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Socio-Economic, Health and Environmental Aspects of Child Waste Picking Activity at Africa's Largest Dumpsite

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Abstract: This study examined the social, economic, health, and environmental aspects of child waste picking at the Olusosun dumpsite in Lagos, Nigeria. A questionnaire was administered through the convenience sampling technique to 150 child waste pickers. Findings showed that recovering materials from the dumpsite involved physical energy and manually-operated rudimentary tools. A majority (62.0%) of the child waste pickers were males between 13 and 17 years (77.8%). The daily average income from their operation was ₦1 180 (₦416.00 = $1.00). Although the child waste pickers were aware that waste picking exposed them to health and environmental hazards, they continued the operation for social and economic reasons. The study concluded by recommending a pragmatic regulatory framework for different actors' involvement, direct assistance program, and prohibition of children from engaging in waste picking, as well as educational policy measure to address the menace of child waste picking in Nigeria.

Keywords: Child Waste Picker, Dumpsite, Health Hazards, Risks, Lagos

Introduction

There has been an upsurge in the incidence of the use of children for strenuous activities outside the homes in different parts of the world in the past few decades and this has become a fundamental element of subsistence for most families. It is generally believed that the most critical reason children take up work outside their homes is poverty (Kruse and Mahony, 2000; Bass, 2004; Obioha, 2009; Goel *et al*., 2012). Okafor (2010) notes that over 650 million children live in poverty, while 130 million children do not have access to education. In the same vein, there are about 250 million children aged 5 to 14 years in child labor worldwide and this figure is increasing daily (Parekh, 2001; UNICEF, 2008).

In Sub-Saharan Africa, over 35 percent of the children are working and Nigeria has an estimated 15 million children engaged in different income-generating activities (Bass, 2004; Ruwanpura and Rai, 2004; Oloko, 2004). In addition to poverty, some other multiple and interdependent factors have been identified as reasons for the increase and pervasiveness of working children, especially in Nigeria. These include low socioeconomic status, culture, and religion, death of a parent (or both parents), inability to continue school, and lack of enforcement of labor restrictions and irregularities in the anti-child labor law (Faloore, 2009; Taiwo, 2019; Taiwo *et al*., 2021). Aransiola (2013) also argues that the incapability of the stakeholders (NGOs, community members, and government agencies) saddled with the duty of caring for children in the country in addressing the children's problems, due to lack of necessary facilities, inadequate skills, and stakeholders working in parallels, among others, is responsible for the incidence of working children. As a result, most children have been forced to take on strenuous economic activities to survive and supplement family incomes (Kuti, 2006; Okafor and Amayo, 2006; Nwaobiala, 2006; Ekpenyong *et al*., 2011). In Nigerian urban centers, it is not uncommon to see children hawking, conducting buses, riding motorcycles, begging, and picking waste, just to mention a few. However, the concern of this study is the children who have been forced to venture into waste picking.

Waste picking, also known as scavenging, refers to the physical selection of recyclable matter from jumbled waste discarded at legal or illegal dumpsites, landfills, open dumps on streets and transfer points, and places where waste is collected (Rockson *et al*., 2013). The act of waste picking exists on the assumption that some economically valuable and worthwhile materials are retrieved from solid waste that has been discarded. In developing countries, waste picking represents a vital

survival strategy for the poor (Muktar, 2007; Magaji and Dakyes, 2011; Ramos *et al*., 2013; Simatele and Etambakonga, 2015). It is an adaptive response to chronic poverty (Muktar, 2007). It increases due to legal and illegal dumpsites and unrestricted access to domestic bins, landfills, and transfer points (Johannessen and Boyer, 1999). Another driver of waste picking activity, especially in developing countries, is the convenient market offered by industrialists and merchants for waste pickers' goods, with the likelihood of satisfying their needs (Medina, 2006) and the level of informality of livelihood sources. It is also apparent that waste picking requires little or no formal education or special skills to be engaged in the activity (Dada *et al.*, 2022). It, therefore, makes it easy for people, including children, to enter into the activity. Again, the unfavorable progressively declining economic policies in many developing countries and lack of parental care have compelled children and youths to be involved in waste picking.

