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Abstract

This research paper focuses on the Public Health Information Service model for the rural inhabitants of the Balasore district, which is one of the objectives of the study. This integrated strategic model is conceptualized and is based on the suitability of health information exchange to rural people. It considers the various parameters of the public and the medical libraries; and the health information stakeholders.

The model recommends the direct involvement of libraries in providing in-house and outhouse health information services to the public in a collaborative manner. This research paper presents an Integrated Public Health Services (IPHIS) model for rural people, which exemplifies in the form of Health Information Center (HIC), which would adopt some attributes, and create an environment that enables rural people to access and avail health information services. The model would provide a health information exchange (HIE) environment, which would imply the best possible ways of health information transfer to promote health among the rural inhabitants of the Balasore district of Odisha.

Keywords*: Public Health, Health Communication, Health Information Service, eHealth, mHealth.*

1.1 Introduction

Health information is a fundamental resource for the welfare of human beings. The speedy, accurate, and pinpointed health information retrieval at all levels of public health is essential. Thus, in turn, the rural people of the Balasore district of Odisha demands adequate, well-equipped, well-organized, and developed infrastructures for public health communication should be available in their area. Thus, the present study assessed and depicted a suitable Integrated Public Health Information Services model for the rural people of the Balasore district of Odisha. The proposed model should be considered an interactive network of Health Information Center (HIC), Public Health Centers (CHCs and PHCs), medical and public libraries in the district. The Health Information Center (HIC) would function as a Central Hub or Server.

The model would be a collaborative venture of the stakeholders of health knowledge, which would focus on the need for capacity building by increasing participatory health communication, ensuring reliable and tailored health information, equable access, and empowerment to it. Building collaborative health networks, adopting and implementing realistic goals to balance the digital health information divide.

1.2 Objectives

(i). To design the public and medical libraries' information system for disseminating health information.

(ii). To design and develop a strategic conceptual model of public health information service (PHIS) for rural inhabitants of the Balasore district of Odisha for health promotion.

1.3 Methodology

A survey was conducted with the help of a structured questionnaire developed to gather the information regarding public health communication infrastructures and services rendered from the medical officers of the Primary Health Center (PHC) or Community Health Center (CHC), doctors and health professionals of the district medical college; secondly, public health awareness among the rural inhabitants of the Balasore district of Odisha; and the librarians of the medical college and public libraries serving to the communities.

After analyzing the data from three sources of information such as medical officers, librarians of public and medical libraries, and rural people of the Balasore district of Odisha; a suitable public health information service model was developed by accessing the health information system architectures, health communication network, and rural inhabitant's approaches with the help of ***'Microsoft Visio'*** software package to disseminate public health information services for health promotion and quality healthcare delivery in rural areas in the district.

1.4 Results

Based on findings from three sources of information such as medical officers, librarians of public and medical libraries, and rural people of the Balasore district of Odisha, the overall findings of the present study can be generalized as follows:

i. There is a demand for health information from rural people in the Balasore district, of Odisha.
ii. PHCs have adequate human resources to provide public health information services to rural people.
iii. Lacks of modern equipment, skilled workforce, and public cooperation from the villages are some problems the medical officers face in providing health information services to rural people.
iv. Most medical officers believe that apart from television, wall posters, and personal talks by health workers or ASHA[1]; health information web portals and mobile health (mHealth) information services can be the best options for health information dissemination.
v. Rural people belong to higher-income groups, and literates are more conscious than the lower-income groups and illiterates regarding the impact of health information to sustain a healthy life.
vi. The majority of rural people are using smartphones and internet services.
vii. The majority of rural people use the Allopathy system of medicine for their treatment.
viii. There is no cooperation between the public and medical libraries regarding health information dissemination to rural people.

[1] Accredited Social Health Activist.

ix. Public libraries do not provide online library services for accessing e-resources and DDS[2] for healthcare personnel, multimedia services on healthcare due to the lack of computer and multimedia systems in the library.

x. Public libraries do not provide community information service portals to disseminate health information services to rural people.

xi. There is no public library available at the district's village council (Gram Panchayat) level.

xii. The situation demands an assessment of a suitable Public Health Information Service (PHIS) model to fulfill the health information requirement of the rural inhabitants of the Balasore district of Odisha.

1.5 Discussion

The public health information service model for rural inhabitants of the Balasore district of Odisha developed strategically and conceptually is discussed below.

