

Is one man's garbage another's toxic treasure?

A brief look into the informal recycling of waste on landfills and associated health challenges in South Africa

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INTRODUCTION

As South African consumerism has risen, the waste being generated has increased. Poor accessibility to recycling infrastructures in communities has resulted in a high influx of reusable waste at landfills.¹ Waste disposal through landfills is the primary form of disposal worldwide. According to the World Bank (2018), South Africans produce 0.50-0.99 kg of waste per capita per day.² In 2017, the Department of Environment, Forestry and Fisheries (DEFF), formerly the Department of Environmental Affairs, reported that 75% of this waste is disposed of in landfills across the country.³ This has, to some degree, created a 'gold rush' to landfills as underprivileged and unemployed men and women in urban communities turn to waste recycling as a form of income generation.

It is estimated that 15 million people work as informal recyclers in developing countries.⁴ In 2016, the DEFF estimated that there were 60 000 to 90 000 informal waste workers on the streets and landfills in South Africa,^{3,5} but this might be a conservative estimate. In a 2013 review by Lizner and Lange, it was estimated that informal waste workers comprised approximately 0.6% of the total global population.⁶ In the South African context, this is equivalent to 350 000 waste reclaimers, in relation to the current total population of 58 million.⁷ Landfill waste disposal and its recycling activities contributed 0.62% to the South African gross domestic product in 2012.³ The DEFF aims to increase this figure to 1-1.5% through acceleration of the waste recycling economy.³

Longevity of landfills is a major challenge as designated land in urban areas becomes scarce.^{8,9} This is further compounded by the growing global concern about greenhouse gas emissions from landfills.⁸ With increasing urbanisation

and population growth, alternative forms of disposal, such as waste recycling, are becoming more important. As the informal recycling sector continues to grow, one needs to ask if there are any associated significant health risks. This paper aims to look at informal waste recycling in South Africa and the associated health risks.

Informal recycling in South Africa

Informal recycling is effective in reducing the amount of waste disposed at landfills in developing countries, thus prolonging use of the sites.⁸ Reclaimed secondary materials from landfills reduce manufacturing costs.⁹ South Africa has an unemployment rate of 29% and low labour absorption rates in the 20-30 and 60-64 years age groups of the population.¹⁰ This has resulted in an upward trend in the proportion of the South African population that earns a living from informal collection of recyclable waste.^{11,12}

Informal recyclers are a common sight in most cities and municipal landfill sites worldwide. The informal recycling chain begins with rummaging through waste in the streets and landfill sites.^{11,12} Informal recyclers (also known as waste pickers) are paid per kilogram of waste sold to buy-back centres, although the rates of payment vary by the type of items recovered, and are at the buyer's discretion (Figure 1).^{5,11-13} In a 2011 study by Mamphita, informal recyclers in Pretoria were reported to be earning ZAR 792 to ZAR 6 600 per month.¹⁴ This was higher than the estimated global daily income of ZAR 11-176 of waste reclaimers at the time (2012).⁶ Viljoen and colleagues later reported, from a 2017 national study, that street waste pickers earned on average ZAR 72 (ZAR 2-500) on a usual day across cities in South Africa. They also found that level of education and having a trolley were associated with income.¹⁵

