

See discussions, stats, and author profiles for this publication at: <https://www.researchgate.net/publication/280639812>

# Medical waste management in Palestine: a case study from the west bank and Gaza strip

Article in *Journal of Mathematical Sciences (University of Tokyo)* · January 2010

---

CITATIONS

0

---

READS

13

1 author:



[I. A. Al-Khatib](#)

Birzeit University

73 PUBLICATIONS 204 CITATIONS

[SEE PROFILE](#)

:

\*

%7.7	426
%61.7	%.%16.8
	%15.6

:

:

.(Almuneef and Memish, 2003; Diaz et al., 2005)

(Defra, 2005;

.Yong et al., 2009; Bendjoudi et al., 2009)

.(Marinkovic et al., 2008)

.(Rushbrook et al., 2000)

.(USEPA, 1991)

(Defra, 2005;

.Karademir, 2004)

.(Mbongwe et al., 2008; Coker et al., 2009)

.2010/2/24

2009/8/16

\*

.(Brent and Rogers, 2002; Tudor et al., 2005)

2005-2000

.(Silva et al., 2005)

(Diaz et

.al., 2005; Yong-Chul et al., 2006)

(1

(2

2004  
.2005

388

2006

35 :

304  
49

1

%15.5

)

%7.7

(

%49.5

:

)

:

(1

30

)

.(

(2004

)

:

2006/3/20

2006/8/20

( )

.(SPSS)

: .

1

: .

57 356

24 54

2

(Anderson, 1995 2003 )

." " " " :

207.1

44.6

2

4

%16.8

3

47.1

79.1

32.0

.5

(2003 )

.(Bdour, 2007)

3

.(WHO, 2005; Oke, 2008)

:

.(Manyele et al., 2003; Alvim-Ferraz and Afonso, 2005)

.(2003 Lee et al., 2004)

(1)

<b>13,651.9</b>	<b>426.1</b>	
9,403.6	120.8	
4,230.1	248.1	
18.2	57.2	
<b>4,720.7</b>	<b>288.1</b>	
833.7	93.6	
3,875.2	168.9	
11.8	25.6	
<b>8,931.2</b>	<b>138.0</b>	
8,569.9	27.2	
354.8	79.3	
6.5	31.5	

(2)

<b>1,713.5</b>	<b>251.7</b>	
1,523.2	97.8	
177.0	135.1	
13.3	18.8	
<b>174.9</b>	<b>207.1</b>	
12.4	78.1	
153.1	110.7	
9.4	18.3	
<b>1,538.6</b>	<b>44.6</b>	
1,510.8	19.7	
23.9	24.4	
3.9	0.5	

(3)

<b>100</b>	<b>4.5</b>	<b>1.8</b>	<b>93.7</b>	<b>100</b>	<b>6.4</b>	<b>4.8</b>	<b>88.8</b>	<b>100</b>	<b>4.6</b>	<b>2.0</b>	<b>93.4</b>
<b>100</b>	11.1	4.8	84.1	<b>100</b>	15.4	11.2	73.4	<b>100</b>	10.4	19.3	70.3
<b>100</b>	3.7	1.1	95.2	<b>100</b>	4.9	1.4	93.7	<b>100</b>	3.2	0.9	95.9
<b>100</b>	8.4	6.4	85.2	<b>100</b>	9.6	17.7	72.7	<b>100</b>	11.3	1.6	87.1
<b>100</b>	<b>2.1</b>	<b>1.8</b>	<b>96.1</b>	<b>100</b>	<b>4.7</b>	<b>5.0</b>	<b>90.3</b>	<b>100</b>	<b>5.0</b>	<b>1.8</b>	<b>93.2</b>
<b>100</b>	10.2	4.0	85.8	<b>100</b>	14.8	9.6	75.6	<b>100</b>	9.5	18.0	72.5
<b>100</b>	0.8	1.0	98.2	<b>100</b>	2.5	1.3	96.2	<b>100</b>	3.4	0.8	95.8
<b>100</b>	9.4	7.2	83.4	<b>100</b>	11.2	20.7	68.1	<b>100</b>	13.2	1.9	84.9
<b>100</b>	<b>18.4</b>	<b>1.6</b>	<b>80.0</b>	<b>100</b>	<b>19.4</b>	<b>3.8</b>	<b>76.8</b>	<b>100</b>	<b>2.0</b>	<b>2.9</b>	<b>95.1</b>
<b>100</b>	15.2	8.0	76.8	<b>100</b>	17.7	17.7	64.6	<b>100</b>	15.0	26.7	58.3
<b>100</b>	20.2	1.3	78.5	<b>100</b>	25.7	2.3	72.0	<b>100</b>	1.4	1.6	97.0
<b>100</b>	0.0	0.0	100.0	<b>100</b>	0.0	0.0	100.0	<b>100</b>	0.0	0.0	100.0

