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Effects of prevailing conditions during second Palestinian uprising on solid waste management system in Nablus city in Palestine

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Abstract

Since the start of the second Palestinian uprising (Al-Aqsa Intifada), and due to the Israeli activities, curfews, closures, and military checkpoints imposed since 2000, the quality of social services rendered by Nablus city has been gradually deteriorating. Solid waste management in Nablus city was badly affected by these conditions, and this situation is negatively affecting health and damaging the environment. Most of these cases were due to reasons beyond the capability of the municipality with its limited resources. This study revealed that some of the important municipal solid waste (MSW) equipment had been damaged during the uprising. The workforce in the MSW system was reduced and certain MSW-related development projects and activities have been frozen due to the current conditions. The city's medical waste incinerator had been phased out and the number of special medical containers had been reduced from 16 to 10. Some MSW compressing trucks had been out of use with no substitute. Another important figure is the number of waste collection workers which decreased from 420 to 301, although the city is growing in premises as well as population. The created unsanitary solid waste transfer station is now a pollution source on its own, causing an ugly scene at the eastern entrance of Nablus city. There should be a comprehensive and urgent solution for this problem and the needed resources should be invested.

Keywords: *Intifada, solid waste management, uprising, Nablus, Palestine*

Introduction

The city of Nablus is one of the oldest in the world and has been a place of habitation for 4000 years (El-Masri 1996). Located 65 km north of Jerusalem, Nablus is considered the main business and residential center of the northern West Bank. Its prime location also enhances its position in any future development plans, as it is located at the crossroads of the Jerusalem – Jenin road running north to south, and the Tulkarm – Jordan Valley road running east to west. The total population of Nablus, including the four refugee camps built after 1948, stood at

about 126 884 inhabitants by the middle of 2003 (Palestinian Central Bureau of Statistic [PCBS] 1999), making it the second largest city in the West Bank.

Since the municipality was established in the 19th century, the municipality started to enhance its waste collection system. A large number of vehicles, trucks and loaders in addition to many labor staff were devoted for this purpose. In 1987, Nablus city had the largest number of vehicles collecting solid waste among all cities in the West Bank and Gaza Strip. After the first Palestinian uprising (Intifada) in 1987, the services of the municipality were severely affected. This was due to bad economical conditions, military closures, and the low income for municipality as many city residents did not pay their waste collection fees. In 1993, and after the Oslo Agreement between the Palestinians and the Israelis, Nablus municipality started to plan strategically to improve the city's environmental conditions (Wiebe 1999). As a result, the city witnessed several positive changes, as follows (Mansoor 2002, personal communication):

- The municipality income has improved, and collection system has been enhanced as the collection of solid waste fees had stabilized.
- Control of littering was greatly enhanced through public awareness and sometimes through penalties.
- Some foreign donations were given to the municipality for enhancing its collection system. This was through providing vehicles and solid waste containers of different sizes (Abu-Ghoush 2005, personal communication).
- Awareness of the public to environmental issues. For example, the old site for open disposal of Nablus solid waste was closed. This site was near Beit Foureek village and had resulted in great nuisance to the citizens there. Instead, the municipality started to transfer its solid waste to a sanitary landfill at a remote area called Fasaiel at a disposal fee of 40 New Israeli Shekel (NIS) per ton (US \$1 equalled 4.5 NIS at that time).
- The municipality began to plan constructing its own sanitary landfill and had actually started identifying suitable land for that project (Marinianscky Associates, Civil and Environmental Engineers 2000; Chopra 2001).

In August 2000, the second Palestinian uprising started. Quickly, the whole priority list of Nablus Municipality changed and the idea of establishing a sanitary landfill or developing a new solid waste management system was abandoned. The main goal became continuing the daily services of the municipality as much as possible. No new development projects were initiated and even the already-approved and funded projects, like the wastewater treatment plant, were frozen.

The goal of this study is to track the changes in the solid waste management system in Nablus city as it progressed from before the second uprising in 2000, during the uprising, and finally as it stood in 2005. This will point out the main current problems of the system in an attempt to give awareness of this issue. Additionally, we will attempt to suggest possible policies or activities to alleviate the current conditions.

