Internship Training

At

National Institute of Health and Family Welfare

By

Col Sumesh Seth

Under the guidance of

Dr Anandhi Ramachandran

Post Graduate Diploma in Hospital and Health Management
2012-2014

International Institute of Health Management Research
New Delhi

Abstract

1. National Institute of Health and Family Welfare (NIHFW) is an autonomous institute under the Ministry of Health and Family Welfare (MoHFW), Government of India. It acts as an 'apex technical institute' as well as a 'think tank' for the promotion of health and family welfare programmes in the country. The Institute addresses a wide range of issues on health and family welfare from a variety of perspectives through the departments of Communication, Community Health Administration, Education and Training, Epidemiology, Management Sciences, Medical Care and Hospital Administration, Population Genetics and Human Development, Planning and Evaluation, Reproductive Bio-Medicine, Statistics and Demography and Social Sciences.

2. NIHFW is conducting regular as well as e-learning courses in the fields of health and family welfare, hospital management and health promotion. In addition, certain ongoing projects of NIHFW are – Reproductive and Child Health Training and Administrative Unit under NRHM, The Annual Sentinel Surveillance for HIV Infection in India (sponsored by NACO), Mother and Child Tracking System (MCTS) Cell, Health Policy Unit and Centre for Health Informatics (CHI).

3. National Health Portal (NHP) is one of the most prestigious projects of CHI under NIHFW, with the objective of providing a single platform with authenticated healthcare related information to all citizens of India. The portal also offers numerous healthcare links and selected m-health applications (apps) in both English and Hindi. Beta version of the portal was released in Nov 2013, with an in-built system for obtaining the feedback of the portal in the form of a 'Feedback' link. However, the same was limited to the registered users and regular visitors of the portal only. Moreover, a need was felt to find out the effect of proliferation of m-health apps over the health indices in India.

4. A relevant questionnaire was developed on Google docs to obtain a separate feedback from the industry, students, consultant firms, healthcare professionals, NGOs and govt entities, etc with an aim to evaluate the usability and effectiveness of NHP with special reference to m-health apps.

Acknowledgements

A study of this magnitude would not have been possible without the help and support of numerous individuals and organizations. First of all, I would like to thank all the experts, professors, reviewers and other contributors who provided their expert inputs on the subject.

The preparation of this internship report has been possible due to the continued commitment of International Institute of Health Management Research (IIHMR), New Delhi and National Institute of Health and Family Welfare (NIHFW). In particular, I would like to thank Dr Anandhi Ramachandran, Faculty at IIHMR; and Prof Indrajit Bhattacharya, Additional Director of NHP at NIHFW.

I take this opportunity to express my profound gratitude and deep regards for their exemplary guidance, monitoring and constant encouragement throughout the course of the internship. Their approvals, assistance and directions from time to time shall go a long way in the journey of life ahead.

They inspired me greatly and their willingness to motivate contributed tremendously to this report. I also would like to thank them for showing examples that were related to my internship and providing with a good environment and facilities to complete. It gave me an opportunity to participate and learn about the operations of NIHFW and in detail about the NHP.

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INTERNSHIP WITH NATIONAL INSTITUTE OF HEALTH AND FAMILY WELFARE

SECTION 1 : INTRODUCTION

1.1 **National Institute of Health & Family Welfare (NIHFW)** is situated in South Delhi, near Jawaharlal Nehru University and DDA Flats Munirka on Baba Gang Nath Marg. It is an autonomous institution, under the Ministry of Health and Family Welfare (MoHFW), Government of India, with the object to act as an 'apex technical institute' as well as a 'think tank' for the promotion of health and family welfare programmes in the country through education, training, services, research and evaluation.

1.2 The internship with NIHFW was mainly restricted to working with National Health Portal (NHP) team under the Centre for Health Informatics (CHI). However, it was a great opportunity to assimilate the working of various departments of NIHFW and meet professionals in the field of medical sciences, community medicine, public health, social sciences, psychology, anthropology, hospital administration, education, population science, statistics, management sciences, economics, operations research, computer science & system analysis, etc.

1.3 NIHFW is conducting regular as well as e-learning courses in the fields of health and family welfare, hospital management and health promotion. In addition, certain ongoing projects of NIHFW are – Reproductive and Child Health Training and Administrative Unit under NRHM, The Annual Sentinel Surveillance for HIV Infection in India (sponsored by NACO), Mother and Child Tracking System (MCTS) Cell, Health Policy Unit and Centre for Health Informatics.

1.4 National Health Portal (NHP) is one of the most prestigious projects of MoHFW, Govt of India setup under the CHI of NIHFW. The aim of developing the NHP was to provide a single platform for authenticated healthcare related information to all citizens of India. It also provides links to a large number of useful healthcare related websites and selected m-health apps, in both English and Hindi. Beta version of the portal was released in Nov 2013, thus making it imperative to obtain feedback for further improvements in the portal in order to launch it successfully by the end of 2014.

SECTION 2 : NIHFW PROFILE

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2.0 NIHFW profile has been described under the following heads:-

2.1 History.

2.2 Vision and Mission.

2.3 Important Features.

2.1 **History**. The National Institute of Health and Family Welfare (NIHFW) was established on 9th March, 1977 by the merger of two national level institutions, viz. the National Institute of Health Administration and Education (NIHAE) and the National Institute of Family Planning (NIFP). The NIHFW, an autonomous organization, under the Ministry of Health and Family Welfare, Government of India, acts as an 'apex technical institute' as well as a 'think tank' for the promotion of health and family welfare programmes in the country.

2.1.1 The Institute addresses a wide range of issues on health and family welfare from a variety of perspectives through the departments of Communication, Community Health Administration, Education and Training, Epidemiology, Management Sciences, Medical Care and Hospital Administration, Population Genetics and Human Development, Planning and Evaluation, Reproductive Bio-Medicine, Statistics and Demography and Social Sciences.

2.2 **Vision and Mission**. The vision of the institute is – 'NIHFW to be seen as an Institute of global repute in public health & family welfare management'. The mission of NIHFW is 'To act as think tank, catalyst & innovator for management of public health and related health & family welfare programmes by pursuing multiple functions of Education & Training, Research & Evaluation, Consultancy & Advisory services as well as provision of specialized services through inter-disciplinary teams'.

2.3 **Important Features**. Values and priority areas of NIHFW are:-

(a) Core Values.

- Excellence
- Equity

- Convergence
- Market Orientation
- Sustainability

(b) Thrust Areas.

- Health & related Policies
- Public Health Management
- Health Sector Reforms
- Health Economics & Financing
- Population Optimisation
- Reproductive Health
- Hospital Management
- Communication for Health
- Training Technology in Health

(c) Areas of Concern.

- Rural Health (Theme 2005: National Rural Health Mission)
- Health of Urban Slum Dwellers
- Tribal Health
- Decentralisation
- Inter & Inter-sectoral Coordination
- Community Ownership
- NGOs
- Public-Private Partnership
- Human Resources for Health
- Financial Management
- Social /Community Health Insurance
- Care of Elderly
- Gender Sensitivity & Care of Girl Child
- Adolescent Health
- Emergency Contraception
- Population Education
- Medical Ethics

- Health Legislations
- Medical Waste Management
- HMIS
- Health Informatics
- Quality in Health Care
- Replicating Best Practices

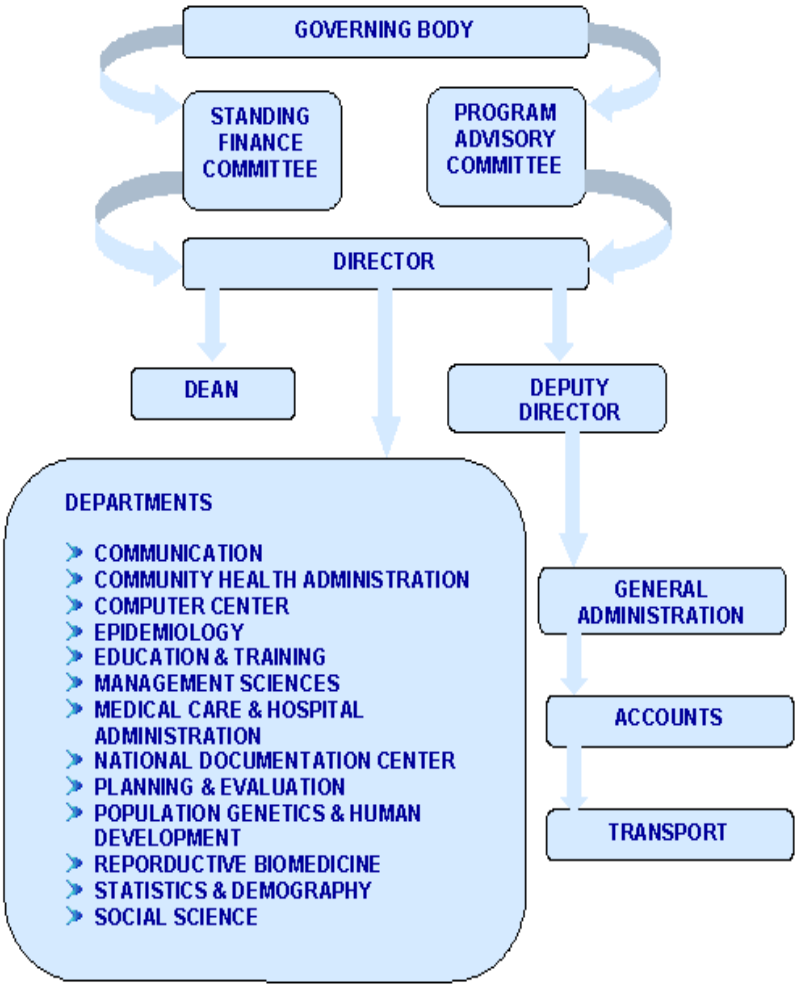

Figure 2.1 : Organisation chart of NIHFW

SECTION 3 : DEPARTMENTS VISITED/WORKED

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3.1 The internship at NIHFW was executed from 24 February to 16 May 14, during which several departments of the institute were visited for acclimatisation and to understand their functioning, mainly restricted to first three weeks.

3.2 The initial briefing about NIHFW was provided on 24 February 14, wherein department wise schedule was also given for first three weeks. Acclimatisation with each department was carried out by personal interaction with the HoD/Professor of that department and by understanding the functioning with the staff. Enormous amount of learning opportunities were available in each department of the institute. The department wise time schedule is enumerated in the Table 3.1 below. Various observations/learning about functioning of the NIHFW and its departments have been described in Section 4 of the report.

Table 3.1 : Department wise schedule at NIHFW

Ser No	Name of the Department/ Project	Date(s) of Visit	% of Time Spent	People Met (With Designation)
1.	General Briefing	24 Feb 14	1.82	Prof Indrajit Bhattacharya, Additional Director (Technical) for NHP
2.	Communication	25 Feb 14	1.82	Dr Neera Dhar, HoD
3.	Community Health Administration	26 Feb 14	1.82	Dr Madhulekha Bhattacharya, HoD
4.	Education and Training	27 Feb 14	1.82	Dr AK Sood, HoD
5.	Epidemiology	28 Feb 14	1.82	Dr Madhulekha Bhattacharya, HoD
6.	Medical Care and Hospital Administration	03 Mar 14	1.82	Dr AK Sood, HoD

Table 3.1 continued

7.	Management Sciences	04 Mar 14	1.82	Dr Rajni Bagga, HoD
8.	Planning and Evaluation	05 Mar 14	1.82	Dr NK Sethi, HoD and Dr VK Tiwari, Prof
9.	Reproductive Biomedicine	06 Mar 14	1.82	Dr K Kalaivani, HoD and Dr MM Misro, Prof
10.	Statistics and Demography	07 Mar 14	1.82	Dr Pushpanjali Swain, HoD
11.	Social Sciences	10 Mar 14	1.82	Dr Thaneshwar Bir, HoD
12.	Reproductive and Child Health Training and Administrative Unit	11 Mar 14	1.82	Dr K Kalaivani, HoD
13.	HIV Surveillance Unit	12 Mar 14	1.82	Prof Madhulekha Bhattacharya
14.	MCTS Cell	13 Mar 14	1.82	Dr Pushpanjali Swain
15.	Health Policy Unit	14 Mar 14	1.82	Dr NK Sethi
16.	CHI	18 Mar 14 onwards	72.7	Prof Indrajit Bhattacharya, Additional Director (Technical) and NHP team

3.3 Reproductive and Child Health Training and Administrative Unit - MoHFW identified NIHFW as National Nodal Agency for coordinating the training under RCH in December 1997. NIHFW carried out the assigned task of development of prototype modules, training curricula & other training materials, coordinating training, conducting training of Master Trainers and monitoring the training in various parts of the country during RCH I, assisted by 18 Collaborating Training Institutions (CTIs). Subsequently in April 2006 after initiation of NRHM and RCH II, NIHFW was identified as National Nodal Agency for coordinating training under NRHM (both RCH and Disease Control) and was also entrusted with the responsibility of evolving a training strategy for integration of training for each category of personnel under various vertical programmes. In December 2007, NIHFW was also given the additional responsibility of

monitoring performance for certain aspects of RCH programme in the country especially high focus states. NIHFW is being assisted by 20 CTIs for carrying out the tasks of coordination training and monitoring performance.

3.4 HIV Surveillance Unit - NACO has designated the NIHFW to co-ordinate, supervise, monitor the implementation of the Annual Sentinel Survey for HIV in the country and prepare a national epidemiological report on HIV status since 1998. The objective of the unit is to ensure quality in the conduction of the Annual Sentinel Survey for HIV in the country in coordination with regional co-ordinating teams for supervision, monitoring and data collection from HIV sentinel sites and testing centres. Then to collate, analyse, interpret and prepare a report on the status of HIV infection in the country.

3.5 MCTS Cell - The NIHFW was identified to take a lead to collaborate with SIHFW's and RHFWTC to mentor M&E process in States, linking with PRC's spread across 18 States, in July 2010. The MoHFW designated the NIHFW, as the nodal agency, responsible for providing coordination and technical guidance for the project. MCTS cell has been established at NIHFW from 1st October 2012. The cell has been working under Statistics & Demography department with the guidance and direction of MoHFW and NIHFW. It is a name-based tracking system whereby pregnant women and children can be tracked for their ANCs and immunization along with a feedback system for the ANM, ASHA etc., to ensure that all pregnant women receive their ante-natal care check-ups (ANCs) and post-natal care (PNCs); and further children receive their full immunization.

3.6 Health Policy Unit is an apex body leading health policy research and analysis guiding governments (centre & state), health based civil society organisations, advocacy networks and coalitions, academic institutions and other stakeholders to establish and improve health policies and strategies.

3.7 National Health Portal (NHP) is one of the most prestigious projects of MoHFW, Govt of India setup under the CHI of NIHFW. The aim of developing the NHP was to provide a single platform for authenticated healthcare related information to all citizens of India. It also provides links to a large number of useful healthcare related websites

and selected m-health apps, in both English and Hindi. Beta version of the portal was released in Nov 2013, thus making it imperative to obtain feedback for further improvements in the portal in order to officially launch it by the end of 2014. An institutional system for obtaining the feedback of the portal is already in place in the form of a 'Feedback' link in the portal. However, the same was limited to the registered users and regular visitors of the portal. Moreover, there was a need to find out the effect of proliferation of m-health apps over the health indices in India.

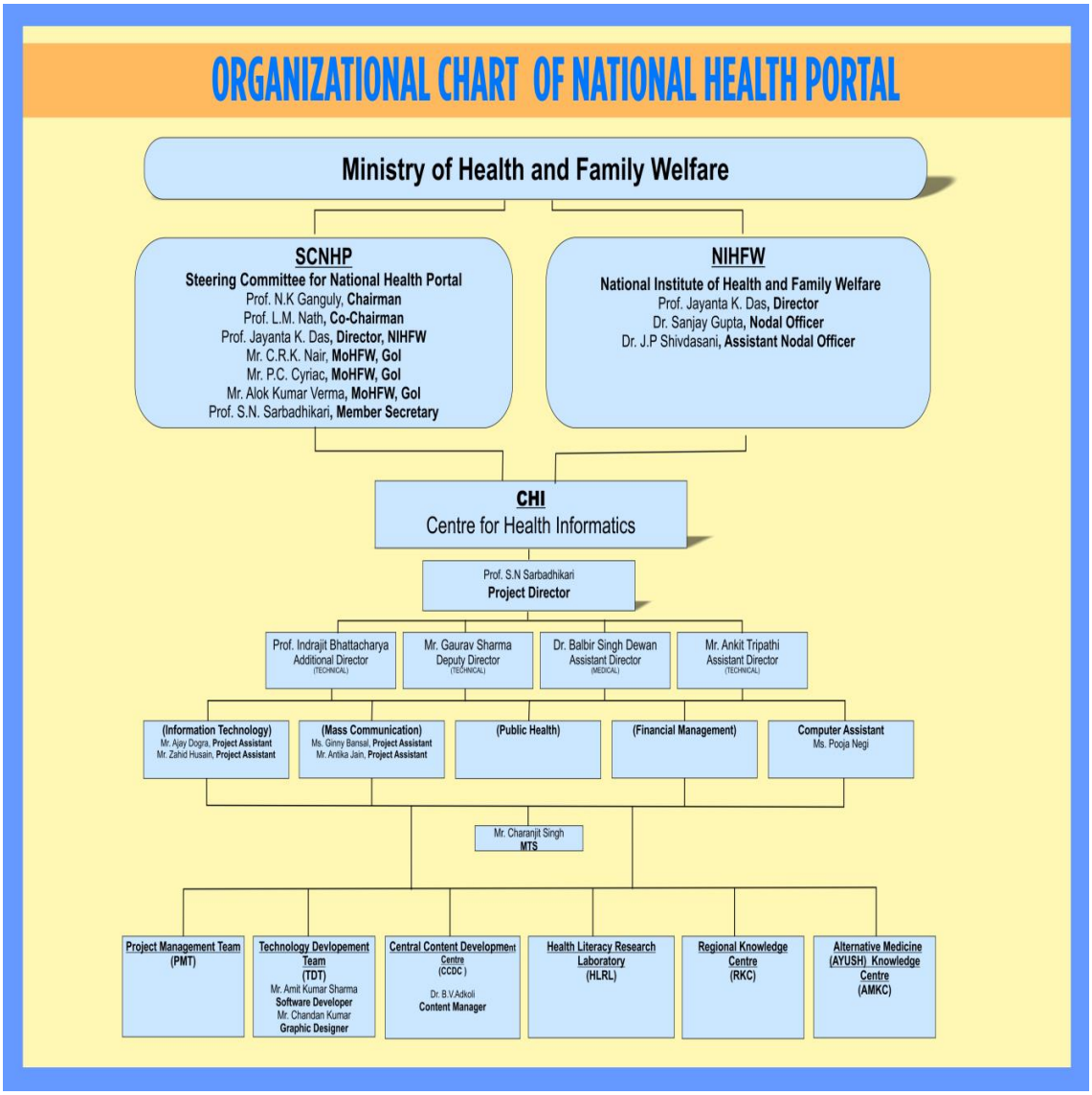

Figure 3.1 : Organisation chart of NHP

3.8 A relevant questionnaire was developed on Google docs to obtain a separate feedback from the industry, students, consultant firms, healthcare professionals, NGOs and the govt entities, etc with an aim to evaluate the usability and effectiveness of NHP with special reference to m-health apps.

SECTION 4 :

OBSERVATIONS/LEARNING

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4.1 The object of NIHFW is to act as an Apex Technical Institute for promoting Health and Family Welfare Programmes in the country through education, training, services, research and evaluation. For the achievement of the above object, following functions are carried out by the management and various departments of NIHFW.

4.2 Education and Training.

4.2.1 To conduct post-graduate diploma, degree and certificate courses in various aspects of Health and Family Welfare such as administration, biomedical sciences, demography and statistics, social sciences, communication, health economics, population sciences, population education and management sciences, etc.

4.2.2 To conduct advance in-service education and training programmes for senior Health and Family Welfare Planning personnel through organisation of courses such as staff colleges, hospital administration, comprehensive health planning, research methodologies and courses for teachers in medical colleges and key-trainers, etc.

4.2.3 To develop methods and materials for training in the field of Health and Family Welfare Planning.

4.2.4 To monitor and evaluate education and training programme in Health and Family Welfare Planning.

4.2.5 To establish, develop and maintain Field Practice and Demonstration Areas (Rural and Urban) for the purpose of education, training and research programmes.

4.2.6 To conduct other orientation and/or training courses in various aspects of Health and Family Welfare Planning for national and international trainees.

4.3 Research.

4.3.1 To review and coordinate research in the field of Health and Family Welfare Planning including demographic and communication action research in the country.

