

Taking action to improve health literacy in Colombia: knowledge transfer and Information and Communication Technologies Platform as health system responses

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Abstract

Although health literacy has become a significant area of research and expanded in scope and depth, we still have much to learn about the pathways we might use to increase health literacy. World Health Organization (WHO) has redefined health literacy as “the personal characteristics and social resources needed for individuals and communities to access, understand, appraise and use information services to make decisions about health”. Low health literacy is associated with poor engagement with health services, and poor self-management and control of illness, including increases mortality, high rates of hospital admissions and use of emergency care. Several tools have been published to help to identify individual health literacy needs, and meeting these needs in particular subgroups using specific health system responses. Our study aimed to demonstrate how Information and Communication Technology Platforms and knowledge transfer address low health literacy among population as the topic for the study. Moreover, this article provides tentative evidence for middle-income country in Latin American and the Caribbean region (LAC). The paper is organized as follows. First, we provide a brief background of health literacy. Then, we explain the associations between low health literacy and poor health. In the methodology and data collection section, we described the five general steps we followed to perform knowledge transfer processes and Information and Communication Technology Platform used. Finally, we demonstrated the findings through two health literacy indicators, discussed results and posed remaining challenges regarding the pathways we might use to increase health literacy, as well as the critical issue on what should be ideal measurement to health literacy.

Key Words: health literacy, health communication, health system responses, knowledge transfer, Health Information System HIS, eHealth

Health literacy

The growing health literacy calls attention to the ways in which health systems have begun to promote

productive interactions between patients and providers, and reorganizing health care delivery through optimising health literacy and access information services, with the

goal to achieve better health for all. Although health literacy has become a significant area of research and expanded in scope and depth, the definition itself has been problematic from a number of perspectives, it has come to mean different things to various audiences and researchers, as well as a source of debate, because there is currently no consensus about the definition. One of the most commonly definitions is

“health literacy is the degree to which individuals have the capacity to obtain – or the ability to get the health information they need-, process, and understand basic health information, and services needed to make appropriate health decisions” (Brach et al., 2012; Paasche, et al., 2006; US National Library of Medicine, 2015).

Other evidence have argued that health literacy is the knowledge, motivation and competencies of a consumer to access, understand, appraise and apply health information to make effective decisions about health and health care and take appropriate action (Sørensen et al., 2013; Australian Commission on Safety and Quality in Health Care, 2013).

Others researchers suggest that if health literacy was traditionally conceptualised at individual level, then depends of the knowledge, motivation and competencies of a patient or consumer (Paasche-Orlow et al., 2006; Greenhalgh, 2015; Baker, 2006; Kripalani & Weiss, 2006; Australian Commission on Safety and Quality in Health Care, 2013). It is also needed to mention health literacy environment, due also depends of the complexities of the health system itself. It means the infrastructure, policies, processes, materials and relationships that exist within the health system that make it easier or more difficult for consumers to navigate, understand and use health information and services to make effective decisions about health and health care and take appropriate action (Rudd, 2013; Groene & Rudd, 2011; Brach et al., 2012; Brach et al., 2012; Parker, 2009; Rudd, 2003; Sanders et al., 2009; Sarkar et al., 2008; Sarkar et al., 2011; Sudore & Schillinger, 2009).

In addition, wider definitions also have been established as suggested by the articles by Greenhalgh (Greenhalgh, 2015), Sørensen and colleagues (Sørensen et al., 2012) and Sallis and colleagues (Sallis, Owen & Fisher, 2008): a new generation of research into health literacy places assessment of individual literacy and numeracy within a broader public health model that emphasizes the complex interdependencies between health understanding, health attitudes and behaviours, Social Determinants of Health (SDH) (such as income,

education, material environment, and gender) in the design and delivery of health services.

As a result, some research on health literacy published from 2006 in special issues have concluded for instance, that health literacy is a complicated construct that depends on individual capacity to communicate and the demands posed by society and health system (Baker, 2006; Kripalani & Weiss, 2006; (Paasche-Orlow et al., 2006). Thus, most recently, with the purpose to address this problem World Health Organization (WHO) has redefined health literacy as “*the personal characteristics and social resources needed for individuals and communities to access, understand, appraise and use information services to make decisions about health*” (World Health Organization, 2015).

