

Analysis of the solid waste management practices in Chinhoyi: bridging the missing link

Analiza practicilor de management al deșeurilor solide în Chinhoyi: trecerea peste veriga lipsă

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Abstract

Over the years, there has been noticeable and steady mismatch between urban population growth and capacity for managing the corresponding increases in solid wastes. The local community is greatly concerned because it is aware of the clear link between poorly managed waste and the potential for the spread of diseases. This study was carried out to examine the solid waste management practices in Chinhoyi urban area and assess the impacts on the environment and human health. The study combined quantitative and qualitative data collected through fieldwork, questionnaires, interviews and document reviews. The population of Chinhoyi stands at about 60 000 generating more than 100 tons of waste per day. Results of the study include high percentage of uncollected waste, high levels of health and safety related problems such as lacerations, contusions, strain/sprains, and illness as well as noticeable deterioration of facilities and the environment. Issues affecting the effective management of waste are discussed. Recommendations based on the sustainable principle of integrated solid waste management are suggested. Sustainability requires the system to be environmentally effective, economically affordable, and socially acceptable.

Keywords: *solid waste; integrated solid waste management; sustainability*

Rezumat

De-a lungul anilor, s-a fost remarcată o permanentă necorelare între creșterea populației urbane și capacitatea de gestionare a creșterii corespunzătoare a deșeurilor solide. Comunitatea locală este foarte îngrijorată pentru că este conștientă de legătura clară dintre proasta gestionare a deșeurilor și potențialul de răspândire a bolilor. Acest studiu a fost efectuat pentru a examina practicile de management al deșeurilor solide în mediul urban Chinhoyi și pentru a evalua efectele asupra mediului și sănătății umane. Studiul a combinat datele cantitative și calitative colectate prin munca de teren, chestionare, interviuri și recenzarea unor documente. Populația orașului Chinhoyi este de aproximativ 60 000 și generează mai mult de 100 de tone de deșeuri pe zi. Studiul prezintă procentul mare de deșeuri necolectate, numărul mare de probleme de sănătate și de siguranță, cum ar fi răni, contuzii, luxații/entorse, boli, precum și deteriorarea vizibilă a facilităților și a mediului. Sunt discutate probleme care afectează gestionarea eficientă a deșeurilor. Sunt sugerate recomandări bazate pe principiul durabil de management integrat al deșeurilor solide. Durabilitatea presupune ca sistemul să fie ecologic efektiv, economic accesibil și social acceptabil.

Cuvinte-cheie: *deșeuri solide; managementul integrat al deșeurilor solide; durabilitate*

JEL Classification: Q53, Q56, R58

Background

The simple fact that people cannot live without generating waste has made waste management a critical urban planning and governance issue. Municipal waste management has thus become a subject of academic, political and economic debate in the world and at national level. Population growth, increasing urbanization and industrialization and rising standards of living have all contributed to an increase in the quantity, variety and complexity of waste generated in towns and cities of the world (Wright, 1983). The growth in the volumes of waste generated has led to budgetary constraints and inability to cope with the hygienic needs of most urban authorities in Zimbabwe. In recent years the blame has been put on the unavailability of fuel, lack of financial resources, lack of trained personnel, inadequate policy frameworks and above all the general lack of capacity. With the advent of critical debate towards the achievement of sustainability there has been some relevant policy reforms but this has not been matching with the volumes of waste that has been introduced into the physical environment. The waste generated finds its way into the physical environment resulting in breakout of diseases and creation of environmental risks and nuisance for the general public (Tsourou & Barton, 2000). The high rates of waste collection of above 80% that were experienced in the 1990s are no longer achievable at the present moment. This scenario calls for innovative ways for dealing with the waste problems particularly those techniques that tap into the existing local and sustainable waste management solutions, that is solid waste management systems that enable the active participation of local community based organizations in cooperation with external organizations that can fund innovative waste management systems.

