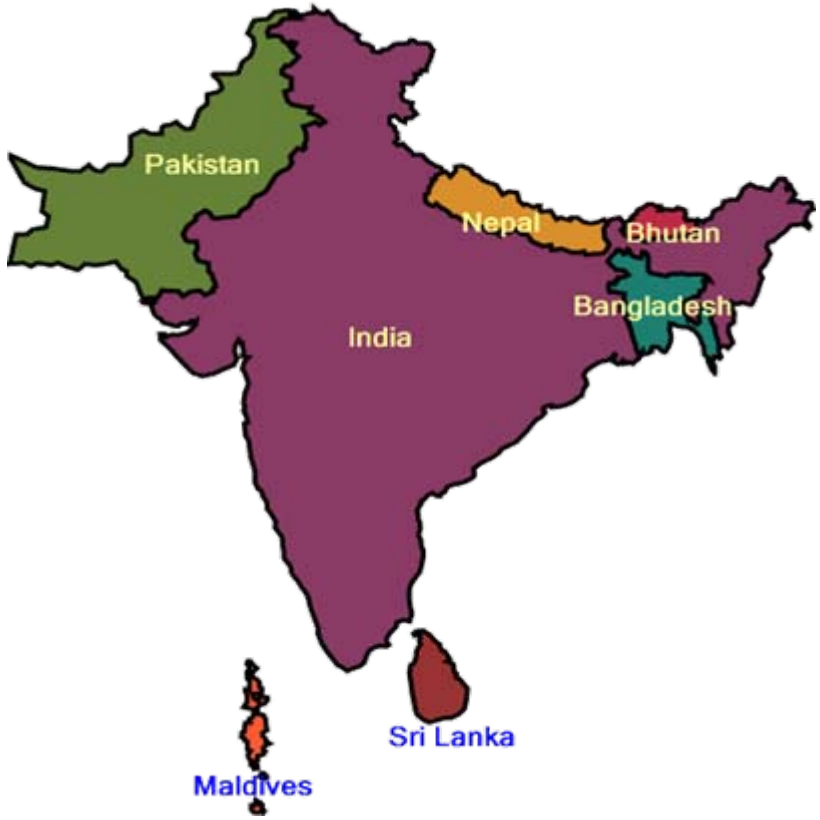
Healthcare Waste Management in South Asia



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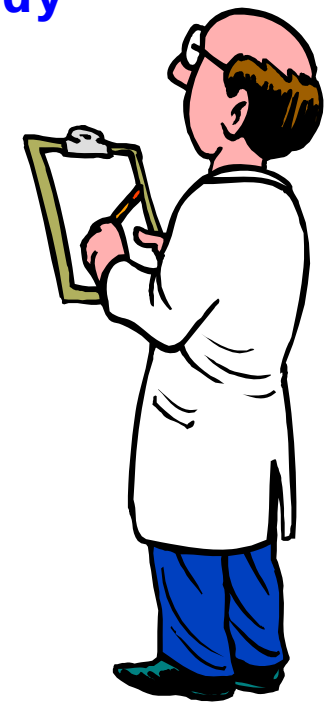
Contents of Presentation

- ✓ Overview of Healthcare Management
- ✓ Treatment Technologies
- ✓ Bangkok Metropolitan Administration: A Case Study
- ✓ Healthcare Waste: South Asian Perspective
- ✓ Conclusions

