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Income and Value Chain Activities in Informal Solid Waste Collection in Tandale, Dar es Salaam, Tanzania

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Abstract: This study investigated on income and value chain activities in informal solid waste collection in Tandale, Dar es Salaam. The study involved the samples of 83 individuals using a non-probability purposive technique. Data was collected using a closed questionnaire and open ended interview guide. Data was analysed using descriptive statistics. The study established that the youth engaged in the informal solid waste collection without knowledge and skills on the use of personal protective equipment in executing the waste collection. Young people engaged in the informal solid waste collection regardless their gender age and education status. However, participation varied according to gender as males highly engaged compared to females. The decrease of number of waste collector was proportional to the increase of age. While primary education holders were leading in the informal solid waste collection, even university graduates participated. While the youth engaged in the informal solid collection were less respected by community members, they perceived source of income as a driving factor for engaging in solid waste collection. However, the amount generated was very minimal for sustainability especially in undertaking obligatory life requirements such as food, health care and personal servings. The study recommends that the government should set appropriate policies and strategies in running waste management so that it can attract all age groups as a source of employment.

Keywords: Solid waste Management (SWM); informal solid waste collectors; household dwellers.

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Introduction

Solid Waste Management (SWM) is a global agenda as it has effects to household dwellers and the public at large (Nzeadibe & Ejike-Alieji, 2020). The informal solid waste is defined as the increased non-liquid solid waste materials that risen as an outcome of domestic, street, commercial, industrial and agricultural activities including refuse or garbage, non-liquid materials from construction and demolition activities, garden trimmings and mining

operations, dead animals and abandoned cars scraps (United Republic of Tanzania, 2004; Nyampundu, et al., 2020; Ravindra, et al., 2015). Based on the World Bank Report, it is expected that the overall world waste generation level will increase to 70% being equivalent to 3.40 billion tonnes by 2050 compared to 2.01 billion tonnes in 2022 (Sharma & Jain, 2020).

Developed and developing countries are struggling to ensure there is safety and appropriate provision of public healthy through different contextualized solid waste treatment approaches, mechanisms and strategies for better livelihood (Duan *et al*., 2020). Besides, the increased urbanization, inhabitants and informal settlements are directly impacting appropriate modalities and mechanisms for handling SWM in African countries, hence affecting public health and sustainable development (Okalebo, et al., 2014; Godfrey *et al.,* 2019). In growing cities, there are observable direct relationships between the increase of population growth against waste generation (Omar, 2008; United Nations Department of Economic and Social Affairs, Population Division, 2014).

Experiences from developed countries disclosed that there is dramatic increase of solid waste which resulted to great environmental challenges. For instance, the experiences from China particularly in cities of Beijing, Guangzhou and Lhasa proved the presence of high economic levels, population and investment growth which resulted into increased challenges of Solid Waste Management (SWM); these challenges are found in generated quantity and components of solid waste (Duan *et al*., 2020). Moreover, the practices from developed countries proved the presence of solid waste treatment via separation during collection and transportation, thereafter recycled for re-use or disposed.

Furthermore, Ding *et al.* (2021) and Khan, *et al.,* (2022) disclosed that solid waste treatments in developed countries are categorically into landfill (52%), incineration (45%) and composting techniques (3%). Besides, Ding *et al.* (2021) revealed the experiences from Berlin, Tokyo and Singapore on paradigm shift from traditional to utilization of modern approaches and Technologies in Treatment and Resource Utilization (TTRU) in solid waste resource utilization for Waste-to-Energy (WtE) and Waste-to-Material (WtM). Further, controversial experiences from developing countries proved the presence of low efforts and minimal solid treatment speed in collection, dumping, transporting, recycling, re-use and disposal (UNEP, 2018).

Yet, in middle developing countries, the review of solid management practices for reduction of environmental destructions with reference from Indian Municipalities showed the presence of open dumping as a common disposal technique (Pujara *et al.*, 2019). However, the solid waste volumes generated in India are estimated to rise from 164 tonnes in 2001 to 735 tones in 2051 per year. Subsequently, the practices of dumping are extremely associated with multiple significant environmental risks, distortion of future generation wellbeing in health aspects due to discharged toxics, emitted methane, CO_2 and greenhouse gases that influence climate change, hence global warming (Hettiarachchi *et al.,* 2018; Sharma & Jain, 2020).