Methodology

The study is both descriptive and quantitative. It depends mainly on interviews with key personnel of the municipality, especially the head of the health section, who is responsible for the city's solid waste management system, municipality engineers, and head of service department during the years 2002 – 2005. In addition, secondary data from available statistics, reports, and previous studies related to solid waste management in the Nablus municipality

were utilized in the study. Finally, the observations of the authors as residents of the city were also recorded.

Presentation and discussion of results

Solid waste management system in Nablus before the second Palestinian uprising

In 1995, after the Palestinian National Authority (PNA) became responsible for the main cities in the West Bank and Gaza Strip, the general situation of the solid waste management system in these cities had improved significantly. In Nablus, there were about 420 garbage collection workers in the city working on a three-shift basis, in addition to the administrative and technical staff (Mansoor 2002, 2005, personal communications). This number was sufficient to manage the solid waste issue in the city. There were enough containers of different sizes (1, 3, 6, 8, 10, and 30 m³) distributed in all necessary places in the city, in addition to many litter bins distributed all over the city (Mansoor 2002, 2005, personal communications; Halaweh 2005, personal communication). Manually-operated rubbish collection carts, used for collecting garbage in front of houses and for collecting street litter, were also available in enough numbers (Mansoor 2002, 2005, personal communications; Halaweh 2005, personal communication). In addition, the city had a set of equipment including; solid waste compressors which compressed the waste by a factor of 3–4, special medical-waste containers for hospital and medical centers, compressing trucks that collected the waste from 1 m³ containers and compacted it by a factor of 2–3, transporting trucks that carried the larger containers (the 6,8,10, and 30 m³), large tipper with tractor that carried the bulky items, and a medical waste incinerator which was used for the incineration of healthcare waste produced from hospitals in the city at a temperature of 900–1200°C (Mansoor 2002, 2005, personal communications; Halaweh 2005, personal communication).

Solid waste problems encountered in Nablus during the second Palestinian uprising

From the beginning of the second uprising in 2000, the Israeli military forces surrounded all entrances of Nablus city by checkpoints. The Israeli army entered the city, particularly between the evenings of Wednesday April 3 and Sunday April 21, 2002. During this period, several structures, including commercial buildings, institutions, and houses, were destroyed and vehicles were burnt and destroyed (SchNEWS of the World 2005). This situation resulted in large amounts of solid waste of different types accumulating in residential areas, including demolition waste. During this period, the municipality had to stop garbage collection, as it was not safe for its crews to do their job (Al-Khatib & Al-Khatib 2002). Therefore, residents burned garbage *in situ* in waste containers in order to reduce the smell and volume of the accumulated solid waste. As a result, many of the garbage containers owned by Nablus municipality were partially or fully destroyed due to this burning practice. This added to the destruction of waste containers of different sizes during the re-entry by Israeli tanks and armored vehicles (Giacaman & Husseini 2002). In general, as other sectors, the solid waste sector was affected by the curfews, closure, and other Israeli occupational activities. Below are some of the forms in which solid waste management in Nablus city was affected:

- (1) Inability to collect the solid waste because of Israeli military operations in the city: Before the second uprising there was a 24-h, 3-shift solid waste collection system. These shifts started at 4:00 am, 11:00 am, and 6:00 pm, respectively (Mansoor 2002, personal

communication). This was vital especially in the commercial center and in the old city as it was not easy to collect solid waste during the morning hours when the streets were very crowded. In addition, this collection system was critical during national holidays and festival seasons, such as the Eid Al Adha and Eid Al Fitter celebrations, during which huge amounts of solid waste were generated. Due to Israeli operations, which were mainly conducted overnight, it was impossible to collect waste during the night, since it would have endangered the lives of the collection teams. So the collection was cut down to one shift only during daytime hours (Mansoor 2002, personal communication).