Waste picking reduces the amount of waste to be disposed of and also aids in saving the natural resources that result in sustainable development (Medina, 1997; Magaji and Dakyes, 2011). It provides economic and environmental benefits like income to unemployed individuals, reducing the demand for collection, transportation, and disposal of waste, and supplying inexpensive raw materials to industries. However, waste pickers face diverse and many hazards and risks because of their horrible labor conditions. Waste pickers also live in deplorable conditions and suffer stigmatization and abuse, as handling waste materials is despised by society (Scheinberg *et al*., 2006; Dada *et al.*, 2022).

The United Nations Environmental Program in 2013 submitted that waste pickers might suffer from respiratory illnesses due to prolonged exposure to smoke from fires and dust from the waste dumpsite. It is documented that Mexican city dumpsite waste pickers have a life expectancy of 39 years, as against 67 for the general population (Castillo Berthier, 1990). In Egypt, the death of a child less than one year out of every live birth was recorded among the waste pickers. In Manila, thirty-five diseases have been identified in waste pickers' neighborhoods and areas lacking refuse collection (Aweng and Fatt, 2014). These diseases include dysentery, diarrhea, typhoid, tuberculosis, cholera, anthrax, skin disorders, pneumonia, poliomyelitis, and malaria. Waste pickers are also exposed to insect stings, snake bites, and injuries from sharp objects, resulting in tetanus (Dada *et al.*, 2022).

Afon (2012) identified six types of hazards and risks to which waste pickers generally could be exposed. First is the physical risk caused by working under all kinds of weather conditions demonstrated by general weaknesses, collapsing, and exploding waste heaps. Second is the occupational accident, which includes injuries like cuts. The third category is a chemical risk involving inhaling toxic gasses on-site during waste picking. Fourth is psychological, among which are low self-esteem, hallucinations, and sexual harassment of female waste pickers by their male counterparts. The fifth group is a biological risk. This includes waste pickers that suffer from helminths, intestinal protozoa, skin diseases, eye infections, diarrhea, and HIV/AIDS arising from health care waste. The general hazard is the sixth group. This is composed of bites from dogs, rats, and snakes and stings from insects, such as scorpions. In addition, violence occurs between different syndicate groups at dumpsites.

Waste picking occurs in different locations, including municipal open dumps in Nigerian cities (Muktar, 2007; Nzeadibe, 2009). The preponderance of those involved in the activity is children and youths (Afon, 2011; Rigasa *et al*., 2015). These groups of people live and work, retrieving and sorting valuable items from municipal open dumps. Several of these children and youths settle in and around dumpsites to reduce the cost of transportation (Dada *et al.*, 2022). According to Hunt (1996), the health risks posed by waste picking may be more significant for children than for adults. This is because children, unlike adults, lack judgment, skill, and knowledge. They may, therefore, be at higher risk of environmental hazards and injuries. For example, children may pick hazardous items that adults know how to avoid. Again, children may be more vulnerable than adults to the harmful effects of this activity on personality development. They may be less conscious of the stigma attached to the activity than adults. The lack of choice associated with this activity implies that the children sacrifice other opportunities, such as formal education.

Therefore, the child waste picking activity deserves a careful investigation in one of Nigeria's Megacity dumpsites-the Olusosun Landfill. While studies on child waste picking have emerged from countries, such as India (Hunt, 1996), Bangladesh (Parveen and Faisal, 2005), and Pakistan (Hai *et al*., 2016), to the best of our knowledge, we are not aware of any study in Nigeria that directly examines the socio-economic, health and environmental aspects of child waste picking. Against this background, this study examines child waste picking activity at Olusosun, the oldest, largest, and most important government-designated open dump in Lagos, Nigeria. The study attempts to answer the following research questions: What are the socio-economic characteristics of child waste pickers? What are the operational features of child waste pickers? Why do children engage in waste picking? What are the health hazards and risks associated with child waste picking activity? Effectively addressing these issues will help provide a guiding principle for policy-makers to curb the incidence of child waste picking activity on dumpsites through enactment of appropriate policies.

