

Assessing the Effects of Illegal Dumpsites on the Environment and Human Well-Being in the Rural Areas of Limpopo, South Africa

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Abstract: Rural communities on a global scale face an array of challenges associated with proper management of solid waste. Poor solid waste collection services or no services in the rural areas is not a new problem and it is the reason why rural communities such as those in Limpopo engage in illegal dumping of solid waste. It is not uncommon to see or find huge piles of solid waste dumped along the roadside. This malpractice is increasingly becoming an eye sore as it an obstacle of clean environment and moreover contributes to a serious impact on wildlife and habitat. The high level of waste generation could be associated with increased levels of illegal dumpsites, in some cases increased wealth and increased population can distinctly be correlated with increasing dumping spots. The aim of this study was to assess the effects of illegal dumpsites on the environment and human health in Praktiseer in Limpopo, South Africa. To achieve this aim, the objectives were to investigate the state of solid waste management in the study area; to assess the impacts of illegal dumpsites on humans and on the environment, to identify alternative avenues pertaining to illegal dumpsites in Fetakgomo-Tubatse Local Municipality, Limpopo Province. This was done through employing quantitative (Questionnaires) and observation methods of data collection. Data were analysed quantitatively by using SPSS version 27.0 computer software, and it was interpreted qualitatively. Themes for this study were coded and analysed separately and presented in figures, graphs, and tables. Lack of awareness campaigns and education on illegal dumping of solid waste were findings of the study. Additional finding was that there were no effective implementation of existing policies and there was also lack of accountability within the municipality. The outcomes of this study may be useful in disseminating information to local municipality to engage communities of the study area in regular awareness campaigns and educate them on effect of illegal dumping on human wellbeing and to environment. The outcomes are also expected to help promote more efficient methods of waste management and to impact people's perception of illegal dumpsites. The gap in knowledge for this study was identified to guide the review of the existing waste management policies and by-laws within Fetakgomo-Tubatse Local municipality. The new methods of solid waste management enshrined in policies and by-laws are the reason why rural communities are resistant to support sustainable developments through good practices of solid waste management. The sole responsibility to protect humans and the environment from negative effects remains with communities with the support of the municipalities as well as experts in solid waste management.

Keywords: environmental effects, human health effects, illegal dumping, rural communities, solid waste, waste management practices

Introduction

The effects of solid waste that is disposed of on illegal dumpsite affect the environment and human health negatively and may differ with the type and characteristics of waste disposed of. They may also differ with the type of soil on which the waste is disposed of. Biohazardous and infectious waste may have serious adverse effects as compared to general waste. According to Jebaranjitham, Christyraj, Prasannan, Rajagopalan, Chelladurai and Gnanaraja (2022), there are numerous reasons behind illegal dumping of solid waste few of which include urbanization, development of new cities and lack of coverage in waste collection. Jebaranjitham et al., (2022) postulate

that the role of municipalities is to provide solid waste collection services to communities in their respective jurisdictions, however, this has become a norm that some areas are serviced while others are denied this right and communities who are at a disadvantage decide on dumping the waste illegally on any vacant land. Adu-Boahen, Atampugre, Antwi, Osman, Osei, Mesnsah and Adu-Boahen (2014) state that although illegal dumping of solid waste is a social problem, it goes as far as affecting the environment and human health negatively. While this is occurring in front of their eyes, many municipalities are recorded to have not been bothered about this, Fetakgomo-Tubatse Local municipality is amongst such municipalities in South Africa. Kalali, Lotfian, Shabestari, Khayatzaadeh, Zhao and Nezhad (2023) show that the main effects on the environment are caused by plastic waste that are disposed of illegally. Generated waste plastics end up in water bodies because compared to other types of waste such as glass, paper, tins and aluminium, plastic items are less recycled. According to Ragauskas, Huber, Wang, Guss, O'Neill, Lin, Wang (2021), lack of technology that can efficiently recycle plastic items seems to be the main reason why the recycling of plastic is low, illegal dumping. Yedinak (2022) states that there is a need to consider the entire life cycle of solid waste and without this, established regulations and policies run the risk of escalating adverse effects on the environment and human health. The effects of illegal dumping on the environment and human health are dependent on three characteristics of solid waste which are biological, chemical, and physical in nature. The University of California (2020) states that material that are classified as biological characteristics of waste include those that once or currently contain living organisms, it can also be a product, portion or waste of a living or once-living organism. Biological activity in the presence of moisture and heat causes the waste to decompose and results in compost and carbon dioxide (CO₂) emissions.

The climate condition such as extreme heat causes the moisture content to decrease. The biological characteristics of waste are pathogenic and can contaminate water sources. Speight (2017) defines chemical characteristics of waste as those that are ignitable, corrosive, reactive and toxic. These types of waste can explode and cause fire, thus affecting the environment negatively. In addition, heavy metals such as fluoride (F) and nitrate (NO₃) found in solid waste can be very harmful and contaminate water sources. Ozcan, Guvenc, Guvenc & Demir (2016) state that waste that has physical characteristics is dense, has calorific value and contains moisture. Illegal dumping of solid waste has negative effects on the natural environment. At the landfill site, effects include those that results from leachate- surface and ground water contamination, odour, and pest. Illegally dumped solid waste leads to destruction of the Ozone layer, aquatic life is destroyed, and formation of acid rain can be very dangerous because it the soil fertility from the surface of the ground (Adu-Boahen, Atampugre, Antwi, Osman, 2014). Illegal dumping of solid waste is a common practice in areas where there are no municipal solid waste collection services. It is evident from previous studies that any biodegradable solid waste that is illegally dumped undergo a process of anaerobic decomposition and later forms a methane gas (CH₄). CH₄ is formed in less than one year when anaerobic conditions are putrefied, and the bacteria start to decompose the waste (United States Environmental Protection Agency, 2021). Based on this information, this study concludes that if engineering methods are not implemented to extract CH₄, CH₄ will explode and causes fire that contributes to global warming.