With the advent of critical debate towards the need for sustainability, the once overlooked solid waste and its management have been receiving fresh attention from academics and development practitioners (UNDP, 1999). It is argued that solid waste management has resurfaced as a key element in debates surrounding sustainable urban development the world over. The current urban management initiatives have seen the status of solid waste management in a given city being considered as an index for assessing governance performance at local level (UNEP, 1996). The increasing interests, associated policy reforms, and the adoption of strategies and action plans for environmental sustainability have in the face of capacity constraints not been fast and effective enough to cope with the ever escalating waste generation trends in the South (Cointreau – Levine, 1994). As a

consequence, Gourlay (1992) points out that there is an increasing proportion of solid waste that remains uncollected in most African cities and consequently, this waste accumulate and filter into the physical environment, resulting in an increasing prevalence of diseases and environmental conditions that tend to undermine the prospects of the socio - economic well being of the community (Tsourou & Barton, 2000).

The deteriorating environmental scenario calls for innovative ways for dealing with the waste problems, particularly those practices and techniques that tap into the existing local resources and opportunities (Turnham, 2000). Local solutions have proven feasible, given the fact that the foreign based, centralized and conventional waste management approaches have since proven to be economically, technically and socially inappropriate for struggling economies (Magobunje, 1984). An integrated approach that is centered on active and widespread community participation and increased involvement and support of the informal players has been seen to bear sustainable achievements in the management of urban solid waste of third world cities (Barraclough, 2005). In this regard Suwarnarat (1996) suggests that community participation by itself is not the end but it has the cumulative effect of making the systems more responsive, more efficient, more economical, more equitable, or more environmentally responsible. The active participation of communities enables cities to mobilize resources, to get innovative ideas, and improve efficiency in SWM in terms of accountability and cost-reduction in waste collection, transport and disposal (Cointreau, 1989).

Due to the increasing incidence of waste management failure by central government, local and municipal authorities, new mechanisms of environmental governance have been explored, opening up opportunities to mobilise other actors including the private sector, NGOs and community organisations (Cointreau – Levine, 1994). The privatization of some of the traditional functions of the local authority such as waste management has seen considerable improvement in the access and quality of services to the community but this new approach alone, has still failed to adequately address the needs of the ever-growing urban population and its associated consumption patterns. A new breed of actors has since emerged in the form of the informal sector (Nas and Jaffe, 2003).

The majority of urban communities in the third world face serious challenges in securing decent livelihood and an opportunity has in these difficult circumstances, been realised in the waste cycle (Furedy. 1999). This is according to Furedy (1999), the “waste economy.” Across the developing world; the “waste economy” of cities affords important sources of livelihood for poor households. The informal sector has for long been involved in garbage collection and recycling in the form of legions of men, women and children who make a living from the recovery, sorting and selling of retrievable items from solid waste. The UNDP (2005) suggests that there is growing appreciation that any intervention should benefit these groups, and not remove their access to the waste. According to Nas and Jaffe (2003), in many low and middle-income countries, collecting, sorting,

trading and recycling of disposed materials provides income to hundreds of thousands of people worldwide. It is estimated that in Karachi, 50000 people earn their livelihood from this activity, two fifths of them engaged in full time waste picking (Amin & Sinha, 2000).

Amin and Sinha (2000) point out that the potential benefits to the informalisation of waste management system includes among several benefits, the provision of waste removal and sanitary services to otherwise unserved (generally poor and inaccessible) sectors of the city, provision of service at no-cost to the municipality, supplying of raw materials to the local manufacturing sector without straining the limited foreign currency reserves, provision of income-generating activity for a large number of people, many of whom would otherwise be destitute or require financial support from the government. This initiative also provides for the availability of a variety of products for poor people, such as containers, harnesses, and wheels made from recycled materials, which improve the living standard of the poor at a price that they can afford (Arnold van de Klundert & Inge Lardinois, 1995).

Problem statement

The population in Chinhoyi Town has been increasing over the years and this has given rise to a growing need to develop and expand the existing community infrastructure and services. However, over the years, there has been a mismatch between rates of population growth, urban expansion and the quality of waste management service provision. This has resulted in a number of environmental health risks and unsightly environs, evidenced by the general lack of enforcement of by-laws as well as the emergence of a culture of coexisting with waste among the residents. The environs of the town are characterized by garbage dumped on open spaces, along streams and roadsides with no remedial action taken. If the current state of Chinhoyi waste management system were not attended to with the urgency that it deserves, the local environmental health conditions would deteriorate to crisis levels that would culminate into unprecedented social, environmental and economic costs. This research constitute an attempt to intervene in the form of raising awareness to the local authority, local government, civic groups and the local community at large on the environmental and health implications of the deteriorating waste management system. This in turn could provide the basis for a concerted, multi-sectoral approach towards a sustainable solution to Chinhoyi's looming environmental crisis.