The Physical Setting of the Study Area

Olusosun is Africa's largest dumpsite and the fourth-largest globally (Dada, 2021). The dumpsite was initially situated on the outskirts of Lagos State, but it is now entirely within the state's center due to urban encroachment. According to Dada (2021), it covers 43 hectares of land area and is 18 meters deep (Fig. 1 and 2). Olusosun has been in existence since 1992 and receives about 3.1 to 4 million tonnes of waste annually, mainly consisting of electronic waste (e-waste), municipal solid waste, and construction waste (Ogwueleka, 2009). The availability of items to be scavenged motivated quite a large number of people, including children, to operate on the dumpsite. The site has become a source of revenue for different categories of people who besiege the place daily for items that could either be recycled or re-used by manufacturing industries. At the time of investigation, several tiny homes were built to accommodate mainly waste pickers on the site. By law, waste dump operations are regulated by the Lagos Waste Management Authority (LAWMA) through edict No. 55 of 1991 (Dada, 2021). It was observed that the informal recyclers dominated waste recycling. The LAWMA regulates their access and activities on the landfill. However, children on the site were not restricted due to the Nigerian government's lack of enforcement of laws on child waste picking (Afon, 2011).

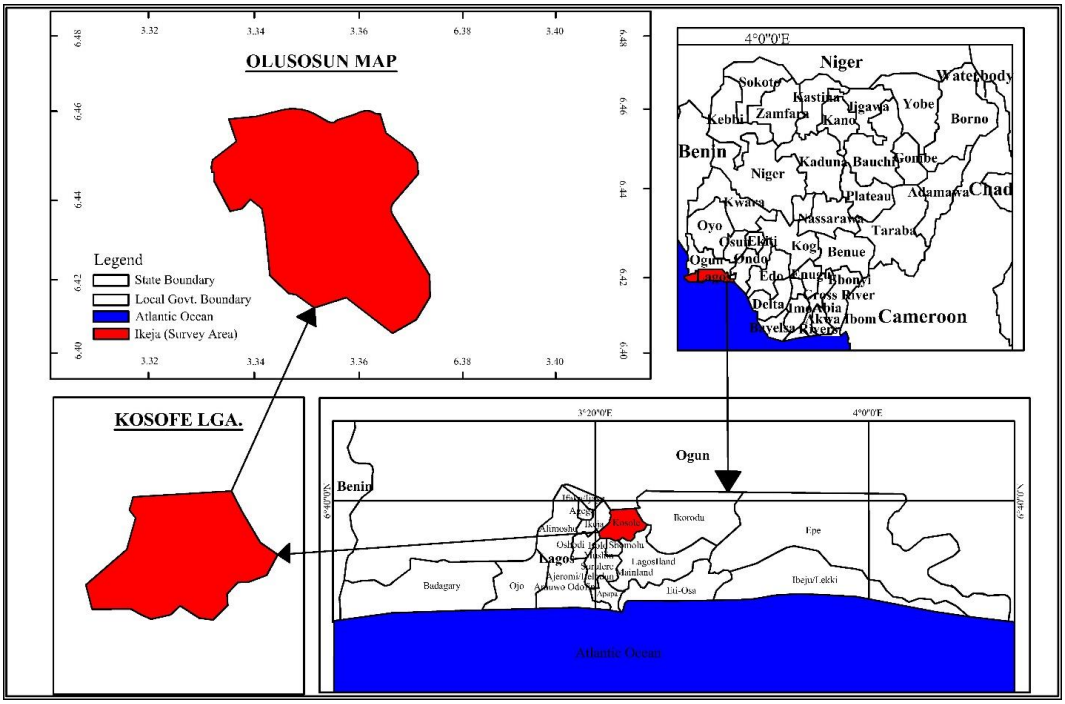

Fig. 1: A map of Olusosun open waste dump in Lagos, Nigeria. Source: Authors' Device, 2021

Fig. 2: An overview of Olusosun open waste dump in lagos, Nigeria. Source: Authors' Fieldwork, 2021

Materials and Methods

The study employed primary data obtained from child waste pickers through questionnaire administration. Before administering the questionnaire, a pilot survey was carried out to determine how child waste pickers understood the questions due to their supposed low level of education. The children were asked about the quality of the questions, the length of the questionnaire, and answer choices. They were also encouraged to make general comments. Their responses were considered and modifications were made to the original questionnaire. In addition, ethical consent was sought from the children or their guardians/parents. The children were informed that participation was voluntary and that they could withdraw at any time if they felt uncomfortable responding to questions. No identifying information was collected from them. The questionnaire was administered to children between the ages of 10 and 17. The reason for picking this age range was based on the fact that the children were able to respond to questions reasonably and based on the earlier pilot survey conducted.