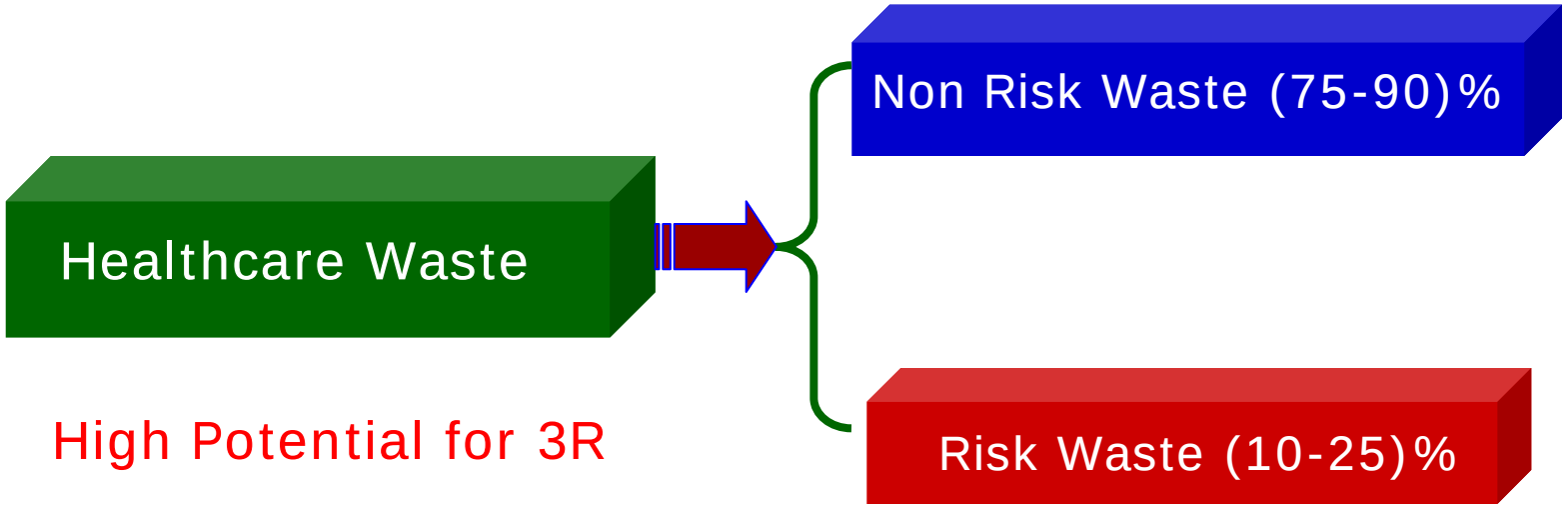


Overview of Healthcare Waste Management

What is Healthcare Waste?

Total waste generated by hospitals, healthcare establishments and research facilities in the diagnosis, treatment, immunization and associated research

Healthcare Waste Characterization:



High Potential for 3R

Overview of Healthcare Waste Management

Treatment Technologies

✓ Incineration

- Double-chamber pyrolytic incinerators specially designed to burn infectious health-care waste
- Single-chamber furnaces with static grate, used only if pyrolytic incinerators are not affordable
- Rotary kilns operating at high temperature, capable of causing decomposition of genotoxic substances and heat-resistant chemicals.

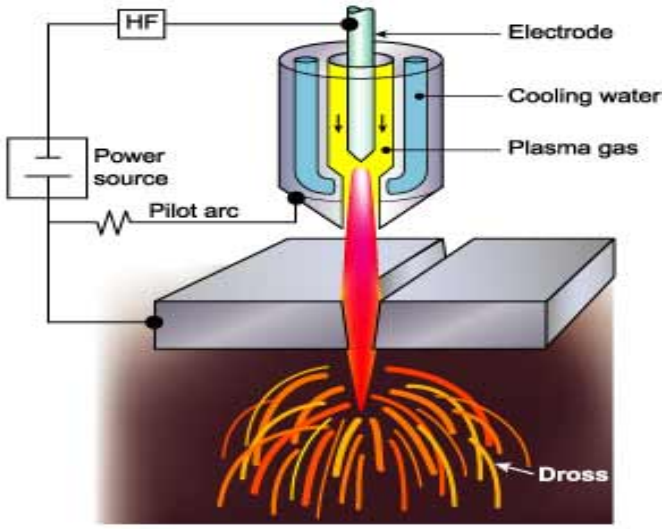
Treatment Technologies

- **Disinfection**
  - Chemical disinfection: used for treating liquid waste
  - Thermal disinfection: generally used for treating solid waste

- **Sterilization**
  - Steam sterilization: autoclave used to disinfect waste.
  - Microwave irradiation: uses radiant energy to heat moisture within the waste