In Africa there are indigenous approaches for informal and formal solid waste treatment to ensure produced solid waste are handled at the levels of household, villages, streets, wards, districts, municipalities, regions and nationally although the approaches are insufficiently recognized (UNEP, 2018). The evidence from Nigeria deliniated presence of multi solid waste treatment techniques including landfills, composting, incineration and anerobic digestions to ensure public health (Muhammad *et al*., 2021; Kazuva & Zhang, 2019). Selected cases from Uganda and Rwanda as was presented by Mukama *et al.* (2016) depicted that households generated solid waste comprised of food remains (38%) and plastic materials (37%); however, the most common utilized treatment methods are open dumping (35.9%), plastic dumping (27%) and separation for different decomposable (37.1%).

Kabera, et al., (2019) ascertained that despite the observable shortfalls in SWM institutional capacity, improper segregation procedures at solid waste source and unavailability of reliable waste data, there are observable efforts to eliminate open dumping in East Africa cities including Kampala, Uganda and Nairobi, Kenya whereas the rate of waste recycling has increased to reach the baseline of 30% with expectations for the cities to be at 60% in 2030. Further, there are appprehended commitments in solid treatments in Kigali, Rwanda whereby 88% of households are receiving and paying for the solid waste collection service, hence the country is recognized as having one of the cleanest cities in Africa (Kabera et al., 2019).

Besides, the experience from Kigali wide-open the lesson to African countries on the importance of initiating the local contextual approaches, continue with advocation, provision of education and awareness creation to households and all parts concern to willingly reduce the rate of producing waste and participate in SWM.

Further, Tanzania has streamlined different acts, policies, rules, regulations, short and long term strategic plans as frameworks and instruments to operationalize the SWM at the households, local communities and nation levels. Addittionally, annually waste generation is estimated to 7 million tons with collection average rate countrywide (32.72%), cities (63%) and districts (less than 7.67%) (United Republic of Tanzania, 2022). However, the Tanzania cities are experiencing tremendous population growth, increased urbanization and economic activities that are not enligned with approaches and procedures for handling quick generated solid wastes (Mwanga, 2022).

Consequently, Dar es Salaam as the fast urbanized and growing city in Sub-Saharan countries, is characterised by planned and unplanned settlements (Sanga & Mbisso, 2020; Mkalawa, 2016);experienced uncoordinated and fragmented SWM waste treatment approaches and procedures focused to the end-of-process solutions than sticking to integrative and preventive measures (Yhdego & Kingu, 2017; Mwanga, 2022); with the fast solid waste generation while uncollected (Onamade, et al., 2022). Yet, Schenck et al. (2022) proposed on integrative participative strategies and approaches in solid waste treatments for gaining economic potentialities. Also, Kihila, et al. (2021) disclosed that the estimated individual income earned by Informal Solid Waste Collectors (ISWCs) in planned areas amounts to Tshs. 540,000, whereas in unplanned areas it is Tshs. 150,000. The experience showed that in the city on average, only 20% equivalent to more than 100 tonnes of wastes generated per day reaches selected dumpsites using collection approaches of door-to-door collection, compact trucks, handcarts, temporary collection points (containers), trucks and head-carrying points clearing and transportation (Kamugisha & Mhanga,2020; Omar, 2018).

Tandale Ward in Kinondoni Municipality is characterized with shortage of waste collection passages due to presence of unplanned settlements and informal houses making 50% of the urban housing stock composition (Kitali 2021; Omar, 2018). As a result, engaging in informal solid waste collection activities in the area has indicators of employment creation which signifies the returns on labor (Sharma & Jain, 2020; Omar, 2018). Study sought to assess the youth perceptions on income and value chain activities in informal solid waste collection in Tandale Ward, Kinondoni Municipal, Dar es Salaam in Tanzania. Findings of the study will assist the Local Government Authorities (LGA) to scrutiny appropriate approaches to enhance SWM activities sense of ownership among youth, support the youth's initiatives for utilization of available solid waste opportunities for public, safety and environmental quality and protection. The study was guided by the following research questions:

1. What is the demographic composition pattern for the youth engaged on informal solid waste collection?
2. How do youths perceive the activity of informal solid waste collection for self-employment?
3. What is the amount of income generated by youth in informal solid waste collection monthly?
4. What are the genders based value chain activities performed by youth involved in solid waste collection to increase the earnings?