- (2) On many occasions, it was difficult for collection vehicles and crews to reach some streets in the old city and other parts of the city due to their closure. The Israeli military forces divided the city into several zones and it was difficult to move between these zones except by walking, and, in some cases, curfew was imposed on certain zones (Doumani 2005).
- (3) Many waste collection containers were damaged, either by gunfire or by being smashed by tanks. In other cases, these containers were used by Palestinian resistance fighters as obstacles to hinder the advancement of Israeli military forces. This resulted in the damage of these containers in many parts of the city and led to the spread of garbage on the streets (Mansoor 2002, personal communication).
- (4) Difficulties to transfer the solid waste outside the city limits: since the estimated solid waste production in Nablus city is about 170 tons/day, the municipality had to establish a transfer station for temporary waste storage between closures. This 'station' didn't have the minimum requirement of sanitary transfer stations. It was an unhealthy dumping site, which became attractive to stray animals, and a source of bad odors and very ugly leachate.
- (5) The stoppage of all solid waste development projects by the municipality due to the lack of resources and low income: this was further worsened by the residents abstaining from paying waste collection fees, due to poor economic conditions. The construction of a sanitary landfill for the municipality has been postponed indefinitely (Abu-Ghoush 2005, personal communication).

In addition to the above-mentioned effects, Nablus residents developed several bad habits related to solid waste handling during that period, which were strengthened by the absence of law enforcement. First, some individuals removed the wheels from the waste containers to sell them. The municipality decided to weld these wheels instead of using screws to fix them in order to make their removal more difficult. Second, in most cases, when the residents used to find the lid of the container closed, they put the garbage beside the container instead of opening the lid and throwing the garbage in. To solve this, the municipality decided to use containers without lids to reduce this type of littering. Another bad habit was throwing the construction and demolition waste in residential waste containers on the streets. This resulted in damage to these containers. This practice was illegal before the uprising and was punishable by a penalty, but no such penalties were imposed during the uprising.

Current status of MSW collection system

The MSW management system in Nablus city in October 2005 has relatively improved compared to the peak times of the uprising (the 2002–2003 period). One aspect of the MSW management system that had changed was the availability of collection equipment. Table I compares the availability of waste collection equipment before the uprising in 2000 and by October 2005. From Table I, it can be noticed that the total number of

Table I. Comparison between the availability of MSW collection equipment before and after the second Palestinian uprising in Nablus city (Mansoor 2005, personal communication).

Item No.	Waste collection equipment	Quantity before the second Palestinian uprising in 2000	Quantity in 2005
1	Containers 1 m ³	1200	1450
2	Containers 6 m ³	20	7
3	Containers 8 m ³	60	62
4	Containers 10 m ³	40	77
5	Containers 30 m ³	3	5
6	Rubbish carts	150	90
7	Solid waste compressor	3	4
8	Special medical waste containers for hospitals and medical centers	16	10
9	Compression trucks	11	8
10	Transporting trucks	5	7
11	Large tipper with tractor	1	0
12	Sterilizing vehicle	1	0
13	Medical waste incinerator	1	0
14	Medical waste transport vehicle	1	1

the 6-, 8-, 10- and 30-m³ waste containers had increased from 123 before the uprising to 151. Around 60 of the original 123 containers were damaged during the uprising and were replaced by 88 containers, which were paid for by different foreign aid funds as well as a municipality fund (Abu-Ghoush 2005, personal communication). Similarly, the number of 1-m³ containers had increased from 1200 to 1450 via over-replacement. On the other hand, the number of carts used for rubbish collection had dropped from 150 to 90 due to the non-replacement of the damaged carts as the number of workers in this field had decreased enormously. A similar trend can be observed for solid waste compressors, which increased by one, and transporting trucks, which increased by two.

The special containers for medical waste collection from hospitals had decreased from 16 to 10, and the only medical waste incinerator in the city had been destroyed and removed from its location. Nowadays there is no special handling for the medical waste collected from hospitals, which is currently mixed with the MSW. This reflects a dangerous situation of reducing the care given to this type of waste, as it is well known that there is strong epidemiological evidence that the main concern of infectious hospital waste is the transmission of HIV virus and, more often, of Hepatitis B or C virus through injuries caused by syringe needles contaminated by human blood (World Health Organization [WHO] 1999).

