

# Qualitative Research: Significance of Health Management Information System in Government Hospitals of Tamil Nadu, India

<sup>[1]</sup> M. Saravanapriya,

<sup>[2]</sup> Dr. T. Suganthalakshmi,

<sup>[3]</sup> Dr. S. K. Thirunavukkarasu

<sup>[1]</sup> Assistant Professor, Department of MBA, Hindusthan Institute of Technology, Coimbatore – 641 032,

<sup>[2]</sup> Assistant Professor, Department of Management Studies, Anna University Regional Centre, Coimbatore – 641 046, <sup>[3]</sup> Joint Director – TNHSP, Chennai. Deputy Director - HMIS & SHDRC (TNHSP), Member Secretary - ICMR, LPRC, and Chief Information Officer (CIO) - E-Health / E-Governance, State of Tamil Nadu.

<sup>[1]</sup> [saravanapriya.m@hit.edu.in](mailto:saravanapriya.m@hit.edu.in), <sup>[2]</sup> [sugi1971@rediffmail.com](mailto:sugi1971@rediffmail.com), <sup>[3]</sup> [skthirurmo@gmail.com](mailto:skthirurmo@gmail.com)

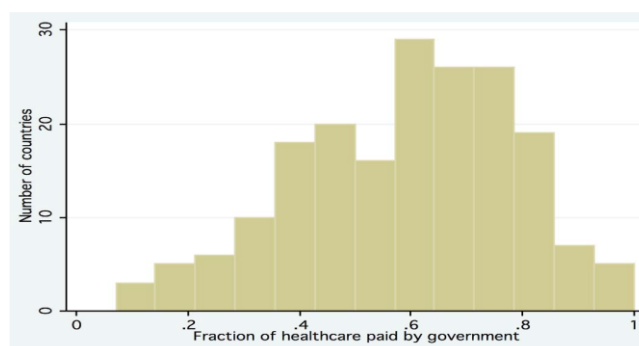
## ABSTRACT

Tamil Nadu Health System Project (TNHSP) is long term strategic plan of the Government of Tamil Nadu, partnered with the World Bank, NRHM, and ICMR to develop a new Health Information System (HIS) in Tamil Nadu. It should be greatly reachable, impartial and valuable. Health Management Information System (HMIS) is a amalgamation of Information Technology and Healthcare management. The study is (i) to understand the impact and importance of Tamil Nadu Health System Project implemented in all Government Hospitals (GHs) of Coimbatore District and (ii) To understand the functioning of Hospital Management System (HMS) in all GHs. Coimbatore district is taken as sample among 32 districts in Tamil Nadu for the convenience of the researcher for collecting data from all Government Hospitals. The primary data are collected from nine Government Hospitals (Institutions) under Coimbatore district and consolidated reports are collected at the office of Joint Director of Health Services (JDHS), Coimbatore. The only secondary data are presented and explanations are based on tables provided by health workers and authorities. Hospital Management System (HMS) and Health Management Information System (HMIS) play a vital and essential role in modern healthcare. The accomplishment of an information system is in the hands of end users' satisfaction and adequate training given to them.

**Index Terms—** Health Management Information System (HMIS), Hospital Management System (HMS), Quality Healthcare Services, Tamil Nadu Health Systems Project (TNHSP).

## I. INTRODUCTION

There is a long-term debate in global health care, whether health care services are provided to low and middle- income countries are balanced (Berendes et al., 2011). Due to economic recession in 2007, lot of restrictions are made in major funding for healthcare costs in most countries (Figure 1) ( Stuckler et al., 2011).



**Figure 1.** Countries' Government expenditure on health.

Source:[114]. doi:10.1371/journal.pmed.1001244.g001.

Every hospital has many institutions and functional departments and supporting units which synchronize care for patients. So hospitals are mostly dependent on Hospital Information System (HIS) which is used to diagnosis, treatment, management and education for effective and efficient health services (Milstein and Bates, 2010). HIS is divisible into different groups to perform specified functions which generate large volume of data. Large volume of data are collected in

the outpatient (OP) department and admitting departments (SINHA and KURIAN, 2014). Specific data are very important for the well-being of patients, while some other data may be collected for overall competence of hospital. There are lot of hurdles and challenges faced by every hospital in checking the data accuracy and reliability to maintain the quality of patient data (Kunder, 2004).