4.3.2 To generate advanced knowledge through research related to the education and training, social, communication, medical, biological, genetic, population education, demography, statistical, organizational, administrative, operational aspects of the National Health and Family Welfare Planning Programme.

4.3.3 To develop more effective methods in ways of applying the relevant knowledge already available for strengthening the National Health and Family Welfare Planning Programme.

4.3.4 To experiment, test and develop effective alternative methods of programme operations, delivery system, organisational procedures and demonstrating their application in the field.

4.3.5 To assign research studies in the field of Health and Family Welfare to special institutions or departments of existing institutions in the country and provide financial assistance for the same.

4.3.6 To patent drugs etc. invented at later stages.

4.4 Evaluation.

4.4.1 To develop tools, techniques and methodologies for research and evaluation, and also to carry out evaluation of plans, programmes and projects in health and family welfare planning.

4.4.2 To develop and evaluate educational prototypes for the various categories of health and family welfare planning personnel.

4.5 Service.

4.5.1 To provide data processing services.

4.5.2 To develop and organise various Health and Family Welfare Planning services for demonstration, training and research.

4.6 Consultancy. To provide and collaborate in providing consultancy services in the field of health and family welfare planning.

4.7 Documentation and Clearing House Services.

4.7.1 To develop and organize a documentation centre which will also work as a clearing house, with a view to collate, compile, disseminate technical knowledge and programme information in relation to health and family welfare planning programmes.

4.7.2 To undertake the publication of monographs, journals, research papers, technical reports, bulletins, newsletters and books, etc.

4.8 Others.

4.8.1 To seek affiliation of the Institute with the Universities.

4.8.2 To grant certificates, diplomas and other academic distinctions and titles as may be provided for in the regulations.

4.8.3 To invite representatives of the Government, Universities and other Institutions and Organisations, Indian or Foreign, and prominent scientists to participate in the programmes of the Institute.

4.8.4 To cooperate with International agencies engaged in health and family welfare planning programmes, in training, research and service activities including interchange of personnel, material and data.

4.8.5 To create administrative, technical, ministerial and other posts under the Institute and make appointments thereto in accordance with the rules and regulations.

4.8.6 To appoint and hire services or discharge/terminate the services of the personnel and to pay them in return for the services rendered to the Institute, salaries, wages, gratuities, pensions, provident fund and other allowances or remuneration in accordance with the rules and regulations of the Institute.

4.8.7 To establish an appropriate Contributory Provident Fund for the benefit of the employees of the Society.

4.8.8 To accept grants of money, securities and properties of any kind and/or produce capital financial assistance or accommodation on such terms which may be expedient.

4.8.9 To issue appeals and apply for money and funds in the furtherance of the objects of the Institute and to raise or collect funds by gifts, donations, subscriptions or otherwise, of cash and securities and any property either movable or immovable and grant such rights and privileges to the donors, subscribers, and other benefactors as the Institute may consider fit and proper.

4.8.10 To invest and deal with the funds and money of the Institute.

4.8.11 To acquire by gift, purchase, exchange, lease, hire or otherwise, any property, movable or immovable which may be necessary or convenient for the purpose of the Institute and build, construct, improve, alter, demolish and repair the buildings, works and constructions as may be necessary for carrying out the object of the Institute.

4.8.12 To borrow and raise money with or without security or on the security of a mortgage charge or hypothecation or pledge of all or in any other manner.

4.8.13 To sell mortgage, lease, exchange, and otherwise transfer or dispose of all or any part of the property, movable or immovable of the Institute for the furtherance of its objective subject to prior approval of the Governing Body of the Institute.

4.8.14 To draw, make, accept, endorse, discount, execute, sign, issue and otherwise deal with cheques, hundies, drafts, certificates, receipts, government securities,, promissory notes, bills of exchange or other instruments and securities whether negotiable or transferable or not, for the purpose of the society.

4.8.15 To make rules and regulations and Bye-laws for the conduct of the affairs of the Institute and to add, to amend, vary or rescind them from time to time.

4.8.16 To create, accept and undertake the management and administration of any endowment or trust fund, or any subscription or donation provided that the same is unaccompanied by any condition inconsistent with or in conflict with the nature and objects for which the Institute is established.

4.8.17 To apply for and take out purchase or otherwise acquire any trademarks, patents, brevets, invention licenses, copyrights, concessions and the like conferring any exclusive or non-exclusive or limited right to use any secret or other information as to any invention which may seem capable of being used for any of the purposes of the Institute or the acquisition of which may seem calculated directly or indirectly to benefit the Institute and to use, carry out, exercise and develop and turn to account the property, rights or information so acquired and to grant licenses to use the same.

4.8.18 To enter into any agreement with any government or authority, municipal, local or otherwise, to obtain from such government or authority any rights, privileges, concessions, statutory or otherwise, that the Institute may deem desirable to obtain and carry out, exercise and comply with such arrangements, rights, privileges and concessions.

4.8.19 To grant prizes, awards, scholarships, travel grants, research grants, stipends and other incentives.

4.8.20 To advance conveyance and other loans to the employees of the Institute, as applicable to the Central Government Employees from time to time.

4.8.21 To take over all the assets and liabilities of the National Institute of Health Administration and Education, and National Institute of Family Planning, New Delhi.

4.8.22 To perform all such other lawful acts and things either alone or in conjunction with other organisations or persons as the Institute may consider necessary, incidental or conducive to the attainment of all or any of the above mentioned functions.

References

1. Annual report of NIHFW, 2012-13.

2. Official website of NIHFW; www.nihfw.org.

3. Beta version of NHP; www.nhp.gov.in.

4. Project reports of ongoing projects of NIHFW.

5. Memorandum of Association in respect of NIHFW.

Internship Training at National Institute of Health and Family Welfare

By

Col Sumesh Seth

PGDHM
2012-2014

International Institute of Health Management Research
New Delhi

Internship Training

At

National Institute of Health and Family Welfare

Evaluation of Usability and Effectiveness of National Health Portal with Special Reference to m-Health Applications

By

Col Sumesh Seth

Under the guidance of

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Post Graduate Diploma in Hospital and Health Management
2012-2014

International Institute of Health Management Research
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Abstract

1. National Institute of Health and Family Welfare (NIHFW) is an autonomous institute under the Ministry of Health and Family Welfare (MoHFW). National Health Portal (NHP) is one of the most prestigious projects of Centre for Health Informatics (CHI) under NIHFW. Beta version of the NHP was released in Nov 2013, with the objective of providing authenticated healthcare related information to all citizens of India. The portal also offers numerous healthcare links and selected m-health applications (apps) in both English and Hindi. The internship-cum-dissertation training in NIHFW was conducted from 24 Feb to 16 May 14, during which several departments of the institute were visited for acclimatisation and to understand their functioning in first three weeks. Subsequently, the dissertation work was executed with the NHP team with the objective to evaluate the usability and effectiveness of the NHP with special reference to m-health apps.

2. A relevant questionnaire was developed to obtain feedback from the HIT industry, students, consultant firms, healthcare professionals, NGOs and the govt entities, etc with an aim to evaluate the usability and effectiveness of NHP with special reference to m-health apps. A data bank of emails was captured in respect of the registered users of the NHP as well as about the healthcare industry to forward the Google docs link with the feedback questionnaire to almost 800 likely respondents, out of which approximately 20% emails were found to be blocked/changed, however 33 responses were received for further analysis.

3. Feedback about the perceived benefits and various features of the portal was obtained mainly from the urbanised healthcare professionals. Health literacy and reliable health information were considered as the key perceived benefits with 55% responses each, whereas interoperability, open/easy access and availability of policies/ plans received 24% each. About 82% were moderately/very satisfied with the design of the NHP; about 73% were moderately/very satisfied with the information given; about 85% were moderately/very satisfied with the links offered; about 76% were moderately/ very satisfied with the innovativeness; and only about 54% of the respondents were moderately/very satisfied with the m-health apps listed at the NHP.

4. Feedback on m-health apps was also obtained with key study variables as potential benefits of m-health apps, impact of drivers on m-health market, impact of m-health on healthcare cost drivers, m-health apps category, barriers of m-health and devices for m-health apps; and importance of vernacular languages in m-health apps. Almost 52% respondents ranked 'increase health consciousness of the society' as 1st and about 40% ranked 'improve interaction between patients and doctors' as 2nd key potential benefit of m-health apps. Smartphone and tablet penetration was considered as the main driver to impact the growth of m-health market by almost 67% respondents, while user/patient demand for m-health apps was at second position with about 48% responses. About 45% believe that 'reduce prevention cost by apps that support patient education' and 42% each believe 'reduce costs of patients non-adherence to a medical treatment by increasing patient engagement with compliance apps' and 'reduce labour costs by increased outsourcing via apps that provide access to remote consultation & diagnostics in low labour cost countries' were key healthcare cost drivers impacted by m-health apps.

5. The m-health apps categories with maximum market potential were 'reminders and alerts apps' and 'remote monitoring apps' with about 48% and 42% responses respectively, whereas about 30% responses favoured remote consultation apps, diagnostic apps, fitness apps and nutrition apps each. Lack of standardisation, lack of data security and resistance from traditional healthcare providers were selected as three main barriers to m-health apps with about 42%, 33% and 33% responses respectively. The other barriers with 27.3% responses each were difficulties for users in finding the right m-health solutions and lack of profitable business models. Smart phones were considered the main target device for m-health apps with about 76% responses, whereas Tablets were at second position with about 48.5% responses. Finally, 55% respondents agreed and 30% strongly agreed that use of vernacular languages in m-health apps will improve the health indices of India.

TO WHOMSOEVER IT MAY CONCERN

This is to certify that Col Sumesh Seth, student of Post Graduate Diploma in Hospital and Health Management (PGDHHM) from International Institute of Health Management Research, New Delhi has undergone internship training at National Institute of Health and Family Welfare from 24 Feb 2014 to 16 May 2014.

The Candidate has successfully carried out the study designated to him during internship training and his approach to the study has been sincere, scientific and analytical.

The Internship is in fulfilment of the course requirements.

I wish him all success in all his future endeavours.

Dr AK Agarwal
Dean, Academics and Student Affairs
IIHMR, New Delhi

Dr Anandhi Ramachandran
Assistant Professor
IIHMR, New Delhi

राष्ट्रीय स्वास्थ्य एवं परिवार कल्याण संस्थान
(स्वास्थ्य एवं परिवार कल्याण मंत्रालय, भारत सरकार के अधीन एक स्वायत्तशासी संस्थान)
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आरोग्यम् सुखसम्पदा

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The certificate is awarded to

Col Sumesh Seth

In recognition of having successfully completed his
Internship in the department of

National Health Portal

and has successfully completed his Project on

Evaluation of Usability and Effectiveness of National Health Portal with
Special Reference to m-Health Applications

16 May 2014

National Institute of Health and Family Welfare

He comes across as a committed, sincere & diligent person who has a
strong drive & zeal for learning

We wish him all the best for future endeavours

Training & Development

आंकित त्रिपाठी / Ankit Tripathi
सहायक निदेशक (तकनीकी) / Assistant Director (T)
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CERTIFICATE OF APPROVAL

The following dissertation titled **"Evaluation of usability and effectiveness of NHP with special reference to m-health apps"** at **"NIHFW"** is hereby approved as a certified study in management carried out and presented in a manner satisfactorily to warrant its acceptance as a prerequisite for the award of **Post Graduate Diploma in Hospital and Health Management** for which it has been submitted. It is understood that by this approval the undersigned do not necessarily endorse or approve any statement made, opinion expressed or conclusion drawn therein but approve the dissertation only for the purpose it is submitted.

Dissertation Examination Committee for evaluation of dissertation.

Name	Signature
Dr. Anuradha Ramachandra	
DR. ABHIJIT CHAKRABARTY	17/05/14

CERTIFICATE FROM DISSERTATION ADVISORY COMMITTEE

This is to certify that **Col Sumesh Seth,** a post-graduate student of the **Post-Graduate Diploma in Hospital and Health Management** has worked under our guidance and supervision. He is submitting this dissertation titled "Evaluation of usability and effectiveness of NHP with special reference to m-health apps" at "NIHFW" in partial fulfilment of the requirements for the award of the **Post-Graduate Diploma in Hospital and Health Management.**

This dissertation has the requisite standard and to the best of our knowledge no part of it has been reproduced from any other dissertation, monograph, report or book.

16/5/14

Dr Anandhi Ramachandran,

Assistant Professor,

IIHMR, New Delhi

Prof Indrajit Bhattacharya,

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CERTIFICATE BY SCHOLAR

This is to certify that the dissertation titled 'Evaluation of Usability and Effectiveness of National Health Portal with special reference to m-Health Applications' and submitted by Col Sumesh Seth, Enrolment No. PG/12/091 under the supervision of Dr Anandhi Ramachandran for award of Postgraduate Diploma in Hospital and Health Management of the Institute carried out during the period from 24 Feb 2014 to 16 May 2014 embodies my original work and has not formed the basis for the award of any degree, diploma, associate ship, fellowship, titles in this or any other Institute or other similar institution of higher learning.

(Col Sumesh Seth)

FEEDBACK FORM

Name of the Student: Col Sumesh Seth

Dissertation Organisation: NIHFW, New Delhi

Area of Dissertation: Evaluation of usability and effectiveness of NHP with special reference to m-health apps

Attendance: 100%

Objectives achieved: Yes, very well done.

Deliverables: Elaborate and meticulously prepared evaluation report on usability and effectiveness of NHP and m-health apps.

Strengths: Sincerity, diligence, self-discipline and systematic approach.

Suggestions for Improvement: Nil.

16/5/14

Prof Indrajit Bhattacharya
Organisation Mentor (Dissertation)

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Date: 16 May 14

Place: New Delhi

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They inspired me greatly to work in this project and their willingness to motivate contributed tremendously to the project. I also would like to thank them for showing examples that were related to the topic of my project and providing with a good environment and facilities to complete this project. It gave me an opportunity to participate and learn about the operation of NHP, preparation of questionnaire on Google Docs and analysis of responses. Finally, I would like the honorable mention and a sincere vote of thanks to all the respondents, whose unflagging support, understanding and cooperation helped me in making this project possible and hence aided me in accomplishing the objectives with such ease and precision.

Table of Contents

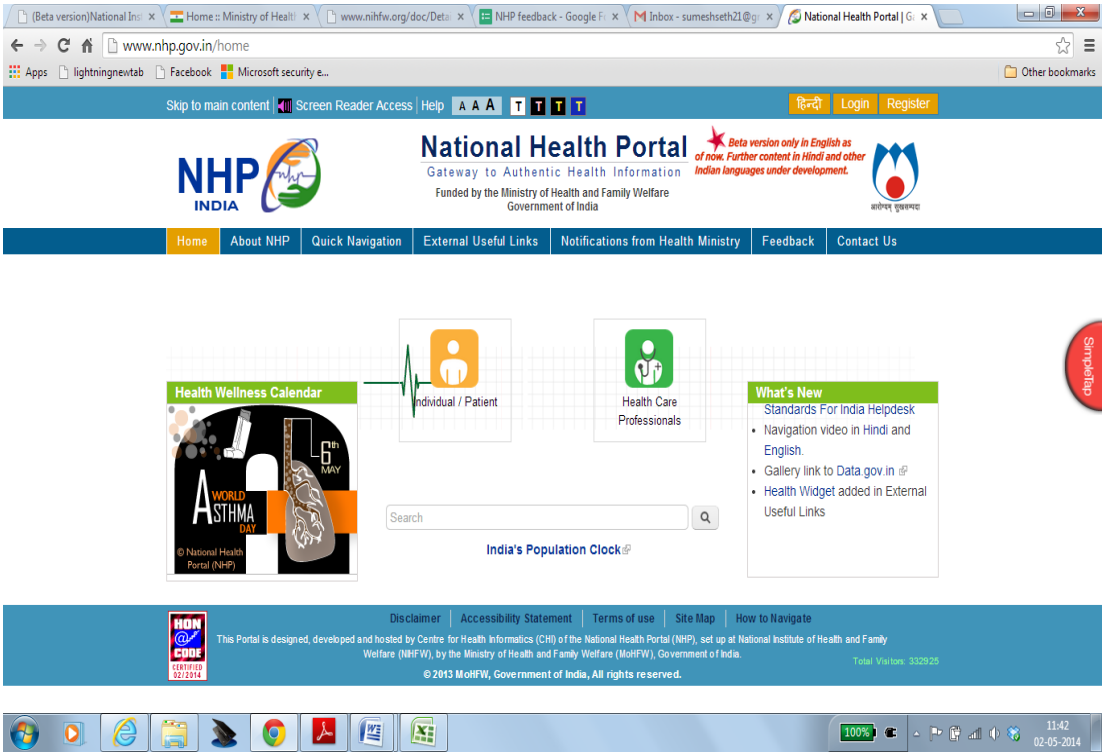
List of Figures/Tables/Graphs

Acronyms/Abbreviations

1.	Apps	-	Applications
2.	AMKC	-	Alternative Medicine Knowledge Centre
3.	AYUSH	-	Ayurveda Yoga and Naturopathy Unani Siddha Homoeopathy
4.	CAM	-	Complementary and Alternative Medicine
5.	CCIM	-	Central Council of Indian Medicine
6.	CCDC	-	Central Content Development Centre
7.	C-DAC	-	Centre for Development of Advanced Computing
8.	CHI	-	Centre for Health Informatics
9.	CIIL	-	Central Institute of Indian Languages
10.	CMS	-	Content Management System
11.	DOL	-	Dept of Official Language
12.	ICMR	-	Indian Council of Medical Research
13.	ICT	-	Information Communication Technologies
14.	IEC	-	International Electro-technical Commission
15.	IMA	-	Indian Medical Association
16.	MCI	-	Medical Council of India
17.	M-health	-	Mobile Health
18.	MoHFW	-	Ministry of Health and Family Welfare
19.	NCDC	-	National Centre for Disease Control
20.	NDMA	-	National Disaster Management Authority
21.	NGO	-	Non Governmental Organization
22.	NHP	-	National Health Portal
23.	NIC	-	National Informatics Centre
24.	NIDM	-	National Institute of Disaster Management
25.	NIHFW	-	National Institute of Health and Family Welfare
26.	NKC	-	National Knowledge Commission
27.	NRHM	-	National Rural Health Mission
28.	PSC	-	Portal Steering Committee
29.	RKC	-	Regional Knowledge Centre
30.	SJRI	-	St John's Research Institute
31.	SMS	-	Short Messaging Service
32.	TDIL	-	Technology Development of Indian Languages

List of Annexure

CHAPTER 1 : INTRODUCTION



EVALUATION OF USABILITY AND EFFECTIVENESS OF NHP WITH SPECIAL REFERENCE TO M-HEALTH APPS

CHAPTER 1 : INTRODUCTION

1.0 This section has been described as under:-

1.1 Introduction.

1.2 Problem statement.

1.3 Objectives.

1.1 **Introduction**. National Health Portal (NHP) is one of the most prestigious projects of MoHFW, Govt of India setup under the CHI of NIHFW. The aim of developing the NHP was to provide a single platform for authenticated healthcare related information to all citizens of India. The scope of this project was to include but not limited to - building the health portal with all its features and functionalities and dissemination of information on the portal through various modalities. The portal will be updated with content in a phased manner. Although there may be certain overlaps between the phases, it was planned that the portal would be developed over a period of 4 years and thereafter regular updates would be performed under maintenance phases. It would also provide links to a large number of useful healthcare related websites and selected m-health apps, in both English and Hindi.

1.1.1 There were three development objectives of the project:-

(a) The project aims to improve the health literacy of the masses in India.

(b) It aims to improve access to health services across the nation.

(c) It aims to decrease the burden of disease by educating the people on the preventive aspects of disease.

1.1.2 The project has following key outputs:

(a) Improve access to services through IT enabled cataloguing of service providers.

(b) Create a web based NHP to make available comprehensive health related information to the community using IT and analogue/non-IT methods.

(c) Create protocols to enable the masses to access reliable, easy to understand, multilingual health information from the interactive NHP.

(d) Create protocols for wide dissemination of health information in public domain using the internet and other pertinent communication modalities.

(e) Create databases to enable citizens to seek, locate and access health care providers across the country.

(f) Create platforms to provide health information and health resources for the healthcare workers, NGOs, student communities, and health professionals.

(g) Create a transparent resource on regulatory and statutory guidelines pertaining to healthcare in India.

1.1.3 Key outcomes of the project are:

(a) Wider awareness of validated information on health, common diseases and health services.

(b) Improved health status of citizens through better access to services.

(c) Improved financial status of citizens through optimized allocation of resources.

(d) To enable the masses to access reliable, easy to understand, multilingual health information from an interactive NHP.

