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Healthcare waste management scenario: A case of Himachal Pradesh (India)

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ABSTRACT

Objective: To explore healthcare waste management scenario in Himachal Pradesh (India).
Method: Data has been collected through a survey questionnaire and accordingly analyses have been carried out by applying appropriate statistical techniques with the help of commonly acknowledged SPSS software.
Results: Results highlight that private hospitals are generating more healthcare waste (yellow and red category of healthcare waste) as compared to public hospitals in the given context. However, in blue category of healthcare waste public hospitals are generating more waste than private ones.
Conclusion: By considering number of beds, doctors, and staff as independent variables, the present study analyses healthcare waste management from the perspective of Human Resources and consequently marks some managerial and policy implications.

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1. Introduction

Economic activities are necessary for the existence of human beings as espoused by the great Indian scholarly book Arthashasthra.[1] To make these activities viable, role of industrialisation is essential because industries will generate products and services in implicit way. Similarly, for the physical survival of human beings basic food elements are needed which come through agricultural base of a country. In this whole process of economic growth, industrialisation, and agricultural yield, a lot of waste is generated some of which is decomposed and most of it is dumped somewhere in the cities or at a point of waste collection. Scholars believe that if this waste is not managed properly it can be detrimental to the environment and human health.[2–6] Moreover, if we scan the contemporary life style of people we can sense that people are busy through day and night in fulfilling their professional and personal desires beyond the limit which consequently impacts their health not only in physical form but also in psychological and mental way. This may be the possible reason that World Health Organization (WHO) defines 'health' and consequently 'healthcare services' in a holistic way (http://www.who.int/en). In response to making these services available, the number of hospitals which are providing diversified healthcare services is increasing in India (https://www.ibef.org). There is no doubt that these healthcare service providers are not achieving their vision by serving people at large but because of healthcare treatment activities a lot of waste is produced which is a matter of cognizance. In this reference, the government of India has recently (2016) amended Part II, Section 3, Sub-section-i of Bio-medical Waste Rules (1998) which was published vide notification number S.O. 630 (E) dated the 20th July, 1998, by the Government of India in the erstwhile Ministry of Environment and Forests. These amendments (2016) have motivated the authors of this article to explore further and survey the literature of healthcare waste management and analyze its scenario in Himachal Pradesh (India). During the literature review we found total 45 studies which are available and highly relevant to the theme of the present study, some of which are briefed in the following section (Literature Review).

2. Literature Review

This section highlights some of the studies related to healthcare waste management in foreign and Indian context.

2.1. Studies conducted in Foreign Context

Oli et al.[7] have assessed the involvement of healthcare workers in waste management in public and private hospitals of Southeast Nigeria. It has been found that healthcare workers in the public hospitals have more awareness about waste management

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practices as compared to their counter parts i.e., private ones. Results of this study also indicate that there is a significant difference in healthcare waste generation between public and private hospitals. Adhikari and Supakankunit [8] have done a cost-benefit analysis of healthcare waste management in Bir hospital, Nepal. The study gives meaningful financial implications for healthcare waste management. Abor [9] has found that public hospitals generate more waste than the private hospitals. From the technical point of view, Shanmugasundaram et al.[10] have shown the relevance of GIS modelling tool in relation to healthcare waste management in Lao People's Democratic Republic. This tool can be used as a decision support tool for the efficient management of healthcare waste by hospitals, government, and concerned authorities. Other studies which have deliberated the significance of research in the area of healthcare waste management and its related issues like segregation of wastes and educating healthcare executives about the waste management are Awodele et al.,[11] Mahasa and Ruhiiga,[12] Omar et al.,[13] and Jang et al.[14]