## **II. a. HOSPITAL INFORMATION SYSTEM (HIS)**

Enormous data are captured in computerized databases and stored in Hospital information systems (HIS). Previous database systems were used for communicating orders among acute care, pharmacy and laboratory departments. Nowadays, HIS is used as a diverse platform in every institution (Nancy Staggers et al, 2001).

HIS may be a centralized database collecting bulky and large volume of data from all departments and combining the reports according to the need and requirements of hospitals health workers including patient, clinical, ancillary and financial management (Acharyulu, 2012). Information System's success has six major dimensions when relating to term "quality" of information systems (William and Ephraim, 1992): They are (i) System Quality, (ii) Information Quality, (iii) Use, (iv) User Satisfaction, (v) Individual Impact and (vi) Organizational Impact. In addition to the six dimensions, "a significant service component" is appended to these dimensions. Indeed, the IT officers of HIS in the Information System Department are doing numerous tasks, such as selection of hardware and software, implementation tasks, problem solving, data communication networks, system updating, giving adequate training, tutoring, translation of data to meaningful information for effective decision making, etc. (Leyland and Richard, 1995).

For the past decades, ICT is playing an important role in effective management of healthcare data; those data are collected from the various sources in the hospital. Hospital Information System (HIS) is one of the essential applications of ICT which supports the health workers in managing various data and reports generated in a hospital on daily basis (SINHA and KURIAN, 2014). Multifaceted Information System (IS) is designed to collect, capture transform and convert into meaningful information and those valuable information are utilized to support all the administrative and clinical activities of a hospital (Yaseen A. Hayajneh. et.al. 2014). At first, Hospital Information Systems (HIS) were used for generating reports for financial and accounting purposes. But at present, many developments are upgraded in computer technology; HIS has covered almost every activity and redesigned the entire flow of information within the hospital. Therefore, an updated HIS has been adapted to improve the quality, safety and efficiency of healthcare apart from generating reports of mere routine administrative and financial tasks. At present, every hospital is more dependent on these HIS for carrying out all the hospital functions like patient care, education and research for improvising both services and practices (Information System. 2014).

The process design and implementation strategies of Hospital Information System (HIS) should be well designed. There should be lot of analysis while selecting the vendors, hardwares and softwares. Appropriate software should be chosen to meet out the objectives of the hospital services. The end users and customers are involved in the process of implementation. The customized software is developed by the support of end users. Appropriate and adequate training should be provided to the end users regarding the use of the system (Mohd-Fadhil NF, Jusop M, Abdullah AA, 2012). End user's satisfaction in using HIS is dependent on a person's feeling or attitudes towards a variety of factors affecting that working environment and situation (SimaAjami, ZohrehMohammadi, 2012). Simultaneously, end user's satisfaction is significant for the successful implementation of HIS. Many obstacles for the malfunctioning of HIS are psychological and organizational issues. So, every hospital has to evaluate the end user's satisfaction level towards the usage of HIS. A standard procedure and norms should be followed to ensure satisfaction level of the end users towards the system (Wixom BH, 2005 and Norman Au, 2014) and also hospitals top level executives use different long term strategies to enhanced acceptability and sustainability of the hospital information system in the health care organization.

## **II b. TAMIL NADU HEALTH SYSTEM PROJECT (TNHSP)**

Tamil Nadu Health System Project (TNHSP) is long term strategic plan of the Government of Tamil Nadu, partnered with the World Bank, NRHM, and ICMR to develop a new Health Information System (HIS) in Tamil Nadu (<http://www.tnhsp.org/news>). It should be greatly reachable, impartial and valuable (Dr. T. Suganthalakshmi, M. Saravanapriya, Dr. S. K. Thirunavukkarasu, 2016). In another part, Health Management Information System (HMIS) is an amalgamation of both ICT and Healthcare management. HMIS is a very important part of TNHSP for offering quality health care services to the public in Government Hospitals of Tamil Nadu (M. Saravanapriya, 2014)

In the area of human development, State of Tamil Nadu is ranked in top when compared to the high-performing States in India (<http://www.tnhealth.org/>). The State is well known for its low mortality rates and efficient healthcare services. The State has made tremendous innovations in the health sector. To improve quality of health care at a lower cost, the state of Tamil Nadu has established various new approaches. For the past decades, the state of Tamil Nadu has advanced significantly in health care sectors, with more people having increased admission to medical care. Health sector is performing well and dedications among health workers are very high. (Project Overview TNHSP, 2005)