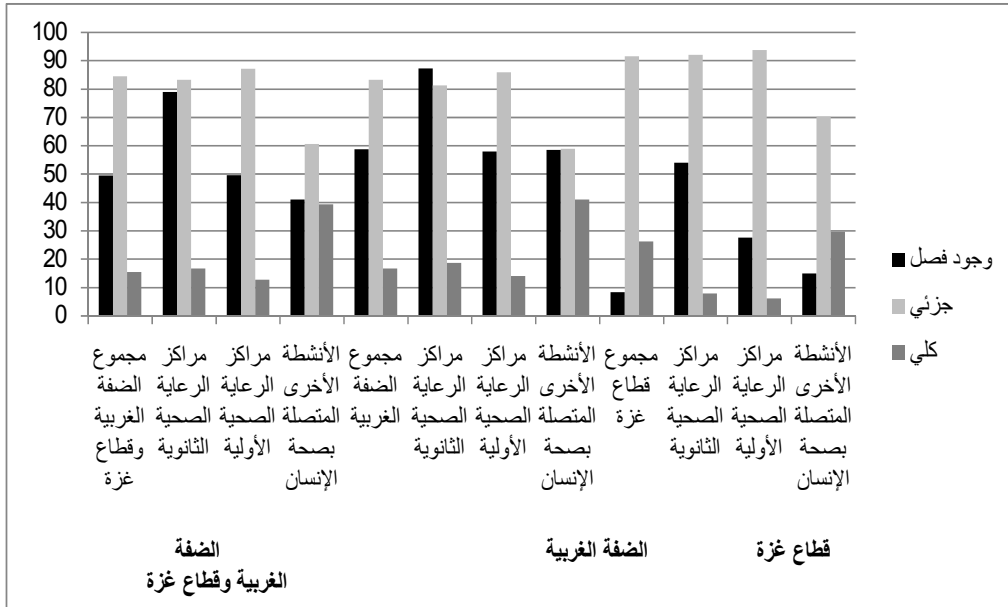
(4)

<b>100</b>	<b>0.2</b>	<b>2.1</b>	<b>4.8</b>	<b>0.4</b>	<b>10.1</b>	<b>15.6</b>	<b>5.1</b>	<b>61.7</b>	<b>16.8</b>	
100	0.0	4.2	12.8	0.0	13.2	13.8	12.3	43.6	25.6	
100	0.2	2.5	5.3	0.5	10.2	9.4	5.9	66.0	15.2	
100	0.0	0.0	1.1	0.0	8.9	43.2	0.0	46.8	26.3	
<b>100</b>	<b>0.0</b>	<b>0.2</b>	<b>4.4</b>	<b>0.0</b>	<b>7.2</b>	<b>17.3</b>	<b>5.0</b>	<b>65.9</b>	<b>20.3</b>	
100	0.0	6.0	0.0	0.0	18.5	8.0	6.5	61.0	24.5	
100	0.0	0.0	5.3	0.0	6.0	10.7	6.0	72.1	18.4	
100	0.0	0.0	1.3	0.0	10.5	49.3	0.0	38.9	37.4	
<b>100</b>	<b>1.4</b>	<b>14.5</b>	<b>7.4</b>	<b>3.0</b>	<b>29.1</b>	<b>4.0</b>	<b>5.8</b>	<b>34.8</b>	<b>7.8</b>	
100	0.0	0.0	45.0	0.0	0.0	28.3	26.7	0.0	29.0	
100	2.0	20.3	5.0	4.2	40.5	0.0	5.0	23.0	6.8	
100	0.0	0.0	0.0	0.0	0.0	8.2	0.0	91.8	9.7	