(e) To make health information readily available on the public domain using the Internet and other pertinent communication modalities.

(f) To enable an average citizen to seek, locate and access health care providers across the country.

(g) To provide health information and resources for the healthcare workers.

(h) To provide information to organizations who wish to contribute to public health and welfare (NGOs).

(i) To provide health information to cater to the needs of student communities including educational/career opportunities.

(j) To cater to the body of health professionals and meet their information needs, networking, and learning.

(k) To provide a transparent resource on regulatory and statutory guidelines pertaining to healthcare in India to the public.

(l) To provide information on National/State Health Programmes and schemes to the public.

1.1.4 Beta version of the portal was released in Nov 2013, thus making it imperative to obtain feedback for further improvements in the portal in order to officially launch it later. An institutional system for obtaining the feedback of the portal is already in place in the form of a 'Feedback' link in the portal. However, the same was limited to the registered users and regular visitors of the portal. Moreover, there was a need to find out the effect of proliferation of m-health apps over the health indices in India.

1.1.5 A relevant questionnaire was developed to obtain a separate feedback from the industry, students, consultant firms, healthcare professionals and the govt entities, etc with an aim to evaluate the usability and effectiveness of NHP with special reference to m-health apps. A data bank of emails was captured in respect of the registered users of the NHP as well as about the healthcare industry, professionals, NGOs and institutions to forward the Google docs link with the feedback questionnaire to almost 800 likely respondents, out of which approximately 20% emails were found to be blocked/ changed, however 33 responses were received for further analysis.

1.2 **Problem Statement**. There is a need to obtain feedback from healthcare professionals including registered users of the portal, mainly restricted to urban population/internet users, in order to evaluate the usability and effectiveness of the NHP with special reference to m-health apps (case study). The purpose of this study is to evaluate NHP through the usability test mainly with urban citizens as subjects. The study will help to evaluate the health portal and m-health apps market and also to determine important factors regarding usability of the portal for patients, health care planners and strategy makers with the help of a questionnaire. This would assist the NHP team to further improve the portal contents and launch it by end of 2014.

1.3 **Objectives**. The general objective, specific objectives and research question are enumerated in succeeding paragraphs.

1.3.1 **General Objective**. The objective of the study is to evaluate the usability and effectiveness of NHP with special reference to m-health apps.

1.3.2 **Specific Objectives**. Enumerated as under:-

(a) To obtain perceived benefits of the NHP from the environment as compared to the laid down development objectives.

(b) To determine satisfaction level regarding design, information, innovation, links and listed m-health apps of the portal.

(c) To recognize the key potential benefits, drivers, cost drivers and barriers of m-health apps having positive impact on healthcare in next five years.

(d) To identify the key m-health app categories and devices in next five years.

(e) To find out the importance of vernacular languages in m-health apps.

1.3.3 **Research Question**. What is the usability and effectiveness of NHP with special emphasis on m-health apps amongst the healthcare professionals?

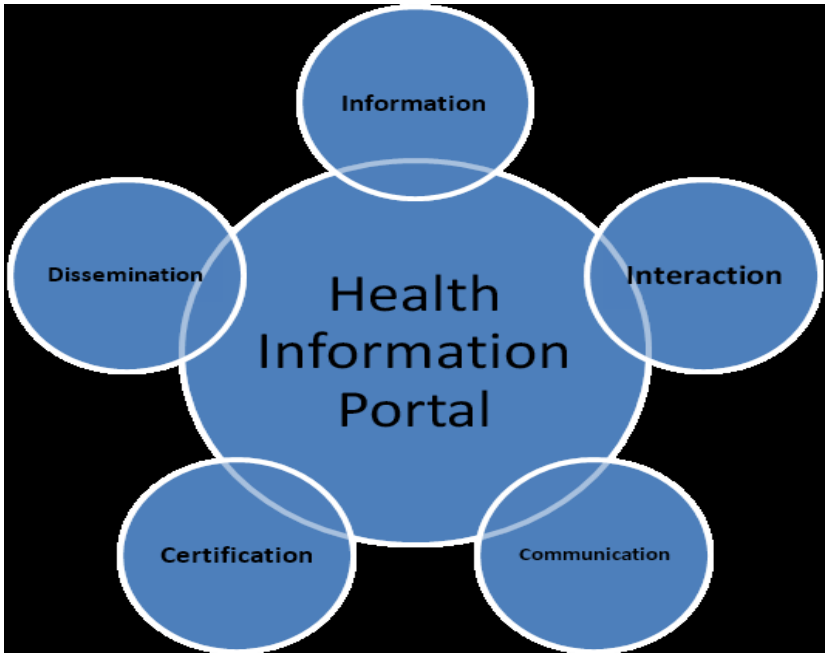


Figure 1.1: Features of the National Health Portal [3]

SECTION 2 : REVIEW OF LITERATURE

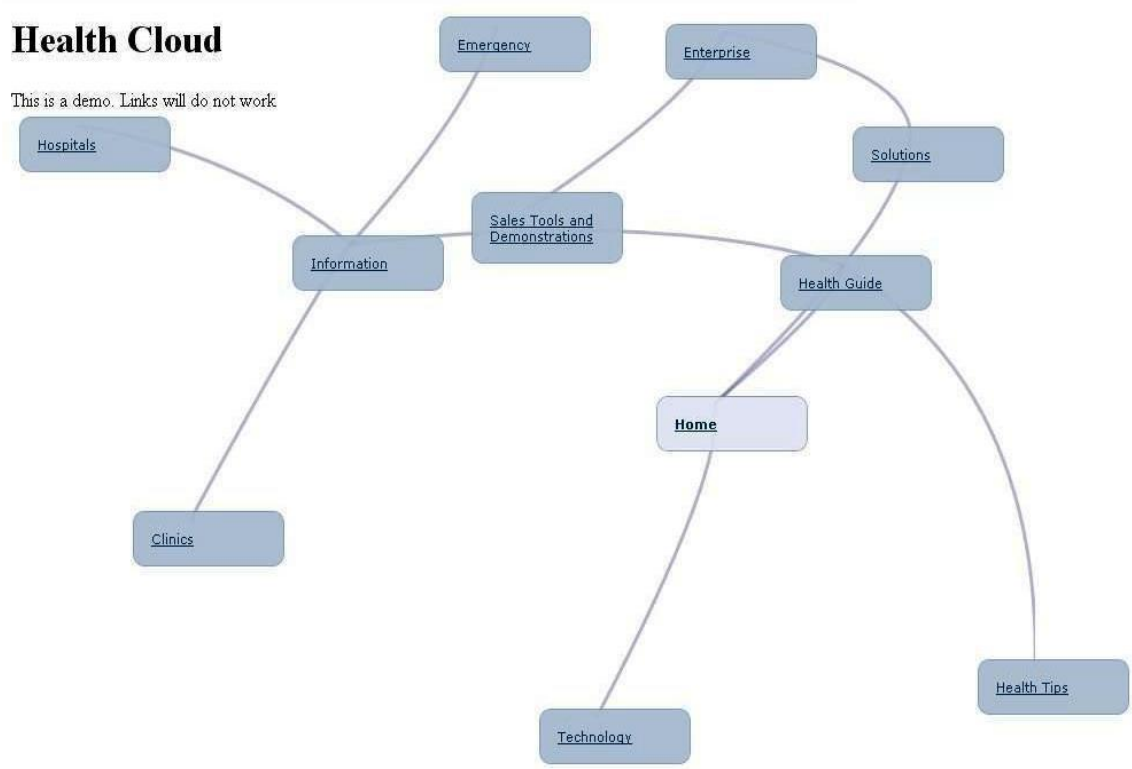


Figure 2.1: Health Cloud Concept

SECTION 2 : REVIEW OF LITERATURE

2.0 The review of literature has been discussed as under:-

2.1 Concept of health portal and m-health apps.

2.2 Studies/papers on health portals and m-health apps.

2.1 **Concept of Health Portal and M-Health Apps**. Different authors have defined usability in a number of ways. The most common definition of usability is "*the capability of a software product to be understood learned, used attractive to the user, when used under specified conditions*". Usability refers to learn-ability, efficiency, memorability, few errors and user satisfaction. Learn-ability means easy to learn, memorability defines that the system should be easy to remember for users, efficiency deals how system make the users capable to perform their job. Few errors mean that the error rate is minimum in the system and can be easily repaired in case of error. Satisfaction means that the system should be user friendly so that users are personally satisfied when they use it. Usability is a key quality attribute for the success of interactive applications. It refers to the ease with which users can access information and navigate the web portal.

2.1.1 Health information is essential for the patients to make and understand the significant decisions regarding their medical care and health status. According to the surveys held in 1999, people seek health information very commonly and frequently on the internet. E-health portal refers to delivery of information and health services via internet or related technologies. Patients use these portals, to get more health information than they can have in their patient-physician relationship. E-health applications can be useful in providing better quality of life in a cost effective way. As most of the patients and health professionals use web resources for seeking information, doing research and communication, so the health portals are becoming an industry standard. It is required that the health portal should be according to expectations of the citizens and effective for the provision of health care services.

2.1.2 Internet constitutes a powerful and democratic source of information and knowledge, as a result the National Knowledge Commission (NKC) deliberated on ways to create a series of web portals, with an aim to become a decisive tool in the popular movements like the right to information, decentralisation, transparency,

accountability and people‘s participation. In order to increase openness and enhance accessibility, the NKC recommended the creation of web portals to aggregate, organise and present relevant and useful content in English and local languages, in a highly uniform, customisable, user-friendly and personalised way for several key areas related to basic human needs.

2.1.3 The country has undertaken major reforms in the health sector in the recent years and there is an opportunity for deploying IT to disseminate health information and present greater health choices before the citizens and help improve health status of the people. The proposal seeks to utilise IT-enabled protocols for improving access to health-related information and services so as to improve the quality of life of citizens specially the poor people living in remote rural areas of the country. The developments in information and communication technology (ICT) have created new opportunities for enhancing the efficiency of health care delivery. It has also come to light that the availability of information pertaining to traditional systems of medicine is lacking in the public domain. In a multilingual country, translation plays a critical role in making this knowledge available to different linguistic groups. It has therefore become increasingly necessary to champion the cause of health literacy.

2.1.4 In the wake of this, the NKC had proposed to launch the National Health Information Portal which would serve as a comprehensive source on health information in India. This portal will provide information on healthcare for the citizens of India and the healthcare workers alike and will serve as a single point of access for consolidated health information, application and resources on the sector and aim to cater to a wide spectrum of users from citizens, to students, healthcare professionals and researchers.
The proposal aims to create space for other portals, publishers, IT and non IT based interventions. As the portal evolves, cloud computing technologies could be incorporated with the central agency becoming the mentor for multiple interventions (thematic, geographical etc). The National Health Portal has been built in collaboration with a wide range of stakeholders from all sectors including Government, academic institutes, private sector and technology experts.

2.1.5 However, the challenges that need to be considered in India include the prevalence of illiteracy, multiple languages and cultures and poor access to the internet

especially in rural areas. These problems can be resolved by disseminating quality health information tailored for the population of our nation by using a wide range of ICT including fixed and mobile telephony, touch-screen kiosks, television and radio, besides the internet. A recent review found that there was a lacuna in the availability of essential health information on Indian websites with regard to mainly non-communicable diseases and injuries. This is a significant gap as India is undergoing an epidemiological transition and non-communicable diseases now account for a major proportion of disease burden. This is besides the point that information on any health condition is less than required across the spectrum.

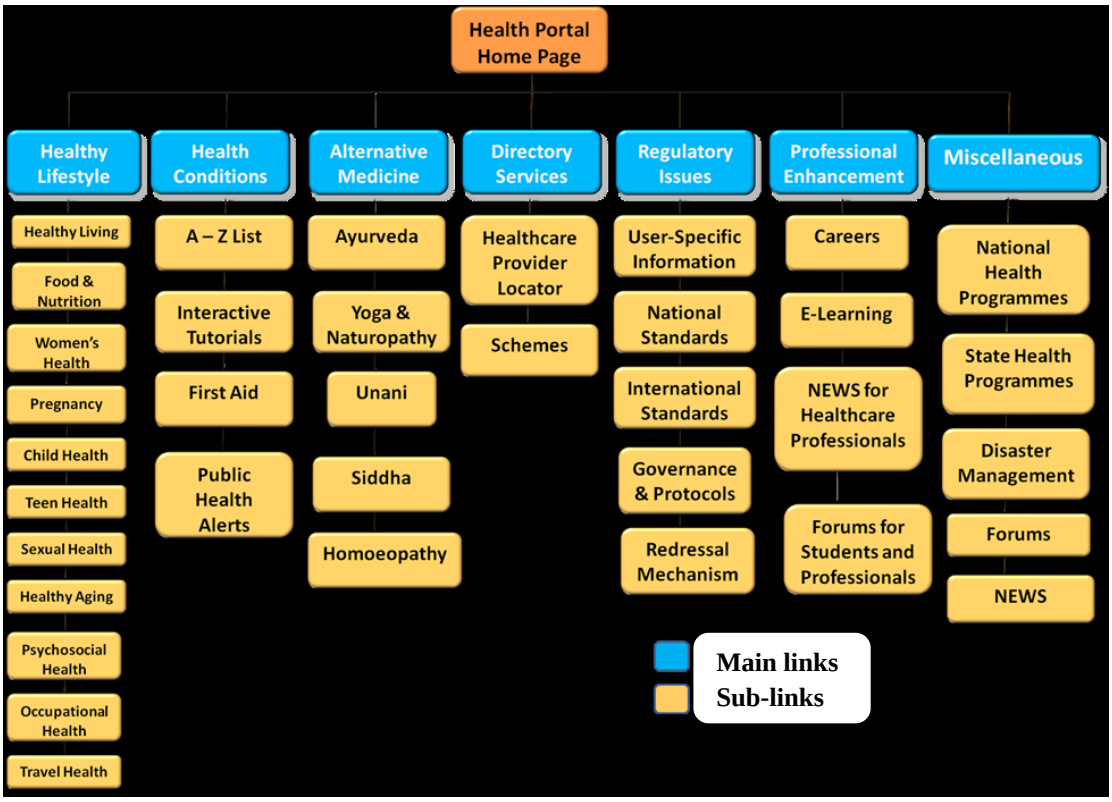


Figure 2.2: Proposed Sitemap for the National Health Portal (year 1-4 & beyond)

2.1.6 The development of reliable, relevant, usable information in an agreed-upon fashion requires cooperation among a wide range of stakeholders including health-care providers, policy makers, researchers, publishers, information professionals, indexers, and systematic reviewers. However, concerns have emerged regarding the quality of health information documents contained on the World Wide Web and this requires introspection. Health information published on the internet lacks review, and there

is no means by which the user can check the validity of the information. Often the information present on the internet is inaccurate and misleading. It was felt that for those seeking easy ways to identify high-quality and reliable information, rating systems to evaluate the quality of health information on the internet should be provided and developed.

2.1.7 M-Health can be understood as a term for collectively describing use of electronic information and communication technology in the healthcare sector. This refers to a technology used across the value chain in healthcare industry from clinical trials, education, research, and administrative purposes, both at the local site and across geographies or regions. It has the potential to improve efficiency in healthcare delivery, extend healthcare to rural areas, provide better quality of healthcare at a lower cost, enhance use of evidence-based medicine, stress on preventive healthcare, empower patients and consumers, and support to smooth relationships between patients and health professionals. The mHealth apps market is broadly categorized into connected medical devices and healthcare applications; connected devices dominate the current market with around 80% of the total revenue contribution. Patient monitoring and fitness-wellness are the major application areas of mobile health technology. The most commonly used device and app are cardiac monitoring and exercise app, respectively. The connected devices market is segmented into cardiac monitoring, diabetes management device, multi-parameter tracker, and other devices like sleep apnea devices, and respiratory monitors. Cardiac monitoring and fitness tracking are the most prominent uses of mobile-enabled connected devices owing to the increasing awareness of the need for healthy lifestyles. On the other hand, the diabetes management connected devices market is on the rise to capitalize on the continuous monitoring products of the blood glucose market.

2.1.8 The mHealth apps market is majorly classified into health and medical apps. The market is dominated by health apps with more than 85% volume contribution to the healthcare application market. Health apps are segmented into exercise, weight loss, women's health, sleep and meditation, medication reminder and other apps, while the medical apps market is segmented into medical reference, and other applications like apps for mental health, dermatological treatment, and emergency response. The major

hindrances in the paid apps market include the availability of free apps almost in all application areas and its low price range. Moreover, an interoperable business model integrates various business entities such as application developers, download centers, and platform developers, thus diluting individual quality contributions to the end solution. Exercise app gains the maximum popularity as it transforms the daily-used gadget, smartphone, into a personal workout trainer without significant investment.

2.2 **Studies/Papers on Health Portals and M-Health Apps**. Certain selected papers on health portals and m-health apps have been summarised in succeeding paragraphs in order to elucidate the concept and its implementation in different countries.

2.2.1 Health 2.0 in Practice: A Review of German Health Care Web Portals by Roland Görlitz, Benjamin Seip et al, 2010 [6]: Contemporary studies show that the usage of health-related web portals increases continuously. Additionally, the internet's usage is in a transition towards more user participation by allowing more and more user generated content. In the area of health care this development is commonly called health 2.0; a development that leads more patients and doctors to actively participate and contribute on health portals their virtual communities. This results in numerous opportunities for health care providers to capitalize on online health communities. In order to aid the understanding of this emerging trend, the paper presents an extensive analysis of up-to-date 246 German web portals that provide health-related content from a user perspective. They are classified as well as clustered according to their characteristics regarding usage of web 2.0 technologies and health care specialization. With this clustered overview of the current health care web portals the paper tries to clarify the term health 2.0. Additionally, general design options for health care portals are drawn from the analyzed web portals and state-of-the-art literature to aid in the development of new health care portals.

2.2.2 European citizens' use of E-health services: A study of seven countries by H K Andreassen, Maria M Bujnowska-Fedak, Catherine E Chronaki, Iveta Pudule, Roxana C Dumitru, Silvina Santana, Henning Voss and Rolf Wynn, BMC Public Health, Apr 2007 [4]: Background. European citizens are increasingly being offered Internet health services. This study investigated patterns of health-related Internet use, its consequences, and citizens' expectations about their doctors' provision of e-health

services. Methods**.** Representative samples were obtained from the general populations in Norway, Denmark, Germany, Greece, Poland, Portugal and Latvia. The total sample consisted of 7934 respondents. Interviews were conducted by telephone. Results**.** 44 % of the total sample, 71 % of the Internet users, had used the Internet for health purposes. Factors that positively affected the use of Internet for health purposes were youth, higher education, white-collar or no paid job, visits to the GP during the past year, long-term illness or disabilities, and a subjective assessment of one's own health as good. Women were the most active health users among those who were online. One in four of the respondents used the Internet to prepare for or follow up doctors' appointments. Feeling reassured after using the Internet for health purposes was twice as common as experiencing anxieties. When choosing a new doctor, more than a third of the sample rated the provision of e-health services as important. Conclusion. The users of Internet health services differ from the general population when it comes to health and demographic variables. The most common way to use the Internet in health matters is to read information, second comes using the net to decide whether to see a doctor and to prepare for and follow up on doctors' appointments. Hence, health-related use of the Internet does affect patients' use of other health services, but it would appear to supplement rather than to replace other health services.

2.2.3 Future Research on Dimensions of E-Service Quality in Interactive Health Portals: The Relevancy of Actor-Network Theory by Saman Foroutani, Noorminshah A. Iahad and Azizah Abdul Rahman, IJANTTI, Volume 5, Issue 4. 2013 [7]: Online Health Organisations (OHOs) involve the use of virtual healthcare and medical services across distances (Poropatich et al., 2013). OHOs extend healthcare services to a more geographically dispersed population than is possible with traditional care (Arief et al., 2013). In fact, OHOs can be defined as the use of existing and emerging e-technologies to provide and support healthcare delivery that transcends physical, temporal, social, political, cultural, and geographical boundaries (Tan, 2005). In other words, according to Eng (2001), OHOs define as use of communication and Information Technology, and especially the Internet, for developing health care. Riteaid.com and Walgreens.com are some vivid example of OHOs that provide online services to patients. Interactive health portals (IHPs) are portals that help OHOs to offer online services to their patients. IHPs provide vast opportunities for both health organisations and patients. Health organisations are able to provide their conventional services 24 hours 7 days a week via

the Internet (Jaganath et al., 2012). IHPs can transfer some of their services to the Internet and improve their quality to reduce overall costs (Bilsel et al., 2006). Most health organisations receive no governmental financial aids and are in a close competition with each other (inside investor, 2012). Enhanced online services can help them to provide more effective and more perfect services for their patients to remain more sustainable in today competitive marketplace (Smith et al., 2009). Patients can use online health services more easily and without any extra cost (Huang et al., 2012). IHPs allow patients to consult with their doctors online. The IHP directs e-patients to use encrypted e-mail, chat, and video conferencing to interact with their doctors regarding symptoms and medications, or to set up appointments or refill prescriptions (Tan, 2008; Maarop et al., 2011). IHPs in developed countries such as the United States (US) and the United Kingdom (UK) have been developed for decade. However, in developing counties such as Malaysia, IHPs are in the very early stages (PEMANDU, 2009). For instance, in Malaysia, very few IHPs use the Internet to conduct basic two-way interactions between IHPs and patients (PEMANDU, 2009). The Performance Management & Delivery Unit of Malaysia (PEMANDU), as an economic transformation programme and the government transformation programme council, states that Malaysian health organisations must gain a strong position in new technologies and move towards IHPs by 2020. Therefore, there exists a fundamental need for Malaysian health organisations to move towards using IHPs and gain better opportunities from their use.