Association between low health literacy and poorer health

Based on the Global Burden of Disease Study (GBD), published in The Lancet in 2014 (The Lancet, 2014) around 95% of the world's population has health problems. According to the American Medical Association report (American Medical Association, 2007) “*Health Literacy and Patient Safety: Help Patients Understand*” a poor health literacy is a stronger predictor of a person's health than age, income, employment status, poverty and race are. Researchers have theorized that low health literacy is associated with poor engagement with health services and poorer self management of illness and control of chronic conditions (e.g. contributes to poor medications adherence and concordance in prescription of medicines); including increases mortality, high rates of hospital admissions and use of emergency care (Aboumatar et al., 2013; Bostock & Steptoe, 2012; Greenhalgh, 2015; Sudore & Schillinger, 2009; Al Sayah et al., 2013; Lindquist et al., 2012).

Similarly, patients with low health literacy may have less familiarity with medical concepts and vocabulary (Kripalani & Weiss, 2006), thus may experience serious medical error, and need to know how to self-manage their conditions, and take their medicines safely. In fact, families that experience low health literacy may experience worse preventive care and health outcomes for their children; for instance, in any cases parents and relatives misunderstand the importance of immunization programs, nutritional health, early detection, cancer, asthma, diabetes (Brach et al., 2012; Sarkar et al., 2011; Sudore & Schillinger, 2009).

Even, low health literacy is critical when affects the access to information and determines the health information and services misuse. For instance, frequently patients have difficulty processing, understand and using health information, such as monitoring health

indicators reports, health analysis situations and access channels of health information and services.

However, as Greenhalgh (Greenhalgh, 2015) suggests low individual health literacy and health literacy environment is more common in low income and minority ethnic groups, immigrants, refugees, people without full citizenship, those with fewer years of education, and older people; it is especially common in people who fall into several of these risk groups.

Most importantly, and at health global level, low health literacy may jeopardize the achieving the Sustainable Development Goals SDG, and the way how health systems facing effectively emerging threats such as ébola, zika, climate change, aging population and those from widening socioeconomic inequalities in health, and economic burden of non-communicable diseases, increasing health care expenditure, inappropriate use of medicines, and the health corruption.

Considering the many ways in which health literacy influences patient care, health outcomes, and global development, as well as be another important pathway to reducing health inequalities through a variety of mechanisms, and it still remains one important question on what health system responses can be carried out to address low health literacy.

Health literacy responsiveness

Accordingly, WHO is exhorting countries to assess and develop their own health literacy responsiveness defined as *"the way in which services, environments and products make health information and support available and accessible to people with different health literacy strengths and limitations"* (World Health Organization, 2015). Thus, several National Action Policies to Improve Health Literacy (such as specific eHealth solutions or health promotion using information services) are available in countries such as Australia, Denmark, Norway, Sweden, and the United States.

Thus, addressing these issues will require a shift in health priorities around the world, not just to keep people alive into life course, but also for instance to keep them healthy, properly well informed especially on SDH. In addition, they should be equipped with skills allowing them to better understand, and to act on that knowledge in order to maintain good health. This implies that the health system should develop, and guarantee the tools needed to improve health literacy and health-related communication skills. Landry (2015) mentioned that in an age of social media, web-based information, and material available literally in an instant, it is crucial for clinicians, nurses, researchers, policy-makers, stake holders, patients, relatives and caregivers use and proactively share their knowledge regarding how to

access, to find credible data sources, and consume online health information and services.

Baker (2006) argued that if we understand the fact that health literacy is determined by characteristics of an individual and that individual's environment (i.e., health care settings, health data sources, and information services) it is easier to define actions to improve it. From this perspective, knowledge transfer and information and communication technologies platforms play an important role to address low health literacy among subgroups of population.

