

Increasing the visibility of the informal waste sector as part of a pathway towards a Just Transition

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Highlights

This paper communicates the main findings of a project which sought to improve the way that data on the activities of the informal waste sector are collected, and which has developed a preliminary model to quantify the contribution of the informal waste sector to the mitigation of plastic pollution in the Global South.

Key findings

Informal waste workers make a substantial contribution to the global circular economy. However, until now, data on the activities of this complex community has been sparsely and inconsistently collected. This pioneering project presents the results of a systematic review of historical evidence on the productivity and prevalence of the sector, as well as the results of a new methodology that offers a consistent and scientifically robust approach to gathering data on this important global cohort.

Subsequent modelling indicates that the informal waste sector collects more than 60 per cent of recyclates worldwide and plays a substantial role in material recovery and the prevention of plastic pollution. Our findings lead to several interventions that are pivotal for policymakers at global and national levels to increase the visibility, recognition, and inclusiveness of informal waste workers:

- **Legal recognition of informal waste workers and the benefits that they bring to the economy, society, and the environment.**
- **Requirement for national statistics institutes to obtain, analyse and report data on informal waste workers activities.**
- **Inclusion of informal waste workers as an occupational category in national censuses and surveys.**
- **Enablement of informal waste workers to self-enumerate their activities, facilitated by waste picker membership or advocacy organisations.**



1. Introduction

In the Global South, plastics recycling has been operational for several decades,[1-3] long before many high-income countries had implemented even the most basic recycling collection systems.[4] Feeding this pioneering material reprocessing sector, a large cohort of informal waste workers* has capitalised on the increasing availability of engineered materials in waste systems which are often overstretched and underfunded.

Driven by opportunistic entrepreneurship, the pressures of poverty, and in the context of insufficient social protection, our new research[5] shows that the informal waste sector continues to be highly active across the Global South, making a substantial contribution to the global circular economy and supporting the efforts of local governments. In addition, we find that this informal global community is already carrying out a substantial role in the fight against plastic pollution.

Despite this contribution to society, informal waste workers have suffered from widespread social stigma and even criminalisation for their efforts, living on the margins of society and often being the poorest.[6-9] They have substantially shorter lives, throughout which they suffer ill health and exposure to greater hazards compared to the wider population.[10] The injustice of the situation faced by informal waste workers is increasingly recognised by international institutions.[11, 12] Organisations such as the International Alliance of Waste Pickers[13] and Women in Informal Employment: Globalizing and Organizing (WIEGO)[14] have advocated in detail for greater integration of informal waste workers in solid waste management planning as part of a so-called 'Just Transition'.[15] This means managing social and economic shifts towards a more sustainable future in a way that protects their human rights and ensures they receive a high level of social protection.[6-9]

The rights of informal waste workers can only be protected if their activities are known about.[16] But by their very nature, informal waste workers rarely keep records of their activities and are not necessarily documented as participants in a recognised profession.[17] In many cases, informal waste workers may not want to be identified, because it could put them at increased risk (perceived or actual) of harm from society, or even the authorities in some countries. This lack of 'visibility' creates a causal nexus by which informal waste workers continue to bring large benefits to society but can never be fully appreciated or rewarded for doing so.

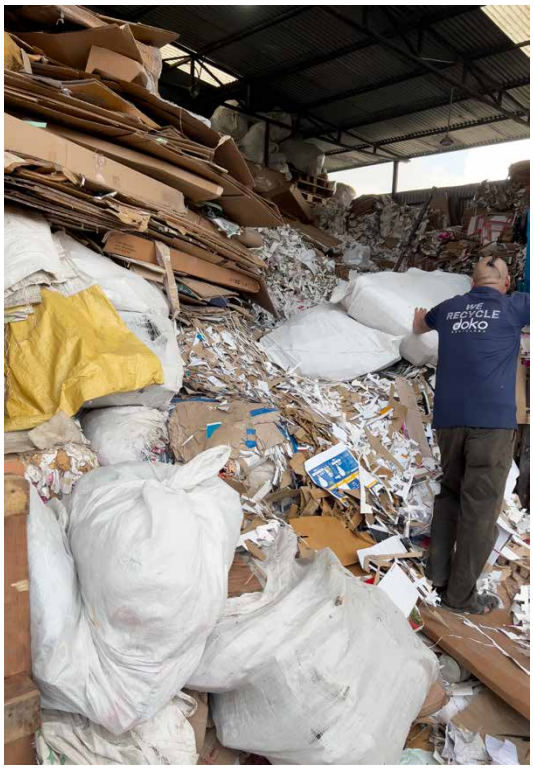
Being unable to accurately quantify the informal waste sector's activities also limits our capability to comprehensively map material flows and derive accurate estimates of waste generation, collection, treatment, and disposal, all of which are essential to monitoring progress towards the SDG11.6.1 indicator.[18] Insufficient enumeration of the informal waste sector's activities is a major shortcoming of most municipal solid waste data worldwide. The Conference of European Statisticians[19] has recently recommended to national statistical authorities to include the complex aspects of the informal waste sector in their reporting.