The pilot survey also showed that the investigation was best conducted before 10:00 a.m. when daily operations started. Therefore, few of the children that came early enough and were ready to attend to the field assistants were sampled over seven days (Monday to Sunday). Some students from the Olabisi Onabanjo University were trained as field assistants to administer the questionnaire to the children under the direct supervision of the authors. To help the children answer the questions appropriately, the field assistants, through an interpreter proficient in the children's dialect, made efforts to simplify the questions. A convenience sampling technique was employed to select the children. One hundred and fifty (150) child waste pickers were surveyed using this method. Information obtained from the children was their socio-economic characteristics, reasons for their taking up waste picking, their modes of operations, materials of interest while picking waste, and perceived health and environmental hazards to which they were exposed. The method of data analysis was primarily descriptive.

In addressing the perceived health and environmental hazards to which the children were exposed, thirty-six (36) health and environmental hazards associated with child waste picking activity were identified. The children were allowed to rate how often they suffered each of those identified hazards using the Likert's scale of 'frequently', 'sometimes', 'occasionally', 'rarely', and 'never'. To arrive at the children's aggregated view on each variable of the health and environmental hazards, each of the ratings above was assigned a value of 5, 4, 3, 2, and 1. The Total Weight Value (TWV) for each view is obtained by summating the product of the number of responses for each rating to an opinion and the respective weight value. This is expressed mathematically as:

$$TWV = \sum_{i=1}^{5} PiVi$$

Where:

TWV = Total Weight Value
P_i = Number of respondents rating a variable i and
V_i = Weight assigned to attribute i

The child waste pickers' aggregated view on each variable was arrived at by dividing the TWV by the summation of the respondents to each of the five ratings. This is expressed mathematically as:

$$CWPAV = \frac{TWV}{\sum_{i=1}^{5} P_i}$$

where:

$CWPAV$ = Child Waste Pickers' Aggregated View, which can take the value of between 5 and 1. The closer the CWPAV to 5, the higher the children's frequency level of that particular health hazard

Results and Discussion

Child Waste Pickers' Socio-Economic Characteristics

Five significant socio-economic characteristics of child waste pickers at the Olusosun open dumpsite in Lagos, Nigeria, were examined and presented in this study. These: Were gender, age, daily income, place of residence, and schooling status.

Gender

As shown in Table 1, 62.0% of the child waste pickers were males, while the females represented 38.0%. The higher proportion of the male child waste pickers was an indication that they were often at the dumpsite early enough to begin the business of the day. Similarly, it suggested that more male children engaged in this energy-sapping activity than the females. This finding is not at variance with the prevailing general belief in different parts of the world that the majority of waste pickers are males (Dias, 2011; Asim *et al.*, 2012; Rockson *et al*., 2013).

Age

Closely connected with gender is the issue of age. The child waste pickers were categorized into two age groups: 10–12 and 13-17 years. As presented in Table 1, most child waste pickers (77.8%) were aged between 13 and 17 years. The bulk (62.0%) of the child waste pickers were males and 77.8% were between the ages of 13 and 17, demonstrating that waste picking may be an activity that

requires the energy found in teenage males. Again, it can be inferred that waste picking is one of the few jobs available to teenagers in Nigeria as a means of support, primarily due to persistent under-employment and unemployment.

Daily Income

Another vital socio-economic characteristic of the child waste pickers is the daily income realized from the activity. Information obtained showed that the minimum daily amount of money made was ₦500 (USD 1.20), while the maximum was ₦1, 600 (USD 3.85). The mean income of child waste pickers was ₦1, 180 (USD 2.84). It was evident that 57.7% of the child waste pickers earned below ₦1000 (below USD 2.40) daily from their operations (Table 1). Using the established daily average income of ₦ 1,180 (USD 2.84), it is estimated that a child waste picker will realize a monthly income of between ₦30, 680 (USD 73.75) and ₦31, 860 (USD 76.59) depending on whether they work for 26 or 27 days in a month.

It should be noted that the national minimum monthly wage in the public sector at the time of data collection was ₦30,000 (USD 72.11). Suppose this amount is compared to what is realized in the public sector, it follows that someone without educational qualifications makes as much as a university graduate in the public sector. In addition, a child waste picker can reach the dumpsite and in no time, they are confident of getting money to feed for the day. These simple reasons explain why the number of child waste pickers grows daily at dumpsites in Nigerian cities.