Ministry of Health and Family welfare proposed the TNHSP Project (Government of Tamil Nadu), which provides its support to the Health Policy of 2003 and focuses on improvising the health condition of people belonging to the lower socio-economic strata (M. Saravanapriya, Dr. D. Rajasekaran, 2010). “There are new approaches to tackle non-communicable diseases, identifying the health requirements of the tribes and partnerships with the NGOs which form the core of TNHSP project (<http://www.tnhsp.org/project>)”. The TNHSP Project is helping for the long term vision of the Health Policy through the following interferences

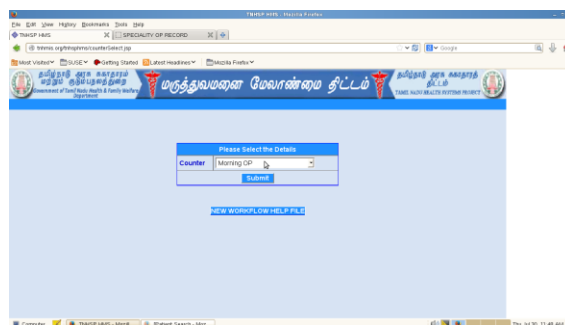
- Giving more attention for underprivileged, deprived, and tribal groups
- Addressing key health challenges and developing effective interventions
- Increasing quality of service thereby improving the health results in public sector and non-governmental sector
- Improving the efficacy and competence of the district and sub-district level public sector hospital services (Project Overview TNHSP, 2005)

HMIS is put into practice by Tamil Nadu Health Systems Project, a part of Health & Family Welfare department with credit support from World Bank (Health Management Information System, Health IT proposal of Government of Tamil Nadu, 2014).

Four modules are under HMIS such as HMS, MIS, CMS and UAS (<http://www.hmis-hms.tn.gov.in/tnhsphms/>)

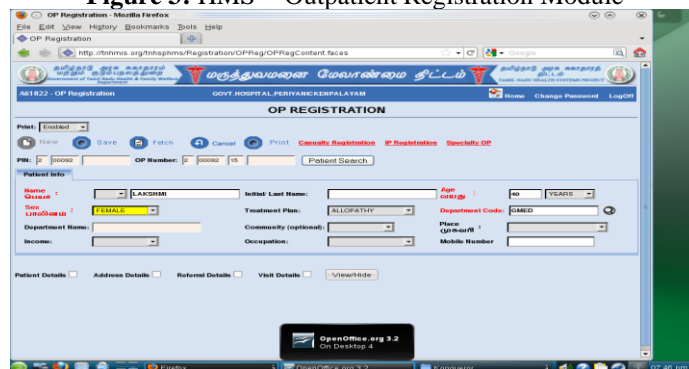
- ❖ Hospital Management System (HMS)
- ❖ Management Information System (MIS)
- ❖ College Management System (CMS)
- ❖ University Automation System (UAS)

**Figure 2:** Hospital Management System (HMS)



Source: Courtesy from TNHSP

**Figure 3:** HMS - Outpatient Registration Module



Source: Courtesy from TNHSP

## II c. HEALTH MANAGEMENT INFORMATION SYSTEM (HMIS)

HMIS is for III layer health care system i.e., Primary, Secondary & Tertiary care. HMIS binds the following Secondary Care Hospitals, Primary Health Centres and Medical University

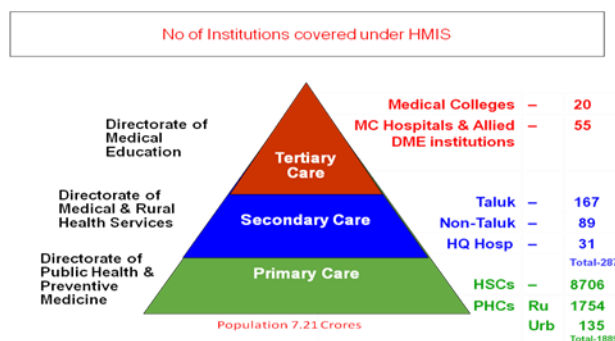
I. 287 Secondary Care Hospitals

II. 20 Govt Medical College Hospitals+ Allied Institutions

III. 1889 Primary Health Centres &

IV. One Medical University

**Figure: 4** Institutions covered under HMIS



Source: Courtesy from TNHSP

## II d. OBJECTIVES

- To understand the impact and importance of Tamil Nadu Health System Project implemented in all Government Hospitals (GHs) of Coimbatore District.
- To understand the functioning of Hospital Management System (HMS) in all GHs.