Other waste collection equipment that was not replaced, and thus had a net decline in numbers compared to pre-uprising, included compression trucks, tippers, and sterilizing vehicles, as seen in Table I. Finally, the number of workers in the city's MSW management system was reduced from 420 to 301 due to lack of money in the budget (Halaweh 2005, personal communication).

Current MSW disposal system in Nablus city

Currently, all the refuse produced in Nablus city is discharged in a dump (as a temporary transfer station) located in the industrial zone in the eastern part of the city at a distance

of approximately 6 km from the city center. Furthermore, in the existing transfer station, dead animals and infectious materials from the hospital are also discharged at present. Burning of solid waste at this transfer station, without any control system to protect the air and groundwater, has become a common daily scene, and polluting fumes are often created from burning refuse. This so-called 'transfer station' suffers from the following:

- It is not fenced so that various animals are continuously present in the transfer station. This may result in the transmission of infectious diseases to the residents.
- The present situation of the existing transfer station is catastrophic from an aesthetic point of view.
- The current management of the existing transfer station is completely out of date.
- The location of the existing transfer station in the industrial area is too near to the city of Nablus.
- The existing transfer station, which has no lining system, is highly suspected of polluting the groundwater in that area.

Afterwards, the solid waste is transported from the transfer station to a legal landfill site under Israeli control in the Jordan Valley area. This costs the municipality a significant portion of its restricted income: 60 NIS is paid per ton for waste disposal at this landfill.

Urgent needs for MSW collection section of the Nablus municipality

The existing MSW management situation in Nablus city is very critical. In one aspect, the current collection system is depending, in a large part, on old vehicles that are being gradually phased out of service. If urgent funding is not made available to remedy this situation, a disaster in the field of solid waste collection may occur. Table II summarizes the most urgently needed equipment along with their cost estimates, as provided by the Health and Solid Waste Management Section in the Nablus Municipality (Mansoor 2005, personal communication). Under normal operating conditions, the Nablus municipality would have no problem raising the amount needed (about US \$1.5M). However, due to current political conditions and the fact that municipality revenues are at a time-record low, such procurement plans have had to be put on hold.

Table II. Most urgently needed equipment for solid waste collection in Nablus municipality (Mansoor 2005, personal communication).

No.	Specifications	Number required	Unit price \$	Total
1	Truck compressor – gross weight 30 tons	3	90,000	270,000
2	Roll on off – gross weight 18 tons	3	100,000	300,000
3	Roll on off – gross weight 27 tons	1	150,000	150,000
4	Tipper – gross weight 18 tons	2	120,000	240,000
5	Loader	1	180,000	180,000
6	Truck – gross weight 30 tons	1	100,000	100,000
7	Small tractor	2	25,000	50,000
8	Sweeper – gross weight 15 tons	2	120,000	240,000
9	Containers 8 m ³ size	20	900	18,000
	Total			1,548,000

Conclusions

The issue of solid waste management in Nablus city is a very important subject that affects the citizens' lives. The city's MSW management system has been affected severely by the political conditions, particularly during the second Palestinian uprising (Intifada). Due to the large needs in the different sectors, the solid waste management sector does not receive the required attention. However, if urgent action is not taken, serious health problems will be facing the city. The waste that is disposed of in the unsanitary transfer station at the eastern border of the city is likely to cause the outbreak of many diseases. On top of that, the dramatic decrease in the allocated staff and equipment for solid waste management needs rectification.

Awareness campaigns and to change citizens' attitudes toward littering should be done. An effective MSW management system should be developed and sustained while trying to utilize the low labor cost in creating job opportunities in the solid waste management sector. Further studies on this issue are recommended. These studies should quantify the decline in the level of MSW services in Nablus city based on some standard and base line that may be suggested. A comprehensive study in co-operation with the municipality is highly recommended. A summary of the initiatives of the Nablus municipality in this field is necessary to prevent any duplication in studies.

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