Several responsiveness tools have been published to help to identify individual health literacy needs, and meeting these needs in particular subgroups using specific responses in high income countries (World Health Organization, 2015; American Medical Association AMA, 2007; Baker, 2006; Brach et al., 2012; Institute of Medicine IOM, 2003; Landry, 2015; Center for Disease Control and Prevention CDC, 2015; Kripalani & Weiss 2006; Rudd, 2003; Sudore & Schillinger, 2009). However, it still has much to learn about the pathways and health-wide responses in middle income countries, in which evidence also is limited.

Health literacy and communication in Colombia

In Colombia (World Bank WB, 2014), in 2011 the rate of literacy (individuals aged 15 and over who can read and write) was around 94%. Despite health literacy has been established as a national priority, there is not evidence on health literacy levels among specific patients or subgroups of population. Since 2012, the country has proposed the strengthening of Knowledge Transfer (KT) as well as the Information and Communication Technologies Platforms in health sector, through i) characterization and improvement of the sources of health information (i.e. e-health solutions), ii) standardization of health information and services, iii) Generation of evidence and analytical strategies (such national health observatories); and iv) data dissemination and transfer through enquiry channels.

For instance, the establishment of national health observatories aims to improve the availability, access, use, and understanding of health information in the national and subnational level. These observatories for monitoring health outcomes and health inequalities expect not only supporting, and guiding the health policies in the country, but also in developing cognitive and social skills, and the end-user's capacities to use them effectively health information and take care of their health.

The hypothesis

The question is what health system responses can be carried out to address low health literacy in a middle-income setting country? We hypothesized that development of Information and Communication Technology Platforms and the implementation of a knowledge transfer-oriented approach may promote meaningful improvements of health literacy of population.

General objective

Based on the above discussion, our study aimed to demonstrate how Information and Communication Technology Platforms and implementation of knowledge transfer approach can address low health literacy among population as the topic for the study. Thus, in our study are described the health system responses that may increase meaningfully health literacy and communication. Moreover, this article provides tentative evidence for middle-income country in Latin American and the Caribbean region (LAC). The paper is organized as follows. First, we just provide a brief background of health literacy (definitions and literature about previous published studies). Then, we explain the associations between low health literacy and poorer health. In the methodology and data collection section, we described the setting and the 5 general steps we followed to perform knowledge transfer processes. Finally, we demonstrated the findings on two health literacy indicators, discussed results and posed remaining challenges to address low health literacy.

Methodology and data collection

This study was conducted with the coordination and support of the Knowledge Transfer and Health Information Group of the Ministry of Health and Social Protection. The data used for this study originate from the Digital Institutional Repository (In Spanish Repositorio Institucional Digital RID) a public Information and Communication Technology Platform provided for Ministry of Health and Social Protection in Colombia since 2013. In order to unify concepts, the first step was to adopt the definitions widely recommended by

international agencies. In that case, health literacy and knowledge transfer were adopted from those promoted by the CDC and WHO respectively, and required to advance health system responses aligned in that direction.

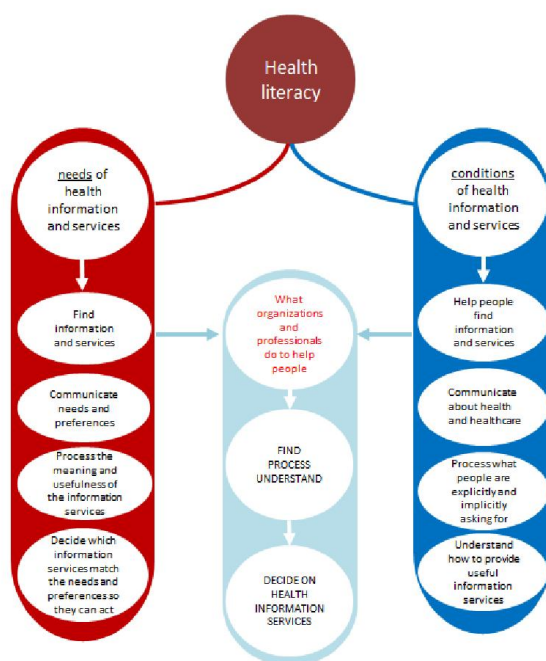
Second, we identified knowledge transfer approach to address low health literacy among population adopted by Ministry of Health and Social Protection according WHO framework. It involved 5 steps: 1) data preparation and management and improvement of health data sources; 2) standardization of health information services, and access channels; 3) management of evidence; 4) evidence dissemination, and 5) priority settings. This information was publicly available in the RID. Indeed, some of the methods outlined in this article have been used in the Australia, Sweden, Norway and Canada's health literacy training program. Finally, the data on queries and indicators on end-users using health information and services provided through Information and Communication Technology Platform was provided by Ministry of Health and Social Protection of Colombia.