The health of individuals and communities gets affected by the state of the environment in which they live. The destructed Ozone layer can cause diseases such as cancer. While waste items cannot be recycled, diseases such as cholera and Dysentery may result. People' life is destroyed because of floods occur because drainage systems are blocked by solid waste that is disposed of illegally. Improperly disposed of waste becomes a breeding place for flies and mosquitoes, thus people suffer from diarrhoea and other diseases caused by flies that carries infections from excreta to food and water (Adu-Boahen, Atampugre, Antwi & Osman 2014). Studies conducted by Kumar, Smith, Fowler, Kumar, Arya, Rena, Kumar & Cheeseman (2017) indicate that illegally dumped solid waste causes bad smell, stagnant water collecting during hot weather conditions creates a breeding ground for mosquitoes. When waste is disposed of illegally and burned in open spaces, fine particles are formed, and these are dangerous to human health as they cause respiratory diseases. Additional diseases attributed to these fine particles include anaemia, shortness of breath throat infections and asthma. The Respiratory Health Association (2021) shows that some communities with no solid waste collection services choose to burn their wastes, and this results in smog and soot that can affect human health and cause heart and lung disease. Studies by Maurya, Ali, Ahmad, Zhou, da Silver Castro, Khan & Ali (2020) show that illegal disposal of solid waste contribute to increase water, soil, and air pollution, thus, the release of toxic gases, biological molecules and chemicals into the atmosphere affects the health of human being.

Methods and Material

Data was collected in Praktiseer township after the researcher received permission from Fetakgomo-Tubatse Local municipality and ethical clearance from the Research Ethics Committee at the University of Johannesburg. This study considered the following ethical considerations: Informed consent: All participants were informed of the purpose and

nature of the study including how data would be collected; protecting the rights of participants: participants were autonomous and had to make their own decision on whether or not to participate in the study; Autonomy: Participants were not forced to provide information and were given opportunity to ask questions for clarification about the study; Beneficence :Participants were informed that there were no direct benefits for participating in the study; Justice: All participants who met the selection criteria were treated with fairness, dignity and respect; Honesty and trust: The researcher adhered to ethical standard to remain honest and ensured that participants will trust the researcher in the data being collected and analyzed. The aim of this study was to assess the effects of unlicensed dumpsites on the environment and human health. To achieve this aim, objectives were to investigate and describe how solid waste is managed within the municipality; to investigate and evaluate different types of impacts on unlicensed dumpsites on the environment within the municipality, to identify and analyze relevant municipal by-laws that are aligned to national waste legislative frameworks and, to identify ways that can be explored in addressing illegal dumpsite in municipalities in Limpopo province.

Quantitative (Questionnaires) and observations were used to collect data at Feta-Kgomo in Limpopo. The researcher engaged in overt observation; participants were made aware that they would be observed when performing their solid waste disposal practices. The researcher stayed away from the activities but observed to understand the disposal of solid waste in illegal dumpsites. Observations were made before questionnaires were completed or when they were completed. Observations were done before if the researcher found participants busy with their illegal dumping practices; and after when the researcher had requested the participants to demonstrate how they dispose of their generated solid waste. Data was collected from Monday to Friday for three weeks from 08:00 to 16:00. The said weekdays and times were chosen because they it was when participants were available. There were 94 participants to respond to questionnaires that were self-administered. Participants were observed on how they disposed of their generated domestic waste. Observations were done in the morning between 08:00 and 10:00 in areas where there were no municipal solid waste collection services. Participants did not allow the researcher to take photos and notes were recorded in the notebook. Participants were watched and some followed to the place where they were going to dispose of their waste. The quantitative analysis of collected data was done through the questionnaire. For reliability, questions were formulated using Yes, No and Do not know. Sample size for this study was 94 and 94 questionnaires were self-administered and completed. All of them formed basis for computing the findings. Data was analyzed by using SPSS version 27.0. Quantitative data was coded, analyzed, and interpreted qualitatively.

Results

Results of this study are presented in line with the objectives and research questions of this study, demographic information, and data analysis. Objectives of this study are presented under methods and materials of this article. Demographic variables used in this study included: Gender, Nationality, language, age group, highest level of education, marital status, employment status and length of stay. 63 were completed by women and 31 by men. All participants were South Africans, they spoke Sepedi, IsiZulu, and Tshivenda. Their age group ranged from 18 to 68 and their level of education ranged from primary to tertiary levels. Their marital status ranged from married, single, separated and divorced. Employment status ranged from employed, self-employed and unemployed. Participants' length of stay ranged from 1-10 years. Results are also recorded from management of waste in Feta-Kgomo local municipality, environmental effects of illegal dumpsites, health effects of illegal dumps, analysis of municipal by-laws and various ways that could be explored to address illegal dumpsites.