Theoretical Framework

The study was depicted into sustainable livelihood theory as a lens to assess youth value perceptions in job creation and value chain activities found within the field of informal solid waste collection for social economic sustainability. The theory of sustainable livelihood developed by Chamber and Conway (1992) pertained into capabilities, assets (resources, stores, claims and access) and activities as means of living.

The theory emphasized on capabilities people hold in doing or performing the basic tasks. The selected social-economic activities youth pertained to engage in should enable accessing the commodities and feeding oneself. Livelihood theory is the people cantered-approach whereas ones select the pathway and resources to participate in social economic activities to improve life quality. The framework was objectively and analytically worked as functional tool to synthesize the research work on hand (Bennett *et al.,* 2018). Basically, the framework comprised the elements of livelihood

resources and strategies, institutionalized processes and organization structure in improving institutional context through making capital less vulnerable; a base analytical framework for exploration of what is and what can be done through the present capitals and a set of principles guiding development interventions being evidence-based (Rashid, 2020; Khumalo, 2018). The sustainable livelihood theory ascertained on assessing the resources and strategies utilized by youth in Tandale Ward in undertaking the core institutionalized functional process of solid waste collections as opportunities for creation of self-employment for livelihood.

Methodology

This study employed the pragmatic mixed design to get different views, opinions, attitudes and multiple realities from informal solid waste collectors in Tandale Ward. The selected area comprised of 282 population frame. The Samples size of 83 respondents was selected using a non-probability purposive technique. Further, data was collected using a closed questionnaire and open ended interview guide; thereafter triangulated was done during analysis. Data was descriptively analysed and presented using frequency tables, figures and narratives. Yet, permission for data collection was obtained through official logistics from LGA. Respondents were told on the objectives of the study and pseudonym was used to hide corresponding names of respondents so as to adhere to the ethical requirements.

Findings and Discussion

This section presents the findings of the study guided by research questions as follows:

Research Question 1: What is the demographic composition pattern for the youth engaged in informal solid waste collection?

Table 1 reveals that in Tandale, there are more male youths (71%) than female youths (29%) who engaged in informal solid waste collection as the source of income.

Table1: Demographic pattern of solid waste collectors in Tandale (n=83)

	Descriptions	Frequency	%
Gender	Women	24	29%
	Men	59	71%
Age	18-27	37	45%
	28-37	29	35%
	38-47	15	18%
	48+	2	2%
Marital Status	Married	37	45%
	Not Married	44	53%
	Widow	2	2%
Level of Education	Primary	51	61%
	Secondary	24	29%
	University	8	10%

The decrease of number of waste collector is proportional to the increase of age as at 48+ years there was only 2%. Yet, the findings demonstrated that most of informal solid waste collectors are not engaging in personal family responsibilities as were unmarried (53%) compared to the widows (2%) and married ones (45%). In addition, the findings show that although the primary education holders (61%) are leading in the field, even university graduates (10%) were engaged in the informal solid waste collection.

Findings on demographic composition implies that regardless the gender, age, education status and qualifications, the youths under investigation participated in the informal waste collection. A study conducted in Ghana by Lissah et al. (2020) similarly revealed the variations in gender participation whereas female solid waste collectors (29) were more compared to male (14); many solid waste collectors were without education (20) compared to different education statuses obtained in this study.

Furthermore, the involvement of informal solid collectors declined as age increased, the same is in the study of *ibid*. Non-married youths had higher rates of involvement than married ones as are free and less caring on the health risks associated the activities of solid waste collection (Wittmer, 2021;

Yousafzai et al., 2020). Consequently, youth are highly engage in informal solid waste collection activities as are accumulating labor returns that meet single person livelihood requirement although not enough for survival and sustainability (Lissah et al., 2021). Moreover, married are less engaged in informal solid waste collection as returns does not satisfies family responsibilities, highly affected with psychosocial stress from family and community stigmatization (Wittmer, 2021; Sai & Yamauchi, 2022). The demographic findings implication are that youths need to be sensitized and assisted in undertaking solid waste collection activities safely, exposed to health care especially on the use of PPE, provision of risks management trainings, and provision of solid waste collection material supports.

