Mohandasundaram, Dr. V. "The Environmental Implications And Economic Issues In Bio-Medical Waste Management In Urban Coimbatore, Tamilnadu, India" in Martin J. Bunch, V. Madha Suresh and T. Vasantha Kumaran, eds., *Proceedings of the Third International Conference on Environment and Health, Chennai, India, 15-17 December, 2003*. Chennai: Department of Geography, University of Madras and Faculty of Environmental Studies, York University. Pages 270 – 275.

THE ENVIRONMENTAL IMPLICATIONS AND ECONOMIC ISSUES IN BIO-MEDICAL WASTE MANAGEMENT IN URBAN COIMBATORE, TAMILNADU, INDIA

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Introduction

The conflict between economic development and environmental quality has been well established in the environmental economics literature. Equally well established has been the trade-off between trade and environmental protection. That is, when an economy grows on the lines of an export-led growth strategy, then it uses more and more resources (renewable as well as non-renewable) to get into higher production levels thereby causing infliction or damage to the environment (in various forms of pollution). The country in question may not be interested in investments that will prevent pollution for the fear of cost disadvantage. That is, to be competitive in the market they have to produce goods at a cheaper cost which means they spend no money on pollution prevention or control measures that will increase their cost of production. Similar is the case with the individual firms. The firms are reluctant to invest or spend money either to prevent or to control the pollution levels that are causing immeasurable damage to the environment. This may be due to three major possibilities; they don't want to reduce their profit: (i.e., such measures are costlier to adopt, especially when there is no incentive) they have not assessed the real damage to the society or the environment around them (i.e. the problem of measurement of environmental damage becomes very difficult when it is intangible or they are in no way affected by such pollution levels, that is lack of knowledge, information and awareness about the damages of the pollution on the one hand and lack of understanding about the social as well as economic values of preservation of natural environment on the other.

From the point of view consumer's, two things are possible to control the environmental pollution; they can demand eco-friendly products or they can reduce their consumption. For the first possibility the income levels of the consumers should be high as the prices of eco-friendly products / services are, in a normal situation, costlier. And for the second possibility there should be alternative choices, in other words, by the reduction in the consumption polluting goods, meaning they should be ready to sacrifice even if that mean a lower standard of living to them.

From the point of view of the administrators, say the government, the problems are compounded when they attempt to prevent or control or regulate the polluting activities in the

economy. Here again the governments are left with two approaches: command and control and economic incentives. As Kolstad points out the basic problem of environmental regulation involves the government trying to induce a polluter to take socially desirable actions, which ostensibly are not in the best interest of the polluter. But the government may not always be able to precisely control the polluter. To further complicate matters, the government faces a complex problem of determining exactly what level of pollution is best for society. In reality the government faces pressures from consumers and polluters.

In other words, at the theoretical level, the intricacies involved in solving the problem of pollution to the satisfaction of the concerned parties- government, polluters and consumer citizens – are complex and complicated. The implied point is that each case neeeds to be treated cautiously and a wholesale application of a law, rule or a tax may not yield the expected results.

Urban Pollution and Bio-Medical Waste Disposal

Having given some theoretical underpinnings in the introduction, now the focus of the present paper focuses on Bio-medical waste management on a scientific line to avoid the impending health hazards. It is an established fact that in India almost all the urban centers have become the havens of pollution, i.e., they are affected by air, water and land pollution. The growing menace is solid waste generation – in heaps and bounds- and their improper disposal. As an injury added, the Bio Medical wastes are also thrown into the garbage bins and mixed with other wastes. In many places, it has been reported that the Bio Medical waste are thrown in the drainage.

For two major reasons, besides others, Bio Medical waste generation is on the increase: an increasing population as well as increased demand for Allopathy treatment, and proliferation of smaller to corporate hospitals in towns and cities on a commercial basis. Thus to tackle the situation a well developed strategy and its impartial implementation are the need of the hour.

Hospital Waste or Bio Medical Waste

Hospital waste is among the more dangerous types of garbage because of being contaminated with disease-carrying pathogens. Hospital wastes require a very safe disposal system, as it may lead to the spread of dangerous disease – viral hepatatis, TB, Bronchitis, Gastroenterits and skin and eye related problems. According to a WHO Publication (1999) Health care waste includes all the waste generated by health-care establishments. Between 75% and 90% of the waste produced by health care providers is non-risk and the remaining 10-25% of health care waste is regarded as hazardous and may create a variety of heath risks (for a detailed description see chapter 3 of the report).