Aims and objectives

The main aim of the study is to assess the management of solid waste in Chinhoyi town and its implications on the environment and community health. This will be accomplished through the following set of specific objectives: to classify solid waste generated in Chinhoyi town; to examine the solid waste management system in Chinhoyi town; to assess the environmental health impacts

of solid waste management in Chinhoyi town; to suggest sustainable solutions to the town's solid waste management problems.

The study area

Chinhoyi Town, which is one of the fastest growing urban centers in Zimbabwe, is the regional capital for Mashonaland West Province. It is located 115 km north west of Harare, on the main road route to Zambia and the resort Town of Kariba. The Town is built on rugged and hilly terrain bisected by a multiplicity of small rivers that drain into the Hunyani River, which marks the eastern boundary of the town. The hilly terrain poses major problems to road construction and water and sewage reticulation. Most of the roads in the residential areas are gravelled such that with the steep slopes, the dirty roads form waterways rendering them virtually inaccessible during the rain season. The population in Chinhoyi Town has almost been doubling every ten years, from 24 309 in 1982 to 43 054 in 1992 and 110 000 in 2002 (Pearce, 2004). Thus, the town has been expanding into the surrounding commercial farms over the past few years. The majority of the population (79%) lives in the high-density areas of Chikonohono, Coldstream and Gadzema whilst the remainder is in Orange Groove and Mzari low-density residential areas. It is important to note that these residential areas, the high density in particular have over the past 10 years recorded significant horizontal expansion much of which without the requisite infrastructure servicing such as roads, water, sewerage and let alone solid waste collection services.

Methodology

The study has been carried out in three phases. Phase one comprises desk study of documents and the town's master plan. It involves also a review of published literature and case studies on the subject. This has helped to design a reconnaissance field survey to give ground - truthing to the information sifted from documents and literature. Phase two comprised a field survey that collected primary data on solid waste classification, disposal at source, both legal and illegal, municipal waste collection, municipal waste treatment and disposal, and also involved a critical examination of the associated environmental and human health implications. A variety of complementary data collection instruments have been employed in the field survey. These include field observations and photographing, interview of key informants or stakeholders (such as the Town Planner, Town Engineer, Housing Director, Environmental Health Officers, and Health officials among others) and a questionnaire survey that was employed on the grassroots community members. Phase three comprises data compilation, analysis, discussion of findings and the proposal of sustainable mitigatory strategies to the problems highlighted.

Results and discussions

Chinhoyi Town Council operates a solid waste management system, which has five basic components. These are generation, storage, collection, transportation

and disposal. The flows of solid wastes and their linkages are illustrated in Figure 1 below. There are two basic streams along which solid wastes generated in the town follow. One is the formal and the other is informal or illegal. The formal involves a scenario whereby once solid waste is produced on site anywhere in town; it is temporarily stored in waste bins or any other suitable containers, in skips or at transfer points awaiting collection. The municipality's solid waste management section collects the wastes from the temporary storage facilities and transports them to its a designated dump site. This formal stream accounts for 20% of the solid waste generated in the town per month.