Demographic results

Participants were males and females from the Feta-Kgomo local municipality. Male participants were 31 (33%) and females were 63 (67%). There were three categories of nationals namely: Mopedi, 65 (69.1%) Zulu, 17 (18%) Zulu and Venda 14 (12.9%). Participants over 68 years were 14 (14.9%), there were 9 (9.6%) between the ages of 58 and 68, those between 47 and 57 years were 12 (12,8%), between 36 and 46 years, there were 9 (9.6%) while between the ages of 18 and 35 there 50 (53%) of participants. A record of 35 (37%) participants who had tertiary education was captured, for high school, researcher recorded 16 (17%), for secondary, it was 31 (33%) while for primary school it was 12 (13%). Employed participants were 37 (39%), self-employed recorded 21 (22%), unemployed participants were 36 (38%). Participants who had the longest stay of more than ten years were 52 (55.3%), those who stayed for 6-10 years were 36 (38.3%) and participants who stayed for 1-5 years were 6 (6.4%). Spoken languages included Sepedi 65 (69.1%), IsiZulu 17 (18%) and Tshivenda 14 (12.9%)

Table 1: Demographic results

Gender	Frequency	Percentage (%)	Valid (%)
Male	31	33	33
Female	63	67	67
<hr/>			
Nationality			
Mopedi	65	69.1	69.1
Zulu	17	18.0	18.0
Venda	14	12.9	12.9
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Language			
Sepedi	65	69.1	69.1
IsiZulu	17	18.0	18.0
Tshivenda	14	12.9	12.9
<hr/>			
Age group			
Over 68	14	14.9	14.9
58-68	9	9.6	9.6
47-57	12	12.8	12.8
36-46	9	9.6	9.6
18-35	50	53.0	53.0
<hr/>			
Highest level of education			
Tertiary	35	37	37
High School	16	17	17
Secondary	31	33	33
Primary	12	13	13
<hr/>			
Employment status			
Employed	37	39	39
Self-employed	11	12	12
Unemployed	46	49	49
<hr/>			
Length of stay			
>10 years	52	55.3	55.3
6-10 years	36	38.3	38.3
1-5 years	6	6.4	6.4
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Management of solid waste in Feta-Kgomo Local municipality

Participants were asked if they knew how solid waste is managed in their area. Of the 94 participants, 14 (15 %) said yes, 63 (67%) said no and 17 (18%) said they did not know. On the question of whether they had solid waste collection services, all 94 (100%) participants said “No”. When they were asked if there were waste collection backlog in their area, 76 (81%) said yes, 18 (19%) said no and no one (0%) said not sure. They were further asked if they had refuse bins to contain their waste, 30 (32%) said yes and 70 (68%) said no. Another question was if they were enough waste collection trucks for disposal services, this was equally responded to where 47 (50%) said yes

and the remaining 47 (50%) said no and there were no participants who said they did not know. The last question was on whether collection of waste was consistent in their area, out of 94 participants, 4 (4%) said yes and 90 (96%) said no. There were no participants who said they did not know.

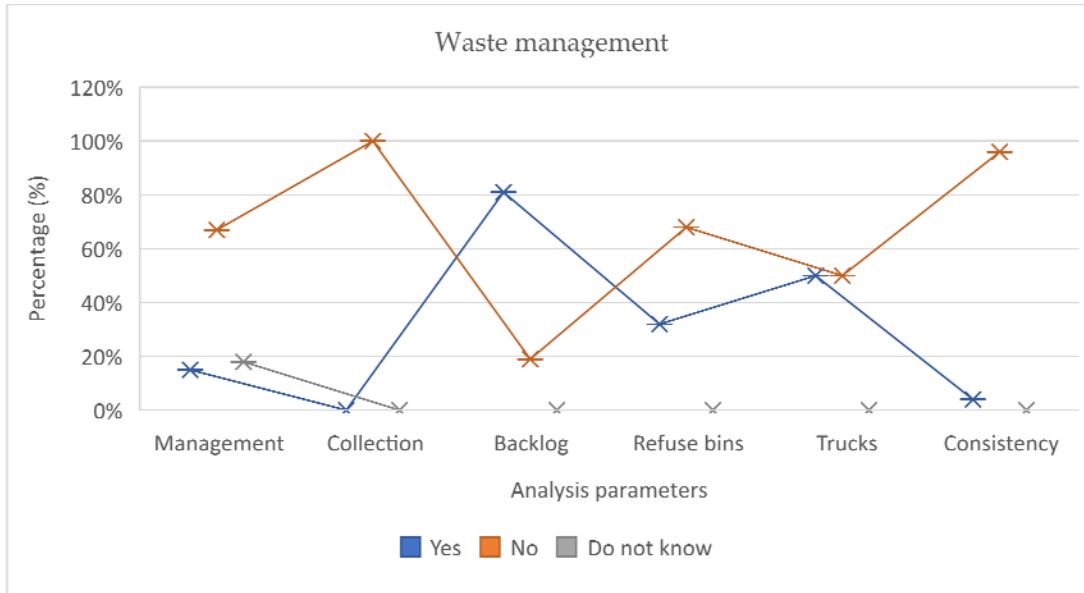


Figure 1: Management of waste

Table 2: Types of waste observed in Praktiseer area Feta-Kgomo Local Municipality

