

An investigation of the work challenges faced by solid waste pickers in the City of Ekurhuleni Metropolitan Municipality, Gauteng South Africa.

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Abstract: The management of waste faces numerous challenges because of the growing population and economy in South Africa. As a result, waste facilities such as landfill sites are overburdened, and municipalities need to move up the waste management hierarchy. Informal waste pickers (IWPs) play a vital role in this regard as they divert waste away from landfills through recycling. However, they work in isolation from municipalities' waste management systems, under harsh conditions and without proper tools. Recent increases in municipal solid waste have been significant and have detrimental effects on the environment and public health, requiring municipalities to move up the waste management hierarchy (reduce, reuse, recycle, recover, landfill). In South Africa, informal waste collection is a crucial component of municipalities' waste management systems. This study aims to investigate the work challenges faced by solid waste pickers in the City of Ekurhuleni Metropolitan Municipality, Gauteng (CEMM), South Africa. To achieve this aim, the objective was to understand the problems that they encountered as they collected solid waste recyclables to sell to recycling companies. The study was conducted in Germiston (Simmer and Jack Landfill) and Springs (Rietfontein Landfill site) in the City of Ekurhuleni municipality, focusing on landfill waste pickers. The study had a sample of 283 IWPs. This study employed a descriptive cross-sectional design and quantitative methods. A sample size of 283 was drawn from a total population of an estimate of five hundred fifty (n=550). Data were collected using self-administered, structured closed-ended questionnaires. Data was analysed by using SPSS computer software version 27. The study revealed that waste pickers face social, financial and lack of support challenges when performing their daily activities. There was no association between the location of waste pickers and their opinions on integration and the results can be generalised for the population of waste pickers in the City of Ekurhuleni. The study revealed that waste pickers need support from municipalities as they face critical challenges that affect their health, livelihood, and their recycling efficiencies. These critical challenges affect their health, livelihood, and their recycling support efficiencies. We recommend the establishment of municipal by-laws that protect solid waste pickers from the afore mentioned challenges, the CEMM should review the solid waste management by-laws that will include protection of solid waste pickers by communities who should at the same time embrace the role they play in protecting human health and the environment. The Gauteng Provincial Government should come up with strategies that will help make waste pickers feel wanted.

Keywords: illegal dumping, landfill sites, recycling, solid waste management, waste pickers

Introduction

Rapid urbanisation and stagnant economic empowerment in South Africa have placed pressure on local municipalities, including the City of Ekurhuleni Metropolitan municipality, to provide effective and fair solid waste management facilities to urban residents. Research indicates that the inadequate collection and treatment of waste has resulted in air, water, and land pollution [1]. Previous studies show that poor management of solid waste attracts vectors and spreads communicable diseases such as cholera and malaria, and these diseases have claimed the lives of millions of informal waste reclaimers and as a result, waste picking for selling in the recycling companies has emerged as an essential activity in the urban regions of South Africa [2]. The waste picking activity is practiced by

informal waste pickers (IWPs) who spend their time collecting, sorting and salvaging recyclable materials like glass, plastic, paper, tins, Polyethylene Terephthalate (PET) and ferrous metals that are economically valuable [3]. IWPs therefore play a vital role in protecting the health of individuals and the environment from adverse effects by keeping the environment clean through collecting the solid waste recyclable items from communities to recycling companies. They also decrease the use of virgin materials required for manufacturing [4]. A key challenge in the South African municipalities is how best they can work with the informal waste pickers to improve their efficiency in waste picking, working conditions and their livelihoods, and continue reaping the sector's benefits [5]. Moreover, [5] state that there is a constant need to determine how IWPs can be officially integrated into South Africa's municipal waste management system and the recycling economy. This study investigated the challenges faced by solid waste pickers in the City of Ekurhuleni Metropolitan Municipality Gauteng, South Africa and how decision-makers in Gauteng Province can address such challenges to protect human health and the environment and to empower IWPs through recycling economy.

Materials and Methods

We employed a quantitative descriptive data collection method. Semi-structured questions were designed to collect primary data while secondary data were sourced from previous studies and Gauteng provincial documents. Sample size of two hundred eighty- three ($n=283$) was drawn from an estimated population of five hundred fifty ($n=550$). We used a non-probability purposive sampling strategy to choose study participants. The aim of this sampling method was to gather information from participants who were mainly knowledgeable about or had experience with the phenomenon of interest, were accessible and eager to participate, and had the capacity to communicate their experiences and opinions in a clear, expressive, and reflective manner. Participants were selected for the study's sample based on where they were situated and whether they met the inclusion and exclusion criteria. We used a purposive sampling to support the works of [6] who postulates that purposive sampling assist researchers to apply their knowledge to hand-pick a sample that is most suitable for research purposes. The sample size was determined by using the Centre for Disease Control and Prevention's (CDC) EPINFO version 7.2. The estimated population was 550 IWPs in both Germiston and Springs, with an acceptable error margin of 5%, and one cluster with the estimated sample size at a 95% confidence level; the total was 226. An additional 25% contingency was estimated at 56.5, and the sample size was $226 + 56.5 = 282.5$: thus, 283. For participants to be involved in the study, they had to be IWPs based in Springs and Germiston for 12 months or longer. In South Africa, anyone who is 18 years and older is deemed an adult and may give consent [7], and this was specified in the inclusion criteria.