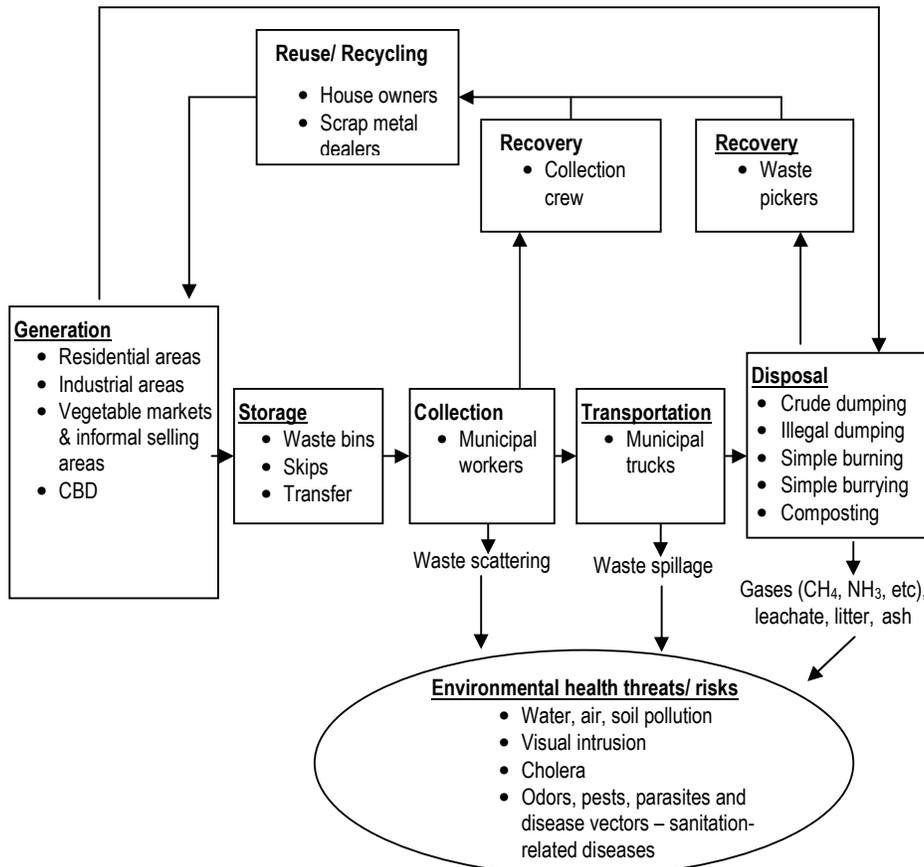


Figure 1 The Functional Components of Chinhoi's Waste Management System

Source: Survey Results

The second stream is infact largely illegal and it accounts for solid wastes that do not find their way into the municipal solid waste collection system. Through this route, generated wastes are disposed of illegally and indiscriminately

in undesignated areas such as vacant plots or simply buried in the ground, or burnt at source. It is disturbing to note that this informal route accounts for about 80% of the average monthly solid waste generated in the town. This is a clear indication that the municipality has little control over the manner in which solid wastes are handled and disposed of in the town. Both streams have leakages that have direct and indirect impacts on the biophysical and social environments. A better understanding of the linkages and the shortcomings of the system can only be understood in the context of the analysis of every stage of the waste stream. The department of health services is in charge of waste management in Chinhoyi and is grossly under-staffed and under – equipped, a situation that has seen the local authority failing to effectively and sustainably manage solid waste in the town. This has over the last few years, frustrated environmental health programmes that have been intended for the local community.

Domestic solid waste composition in Chinhoyi

Household waste constitutes the largest proportion of all solid waste generated in Chinhoyi and it is increasing at a much faster rate over the years than any other category of waste generated. The town has over the past decade experienced a dramatic increase in the quantities of domestic waste generated. In 1995 an estimated 34 tons of domestic waste was produced per day out of a total of 40 tons and in 1998 the estimated amount of domestic solid waste generated was 51 tones out of a total of 58 tones per day. Currently the solid waste generated in the town surpasses 220 tones per day with 90% of this being domestic solid waste. The reason for the high increase in domestic solid waste is the rapid population growth rate that is being experienced in the town.

Generally there has been significant growth in the per capita generation of domestic waste and an increase on non-biodegradable waste such as plastics, glass and other synthetic material. Such material is difficult to deal with particularly in terms of sustainable disposal. In 1995 per capita generation of solid waste was estimated at 0,31kg per person per day whilst the 1998 per capita generation was estimated at 0, 35 kg per person per day and the current average stands at 0.6 kg per person per day. This pattern is attributable to the generally increasing trend in per capita income and associated rising levels of consumption of goods and services. The consumption trends are also associated with an increase not only in the quantities of the waste, but also in the diversity and complexity of the waste generated. This in turn demands sophisticated, capital - intensive management techniques, which the council cannot afford given its financial and technical shortcomings. Chinhoyi's solid waste is however not as complex as that generated in the major industrial cities such as Harare and Bulawayo but the council still fails to cope citing a number of problems that range from non availability of fuel, inadequate funds, to the general lack of capacity and political will. Domestic Waste includes food waste, sweepings, rugs, papers, plastics, rubber, leather, tin cans,

glass and vegetable garden waste. Table 1 shows the general composition of domestic solid waste generated in Chinhoyi.