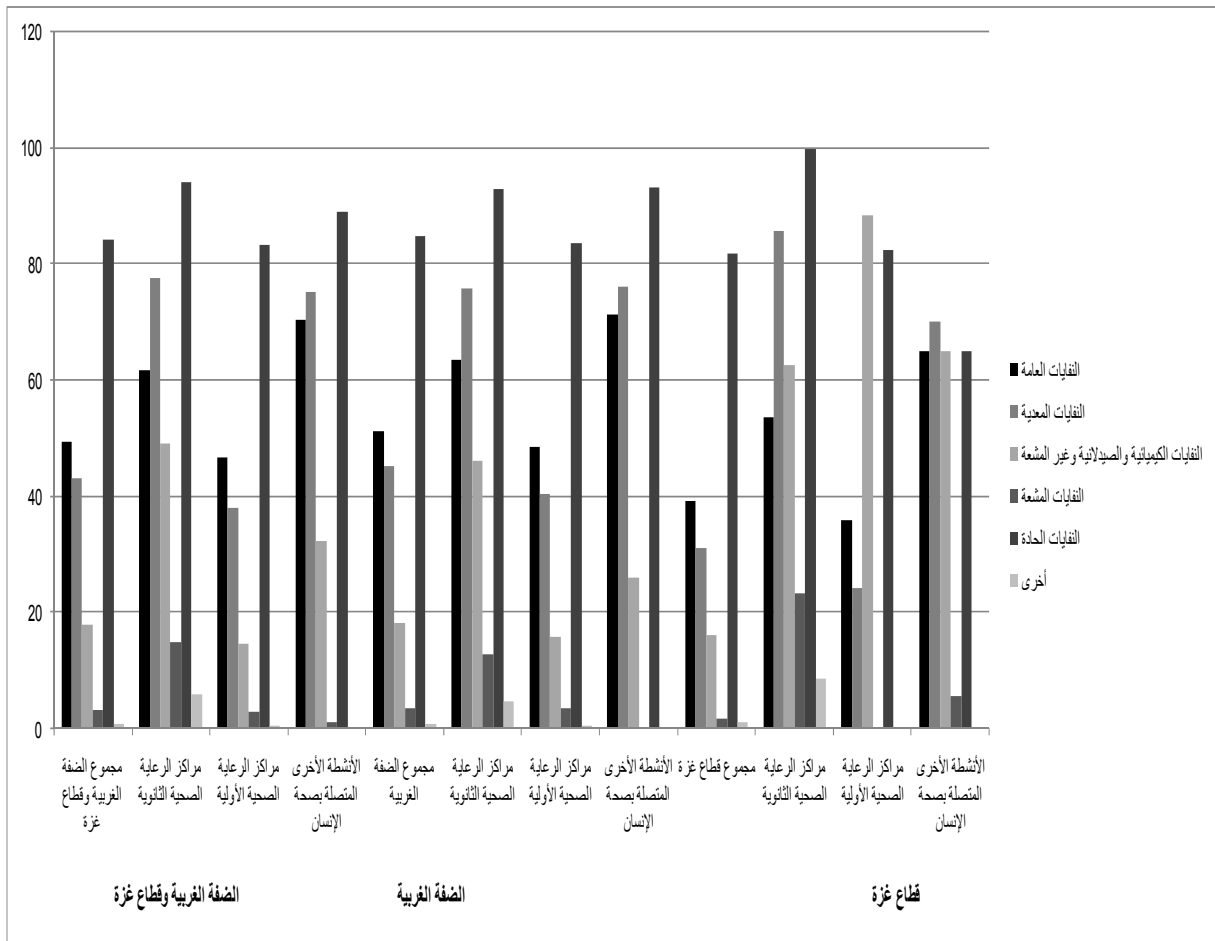
(5)

<b>1,462.7</b>	<b>79.1</b>
1,307.8	19.3
148.3	58.8
6.6	1.0
<b>199.6</b>	<b>47.1</b>
52.0	2.0
141.7	44.4
5.9	0.7
<b>1,263.1</b>	<b>32.0</b>
1,255.8	17.3
6.6	14.4
0.7	0.3

