in the LIS subject domain, and in the African setting, CMIS is still very relevant in informing future applications to studies. The trend of use of CMIS has provided insight into future applications to studies. Based on the findings from the scoping review, the trend of use of CMIS between 1993 and 2013 was very low, and specifically, the rate of outputs by researchers was very poor between 1996 and year 2000. However, the outputs gained momentum and witnessed some improvement in the year 2020 with four documents produced in 2020 alone. Based on the increase in the number of articles produced between 2014 (2 articles each year) and 2020 (4 articles), it is envisaged that 2021 might witness a tremendous increase in CMIS research outputs. The prospects were evidenced in the fact that there is a possibility for of more documents applying CMIS in a wider application to various subjects and specialisation, geographical distributions, countries and regions because CMIS variables are still relevant.

Given the non-participation of researchers in African regions especially in the South African context, African researchers need to contribute immensely towards the development and expansion on CMIS model. Regarding the low level of applications of mixed-methods in the methodological applications, it considered important that researchers intensify the use of mixed-methods to gain a deep understanding of the context of the study. This is because the ideas of positivists and interpretivism have important values to contribute to research development for generalization. The implications regarding the clinical practices, methodological and theoretical applications of CMIS to health information seeking can be effectively utilised to guide future studies in other contexts. This study contributes to literature assisting public health specialists, researchers, and the general public to comprehend and manage effective information and communication between doctors and patients, as well as doctors and nurses in the health facilities. The researcher envisaged that this literature will assist in the reduction or the spread of HBV and HCV diseases globally including South Africa. It is hoped that HBV and HCV patients, librarians and other social science researchers, finds it imperative to bridge the information gap as identified in this study, especially in the occurrence of an epidemic outbreak in South African context (WHO, 2020; Boyer, *et al.* 2013:41). Further studies may explore other scientific databases relevant to the role of librarians and healthcare providers in the provision and use of HBV and HCV patients information to enhance patients information-seeking access and use.

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