

Use of web-based health information portals in primary health care: Experience from a rural Primary Health Centre in Haryana

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ABSTRACT

Background: Health care informatics is the scientific field that deals with the data capture, storage, retrieval, and use of biomedical data, information, and knowledge for problem solving and decision-making. The objectives of the study were to describe the web-based portals used at the Primary Health Centre (PHC) and to appraise its utilization at the local level. **Methods:** Various methodologies included observation of portal use, record review, interview of stakeholders using the portals. **Results:** Health Workers workload increased because of physical record entry and time spent for entry in web-based health information portals. Web-based portals did not have options for utilization of the data generated at the PHC level. The options of feedback and helpline were not universally available. **Conclusion:** Web-based portals are integral part of health system at primary healthcare level. Adequate utilization of web-based health information portals may lead to efficient provision of health services at the primary health care level.

Keywords: Healthcare informatics, primary health centre, web-portals

Introduction

Universal health coverage (UHC) endorses equity, improving efficiency and provision of quality healthcare. It is believed that the use of information technology (IT) in healthcare can be a key enabler for achieving UHC.^[1] Globally, information and communication technology (ICT)-based health information systems (HISs) have been developed. These systems capture,

store, manage, analyze, and transmit required information related to the health for planning and decision-making.

Health care informatics is the scientific field that deals with the data capture, storage, retrieval, and use of biomedical data, information, and knowledge for problem solving and decision-making. Health Informatics deals with four major interdisciplinary components: emerging technologies, epidemiology and health management, advanced statistics, and health systems.^[2] According to Alma-Ata Declaration, principles of primary health care include appropriate technology. Appropriate technology has been defined as “technology that is scientifically sound, adaptable to local needs,

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and acceptable to those who apply it and those for whom it is used, and that can be maintained by the people themselves in keeping with the principle of self-reliance with the resources the community and country can afford.”^[3] Use of appropriate IT corresponds to this principle.

There are barriers to HIS in terms of non-availability of IT infrastructure and relevant software, adequate human resources, and inconsistent reporting at the primary care level. Lack of data ownership gives little incentive for health workers at the lower levels of employment to analyze, use, and interpret health data. Lack of feedback on the data that is generated and entered by the healthcare workers negates open communication, discussion, and resolution of problems. Utility of multiple web-based portals at primary health care level needs a relook. Objectives of the study were to describe the web-based portals used at the Primary Health Centre (PHC) and to appraise its utilization at the local level.

Methods

This was a cross-sectional study carried out in one of the PHC under the Intensive Field Practice Area of Comprehensive Rural Health Services Project (CRHSP), Ballabgarh, Haryana, India. The web-based portals were described by observation of use of the portals, checking the relevant records and interviewing persons using the portals. All the portals were accessed through the username and password provided to the Medical Officer In-Charge of the PHC. The records that were reviewed during the process of description and observation were listed in Box 1. Healthcare workers interviewed for appraisal of the utilization of the web-based portals were listed in Box 2.

All the web-based portals were described and appraised about the person responsible for data entry, data authentication methods, local use of data generated, feedback mechanism, and availability of helpline.^[15] All these data were collected from June to July 2020. All the web-based portals were described on the purpose of the portal, developer of the portal, data entry, data collection, and data authentication. Uniform Resource Locator (URL) of the web-based portal were listed along with their utilization, up-to-date information, feedback, and helpline status.

Ethical approval was obtained from Institute Ethics Committee, AIIMS, New Delhi. The participants were provided with an information sheet in Hindi. Informed written consent was obtained from all the participants.

Results

There were 11 online web-based health information portals used at this PHC. Details of these web-based portals like description, purpose of the portal, developer and Data collection, entry and authentication were described in Table 1.

Antyodaya Saral

Antyodaya Saral portal delivers and tracks more than 500 government-to-citizen services or schemes across Haryana. The website had two components namely dashboard and portal. The health-related services on this portal consist of application for birth and death certificate issuance, correction in birth and death record, delayed birth and death registration, inclusion of child name in birth record, and issuance of birth/death/non-availability certificate. This portal had facility of application for the above-mentioned purposes at the village level.