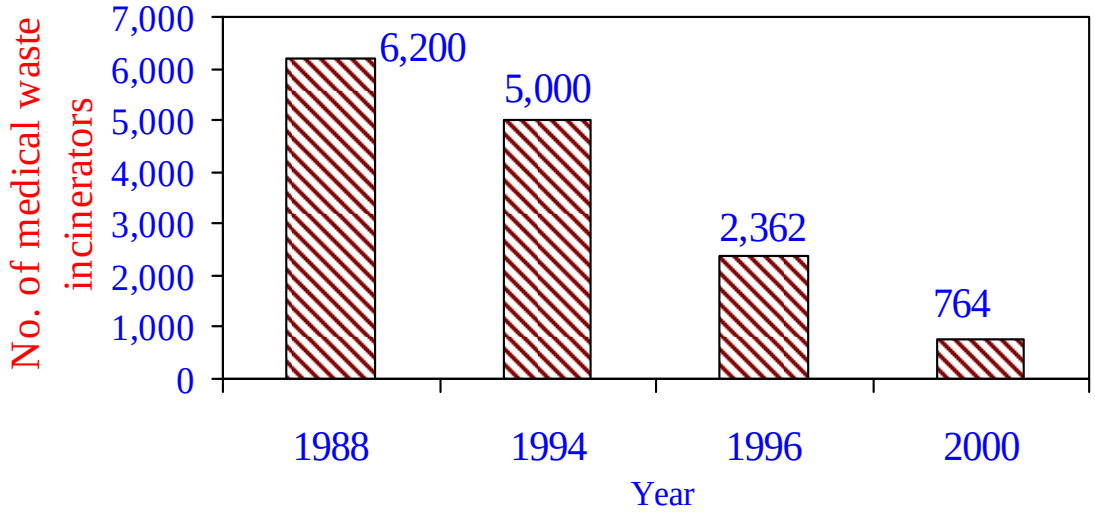
Treatment Technologies

- **Plasma arc technology**
  - Operates on principles of an electrical arc struck between two electrodes.
  - There is no burning and no formation of ash.



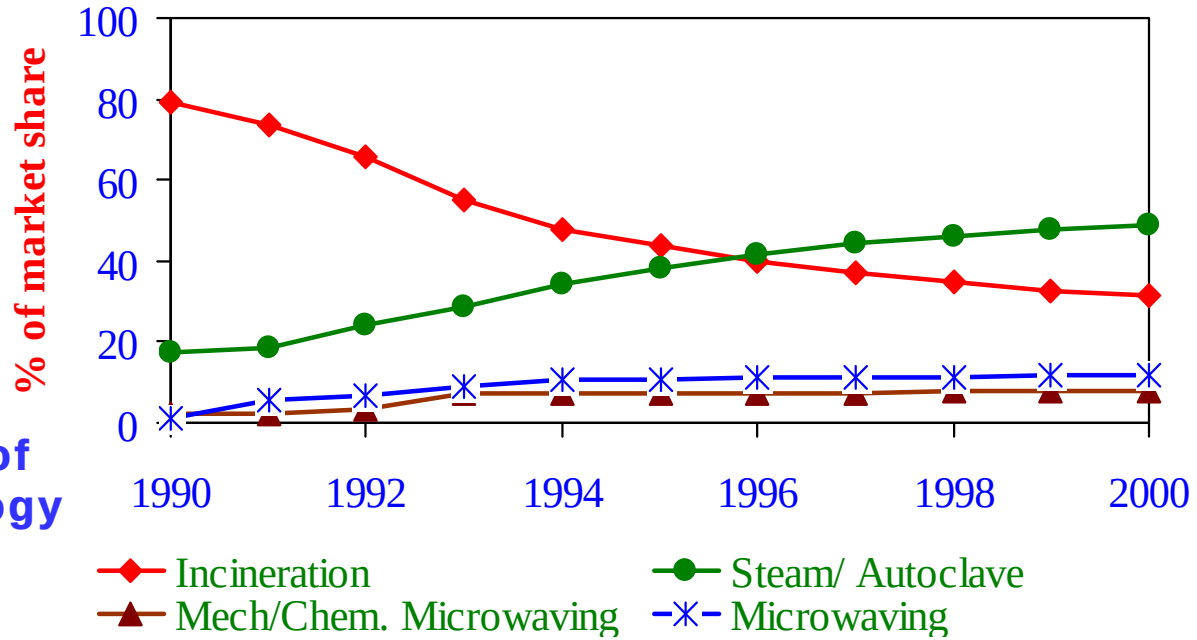
- **Landfill**
  - **Open dumps** : not recommended
  - **Sanitary landfills** : Disposing of certain types of health-care waste (infectious waste and small quantities of pharmaceutical waste) in sanitary landfills is acceptable