## III. DATA COLLECTION METHODS

Coimbatore district is taken as sample among 32 districts in Tamil Nadu for the convenience of the researcher for collecting data from all Government Hospitals. The primary data are collected from nine Government Hospitals (Institutions) under Coimbatore district and consolidated reports are collected at the office of Joint Director of Health Services (JDHS), Coimbatore. The researcher has contacted the Joint Director of Rural & Health Services in Coimbatore District and seeking his permission and requesting for consolidated reports. With the help of District IT Coordinator (Engineer), HMS Usage reports of nine Government hospitals under Coimbatore District were collected.

## IV. ANALYSIS & RESULTS

Analysis is done using two sample tables drawn from office of Joint Director of Health Services (JDHS) and explanation is given based on the face to face interview did with District IT Coordinator (Engineer). First table shows the installation and working status of Hospital Management System (HMS) in all Government Hospitals restricted to Coimbatore District alone. And Second table and Chart Show the performance of Government Hospitals based on number of patients treated with usage of HMS in their GHs. Quality of Health services increased only because of implementing successful HMS. Every HMS is interlinked with Health Management Information system (HMIS) for health data analysis and effective decision making in health aspects.

**Fig.5 INSTALLATION & WORKING STATUS OF HMS in all GHs of Coimbatore District**

S. No	Hospital Name	Installation status	Working status
1	DHQH,Pollachi	Completed	Working
2	GH Mettupalayam	Completed	Working
3	GH Annur	Completed	Working
4	GH Suler	Completed	Working
5	GH Thondamuthur	Completed	Working
6	GH Periyannackalpalayam	Completed	Working
7	GH Kottur	Completed	Working
8	GH Vetaikaranpudur	Completed	Working
9	GH Valparai	Completed	Working

Secondary data: Tamil Nadu Health System Project (TNHSP) – Coimbatore district

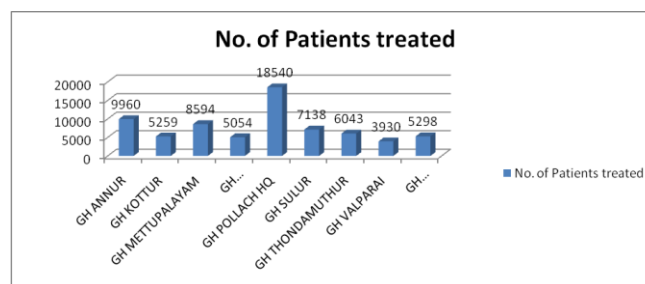
**INTERPRETATION:**

Hospital Management Systems (HMS) is successfully implemented in every Government Hospital in entire Coimbatore District. There are nine GHs in Coimbatore district in which Pollachi leads as District Headquarters' Hospital (DHQH). HMS and HMIS training are scheduled and executed at DHQH. All Chief Medical Officers, Doctors, Nurses, Pharmacists, Lab technicians and other hospital workers are given training on how to use HMS, how to consolidate reports and how to maintain the system. Each module related to each grade people is explained elaborately with practical training provided by Coimbatore District IT Engineer (O/o JDHS).

**Fig.6 HMS USAGE IN COIMBATORE DIST APRIL 2015**

S. No	INSUTITUTION	OP REG	CL.OP %	PH %	LAB %	IP REG
1	GH ANNUR	9960	80	92	82	170
2	GH KOTTUR	5259	81	94	100	220
3	GH METTUPALAYAM	8594	50	90	99	359
4	GH PERIYANICEKENPALAYAM	5054	84	91	93	204
5	GH POLLACH HQ	18540	55	93	85	1027
6	GH SULUR	7138	85	94	75	127
7	GH THONDAMUTHUR	6043	83	85	96	208
8	GH VALPARAI	3930	62	72	98	84
9	GH VETTAIKARANPUTHUR	5298	88	95	98	96

Secondary data: Tamil Nadu Health System Project (TNHSP) – Coimbatore district

**Chart.1 HMS USAGE IN COIMBATORE DIST APRIL 2015****INTERPRETATION:**

Government Headquarters' Hospital at Pollachi places first position in using Hospital Management System (HMS) to the maximum extent. Hence Pollachi GH has increased quality of health services only because of adequate training given to Doctors, Nurses, Pharmacists, Lab technicians and other hospital workers. Annur GH places second position in using HMS to maximum extent. All GHs are performing well by using HM. Adequate training and coworkers briefing are done to all level of health workers. The success of HMS is also in the hands of individual responsibility of every health workers. And in turn, the success of Health Management Information System (HMIS) is in accurate, timely and reliable data provided by all HMS implemented in every GH in Coimbatore District.