Place of Residence

Investigation into the place of residence of the child scavengers, as presented in Table 1, showed that 58.7% of the child waste pickers lived very close to the dumpsite (rented apartments within walking distance). In comparison, 28.0% resided on the dumpsite. The category of child waste pickers who lived on the site was possibly working with their parents, who also made the place their permanent abodes. Only a negligible proportion (13.3%) of the child waste pickers lived in areas different from the vicinity of the site. The majority of the child waste pickers living near the dumpsite could be attributed to the economic consideration of reducing transport costs between residence and workplace. This assertion is consistent with the observation of Dada *et al.* (2022).

Schooling Status

The pattern of schooling status of the respondents showed that, of the total 62 (41.3%) of the child waste pickers attending school, 48.4% were in primary school, 32.3% were in Junior Secondary School and a proportion of 19.4% was in senior secondary school (Fig. 3). This distribution generally suggests a relationship between education costs and child waste picking activity. There is an indication that the government policy of Universal Basic Education (UBE) at the federal and state levels in Nigeria has made it possible for some children to attend school while still engaging in waste picking. However, it becomes expensive as they climb up to higher levels and drop out. It is equally important to say that even the so-called 'free education' has hidden costs that make them unaffordable for many people. Even though there is no cost for tuition fees, there are often charges for school supplies and materials, uniforms, transportation, and extra-curriculum activities. These costs are beyond many families as they are penniless and have to live on only 1 US dollar per day (Ogunkan, 2014).

Finding further showed that while 22.7% had dropped out of school, a relatively high proportion (36.0%) of the children had never enrolled. That is to say, 58.7% (22.7 and 36.0%) of the child waste pickers were not attending school. In line with this finding, the Ministry of Education in Nigeria notes that, of the 42.1 million children eligible for primary education, only 22.3 million are in school, while the remaining 19.8 million are out of school, taking on one economic activity or the other. Similarly, the observation of secondary school enrolment shows that, of the 33.9 million eligible children, only 6.4 million are in school (Taiwo, 2022).

Child Waste Pickers' Operations at the Dumpsite

It was observed that waste pickers operating at Olusosun dumpsite had an association and before anybody could scavenge on this site, such must have registered with the association. The association only registered people who were 18 years and above. Officials of the association were chosen based on the length of experience on the job. The association was funded with payments made by members. The government (local or state) does not know the association. It was an informal association formed by casual operators in urban solid waste management.

There were mainly four benefits a waste picker could derive from being a registered member of the association. Being a member of the association guarantees one to pick up waste on the site and sell every item recovered without problems. Two, adequate safety and security were often provided for life and scavenged items within the dumpsite. Three, members' disputes and fights were also amicably and affably settled by the association's executives. Four members enjoyed unrestricted access to procure implements they use in picking waste at lower prices. It was found that a registered waste picker could employ persons to be working for them. Several of these registered waste pickers hired children to keep their costs low. As observed in the survey, the amount paid to someone employed by a registered waste picker is usually a percentage of the sales value of the items scavenged daily. The allocation would have been decided upon between the two parties before waste picking

commences. However, children could be paid as low as N500 (USD 1.20) by these registered waste pickers, as the children lacked the bargaining power to negotiate charges. Some of the children's parents were also waste pickers themselves. The children were not allowed to conduct business with buyers of the scavenged item directly, since they were not registered.

The child waste pickers usually used sack and go-to-hell (fork made from an iron rod) locally referred to as akoro. While the go-to-hell was employed to search for the desired items from the heaps of solid waste, the sack served as a container to store the scavenged items. The sack is generally positioned on the shoulder and is held with either the right hand or left, while the go-to-hell is held on the other. Once a sack is filled, it is moved to where adequate safety and security can be guaranteed. A picture of scavenged materials in sacks stored in a safe and secured location is presented in Fig. 4.

One other vital issue in the operations of the child waste pickers is the materials sought after while picking waste. The study showed that four essential items were sought after by the child waste pickers in the open dumpsite. These were: Paper and paper products, plastic and rubber materials, pure nylon and polythene, and metal products. Paper and paper products include paper cartons, old books, and newsprint, while plastic and rubber materials comprise water, soft drink, empty drug ornamental containers, and rubber slippers. Nylon and polythene include nylon containers used in packing water, fast food, and other items. Metal products could consist of bottle corks, discarded vehicle parts, and scraps from metal works. There are ready markets for all of these materials.