During the survey, spatial variations in the quantities and composition of domestic solid waste were observed. The waste generated in the low income, high density residential areas has a low content of packaging and other materials such as cardboard, paper, plastic, tin material, bottles, rubber and textile material. Instead large amounts of vegetables, putrescibles and inert material constitute the largest proportion of their waste as shown in Table 1.

Estimates of Chinhoyi’s Domestic Solid Waste Composition (%) (2008)

Table 1

Type of waste	High density (%)	Low density (%)	Average (%)
Paper and cardboard	10.3	18.7	15-22
Glass and ceramic	4	8.9	10-15
Plastics	3	6.4	8
Leather and rubber	7.7	9.3	10-15
Metals	1.	3.0	10-15
Textiles	2.1	5.4	4-7
Vegetables and putrescibles	56.1	43.3	20-25
Miscellaneous materials	15.5	5.0	14-20

Source: Survey results

It has been noted that it is the high-income communities who have much to spare and spend on packaged consumer goods and other luxuries that are associated with paper, plastic and glass waste generation whilst for low income groups, such material is actually recovered and reused in one way or the other.

Domestic waste storage in Chinhoyi

In the past the Chinhoyi municipality used to supply three main types of refuse containers to its residents. These were the galvanized refuse bin with fitting lid, hard polythene refuse bin with fitting lid and Polythene bags. This particular survey has noted a scenario whereby the local residents in the past six years were on a small fee supplied with household dust bins by the municipality. Instead of using them for waste storage, all the residents surveyed chose to use the containers for storage of household valuables such as grain, mealie meal and lately water storage given the increasing incidents of water supply interruptions in the town. So for the waste storage purpose, households improvise by using different types of refuse containers mostly in the form of empty mealie meal bags and various other types of bags, tins, and cardboard boxes. Most of the containers in use have limited capacity and hence fill up quickly. Over spilling and littering is therefore not uncommon. The problem is compounded by roaming animals, especially dogs searching food. Some households do not have bins at all and so tend to have their

refuse accumulating on open ground normally by the roadside. It has been noted that the problem of refuse storage is less critical in the high-income residential areas mostly because they can afford better containers and also that their extensive residential yards allow for composting, burying or even burning of waste.

In some parts of the high-density residential areas such as Chikonohono, Gadzema, and Cold stream, the lack of appropriate refuse storage containers has resulted in the prevalence of bad odors, housefly infestation and visual pollution produced by the exposed and decomposing garbage. Overcrowding whereby in many cases several individuals and families reside at one residential unit worsens the storage problem. Refuse generation per unit residential stand is therefore made much greater to an extent that the garbage bins fail to cope with the refuse generated. When this happens the residents resort to dumping excess refuse at undesignated sites and some have the tendency of burning the excess refuse thus creating environmental problems such as land and air pollution.

Domestic refuse collection and transport

In terms of waste collection coverage, the City Engineer did not mince his words and readily confessed to gross failure on the part of the municipality. In the high density residential areas in particular, there is hardly any waste collection activities going on. Residents pointed out that there has not been any waste collection from their homes for the past several months and this is despite the fact that there is a waste collection fee that they have to pay every month. From the perspective of residents from the low income suburbs, there is an almost total collapse of the municipal waste management system and this is particularly the case with the newly extended residential sections of Chikonohono, white City and Brundish. Among the several reasons for the non-collection, there are no properly engineered council service roads linking the areas with the town's main service roads. The poorly engineered paths have been turned into waterways and gullies that have made accessibility to and within most high-density residential areas extremely difficult. The collection of domestic refuse is no longer systematic nor consistent although from an official perspective a waste collection schedule indicates that some of the high-density suburbs are supposed to have waste collected once per week. The council has got one conventional refuse truck that only operates in the commercial area and the low-density residential areas. The town engineer attributes this unfortunate case of segregation to the fact that the vehicle can only service areas with good road network to minimize its breakdown which has proved to be highly costly for the town each time when the vehicle needs repair or service. The municipality uses a tractor for the collection of refuse in other parts of the town. During the time of field survey, the two vehicles were among several of municipal vehicles that were grounded. Besides the fact that most of the vehicles were ageing, the City Engineer indicated that maintenance of the municipal equipment and other infrastructure is facing chronic challenges in the form of Technicians/ workers laying down their tools because of poor

remuneration and also on this note; there is widespread theft of vehicle parts and tools by workers for resale elsewhere in the city.