A pilot study was conducted before the main study to test the appropriateness of the data collection instrument and improve the efficiency of the data collection process. Ten ($n=10$) IWPs from Boksburg in the East Rand, Gauteng took part in the pilot study, and they were asked to respond to the same questions that were given to waste pickers in the main study. Two ($n=2$) field workers were employed to assist with data collection. The responses were coded to facilitate data analysis. The questionnaires were checked for errors and accuracy before responses were captured, then each variable was checked for unusual values. The Statistical Package for Social Sciences (SPSS) version 27 software was used for data entry and analysis using the SPSS analysis fields. Data were coded to categorize and enable data entry into the statistical software. The analysis included summary statistics, frequencies, and cross-tabulation.

Results and Discussion

The results for this study are presented numerically and visuals such as tables and graphs in six phases of demographics, health and safety challenges, other health and safety challenges, social challenges, financial challenges, and challenges in the landfill site

Demographics**Table 1: Demographic variables and results**

Characteristics	Category	Frequency	Percentage (%)
Gender	Male	252	89%
	Female	29	10%
	Prefer not to mention	2	1%
Nationality	South African	114	40.3%
	Other	169	59.7%
Race	White	1	0.4%
	Black	281	99.2%
	Indian	1	0.4%
Age group	18-30	175	61.8%
	31-49	95	33.6%
	50-65	13	4.6%
Level of education	Tertiary	3	1.1%
	High School	89	31.4%
	Secondary	140	49.5%
	Primary	40	14.1%
	Never went to school	11	3.9%

There were 252 (89%) questionnaires completed by male respondents, while only 29 (10%) were completed by female respondents. Two (1%) questionnaires were completed by individuals who preferred not to disclose their gender. The results indicate that most waste pickers were male, implying that waste picking is an activity dominated by men. The high percentages of male-to-female respondents may have been influenced by the fact that female waste pickers are not allowed at Simmer and Jack landfill due to the presence of illegal miners near the site which presents a safety concern, but they are allowed at the Rietfontein landfill in Springs. A study conducted by [8] in Johannesburg, South Africa, similarly found that males represented 75% of the sampled group, while 25% of the respondents were female. Of the 283 IWP, 40.3% were of South African origin, 0.4% from Lesotho, 1.4% from Malawi, 4.9% from Mozambique, 44.9% from Zimbabwe, and 8.1% preferred not to mention their country of origin possibly for fear of stigmatization. Interestingly, most respondents (59.7%) involved in waste picking were non-nationals; Zimbabwe with the highest percentage (44.9%) while Lesotho had the lowest percentage of IWP at 0.4%. [9] points out that waste picking is normally done by vulnerable groups in society, including people who have newly migrated to a new country and are deprived of employment opportunities.

Of the questionnaires, 99.2% were completed by waste pickers of the Black race, 0.4% were Indian, and 0.4% were completed by Caucasian participants. These results indicated that most respondents involved in waste picking were Black, while other races constituted a small number. This is in line with the City of Ekurhuleni municipality's profile [10], which revealed the Black African population group makes up most of the City of Ekurhuleni population at 82%, followed by the White population at 14%, and Coloured and Indian populations representing the minority groups at 3% and 2% respectively. Another study by [11] concurred that most waste pickers in South Africa are Black

Further analysis reveals that waste picking was mostly done by youths (61.8%) aged 18-30, 33.6% of respondents were aged 31-49, and 4.6% were in the older ages of 50-65 years. This data is important as it proves that a significant number of youths in the City of Ekurhuleni actively participate in waste picking, possibly attributed to the high level of unemployment in the country. According to the Quarterly Labour Force Survey (QLFS), for the first quarter of 2022, the unemployment rate was 63.9% for those aged 15-24, and 42.1% for those aged 25-34 years, while the current official national rate stands at 34.5% [12]. Respondents' level of education was divided into five categories, as indicated in Table 1. Only 3 (1.1%) respondents had a tertiary level education, 89 (31.4%) had a high school education (obtained matric), 140 (49.5%) had some secondary schooling, and 40 (14.1%) had some primary schooling. A very small proportion (n=11; 3.9%) of respondents never attended school. These results indicate that most waste pickers

who participated in the study had low levels of education (49.5%), compared to only 1.1% who had tertiary education. According to [13], waste pickers’ lack of education or low levels of education contributes to their ineffectiveness in gaining full-time employment. It was also worth noting that in terms of other sources of income, 95.4% of the respondents depended on waste picking as their only source of income, while 2.1%, 1.4% and 1.1% had other sources of income, had other jobs, and received child support grants as another source of income, respectively. The lack of other sources of income may have led many respondents to resort to waste picking. This view is supported by [9], who noted that the absence of official jobs and opportunities caused many people to seek alternate means of making a living, such as waste picking and recycling.

Health and safety variables and results

Health and safety challenges cannot be separated; thus, we present the results of phase 2 separately in a figure and a table but in combined discussion. The health challenges experienced by waste pickers are presented in figure 1 while the safety challenges are presented in table 2. Variables in health challenges include exposure to health and safety risks; harmful gases; biological risks, dust; chemicals and extreme weather conditions. The safety challenges are presented under the following variables: injuries; broken glasses; used needles, nails/wires; animals/insects; vehicle accidents and working long hours. Figure 1 below shows these variables and the results.