Most of the children were made to work between 10:00 a.m. and 6:00 p.m. on weekdays, but activities usually peak between 10:00 a.m. and 1:00 p.m. The reasons for this are not farfetched. The entrance gate of the dumpsite is typically shut to vehicles conveying waste from different parts of the city to dispose of their contents by 5.00 p.m. and would be opened by 8.00 a.m. of the next day. Again, waste picking activity was permitted to begin at 10.00 a.m. and close by 6.00 p.m. Therefore, the child waste pickers would have to work very hard between 10.00 a.m. and 1.00 p.m. to recover items from the waste disposed of by vehicles between 8.00 and 10.00 a.m.

A large number of the child waste pickers often observed a period of rest between 1:00 and 4:00 p.m. to take lunch and shelter from the scorching heat of the sun. Clearly shown in Fig. 5 is the tiny home provided for the waste pickers to protect them from weather conditions. Some of the children had turned the shelter into their permanent abodes. Child waste pickers were barely prevented from their activities by rain. The rest period may then be followed by a severe waste recovery between 4:00 and 6:00 p.m. By this time, those who probably went to school would have returned. As observed in the survey, weekends witnessed a higher incidence of child waste picking than weekdays, perhaps due to the tendency of part-time child waste pickers.

Reasons Children Take up Waste Picking

A summary of findings on reasons cited by the child waste pickers for engaging in waste picking is presented in Table 2. It was established that the children were involved in waste picking activity for several reasons. The most important reason was economic (the need to stay alive). Therefore, the necessity to secure a source of livelihood for themselves and their families accounted for 68.0% of the reasons children engaged in waste picking. In support of this finding, Admassie (2002) submits that children in Sub-Saharan Africa define themselves as "workers" because they are mainly on the street for economic reason.

Another important reason was that the child waste picker had no formal education to secure a proper job. This reason was stated by 15.3% of the child waste pickers. This reason emphasizes that child waste picking does not require formal training and special skills that other forms of employment would need. It is essential to say that the children's accessibility to legal jobs will be very low in the future. This is because they would not have the required educational qualification to fetch them good jobs, since majority of them are not going to school now. Unless adequate measures are put in place now, not only to make education compulsory and free of charge but also to get the children and their parents/guardians enlightened on the hazards and risks associated with waste picking, they are not likely to leave the business. Sixty-five (65) children claimed to take on waste picking because they lacked parental care. This accounted for 8.7% of all the reasons.

Other reasons why waste picking was thriving among the children included the fact that they did not have any other job (4.7%) and seeking initial capital to start a business of their choice (2.7%). The minor reason pointed out was that the activity reduced solid waste materials. This accounted for as low as 0.7% of the reasons. Therefore, the conclusion could be drawn that taking on waste picking is generally determined by social and economic factors. On the one hand, the activity is straightforward as no serious investment is required. On the other hand, it is equally easy to make money. There is no need to wait for the investment to yield returns. Child waste pickers need the will and energy to search for materials.

Having confirmed that the majority of the child waste pickers were on the dumpsite for social and economic reasons, the question that comes to the fore is: Does this economic activity or work, as identified by the children as their means of livelihood, have health hazards and risks? This is the focus of the following sub-section.

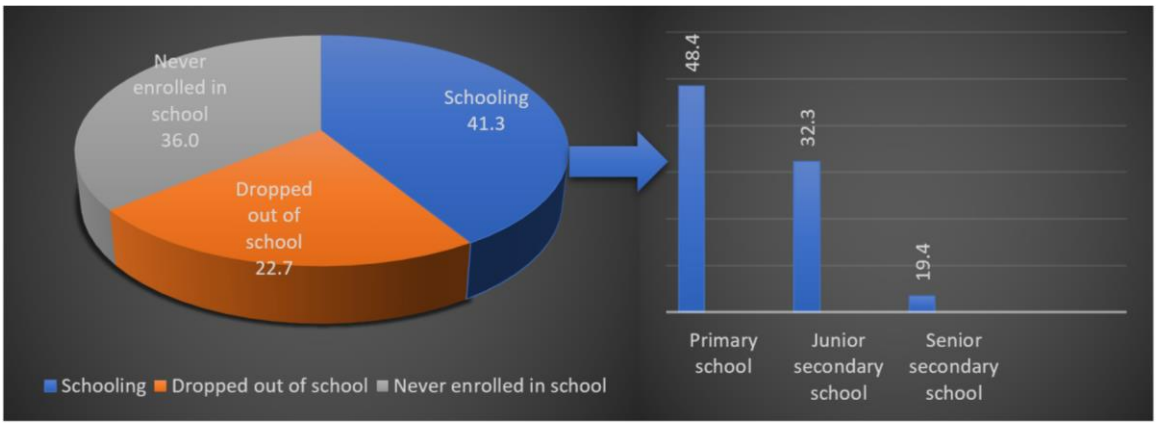

Fig. 3: Schooling status of child waste pickers. Source: Authors' Fieldwork, 2021