2.2. Studies conducted in Indian Context

Thakur and Anbanandam [3] have identified the important barriers that hinder healthcare waste management (HCWM) in the state of Uttarakhand (India). This study delineates valuable issues in healthcare waste management by employing meticulous literature review, field surveys, brainstorming sessions, and advanced statistical techniques. Chauhan et al. [15] have found that there is a limited participation from the private healthcare organizations of India in terms of setting up of waste recycling units which may be because of financial constraints. Somaiah and Shivaraj [16] have conducted a cross-sectional study to assess performance of biomedical waste management in Government District hospitals of Southern India. Data has been collected through direct observation, staff interview and documents reviews. The study concludes that improvements in biomedical waste management can be made by increasing the knowledge, awareness and practices among the healthcare workers by providing mandatory training. Thakur and Ramesh [5] have analyzed the healthcare waste management research in a systematic, structured and thematic manner wherein it has been found that (a) out of the total publications, 72.72% are covered by the two journals namely, Waste Management & Research and Waste Management (b) around 42% of the studies have been done in China, Iran, Greece, India and UK. (c) 60% of the articles are related with general healthcare waste management practices. The study provides a comprehensive overview of the research paradigm in the area of healthcare waste management during January 2005 to July 2014.

Other studies which have highlighted the significance of waste management research in Indian context include Sunmeet and Gangawane,[17] Patil et al.,[18] Reddy et al.,[19] Kumari et al.,[20] and Bathma et al. [21] Moreover, there are some studies [22–24] in the area of healthcare waste management with reference to the state of Himachal Pradesh (India), still there is a research gap in the given context especially from management point of view. Therefore, the present study is an attempt to fill this gap with the following methodology.

3. Methodology

3.1. Objectives

Objective 1: To compare the healthcare waste generation across private and public hospitals

Objective 2: To find the correlation between the healthcare waste across colour codes and other variables of the study i.e., number of bed, doctor, and staff

Objective 3: To identify the factors responsible for healthcare waste generation

3.2. Sample

The study has been conducted in a sample of six hospitals of Himachal Pradesh (India). Initially, a list of ten hospitals was prepared according to the purpose of the study. Out of these ten hospitals, only six hospitals permitted for data collection and other relevant research support for this study. Out of these six hospitals, three are from public domain and three are from private domain. Out of 3 public hospitals, 1 is from Hamirpur, 1 from Kangra, and 1 from Palampur district. In private domain the similar distribution has been followed (1 from Hamirpur, 1 from Kangra, and 1 from Palampur). All these hospitals have necessary healthcare infrastructures which are catering the needs of concerned patients; however, during data collection it was observed that these hospitals are lacking in terms of advanced technological facilities related to healthcare waste management. On ethical grounds of research, the names of these hospitals cannot be disclosed.

3.3. Data collection and analyses

The data was collected through self-developed structured questionnaire and by visiting each hospital personally between Feb-April 2017. Ethical clearance from the institution and the permission of superintendent was needed for the collection of data regarding healthcare waste. It took approximately one month in collecting the required data. The questionnaire consists of total six closed ended question that provides the required data (name and location of the hospital; number of beds, doctors, and staff; healthcare waste generation according to month and year wise). Data analysis has been carried out by applying appropriate statistical techniques with the help of SPSS software.

4. Results

Table 4.1 compares the average value of healthcare waste (colour wise) across public and private hospitals. It is clear from this table that there are total 108 data points which refers to 36 month's data of 3 years (2014–2016) i.e., $36 \times 3 = 108$. In this table the descriptive statistics (mean values and standard deviation) of healthcare waste has been shown according to colour (Yellow, Red, and Blue) which indicates that there is difference in healthcare waste between public and private sector hospitals for which there could be many reasons. Table 4.2 indicates that relationship between yellow waste (Y) and bed is positive (0.44) and significant at 0.01 level. This implies that as the number of bed increases the waste of yellow colour also increases. The relationship between red waste (R) and bed is positive (0.80) and significant at 0.01 level. Similarly, the relationship between blue waste (B) and bed is

Table 4.1
Mean value of healthcare waste across Public and Private hospitals.

Waste Colour	Sector	N	Mean	Std. Deviation	Std. Error Mean
Y (Yellow)	Public	108	81.1392	64.0355	6.16182
	Private	108	183.377	123.161	11.8512
R (Red)	Public	108	277.053	301.944	29.0546
	Private	108	348.612	359.579	34.6005
B (Blue)	Public	108	125.803	151.499	14.578
	Private	108	62.2361	52.2182	5.0247