Anemia tracking module

Information about pregnant women (PW) anemia status who delivered at the PHC was entered in this portal. Information about Postpartum Intra Uterine CuT Device (PPIUCD) insertion and outcome of pregnancy were also updated. The output included line listing of anemic cases, abstract report of anemia

Box 1: List of Primary Health Centre registers reviewed

Tuberculosis patient register and laboratory register
Beat schedules of Health Workers
Verbal and social autopsy forms
Drug stock register and stock cards
Pharmacy drug issue register
Outpatient department diagnosis register
Immunization register
Birth and death registers
Antenatal Care register
High Risk Pregnancy register

Box 2: Healthcare workers interviewed for appraisal of the utilization of the web-based portals

Web-based portals	Healthcare workers interviewed
Nikshay ^[4]	Senior tuberculosis laboratory supervisor (STLS), Information Assistant, Laboratory Technician
Reproductive and Child Health portal ^[5]	Information Assistant, Auxiliary nurses and mid-wife (ANM)
Maternal and Infant Death Reporting System ^[6]	Information Assistant, ANM
Online Drug Inventory and Supply Chain Management System ^[7]	Medical Officer In-charge, Junior Resident
Anemia Tracking Module ^[8]	Information Assistant
Integrated Disease Surveillance Programme ^[9]	Information Assistant, Junior Resident
Health Management Information System ^[10]	Information Assistant, ANM
Civil Registration System ^[11]	Medical Officer In-charge, Junior Resident
Antyodaya Saral ^[12]	Information Assistant, Antyodaya Saral Portal Operator of Dayalpur Village
Family Planning - Logistics Management Information System ^[13]	ANM, Nursing-in-charge at PHC
Pradhan Mantri Surakshit Matritva Abhiyan ^[14]	Medical Officer In-charge, Junior Resident

Table 1: Description of web based health information portals used at PHC

Name of portal	Purpose of the portal	Developer and maintenance	Data entry	Data collection and authentication
Antyodaya Saral	Application for editing of birth and death certificates	Designed, hosted and maintained by National Informatics Centre, website is owned, updated and managed by Ministry of Panchayati Raj	Saral booth operator (Atal Seva Kendra), general public	Data entry operator, Registrar
Anaemia Tracking Module	Recording and their followup	Designed and developed by Centre for National Informatics.	Information Assistant	Health Worker and staff nurse
Civil Registration System	Birth and death registration and certificate generation	Office of Registrar General and Census Commissioner, under Ministry of Home Affairs	Information assistant, Registrar, general public	Senior and Junior Resident, Health Worker, Staff nurse
Family Planning- Logistics Management Information System	Indent of family planning materials	Designed and developed by Centre for Development of Advanced Computing	Senior and Junior Resident	Medical Officer In-Charge
Health Management Information System	Reporting health parameters	Conceived and developed by Ministry of Health and Family Welfare with technical support from Vayam Technologies Ltd.	Information Assistant	Health worker
Integrated Disease Surveillance Programme	Disease surveillance	Designed and developed by Centre for National Informatics	Information Assistant	Junior resident and senior resident
Maternal and Infant Death Reporting System	Reporting of maternal and infant deaths	Haryana government	Information Assistant	Health worker
Nikshay	Notification of tuberculosis, recording tuberculosis patient details and sanction of direct benefit transfer	Developed and maintained by the Central TB Division (CTD), under Ministry of Health and Family Welfare, Government of India, in collaboration with the National Informatics Centre (NIC), and the World Health Organization Country office for India.	Laboratory Technician	Health Worker, Laboratory Technician
Online Drug Inventory and Supply Chain Management System	Indent of materials	Designed and developed by National Informatics Centre, Haryana.	Junior Resident	DC: Pharmacist And Junior Resident DA: Junior Resident And Senior Resident
Pradhan Mantri Surakshit Matritva Abhiyan	Reporting of antenatal women visiting antenatal clinic	Designed, developed and hosted by Centre for Health Informatics, of National Health Portal, and Ministry of Health and Family Welfare.	Information Assistant, Junior Resident	Medical Officer In-Charge
Reproductive and Child Health	Reporting health parameters of mother and under-five children	Designed and developed by National Informatics Centre	Information Assistant	Health worker Medical Officer In-Charge

cases, time trend report of anemic women (month-wise). The data was updated on a monthly basis.