Fig. 4: Scavenged materials stored in the sack within the dumpsite, Source: Authors' Fieldwork, 2021

Fig. 5: A typical example of a shelter built for waste pickers on the site, Source: Authors' Fieldwork, 2021

Fig. 6: A child waste picker was spotted on-site sorting waste materials with bare hands, Source: Authors' Fieldwork, 2021

Table 1: Socio-economic characteristics of child waste pickers at Olusosun

Characteristics	Frequency	Percent
Gender		
Male	93	62.0
Female	57	38.0
Total	150	100.0
Age		
10-12 (younger children)	27	17.1
13-17 (teenagers)	123	77.8
Total	150	100.0
Daily income		
Below ₦1000	88	57.7
₦1000-₦1,500	56	35.4
Above ₦1500	6	3.8
Total	150	100.0
Place of residence		
Dumpsite	42	28.0
Around the site	88	58.7
Area different from this vicinity	20	13.3
Total	150	100.0

Table 2: Reasons for child waste picking at Olusosun

Reasons	Frequency	Percent
No initial capital base to start a business	20	2.7
No formal education to secure a proper job	115	15.3
I do not have any other job	35	4.7
No parental care/poor background	65	8.7
To secure a source of livelihood for my family and me	510	68.0
To help in reducing solid waste materials	5	0.7
Total	750*	100.0

Table 3: Health and environmental hazards child waste pickers suffered

Health and environmental hazards	CWPAV	CWPAV - $CWPAV_a$
Insects' stings	3.99	1.13
Skin rashes	3.98	1.12
Snake bites	3.97	1.11
Headache	3.93	1.07
Heat stress	3.89	1.03
Breeding of mice	3.83	0.97
Slipping wet surface	3.79	0.93
Fire outbreak	3.60	0.74
Crumpling of waste materials	3.44	0.58
Wounds from sharp objects	3.36	0.50
Presence of mosquito	3.32	0.46
Diarrhea	3.25	0.39
Cholera	3.21	0.35
Shortness of breath	3.20	0.34
Dust	3.17	0.31
Fighting among scavengers	3.17	0.31
Sexual harassment of female waste pickers	3.11	0.25
Smoke from heavy machinery	3.07	0.21
Violence between different groups	3.02	0.16
Stigmatization	2.89	0.03
Death of a human being	2.75	-0.11
Noise pollution	2.69	-0.17
Feeling of weakness	2.54	-0.32
Presence of rodents	2.24	-0.62
Arouses vomiting	2.23	-0.63
Presence of dogs	2.16	-0.70
Poor security in and around the site	2.05	-0.81
Blockage of drain	1.99	-0.87
Presence of cats	1.97	-0.89
Dirty surroundings	1.93	-0.93
Presence of pests	1.92	-0.94
Breeding of birds	1.91	-0.95
Breeding of flies	1.89	-0.97
Odour	1.88	-0.98
Presence of litters	1.79	-0.07
Visual pollution	1.74	-1.12
$CWPAV_a$	2.86	

Health Hazards and Risks in Child Waste Picking Activity

Child waste pickers were instructed to identify and rate how often they suffered different hazards and risks during their operation. Presented in Table 3 are the findings. It is worthy of note that the average CWPAV for all views denoted by $CWPAV_a$ was computed to be 2.86. This implied that the aggregate view of all child waste pickers was between 'occasionally' and rarely. Without a doubt, the figure is closer to the former than the latter. The health hazards and risks were separated into two: Health hazards and risks above the average index calculated and those below it. The health hazards and risks with indices above the average index are significant in this study. This is because the health hazards and risks were considered to be suffered largely by the child waste pickers.