2.2.4 Designing a Mobile Phone-Based Intervention to Promote Adherence to Antiretroviral Therapy in South India by Anita Shet, Karthika Arumugam, Rashmi Rodrigues, Nirmala Rajagopalan, K. Shubha, Tony Raj, George D'souza, Ayesha De Costa, Volume 14, Issue 3, pp 716-720. June 2010 [8]: Integration of mobile phone technology into HIV care holds potential, particularly in resource-constrained settings. Clinic attendees in urban and rural South India were surveyed to ascertain usage of mobile phones and perceptions of their use as an adherence aid. Mobile phone ownership was high at 73%; 26% reported shared ownership. A high proportion (66%) reported using phones to call their healthcare provider. There was interest in weekly telephonic automated voice reminders to facilitate adherence. Loss of privacy was not considered a deterrent. The study presents important considerations in the design of a mobile phone-based adherence intervention in India.

2.2.5 Research and Markets: Report on the International mHealth Apps & Solutions Market - Global Trends & Forecast to 2018, September 2013 [9]: mHealth apps solutions offer a successful combination of healthcare and mobile technology. iOS and Android-based medical devices contribute significantly to the healthcare market. Though Android-based smartphones have outpaced the market share of iOS-based smartphone, the healthcare industry prefers iOS-based devices. The mHealth apps market is broadly categorized into connected medical devices and healthcare applications; connected devices dominate the current market with around 80% of the total revenue contribution. Patient monitoring and fitness-wellness are the major application areas of mobile health technology. The most commonly used device and app are cardiac monitoring and exercise app, respectively.

2.2.6 The connected devices market is segmented into cardiac monitoring, diabetes management device, multi-parameter tracker, and other devices like sleep apnea devices, and respiratory monitors. The global connected devices market is estimated at $5.3 billion in 2013 and is poised to reach $16.4 billion by 2018 at a CAGR of more than 25.0%. Cardiac monitoring and fitness tracking are the most prominent uses of mobile-enabled connected devices owing to the increasing awareness of the need for healthy lifestyles. On the other hand, the diabetes management connected devices market is on the rise to capitalize on the continuous monitoring products of the blood glucose market. The mHealth apps market is majorly classified into health and medical apps. The market is dominated by health apps with more than 85% volume contribution to the healthcare application market. Health apps are segmented into exercise, weight loss, women's health, sleep and meditation, medication reminder and other apps, while the medical apps market is segmented into medical reference, and other applications like apps for mental health, dermatological treatment, and emergency response. The major hindrances in the paid apps market include the availability of free apps almost in all application areas and its low price range ($1-$2 each). Moreover, an interoperable business model integrates various business entities such as application developers, download centers, and platform developers, thus diluting individual quality contributions to the end solution. Exercise app gains the maximum popularity as it transforms the daily-used gadget, smartphone, into a personal workout trainer without significant investment.

2.2.7 North America contributes the maximum to both the devices and applications market, whereas the increasing number of chronic disease, faster adoption of smartphones and related advanced connectivity and network drive the Asian and African mHealth markets at a brisk rate. Besides, different government initiatives such as Operation Smile by USAID (India), the Indo-Dutch Project Management Society (India), and Mobile Alliance for Maternal Action (South Africa, Bangladesh, India) encourage the local healthcare market to adopt this novel technology. The device-software interlinked ecosystem makes the mhealth apps market highly fragmented with an ample number of software developers and network providers. Philips (The Netherlands), Medtronic (U.S.), Nike (U.S.), Omron (Japan), and Alere (U.S.) are notable players in the connected devices market, while AT&T (U.S.), Qualcomm (U.S.), Cerner (U.S.), and Diversinet (Canada) have emerged as significant solution enhancers in 2013.

SECTION 3 : METHODOLOGY

SECTION 3 : METHODOLOGY

3.0 This section has been described under following heads:-

3.1 Study area.

3.2 Study design.

3.3 Study population.

3.4 Sample size and methods.

3.5 Study variables.

3.6 Data collection tools and techniques.

3.7 Data analysis.

3.8 Work/activity chart.

3.9 Limitations.

3.1 **Study Area**. Usability and effectiveness of the NHP through perceived benefits, design, information, links, innovativeness and listed m-health apps in the portal, in both English and Hindi, with special focus on evaluation of m-health apps in healthcare.

3.2 **Study Design**. A semi-qualitative and semi-quantitative, descriptive, cross-sectional study was carried out amongst urban healthcare professionals with special focus on m-health apps during the month of Mar, Apr and May 2014. An approximately 800 healthcare professionals were approached via email to obtain the feedback through questionnaire based on Google docs link. The evaluation of feedback was conducted by collating and analysing key study variables, such as perceived benefits, m-health apps categories, languages, barriers, drivers, cost drivers and devices.

3.3 **Study Population**. Healthcare professionals including providers, researchers, consultants, students, NGOs, govt entities and healthcare IT managers, mainly restricted to urban areas, were approached to obtain feedback.

3.4 **Sample Size and Methods**. A convenience sample with a 95% CI (20%) was taken with the formulae ($n=z^2pq/d^2$) to obtain 96 as sample size. However, only 33 feedbacks (34%) were received (out of approximate 800 emails sent) due to limitations of the environment. The sample size was taken as 33 by using non-probability convenience sampling method.

3.5 **Study Variables**. The usability and effectiveness of NHP was reviewed by obtaining feedback about perceived benefits, design, information, links, innovativeness and listed m-health apps in the portal, mainly from urban healthcare professionals. M-health apps and its market were also evaluated by seeking feedback on their potential benefits, barriers, drivers, cost drivers, categories, devices and regarding importance of vernacular languages.

3.6 **Data Collection Tools and Techniques**. The data pertaining to various study variables was collected by developing a structured questionnaire in Google docs (forms) and by seeking feedback from the study population by sending the questionnaire through email from mid Mar to mid May 14.

3.7 **Data Analysis.** The collected data was analyzed manually as well as by using statistical methods, to present it descriptively as tables/graphs.

3.8 **Work Plan**. The following schedule was followed in the subject study with effect from 18 Mar 2014:-

Activity	Completed by
Proposal development	20 Mar 14
Development of tools	28 Mar 14
Pretesting and improvements	11 Apr 14
Data collection	14 Apr to 07 May 14
Analysis of data	08 to 12 May 14
Report writing (first draft)	12 May 14
Finalise report & submission	13 to 23 May 14

3.9 **Limitations**. The study was conducted with the following limitations for correct imbibing of the concepts:-

(a) **Time**. Limited time was available for conduct of the research.

(b) **Resources**. Restricted manpower, dedicated working space and non-availability of reliable high speed internet connection.

(c) **Sample Size**. 33 samples were taken against the desired sample size of 96 for 20% margin of error (95% CI), due to lack of time and resources.

(d) **Study Population**. Mainly urban population with email accounts.

SECTION 4 : RESULTS

SECTION 4 : RESULTS

4.0 The internship-cum-dissertation training in NIHFW was conducted from 24 Feb to 16 May 14, during which several departments of the institute were visited for acclimatisation and to understand their functioning in first three weeks. Details of the internship and its time schedule have been given in the internship report. Subsequently, the work for dissertation was executed with the NHP team.

4.0.1 The results have been described as under:-

4.1 Demographic details of respondents.

4.2 Feedback about NHP.

4.3 Feedback about m-health apps.

4.1 **Demographic Details of the Respondents**. Demographic details of the respondents have been described in the tables and figures given below, Table and Figure 4.1 covering their gender, marital status and age group whereas Table and Figure 4.2 showing the type of organisation/company and income group of the respondents.

4.1.1 A total of 33 respondents contributed for the NHP feedback questionnaire out of approximately 800 emails sent to various categories of healthcare professionals to include providers, researchers, healthcare students, consultant organisations, healthcare IT firms, govt entities, NGOs, etc. A total number of 29 males and four females responded, out of which 19 were married and 14 unmarried. Age group wise distribution of the respondents is given in the table below. The same data has been shown in Figure 4.1 as bar graph for better assimilation.

Table 4.1 : Demographic details of the respondents

Age Group	Male/M	Male/U	Female/M	Female/U	Total
< 25	0	3	0	1	4
25-35	6	6	0	2	14
35-45	2	0	0	1	3
45-55	10	0	0	0	10
> 55	1	1	0	0	2
Total	19	10	0	4	33

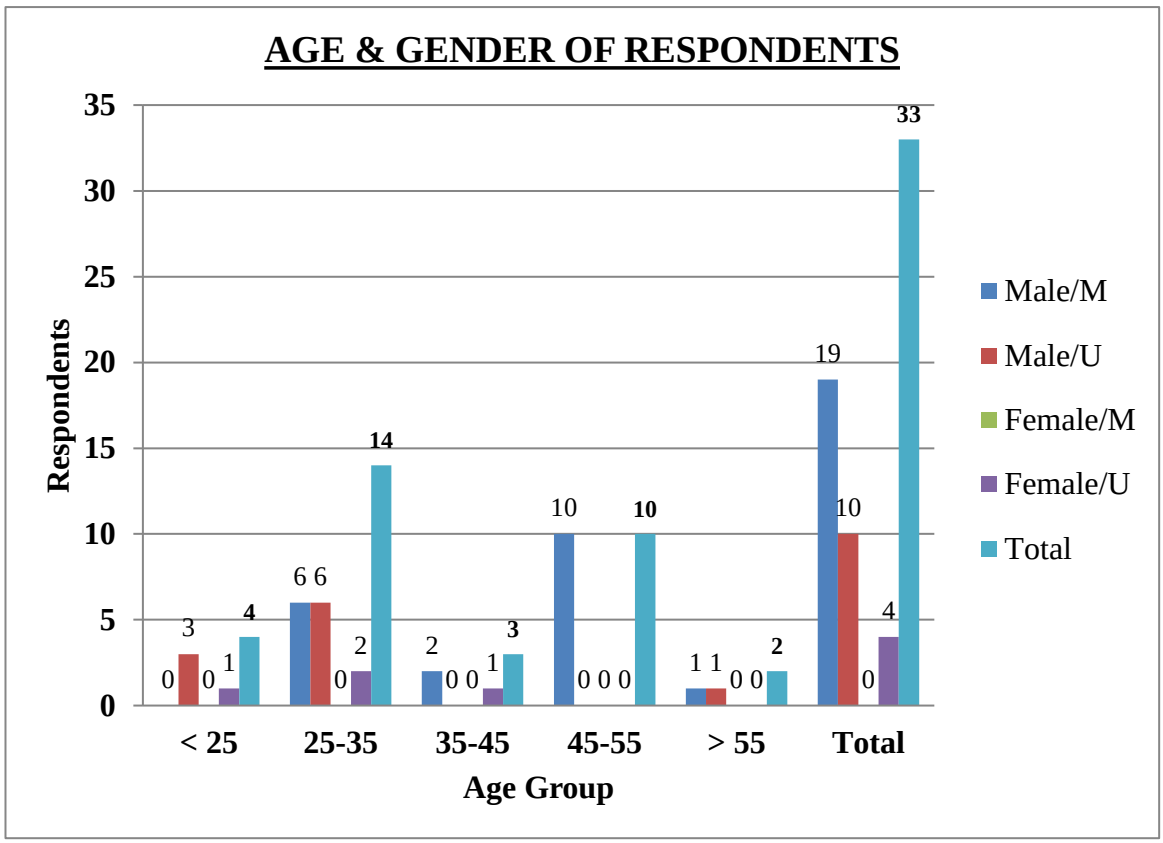


Figure 4.1 : Bar graph showing age and gender of the respondents

4.1.2 A total of 33 respondents contributed for the NHP feedback questionnaire from various categories of healthcare industry to include IT/Tech companies, education industry, hospital/nursing, consultant organisations, govt institutions, NGOs, etc. A total of 11 respondents were from below 30 K per month, five each from 30 to 60 K and 60 to 90 K per month, and 12 from above 90 K income group. Organisation/company wise details of the respondents are given in the table below. The type of company/ organisation was listed in the questionnaire as a drop down menu, however only a limited number of people responded, even after gentle reminder to participate and contribute in this project of national importance. A total of 10 respondents were from IT/Tech Company, seven from Govt institution, three each from Consultant Company and others, two each from education, university and Tele Health Company, and one each were from medical device manufacturer, health insurance Company, nursing service and hospital. The type of company/organisation and income group of the respondents has also been depicted in the form of bar/column graph in Figure 4.2 below for quick reference.

Table 4.2 : Organisation/company and income details of the respondents

Type of Org/company	< 30 K	30 - 60 K	60 - 90 K	> 90 K	Total
App developer					0
IT/Tech company	3	0	3	4	10
Medical device manufacturer				1	1
Health insurance company	1				1
Medical publisher					0
Sport/Fitness company					0
Pharmaceutical company					0
Education/Training company	1		1		2
Consultancy/Market research company	3				3
Telecommunications company					0
Independent practitioner					0
Tele health service provider		1		1	2
Nursing service	1				1
Hospital				1	1
University	1	1			2
Government institution		2	1	4	7
Other	1	1		1	3
Total	11	5	5	12	33

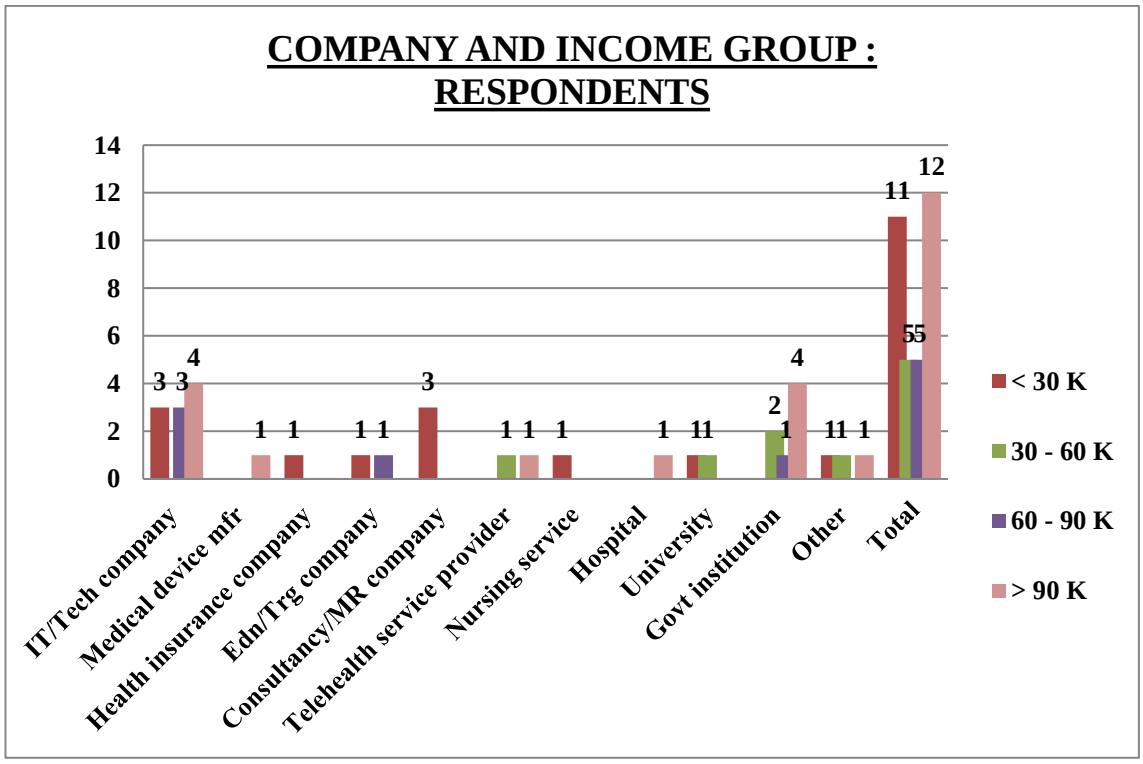


Figure 4.2 : Bar graph showing type of company and income group of the respondents

4.2 **Feedback about NHP**. The aim of developing the NHP, setup under CHI of NIHFW, was to provide a single platform for authenticated healthcare related information to all citizens of India. There were three development objectives of the project - to improve the health literacy of the masses in India, to improve access to health services across the nation and to decrease the burden of disease by educating the people on the preventive aspects of diseases. The scope of this project was to build the health portal with all its features and functionalities and dissemination of information on the portal through various modalities. The portal is planned to be updated with content in a phased manner. Although there may be certain overlaps between the phases, it has been planned that the portal would be developed over a period of 4 years and thereafter regular updates would be performed under maintenance phases. It would also provide links to a large number of useful healthcare related websites and selected m-health apps, in both English and Hindi.

4.2.1 In view of the above, there is a need to obtain feedback from healthcare professionals including registered users of the portal, mainly restricted to urban population/internet users, in order to evaluate the usability and effectiveness of the NHP with special reference to m-health apps, both in English and Hindi. This study will help to evaluate the health portal and to determine important factors regarding usability of the health portal for its improvement for patients, health care planners and strategy makers with the help of a questionnaire. A relevant questionnaire was developed to obtain the feedback from the industry, students, consultant firms, healthcare professionals and the govt entities, etc. A data bank of emails was captured in respect of the registered users of the NHP as well as about the healthcare professionals, students, Govt entities, NGOs, healthcare IT and consultant companies, etc to forward the Google docs link with the feedback questionnaire to almost 800 likely respondents, out of which approximately 20% emails were found to be blocked/changed, however 33 responses were received for further analysis.

4.2.2 The laid down objectives of the NHP have been described above, however there was a need felt to obtain the views of the healthcare professionals about the perceived benefits of the portal for a common man as well as the industry. All respondents were asked to write up to three perceived benefits of the NHP. It is quite clear from their replies that most of the respondents have assimilated the concept and development

objectives of the NHP. However, the replies were as varied as the age group, type of company and occupation of the respondents. Thus, the perceived benefits of the portal have been listed into 15 different categories, according to the replies received. The summary of perceived benefits as per the respondents has been shown in the form of doughnut chart as Figure 4.3 below.