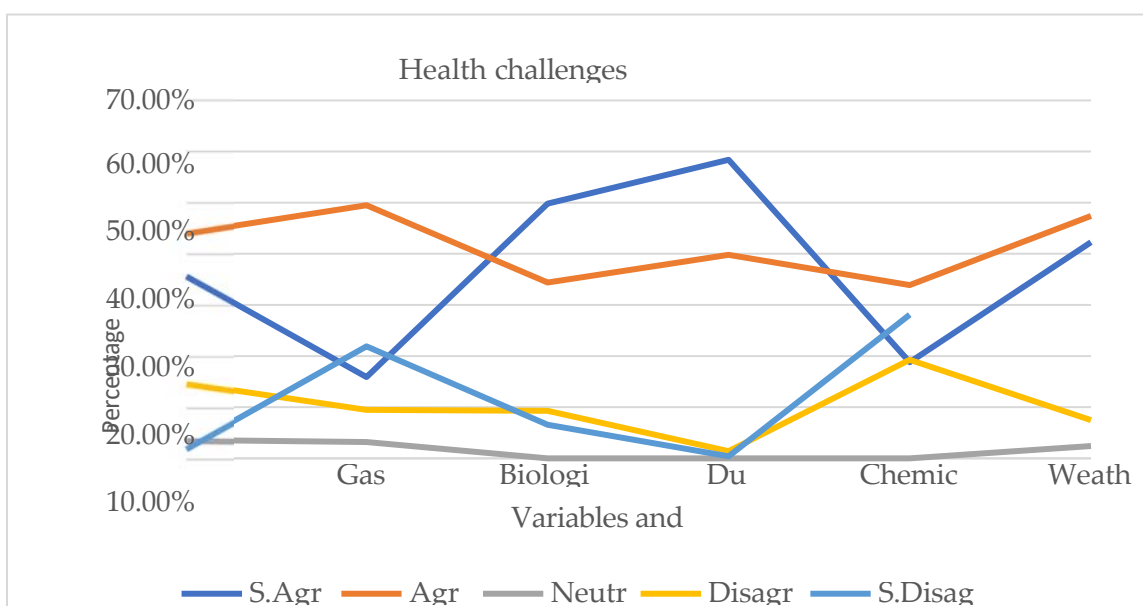


Figure 1: Health challenges faced by waste pickers

Health and safety risks

Two hundred and fifty-two questionnaires formed the base for computing the results; 31 questionnaires were excluded because of missing data. Of the respondents, 35.7% strongly agreed they were being exposed to health and safety risks, 44% agreed, 3.6% were neutral, 14.7% disagreed, and 2% strongly disagreed.

Harmful gases

Two hundred and eighty-three questionnaires formed the base for computing the results. Of the respondents, 15.9% strongly agreed and believed that they breathe harmful substances, 49.5% agreed, 3.2% were neutral, 9.5% disagreed, and 21.9% strongly disagreed with breathing harmful gases when working.

Biological risks (faeces, blood, dead animals and babies, nappies, etc.)

Twenty-four questionnaires were excluded from this analysis because of missing responses; thus, 259 questionnaires formed the base for computing results. Of the completed questionnaires, 49.8% of waste pickers strongly agreed they were exposed to biological risks, 34.4% agreed, 9.3% disagreed, and 6.6% strongly disagreed that they were exposed to biological risks.

Dust

Two hundred and seventy-nine questionnaires formed the base for computing the results; four questionnaires were excluded because of missing responses. Of the waste pickers, 58.4% strongly agreed that they were exposed to dust, 39.8% agreed, 1.4% disagreed, and 0.4% strongly disagreed. As expected, the results show that waste pickers are exposed to and perceive dust as a major challenge when collecting recyclables.

Chemicals

There were 274 questionnaires that formed the base for computing of result; nine questionnaires had no responses and were excluded from this section. Of the waste pickers, 18.8% strongly agreed that they were exposed to chemicals while picking waste, 33.9% agreed, 19.3% disagreed, and 28.1% strongly disagreed. Therefore, almost half of the waste pickers were exposed to chemicals at the landfill, while another half disagreed with being exposed to chemicals at landfills.

Extreme weather conditions

Two hundred and fifty-three questionnaires formed the base for computing the results; 30 questionnaires were excluded in this analysis because there were no responses. Of the respondents, 42.3% strongly agreed that they were exposed to extreme weather conditions, 47.4% agreed, 2.4% were neutral, 7.5% disagreed, and 0.4% strongly disagreed. Extreme weather conditions such as heat, rain, and wind thus greatly affect the waste pickers' activities at the landfill sites.

Safety challenges**Table 2: Safety challenges experienced by waste pickers**

Safety challenges	Strongly Agree	Agree	Neutral	Disagree	Strongly Disagree	Total (%)
Injuries	102 (36.0%)	122 (43.1%)	0 (0.0%)	44 (15.5%)	15 (5.3%)	283 (100%)
Broken glass	99 (36.9%)	125 (46.6%)	2 (0.7%)	30 (11.2%)	12 (4.5%)	268 (100%)
Used needles.	78 (27.7%)	96 (34.0%)	3 (1.1%)	72 (25.5%)	33 (11.7%)	282 (100%)
Nails/wires	99 (35.1%)	113 (40.1%)	5 (1.8%)	49 (17.4%)	16 (5.7%)	282 (100%)
Animals/insects	26 (9.6%)	52 (19.1%)	3 (1.1%)	83 (30.5%)	108 (39.7%)	272 (100%)
Vehicle accidents	68 (25.8%)	89 (33.7%)	2 (0.4%)	64 (24.2%)	41 (15.5%)	264 (100%)
Working long hours	36 (12.9%)	101 (36.2%)	2 (0.7%)	101 (36.2%)	39 (14%)	279 (100%)