Civil registration system

This portal had facility for birth and death certificates, non-availability certificates, corrected certificates, date-wise registration summary, report of vital statistics of India (up to 2016), and report on medical certification of death (up to 2016). Birth and death details were entered for certificate generation. Birth and deaths that happened in the PHCs were filled and provided by the staff nurse. Births and deaths happened at the village were verified by concerned ANMs before entry into the portal. Medical Officer In-Charge was the registrar of birth and death.

Family planning-Logistics management information system

The demand of contraceptives from subcenters and PHC, stock present in subcenters and PHC and consumption of the stock were uploaded in the portal. It had dual log in system, one for

the health worker at subcenter and another for medical officer at PHC. The medical officer at PHC level sanctioned indented contraceptives by the Health Worker for the subcenters. The portal had facility for current stock availability for indent in the issuing store, summary report, transfer to other PHC, and amount of items issued without indent. The portal was updated on a monthly basis.

Health management information system (HMIS)

HMIS was conceived and developed by the Ministry of Health and Family Welfare with technical support from Vayam Technologies Limited. This portal was updated on a monthly basis by the ANMs from the subcenter on a fixed schedule. Information about the maternal, reproductive, and child health were entered in this portal. The portal had information about the family welfare, maternal, and immunization statistics at the district level.

Integrated disease surveillance programme (IDSP)

IDSP portal was developed and maintained by the Centre for

National Informatics. At the PHC level, information was entered for S form and L form by the Information Assistant. This portal was updated every week. This portal had weekly surveillance report year-wise at the national, state, and district level. It also had summary report, consistency report, human resources report, weekly outbreak reports, reporting unit details. The portal also had financial monitoring reporting format, checklist for IDSP portal during field visit, laboratory monitoring formats.

Maternal and infant death reporting system (MIDRS)

This portal was developed by Haryana State Ministry Health and Family Welfare in 2012 to collect information of maternal deaths, infant deaths, and stillbirths from various levels. Information regarding maternal and infant deaths were entered in maternal and infant death reporting format. The Information Assistant with the help of Health Workers filled maternal Death Review (MDR1), Infant Death Review (IDR1 to IDR4), and verbal autopsy forms on a monthly basis. The portal provides line listing of maternal, infant deaths and still-births, and consolidated death reports of Haryana (month-wise).

Nikshay

Nikshay portal was used for the online patient management system for tuberculosis control, under National Tuberculosis Elimination Programme.^[4] The data entered were name, demographic, residence, contact person details, test reports, treatment status, bank details, treatment details, outcome of disease, and comorbidities of the suspected and confirmed tuberculosis cases. The portal had total notification rate, directory with contact numbers of State Tuberculosis Officer (STO), District Tuberculosis Officer (DTO), Tuberculosis unit, and Peripheral Health Unit. The various reports include that of notification (state and district wise), outcome report (Haryana, month-wise), empty bank details, treatment status, Universal Drug Susceptibility Test (UDST) status, HIV status, Active Case Finding (ACF) report, comorbidity status report, contact tracing report, and monthly summary report. The different patient registers consist of notification register, presumptive case, DMC register, deleted patient, prescription, Drug Resistant Tuberculosis (DRTB) register, follow-up register, Direct Benefit Transfer (DBT), private health facility, comorbidity

register, beneficiary register, culture and drug susceptibility testing (CDST) register, patient lab register.

Direct benefit transfer (DBT) registers include DBT summary, DBT beneficiary status, DBT benefits status, DBT offline Excel export utility, DBT Nikshay Poshan Yojna (NPY), DBT transaction summary. Senior Treatment Supervisor approved the direct benefit transfer of beneficiaries and treatment supporter online via this portal. Data entry was real-time, whenever there was update about any patient.

Online drug inventory and supply chain management system

This portal was developed and maintained by the National Informatics Centre, Government of India. This portal was used for indenting of consumables from central warehouse of the district. The data that were entered in this portal were stock of medicines present in PHC, demand list from sub-centers and PHC, receipt and acknowledgement of drugs from warehouse, indent for PHC, and amount of drugs issued to other PHC and sub-centers. The output from the portal were consumption rate, roster of indent of all PHCs and district hospital, stock present in warehouse, and non-availability certificates (for item that was absent in warehouse stock for at least 3 months). The indented items were received from the warehouse on the specific date mentioned in the roster. The homepage of the portal had performance summary of the district.