Types of waste observed in Praktiseer area in Feta-Kgomo Local municipality							
Non-Biodegradable:	Plastic	Paper	Wood	Fabric	Metal	Electronics	Rubble
	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Biodegradable:	Garden waste	Food waste	slaughterhouse waste				
	Yes	Yes	Yes				
Specific Recyclables:	Glass	Cans	Steel	Tyres	Plastic	Paper	
	Yes	Yes	Yes	Yes	Yes	Yes	

Environmental effects caused by unlicensed dumpsites

Participants were asked if their dump sites were registered or had licenses to operate, 74 (79%) said they did not know, 11 (12%) said yes and 8 (9%) said no. They were further asked if they have a licensed dumpsite nearby, 94 (100%) said they did not know about licensing of dumpsites. On the question of whether the municipality in their area sometimes organize cleaning campaigns that include unlicensed dumpsites that they use to dispose of their generated waste, 89 (95%) reported that they never have cleaning campaigns and 5 (5%) said yes but occasionally. They were further asked if there is a signage of “No dumping” in the dumpsite and 94 participants responded “No”. When they were asked if they are aware of the effects on the environment 25 (27%) indicated “yes” 67 (71%) indicated “no” 2(2%) did not know. On the question of effects on human health, 77 (82%) said yes,17(18%) said no. It is clear then from these results that the Feta-Kgomo Local municipality is comfortable and relaxed when it comes to environmental effects and the health of communities around their area.

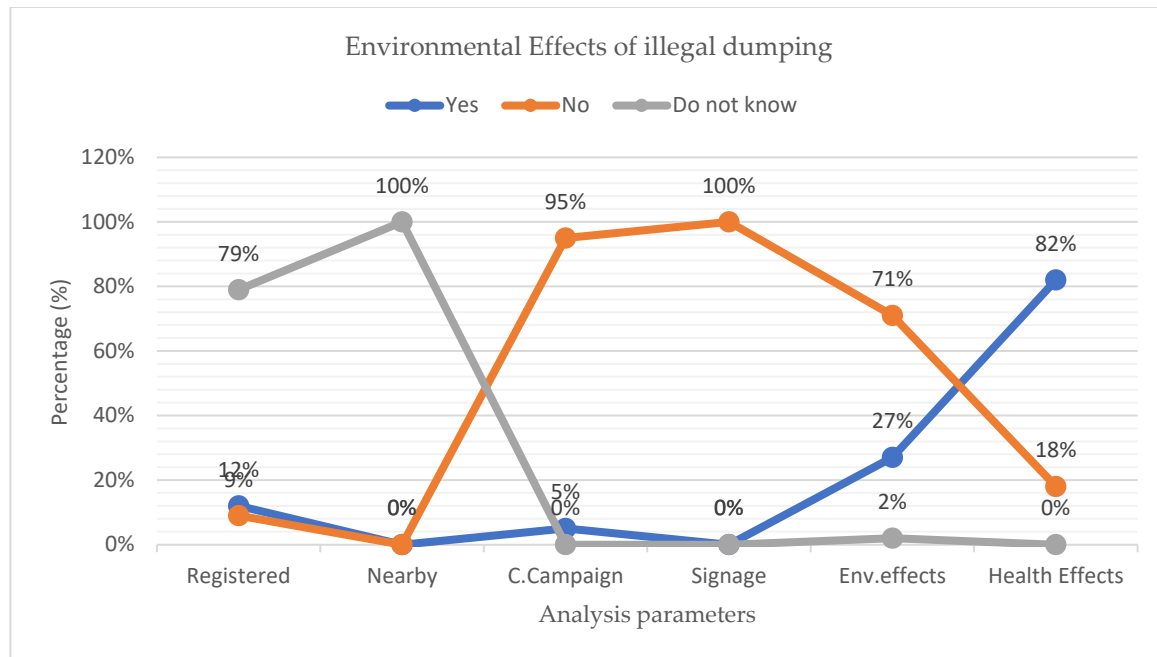


Figure 2: Environmental effects of illegal dumping

Health Effects of illegal dumping

Participants were asked if they have experienced bad smell from the unlicensed dump sites, out of 94 participants, 83 (88%) of them said yes, 11 (12%) said no because they live far from the unlicensed dumpsite. On the question of whether they have been ill and diagnosed cholera, 16 (17%) said yes, 64 (68%) said no and the remaining 14 (15%) said they did not know. They were asked if beside cholera there had suffered from asthmatic attacks, 47 (50%) indicated yes, 29 (31%) said no and the remaining 18 (19%) said they did not know. On the question of toxic gases caused by burning of waste, 26 (28%) said yes, 55 (59%) said no and the remaining 13 (14%) said they did not know. They were further asked if they or their children have not sustained any injuries caused by sharp objects in unlicensed dumpsite, 79 (84%) indicated that their children have had injuries, 8 (9%) said no and the remaining 7 (7%) said they did not have young children that play in the unlicensed dumpsite. The last question was whether their children had not had any skin infections. Out of 94 participants, 82 (87%) said yes and 12 (13%) said no.