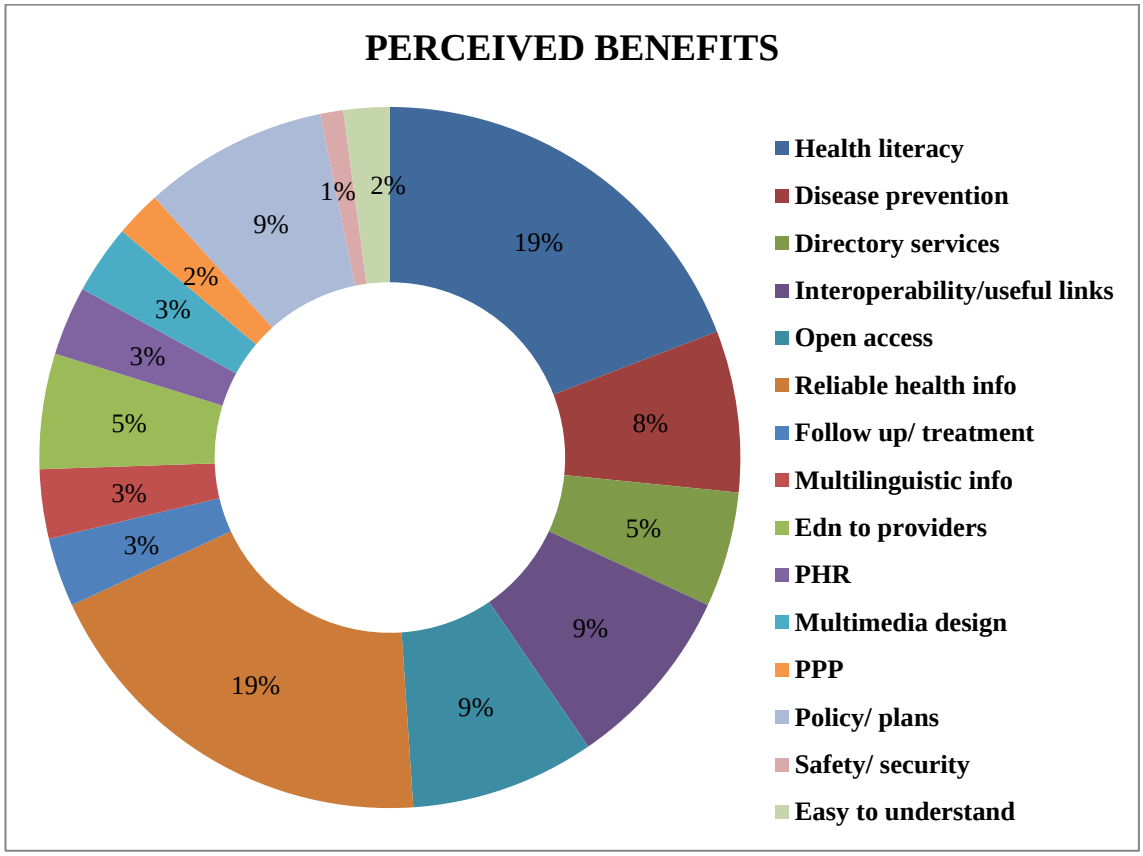


Figure 4.3 : Doughnut chart showing perceived benefits of NHP

4.2.3 In addition to the potential benefits, feedback was also sought about various features of the NHP to include design of the portal, information given in the portal, important links grouped and offered in the portal, innovativeness of the NHP and m-health apps listed in the portal. The question was set in the form of a five point satisfaction scale to obtain the satisfaction level of the users about these aspects of the portal. It was revealed from the analysis of the responses that about 82% of the respondents were moderately and very satisfied with the design of the NHP; about 73% of the respondents were moderately and very satisfied with the information given on the portal; about 85% of the respondents were moderately and very satisfied with the links

offered at the NHP; and about 76% of the respondents were moderately and very satisfied with the innovativeness of the portal. On the other hand, only about 54% of the respondents were moderately and very satisfied with the m-health apps listed at the NHP and 24% were slightly satisfied. The satisfaction level of the respondents in respect of the above mentioned five aspects of the NHP has been shown in the form of bar graph as Figure 4.4 below.

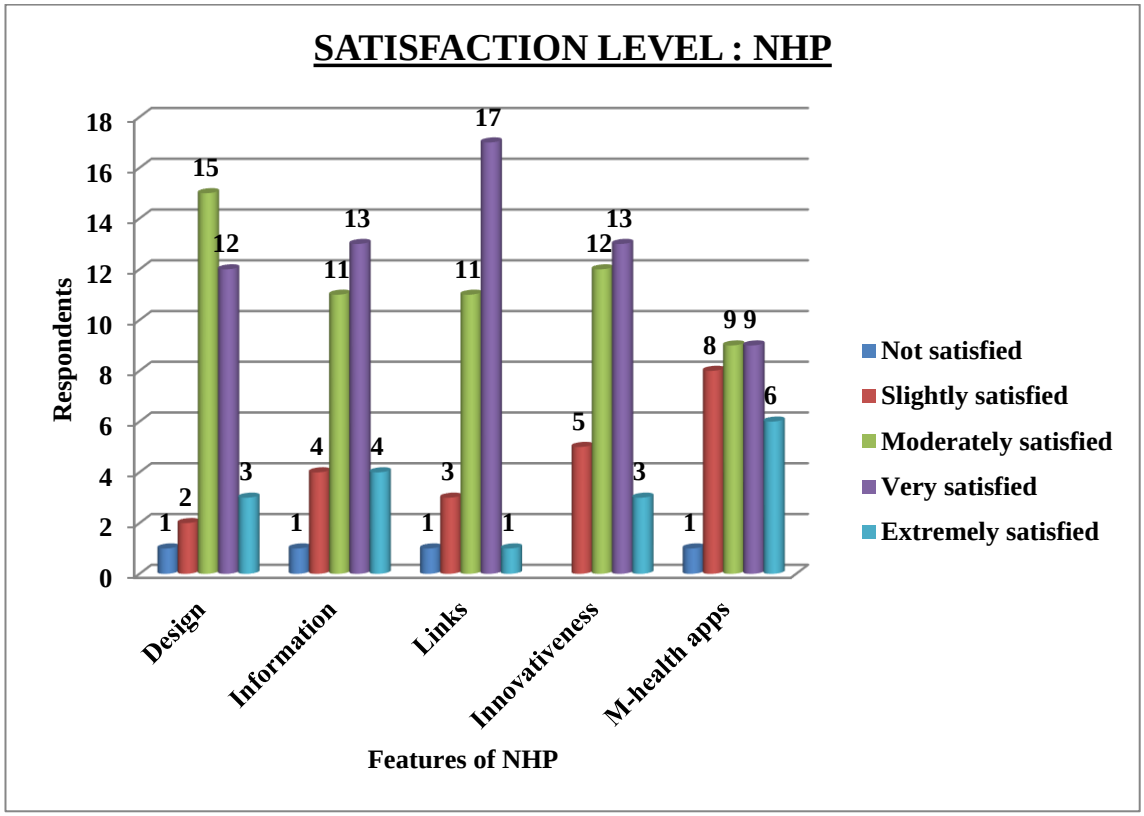


Figure 4.4 : Bar graph showing satisfaction level about various features of NHP

4.3 **Feedback about M-health Apps**. M-Health addresses some of healthcare industry's biggest concerns. It has the potential to tackle issues like the billions of dollars being spent annually in inappropriate or wasteful care, or the shortage of primary care physicians in India. Thus, it is evident that m-Health is attracting the attention of the healthcare community as well as the investor community. Patients and Physicians alike are increasingly turning to mobile devices to help monitor, track and manage healthcare outcomes. Mobile health apps bring about improvement in overall patient satisfaction by fostering a connected system of care. Compared to a decade ago, we are highly "connected" population today – from email to face book to news on the go;

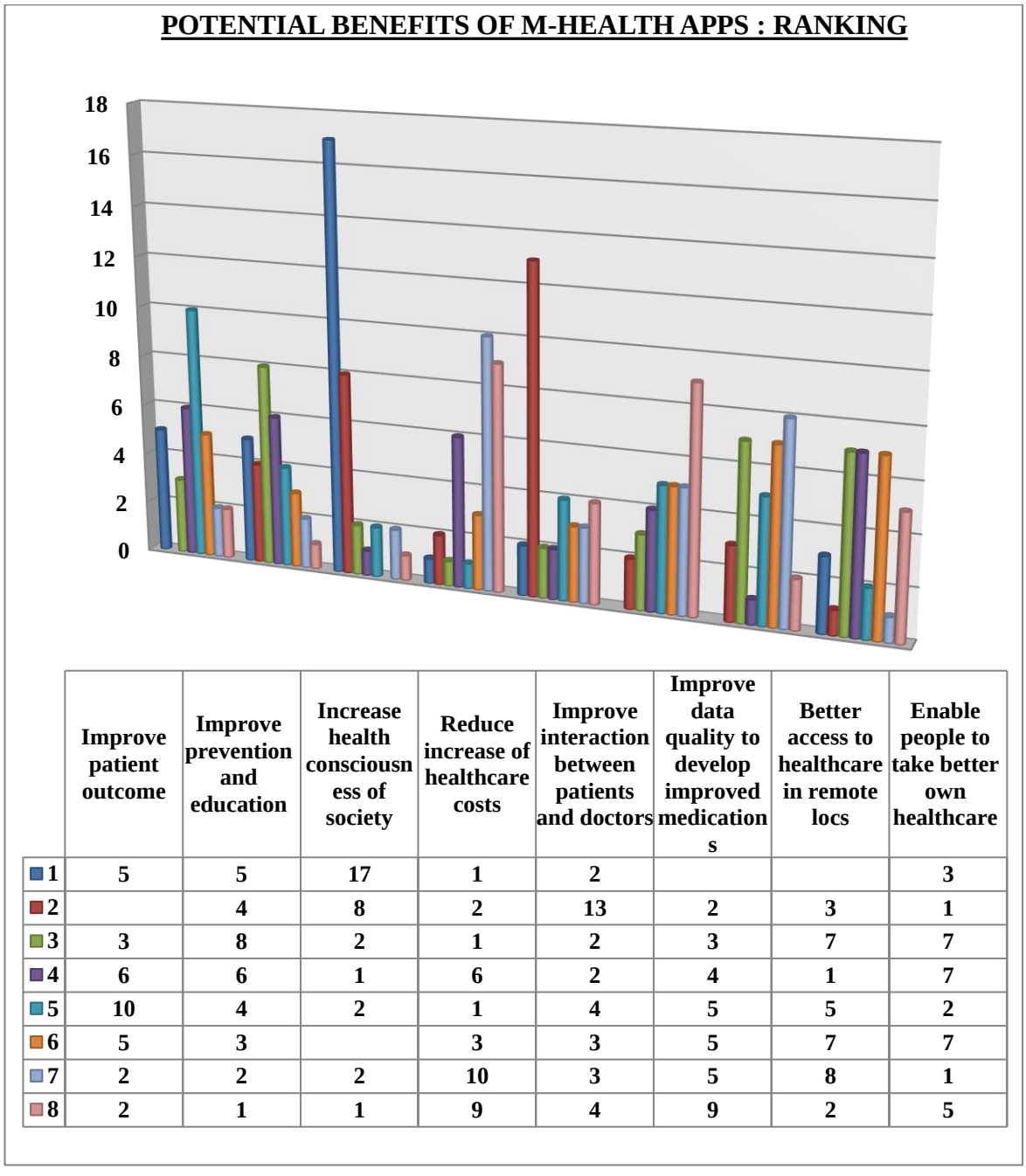
information is accessible anytime, anywhere. In a similar sense, the progression of m-Health will largely be dependent on innovations in telecom and the speed of implementation of the same. In the near future, we envision a scenario where a consumer can set up a tele-health appointment and consult a physician by leveraging the high speed wireless connection and high-definition video conferencing capability available from his handset. However, these applications need to work seamlessly with other systems with defined processes in place to achieve adoption and to be self-sustainable. There is a little value in creating apps that can't connect to clinical workflows, other providers, common man and their specific networks.

4.3.1 On the other side, m-health apps provide D2C connect which empowers the end users with customised information, advice and also helps drive qualified referrals to the providers. It helps increase the overall patient satisfaction through follow ups and connected care all while reducing the overall cost of care. Unfortunately, most of today's m-Health apps are limited in their ability to both access and share information because the data is sitting in silos, typically locked away in disparate, proprietary, redundant systems that are hard to integrate. M-Health apps will be an integral part of the approach for offering quality healthcare on an anywhere, anytime basis.

4.3.2 There are 20,000 plus m-Health apps in a major app stores today, and by end of 2015, it is projected that there will be 500 million m-Health app users worldwide. The smart phone penetration in India is increasing with 40 percent consumers accessing internet daily through smart phones; 34 percent of these users log in for more than half an hour each day. Smartphone users have, on average, downloaded 13 apps with 12 currently on their phone and eight are used regularly. It is obvious that apps are fast becoming commonplace in every smart phone owner's life. However, although consumers are investigating an increasingly wide range of apps, they will only use those which offer them real benefits ranging from functional, social or entertainment oriented.

4.3.3 Certain key potential benefits of m-health apps were listed for respondents to rank them from 1 to 8 based on their experience and knowledge. It is quite evident from the analysis of the responses received that 51.5% (Rank 1) consider m-health apps expected to increase health consciousness of the society. About 40% have ranked 'improve interaction between patients and doctors' at number 2. On the other hand,

57.6% respondents have ranked 'reduce/slowdown increase of healthcare costs' at 7th or 8th position. Another 42.4% consider 'improve data quality to develop improved medications/treatment plans' at 7th or 8th position. The ranking of the potential benefits of m-health apps is shown in the form of bar graph as Figure 4.5 below.



	Improve patient outcome	Improve prevention and education	Increase health consciousness of society	Reduce increase of healthcare costs	Improve interaction between patients and doctors	Improve data quality to develop improved medications	Better access to healthcare in remote locs	Enable people to take better own healthcare
1	5	5	17	1	2			3
2		4	8	2	13	2	3	1
3	3	8	2	1	2	3	7	7
4	6	6	1	6	2	4	1	7
5	10	4	2	1	4	5	5	2
6	5	3		3	3	5	7	7
7	2	2	2	10	3	5	8	1
8	2	1	1	9	4	9	2	5

Figure 4.5 : Bar graph showing ranking of potential benefits of m-health apps

4.3.4 The impact of certain key drivers on the growth of m-health market in next five years was obtained from the respondents by letting them choose three out of the ten

drivers offered. Smartphone and tablet penetration was considered by almost 67% respondents as one of the main driver to impact the growth of m-health market. User/ patient demand for m-health apps was choosen by about 48% respondents. Price development of m-health apps and corporate involvement in m-health received only 12% and 15% votes respectively. The summary of responses about the impact of drivers on the growth of m-health market is shown as bar graph (pyramid) in Figure 4.6 below.

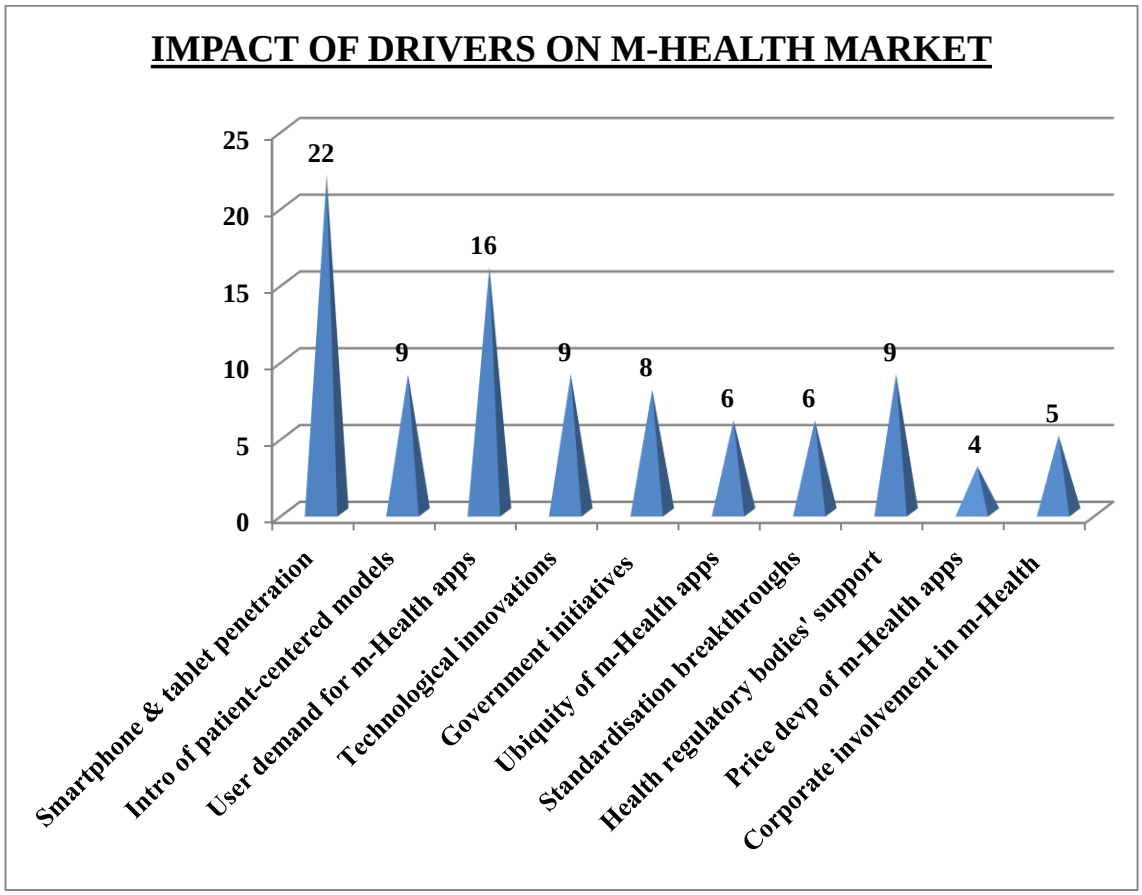


Figure 4.6 : Bar graph (pyramid) showing impact of drivers on m-health market

4.3.5 On the other side, the positive impact of m-health apps on healthcare cost drivers was also sought from the respondents by listing out eight key cost drivers and asking them to choose up to three. The analysis of responses reveals that almost 45% are in favour of m-health apps which would reduce prevention cost by apps that support patient education. 42% each have chosen 'reduce costs of patients non-adherence to a medical treatment by increasing patient engagement with compliance apps' and 'reduce labour costs by increased outsourcing via apps that provide access to remote consultation & diagnostics in low labour cost countries' to have positive impact.

Whereas ‘reduce investment in expensive technologies by replacing expensive ultrasound scanners with low cost app-based scanning solutions’ received only 21% responses. The impact of m-health apps on healthcare cost drivers has been shown in the form of bar graph as Figure 4.7 below.

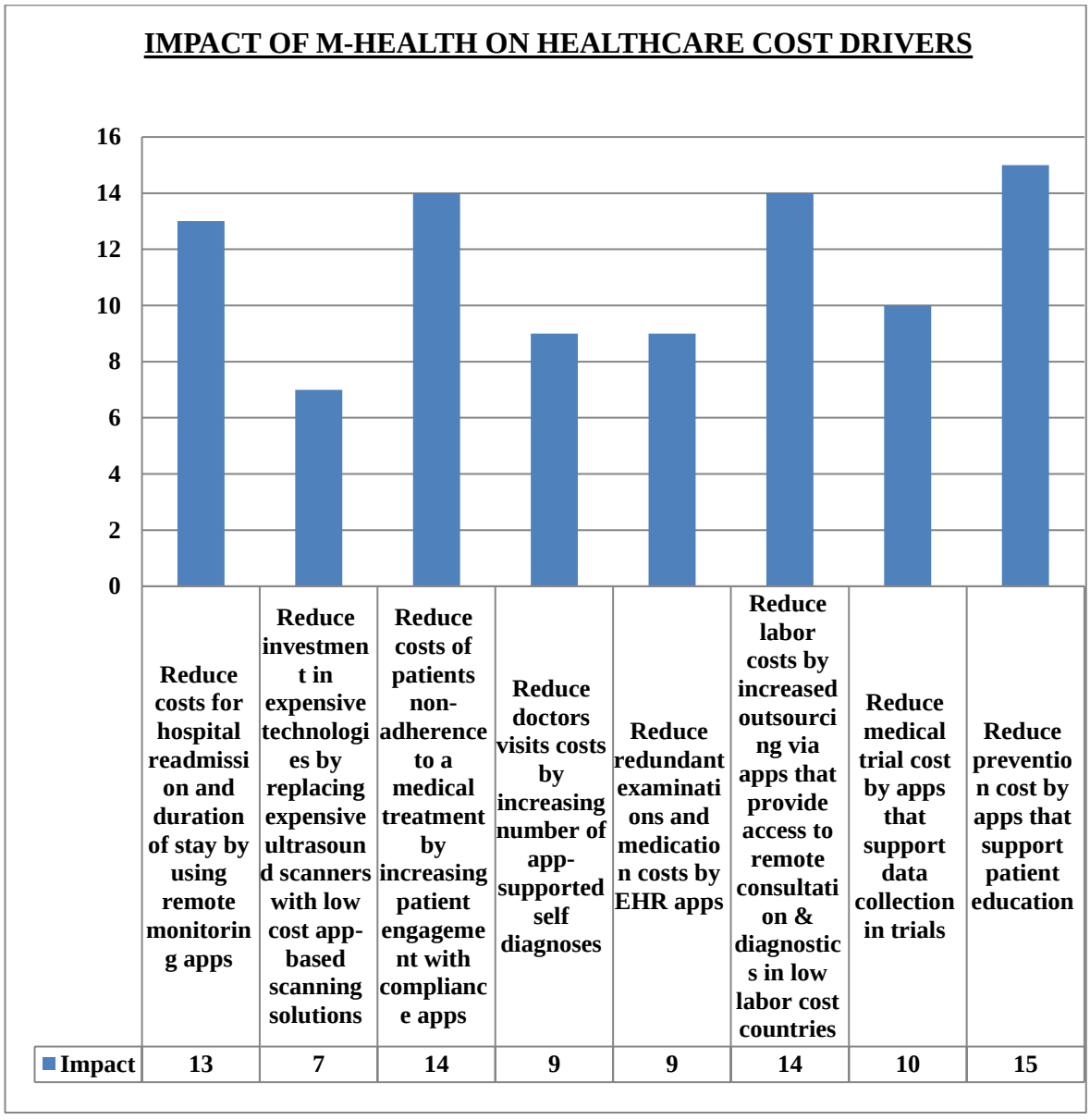


Figure 4.7 : Bar graph showing impact of m-health apps on healthcare cost drivers

4.3.6 A large variety of m-health app categories are available in the market as described above, out of which 13 popular categories were offered to the respondents for choosing up to three with highest market potential. The summary of responses shows that ‘reminders and alerts apps’ and ‘remote monitoring apps’ received about 48% and

42% votes in favour respectively, whereas remote consultation apps, diagnostic apps, fitness apps and nutrition apps received about 30% votes each. On the other hand, continuing medical education tools and wellness apps received only 6% responses each in their favour. The summary of responses in respect of m-health categories offering market potential has been shown in the form of bar graph as Figure 4.8 below.