Health Literate Settings

Based on WHO's health literacy redefinition (World Health Organization, 2015) in 2015, CDC (Center for Disease Control and Prevention, 2015) published the specific needs of health information and services, as well as the conditions to be met by anyone who provides health information and services to others, such as doctors, nurses, dentists, pharmacists, or public health workers, patients, and communities to foster the development of health literacy skills, namely: 1) needs of health information and services, 2) conditions of health information and services, and 3) what organizations, and end-users can do to help.

In summary, four needs of a comprehensive approach to improve health literacy were presented by CDC; we refer to them as "needs" of a comprehensive approach rather than "conditions" because they are not mutually exclusive. Figure 1 shows specific needs, and conditions to improve Health Literacy.

Figure 1 Needs and conditions to improve Health Literacy



(Source of data: Adapted from CDC Learn How to Improve Health Literacy in Health Organizations, 2015)

In short, health literacy requires transferring information using the best tools for communication, and best equipped channels in the health information system, considering end-users adequately. As Branch and colleagues (Brach et al., 2012) argued before, it is important to mention that both the needs and conditions apply as health literacy environment, it means what organizations and professionals can do to remove health literacy barriers to help people: find, process, understand, and decide on health information and services.

Knowledge transfer

While we may be moving closer toward address effectively health literacy, WHO strongly recommends the integration of Knowledge Transfer (KT) to achieve this goal. KT has defined as *“the synthesis, exchange and application of knowledge by all involved so as to enhance the benefits of global and local innovation with the purpose of strengthening health systems and improving people’s health”* (World Health Organization, 2005). Based on this, Colombia endorsed this definition, and has progressively integrated it to all those activities that promote knowledge sharing and learning experiences, for instance across national health observatories.

Thereby, there significant three elements are basically involved in knowledge transfer: i) the health information sources, ii) the end-user, and iii) the communication channel connecting the information source and the end-user. At the same time, these three elements interact in five knowledge transfer processes (steps):

- 1) Data preparation and management and improvement of health data sources;
- 2) Standardization of health information services;
- 3) Generation of evidence;
- 4) Ensuring the use, dissemination, spreading and transfer of research and evidence in health system settings, policy decision making through enquiry channels; and
- 5) Long-term knowledge management regulation and priority settings.

It is important to note that integration of these KT elements and processes will ensure and address poor health literacy and improving of health literacy levels among end-users and specific health risk subgroups.

Step 1. Characterization and improvement of the sources of health information

Accurate and timely health data are the foundations to improving health population. Unreliable information to set priorities and measure results, health systems may be working in the dark. Therefore, a source of information which compiles and supplies relevant, reliable and appropriate data, statistics and indicators for health decision making needs to be assessed, and improved before it is made available (Ministerio de Salud y Protección Social de Colombia, 2014). The first knowledge transfer process is regarding the selection process to characterize the sources of information, what implies identify the role each of them plays in providing input to meet the information demands. These demands come from a variety of actors and end-users within and outside of the health system (health care providers, national health observatories, regulatory and control institutions, local health governments, patients, relatives and caregivers, international agencies).

To address this, Colombia has defined the guidelines, strategies, methods, and tools of the Information and Communication Technologies Platform to adequately characterize the sources of health information by means of a characterization guide that considers the flow of information, the quality, appropriateness, and coverage of the data, with the aim to identify difficulties that need to be overcome. This has allowed that System of Information for Social Protection (in Spanish SISPRO) improves each of the sources of information in accordance with their specific circumstances, goals, and specific needs of end-user before they are published openly.