Table 3: Other Health and Safety challenges

Health and Safety Challenges	Strongly Agree	Agree	Neutral	Disagree	Strongly Disagree	Total
I am covered by medical aid	3 (1.1%)	1 (0.4%)	1 (0.4%)	126 (44.5%)	152 (53.7%)	283 (100%)
I wear adequate protective clothing (gloves, masks) when doing my work	47 (16.6%)	151 (53.4%)	0 (0%)	27 (9.5%)	58 (20.5%)	283 (100%)
I have access to sanitation facilities (toilets, clean water etc.)	4 (1.5%)	12 (4.5%)	1 (0.4%)	82 (30.6%)	168 (63.1%)	268 (100%)

Sharp objects in the reclaiming process often injure me

283 questionnaires formed the base for computing the results: 36% of waste pickers strongly agreed with this statement, 43.1% agreed, 15.5% disagreed, and 5.3% strongly disagreed.

Waste pickers were further asked to indicate the type of sharp objects that often injured them: -

Broken glass: Two hundred and seventy-eight questionnaires formed the base for computing the results; five questionnaires had to be subtracted because of missing data. Of the respondents, 36.9% strongly agreed that they were often injured by broken glass, 46.6% agreed, 0.7% were neutral, 11.2% disagreed, and 4.5% strongly disagreed that broken glass often injured them.

Used needles: One questionnaire was subtracted because of missing data, and 282 questionnaires were used to compute the results. Of the respondents, 27.7% strongly agreed they were often injured by needles, 34% agreed, 1.1% were neutral, 25.5% disagreed, and 11.7% strongly disagreed with being injured by used needles.

Nails/wires: One questionnaire was subtracted because of missing data, thus 282 questionnaires formed the base for computing the results; 35.1% of waste pickers strongly agreed that nails/wires often injured them, 40.1% agreed, 1.8% were neutral, 17.4% disagreed, while 5.7% strongly disagreed with being injured by nails/wires.

The results indicate that sharp objects such as broken glass, used needles, nails and wires are typical problems waste pickers encounter when working; many waste pickers agreed these were challenges. Those who remained neutral or disagreed with this statement were likely able to wear full PPE.

Dangerous animals/insects: Two hundred and seventy-two completed questionnaires formed the base for computing the results, and 11 questionnaires were subtracted due to missing responses. Of the respondents, 9.6% strongly agreed they were exposed to dangerous animals and insects as they collected waste, 19.1% agreed, 0.4% were neutral, 30.5% disagreed, and 39.7% strongly disagreed. These results show that most waste pickers at the two landfill sites were not exposed to dangerous animals and insects, and thus they were never considered a challenge.

Vehicle accidents: Two hundred and sixty-four questionnaires formed the base for computing the results; 19 questionnaires were subtracted because of missing data: 25.8% strongly agreed they were exposed to vehicle accidents in the landfill, 33.7% agreed, 0.4% were neutral, 24.2% disagreed, and 15.5% strongly disagreed to being exposed to vehicle accidents.

These results indicate that although a sizeable number of waste pickers claimed they were exposed to vehicle accidents while they worked at the landfill site, a significant number of respondents also did not experience vehicle accidents.

I work long hours: There were 279 questionnaires that formed the base for computing the results, since four questionnaires were excluded due to missing data. Of the respondents, 12.9% strongly agreed that they worked long hours, 36.2% agreed, 0.7% were neutral, 36.2% disagreed, and 14% strongly disagreed.

These results indicate an almost symmetric distribution of those who agreed and disagreed with working long hours. The findings can potentially be attributed to waste pickers working independently and deciding when to start and finish their workday.

Table 3 depicts other health and safety challenges faced by waste pickers. When asked about medical aid, 1.1% strongly agreed that they were covered by medical aid, 0.4% agreed, 0.4% were neutral, 30.6% disagreed, and a high number (63.1%) of waste pickers strongly disagreed with being covered by medical aid.

The analysis showed that a significant proportion of waste pickers from both landfill sites (93.7%) were not covered by medical aid and depended on free public health care for medical services.

For the statement: "I wear adequate protective clothing (gloves, masks) when doing my work", all 283 questionnaires formed the base for computing the results; 16.6% strongly agreed that they wear adequate protective clothing, 53.4% agreed, 9.5% disagreed and 20.5% strongly disagreed.

For the statement: "I have access to sanitation facilities (toilets, clean water etc.)", 268 questionnaires formed the base for computing the results, and 15 questionnaires were subtracted because of missing data. 1.5% strongly agreed that they have access to sanitation facilities, 4.5% agreed, 0.4% were neutral, 30.6% disagreed and 63.1% strongly disagreed. These results show a combined 93.7% of waste pickers who did not have access to sanitation facilities such

as toilets and clean water. This means the waste pickers had to bring their own water to the landfill site and use parts of the landfill as toilets. These results are supported by a study conducted in South Sudan, where waste pickers shared similar health experiences, attributed to working without protective clothing [14].