Research Question 2: How do youths perceive the activity of informal solid waste collection for self-employment?

In order to answer this research question, participants were asked to express their views regarding engagement in the solid waste collection as reflected in table 2. The youths perceived source of income as the key opportunity in engaging in solid waste collection as 81% of participants agreed with the statement.

During the interview, one of university graduates during the interview revealed that there are financial gains in the informal waste collection field:

> I am a professional environmental expert, graduated in environmental science, without capital and employment. I cheated to my colleagues in the field to be a secondary education leaver so as to be acceptable. At least my monthly collections are amounted to Tshs. 450,000/- due to the services I offered to my clients, this is better than nothing (Graduate informal waste collector).

Table 2: Youth perception on opportunities from solid waste collection (n=83)

Indicators	Responses					
	Yes	%	No	%	Total	%
Source of income	67	81%	16	19%	83	100%
Respect from community members	12	14%	71	86%	83	100%
Connection with households	29	35%	54	65%	83	100%
Training, workshop and seminars	8	10%	75	90%	83	100%
Community diligence	77	93%	6	7%	83	100%
Required capital	32	39%	51	61%	83	100%

Findings about lack of respect and recognition were further supported by qualitative data as presented by one of respondents:

> I have seven years in informal solid waste collection activities, there is no any recognition from household and local government leaders in the area; they don't think of seminars, workshops or training. You just enter the sector and leave it. Despite the services we offer, the job is not respected, we are labelled with bad nicknames reflecting the work we are engaged in (Experienced informal waste collector).

Nevertheless, majority of respondents perceived that community willingness (93%) is very important for solid waste collectors to undertake their roles smoothly. Apparently, the responses disclosed that youth engaged in the informal solid collection are less respected by community members (14%) leading to the low margin of connectivity (35%). Additionally, respondents admitted very few seminars, workshops, training (10%) and less accessibility of capital (39%) to support standard provision of solid waste collection services. The finding disclosed that although youth in solid waste collection service provision consider it as suitable to facilitate generation of income for livelihood, there are stigmatization and poor social interaction from service receivers. Scholars commented on the solid waste management being source of employment with labor return (Sharma & Jain, 2020; Omar, 2018). Likewise, the study revealed that the youth engaged in informal solid waste collection are not exposed to different training so as to get skills, knowledge and competences to perform their activities.

The findings imply that youth are engaging in the activity blindly without knowledge on the use of personal protective equipment (Yousafzai et al., 2020). They are not familiar with the equipment and tools to assist in collection and carrying waste that are hazardous free (Wittmer, 2021). The youth needs exposure to the knowledge of adding value in

stuff collected from waste and modalities of getting market to sell the separated solid waste for reuse or recycling.

Research Question 3: What is the amount of income generated by the youth in informal solid waste collection monthly?

It should be noted that informal solid waste collectors are depending on residual fees charged to household as return to the service provision. The Figure 1 presents different ranges of monthly income generated by the youth solid collectors from solid waste collection. The findings show that the youth working as informal solid waste collection receive different levels of income as reflected in figure 1.

Most of respondents received between Tshs 50,000 to 100,000 while 34% received between 150,000 and 200,000. Furthermore, 13% received below 50,000, 12% received above 200,000. Only 1% claimed to have received nothing. The finding implies that the monthly range of income generated in solid waste collection is between Tshs 50,000 and above Tshs 200,000 making the range of average daily purchasing power of Tshs. 1667 to above 6,667. The amount generated is very minimal for sustainability especially in undertaking obligatory life requirements such as food for individual and family, health care, servings, hence became inevitable for social-economic growth and sustainability. Also, Wittmer (2021) delineated that the solid waste collectors are poorly remunerated compared to the heaviness and risks pertained the solid waste activities.