1.5.1 The Integrated Public Health Information Service Model – The Proposed Model

The survey indicates that the rural inhabitants of the Balasore district preferred to access health information about the causes and symptoms, prevention, and cure of their diseases. The health information needs varied with the mode of therapy, preferred system of medicine, and belief. The rural people deliberately wanted to access the information on maternal and child health, nutrition, family planning, communicable and non-communicable diseases. They also wanted to access the health information regarding medical emergence situations like trauma, poisoning, and poisonous bite as well as the foremost healthcare cost. It depends on various factors such as current health conditions, healthcare infrastructure and facilities available in their area, financial health, sources of health information, and their social and cultural belief. People who have been newly diagnosed with a medical condition, most likely need health information about their condition so that they could make informed and appropriate health decisions.

[2] Document Delivery Service.

The various stakeholders in this model are required to establish multiplatform collaboration and affiliations by which they could participate in imparting health information service to rural inhabitants.

The following objectives were kept in mind for defining the collaborative model of public health information system:

- To transfer the healthcare knowledge to rural people.
- To facilitate public health communication in terms of healthcare needs in day-to-day life.
- Collaboration of the various stakeholders of health communication.
- To train the human resources needed in the areas concerning public health communication and health informatics, and
- To identify and implement the supportive and directed public health information services by the public and medical libraries in collaboration.
- To promote health consciousness and healthy habits and environment; and
- To support people in the cure and prevention of diseases and ensure immediate treatment.

The model entrusts on public health information center, which will dispense all possible types of health information to rural people. This is an integrated, conceptualized, and strategically developed public health information system model that will deliver health information services to rural people in an electronic environment. The model would link the health knowledge resources, i.e., the government agencies with the medical and public library, with the healthcare needs of rural people. The model would require a multidisciplinary team to coordinate, collaborate, and facilitate the health information exchange with the rural people to accomplish the objectives. As a public service establishment, the library needs to be linked in the public health information system as an auxiliary hub of information exchange between the health information center and rural people. It is pretty evident from the review that libraries are directly and indirectly involved in the health information transfer to the public. The public library would work as an interface between the rural people and health professionals. Hence, the suggested model would build up a public health communication platform and promote public health for diverse and vulnerable rural people.

1.5.2 Administration of the Integrated PHIS Model

To encompass a user-centered health information system, the Directorate of Health, Ministry of Health and Family Welfare and Directorate of Public Libraries, Ministry of Culture of Odisha state need to develop a Health Information Center (HIC) collaboratively at the district level to support and facilitate rural people to navigate health information sources and systems for themselves, their families and public in general.

1.5.3 Leadership and Organizing Responsibility

At the state level, the health information system would jointly rely on the Directorate of Health Services and the Directorate of Public Libraries for its overall administration and management of contents, language, information technology and systems, operation, finance, and human resources.

Strong support from the local administration bodies is required to run the proposed model efficiently and for its establishment, operational inputs, and overall management. The administration should be decentralized for managing this integrated PHIS model so that responsibility would eventually be distributed.