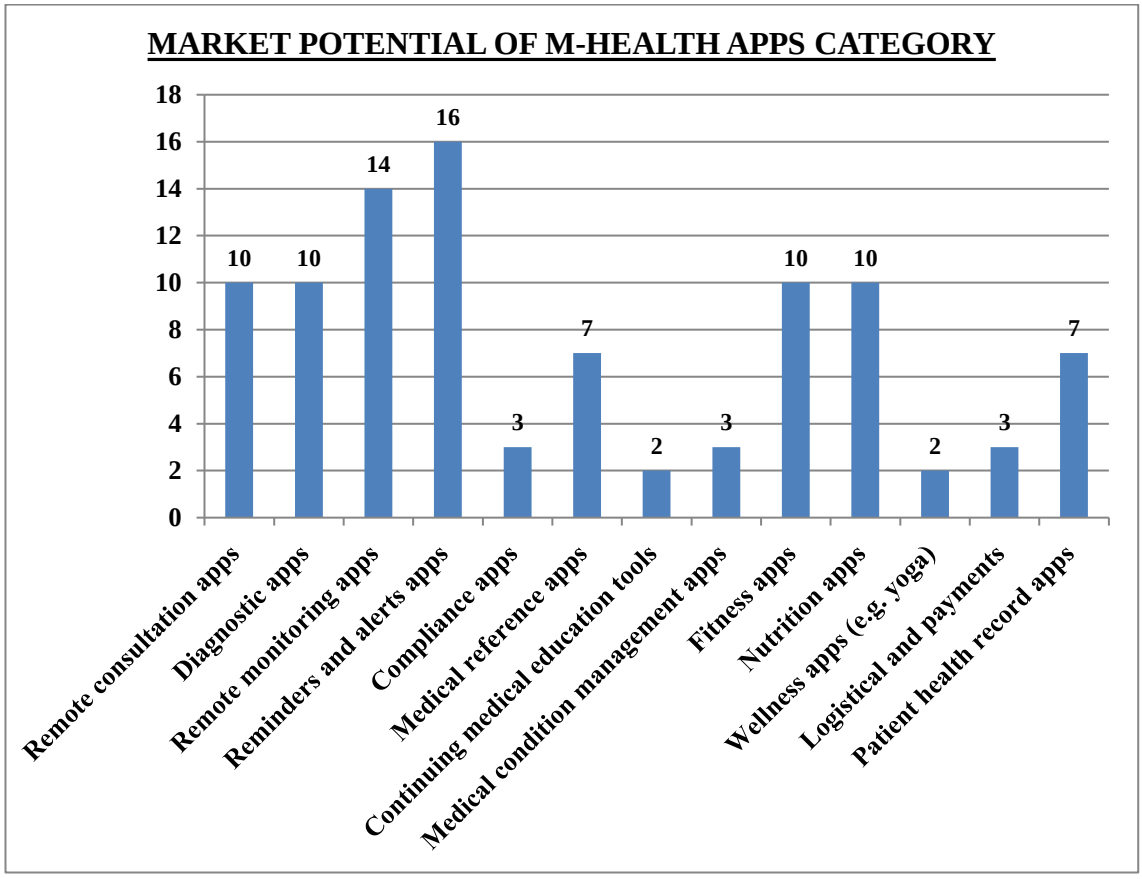


Figure 4.8 : Bar graph showing market potential of m-health apps categories

4.3.7 There are number of likely barriers to m-health apps having a greater impact on healthcare, out of which 15 barriers were offered to the respondents to select up to three main barriers. The summary of responses clearly shows lack of standardisation, lack of data security and resistance from traditional healthcare providers as three leading main barriers with about 42%, 33% and 33% responses respectively. The other barriers with 27.3% responses each are difficulties for users in finding the right m-health solutions and lack of profitable business models. On the other hand, barriers like lack of reimbursement for m-health apps from company funds and insurance receive no response and barriers like devices do not meet clinical requirements in terms of hygiene,

etc and missing or unknown legitimacy of m-health publishers got 3% responses each only. The summary of responses in respect of barriers to m-health apps has been shown in the form of bar graph as Figure 4.9 below.

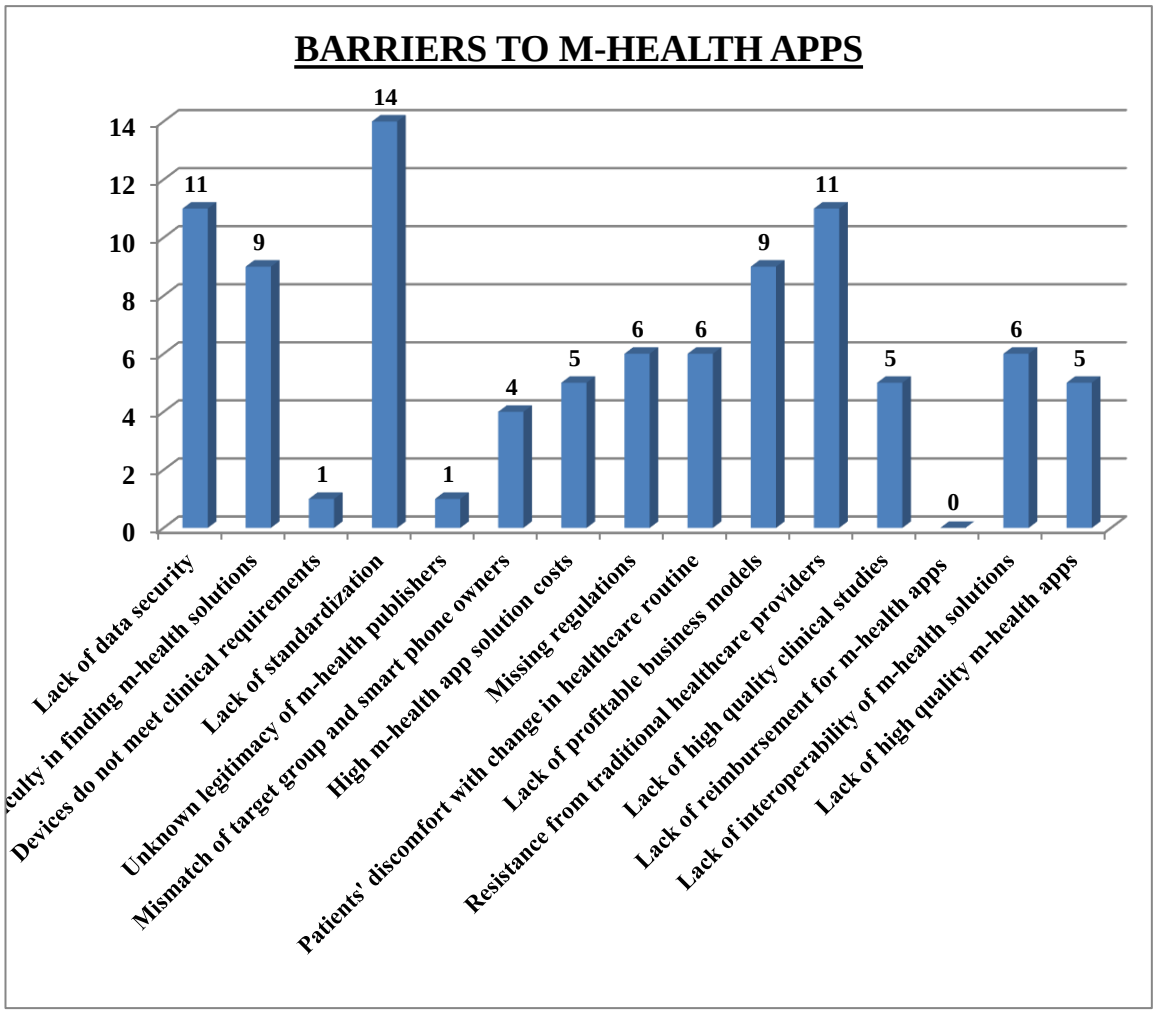


Figure 4.9 : Bar graph showing barriers to m-health apps

4.3.8 In order to select or finalise the top five target devices for m-health apps in next five years, ten popular devices including 'others' were offered to the respondents for ranking from 1 to 5. The response was quite mixed, however smart phones were the clear winner, with about 76% grading it as Rank 1. Tablets were ranked as second with about 48.5% grading it as 2. The other devices were ranked as 3rd or 4th whereas glasses and game consoles were clearly at fifth position with 45% votes grading them as 5. The summary of responses in respect of ranking of devices for m-health apps has been shown in the form of bar graph as Figure 4.10 below.

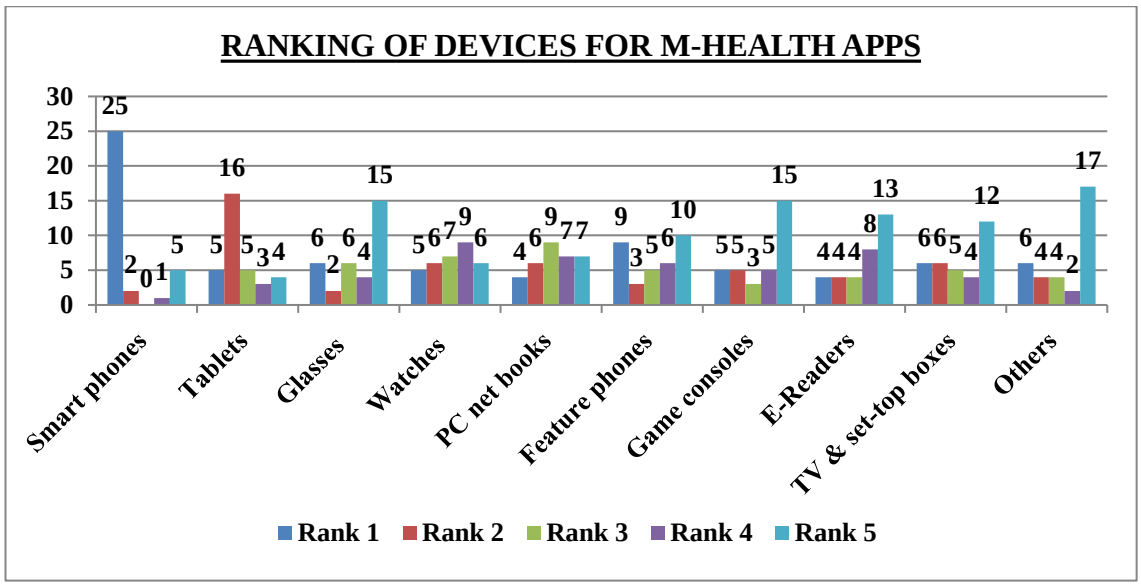


Figure 4.10 : Bar graph showing ranking of devices for m-health apps

4.3.9 The NHP plans to offer the information in 13 vernacular languages and to start with, it is available in Hindi and English including 49 m-health apps/websites in English and 19 m-health apps in Hindi. The respondents were asked for their opinion regarding improvement of health indices in India by vernacular (Hindi) m-health apps, in the form of a five-point scale. 30% of the respondents strongly agreed with the view and 55% agreed with the view, 9% were neutral and 3% each were disagree and strongly disagree. The summary of responses showing importance of vernacular languages in m-health apps has been presented in the form of a pie chart as Figure 4.11 below.

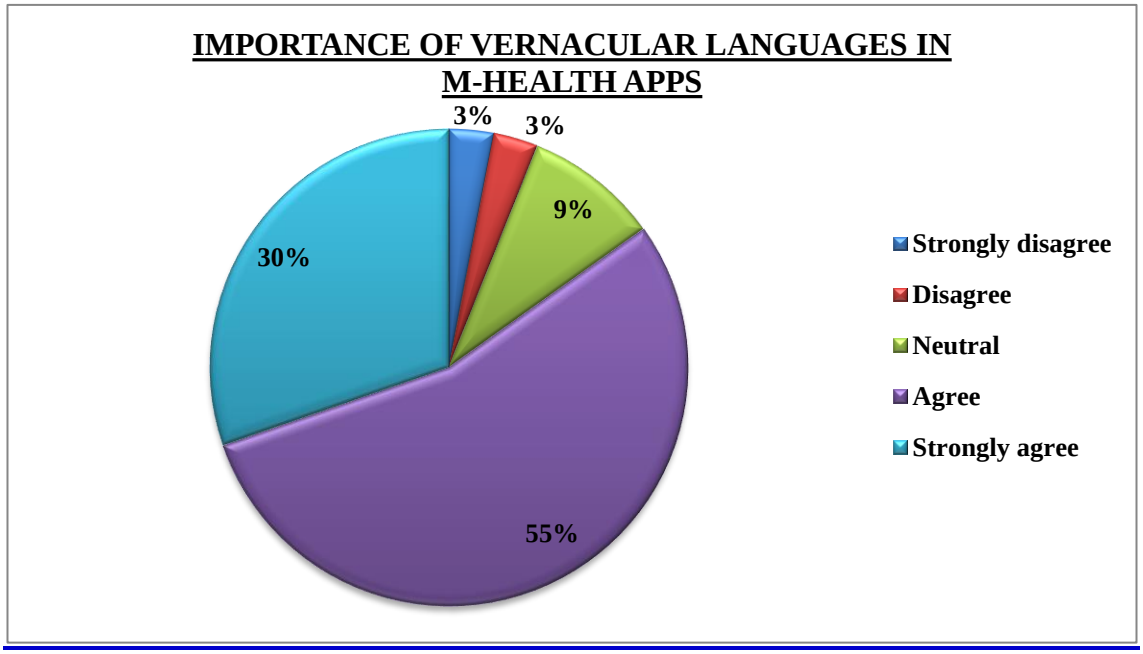


Figure 4.11 : Pie chart showing importance of vernacular languages in m-health apps

SECTION 5 : DISCUSSION

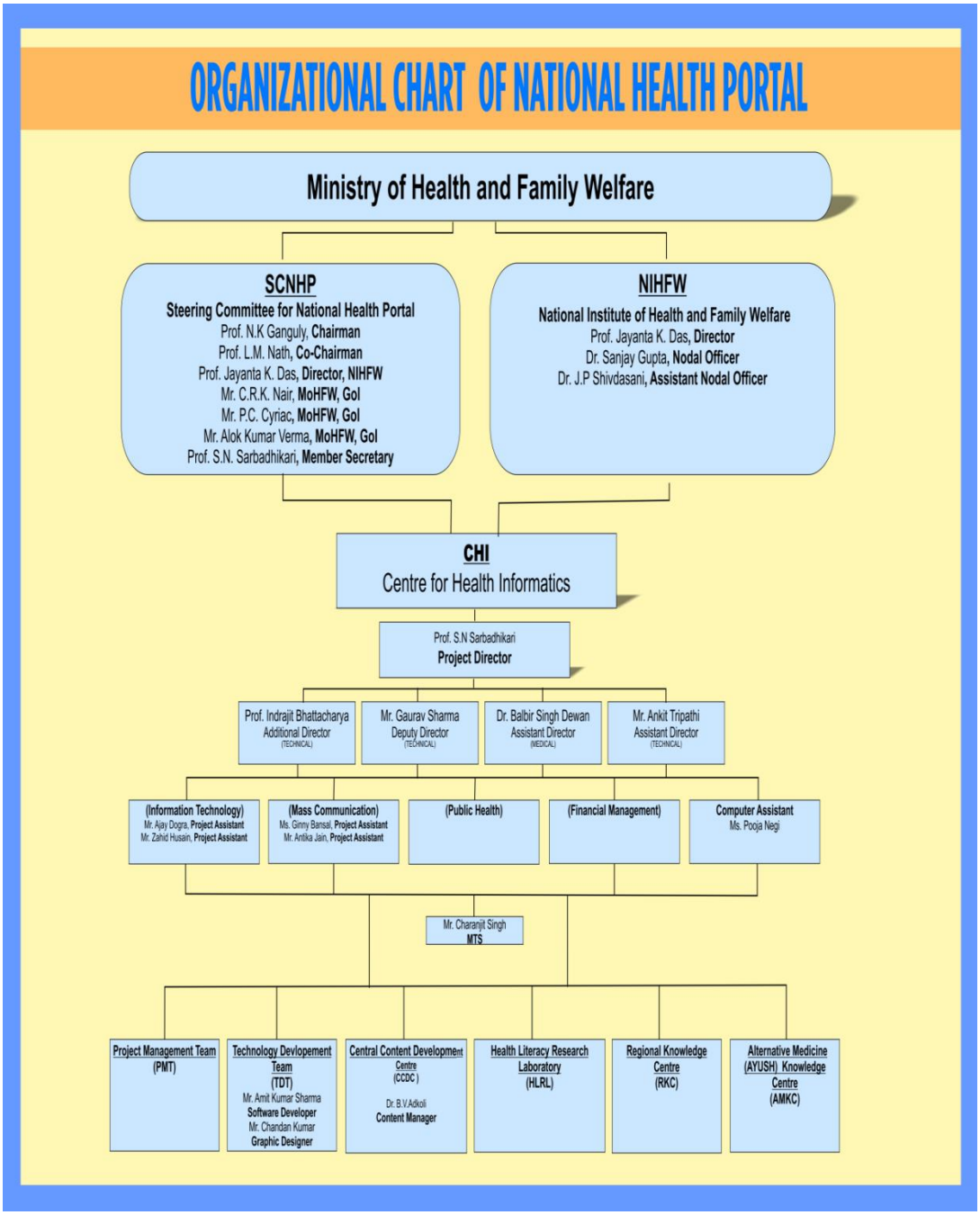


Figure 5.1: Organisation Chart of the NHP

SECTION 5 : DISCUSSION

5.0 The beta version of the NHP was released in Nov 13 after the concerted efforts for three years (Gantt chart and PERT analysis are given as Annexure 1) and it is the first evaluation study being conducted on its usability and effectiveness. Although there are various other health portals available in India at national and state level, such as healthy-india.org, vikaspedia.in/health/, indg.in/health/, etc most of the govt health websites were found to have information on central/state health schemes, health policies and health status of their citizens only. There are several other private websites that provide health information, however the information available is not comprehensive, and was neither credible nor in the same format. Certain govt, hospital and AYUSH websites with some health content are listed in Annexure 2, 3 and 4 respectively.

5.1 There are several alternative websites; however, none of these initiatives are comprehensive to be called a portal. They also lack the objectives and coverage as proposed for the NHP. The NHP Initiative would have several advantages over the current initiatives and would add value. No single project or website would mirror all aspects of the NHP since it would be different in the following features:

(a) Multilingual health content.

(b) It would have a repository of AYUSH content along with content from modern medicine.

(c) Interactive modules.

(d) SMS or text alerts.

(e) Health e-learning platform.

(f) Regulatory information on health.

(g) Directory services to locate health care providers and facilities.

(h) Moderated health forums.

(i) Downloadable health widgets/tools (Annexure 5).

(j) Content on disaster management.

(k) Information on National and State Health Programs & Schemes.

(l) Health cloud for easy access of information.

5.2 NHP provides hyperlinks to various useful websites for people to visit and have advice/information on their health related problems. The portal also provides people

access to some of e-health and m-health services in the country. Citizens can among other things, read about the following:

(a) Diseases, injuries and symptoms.

(b) Examinations, treatments and medicines.

(c) Pregnancy and childbirth, parenting and child.

(d) Health and wellness tips.

(e) How to deal with difficulties and crises.

(f) How the healthy body looks and works.

(g) Rights and obligations of patients and healthcare professionals.

5.3 In order to appeal to the masses, the NHP has been designed to cater to the entire spectrum of audiences in multiple Indian languages. The list of target beneficiaries would include:-

(a) General population of India.

(b) Infant, children & adolescents.

(c) Elderly, middle-aged and the young adults.

(d) School children.

(e) Individuals with special health needs (including those with disabilities, mental health problems, chronic diseases, etc).