Pradhan Mantri surakshit matritva abhiyan (PMSMA)

This portal was designed, developed, and hosted by Centre for Health Informatics and Ministry of Health and Family Welfare. It was used to enter data related to pregnant women attending ANC clinic under PMSMA, investigations done, high-risk identification and management, tracking of high-risk pregnancy. The portal had self-assessment checklist for facility and available infrastructure in the PHC. The Information Assistant or Junior Resident entered the data on a monthly basis.

Reproductive and child health (RCH)

This was designed and developed by National Informatics Centre for early identification and tracking of all individual

Table 2: URLs of web-based health information portals used at PHC

Web-based portal	URL
Antyodaya Saral	https://saralharyana.gov.in/
Anemia Tracking Module	http://nrhmharyana.gov.in/home1.aspx#
Civil Registration System	http://crsorgi.gov.in/web/index.php/auth/login
Family Planning - Logistics Management Information System	https://fplmismohfv.in/IMCS/hissso/Login.fp
Health Management Information System	https://nrhm-mis.nic.in/SitePages/Home.aspx
Integrated disease surveillance Program	https://idsp.nic.in/
Maternal and Infant Death Reporting System	http://midrs.nrhmharyana.gov.in/
Nikshay	https://www.nikshay.in/
Online Drug Inventory and Supply Chain Management System	http://dpmuhry.gov.in/
Pradhan Mantri Surakshit Matritva Abhiyan	https://pmsma.nhp.gov.in/
Reproductive and Child Health	https://rch.nhm.gov.in/RCH

beneficiaries throughout reproductive lifecycle of women, and to promote, support and monitor maternal, neonatal and child health programme/scheme delivery and reporting. Profile of the PHC was opened by entering demographic details of the village (population, number of eligible couples, estimated number of pregnant women and infant), contact details of health institute, Accredited Social Health Activists (ASHA), multipurpose worker (MPW), ANM and Anganwadi workers (AWW). Details of eligible couples, pregnant women, child, ASHA/health provider details, re-registration of eligible couples in case of next pregnancy were entered in the portal. The dashboard provides number of registered eligible couples, pregnant women, children and health provider (current year and cumulative process since inception) at state level and at nation level. Kilkari messages, ringtone, and link to mobile academy were also included in the portal. Health record of a particular beneficiary can be checked using the RCH number. Data entry was completed on a monthly basis.

The Uniform Resource Code (URL) of the web-based health information portals were list in Table 2. Antyodaya Saral portal, Civil Registration System, Family Planning--Logistics Management Information System, Integrated Disease Surveillance Programme portal, Online drug inventory and supply chain management system portal had local usage of information and data at the PHC level. Nikshay portal had direct benefit transfer system that was used at the local level [Table 3].

Four of the 11 web-based portals did not have up-to-date information. Feedback mechanism was absent in the nine of the 11 portals. Helpline was not available for four web-based portals namely Health Management Information System, Maternal and Infant Death Reporting System, Online drug inventory and supply chain management system, Reproductive and Child Health portals [Table 4].

Discussion

Total of 11 web-based health information portals were being used at the Primary Health Centre. Five portals had data utilization at the local level, four portals did have up-to-date information.

Nine portals did not have a feedback mechanism and helpline was absent for four of the web-based health information portals.