**V. FINALE SUMMARY**

In modern healthcare, Hospital Information System plays an imperative role. On the other hand, end user's satisfaction also plays a significant role for the existence and sustenance of information system itself. Some displeasure and dissatisfaction existing among the end users, because of not caring about their requirements and not involving them during

the implementation process of the system. There should be a free and open discussion on end users' issues regarding the hospital information system and therefore most of their problems which remain unnoticed by the administration are solved. The pros and cons of the problems are identified and effective decisions are made in the future. Even similar studies are carried out in the future to accomplish maximum sustainability of Hospital Information System (SINHA and KURIAN, 2014).

Each and every HIS and DSS systems were divided on the basis of institution-levels and provider-centered applications. The Vision of Information System is to integrate longitudinal views of health records. Eventually, this vision is to amalgamate Information Systems to support patient care and also attention is required in terms of decree by legal, privacy, and security issues (Nancy Staggers et al, 2001).

In this research paper, both Hospital Management System (HMS) and Health Management Information System (HMIS) play a vital and essential role in modern healthcare. The researcher found adequate training provided to new staff nurses, new pharmacist and new lab technician. And the HMS is having full technical support from separate technical wing in each district. HMIS will be even more successful in future when each and every person who uses the system has integrity, strong communication and continuous learning among them. The victory of an information system is in the hands of end users' satisfaction and adequate training given to them. And the commitment of the end users will make Tamil Nadu Health System Project (TNHSP), a great success in the entire nation.

## ACKNOWLEDGEMENT

The researchers will be always grateful to those authorities who permitted to collect data from the office of Joint Director of Health Services (JDHS) and in Government Hospitals in the district of Coimbatore. First, we would like to thank **Thiru Dr J. Radhakrishnan IAS, Health Secretary** to the Tamil Nadu Government, Ministry of Health and Family welfare & Project Director (i/c), Tamil Nadu Health Systems Project, Chennai, **Dr. S. K. Thirunavukkarasu**, MBBS, DPM, M.Phil (HHS), FIPS, Deputy Director - HMIS & SHDRC (TNHSP), Member Secretary - ICMR, LPRC, & Chief Information Officer (CIO) - E-Health / E-Governance, State of Tamil Nadu, **Dr. M. Tamilmani**, MBBS., M.D, Joint Director of Rural Health Services (JDRHS), Coimbatore District and **Mr. K. Harish Kumar**, Coimbatore District IT Engineer (O/o JDHS), Coimbatore. We also acknowledge the efforts of all health workers who routinely submit their daily activity reports through the HMS and HMIS.

## REFERENCES

- [1]. J. Adler, Milstein, and D. W. Bates. 2010. Paperless healthcare: Progress and challenges of an IT-enabled healthcare system. *Business Horizons*. 2010 Vol.53. No.2.
- [2]. G. D. Kunder. Hospital Information System. Hospitals – Facilities Planning and Management. 2nd Ed. TBS. 2004.
- [3]. Yaseen A. Hayajneh. et.al. Extend of Use, Perceptions, and Knowledge of a Hospital Information System by Staff Physicians. [Cited on 2014 February 14]. Available from: [hayajneh.startlogic.com/research/Extent\\_of\\_Use\\_.pdf](http://hayajneh.startlogic.com/research/Extent_of_Use_.pdf).
- [4]. Information System. 2014. [Cited on 2014 February 14] Available from: [http://en.wikipedia.org/wiki/Hospital\\_information\\_system](http://en.wikipedia.org/wiki/Hospital_information_system).
- [5]. Mohd-Fadhil NF, Jusop M, Abdullah AA. 2012. Hospital Information System (SIS) Implementation In A Public Hospital: A Case Study From Malaysia. [Cited on 2014 March 5] Available from: <http://www.fareastjournals.com/files/FEJPBV8N3P1.pdf>.
- [6]. SimaAjami, ZohrehMohammadi. 2012. Training and its Impact on Hospital Information System (SIS) Success. [Cited on 2014 March 22]. Available from: [omicsgroup.org/journals/training-and-its-impact-on-hospital-information-system-SIS-success-2165-7866.100011](http://omicsgroup.org/journals/training-and-its-impact-on-hospital-information-system-SIS-success-2165-7866.100011).
- [7]. Wixom BH, Todd PA . 2005. A theoretical integration of user satisfaction and technology acceptance. 16. 85-102. [Cited on 2014 April 3] Available from: [www.lib.yuntech.edu.tw/~exam/exam\\_new/100/dmi.pdf](http://www.lib.yuntech.edu.tw/~exam/exam_new/100/dmi.pdf).
- [8]. Norman Au, W T Eric Ngai, T C Edwin Chang. Extending the understanding of end user information systems satisfaction formation: An equitable fulfilment model approach. [Cited on 2014 April 10] Available from: <http://misq.org/extending-theunderstanding-of-end-user-information-systems-satisfaction-formation-an-equitable-needs-fulfillment-model-approach.html>.
- [9]. Dr. Rajesh Kumar SINHA and Susanna KURIAN, 2014, Assessment of end user satisfaction, Quality, Management in health XVIII/3/2014; pp. 26-33.