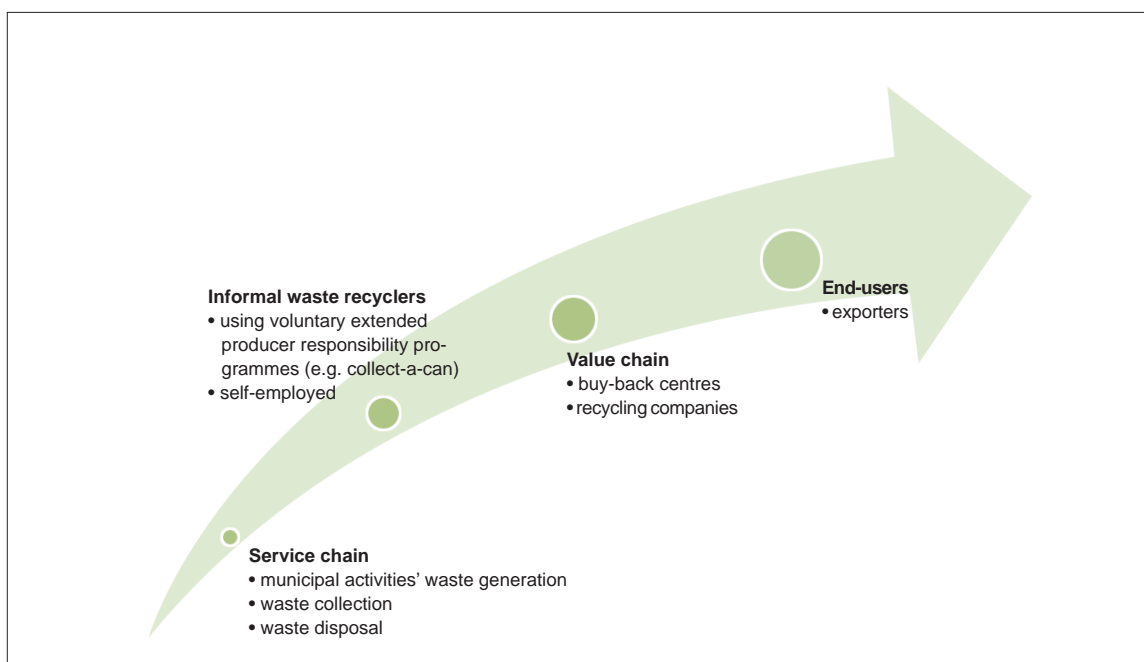


Figure 1. The role of informal waste recyclers in bridging the service and value chains in South Africa [adapted from Godfrey and Oelofse, 2017⁵]

The International Labour Organization (ILO) describes progressive steps in moving out of informal work as 'giving priority to reducing decent work deficits in the informal economy in the immediate term, by ensuring those found in it are recognised by law, have rights, legal and social protection and representation'.¹⁶ This statement outlines focus areas that can be adopted by national governing structures to formalise informal waste recycling. Several attempts have been made in South Africa to achieve this.¹⁷⁻²⁰ The waste disposal by landfill policy of the DEFF does not encourage waste reclamation at landfills. Nevertheless, access control measures were left to the discretion of the relevant local municipalities, on condition that the landfill did not accept hazardous waste.¹⁷ Some local municipalities create synergies between informal recyclers and their work processes on landfill sites, by granting landfill access to informal

waste recyclers. According to the Council for Scientific and Industrial Research's (CSIR) guide for municipal waste management, health and safety concerns are addressed by both the informal waste recyclers and landfill managers at an elementary level (wearing gloves and avoiding vehicle accidents, etc.).¹⁸

The DEFF has aimed to streamline the practice of informal recycling by including it in the strategic goals for national waste management systems (Table 1).¹⁶ Goal 3 of the DEFF National Waste Management Strategy is to grow the contribution of the waste sector to the green economy by promoting decent work through the formalisation of the practice of informal recycling, and expanding the roles of small and medium enterprises (SMEs) in waste management.¹⁹ Goal 3 is reiterated in the Department's draft document on 'Recognising the Informal Waste Sector in Advanced

Table 1. Summary of the 2016 DEFF National Waste Management Strategy goals¹⁹

Goal 1: Promote waste minimisation, reuse, recycling and recovery of waste
Goal 2: Ensure the effective and efficient delivery of waste services
Goal 3: Grow the contribution of the waste sector to the green economy
Goal 4: Ensure that people are aware of the impact of waste on their health, well-being and the environment
Goal 5: Achieve integrated waste management planning
Goal 6: Ensure sound budgeting and financial management for waste services
Goal 7: Provide measures to remediate contaminated land
Goal 8: Establish effective compliance with and enforcement of the Waste Act

Table 2. Health and safety risks perceived by informal waste recyclers, by activity and waste type ^{12,13,22-24}

Activity	Solid waste type	Hazards
Offloading of waste from trucks	Domestic	Vehicle accidents Vehicle exhaust emissions
Searching construction rubble and cleaning collected bricks	Construction/building	Cement and brick dust Repetitive movements Asbestos exposure from asbestos-containing building material
Searching through offloaded waste from trucks	Biological	Biological exposures from faecal matter in nappies and discarded human foetuses Rodent infestation
	Hazardous chemicals (illegal waste)	Chemical vapours
	Glass	Cuts
	Electronic	Mercury exposure from broken light bulbs
Burning plastic cables	Electronic	Chemical fumes
Smashing computer and television screens	Electronic	Cuts
Sorting waste	Paper; cardboard and plastic	Repetitive motion

Waste Treatment'.²⁰ In the draft document, the Department acknowledges the need for expert advice on health and safety, as well as training, for informal recyclers. However, accountable stakeholders are not clearly indicated.²⁰ Formal infrastructures for informal waste recycling have been observed in Gauteng and the Western Cape provinces in the last five years.^{9,21} While these enclosed facilities show improved working conditions (e.g. sheltered, and with waste conveyor belt systems), it is important to acknowledge hazards that may arise in an indoor setting. This was observed in Brazil when poor ventilation was highlighted in enclosed waste sorting facilities that were established to improve the infrastructure for waste recycling.²²