Treatment Technologies



Decrease in number of medical incinerators (USA)

Increased market share of non incineration technology (USA)



Treatment Technologies: Comparison

	Treatment Technologies				
	Incineration	Autoclave	Microwave	Chemical Disinfection	Plasma Pyrolysis
Investment/ Operating cost	High	Moderate	High	Low	High
Suitability Of the waste	Not for radioactive	All except Pathological	All except cytotoxic, radioactive	Liquid waste	All
Ease of Operation	No	Yes	Yes	Yes	No
Waste Volume reduction	Significant	Less	Significant		Significant
Odour Problems	Yes	Slight	Slight	Slight	-
Environmental friendly	No	Yes	Yes	No	Yes

Bangkok Metropolitan: Case Study

Incineration by Private Contractor

- ✓ Operated by Bangkok Thanakom Co., Ltd (cost of B 5,800/ton)
- ✓ Disposal of infectious waste from Bangkok hospitals: 16 ton/day

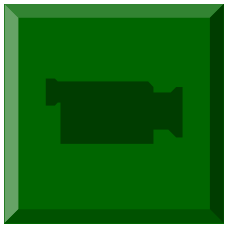
Bangkok Metropolitan: Case Study

(Nonthaburi, Thailand)

Spoiled medicine capsule together with MSW

Infectious waste in red plastic bag co-disposed with MSW

Hospital Waste Management : Bangkok Metropolitan Administration



Healthcare Waste: South Asian Perspective

Bangladesh

Prevalent practices

- ✓ Wastes not segregated in many hospitals
- ✓ Disposed off together with municipal solid waste
- ✓ Openly burnt in some hospital
- ✓ Few local initiatives taken by NGOs (e.g., Prodipan)
- ✓ Medical waste segregation, recycling and reused by rag pickers

Medical waste scavenging

Healthcare Waste: South Asian Perspective

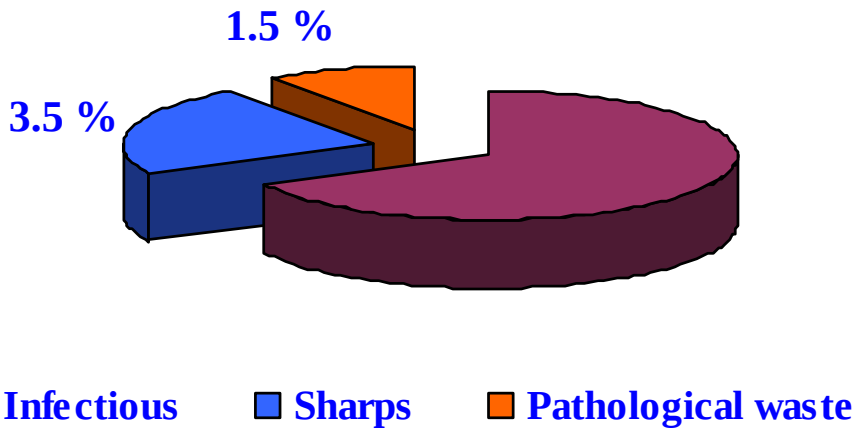
Bangladesh

Legislation:

- ✓ No specific legislation directly to medical waste

Generation:

- ✓ 255 ton/day in Dhaka alone
- ✓ 10-25% is hazardous
- ✓ Waste generation➔ 0.8-1.67 kg/bed/day



Composition of risk waste

Rag Picker

Healthcare Waste: South Asian Perspective

Bhutan

Legislation & Policy

- Guidelines for Infection Control (Ministry of Health);
- Healthcare management is addressed in Environmental Code of Practice for Hazardous Waste Management, 2001.

Generation : 73 ton/year…..