In support of this, [15] state that IWPs often encounter unfavourable health, safety, and working conditions, such as bruises and injuries from broken glass, needles, sharp metals and medical waste deposited in the waste stream. A study conducted [9] presented different results where waste pickers emphasised that venomous snakes were one of the risks at the landfill site. These results indicate that although a sizeable number of waste pickers claimed they were exposed to vehicle accidents while they worked at the landfill site, a significant number of respondents also did not experience vehicle accidents. Those who experienced vehicle accidents, this occurred mostly when waste pickers tried to pull waste from moving trucks and worked where compactors were moving. [16] postulates that waste pickers carry a high risk of injury, especially if they labor at open dumps where they could get struck by moving trucks. [14] agreed that waste pickers' health is compromised at every stage they handle waste, and the above health and safety risks were also observed in their study.

That study also emphasized that waste pickers are regarded as a direct population at risk as they are exposed to various types of toxic compounds; some of these compounds are present in the waste, and some are formed during the decomposition process. In a study by [9], waste pickers mentioned that they experienced respiratory problems as they did not have masks to cover their nose and mouth while working. [17] and [18] agreed that unhealthy working conditions may compromise waste pickers' health. [19] observed that due to the smoke and dust they inhale, many waste pickers have chronic coughs and experience chemical burns and come into contact with syringes, blood, cotton swabs, and pharmaceuticals, which might cause illness and even death.

Majority of respondents as reflected in figure 1 agreed that waste picking exposed them to extreme weather conditions, and only few disagreed with this statement. Extreme weather conditions such as heat, rain, and wind thus greatly affect the waste pickers' activities at the landfill sites. A study conducted in the Western Cape, Northwest, and Eastern Cape by [9] also found waste pickers were subjected to extreme weather elements such as very hot days causing disorientation, very cold temperatures, windy and rainy days, which resulted in a few waste pickers not being able to work. Such weather conditions seriously affected the collection of recyclables and had a negative impact on their earnings. The study continued to state that the municipality built a structure to provide shade for waste sorting and storage, but this was not used as it was built by the gate of the landfill site, far from the actual dumping area.

Many waste pickers (93.7%) in this study indicated that they were not covered by medical aid and thus depended on government public health care. The public health system is typically characterised by various drawbacks, such as long delays and low service quality. As a result of such delays, waste pickers choose to ignore their health needs because their work and earnings are time dependent. This finding is similarly emphasized by [20], who noted that waste pickers' work is very physically demanding, yet they typically have limited access to health care, and they are not covered by health and safety laws. The study's results further revealed that most waste pickers (70%) wear protective clothing when working compared to 30% who said they do not wear adequate protective clothing. This indicated that waste pickers were aware of the importance of protecting themselves as they work. These results differ from observations at the landfill sites where this study was conducted. Most waste pickers were not wearing dust masks, proper safety shoes and gloves. This was also observed in a study by [21] in Kenya where IWPs did not have protective clothing when salvaging.

Social challenges**Table 4: Social challenges experienced by waste pickers.**

Themes	Strongly Agree	Agree	Neutral	Disagree	Strongly Disagree	Total
I have a good relationship with the landfill operators.	144 (51.1%)	124 (44%)	1 (0.4%)	11 (3.9%)	2 (0.7%)	282 (100%)
The landfill operators and other waste pickers have accused me of wrongdoing.	18 (6.4%)	14 (5%)	3 (1.1%)	133 (47.2%)	114 (40.4%)	282 (100%)
I believe people appreciate what I do.	110 (39%)	120 (42.6%)	22 (7.8%)	21 (7.4%)	9 (3.2%)	282 (100%)
Some people call me names due to the nature of my work.	10 (3.5%)	19 (6.7%)	10 (3.5%)	126 (44.7%)	11 (41.5%)	282 (100%)
I am exposed to violence from other waste pickers and the community.	48 (17%)	8 (2.8%)	2 (0.7%)	125 (44.3%)	99 (35.1%)	282 (100%)

Table 4 above displays the social challenges waste pickers encounter in their job. One questionnaire was subtracted due to missing data; thus, 282 questionnaires formed the base for computing the results of all five statements.

For the first statement: "I have a good relationship with the landfill operators", 51.1% of respondents strongly agreed, 44% agreed, 0.4% were neutral, 3.9% disagreed, and 0.7% strongly disagreed. Moreover, 6.4% of waste pickers strongly agreed that they were accused of wrongdoing by landfill operators and other waste pickers, 5% agreed, 1.1% were neutral, 47.2% disagreed, and 40.4% strongly disagreed.

Of the waste pickers, 39% strongly agreed that people appreciate what they do, 42.6% agreed, 7.8% were neutral, 7.4% disagreed, and 3.2% strongly disagreed. In addition, 3.5% of waste pickers strongly agreed that some people called them names due to the nature of their work, 6.7% agreed, 3.5% were neutral, 44.7% disagreed, and 41.5% strongly disagreed.

These results show that the relationship between waste pickers, landfill operators and community members is good; only a few problems were reported. Moreover, many waste pickers were not disrespected because of the work they do. A study by [22], found that waste pickers in Brazil faced discrimination, including being called names and accused of being "smelly". Since the respondents in this study picked waste at landfill sites (as compared to on the streets), they were not exposed to a lot of the public where they can be called names, and as soon as the day's work finishes, they were able to change their clothes before going home. As a result, some waste pickers indicated that most people in their communities are unaware of the work they do.

Financial challenges

In this phase, we present financial challenges split into two of business-related challenges in table 5 and Pricing challenges in figure 2.