The health hazards and risks perceived to be suffered mainly by the children included insect stings, skin rashes, snake bites, headache, heat stress, breeding of mice, slipping on a wet surface, fire outbreak, and crumbling of waste materials and wounds from sharp objects. The CWPAV computed for these hazards and risks were 3.99, 3.98, 3.97, 3.93, 3.89, 3.79, 3.60, 3.44, and 3.36. Insect stings, snake bites, and wounds from sharp objects could be as a result of sorting waste materials recovered manually. It was a norm among the children to be sorting waste manually as they had been accustomed to working without protective equipment. Shown in Fig. 6 is a typical child waste picker sorting materials recovered manually on site. Additionally, stings and bites from insects, such as ants, scorpions, and flies, can cause skin rashes and malaria. This explains why headache was among the most critical environmental risks, with skin rashes also ranking high in importance. In addition, wounds are an essential risk that can be sustained by child waste pickers from sharp objects, such as syringes, needles, surgical blades, broken bottles, and metals. Wounds from these objects are

likely sources of AIDS, hepatitis, tetanus, and other deadly diseases. All these are in addition to the life-threatening gases emitted into the atmosphere due to the chemical reactions from the several waste components.

On the other hand, the health hazards and risks the children rarely experienced were poor security in and around the site, blockage of the drain, presence of cats, dirty surroundings, presence of pests, breeding of birds, breeding of flies, odor, presence of litters and visual pollution. It is not as if all these are not there, but they have become part and parcel of their lives.

The above observations are strong indications that child waste pickers globally are exposed to different health hazards and risks. However, with varying intensities, the child waste pickers at Olusosun dumpsite in Lagos, Nigeria, are not insusceptible.

Conclusion

This study has shown child waste pickers' socio-economic, operational, health, and environmental aspects of waste picking at Olusosun dumpsite in Lagos, Nigeria. The preponderance of the child waste pickers at the dumpsite was males ranging from younger children to teenagers. A vast majority of the children had dropped out of school or never enrolled in school. The child waste pickers operated manually with rudimentary working tools and their operations were tasking. They were also exposed to diverse health and environmental hazards arising from their operations. Among these hazards were: Insect stings, skin rashes, snake bites, headache, heat stress, breeding of mice, slipping on the wet surface, fire outbreak, crumbling of waste materials, and wounds from sharp objects.

An average child waste picker earned as much as a university graduate employed in the public sector on the entry point makes monthly. Proceeds from their waste picking activity were used to enhance their social and economic status and even to support their families. Hence, child waste picking activities would undoubtedly continue to be attractive to children of similar socio-economic status. It will also continue to be appealing to them as an initial capital outlay is not needed to begin the operation.

Based on the findings of this study, child waste picking can only be wiped out if a pragmatic regulatory framework is developed whereby different actors-government, civil society, and international organizations-are made to prioritize its elimination, give their full political backing to it, and provide financial support to efforts aimed at eradicating it. Such a regulatory framework should also make provisions for financial aid to children's parents through the direct assistance program. This is essential because the majority of the children ventured into waste picking to secure a source of livelihood for themselves and their respective families. It is believed that if this policy measure is introduced, families will not depend on their children to help their poverty-stricken situations or supplement their income by allowing them to pick up the waste. Such a program will help families improve their livelihoods and those of their children. Further, the regulatory framework should prohibit children's engagement in waste picking or recycling activity in its entirety.

All over the world, children are seen as the leaders of tomorrow. They should, therefore, be given the opportunities and constitutional rights that can support their development and progress in life. This brings to the fore the importance of education in addressing the issues of child waste picking. Education has been proven to be a robust approach for combating the use of children for strenuous activities in any society. Lack of access to education can lead to an increasing cycle of poverty and socioeconomic deprivation. Because of this, there is a need for a well-thought-out plan by the government to introduce free and compulsory primary and secondary education for every child. Without first making education compulsory, it is believed that it may be very difficult, if not impossible, for any strategy to curb child waste picking to be practical and operational.

In this wise, the enforcement of education policy is considered indispensable in addressing child waste picking. Therefore, the government of the day should introduce policy measures to ensure that all children of school age are included in compulsory education and that education is provided practically free of charge. This will help to keep children off the dumpsite. The introduction of the Universal Basic Education represents a positive step in this direction. However, the effect of over polarization and corruption on the program should be addressed. This will ensure the non-violation of policy recommendations for solving educational issues of child waste pickers and working children generally in Nigeria in line with the context of the Sustainable Development Goals (SDGs). Education needs will be connected to broader poverty reduction, social inclusion, and child protection strategies within this context.

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Author's Contributions

All authors equally contributed in this study.

Ethics

This article is original and contains unpublished material. The corresponding author confirms that all of the other authors have read and approved the manuscript and no ethical issues are involved.

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