Step 2. Standards of health information and services

Data are symbolic (numerical, alphabetic or algorithmical) representations of an attribute or variable. Data become information only by means of meaningful acquisition, analysis, and constant use of the data. This allows that users know, compare, explore and make decisions on the basis of this quality information (Estupiñán-Galindo, AC; et al. 2014). This process ensures availability and delivery of a number of information outputs, mainly health indicators (such as mortality, morbidity, health care, disability shown in tables, graphics or maps), and data bases (presented in microdata or OLAP cubes) depending on the end-user's expertise level.

Thus, the development of this information output starts up with the information needs from several users. The identification of information

needs was initially based on defining the health indicators that must be regularly measured in the country. These include basic health indicators, health indicators for monitoring government goals and health indicators of chronic conditions (cancer, HIV, diabetes). Also, several meetings were held with technical staff, thematic experts and frequent users of the information with the purpose meet the needs of a variety of end-users and range of health topics.

Step 3. Generation of evidence

Knowledge transfer considers the strategies for evidence and research generation. Health analysis of the Colombian population is a permanent task of the Ministry of Health and Social Protection, whose major purpose is to reduce gaps in health-related knowledge, and to adjust policies to ensure general well-being and health for all (Ministerio de Salud y Protección Social de Colombia MSPS 2013c). This is a wide process that arises from the organization of population surveys until the establishment of national health observatories; both aimed bridging specific research gaps.

Population surveys are a secondary source of information on various interesting matters on public health, and make possible to characterize people's health as regards geographical, sociodemographic, epidemiological, and health-specific conditions; and to deepen into their determinants and risk factors. Other pathway however is carried out by the national health observatories (Spanish acronym ROSS). The ROSS provides evidence on monitoring health outcomes, measuring inequalities and explaining SDH that influence health status among socioeconomic groups. The main purpose of the ROSS is to increase efficiently evidence, and reduce research gaps. Figure 1 show 32 national health observatories which are organized according to the dimensions set by the National Health Policy PDSP 2012-2021, making easier to identify health topics by end-users.

Step 4. Data dissemination and transfer through enquiry channels

The challenges posed by the process supported by Digital Institutional Repository (In Spanish RID) as a strategy towards health-related knowledge availability and access, is one out of information and communication technologies platforms that allows ideal measurement of health literacy (Palacios-Torres, PM; et al. 2014). Based on the inter-operationability framework of the Government-On-Line strategy (GEL), RID is the open-access system of the Ministry of Health and Social

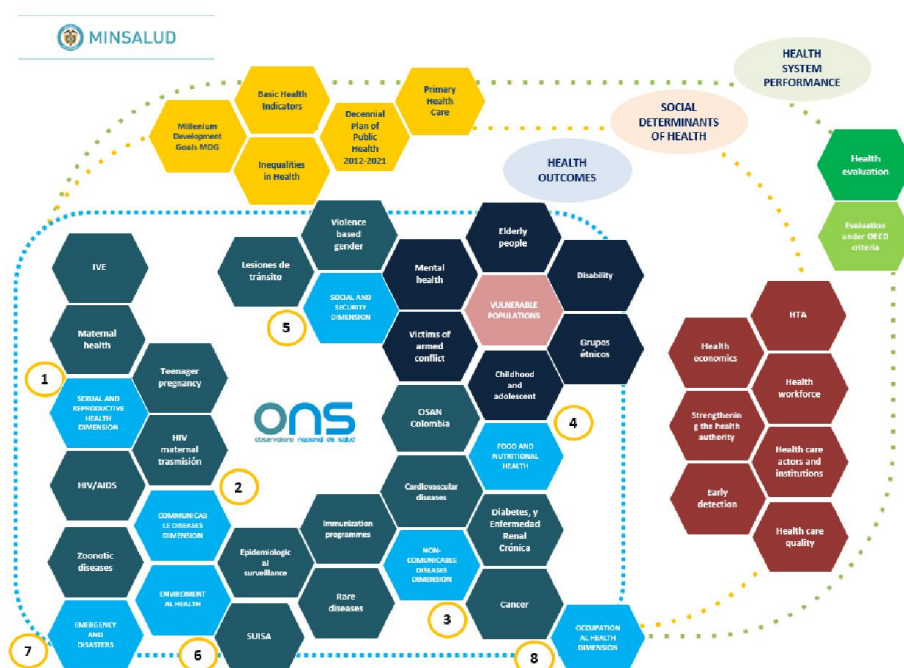
Protection which compiles, stores, preserves, and disseminates health-related documents, and information according needs and conditions of end-users.