Table 5: Business-related and pricing challenges

Statements	Strongly Agree	Agree	Neutral	Disagree	Strongly Disagree	Total
I sell recyclables to formal businesses.	105 (37.1%)	85 (30%)	4 (1.4%)	51 (18%)	38 (13%)	283 (100%)
I get enough money from waste recycling.	11 (3.9%)	98 (34.6%)	17 (6%)	88 (31.1%)	69 (24.4%)	283 (100%)
I work every day to get more money.	70 (24.8%)	146 (51.8%)	2 (0.7%)	14 (5%)	50 (17.7%)	282 (100%)

Table 5 depicts the business and finance-related challenges respondents discussed. 283 questionnaires formed the base for computing the results, with no missing or excluded questionnaires.

Of the respondents, 37.1% strongly agreed that they sell their recyclables to formal businesses, 30% agreed, 1.4% were neutral, 18% disagreed, and 13% strongly disagreed. The results reflect the reality at the two landfill sites; waste pickers at Simmer and Jack landfill have the freedom to transport their recyclables to buy-back centres of their choice, while at Rietfontein landfill, waste pickers are forced to sell their recyclable material to the buyers located at the landfill and no other formal businesses.

A few respondents (3.9%) strongly agreed that they receive enough money from waste picking, 34.6% agreed, 6% were neutral, 31.1% disagreed, and 24.4% strongly disagreed.

For the statement: "I work every day to get more money", 282 questionnaires formed the base for computing the results, and 1 questionnaire was excluded because of missing data. 24.8% of waste pickers strongly agreed that they worked every day, 51.8% agreed, 0.7% were neutral, 5% disagreed, and 17.7% strongly disagreed to working every day. The results illustrate that waste pickers do not earn a sufficient income from this activity, even when they work most days of the week. A combined 67.1% agreed that they sold their recyclable material to formal businesses (buy-back centres), while 31% disagreed. A majority of those who did not sell to formal businesses were from the Rietfontein landfill in Springs, where waste pickers are not allowed to take material outside the landfill and are made to sell their recyclables to the buyers on-site.

They do not have the freedom to take their recyclables anywhere they want. In addition, 38.5% of respondents from both landfill sites agreed that they received enough money from waste picking, while the majority claimed they did not earn a sufficient income from picking and recycling waste, even though most of them worked every day. [23] agree that although waste picking is regarded as an entrepreneurial activity, it is not a flourishing one; in the poorest countries of the world (such as Nicaragua), waste pickers earn between \$1.50 and \$2 per day, which is just below World Bank's poverty line.

Pricing challenges

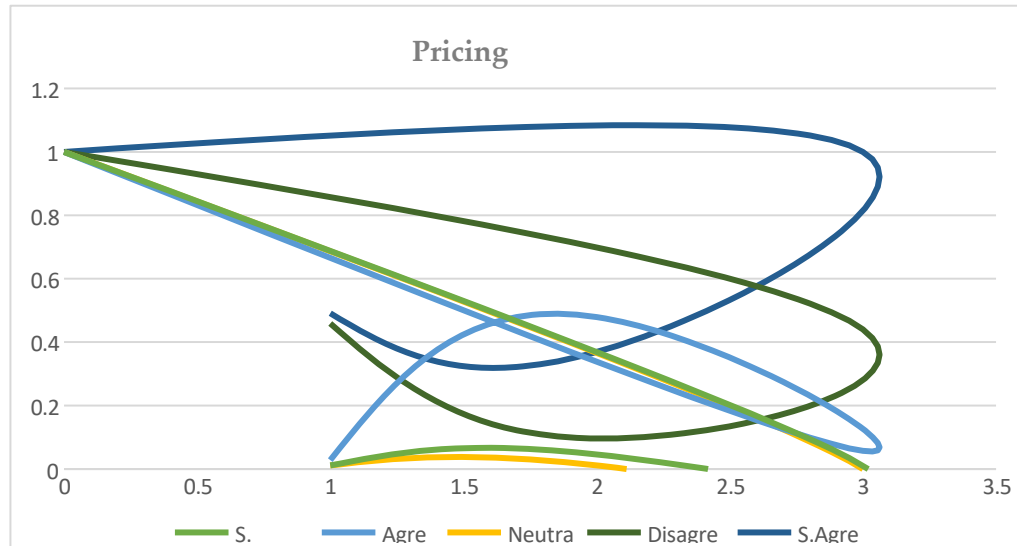


Figure 2: Pricing challenges

Figure 2 depicts the pricing and organizational challenges waste pickers encountered.

A total of 283 questionnaires were used to compute the results. Only 1.1% of the respondents strongly agreed that they determined the price for their recyclable items, 2.8% agreed, 1.1% were neutral, 45.9% disagreed, and 49.1% strongly disagreed. One questionnaire was excluded due to missing data, and 282 questionnaires formed the base for computing results on the statement: "I allow my buyers to negotiate better prices for my reclaimed items". Of the respondents, 4.6% strongly agreed, 47.9% agreed, 1.1% were neutral, 9.6% disagreed, and 36.9% strongly disagreed.

These results indicate that waste pickers cannot determine the price of their recyclable material; they can only hunt around for buy-back-centres offering a good price. Conversely, buyers can negotiate the buying price of materials with waste pickers. With regards to being members of an organised waste recycling society, only 1.1% of respondents strongly agreed, 5.7% agreed, 44% disagreed, and 49.3% disagreed.