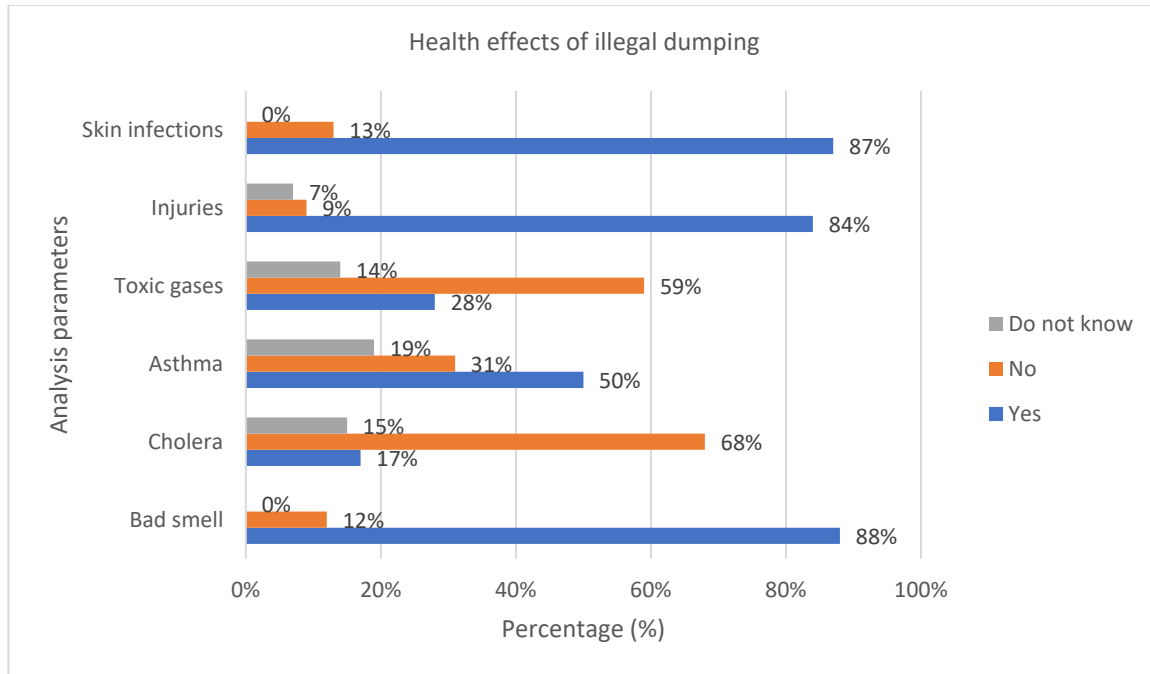


Figure 3: Health effects of illegal dumping

Analysis of municipal by-laws

The first question under municipal by-laws was for participants to indicate if there were legislative framework that govern the operation of unlicensed dumpsites. Majority 87 (93%) said they were not sure while 12 (7%) said “no”. On the question of whether they know that they were using unlicensed dumpsite to dispose of their generated waste, 94 (100%) participants showed that they do not know. They were then asked if they would be happy if their dumpsites were licensed, majority 80 (85%) said yes, 12 (13%) said no, 2 (2%) said they were not sure. The last question that they were asked was if participants have had about municipal by-laws, this question received equal response of yes and no where 46 (49%) said yes, 46 (49%) said no. However, the remaining 2 participants (2%) were not sure.