(f) Rural, remote, semi-urban, & urban populations.

(g) Illiterate and the literate populations.

(h) Technologically-challenged and the technology-savvy.

(i) Lower, middle and the upper socioeconomic groups.

(j) Healthcare professionals.

(k) Health care workers, ASHA, etc.

(l) Healthcare students.

(m) AYUSH-healthcare practitioners.

(n) Special population groups.

5.4 All these populations will be served with this portal to present information in various means and aim to satisfy most of their health information needs. The portal also has special features that would in turn help meet the special needs of the special populations. For example, the interactive modules contain voiceovers, with user-friendly graphics & textual messages, which would aid the illiterate populations &

people with disabilities. Further, various dissemination modes beyond the portal including Non-IT modes such as the print media, mobile telephony, TV, radio and kiosks would also be utilized. The NHP has been built in collaboration with a wide range of stakeholders from all sectors including govt, academic institutes, private sector and technology experts. The project would have a positive impact on the health and lives of the people as it has been proved time and again that the more informed the people are the better choices they can make. For example, providing people with the right health knowledge is akin to empowering them to lead better lives and take better care of their health. Health awareness is the problem area here and a multipronged mechanism to provide health information to the masses is expected to reduce disease burden and provide a solution to the problem of ill health.

Table 5.1: Stakeholders and their roles

Stakeholder	Stakeholders Roles
MoHFW	Own the portal; Develop a policy for the portal; Coordination & evaluation of the executor functions related to the portal.
NIHFW	Proposed to be the nodal centre to provide an administrative framework that would enable the development, implementation, and maintenance of the NHP.
NRHM	Aiding in improving the quality of health of those who reside in rural areas through dissemination using the portal and other Non-IT modes of communication.
NIC	Will provide the necessary security framework within their data centre to host the IT infrastructure based on set standards as required by GoI.
ICMR	Being a national knowledge body and a contributor towards research, will provide assistance in research studies and content related to the portal.
Dept of AYUSH	Will provide guidance and content for enriching people‘s knowledge on AYUSH systems for the portal.
NCDC	Will provide educational content & literacy materials on various topics related to communicable diseases meant for the portal.
NDMA & NIDM	Would provide additional content on various disaster management topics. Aid to develop a disaster management strategy, thereby help in building a safer and resilient India.
C-DAC; CIIL; TDIL & DOL	Aiding in the translation of health and non-health related content generated by various content development centres into Hindi & various other Indian languages.

Table 5.1 continued

State Dtes of Information and Publicity	Help in the implementation of various health literacy initiatives at the state level so as to improve the health status; Aiding in the dissemination through various modes.
UNICEF	Providing IEC content to educate families and providing them with the knowledge required to take better care of their children.
WHO	Providing IEC content to help people attain the highest possible level of health.
SJRI	Will contribute their vast experience in developing and validating health content as well as medical illustrations and animation for the masses.
Apollo Group	Will assist with providing technology inputs for the portal platform development as well as contribute content.
NGO's and other Knowledge partners	NGO's will contribute health content that is beyond the scope of the Content Development Centre and Regional Knowledge Centres and will actively engage in the dissemination process.

5.5 The urbanised healthcare professionals from varied fields expressed their views about the perceived benefits and various features of the portal. Most of the respondents have understood the concept and objectives of the NHP very well. Health literacy and reliable health information were considered as the most important perceived benefits with 55% votes each in their favour, whereas interoperability, open/easy access and availability of policies/plans/programmes receive 24% votes each. On the other hand, about 82% were moderately/very satisfied with the design of the NHP; about 73% were moderately/very satisfied with the information given; about 85% were moderately/very satisfied with the links offered; about 76% were moderately/very satisfied with the innovativeness; and only about 54% of the respondents were moderately/very satisfied with the m-health apps listed at the NHP. Usability applies to all those aspects with which a person interacts. It means that the user of the portal can learn the application quickly and complete the tasks easily by using it. Usability helps the workers in focusing on their tasks instead of tools used to perform the tasks. Every design and development decision has an impact on the portal's usability. A usable portal is one which meets following criteria:

(a) Easy to learn.

(b) Efficient to use.

(c) Provides quick recovery from errors.

(d) Easy to remember.

(e) Enjoyable to use.

(f) Visually pleasing.

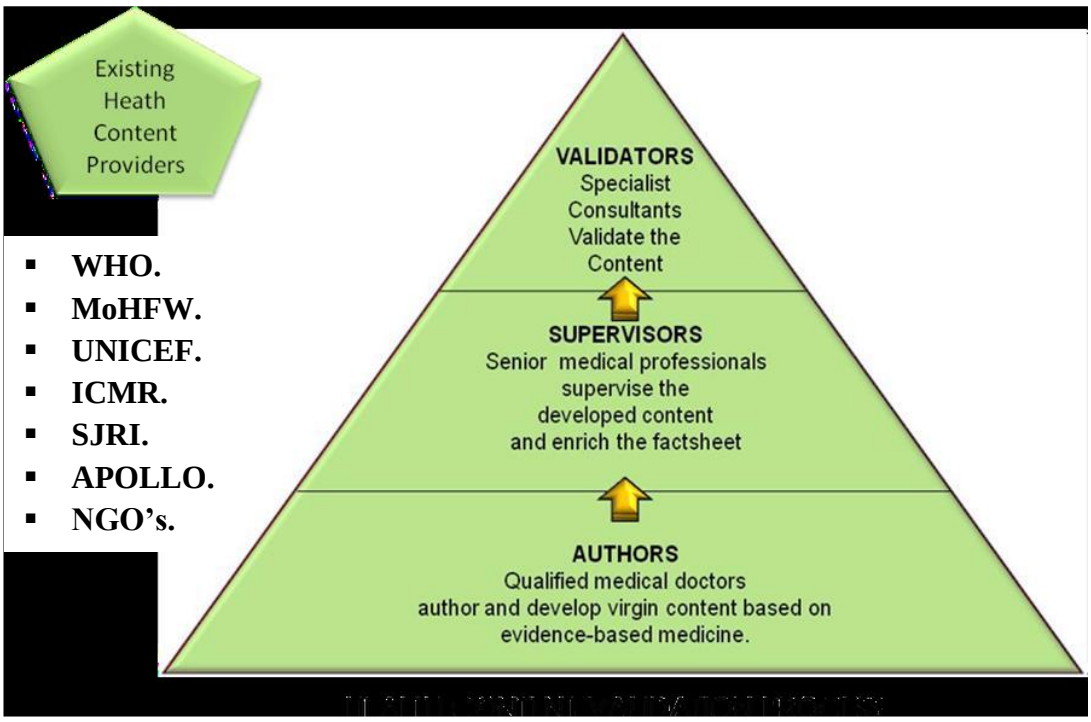


Figure 5.2: Health Content Validation Process for the NHP [3]

5.6 M-Health is going to be a 3000 crore market in India by 2017 (Source PwC) [15]. M-health and E-health are all set to make an entry into India's primary health centres (PHCs) and sub-centres as the health ministry plans to go hi-tech. Healthcare industry is expected to show a strong growth of 23% per annum to become a $ 77 billion industry by 2017. One of the largest sectors in terms of revenue and employment has grown at 9.3% per annum between 2000-2009 with a current size at par with fastest growing developing country like China, Brazil and Mexico. Driven by various catalysts such as increasing population, rising income levels, changing demographics and illness profile with a shift from chronic to life style diseases, healthcare industry is expected to move to levels of $ 77 billion in next 3 years. (Source: ASSOCHAM) [14].

5.7 Empowering rural India is of utmost importance and the government needs to do so by provisioning for broadband penetration and financial inclusion. Access to quality health care is another key to achieving rural empowerment. The budget for this segment was raised marginally last year and it would be good to have an allocation for rural health care programs with provisions for technology that would help modernize this sector to expand its reach through remote healthcare solutions and telemedicine. The steering committee on health said that in the 12th plan (2012-17), all district hospitals

would be linked to leading tertiary care centres through telemedicine, Skype and similar audio visual media. M-health will be used to speed up transmission of data. Disease surveillance will be put on a GIS platform. Disease surveillance based on reporting by providers and clinical laboratories (public and private) to detect and act on disease outbreaks and epidemics would be an integral component of the system. India will also put in place a Citizen Health Information System (CHIS) - a biometric based health information system which will constantly update health record of every citizen-family. The system will incorporate registration of births, deaths and cause of death. Maternal and infant death reviews, nutrition surveillance, particularly among under-six children and women, service delivery in the public health system, hospital information service besides improving access of public to their own health information and medical records would be the primary functions of the CHIS.

5.8 While the Govt is building more and more hospitals, the gap between the patient-doctor ratios is huge. For the next 20 years, the infrastructure will not be able to match the growing population of India. Hence, the next step is to create a model where one hospital supplies its service to 10 -15 nearby villages through the use of technology. Technology facilitates remote patient monitoring, enables safe data collection and dissemination, while reducing service costs. To give a data point, every citizen in rural area has to travel a distance of 20 kilometres to avail healthcare facility. The need is to decrease the travel time, decrease the cost and make it more affordable and convenient. For this, the government started disseminating information and awareness through mobile phones. It also started educating rural citizens about the various free campaigns being conducted in their district. Also, today the mobile phones worth only Rs 5,000-6,000 have Smartphone capabilities. One can run apps that tell us if a person has got flu or not. This has empowered the rural population too.

5.9 Economies of Indian states can grow 1.08 per cent faster with every 10 per cent increase in Internet and broadband connections, says a study released by Indian Council for Research on International Economic Relations (ICRIER). Consequently, for every 10 per cent increase in Internet and broadband penetration, India could potentially add $ 17 billion to the Gross Domestic Product (GDP). Also as per a report by Health Cursor, the tele-density in urban areas in India is almost 100 percent while in the rural areas, it is 37 percent. The pervasiveness of m-health and e-health (Community based broadband

now available) platforms will be harnessed in the MDG and National Health plans in India. “In the years to come, m-Health applications will be distributed primarily through healthcare distribution channels like hospitals and specialized healthcare product vendors and not the app stores as is currently the case, and that traditional will become the predominant distribution channel.” [12]

5.10 India is witnessing a rapid growth in the smart phones segment. All the major handset makers like Nokia, HTC, LG, Motorola, Samsung etc are focusing on smart phone market for last 5-6 years. Launch of 3G technology in the Indian market has further accelerated the growth of Smart phones. With the number of smart phone users witnessing an upswing, prices are also witnessing a phenomenal dip. The end consumer will be immensely benefited. Smart phones will provide cost-savings, increased efficiency and a better quality of life. To give just one example, smart phones are being used as smart-health sensors, allowing heart patients to stay at home safely, while having their heart issues controlled and monitored by medical staff. In this way smart phones increase the patient’s quality of life and, at the same time, save healthcare costs.

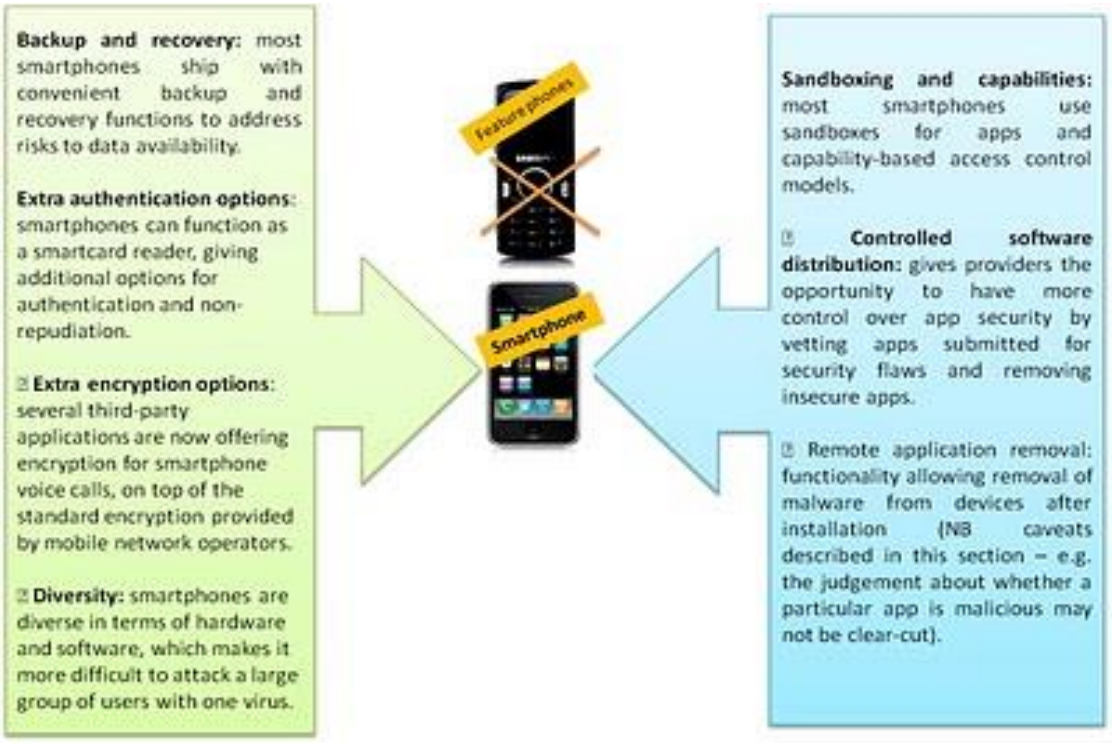


Figure 5.3: Positives: Growth of Smart phones market in India [11]

5.11 However, we all know that the success of an m-Health business model doesn't depend on the distribution channel but on what you give for the money you take and in turn sustainability of that service. The mobile operators/carriers will be leading this business due to following reasons [11]:-

(a) Operators Define Connectivity. The progression of m-Health will largely be dependent on innovations in telecom and the speed of implementation of the same. 4G/LTE (Long-term evolution) will revolutionize the way data is sent over wireless networks. In the near future, I envision a scenario where a consumer can set up a tele-health appointment and get a physician consult leveraging the high speed wireless connection and high-definition video conferencing capability right from his handset.

(b) Hands on Experience. Operators have a proven track record of implementing innovative technologies on a large scale (2G/3G/4G capabilities, smart phones connected to "app stores" with thousands of applications etc) and adapt them to different geographies in a highly competitive market.

(c) Knowledge of Local Customer Needs. Deploying telecom solutions in various geographies and complying with local regulations, legal framework has enabled operators understand the local customer and their needs. Partnering with operators will enable organizations deliver specific solutions that meet local customer needs.

5.12 Operators should pro-actively seek out opportunities to improve health outcomes by initiating public-private partnerships, teaming up with the government and NGOs to address pressing national health issues, and collaborating with software providers to develop targeted healthcare solutions. Joint projects help ensure that key stakeholders are on board, increasing the potential for successful outcomes. Already, mobile operators have tremendous influence and strong relationships with handset manufacturers, and they should leverage this position to bring to market phones and other devices that can provide the m-Health and other mobile services to consumers as per their need. We should remember that while some of the role players will play a bigger role in driving the m-Health market, each and every player is a key ingredient in making this a service that the end-user will consume.

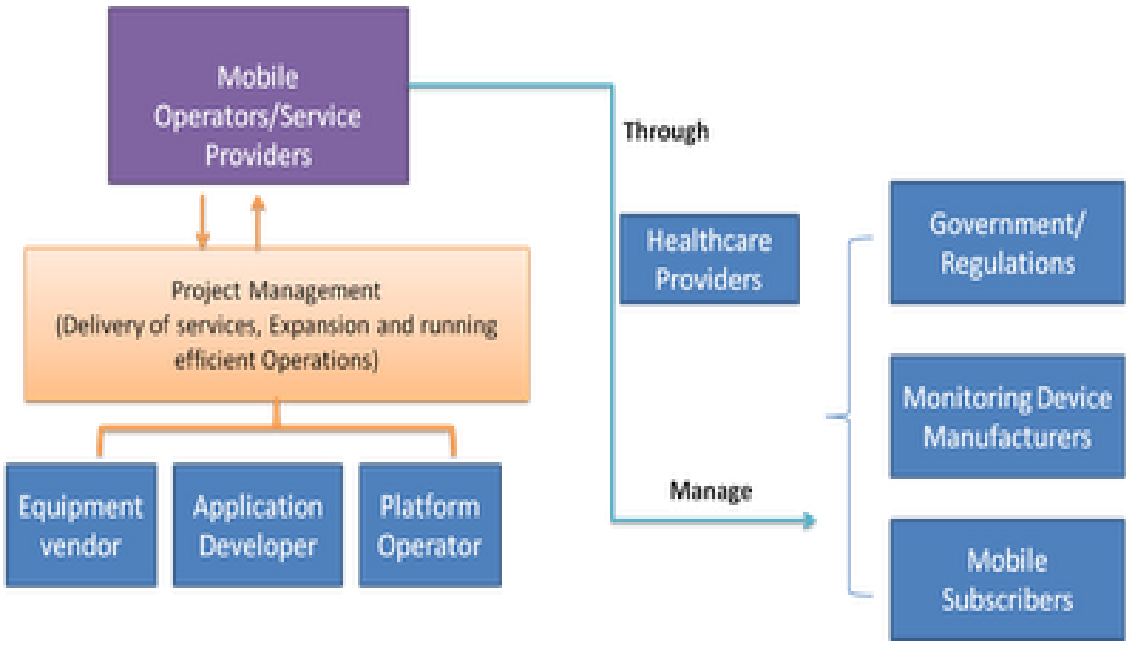


Figure 5.4: An Ideal m-health Business Model Organization [11]

5.13 Summary of the responses for feedback on m-health apps indicates almost similar results as per other international studies. The study variables under consideration were potential benefits of m-health apps, impact of drivers on m-health market, impact of m-health on healthcare cost drivers, m-health apps category, barriers and devices for m-health apps; and importance of vernacular languages in m-health apps. Almost 52% respondents have ranked 'increase health consciousness of the society' as 1st and about 40% have ranked 'improve interaction between patients and doctors' as 2nd key potential benefit of m-health apps. Smartphone and tablet penetration was considered by almost 67% respondents as one of the main driver to impact the growth of m-health market, while user/patient demand for m-health apps was at second position with about 48% responses. About 45% believe that 'reduce prevention cost by apps that support patient education' and 42% each believe 'reduce costs of patients non-adherence to a medical treatment by increasing patient engagement with compliance apps' and 'reduce labour costs by increased outsourcing via apps that provide access to remote consultation & diagnostics in low labour cost countries' are key healthcare cost drivers impacted by m-health apps. The m-health apps categories with maximum market potential were 'reminders and alerts apps' and 'remote monitoring apps' with about 48% and 42% responses respectively, whereas about 30% responses favoured remote consultation apps, diagnostic apps, fitness apps and nutrition apps each.

5.14 Lack of standardisation, lack of data security and resistance from traditional healthcare providers were selected as three main barriers to m-health apps with about 42%, 33% and 33% responses respectively. The lack of having standards on hardware and standardization software will slow down market dynamic. “Industry (or regulators) has to build common frameworks and platforms to suit interoperability of multiple bodies and devices.” The other barriers with 27.3% responses each were difficulties for users in finding the right m-health solutions and lack of profitable business models. Smart phones were considered the main target device for m-health apps in next five years with about 76% responses as Rank 1; Tablets were ranked at second position with about 48.5% responses. Smart phones will offer the highest business potential for m-Health. “There will be a very large migration "to the middle" between smart phones and tablets. The lines will be blurred and there will be the "real" device that people use for healthcare: a small tablet; bigger than today’s smart phones, smaller than mainstream tablets like the iPad.” “We will be able to unify our communications across multi modalities - web, mobile, other media - a single device will have the ability to have multiple personas.” Finally, 55% respondents agreed and 30% strongly agreed that use of vernacular languages in m-health apps will improve the health indices of India.

SECTION 6 : CONCLUSION

Figure 6.1: Components of Health Literacy

SECTION 6 : CONCLUSION

6.0 A health portal refers to delivery of information and health services via internet or related technologies. Patients use these portals, to get more health information than they can have in their patient-physician relationship. E-health applications can be useful in providing better quality of life in a cost effective way. Although an increasing number of health portals are developed for the purpose but many of them have usability problems. There have been many local and regional e-health projects and programs implemented in India. Currently, a number of health portals are providing health services in different states of the country. NHP is one such web portal which provides different health care services to the citizens across the country. Citizens can search on this portal for information about news on health care, maps and directions, state health organization and activities, how to manage health, treatments and diseases, rights and obligations of the patient, etc. Currently, NHP is available in English language and some contents of the portal are also available in Hindi language.