Bio Medical Waste in India

The WHO Report quotes the following information that it received from the National Environmental Engineering Research Institute (1997); the data obtained from 10 large hospitals in Mumbai, Culcutta, Delhi and Nagpur during the period 1993 –1996 shows the percentage (wet-weight basis) of different wastes, as paper 15, plastics 10, rags 15, metals, sharps, etc., infections waste 1.5, glass 4 and the remaining 53.5 as general waste.

Similarly a large number of estimates are coming up relating to cities like Bangalore, Kanpur, Hyderabad and Vishakapattinam. For want of space these are not elaborated on here.

By realizing the seriousness of unscientific management of Bio Medical Waste and its health hazards GOI brought out "The Bio-Medical Waste (Management and Handling) Rules, 1998". It notified that the Bio Medical Waste shall be treated and disposed of in accordance with schedule I, and in compliance with the standards prescribed in schedule V; every occupier, where required; shall set up in accordance with the time-schedule in schedule VI; requisite Bio Medical Waste treatment facilities like incinerator, autoclave, microwave system for the treatment of waste. The Act also gives detailed guidelines regarding categorization, colour coding, standards, segregation, packaging, transportation, storage and maintenance of records on Bio Medical Waste.

The significant point is that the Act has given a time frame within which the installation of the treatment facility has to be completed by the health care establishments. That is, the rules shall come into force on the date of their publication in the official gazette. As far as Tamil Nadu is concerned it has notified the Act and the deadline was over by 31-10-2003. The moot question is whether all the health care establishments (both public and private) implemented a Bio Medical Waste treatment facility or not.

Micro Level Analysis

This section deals very briefly on the status of Bio Medical Waste disposal in Urban Coimbatore. The total number of hospitals in the private sector in Coimbatore Urban area is 76. Out of this four hospitals are having more than 250 beds; three hospitals with 50 to 100 beds and the remaining 69 hospitals have below 50 beds. In the public sector, there is a medical college hospital with 1020 beds, one E.S.I. Hospital with 250 beds and 20 corporation dispensaries. There is one corporate hospital namely Kovai Medical Center & Hospital (KMCH), just a few hundred feet away from the corporation limit and is functioning with 350 beds. For the present study data and information gathered from one Government Hospital (CMCH) and one Corporate Hospital (KMCH) are used.

CMCH, Coimbatore

The details regarding the number of admissions, operations, deliveries, out patients treated and number of discharges during 1998 to 2003 are given in the table one.

The total number of admissions varied from 47683 to 57599 in a year; discharged varied between 46676 and 56350. The number of major operations performed during a year varied from 7824 to 10855 and minor operations from 8583 to 11271 the total number inpatients treated varied form 356533 to 410961. And the number of out patients treated has been massive; it varied from 1237831 to 1465599.

Bio Medical Wastes Disposal at CMCH

To date no scientific method of collection, segregation, transportation and disposal of Bio Medical Waste have been adopted in CMCH. All these wastes are simply dumped in dustbins and municipality vehicles collect them to be disposed in corporation waste dumping sites. The observation made revealed that (i) substantial amounts of Bio Medical Waste have been thrown in to the drainages (ii) rag pickers collect and sell reusable materials.

Economic Aspects of Bio Medical Waste at CMCH

The Scientific method of disposal of Bio Medical Waste at CMCH involves capital investment as well as maintenance changes. The fixed cost include the following

a. Building to house incinerator - Rs 50,00,000
b. Cost of Incinerator - Rs 1,00,00,000
c. Other accessories and components - Rs 10,00,000
Total Fixed Cost - **Rs 1,60,00,000**

The variable costs include electricity, and diesel charges, transport cost and wages. The Tekno Therm Industries, a Private firm, has quoted Rs 2.50 per day, per bed to dispose of biomedical waste. The information from other cities like Hyderabad show that there the private firms are charging Rs 4.50. An average of these two comes to Rs 3.50. At this rate the cost per day at CMCH will be Rs 3570 (1020 beds X Rs 3.50). And for one year it will come to Rs 13,03,050.