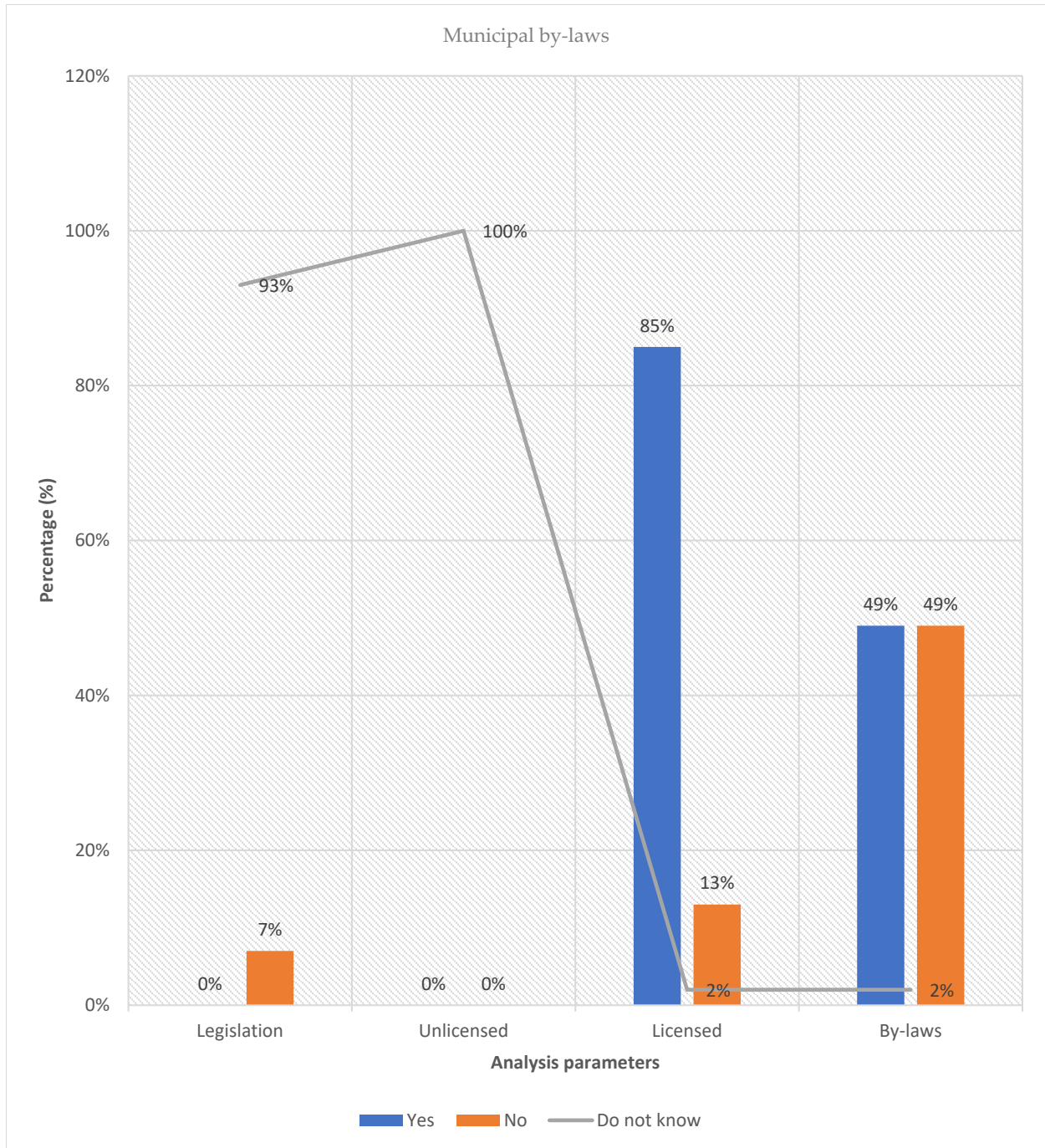


Figure 4: Analysis of municipal by-Laws

Various ways that can be explored to address illegal dumpsites

Participants were asked if they would like to be advised on various ways of addressing illegal dumpsites. Majority of participants, 67 (71%) said yes and minority 27 (29%) said no. On the question of whether they would pay for waste management collection services if asked to do so, 60 (64%) said yes, 30 (32%) said no, 4 (4%) said they were not sure. They were further asked if they would like to be trained and educated on how to apply the waste hierarchy in their waste management strategy, all 94 (100%) participants said yes. Another question was would they help if

they are requested to assist the municipality to remove the waste dumped on illegal dumpsite, 49 (52%) said yes, 5 (14%) said no and 32 (34%) said they were not sure. On the question of reporting perpetrators of illegal dumping to the municipality, 8 (9%) said yes, 83 (88%) said no and 3 (3%) were not sure. Participants were asked to indicate if they prefer to live in unsightly environment because of illegal dumpsites, all 94 (100%) participants said no. The last question was for participants to indicate if they have been participating in any cleaning campaigns in their area, 72 (77%) said yes, 22 (23%) said no, they were then asked if they were told where the waste was going to be disposed after cleaning, 72 (77%) said yes and 22 (23%) said no.