6.1 Merits of the NHP. Overall, citizens were pleased with the idea of the NHP for accessing the health related information and health services on their own. Although citizens were not satisfied with many features of the portal yet they like few features. They liked the search feature present on the portal because it is visible and can be found very easily. The NHP is very simple to use and having the relevant information so users do not feel difficulties in using it. Citizens can access the health related information and other services without much effort. They can get information about the different clinics, opening hours and addresses from the portal. Citizens liked the idea of e-services like booking visit for a doctor, cancelling the visit, recipes renewal, ordering the certificates, travel vaccination, universal access cards, self-referral to physiotherapy, self-referral to occupational therapist, ask the doctor on the web portal, etc. This will save their time of going to hospital and getting these services. Also it makes them more capable of taking decisions on their own. Getting information about diseases like symptoms of different diseases, its treatments and advice on self care was also appreciated by the citizens. They want to have update information about their health problems. This will make them more confident about their health.

6.2 Demerits of the NHP. Citizens were not completely satisfied with contents and the available health related information for diagnosing the health related problems and how to cure these diseases. Also there were number of diseases for which the information has not been placed/ updated. This decreases the trust of citizens on the portal. The layout of page which is providing information about the symptoms of different diseases, its treatments and advice on self care is not satisfactory. It contains long text instead of graphical representation of health information. Procedure of advice on self care is also not pleasing and attractive for the citizens. Help page was complex which is not liked by most of citizens. They do not want to spend their time while reading lengthy descriptions. Citizens expect more elaborated screen tips for performing the different activities. Also icons used on different pages are not very attractive and meaningful. Generally, health portals use multimedia contents to demonstrate different health related activities in health domain but currently the NHP have no support for the audio and video multimedia contents which makes it less interactive and effective for the citizens. Observations show that while performing different operations during the usability test appropriate warning or error messages are not provided by the portal. Messages displayed are not elaborated regarding the specific operations. Only some parts of the portal are available in languages other than English. As many citizens living in our country are not literate in English, it makes it less useful for all the citizens. The portal should also be available in languages other than English in order to cover maximum number of citizens. E-health services also need to be improved by the addition of more visible fonts, attractive labels, clear text fields, meaning full buttons, drop down menus and helping information. The portal should also provide support regarding accessibility, so that people who may suffer from a range of disabilities become able to access its resources.

6.3 M-health can embrace modern technology to widen healthcare accessibility in rural India and can be a solution for India's healthcare woes. A vast country like India, with a population of over 1.2 billion across 28 states, 7 union territories and governed by a federal system, needs affordable healthcare. In order to meet demand, healthcare will have to undergo a paradigm shift. It will witness massive convergence to tele-health and mobile health to fill the massive 'need gap'. Currently, India has three-tier government supported system for healthcare delivery with states having the primary responsibility of public healthcare. This results in significant disparity in quality and

access to healthcare services in various regions within the states and even cities in India. The disparity is far greater between urban and rural regions in India. On the other hand, India is technologically advanced in the ICT sector and self-sufficient in meeting its needs of software, connectivity and services. Therefore, ICTs have the potential of making healthcare affordable for India, especially in rural India. This success can be further reinforced if these technologies are integrated into existing health-care delivery systems. In the last decade there has been active investment for development of m-Health in India but considering the demographic spread this investment is not sufficient for such a large country. The scale of m-Health services in India has been limited so far to medical transcription, health awareness through portals, telemedicine, and hospital management system and customer service using the internet. While globally and particularly in Africa, advanced technologies such as 3G services are used efficiently for providing healthcare solutions to remote villages, the use of communication devices such as mobile phones or conferencing solutions for m-Health in India has been limited.

6.4 Prof. K. Ganapathy, President Telemedicine Society of India, and President, Apollo Telemedicine Foundation says, "m-Health is more relevant in India than conventional e-Health, as access to PCs, laptops and broadband is far less than access to mobile phones just 12 million broadband connections, 24 million internet subscribers, 85 million PCs but 900 million mobile phones. Utilising wireless to access the internet is steadily increasing and telecom operators in India see this as a potential gold mine." He adds, "The ubiquitous all pervading universally available mobile phone can now be used as a tool, an enabler to deliver healthcare to the haves and the have-nots. There are unlimited opportunities and strategies for using the mobile in implementing m-Health in hospitals, insurance companies, pharmacy companies etc. With 50 mobile phones being sold every second, with an urban tele-density of 113 percent and a rural tele-density of 49 percent, we in India, should certainly be poised, to incorporate m-Health into the very fabric of our healthcare delivery system. M-Banking, is taking off with 31 banks having 60 million urban customers (11 percent of the urban population use m-Banking). Thirty five television channels can now be accessed on the mobile phone. This is just the beginning of m-entertainment. Today's PC based online shopping, will soon give way to m-Commerce." Today, India has the right opportunity with 875 million mobile phone users, 1.55 lakh post offices, 2.38 lakh gram panchayats, 8 lakh chemists and 2.2 million SHGs spread across the nation. The optimum utilisation of these networks,

involving SHGs and training them with point of care diagnostics connected to mobile devices for diagnosis and treatment, will help deliver a cost effective and an impactful primary healthcare system for rural India.

6.5 The opportunity for m-Health has also been stimulated by a number of factors, which include technological innovations relating to systems integration, improvements in wireless networks, mobile handset innovations, and the continued growth of mobile phone subscribers. There are a number of m-Health solutions that are in use in the marketplace today, application types include mobile access to medical records, adherence applications, medication compliance, chronic disease management solutions, as well as general 'wellness' applications including health surveys and data collection. The adoption of m-Health globally has initially been based around healthcare information and alerting using SMS as a medium, this has a proven model in India, however with the emergence of smart phones this traditional model is going through some rapid change. Potential key applications of m-Health include education and awareness generation, remote data collection, communication and training for healthcare workers, disease and epidemic outbreak tracking, diagnostic and treatment support and remote monitoring. Access to technology, end user and healthcare provider acceptance, lack of regulatory issues, logistics and availability of appropriate, need-based, customised solutions are some of the major challenges in the way of widespread utilisation of m-Health. As per an estimate, there are at least 20 active m-Health pilot projects in India being carried out by some state governments and NGOs as part of m-Governance initiatives. They include use of mobile games to enhance HIV/AIDS awareness (10.3 million game sessions were downloaded in 15 months). Handheld devices were used to collect raw health data which were transmitted in real time to the health information system database. Disease and epidemic outbreaks have been tracked and daily health alerts have been sent to subscribers for nominal charges. The majority of participants forecast a breakthrough of m-Health in the next five years "An emerging market for m-Health could be India. Even though it is still a developing economy, it is a country where acceptance of technology is very high due to a large population in the age group 20 to 40 years."

National Health Portal and m-Health Apps – Feedback on Usability/Effectiveness

1. Name -

2. Gender - Male/Female

3. Marital status - Married/Unmarried

4. Age group

- Below 25 years
- 25-35 years
- 35-45 years
- 45-55 years
- 55 years and above

5. Income group

- Below Rs 30 K/month
- Rs 30-60 K /month
- Rs 60-90 K/month
- Above Rs 90 K/month

6. Occupation -

7. Your company/organisation is best described as:

- App developer
- IT / Tech company
- Medical device manufacturer
- Health insurance company
- Medical publisher
- Sport / Fitness company
- Pharmaceutical company
- Education / Training company
- Consultancy / Market research company
- Telecommunications company
- Independent practitioner
- Tele health service provider
- Nursing service
- Hospital
- University
- Government institution
- Other (please enter an 'other' value for this selection)

8. Contact information - email id and mobile number (optional)

9. What are the perceived benefits of NHP? (Write any three)

10. Please mark the following aspects of NHP on a 5 point satisfaction scale according to your experience with the portal.

	Not at all satisfied	Slightly satisfied	Moderately satisfied	Very satisfied	Extremely satisfied
How satisfied you are with the design of NHP					
How satisfied are you with the information given on the portal					
How satisfied you are with the links offered in the NHP					
Were you satisfied with the innovativeness of the portal					
Were you satisfied with the m-health apps listed in the NHP					

11. What other features according to you can create an exceptional/desirable impact of NHP in healthcare sector? (Write any three)

12. What is the perceived usefulness of m-health apps listed in the NHP? (Write any three)

13. How will you rank the following potential benefits of m-health apps in preference order of biggest impact on healthcare in next 5 years?

Begin by picking out the one potential benefit that you find most important and assign it a Rank 1. Then find the second most preferred benefit and assign it a Rank 2. Continue this procedure until you have ranked all in order of your preference. No two potential benefits should receive the same rank.

	1	2	3	4	5	6	7	8
Improve patient outcome								
Improve prevention and education								
Increase health consciousness of society								
Reduce or slow down increase of healthcare costs								
Improve interaction between patients and doctors								
Improve data quality on diseases to develop improved medications or treatment plans								
Provide better access to health care in remote locations								
Enable people to take better care of their own health								

14. Which of the following drivers will have the biggest impact on the growth of the m-health market over the next five years? (Please select up to three)

- Smartphone and tablet penetration
- Introduction of patient-centered care models
- User / patient demand for m-Health apps
- Technological innovations
- Government initiatives and demand for healthcare efficiency savings
- Ubiquity of m-Health solutions / apps
- Standardisation breakthroughs
- Health regulatory bodies' support
- Price development of the m-Health apps
- Corporate involvement in m-Health market
- Other (Please enter an 'other' value for this selection)

15. On which of the following healthcare cost drivers, will m-health apps have the highest positive impact in the next five years? (Please select up to three)

- Reduce costs for hospital readmission and duration of stay by using e.g. remote monitoring apps
- Reduce investment in expensive technologies by e.g. replacing expensive ultrasound scanners with low cost app-based scanning solutions
- Reduce costs of patients non-adherence to a medical treatment by e.g increasing patient engagement with compliance apps
- Reduce doctors visits costs by e.g increasing number of app-supported self diagnoses
- Reduce redundant examinations and medication costs by e.g. EHR apps
- Reduce labor costs by e.g increased outsourcing via apps that provide access to remote consultation & diagnostics in low labor cost countries
- Reduce medical trial cost by e.g. apps that support data collection in trials
- Reduce prevention cost by e.g. apps that support patient education
- Others (Please enter an 'other' value for this selection)

16. Which of the following m-health app categories offer the highest market potential in the next five years? (Please select up to three)

- Remote consultation apps
- Diagnostic apps
- Remote monitoring apps
- Reminders and alerts apps
- Compliance apps
- Medical reference apps
- Continuing medical education tools
- Medical condition management apps
- Fitness apps
- Nutrition apps
- Wellness apps (e.g. yoga)
- Logistical and payments
- Patient health record apps
- Other (Please enter an 'other' value for this selection)

17. What are the main barriers to m-Health apps having a greater impact on healthcare in the next five years? (Please select up to three)

- o Lack of data security
- o Difficulties for users in finding the right m-health solutions
- o Devices do not meet clinical requirements in terms of hygiene, waterproofing, etc
- o Lack of standardization
- o Missing or unknown legitimacy of m-health publishers
- o Mismatch of target group and smart phone owners (elderly/chronic disease)
- o High m-health app solution costs
- o Missing regulations
- o Patients' discomfort with change in their healthcare routine
- o Lack of profitable business models
- o Resistance from traditional healthcare providers
- o Lack of high quality clinical studies
- o Lack of reimbursement for m-health apps from company funds and insurance
- o Lack of interoperability of m-health app-based solutions
- o Lack of high quality m-health apps
- o Other (Please enter an 'other' value for this selection)

18. Which distribution channels offer the best market potential for m-Health apps as of today and in 5 years? (Please select up to three per year)

	2014	2019
App Stores		
General healthcare websites		
Hospitals*		
MNO (Mobile Network Operator) platforms		
Pharmacies*		
Physicians*		
Web pages of m-health app & solution providers		

*Hospitals, pharmacies, and physicians would recommend or provide m-Health solutions when patients come in for treatment.

19. Which of the following devices will be the main target device for m-Health apps in five years? Please rank them in order of relevance. (Please select top five only)

o Smart phones	
o Tablets	
o Glasses (e.g. Google glasses)	
o Watches (e.g. Samsung watch)	
o PC net books	
o Feature phones	
o Game consoles	
o E-Readers	
o TV & set-top boxes	
o Others	

20. Use of Hindi m-health apps will improve the health indices in India.

	Strongly disagree	Disagree	Neither Agree Nor Disagree	Agree	Strongly agree
Your opinion					

21. What smart phone platforms offer the best market potential for m-Health as of today and in 5 years time? (Please select up to three per year)

	2014	2019
Android		
iOS		
Windows Phone		
HTML5		
Mozilla Firefox		
Ubuntu		
Blackberry		
Bada		
Symbian		

22. Any other m-health app you feel is important to be listed in the NHP.

23. Do you think that the experience obtained on NHP was up to your expectations?

	Strongly disagree	Disagree	Neither Agree Nor Disagree	Agree	Strongly agree

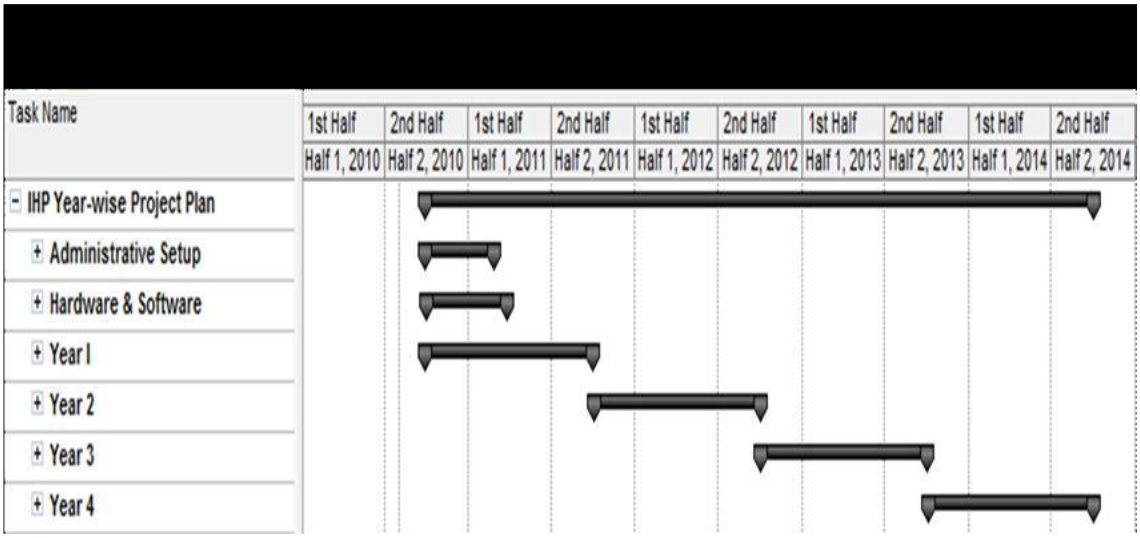
24. If strongly disagree, why?

25. Would you recommend this portal to your friends and family?

	Extremely unlikely	Unlikely	Neutral	Likely	Extremely likely

26. If extremely unlikely, why?

Gantt Chart – Timeline of NHP



PERT Analysis – Year Wise

	Task Name	Duration	Optimistic Dur.	Expected Dur.	Pessimistic Dur.
1	IHP Year-wise Project Plan	1048.67 days?	1046 days	1050 days	1067 days
2	Administrative Setup	108 days?	89 days	110 days	119 days
7	Hardware & Software	127.33 days?	118 days	128 days	134 days
14	Year I	263 days?	261 days	264 days	334 days
26	Year 2	262 days?	229 days	262 days	312 days
41	Year 3	261 days?	210 days	261 days	310 days
57	Year 4	260 days?	228 days	260 days	310 days

Annexure 2

Certain Indian Govt Websites with Health Content

No.	Name of the Organisation	Web Address (URL)	Updated Date
1.00	**Indian/State Government Websites**		
1.01	Kerala Govt	http://www.healthkerala.gov.in/hrp/diseaseinfo.jsp	Link not working
1.02	Tamil Nadu Govt	http://www.tnhealth.org/	Copyright date - 2009
1.03	Maharashtra Govt	http://maha-arogya.gov.in/diseasesinfo/default.htm	No update/ copyright date
1.04	Rajasthan Govt	http://rajswasthya.nic.in/	No update/ copyright date
1.05	Andhra Pradesh Govt	http://health.ap.nic.in/	No update/ copyright date
1.06	Karnataka Govt	http://stg2.kar.nic.in/healthnew/IDSP/Home.aspx	No update/ copyright date
1.07	Haryana Govt	http://haryanahealth.nic.in/	No update/ copyright date
1.08	Uttaranchal Govt	http://gov.ua.nic.in/health/	No update/ copyright date
1.09	Delhi Govt	http://health.delhigovt.nic.in/	12th March 2010
1.10	Gujarat Govt	http://gujhealth.gov.in/	No update/ copyright date
1.11	Lakshdeep Govt	http://lakdirhealth.nic.in/	2003
1.12	Orissa Govt	http://www.orissa.gov.in/health_portal/Swine/swine.htm	No update/ copyright date
1.13	National Leprosy Eradication Programme	http://mohfw.nic.in/National_Leprosy_Eradication_Programme/LEP_ABT.htm	No update/ copyright date
1.14	Tuberculosis control	http://www.tbcindia.org/	No update/ copyright date
1.15	National Institute of Malaria Research	http://www.mrcindia.org/	4th August 2010
1.16	India Development Gateway (DIT)	http://www.indg.in/health/	July 27, 2010

Annexure 3

Certain Hospital Websites in India with Health Content

2.00	Hospitals	Web Address (URL)	Updated Date
2.01		http://www.apollolife.com/	Copyright 2010 by Apollo life
2.02	AIIMS	http://www.aiims.edu/aiims/health_inf.htm	Web site was last revised on July 21, 2010; National oral health programme updated in 2003; Information on Dengue fever updated in May 2007
2.03	Rajiv Gandhi Cancer and Research Institute	http://www.rgci.org/index.php?option=com_bnmn&id=69&Itemid=10622	Copyright © 2009-10
2.04	Tata Memorial centre	http://www.tatamemorialcentre.com/cancerinfo/cancer/cancer.htm#cause	Copyright 2003-04
	Tata Memorial centre	http://www.tatamemorialcentre.com/cancerinfo/types.htm	Copyright 2003-04
2.05	Apollo health street	Nil	No update or copyright date available
2.06	Manipal Hospital	Nil	Copyright 2009 Manipal Hospitals
2.07	Sanjay Gandhi Hospital	Nil	No update or copyright date available

Annexure 4

Certain Govt AYUSH Websites with Health Content

3.00	Health Information concerned with Ayurveda	Web Address (URL)	Updated Date
3.01	National Institute of Ayurveda	http://www.nia.nic.in/	Updated on 30-07-2010
3.02	National Institute of Naturopathy	http://punenin.org/index.htm	Copyrighted 2004
3.03	National Institute of Unani Medicine	http://www.nium.in/	Website temporarily unavailable
3.04	National Institute of Siddha	http://www.nischennai.org/	Copyright (2009-10)
3.05	National Institute of Homoeopathy	http://nih.nic.in/	Updated on July 23, 2010
3.06	Department of Ayurveda, Yoga & Naturopathy, Unani, Siddha and Homoeopathy (AYUSH)	http://indianmedicine.nic.in/	Copyright and Update date not available
3.07	Rashtriya Ayurveda Vidyapeeth	http://ravdelhi.nic.in/	Copyright and Update date not available
3.08	Gujarat Ayurveda University	http://www.ayurveduniversity.edu.in/index1.php ,	Updated 28 July 2010
		http://www.ayurvedamanuscripts.com/	Copyright and Update date not available
		http://www.ayujournal.org/	Copyright and Update date not available
3.09	Institute of Post Graduate Teaching & Research in Ayurveda	http://www.ayurvedacatalogue.com/viewjournal.php	Copyright and Update date not available

Annexure 5

Online Calculators/Health Tools in the NHP

#	Name of the Widget/Calculator	Functions of the Widget/Calculator
1	Expected date of delivery (EDD) calculator	Calculates the Expected Date of Delivery based on the Last Menstrual Period
2	BMI Index Tool	Measures the BMI
3	Risk for Cardiac Disease	Measures the Risk for CVD
4	Life Stressors Calculator	Helps to measure the level of stress in the life activities
5	Adult Height Potential of the Child	Predicts the height of the child, based on height of the mother and father
6	Life time risk for specific cancers	Determine the risk of cancer through various history and clinical details
7	Immunization scheduler	Helps to set up the immunization calendar for the baby
8	Depression Screening test	Online depression screening test
9	Tooth eruption chart	Mentions the eruption/fall of various teeth
10	Family Heart Risks	Determines the family risk for heart disease

References

1. NIHFW (internet). Delhi: NIHFW; [date unknown]. Available from: http://www.nihfw.org/Index.aspx

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