[10]. Nancy Staggers, Cheryl Bagley Thompson, Rita Snyder-Halpern, 2001, History and Trends in Clinical Information Systems in the United States, *JOURNAL OF NURSING SCHOLARSHIP*, 2001; 33:1, 75-81.

[11]. Berendes S, Heywood P, Oliver S, Garner P (2011) Quality of private and public ambulatory health care in low and middle income countries: systematic review of comparative studies. *PLoS Med* 8: e1000433. doi:10.1371/journal.pmed.1000433. Private and Public Healthcare Performance *PLoS Medicine* | [www.plosmedicine.org](http://www.plosmedicine.org) 11 June 2012 | Volume 9 | Issue 6 | e1001244.

[12]. Stuckler D, Basu S, Wang SW, McKee M (2011) Does recession reduce global health aid? evidence from 15 high-income countries, 1975–2007. *Bull World Health Organ* 89: 252–257.

[13]. G. V. R. K. Acharyulu, 2012, Assessment of Hospital Information System Quality in Multi Specialty Hospitals, *International Journal of Innovation, Management and Technology*, Vol. 3, No. 4, August 2012, pp 349-352.

[14]. M. M. Yusof, A. Papazafeiropoulou, R. J. Paul, and K. Stergioulas, "Investigating evaluation frameworks for health information systems," *International Journal of Medical Informatics*, vol. 77, pp. 377-385, 2008.

[15]. L. Roussel, R. C. Swansburg, and R. J. Swanburg, "*Management and Leadership for Nurse Administrators*," Contributor Russell C. Swansburg, Richard J Swansburg. Jones and Bartlett Publisher, 2005.

[16]. R. Haux, E. Ammenwerth, and A. Buchauer (Ed). The Requirements Index for Information Processing in Hospitals. Version 1.0b. Germany: Institut für Medizinische Biometrie und Informatik (imGi). Supported by the Deutschungsgemeinschaft (DFG), Adopted by the DFG's Computing Facilities, 2001.

[17]. M. F. Collen, "A vision of health care and informatics in 2008," *J Am Med Inform Assoc*. 1999 Jan- Feb, vol. 6, no.1, pp. 1-5, 1999.

[18]. D. William H.- McLean Ephraim R. - "Information system success : The quest for the dependant variable," *Information Systems of Research*, March, vol. 3, no. 1, 1992.

[19]. P. Leyland F. - Watson Richard T. - Kavan C. Bruce - "Service quality: A measure of information systems effectiveness," - *MIS of Quarterly*, June, vol. 19, no. 2, pp.173-188, 1995.

[20] Dr. T. Suganthalakshmi, M. Saravanapriya, Dr. S. K. Thirunavukkarasu - "A Study on Health Management Information System (HMIS) with reference to Periyanaickenpalayam Government Hospital, Coimbatore", *Journal of Contemporary Research in Management (JCRM)*, June, Vol. 11, No.2, pp. 1- 17, 2016.

[21] M. Saravanapriya, "Impact of HMIS in Government Hospitals of Tamil Nadu – A theoretical Perspective", *International Journal of Management Review (IJMR)*, April, Vol. no.1, pp. 291 – 297, 2014.

[22] M. Saravanapriya, Dr. D. Rajasekaran, "A Study on Health Management Information System for the Indian Masses", *International Journal of Applied Management Research*, December, Vol. 2, Special Issue No.1, pp. 274 – 276, 2010.

## ONLINE REFERENCES

- <http://www.tnhsp.org/project>
- <http://www.tnhsp.org/news>
- <http://www.tnhealth.org/>
- <http://tnhmis.org/>
- <http://www.hmis-hms.tn.gov.in/tnhspHMS/>