Whilst the inconsistent refuse collection can be in one way or the other fairly contained in high-income residential areas where family sizes and tenancy rates are low, the waste collection shortcomings have unprecedented environmental and health impacts in the high-density residential areas. In most of the low-income residential units there is a high degree of overcrowding. More than 70 % of the sampled low-income housing units are inhabited by at least two families. The landlord – tenant system is highly prevalent in the high density residential zones and 26 per cent of this group mentioned the problem of overcrowding at their residence while 22% of the sampled population complained about a variety of problems emanating from overcrowding and these include high refuse generation rate per residential unit. This scenario significantly aggravates the state of waste management in these areas in the face of the infrequent if not the non-existence of waste collection in the areas. Consequently, residents are dissatisfied with the municipal waste collection system. Most residents confessed that they are frequently forced to dump refuse at illegal sites even though they know that indiscriminate dumping is a health hazard to the community. They are also aware of the visual pollution this causes. The residents put the blame of the looming environmental and health disaster in their own areas on the council's infrequent collection of domestic refuse especially when on a monthly basis they pay for the non-existent service.

Waste disposal

Domestic solid waste disposal is entirely the responsibility of the local authority's waste management services. On the other hand there is a growing tendency of illegal disposal of waste within the boundaries of the residential zones. Household waste is incorporated into the town's solid waste stream that includes commercial, institutional and industrial waste. All these categories of waste are disposed of at one site without giving any particular attention to special waste, which may be hazardous to both the environment and people. Mercury in old batteries, toxic chemicals like paints, old motor oil, asbestos waste, cleaning solvents, pesticide residue and containers may be particularly hazardous such that it is generally recommended that they should be carefully disposed of by employing special waste treatment and disposal procedures.

The official dump site does not show any evidence of controlled tipping as heaps of various types of waste material are haphazardly scattered uncovered all over the site. Some waste is seen in advanced state of decomposition. Swarms of houseflies and mosquitoes, cockroaches, rats and birds are seen feasting on the decomposing waste on the bare sloppy terrain that has got the potential of flowing towards the nearby Mzari stream or leaching to the ground water reserves. The refuse is often set on fire and this produces dense black smoke that engulfs the nearby farming community. Such air pollution causes discomfort and respiratory infections to the

surrounding community. Burnt waste material such as plastic, rubber and various other chemicals form hazardous substances that can leach into the ground and so result in ground water pollution. The bad odors, blowing litter from the unfenced dumps, the flies, mosquitoes and other pests together with rodents have been of great concern to the nearby communities.

The bad odors and visual pollution from the decomposing heaps of waste become a major environmental problem within the residential areas. The occasional burning of excess waste particularly on road sides causes air pollution and reduces visibility thus with a potential to cause accidents to motorists. Noxious gasses that are emitted from burning of waste are major causes of respiratory infections. About 80% of the sampled residents admitted to dumping rubbish at the undesignated sites whilst 62% confessed to occasionally setting mounds of garbage on fire in an attempt to get rid of the excess garbage. The fact that 85 percent of the sampled residents consider illegal dumping as improper due to the health risks it causes shows that illegal open dumping is practiced not out of the ignorance of the risks but as one desperate way of reducing the problems of waste storage at their dwellings.