Figure 1: Income generated from solid waste collection (n= 83)

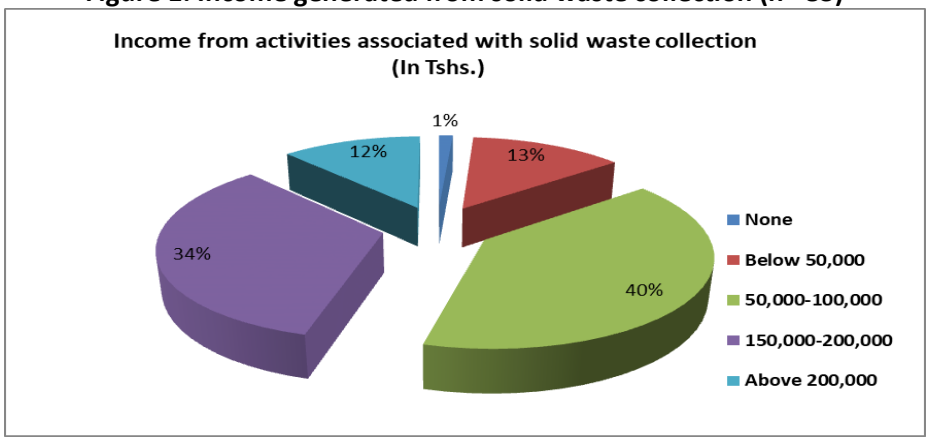

Table 3: Value Chain activities found in solid waste collection (n= 83)

Value Chain in waste collections	F	%	M	%	Total	%
Empty Bottles	5	14%	31	86%	36	43%
Iron Scrapers	9	43%	12	57%	21	25%
Paper and Boxes	5	1%	2	29%	7	8%
Food remained for husbandry	7	37%	12	63%	19	23%
Total	**26**	**31%**	**57**	**69%**	**83**	

According to the argument made by Paes et al. (2019), solid waste collection possesses ecological and economic value chain with capability to be used as resources for producing competitive economic goods. Subsequently, the amount generated is the reflection of technologies, approaches and techniques embedded by youth engaged in solid waste collection being traditional than modern. The study implies that youths engaged in solid collection from Tandale required intellectual and financial supports to expand the services through utilization of other opportunities within the industry such as separation and selling stuffs for recycling and reuse.

Research Question 4: What is the rate of youth participation in informal solid waste collection according to their genders?

This research question sought to determine the rate of youth participation in informal solid waste collection according to their gender as reflected in table 3.

The Table 3 indicates that males (69%) highly participated relatively to female (31%) in value chain activities. Further, value chain activities found in solid waste collection included empty bottles (43%), iron scrapers (25%), papers and boxes (8%) and food remained for husbandry (23%). Moreover, the rate of value chain activities participation, varied according to gender. The number of male being large is supported by Sai and Yamauchi (2022) who noted that male are masculinity in nature, henceforth easy to sacrifice in garbage sorting while working on dirty environment compared to females. The remarkable conclusion of gender disparity in value Chain activities is that female need to be sensitized and assisted to engage in identifying potentials found in solid waste collection.

Conclusions and Recommendations

Conclusion

The study came up with the following conclusions.

While the chain activity included collection of empty bottles, iron scrapers, papers, boxes and food remaining, the youth engaged in the informal solid waste collection without knowledge and skills on the use of personal protective equipment in executing the waste collection.

Young people engaged in the informal solid waste collection regardless their gender age and education status. However, participation varied according to gender as males highly engaged compared to females. The number of male being high is possibly due to the fact that males are masculinity in nature, hence it is easy for them to sacrifice in garbage sorting while working on dirty environment compared to females. Therefore, community willingness, respect and support are key factors for solid waste collectors to undertake their roles smoothly.

The decrease of number of waste collector was proportional to the increase of age. While primary education holders were leading in the informal solid waste collection, even university graduates participated. Therefore, demographic factors determined the rate of participation in the informal solid waste collection.

While the youth engaged in the informal solid collection were less respected by community members, they perceived source of income as a driving factor for engaging in solid waste collection. However, the amount generated was very minimal for sustainability especially in undertaking obligatory life requirements such as food, health care and personal servings.

Recommendations

Based on the conclusions, the study recommends that the government should set appropriate policies and strategies in running waste management so that it can attract all age groups as a source of employment. There should be capacity building on opportunities in waste collection for self-employment reasons. Finally, the youth needs exposure to appropriate knowledge and skills on informal solid waste collection and modalities of getting market to sell the separated solid waste for reuse or recycling.

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