Prevalent Practices

- Poorly managed incinerators;……..or back yard burners?
- Open burial pits posing a threat to public;
- No regulated disposal sites except JDW National Hospital;
- Sharps collected/reused without cleaning or sterilization.

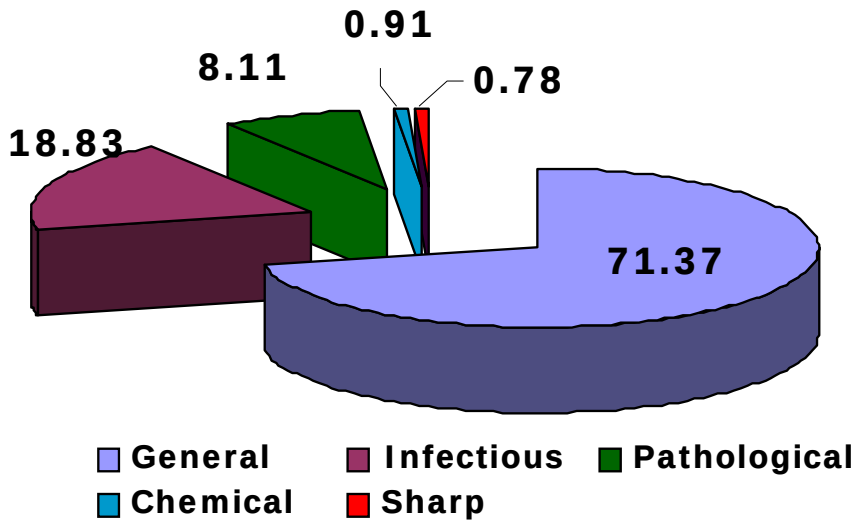
Healthcare Waste: South Asian Perspective

India

- ✓ **Legislation:** Bio-Medical Waste Regulations 1998
  - Classified in ten categories;
  - Color coding and types of containers for different categories and their corresponding treatment & disposal option with standards

- ✓ **Generation:** 0.33 million tons/year

Proportion of different waste in hospital waste (Calcutta)



Healthcare Waste: South Asian Perspective

India

Prevalent Practice & Implementation

Audited by Controller & Auditor General, Delhi (July 1998- August 2001)

- ✓ Implementation is unsatisfactory
- ✓ No segregation in 27 out of 40 government hospital
- ✓ Intravenous sets , catheters , plastic bags etc. incinerated not autoclaved
- ✓ Labeling instructions of bags not complied,
- ✓ Usage of same wheelbarrow for transportation of all categories of waste

Biomedical waste mixed with general waste

After a Sristi's (NGO) intervention in 1997, Court directed Central Pollution Control Board to emphasize on non-burn technology