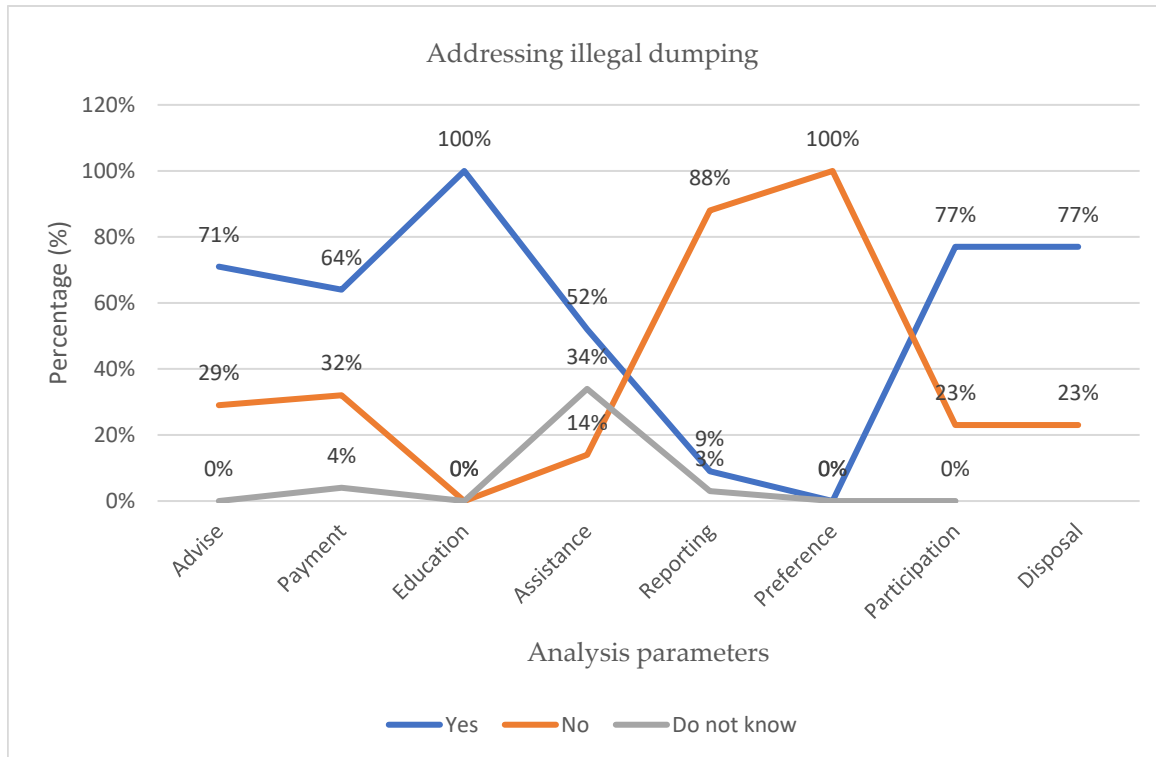


Figure 5: Addressing illegal dumping

Discussion

Among a sample of 94 participants living in Fetakgomo local municipality. Solid waste was reported by majority of community members as being not collected which influenced them to engage in illegal dumping. Few said there were waste collection services, and these anomalies may exist even if there are formal waste collection in the study area. It is common that municipalities are not consistent in waste collection delivery service, one week they collect and in the other week they do not collect despite the government's mandatory that waste should be collected on a weekly basis. Common reason includes three aspects of insufficient or lack of resources, municipalities do not have the capacity to perform their duties in an efficient manner and failure of community members to pay for waste collection services. This study concludes that the level of unemployment in this area was high and therefore, it would not be possible for community members to pay for waste collection services. The highest rate of unemployment was seen on youths more than any other age group category and conclusion is that the high rate of unemployment is associated with COVID-19 pandemic when most people lost their jobs and college and university graduates have never got jobs. Community members were not sure as to how waste is managed in their area and that they have centralised refuse bin to contain their waste for collection. The types of waste generated and disposed of illegally on unlicensed dumpsite include paper, plastic, glass, steel, wood, food waste, tin, electronics such as laptops, cell phones and microwaves. Plastic items seemed to be dominating all these types of waste. Findings of this study show that solid waste management in this area is poor or non-existent. It is appropriate then to present that illegal dumping of waste on unlicensed dumpsites is influenced by community members who do not pay for waste collection. This study concludes that there is a weak management in the Feta-Kgomo local municipality as well as weak collectiveness that

holds community together in preventing environmental and humans from effects caused by illegal dumping of waste on unlicensed dumpsites. It may be difficult for the municipality to gain cooperation of community members if such municipality does not allow community members to raise their concerns. Municipalities including Feta-Kgomo local municipality are political entities, and this makes it very difficult to operate under political conditions where municipal official would operate to satisfy the needs of politicians without considering the needs of the communities. In South Africa, there is poor service delivery in several municipalities at all categories and Feta-Kgomo Local municipality is no exception in this regard.

With the modern and simple technological methods such as reduce, reuse, recycle and recover (4Rs), illegal dumps should not be existing whether in developing or developed countries, rural or urban areas and even in poor or wealthy communities. This study, however, supports the Feta-Kgomo Local Municipality for not issuing licenses for dump sites within residential areas and those in proximity with residential areas because of environmental and health effects associated with illegally dumped solid waste. But this study does not support the municipality for lack of strategies to avoid illegal dumping. Educating the community members about the 4Rs would embrace modern technological methods and combat environmental pollution and effects of climate change. The demographic results for this study show that there are people who were not working in the study area, amongst them are youth who should be taking advantage of these modern technological methods to earn cash through utilizing the waste items. The effects of illegal dumpsites do not only affect the local communities but the global societies, an injury to one is an injury to the other, thus it is very important for the Feta-Kgomo Local Municipality to deal with illegal dumps to save the health of the global society and the environment in which they live. While it may be impossible to legalize the dumpsite for any valid reason, it would work better for these communities if they were health educated on the effects on the environment and human health if communities continue to dump their generated waste on unlicensed dumps. Putting a “No dumping” signage would also be an indication that such dumping sites are not authorized, and community members should avoid dumping waste illegally.