Step 5. Long-term regulation and priorities

Finally, health literacy has been identified as a priority area for national action. First, by the Ministry of Health and Social Protection as an objective for the 2012-2021 Decennial Public Health Plan (Ministerio de Salud y Protección Social de

Colombia MSPS 2013a), by ensuring access to health data, and indicators to monitor progress during the next decade at local, institutional and national-levels. Second, a national resolution (Ministerio de Salud y Protección Social de Colombia MSPS 2013b) was launched in 2014 with the aim to support health literacy fostering the use and communication of the national health observatories, as well as recognizes the importance to improve governance in health information systems within health system.

Figure 2 National Health Observatories in Colombia



(Source: Ministry of Health and Social Protection, Knowledge Transfer Unit, Colombia, 2015).

Results and discussion

The main barriers to overcome in improving health literacy may be definitely the insufficient number of ways or channels to access health information. Secondly, the way and language in which the information is mostly published through these channels are not user-friendly. Therefore, it was important to tackle these issues in a systemic and organized way. Colombia has addressed this situation improving Information and Communication Technology Platform under a knowledge transfer approach. As a result, health data, indicators,

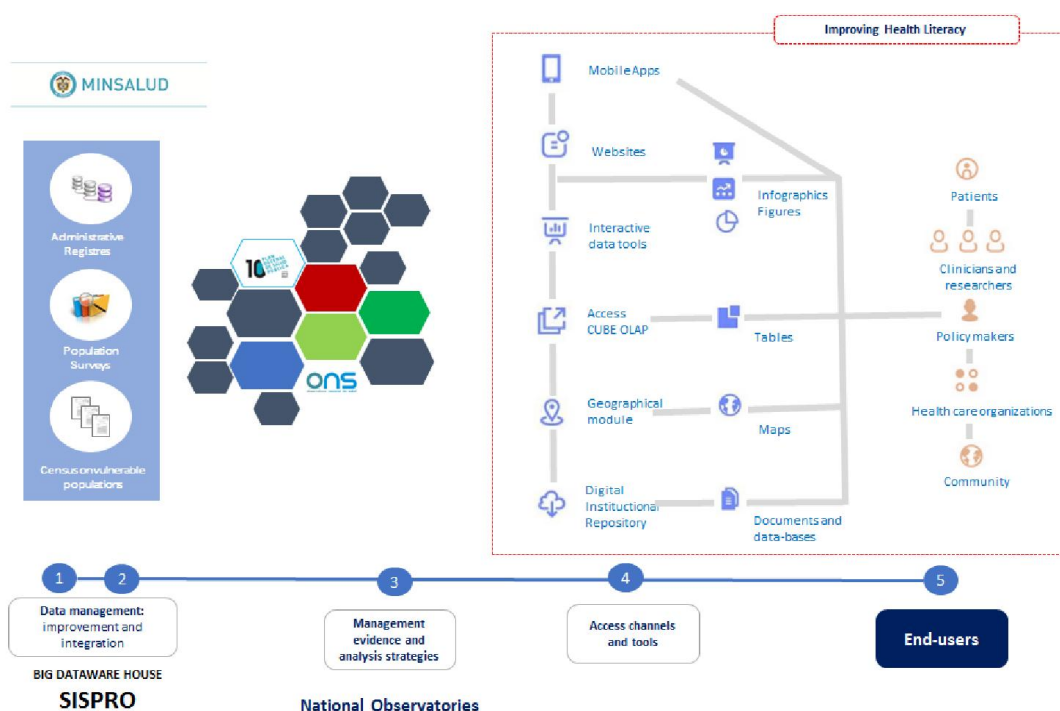
evidence has been provided using a multiple access channels that meet need's end-users. For instance: mobile apps, websites national health observatories, interactive data tools, access to Cubes and dynamic tables in OLAP, geographical module and Digital Institutional Repository (RID). Simultaneously, these channels are used to create and manage visualizations by means of graphic reports, dynamic tables and health indicator maps. This kind of outputs stimulates information synthesis in end-users. Different kinds of users will always show different levels of understanding, technical knowledge and