Healthcare Waste: South Asian Perspective

India

Dioxins in Delhi

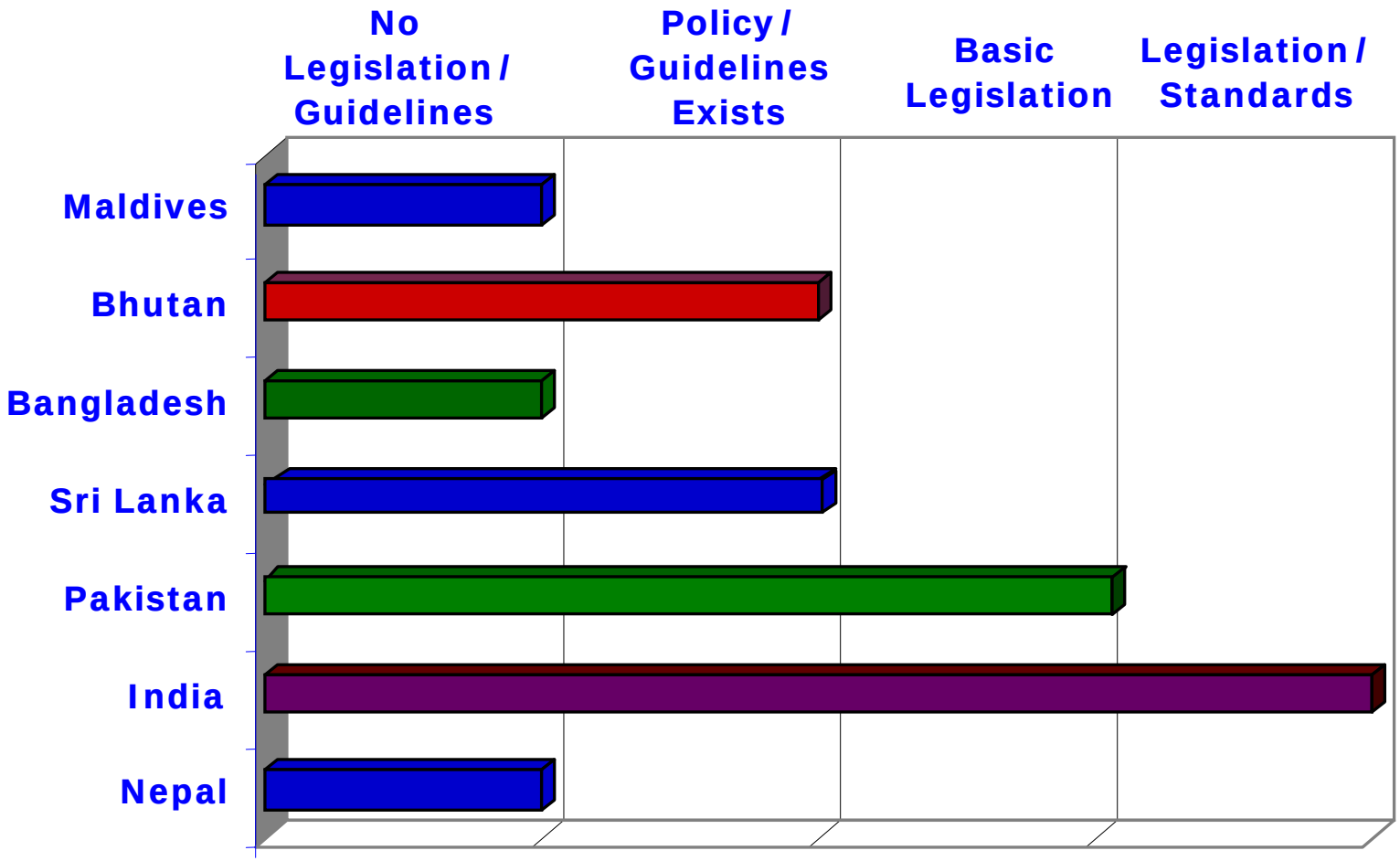
- Dioxins were detected in most of the samples analyzed (tissues of humans, fishes, chickens, goat, lamb, predatory birds and Ganges River dolphin);
- The liver of the spotted owlet showed the highest concentration of 3,300-picogram/gram fat;
- Dioxins conc. in the human fat tissues ranged from 170 to 1300 picogram/gram fat weight *(WHO limits of 1-4 picogram/kg of body weight ➔ levels seriously alarming);*
- Incineration technology being unpopular as dioxin releaser, being subsidized in India through the program of Ministry of Non-conventional Energy Sources;
- Hospital incinerators the biggest polluters in Delhi, government hospitals seems ignoring the rules & regulations.

Source: Singh, 2003;The Hindu (April 21, 2004)

State of Healthcare Waste Legislations, Policies, Guidelines in South Asia

Country	Legislation
Bangladesh	No specific legislation covered in Bangladesh's Environmental protection Act 1995
Bhutan	Guidelines for Infection Control (Ministry of Health) Addressed Environmental Code of Practice for Hazardous Waste Management, 2001 Policy
India	Biomedical waste Regulations (1998) (Amended: March, 2000 and June, 2000)
Maldives	No separated rules in Environmental Protection and Preservation Act 1993
Nepal	No polices and legislation dealing with hazardous waste
Pakistan	Hospital waste management rules, August 2005
Sri Lanka	No proper legal framework in National Environmental Act (Draft of national policy, 2001 exist)

Healthcare Waste Legislation in South Asia (at glance)