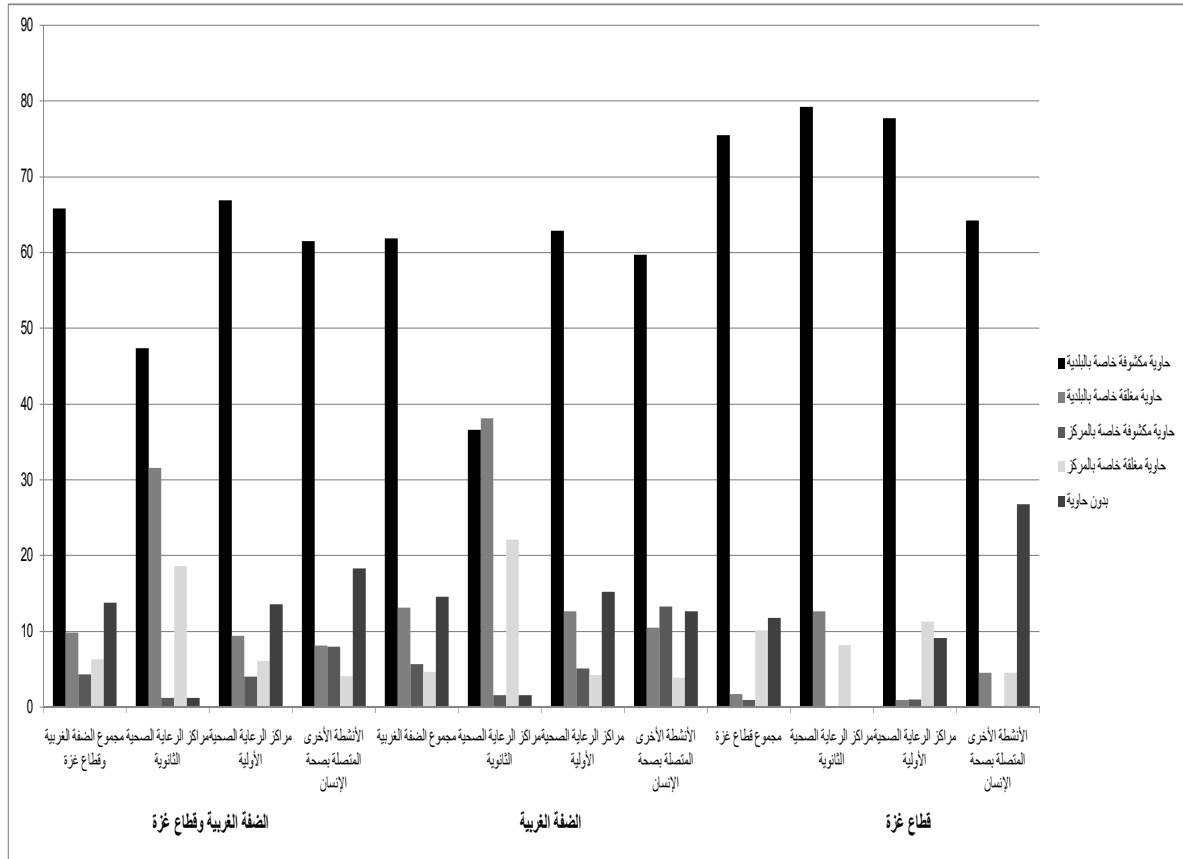




(1):



(2):



:(3)

Bendjoudi, Z., Taleb, F., Abdelmalek, F., Addou, A. 2009. Healthcare waste management in Algeria and Mostaganem department. *Waste Management*, 29: 1383-1387.

Brent, A., Rogers, D. 2002. Establishing the propensity for dioxin formation using a plume temperature model for medical waste incinerator emissions in developing countries. *Journal of the Air and Waste Management Association*, 52: 811-821.

Coker, A., Sangodoyin, A., Sridhar, M., Booth, C., Olomolaiye, P., Hammond, F. 2009. Medical waste management in Ibadan, Nigeria: Obstacles and prospects. *Waste Management*, 29: 1376-1382.

Department for Environment, Food and Rural Affairs Defra. 2005. Guidance on mixing hazardous waste – hazardous waste regulations. London, United Kingdom.

Diaz, L.F., Savage, G.M., Eggerth, L.L. 2005. Alternatives for the treatment and disposal of healthcare wastes in developing countries. *Waste Management*, 25 (6): 626-637.

Lee, B., Ellenbecker, M., Moure-Eraso, R. 2004.