These results show most waste pickers (93.3%) are not organised into societies or SMMEs but continue to work in isolation. Only 6.8% of respondents formed some sort of recycling society. A very small proportion of waste pickers indicated that they determined the price for their recyclable items, while the majority indicated they had no say in the pricing of their material. This means that buyers on-site and buy-back centres determine the price for recyclables. In addition, majority of waste pickers were not members of an organized society or cooperative, illustrating that waste pickers in the City of Ekurhuleni are still not organised; they work in isolation. These findings were like those of [24] who found that 91% of IWPs in Malawi run their recycling business independently.

Challenges in the Landfill

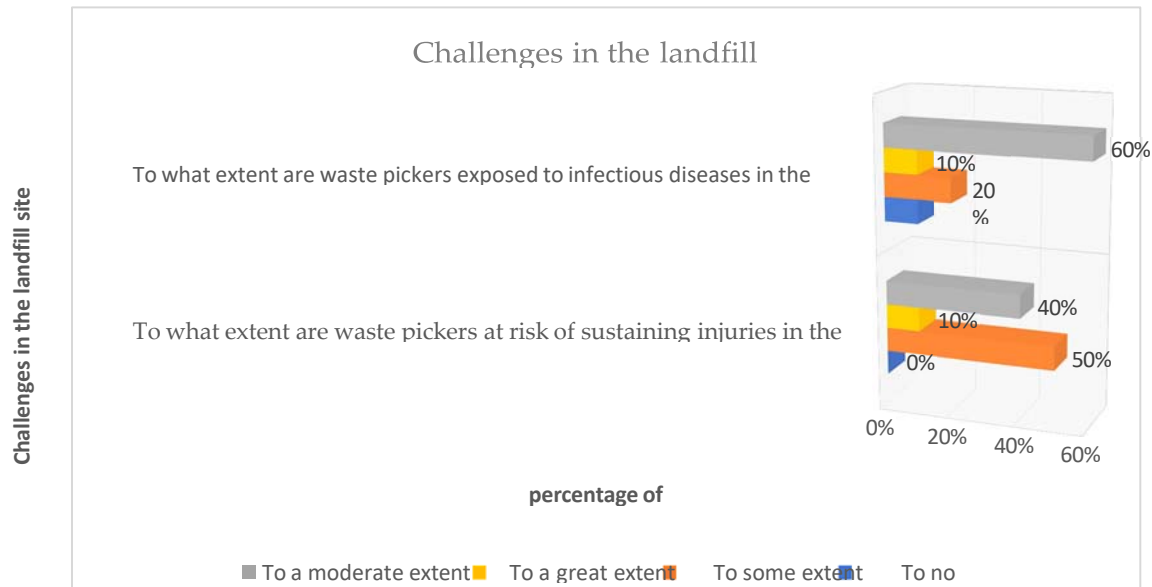


Figure 3: Challenges in the landfill site

Landfill operators were asked about the challenges waste pickers face at the landfill site, as indicated in figure 3 above, half (50%) believed waste pickers were at risk of sustaining injuries in the landfill site to some extent, 40% believed they had a moderate risk, and only 10% claimed they had a great risk. Landfill operators were also asked about the extent to which waste pickers were exposed to infectious diseases; 10% said to no extent, 20% said to some extent, 60% said to a moderate extent, while another 10% said to a great extent. The landfill operators believed waste pickers were at risk of sustaining injuries at the landfill site, and they were exposed to infectious diseases. This claim was also supported by [25] who associated health problems such as infectious diseases with landfill site exposure.

Conclusion

This study investigated the work challenges faced by solid waste pickers in the City of Ekurhuleni Metropolitan Municipality Gauteng, South Africa. The investigation was based on six phases of demographics, health and safety challenges, social challenges, financial challenges, and challenges in the landfill site. It is clear from this study that waste pickers are faced with a lot of challenges, the worst being the pricing of their collected waste recyclables where they have no say on how much they want to sell their waste items. The recycling companies determine how much they want to buy the recyclables. The waste pickers are not satisfied with this as they consider it an unfair labor practice, however, because they are not supported by municipalities and the Gauteng provincial government, they choose to continue to work even under this unfair condition because they say "Half a loaf is better than no bread". Furthermore, waste pickers are at risk of sustaining injuries from sharp objects such as broken bottles and used needle prick injuries. They are exposed to infectious diseases such as hepatitis A and C. The work they do is generally embraced by some community members, however, few community members have called them names such as "Thieves". This study embraces the work done by waste pickers because the public is exposed to infectious diseases and the environment looks unsightly since municipalities are not doing enough to collect the waste, there are backlogs caused by various reasons such as strikes by waste collectors; broken waste collection vehicles which takes time for municipality to fix. Most importantly, waste pickers are responding to transforming the world through the implementation of sustainable development goals 1 (No poverty), 3 (Good health and well-being), 6 (Clean water and sanitation), 11 (Sustainable cities and communities), 13 (Climate action). How would the world and the City of Ekurhuleni look like without the good work of waste pickers?