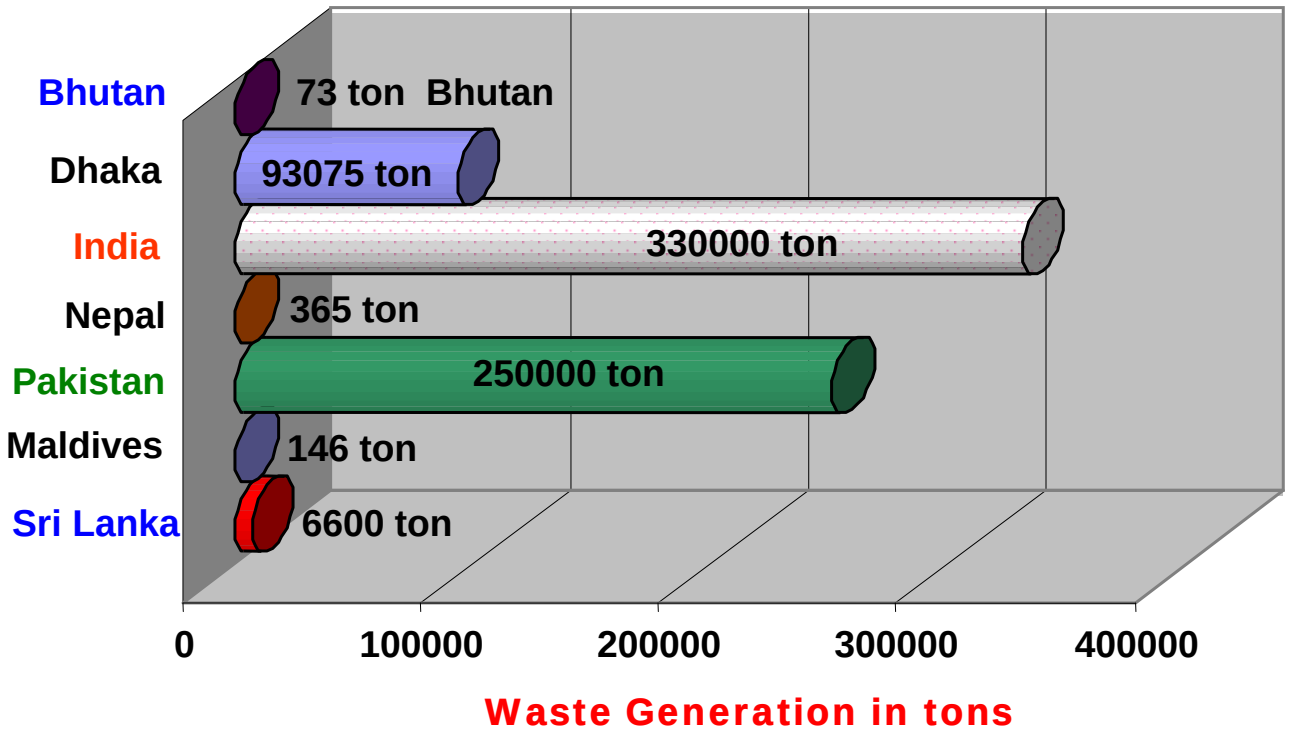


State of Healthcare Waste Generation in South Asia

Estimates of medical waste generation in South Asia

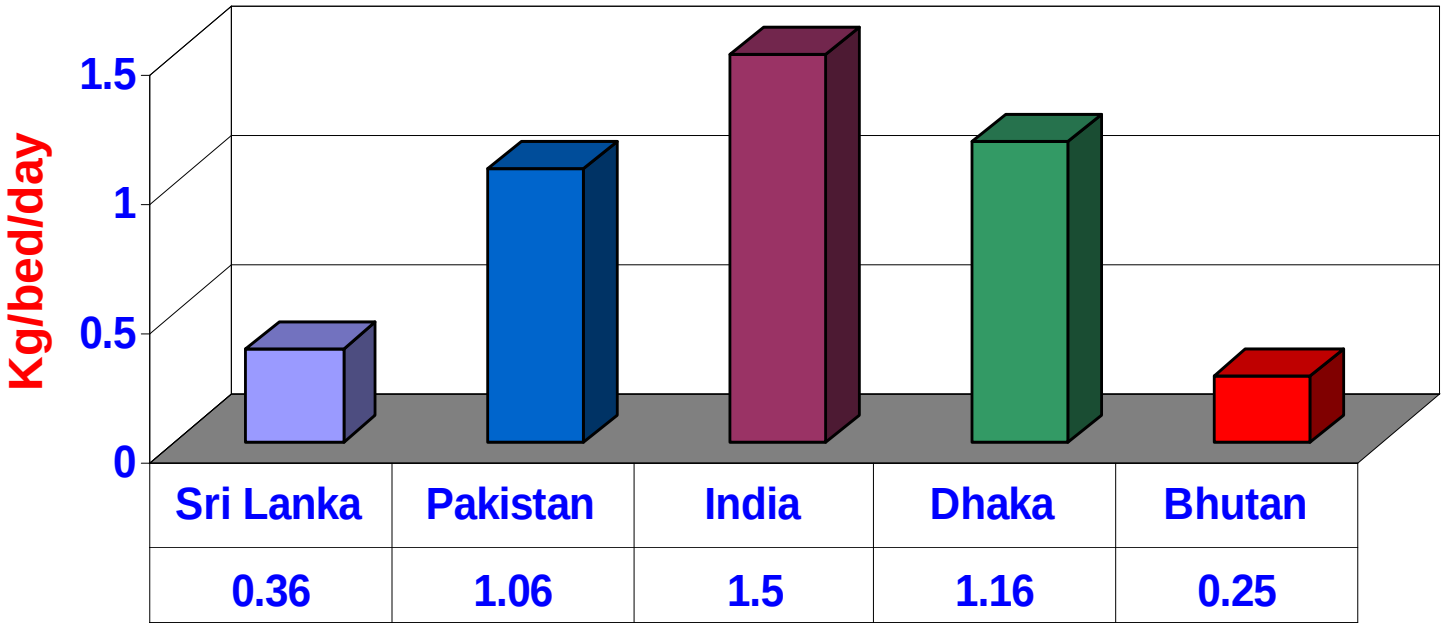
Country	Waste generation (kg/bed/day)	Total waste generation (tons/year)
Bangladesh	0.8 - 1.67	93,075 (255 ton/day) (only in Dhaka)
Bhutan	0.27	73
India	1 - 2	330,000
Maldives	NA	146
Nepal	NA	365
Pakistan	1.06	250,000
Sri Lanka	0.36	6600 (only in Colombo)

State of Healthcare Waste Generation in South Asia



Estimates of average medical waste generation per year in South Asia

State of Healthcare Waste Generation in South Asia



Estimated average waste generation per bed in different South Asian countries

Scope of 3Rs in Healthcare Waste Management

Reduce (source reduction) has higher potential to be implemented in health care waste management.

Benefits of source reduction:

- ✓ Resources conservation;
- ✓ Reduction of collection, transportation, and disposal costs;
- ✓ Decreased pollution control liability, regulatory & compliance costs.

Segregation and handling of generated waste

- ✓ Segregation reduces the volume & toxicity of waste stream;
- ✓ Proper procurement practices such changing the products and materials can help to reduce the harm **(Hg based thermometer can be substituted by electronic sensing devices);**
- ✓ Increasing awareness of hospital staffs, employee training in hazardous materials management and waste minimization

Conclusions

- ✓ Lack of segregation practices, mixing of hospital wastes with general waste makes whole waste stream hazardous;
- ✓ Mushrooming of clinics often unregistered aggravating the problem; (typical SA problem). How to cover them in the existing legislation.
- ✓ Open burning by clinics, dispensaries & some hospitals;
- ✓ Incinerators are old and poorly maintained;
- ✓ Poor legislative measures/standards, poor implementation;
- ✓ Public ignorance of the law (if any);
- ✓ Informal sectors largely involved in recycling and reusing medical waste items.

All is not bad in South Asian Healthcare Management

- Countries are moving towards better technology
  - Many private hospitals in India ➔ non-burn technology
- Greater attention given to improve legislation and guidelines
  - Legislations already exists in India & Pakistan
  - Bangladesh, Bhutan: Guidelines in some form,
  - Sri Lanka: Draft National policy (2001)
- NGOs, communities playing vital role

Thank you very much for your kind attention

&

Now it is Time for discussion!