1.5.4 Executive Information System (EIS)

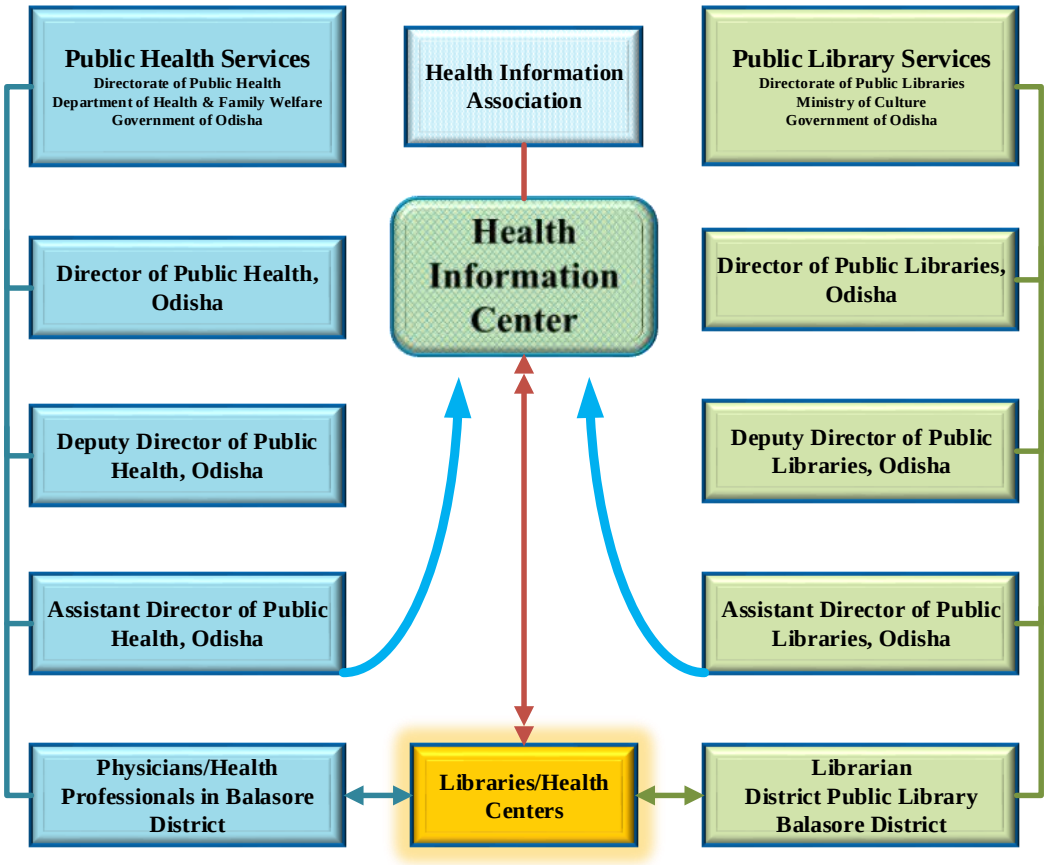
The Executive Information System is a decision support system used to support health information executives in decision-making by providing easy access to essential healthcare data required in the directorate to accomplish the strategic goals. It will provide critical healthcare information from a broad category of internal and external sources in user-friendly intuitive displays to the top executives in the directorate. Top executives like CMOs and CMIOs may use touch-screen terminals to view text and graphics presentations straight away, highlighting critical areas of healthcare organizational competitiveness. It can be used for monitoring the Health Information Center and health communication management decision-making as a whole by identifying opportunities and challenges (*Executive Information System (EIS)*, n.d.).

1.5.5 Establishment of Health Information Association (HIA)

There is a need to establish the Health Information Association (HIA), which will take care of the Health Information Center (HIC) at the district level. A delegate body would require establishing Health Information Association (HIA) by the Directorate of Health Services, which will manage the Health Information Center (HIC). Chief Medical Officer (CMO) and Chief Medical Information Officer (CMIO) would lead the Health Information Association (HIA) that will solely be responsible for the administration and management of the Health Information Center (HIC). The delegation body would allocate funds and human resources to run the Health Information Center (HIC) through Health Information Association (HIA). The Health Information Center (HIC) would be the central point at the district level to disseminate health information to rural people and be the hub of interactive health communication for rural people.

1.5.5.1 Training of HIA personnel

The HIA would work under the aegis of CMO, and CMIO comprises health professionals, health informatics professionals, and library and information science professionals. They must be trained by the authority to accomplish the objectives of public health communication. They would develop programs for health information exchange that will work seamlessly between the health professionals and rural people to establish a health communication platform.



[Fig. 1.1: Administrative Model of Public Health Information System]

1.5.6 Action Plans for Implementation of IPHIS Model

Realizing the potentiality of verbal and nonverbal health communication to modify the beliefs and behavior of rural people, public health professionals should work with the medical and public libraries to develop a strategy of public health communication to disseminate health information to rural people.

The design and development of effective health communication strategies have become more invaluable with the development of state-of-the-art, unproven, proposed technologies that could have the tremendous potential for disseminating health information across the diverse and medically underserved rural inhabitants. However, this potentiality to affect public health through

communication is agitated that not all groups benefit equally from it, as exemplified by the "digital divide" [3] in access to and use of the internet.

1.5.7 Solutions to digital divide of rural people

Ensuring rural populations access to the internet represents an essential challenge to using it for public health purposes. Access to the internet presently requires computer equipment that may be out of reach for persons with marginal income levels. Majority-language literacy and the physical capability to type and read present additional requirements for effective internet use. Preventing unequal access to healthcare resources delivered via the internet will require that healthcare agencies work with other social service and educational groups and public libraries to make available the technology necessary to capitalize on this electronic environment for health care. For a less technical savvy person that may be skeptical of technology, the public library will serve as a "trustworthy" location to view and dictate access to the health information they need.