Method of Financing

An alternative method to state sponsoring/budget allocation is the collection of user charges. The state can supplement a part of the project (say 25 per cent) at the initial stage. Then by collecting user charges the remaining amount as well as maintenance charges can be collected. What we quote here does not include the wages paid to the existing staff and cleaners who are on the permanent workers list. Hence, the amount quoted here is on the higher side and in actual practice it will go slightly down.

Raising the fixed capital

i. Financial Grant from the Government =Rs 60,00,000
ii. Money collected from outpatients
(Rs 4000 patients per day x 365days xRs 5) =Rs 73,00,000
iii. Money collected from Inpatients
(Rs 1000 patients per day x 365days xRs 10) =Rs 36,50,000
iv. Money collected from the Major operated cases
(25majoroperationsper day x 365days xRs20) =Rs 1,82,250
v. Money collected from Minor operated cases
(27minoroperationsper day x 365days xRs10) =Rs 98,550

= Rs1,71,31,050

For Maintenance

The maintenance cost per year comes to Rs 13,03,050. This can be financed by charging the user fees in the following manner.

a. Amount to be collected from outpatients per year = Rs 7,30,000
(4000 x 365 x 0.50p)
b. Number of Inpatients (1000 x 365 x Rs 1) = Rs 3,65,000
c. Number of operations Major (25 x 365 x Rs15) = Rs 1,36,875
d. Number of operations Minor (27 x 365 x Rs 8) = Rs 78,840

= Rs 13, 10,715

Hence, this way the system of scientific biomedical waste disposal and management can be maintained and operated. In due course of time, when the number of operations conducted and the number of patients treated increases the user charges can be reduced.

Bio Medical Waste Generation at KMCH

The factors that determine the bio-medical waste at KMCH are identified as occupancy ratio, number of operations and delivery cases. It is found that on an average 500kg of Bio Medical Waste is generated per day and put into the incinerator. The occupancy ratio of the hospital during the study period (17.3.2002 to 23.3.2002) has been found to be 90%. During 2001 to 2002 the number of operations performed has been 5026.

The incinerator runs through electricity with the help of a 5 HP motor. When the cost of (fixed as well as variable costs) incinerator operation per day is calculated it came to Rs.782 and for one year Rs.285587.

To sum up

In the corporate hospital the Bio Medical Waste disposal through incinerator looks as good. However, whether it meets the operating and emission standards has yet to be examined. At the same time the worst scenario found in CMCH needs to be changed quickly for the betterment of the patients and also the public at large.

Table -1
COIMBATORE MEDICAL HOSPITAL, COIMBATORE
MEDICAL RECORDS DEPARTMENT
HOSPITAL STATISTICS FROM 1998 – 2003

S.No	DETAILS	1998	1999	2000	2001	2002	2003
1	Total No of Admissions	48703	54081	55536	56854	57599	47683
2	Average per Day	133	148	152	156	157	157
3	Total No. of discharges	47872	54208	54428	55747	56530	46676
4	Average per Day	131	148	149	153	155	154
5	Total No. of Inpatients Treated (Census)	356533	394255	406045	40830	410961	331139
6	Average per day	977	1080	1112	1119	1126	1089
7	Total No. of deaths	1173	1147	1175	1091	1086	N.A
8	Total No of Out-patients treated	1237831	1380993	1424655	1441203	1465599	1201587
9	Average per day	3391	3783	3903	3948	4015	3952

10	Total No. of operations performed						
	Major	8993	10855	9652	7825	9715	8215
	Minor	8583	9623	8865	11271	10384	7898
	Total	17576	20478	18517	19095	20099	16113
11	Total Deliveries	6312	7666	7627	6297	7931	6256
12	Total no. of Babies	6338	7694	7657	6331	8019	7261

The efforts of PCB and the IMA chapter at Coimbatore along with the Coimbatore corporation establishment has been delivering the benefits, of late. In an order dated 21.5.2003 the TNPCB has authorized Tekno Therm Industries to operate a facility for collection, reception, storage, transport and disposal of Bio Medical Waste of 2.5 tonnes per day in the premises situated at R.S.No.183/1 of Orattukuppai village, Coimbatore Taluk, Coimbatore District. The Tekno Therm in turn offered IMA, Coimbatore, to charge Rs.250/- per bed, per day. The scheme is yet to take –off. One wishes a speedy remedy to the problem of Bio Medical Waste disposal and urge the government sector hospitals (CMCH, E.S.I, and Corporation dispensaries) also to join in this endeavor as early as possible.

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