The 2008/ 2009 Cholera Epidemic - A Solid Waste Management Implication

The increasing prevalence of diseases such as cholera, malaria, diarrhea, respiratory infections and other plagues in Chinhoyi is significantly attributable to a collapse of the environmental health management delivery infrastructure and services among which solid waste management is central. The accumulations of garbage in the environment constitute breeding ground for many diseases and agents such as houseflies, cockroaches, mosquitoes, rodents and pathogens. A cholera outbreak was experienced in Zimbabwe beginning August 2008 and this soon assumed epidemic levels to the effect that it was declared a national disaster. Given the above discussed environmental health scenario in Chinhoyi, it would not be surprising that Chinhoyi was one of the hotspots of the pandemic. By November 2008, out of total 1224 cases recorded nationwide, Chinhoyi had 75 reported cases out of which 42 deaths were recorded. The worst affected areas throughout the 10 month pandemic were Harare, Nyamapanda and followed by Chinhoyi, among other areas. By April 21 2009, total cumulative reported cases nationwide had reached 92043 with Mashonaland West alone recording 16229 from which 744 deaths were incurred (Red Cross and Red Crescent, 2009 and Epidemic and Pandemic Alert Response, 2009). The factors behind the high cholera prevalence status of Chinhoyi included mostly the poor water and sanitation coverage in the town and it is without doubt that the management of liquid and solid waste is hardly separable in terms of ensuring sound, disease free environmental health conditions in a given urban community.

Conclusion and opportunities for sustainable waste management in Chinhoyi

The preceding discussions have demonstrated beyond reasonable doubt that the waste problem in Chinhoyi Town has become a cross cutting issue that has no immediate solution. It is also now clear that the management of domestic waste is an expensive operation and is becoming increasingly costly as a consequence of rapid population growth in Chinhoyi. It is imperative that more adaptable and affordable methods of waste management be adopted with a view to achieving sustainability. This sustainability can only be achieved if the missing link - 'cradle to grave' (integrated) approach is adopted. Waste is our common problem and thus can be turned into our 'common property' that can be managed through community-based mechanisms. There is a growing realization that communities themselves can be the drivers in waste management, departing from the traditional paradigm whereby they were only viewed as ratepayers and the municipality as the sole service provider. Participatory methodologies, which have been associated with development projects in communal settings, can be adapted to small urban settlements like Chinhoyi through the formation of community-based organizations. The local people contribute into the identification of waste problems, proposal of workable solutions and the formulation of locally understood policies of waste management. The Council, in collaboration with the Ministry of Health has to come as facilitators of waste collection and disposal methods that are cheap to the community. This has the capacity to generate awareness and a sense of responsibility among the residents.

The following specific actions could be considered as opportunities for sustainable domestic waste management in Chinhoyi:

- In order to develop appropriate waste management strategies, the first requirement is for Council to ensure that it is aware of the nature, volume and source of its wastes and understand the environmental impacts. This could be done by working with the local universities (Chinhoyi University of Technology and Zimbabwe Open University) in areas of research in order to deliver a comprehensive situation analysis.
- Council should ensure that the community and Industry have access to information necessary for understanding waste management issues and for appropriate handling. This could be achieved by educational campaigns and other community-based programmes to educate the public and Industry of the need for and the benefits of appropriate waste management.
- The social components of sustainability are crucial to the effect that failure to recognize the determinant role of the social actors has doomed many development programmes (Cernea, 1995). The environment is at risk not from extra-terrestrial enemies, but from human beings. Putting people first in policies and investment programmes for environmental sustainability is therefore not a radical but a realistic approach. This involves the recognition of the centrality of

social actors and their institutions in all stages of a project cycle. Allowing the public to make important decisions as part of the waste management planning process helps to avoid conflicts and community project rejection. The waste management programme should stress the need for all sectors of the community to take part in, and take responsibility for environmental protection through appropriate waste management practices (Rondinelli, 1988). A community strategy which emphasizes on the hierarchy of waste management; of prevention and minimizing, recovery, recycling and reuse should be seriously considered for trial in Chinhoyi.

Clean-up campaigns are among the most effective measures that have got enormous potential for community involvement in national and local environmental management practices. Zimbabwe had made significant progress in this respect during the 1990s but since the onset of the new millennium the state has progressively disappeared from the clean up campaign scene, leaving it to the voluntary initiative of the NGOs and the corporate world whose primary intention is to spruce up their images and advertise their products. The campaigns need to have a national drive, with strong and consistent backing from the state and local government, not only leaving the task to the environmental agencies. The backing should be in the form of mobilizing funds for the clean up campaigns. National galas can extend their roles towards environmental education, cleaning, environmental rehabilitation and other conservation work.