: 2003

2004

Almuneef, M., Memish, Z. 2003. Effective medical waste management: it can be done. *American Journal of Infection Control*, 31 (3): 188-192.

Alvim-Ferraz, M.C.M., Afonso, S.A.V. 2005. Incineration of healthcare wastes: management of atmospheric emissions through waste segregation. *Waste Management*, 25: 638-648.

Anderson, G.K. 1995. Management of Health Care Wastes, WHO, Amman, Jordan.

Bdour, A., Altrabsheh, B., Hadadin, N., Al-Shareif, M. 2007. Assessment of medical wastes management practice. A case study of the northern part of Jordan. *Waste Management*, 27: 746-759.

- practical approach. World Health Organization WHO Healthcare Practical Information Series No. 1.
- Silva, C.E., Hoppe, A.E., Ravanello, M.M., Mello, N. 2005. Medical waste management in the south of Brazil. *Waste Management*, 25 (6): 600-605.
- Tudor, T.L., Noonan, C.L., Jenkin, L.E.T. 2005. Healthcare waste management: a case study from the National Health Service in Cornwall, United Kingdom. *Waste Management*, 25 (6): 606-615.
- US Environmental Protection Agency, Landrum, V.J., Barton, R.G., Neulicht, R., Turner, M. Wallace, D., Smith, S. 1991. Medical waste management and disposal. Noyes Data Corporation, Park Ridge, NJ, USA.
- Yong-Chul, J., Cargro, L., Oh-Sub, Y., Hwidong, K. 2006. Medical waste management in Korea. *Journal of Environmental Management*, 80: 107-115.
- Yong, Z., Gang, X., Guanxing, W., Tao, Z., Dawei, J. 2009. Medical waste management in China: A case study of Nanjing. *Waste Management*, 29: 1376-1382.
- World Health Organization WHO. 2005. Management of Solid Waste Health-Care Waste at Primary Health-Care Centres. WHO, Geneva.
- Alternatives for treatment and disposal cost reduction of regulated medical wastes. *Waste Management*, 24: 143-151.
- Mbongwe, B., Mmerekhi, B.T., Magashula, A. 2008. Healthcare waste management: current practices in selected healthcare facilities, Botswana. *Waste Management*, 28: 226-233.
- Karademir, A. 2004. Health risk assessment of PCDD/F emissions from a hazardous and medical waste incinerator in Turkey. *Environment International Journal*, 30: 1027-1038.
- Manyele, S.V. 2004. Medical Waste Management in Tanzania. Current situation and the way forward. *African Journal of Environmental Assessment Management*, 8 (1): 74-99.
- Marinkovic, N., Vitale, K., Holcer, N.J., Dzakula, A., Pavi, T. 2008. Management of hazardous medical waste in Croatia. *Waste Management*, 28: 1049-1056.
- Oke, I.A. 2008. Management of immunization solid wastes in Kano State, Nigeria. *Waste Management*, 28: 2512-2521.
- Rushbrook, Ph., Chandra, C., Gayton, S. 2000. Starting healthcare waste management in medical institution,

## **Medical Waste Management in Palestine: A Case Study from the West Bank and Gaza Strip**

*Issam A. Al-Khatib\**

### **ABSTRACT**

This paper describes the amount of solid waste generated from health care centers and the reality of medical waste management in both the West Bank and Gaza Strip of Palestine. The estimated total amount of solid waste generated by health-care centers in the West Bank and Gaza Strip in one month was about 426.1 tons, and results showed that only 7.7% of the health-care centers separate all types of solid waste. Only 16.6% of the health-care centers treat the generated solid waste. The results showed that in 61.7% of the health-care centers that treat solid medical waste, incineration was used for treatment, compared with 15.6% using a thermal disinfection. The transport of medical waste was done mostly manually from within the health-care centers to their places of temporary storage. The study recommended the need for the application of relevant laws and the development of operational plans, with the importance of awareness and training of persons responsible for planning and waste management, with the importance of improving the status quo; and access to the system in tune with sustainable development, and protects the environment and human health.

**Keywords:** Medical Waste Management, the West Bank and Gaza Strip, Palestine.

---

\* Institute of Environmental and Water Studies, Birzeit University, Palestine. Received on 16/8/2009 and Accepted for Publication on 24/2/2010.