Health risks associated with informal waste recycling

Reclamation has come under scrutiny in South Africa as a health risk to recyclers.^{12,13,23} As outlined in Table 2, informal waste recyclers recognise various health hazards relating to the type of waste received on municipal landfill and associated activities.^{13,21-24} While correct waste disposal procedures and diverting hazardous waste from municipal landfills may reduce health hazards, training informal waste recyclers on risk management is essential. Waste reclaiming activities

on landfills may put individuals at risk of exposure to mercury from light bulbs, lead, endocrine-disrupting chemicals from electronics devices, and asbestos fibres from unregulated disposed of building waste.^{13,18,21,24} Increasing outdoor air pollution in urban areas, due to fossil fuel emissions, further compounds the cocktail of harmful exposures experienced by informal recyclers.⁸

There is considerable epidemiological evidence for adverse health effects associated with landfill exposures. A Google Scholar search, using the keywords 'municipal landfills', 'waste workers', 'waste pickers', 'informal waste workers and health effects', identified various studies that have highlighted challenges in the waste management sector.^{12,13,15,18-38} Some studies have also investigated an association between proximity to municipal landfills and adverse health effects in surrounding communities.²⁶⁻²⁸ In a case-control study that examined hospital hypertensive discharge rates from 1993 to 2000, Huang and colleagues (2006) found that the prevalence of hypertension in people residing near waste sites in New York was associated with exposure to persistent organic pollutants from the waste sites.²⁸

Cross-sectional studies on municipal waste workers in developed countries have reported respiratory symptoms

(e.g. coughing, sneezing, wheezing, and phlegm production) and skin diseases (e.g. rashes, eczema and itchy skin).²⁹⁻

³² Hazards of concern reported in the literature in the last 10 years are mainly those associated with exposure to respirable and total inhalable particulates from landfills, and biological agents.^{27,31,32,36-38}

Research on waste workers in South Africa is limited. Ncube et al.'s 2017 systematic review of studies with epidemiological evidence on public health concerns of municipal waste handling did not include any studies from South Africa.³³ There is also a scarcity of studies in South Africa that focus on quantifying waste handling exposures. To our knowledge, only two studies have used quantitative exposure monitoring techniques to assess occupational exposures in the waste handling sector in South Africa.^{37,38}

Some studies in developing countries have focused on informal recyclers' exposures, and landfill exposures. For example, lead exposure levels in waste-recyclers have been studied in Ghana and Senegal.^{29,35} High lead levels were observed in personal respirable dust samples of recyclers of electronic waste and urine of children residing in close proximity to landfills. In both countries, soil lead levels on the landfills were higher than on the reference sites. In the Senegal study, lead levels (known to produce progressive tubule-interstitial nephropathy that may cause kidney failure) found in children's urine, were traceable to lead in the soil on the landfill.²⁹ The high lead levels may have stemmed from the high influx of electronic waste into developing countries, in general.

There is a dearth of studies focusing on exposures and health outcomes in the domestic waste management sector in South Africa. Ncube et al. (2017) reported total dust concentrations in municipal waste workers (waste bin loaders) that exceeded 10 mg/m³. However, a complementary study by Dalasile and Reddy (2017) reported personal respirable dust exposures in waste pickers on a Durban landfill that were below current South African occupational exposure limits.³⁸ Using general household survey data from 2005-2015, Omotoso found that those who collected recyclable waste for a living were 3% more likely to experience ill-health than those who did not.¹³ Further, more specific research on contributing factors to ill-health in waste recyclers would be beneficial.

CONCLUSION AND RECOMMENDATIONS

Informal waste recyclers are exposed to hazards that may increase the risk of adverse health outcomes. In the Government's efforts to accelerate economic growth and promote decent work in the recycling sector, support is needed from environmental and occupational health and safety professionals in controlling hazardous exposures to mitigate risks of adverse health effects. While there is

commitment to promote decent work for informal recyclers at the national government level, implementation strategies to address health and safety challenges need to be cascaded to the informal sector through engagement between government stakeholders and informal recycling consortiums, such as Women in Informal Employment: Globalizing and Organizing (WIEGO).³⁹

DECLARATION

The authors declare that this is their own work; all the sources used in this paper have been duly acknowledged and there are no conflicts of interest.

AUTHOR CONTRIBUTIONS

Conception and design of the paper: TM

Data acquisition: TM, JW

Data analysis: TM, JW

Interpretation of data: all authors

Drafting of the paper: TM, M

Critical revision of the paper: all authors

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