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References

- Zohoori, M. & Ghani, A. (2017). Municipal Solid Waste Management Challenges and Problems for Cities in Low-Income and Developing Countries. *Int. J. Sci. Eng. Appl.* (6):39–4
- Kasala, S.E. (2014). Critical Analysis of the Challenges of Solid Waste Management Initiatives in Keko Machungwa Informal Settlement, Dar Es Salaam. *J. Environ. Prot.* (5):1064–1074.
- Simatele, D, M., Dlamini, S. & Kubanza, N, S. (2017). From informality to formality: Perspectives on the challenges of integrating solid waste management into the urban development and planning policy in Johannesburg, South Africa. *Habitat International.* 63:122–130
- Colombijn, F. & Morbidini, M. (2017). Pros and cons of the formation of waste-pickers' cooperatives: A comparison between Brazil and Indonesia. *Decision.* (44):91–101.
- Godfrey, L., Strydom, W., Phukubye, R. (2016). Integrating the Informal Sector into South African waste and recycling economy in the context of Extended Producer Responsibility. Briefing Note.
- Taherdoost, H. (2016). Sampling Methods in Research Methodology; How to Choose a Sampling Technique for Research. *International Journal of Academic Research in Management (IJARM).* 5 (2):18-27
- Zuch, M., Mason-Jones, A.J., Mathews, C. & Henley, L. (2012). Changes to the law on consent in South Africa: Implications for school-based adolescent sexual and reproductive health research. *BMC Int. Health Hum Rights.* 12(3). doi: 10.1186/1472-698X-12-3
- Mvuyane, A.T. (2018) War on Waste: Perspectives on Supporting and Formalizing Informal. Faculty of Science, University of the Witwatersrand. Available at: <https://wiredspace.wits.ac.za> (Accessed 11 September 2021)
- Mudavanhu, N. (2019). An analysis of Livelihood of landfill waste pickers in South Africa. (PhD Thesis). University of the Western Cape, Cape Town. Available at: <https://etd.uwc.ac.za/handle/11394/7310> (Accessed 14 August 2021)
- Department of Cooperative Governance and Traditional Affairs (COGTA). (2020). City of Ekurhuleni Metropolitan Municipality: Profile and Analysis. District Development Model. [Online]. Available at: https://www.cogta.gov.za/ddm/wpcontent/uploads/2020/08/Take2_DistrictProfile_EKURHULENI-2.pdf (Accessed: 10/03/2023)
- Komane, K.A. (2014). Waste Reclaimers and South African Environmental Law (master's Thesis). North-West University, Gauteng South Africa. Available at: <https://dspace.nwu.ac.za> (Accessed: 20 September 2022)
- Statistics South Africa. (2022). Quarterly Labour Force Survey (QLFS) Q4:2022. [Online]. Available at: <https://www.statssa.gov.za> (Accessed: 14 January 2023).
- Schenck, C.J. & Blaauw, P.F. (2011). Living on what others throw away: An exploration of the socio-economic circumstances of people and selling recyclable waste. *The Social Work- Practitioner Researcher.* 23(2):135-153s
- Mothiba, M., Moja, S.J. & Loans, C. (2017). A Review of the Working Conditions and Health Status of Waste Pickers at Some Landfill Sites in the City of Tshwane Metropolitan Municipality, South Africa. *Advances in Applied Science Research.* 8(3):90-97
- Made, F., Ntlebi, V. & Kootbodien, T. (2020). Illness, Self-Rated Health and Access to Medical Care among Waste Pickers in Landfill Sites in Johannesburg, South Africa. *Int. J. Environ. Res. Public Health.* (17): 2252. doi: 10.3390/ijerph17072252
- Jerie, S. (2016). Occupational risks associated with solid waste management in the informal sector of Gweru, Zimbabwe. *Journal of Environmental and Public Health.* doi: 10.1155/2016/9024160
- Gutberlet, J. & Uddin, S.M.N. (2017). Household waste and health risks affecting waste pickers and the environment in low- and middle-income countries. *International Journal of Occupational and Environmental Health.* 23(4):299-310.
- Parizeau, K. (2015). Urban political ecologies of informal recyclers' health in Buenos Aires, Argentina. *Health & Place.* (33):67–74
- Lubaale, G.N. & Nyang'oro, O. (2013). Informal Economy Monitoring Study: Waste Pickers in Nakuru, Kenya. Manchester, UK: WIEGO.
- Schenck, C.J., Blaauw, P.F., Viljoen, J.M.M. & Swart, E.C. (2019). Exploring the Potential Health Risks

- Faced by Waste Pickers on Landfills in South Africa: A Socio-Ecological Perspective. *International Journal of Environmental Research and Public Health*. 16(2059):1-21. doi: 103390/ijerph16112059
21. Onyango, J.O., Olima, W.L.A. and Onyango, L. (2012). Dynamics of Street vending Phenomenon in the Kisumu Municipality. *International Journal of Arts and Commerce*. 1(4):107-120.
22. Dias, S.M. & Fernandez, L. (2013). "Waste pickers: A Gendered Perspective." In *Powerful Synergies: Gender Equality, Economic Development and Environmental Sustainability*. UNDP.
23. Mareello, M. & Helwege, A. (2014). Solid Waste Management and Social Inclusion of Waste Pickers: Opportunities and Challenges. *Center for Finance, Law, and Policy*. (7):1-23
24. Kasinja, C. & Tilley, E. (2018). Formalization of Informal Waste Pickers' Cooperatives in Blantyre, Malawi: A Feasibility Assessment. *Sustainability*. (10):1149. doi: 10.3390/su10041149
25. Uhumamure, S.E., Edokpayi, J.N., Shale, K. (2021). "Occupational Health Risk of Waste Pickers: A Case Study of Northern Region of South Africa". *Journal of Environmental and Public Health*, vol. 2021. doi: <https://doi.org/10.1155/2021/5530064>