background. Figure 3 show the access channels and visualizations tools availables in health information system in Colombia.

Just as important, RID has been an effective channel for the users to retrieve information by means of filters on the basis of the nature of data required (clinical guide, methodological guide, norms, documents, reports, surveys, and file format – xls data base or pdf documents in any specif topic of health). Several indicators have been developed based on the use of Information and Communication Technology Platform. However, two indicators we choose related to health literacy, one indicator were related to the

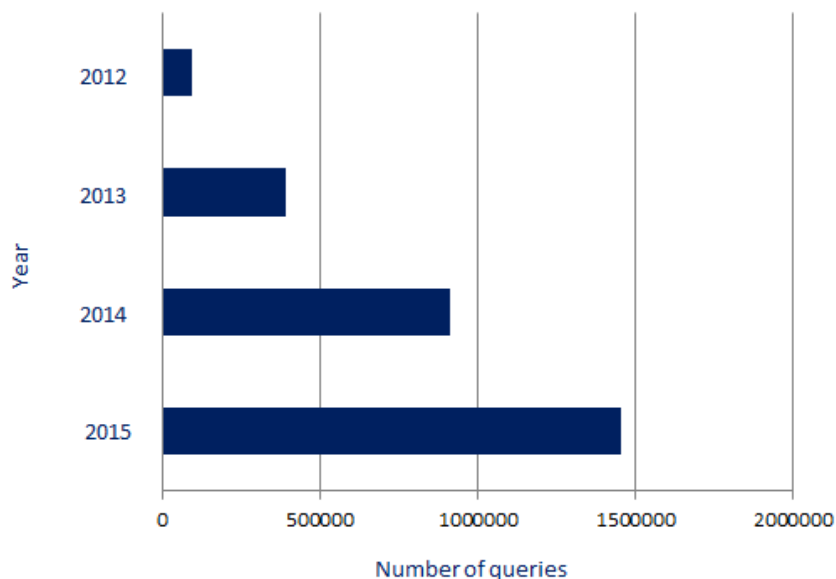
frequency and patterns of visits: Number of queries using Information and Communication Technology Platform (services available on SISPRO) in Colombia: self-consultations 2012-2015, and one indicator were related to Number of queries using Digital Institutional Repository (RID) 2014-2015. Figure 4 and Figure 5 shown how has been singnificant increasing the number of queries in two specific channels provided by Information and Communication Technology, and which may be useful as measure health literacy.

Figure 3 Access channels and visualization tools availables in health information system in Colombia



(Source: Ministry of Health and Social Protection, Knowledge Translation Unit, Colombia, 2015).

Figure 4 Number of queries using Information and Communication Technology Platform (services available on SISPRO) in Colombia: self-consultations 2012-2015

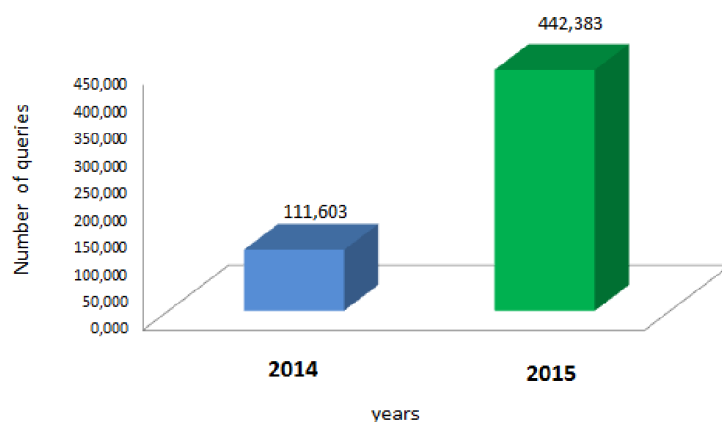


(Source: Ministry of Health and Social Protection, Information and Communication Technologies Office, Colombia, 2015).