- During these times of economic hardships, which are associated with chronic shortages of energy, fuel and equipment, it is no longer feasible to continue relying on conventional waste collection, transport and disposal techniques because of their technical, energy, and capital demands. There is a real need to use local ingenuity and resources such as the abundant labor force, and the informal sector's push cart transport system that has become dominant in Zimbabwe's towns and cities. Medium-sized cooperative units can be established to collect separated waste from households and streets to centralised, specially prepared community collection points from which municipal and other private transport operators collect the waste to the municipal dumps. The same cart cooperatives can also be encouraged and empowered to embark on the separation and collection of recyclable waste to boost their business returns. This could also extend into schemes for managing food and garden wastes such as centralized composting and conversion to useable products, where possible (Scheinberg & Mitrovic, 2007).

The participants need to be equipped with necessary knowledge and skills on waste management and this should be made possible through training workshops, whereby a business perspective approach is employed. The recruited and established SMEs and MSEs are oriented to look at waste management as a business venture and not just community service to ensure sustainability of their interventions. They should be trained to produce business proposals which demonstrate the viability of their businesses.

When it comes to the implementation stages there is need in some cases to engage in pilot activities, whereby the organisation start with for an example a 6-month pilot experiment to convince the local authority that the organisation is capable of offering a consistent and reliable service after which they then sign a service provision contract to deliver the services to an agreed number of households. The priority areas should be those households which have been disadvantaged receiving no such service before, either because of their residential location or income challenges.

To augment the waste management services, Participatory Health and Hygiene Education (PHHE) should be offered to the communities through community-based trainers who use tools which cover various diseases, water and sanitation issues and general hygiene aspects. These trainings enable communities to not only benefit from proper waste management services but also from good health and hygiene practices.

As the implementation gathers momentum, the need to raise awareness of the new approaches in urban waste management among the communities becomes apparent, such that awareness campaigns are required with support solicited from international agencies such as UNEP and UN Habitat and NGOs such as ENDA to work with and educate the CBOs and MEs involved in both refuse collection and recycling activities

The involvement of the pushcart cooperatives will result in major savings for the local authority. The door-to-door collection of waste by council vehicles is very costly in terms of fuel, man -hours, and even in mechanical terms. With proper accounting of the waste collection bill from ratepayers, the municipality can comfortably pay the pushcart cooperatives for the noble contribution they will have made to remove street garbage. Collection of separated garbage from centralised community points by council and other private players will minimise waste collection, transport and disposal costs. In addition the residents will enjoy sound environmental health conditions and there would be a new form of employment for the local youths. The initiative of integrating pushcart transport and scavenging (resource recovery) if comprehensively explored could become a lasting solution to a number of problems affecting urban communities. This includes: accumulating street garbage and associated health risks, the municipality's technical and economic challenges, unemployment, and most importantly the problem of waste disposal that is usually associated with the large quantities and variety of domestic waste.

- Council should aggressively seek partnerships with the country's major waste recycling companies such as National Waste Collection in order to institutionalize waste recovery and recycling practices in the town. A ready and active market for the recyclable material will significantly boost, waste recovery, recycling and overall waste minimization. Also partnerships with local institutions of higher learning and the local Industry among others should be encouraged to facilitate research in areas of waste minimization and recycling. An annual prize for the best research outcome could be initiated.

- Environmental management practices at whatever scale may not be able to yield desired results without state support or protection in the form of legal and other instruments. It's high time that the EMA be felt and appreciated in every hierarchy of the society. There should be real and effective enforcement of the law, which should be complemented, by formulating relevant environmental by-laws, including those that effectively cater for the waste management issues. The implementing/ enforcement agencies there of, should be capacitated in legislative, financial, technical and human resources terms so that their existence is made visible and appreciable to the community.
- The administration of public funds and the intended service areas has got to improve in order for the local waste management system to be sustainable. This should include the employment of staff with qualifications that are relevant to waste management issues. This should also involve discipline on the part of the council to use the ratepayers' money in the intended waste collection activities and not to divert the revenue into other sectors, which have nothing to do with waste management. This therefore calls for the immediate practice of "Good Governance", whose principal components include accountability, transparency, predictability, and participation.

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