Many of the essential benefits of communication strategies may be obtained across the diverse rural population through a generic approach that capitalizes on their similarities in beliefs and behaviors. In setting the scope, the investigator purposely attempted to include public health strategies as internet-based communication by the providers (health organizations and collaborating medical and public libraries) to rural inhabitants of the Balasore District of Odisha.

1.5.8 Ethical Considerations

The core ethical principles have been considered while developing this model by taking account of an individual's autonomy to make choices, maximizing benefit, avoiding harm, and treating groups and individuals fairly and equitably. Several ethical principles have been contemplated in developing and implementing public health communication strategies for diverse and medically underserved rural inhabitants.

[3] Digital divide refers to the gap between demographics and regions that have access to modern information and communications technology, and those that don't or have restricted access.

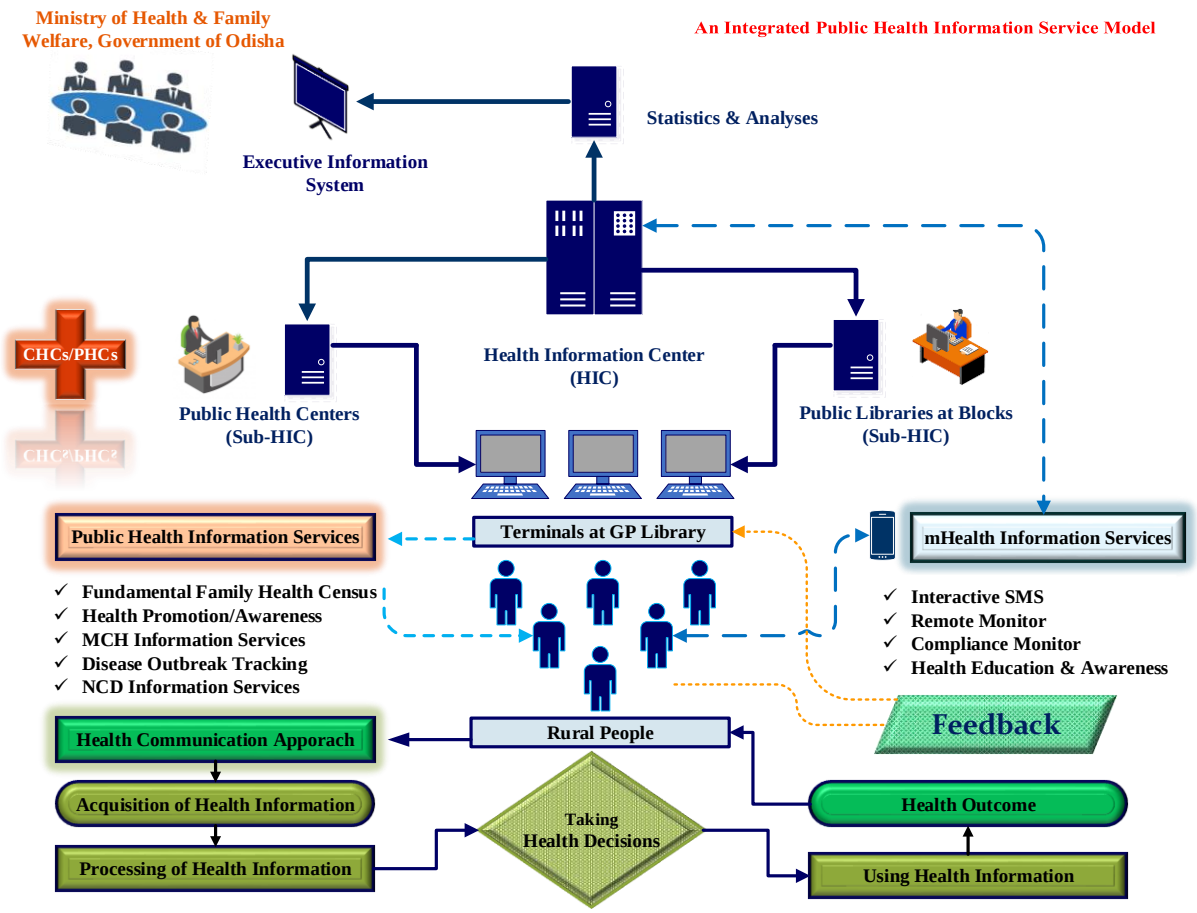
The principles of health communication strategy:

- It should be efficient, cost-effective, and improve the population's health mainly for the people in need versus a broader range of people.
- A health communication strategy that incorporates should function effectively and appropriately for every population segment.
- A health communication strategy should succeed in dealing with unintended consequences among the diverse rural population, which creates confusion about the meaning of a message, unwarranted anxiety resulting from implicit individual guilt, or the stigmatizing of certain cultural practices.

The only method for dealing with these kinds of concerns is to seek and maintain mutual collaboration with the rural populations during all phases of the communication intervention process. This method will increase the likelihood that the health communication strategies of the intervention will unfold in a manner that is significant for the intended rural people.

1.5.9 Establishment of Health Information Center

The Health Information Center (HIC) will be installed on the premises of the district public library. The Sub-Centers shall be installed within the libraries located at CD-Blocks and the premises of the CHCs and PHCs near the entrance. The access terminals would be available at every Gram Panchayat (GP) library in the Balasore district. The Directorate of Public Libraries, Ministry of Culture, Government of Odisha need to establish a public library at every Gram Panchayats or Village Council. The Health Information Center and its Sub-Centers would be networked with the terminals of the GP Libraries for the health information exchange.



[Fig. 1.2: An Integrated Public Health Services Model for Rural Inhabitants]

The main advantage of the proposed model is that the health information center would run as an extension center of the medical library under the aegis of the directorate health services and directorate of public libraries of the government of Odisha.

1.5.10 Functions of HIC and Sub-HIC

The Health Information Center (HIC) would function as a health information referral service for Disease Prevention and Health Promotion. It will put health professionals and rural people who have health questions in touch with those organizations that can provide answers. Using a database that contains descriptions of health-related organizations, HIC staffs refer people to the most appropriate resource. The public library should include all the health-related information available in the district for the public on its website as a part of community information services. That information should be available at the terminal of GP Library through the HIC server network to

rural people. The Sub-Center of HIC would be installed at the CHCs and PHCs as well as public libraries at CD-Blocks. The staff in the Sub-HIC will help the rural people who face difficulty in obtaining health information due to their ignorance or illiteracy. The less technical savvy rural people will find this trustworthy as the personnel deployed in Sub-HIC will interact and help them in this regard.

The statistical and analytical report of health communication will be sent to the ministry and top executives for necessary action and decisions by the Health Information Association (HIA) team through Health Information Center (HIC). The Executive Information System (EIS) will work as Decision Support System (DSS) for the top executive officers like CMO and CMIO.

The HIC would provide every type of health information to rural people. However, some of the services should be included on a priority basis as per the health information needs of rural people, as evident from the surveillance. The services include health education and awareness for health promotion, health information services on family planning, MCH, nutrition, disease outbreak tracking of communicable diseases, non-communicable diseases, and emergence healthcare information services for trauma and poisoning.

1.5.11 mHealth Information Services

Mobile health (mHealth) information service is the practice of electronic health assisted by smartphones used to transmit health information through a health information system. There is a communication revolution developing in the modern health care system driven by health information technologies (HITs) for enhancing health care delivery and health promotion. These tools must be designed to effectively communicate the right health information needed by rural people at the right time, in the right place, and in the best ways to guide health care and health promotion (Angula & Dlodlo, 2017).

Since the present study reveals that most rural people use smartphones in their daily lives, it will be pretty easy to disseminate healthcare information through it. The proposed model focuses on the mHealth applications, which need to be easy to use, adaptable, interactive, interoperable, engaging, and accessible for the diversified rural population. Effective and humane mHealth

applications strategically developed and implemented will improve the quality of healthcare and promote rural health.

The mHealth has tremendous potential to encourage the adoption of healthy behaviors by rural people to promote disease prevention, health promotion, and early detection. A mHealth can supplement and reinforce healthcare information disseminated via Health Information Center (HIC).