It transpired that the landfill site in Fetakgomo Local municipality had been closed for three years at the time of this study, however, communities did not stop dumping the waste illegally and this has been continuing over the past twelve months. One participant said “Thick black smoke coming from the landfill fills the air in town. Not only is this an unpleasant sight, but it is also becoming a health risk.” There is no doubt that where waste is disposed of illegally, the very same perpetrators in turn will complain of the stench and fires at the landfill site. Another resident said “We demand Fetakgomo Local Municipality to clean up the area next to the site and to cease their fires. An alternative dumping area must also be organized by the municipality. The area is also not safe. Our children might suffer from diseases (<https://lowvelder.co.za/652734/landfill/>)”. In South Africa, municipalities are governed by various legislative frameworks which include among others The Constitution of the Republic of South Africa, (Act 108 of 1996), the National Environmental Management Act, (Act no 107 of 1998), Municipal systems Act, (Act 32 of 2000). In addition to these, each municipality has its own by-laws that are aligned with these Acts (The Constitution of the Republic of South Africa, (Act 108 of 1996). This study focused on three sections of Refuse removal in Feta-Kgomo local municipality. For example, section 13 (1) of the Feta-Kgomo Local municipality by-laws on refuse removal states that “*The municipality periodically sets aside and maintains a place or places where domestic, garden and builders refuse shall be dumped. Any person dumping domestic, garden and builders in any place shall be guilty of an offence*”. Section 17 is about Charges and deposits and state that “*The charges payable to the municipality for the establishment, provision and maintenance of a refuse removal service and the amount a person making use of such service shall deposit with the municipality, shall be determined by the municipality*”. Section 18 of refuse removal by-law is about penalties and states that “*Any person who contravenes or fails to comply with any provision of this by-law shall be guilty of an offence and liable upon conviction to– (1) a fine or imprisonment for a period not exceeding six months or to such imprisonment without the option of a fine or to both such fine and such imprisonment and, (2) in the case of a continuing offence, to an additional fine or an additional period of imprisonment of 10 days or to such additional imprisonment without the option of a fine or to both such additional fine and imprisonment for each day on which such offence is continued and, (3) a further amount equal to any costs and expenses found by the court to have been incurred by the municipality as result of such contravention or failure*”. (Feta-Kgomo Local municipality, 2023).

This documented evidence makes it clear that there were by-laws that govern waste management in the study area, however, it is not clear why perpetrators of illegal dumping were not brought to courts of law to be prosecuted, it makes sense then to conclude that community members in some areas do as they wish because they know that existing by-laws are not implemented. The study also concludes that participants in this study were not honest, their responses were based on self-defense on their criminal activities of illegal waste disposal. With these clearly documented by-

laws, fines were also not imposed on perpetrators and what it means to the author of this article is that it is very easy to plan but implementation is always a problem.

The responses on various ways that can be explored to address illegal dumping informs that participants were willing to change from a negative mindset to a positive one. The participants however, cited that they were willing to pay for waste collection services but because majority were not employed, it was difficult for them because they did not have money and they engaged in illegal dumping in unlicensed dumping sites. Illegal dumping in unauthorized areas brings to light that illegal dumping practices cannot be blamed on unemployment only but also on lack of education that should be provided to community members by the municipality in the study area. This study concludes that there is weakness on the part of the municipality when it comes to addressing problems in the study area. It was evident from responses that the waste is illegally dumped on public spaces, and this means that the municipality is responsible for clearing the waste if it is not able to advise community members to stop that practice. It may not be for the municipality to deal with unemployed communities because such community members are hungry, full of anger and frustrated. This does not mean that solutions may not be suggested, thus this study suggest to Fete-Kgomo local municipality to provide each household with refuse bins or refuse plastics to contain waste and be collected by the municipality on a specific day in a week. It may sound ridiculous to provide waste collection services for unemployed people who are not able to pay, but it is better to do so than causing harm to people and the environment. It also transpired from the results that the municipality did not fine the perpetrators of illegal dumping, and participants asserted that it would be difficult for perpetrators to spend more money for using formal waste collection channels. It is clear from figure 5 below that there is specified amount of fee (R1,000) perpetrators should pay for fines and for the purpose of this study, the researcher also makes examples of eThekweni municipality in KwaZulu-Natal Province, South Africa, where illegal dumpers could be fined R5,000. Figures 4 below shows that in South Africa, there are good plans in place, but the problem lies with prosecution. This study concludes that not only fines will stop illegal dumping in South Africa but also imprisonment.

Figure 6: Illegal dumping signage for eThekweni municipality and Emfuleni Municipality



eThekweni municipality, Durban Emfuleni municipality, Gauteng
(Source: <http://www.fgtm.gov.za>)

Figure 7 A: Closed landfill site in Burgersfort.

Figure 7B: Illegal dumpsite with “No dumping signage”

Figure 7 A



Figure 7 B

(Source: <http://www.fgtm.gov.za>)

Despite the Fetakgomo local municipality putting up signages of closed landfill sites, it has failed to put signages of no dumping at every corner of its jurisdiction to warn people not to dispose of the waste illegally, it remains a frustrating situation for the rate payers and community members who must suffer the consequences of other people who do not want to obey the by-laws. Municipalities spent a lot of money that could be allocated to other services in trying to address the social-ill of illegal dumpsites. An effective law enforcement and high fines than disposal charges would cur illegal dumping in the study area. Without health education, provision of refuse bins and bags are not enough, education is the strongest tool to put communities on board with the municipality. Communities should know what to do with the waste that they generate. For instance, communities should engage in the 4Rs which can help them to generate income by selling recyclables to recycling companies in their areas. Biodegradable waste can be used to form a compost that will later be used as manure in their gardens.

Conclusion

There are no formal solid waste collection services in the rural areas surrounding Fetakgomo local municipality. The above-mentioned ways are not just strategies but also simple sustainable solutions that can change people's negative mindset when it comes to dumping waste illegally in unlicensed areas. South Africa needs to establish a different responsibility for illegal dumping which this study believes will work better to relieve the people and environment from adverse effects of illegal dumpsites.

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Conflict of interest: I declare no conflict of interest

Author contribution: Senekane, MF- Designing of the manuscript, writing the manuscript, editing the manuscript.

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