The evolution of queries from end-users using Information and Communication Technology Platform (services available on SISPRO) in Colombia: self-consultations 2012-2015 has been increasing progressively in the country from 2012. The number of

queries through Digital Institutional Repository (RID) in 2015 is almost three times more than number of queries reported in 2012. RID is currently the simplest and most appropriate access channel to entire health information in the country.

Figure 5 Number of queries using Digital Institutional Repository (RID) 2014-2015



(Source: Ministry of Health and Social Protection, Information and Communication Technologies Platform RID, Colombia, 2016).

Likewise, these queries disaggregated by two available years shown has significantly increased by end-users. Mostly of these queries for instance frequently they are looking for better knowledge in order to maintain good health, to prevent health risks, monitoring trends in health outcomes (especially chronic diseases), issues related health equity and SDH, and ultimately some are interested on universal health coverage. Unfortunately, it is not possible to obtain this information by the type of user who performed in order to measure health literacy among health risk populations, and then contrast them with prevalence, use of services and even mortality indicators.

These channels are increasingly influencing the public's awareness of health issues, redefining needs of end users, shaping consumers's expectations of health and their demands on the health care systems, and narrowing public opinion regarding. As Pasche and colleagues (Paasche-Orlow et al. 2006) suggested above, instituting such changes could improve the quality of care not only for patients with limited literacy, but for all health care consumers, and could contribute to the development of a more health literate society.

In other hand, it also has helped to increase accountability of health care providers, researchers, patients, and their relatives. It is clearly strengthened health information and services build leadership capacities within the health system became a key strategy and priority for health promotion. However, the availability and dissemination of these processes have made an impact, as they are now able to:

- To access and use health information and services.
- To increase the interest and understanding about the political agenda on health issues: SDH, health inequalities, universal health coverage.
- To create greater empowerment for measuring and monitoring health indicators.

- To develop greater understanding of analytical methods and approaches in health.
- To become involved in dialogues and forums between users, researchers and decision-makers, thus increasing critical thinking.
- To increase knowledge transfer from the perspective of each end-user.

It is important to mention, the resulting documents (handbook, technical documents, policy briefs, health information and services summary, and others) have been produced in Spanish only so far and are available on RID: <http://www.minsalud.gov.co/sites/rid>.

Conclusions and recommendations

This is a good start on the research agenda in the field in Colombia, but more than research is needed. Despite, that some progress has been made encourage large-scale health literacy at different levels and according to the needs of end-users (especially patients, health care providers and policy-makers), greater attention to health literacy is still needed in medical education, undergraduate programs and up to dating of health workers for instance. Such changes could ameliorate not only the health effects of limited literacy, but improve the overall performance of health system. In addition, research in this field will be useful strengthening health information and services and knowledge transfer processes, and communication skills, thereby advancing one other national goals of health literacy: open and transparency data, and inclusive health information services. WHO's recommendations definitively call for much-needed health literacy research, but also more research on new instruments are needed, for instance that measure health literacy among subgroups and specific health risk populations. It is a critical issue, that we still have much to learn not only about the pathways we might use to increase health literacy, but also of the challenges and debate on what should be ideal measurement to health literacy.

Limitations of the study

Disaggregated data by types of users were not available at the time of the analysis (for instance patients, relatives, policy makers, health care providers, researchers and universities). We still have much to learn about pathways and new instruments that may affect low health literacy in particular in subpopulations and risk groups.

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Conflicts of interest.

None.

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