Advantages of mHealth Information Services

- Computer-automated SMS reminders or alerts about public health conditions and health care appointments can be communicated.
- Health care organizations accompanied by the public and medical libraries through Health Information Center (HIC) can send tailored health information to the people who can, at their own "24/7" convenience, respond, ask questions, request services, and even transmit their views and advice.
- Remote Health Monitoring services that track and report public health conditions.
- Interactive SMS chat between the rural people and health care providers over the network of Health Information Center (HIC) is possible.
- Compliance monitoring is possible. It refers to the quality assurance tests that the health information services provider can perform to check how well their operations meet their regulatory and internal process obligations.

A mHealth information that is interactive, interoperable, personally engaging, contextually tailored, with the ability to be delivered to the mass public, can make a difference in enhancing the quality of health care and health promotion efforts. It can reach the diverse population with information that matches their health needs and communication orientations. Health information can be easily updated and adapted to changing public health situations. It can foster greater participation between Health Information Center (HIC) and rural people and ensure that all crucial stakeholders in the public health communication have access to timely and accurate information to guide their decisions (Baulch et al., 2018).

1.5.12 Establishment of GP Libraries

As per the 2011 census, there are 12 CD-Blocks, 289 Gram Panchayats (Village Councils), 2953 villages, and 4,77,434 rural households in the Balasore district of Odisha. The proposed model focuses on establishing Sub-HIC within the premises of block-level libraries, which will work as mediating servers in the health communication network intended to serve the terminals at GP Libraries and help the rural people in case of communication difficulties. The public libraries need to be established at every Gram Panchayats level so that the rural people will find it handier because of its proximity to their households. The health communication terminals will be installed at every GP library so that rural people can obtain the health information they require and communicate interactively. The Directorate of Public Libraries, Ministry of Culture, Government of Odisha should establish public libraries at 289 Gram Panchayats for the benefit of rural people. It will be cost-effective for the state government to establish public libraries at the GP level rather than the village level.

The terminals at the GP library will work as Health Communication Kiosk[4] to be available without any cost for the rural people for which the state government should allocate funds, a computer system, and a well-furnished environment.

1.5.13 Health Communication Approaches of Rural People

Health communication approaches of rural people are depicted in the Integrated Public Health Services Model **(Fig. 1.2)** in a flow chart. Information flows from the acquisition of healthcare information to the public health outcomes for the rural people.

- **Acquisition of Health Information:** The rural people of the Balasore district goes to the terminals available at the GP Library in their locality and put queries with regards to their healthcare needs. The information will be available online from the server of the HIC at the interface of the terminals they are using.
- **Processing of Health Information:** The users would analyze the healthcare information they have acquired based on their healthcare needs, socio-economic status, and belief to

[4] Displays health information in the form of an interactive menu system.

use it for themselves, for families, and the public, in general, to control and prevention of diseases and disorders.

- **Taking Health Decisions:** This is the crucial moment when the users have to make the decisions that will be appropriate for their health. It depends on the user's satisfaction, convenience, and effectiveness of the health information.
- **Using Health Information:** Now, the user will use the health information after taking the right decision for their health, either by taking appropriate measures to prevent the diseases or getting treatment for their illness.
- **Health Outcome:** The health outcome for rural people is obtained from health professionals, doctors in the hospitals. The follow-up reminder alert will be provided "24/7" from HIC through users' registered smartphones in the form of mHealth information service.

At last, the feedback would be demanded further reference and improvement of the health communication program. This would incorporate the user-focused, active user-oriented health communication program and activities for democratizing the public health communication environment for the rural inhabitants of the Balasore district of Odisha and the public in general in India (Ouma & Herselman, 2008), (Parvanta et al., 2011).

Conclusion

Information communication technology provides tools that facilitate the linking of health information with the public data for healthcare and provides health professionals with access to the knowledge they need to ensure optimum health outcomes.

This study has provided a conceptual framework, strategically developed Integrated Public Health Information Services Model that, if implemented correctly, could have a significant impact on how healthcare data is stored, shared, and most importantly, owned. The integrated service model will allow rural people to view and authorize access to the health information they need to make healthcare decisions.

The model is purely an output of qualitative and quantitative results of the study, introducing a collaborative public health information service model that could be adopted by the rural people of the Balasore district of Odisha. This model would substantially promote public health for rural inhabitants of the Balasore district of Odisha. The provision of the health information center within the public library would help the public health system assist health information seekers in being a one-stop health information hub.

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Conflicts of Interest: Nil

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