In the study by Faujdar *et al.*, the public health information system for primary health care in India was evaluated based on literature search, observation, and in-depth interview of key staff. The study found that the health information portals were proprietary-based, and the long-term sustainability and integration of these systems remains a challenge.^[15]

Gera *et al.* conducted an in-depth assessment of India's Mother and Child Tracking System in Rajasthan and Uttar Pradesh. It found that there was an urgent need to create data processes and supervision guidelines that complement the existing workflows and service delivery priorities. Health staff should be trained to implement these guidelines. MCTC outputs, such as service delivery planning tools, should replace existing tools once data quality improves.^[16]

Study conducted by Saha *et al.* for recording the document rollout and early implementation experience of mHealth Programme called TeCHO+ (Technology for Community Health Operations) in Gujarat. They conducted key informant interviews among health officials and field staff from five districts of Gujarat. TeCHO+ showed the potential to enhance the quality of the collected data and also service coverage. However, poor

Table 3: Utilization of web based health portals at local level

Web based portal	Local use
Antyodaya Saral	Yes
Anaemia Tracking Module	No
Civil Registration System	Yes
Family Planning- Logistics Management Information System	Yes
Health Management Information System	No
Integrated Disease Surveillance Programme	Yes
Maternal and Infant Death Reporting System	No
Nikshay	Yes, for sanction of DBT
Online Drug Inventory and Supply Chain Management System	Yes
Pradhan Mantri Surakshit Matritva Abhiyan	No
Reproductive and Child Health	No

Table 4: Web-based health information portal's completeness, feedback mechanism and helpline status

Web based portal	Completeness	Feedback	Helpline
Antyodaya Saral	Yes	Yes	Yes Monday to Saturday functional from 8 am to 8 pm
Anaemia Tracking Module	Yes	No	Yes but non-functional
Civil Registration System	Yes	No	Yes functional from 9.30 am to 6 pm
Family Planning- Logistics Management Information System	No	No	Yes
Health Management Information System	Yes	No	No (contact email id is present)
Integrated Disease Surveillance Programme	Yes	No	Yes but non-functional
Maternal and Infant Death Reporting System	No	No	No
Nikshay	No	No	Functional from 7 am to 11 pm
Online Drug Inventory and Supply Chain Management System	Yes	Yes	No
Pradhan Mantri Surakshit Matritva Abhiyan	Yes	No	Yes
Reproductive and Child Health	No	No	No

technology literacy of old Female Health Workers posed a major challenges.^[17]

Dey *et al.* studied the web-based TB case notification and management portal to assess the awareness and its utilization among the private practitioners in Karnataka. Awareness and utilization of NIKSHAY was low. Private practitioners face various barriers which needs to be addressed to increase the notification rates.^[18]

Krishnan *et al.* conducted a study at CRHSP, Ballabgarh to evaluate the effectiveness of a computerized Health Management Information System in rural health system in India. The study found that time was saved by the health workers from record keeping and report generation. The initial capital costs of computerization can be recovered within 2 years of implementation if the system was fully operational. Computerization has enabled implementation of a good system for service delivery, monitoring, and supervision.^[19]

Athavele *et al.* in his study discussed the challenges of public health informatics. The major challenge was the initial financial investments required for development, implementation, and maintenance of web portals. Trained and skilled manpower is scarce in remote rural areas for establishment and maintenance of the web portals. Development of coherent and integrated public health information systems is still a challenge. Development of cost-effective systems, clear definitions, uniform and quality data collection and comparability are the few of the many problems. Resistance to the development of ICT systems by stakeholders such as health professionals, managers, and even the users of the systems can create further problems once systems are implemented and may limit its use.^[20]

In the systematic review by Jimenez *et al.*, 38% articles described a technology-based innovation as a component of their multicomponent intervention to improve primary care. Electronic health record, data monitoring technologies, and online messaging portals were the commonest variants. They aimed at improving continuity of care and comprehensiveness, which resulted in improved patient satisfaction, increased primary care visits (compared to specialist visit), provision of more health education and improved prescribing practices. However, they increased costs and utilization of some parameters like consultation costs and number of prescribed drugs.^[21]

Further researches like the study conducted by Choi *et al.*, analyzing the longitudinal trends of online health information portals over four years, will help improving the features of web-based portals for healthcare.^[22]

Conclusion

The use of public health informatics has the potential of increasing effectiveness at all levels of healthcare. However, there is limited use of the system at primary health care level,

except for data entry. In addition, duplication of data recording both manually and in portals seems to be waste of both time and manpower. Further technological and operation researches are required for advanced utilization of health informatics in the primary healthcare settings. An integrated system covering all essential services, with a simple interface for data entry, authentication and utilization may be the way forward.

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Conflicts of interest

There are no conflicts of interest.

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