Lack of accurate data on informal waste collection also harms the efforts of formal waste management authorities because it prevents them from supporting a cohort that often provides substantial assistance with the authorities' own activities. As such, formal waste management statistics tend to focus on waste that is collected and formally managed whilst ignoring informal activities. Being unable to accurately quantify the informal waste sector's impact also hampers

*Here, the term 'informal waste workers' is used throughout the document to describe workers engaged in the collection of recyclates from the built or natural environment, from land disposal sites, waste sorters, and those who support the aforementioned. Other terms include waste pickers, informal recycling sector, and IRS. Our research focusses on primary collectors which are a sub-set of informal waste workers, however in this document, we only use the term 'informal waste workers' for simplicity.

our capability to comprehensively map material flows and derive accurate estimates of waste generation, collection, treatment, and disposal. All of which are essential for monitoring progress towards the Sustainable Development Goal (SDG) 11.6.1 indicator.[18] We argue that the quantification of the informal waste sector's activities is an essential perquisite for developing policies for a Just Transition to the circular economy and a world without plastic pollution.

In response to this need, we have consolidated and reviewed the global state of evidence on the informal waste sector's capability;[5] developed a methodology for more effective and scientifically robust quantification of the informal waste sector's activities; and created a preliminary model to assess the activities of the sector worldwide. We find that this large cohort of entrepreneurs is already collecting large amounts of material for recycling and carrying out a substantial role in the fight against plastic pollution. We propose to embark on a new path of self-empowerment for the informal waste sector, whereby the collectors themselves are supported to self-enumerate and promote the substantial global role they play. We argue that the current state of knowledge on informal waste collectors is insufficient to meet this challenge. Governments and non-governmental



stakeholders should co-create policy to ensure that informal waste workers receive the recognition they deserve. Legal recognition and greater visibility for the informal waste sector marks the point of departure in this journey, while more specific actions are needed to obtain data to profile the sector using scientifically robust methodologies.

About this paper

This paper aims to raise the profile of informal waste workers and to inform policymakers of the importance of robust and defensible enumeration and quantification of the informal waste sector's activities, prevalence, and productivity. It seeks to highlight the need to enable evidence-based policies and measures for a Just Transition for the informal waste sector in the context of the negotiations of the international legally binding policy instrument on plastic pollution (hereafter the 'Plastics Treaty'). The objectives of this paper are to:

- Communicate the results of a systematic review of data and methods used to enumerate the activities of the informal waste sector.
- Introduce a new method for scientifically robust quantification of the informal waste sector prevalence and productivity and present the preliminary results of a pilot case study in Nepal.
- Propose a set of interventions to raise the visibility of informal waste workers as change agents in the plastic value chain and the fight against plastic pollution.

We build on a literature review; a case study in Lalitpur, Nepal; and a model developed by the University of Leeds.

2. Latest estimates of informal waste sector activities

New research[20] conducted by the University of Leeds suggests that the informal waste sector collects more material for recycling than previously accounted for. It also continues to make a larger contribution to the recycling of municipal solid waste in the low- and middle-income countries than all the high-income countries put together.[10,21] Preliminary modelling indicates that more than 10 million informal waste workers operate globally, collecting nearly 108 million metric tonnes of plastic, metal, glass and paper waste for recycling each year (Figure 1). This is approximately 40% of all material reported[21] to be collected for recycling worldwide.

Although formal systems in high-income countries have struggled to make plastic recycling cost-effective,[22] the informal waste sector has been recycling plastic since at least the late 1980s[1-3,23] and currently collects nearly 31 million tonnes per year, in line with other recent estimates of approximately 29 million tonnes per year.[10,24,25]

Unlike recycling systems in high-income countries, the informal waste sector recovers a far greater range of plastic types. This includes flexible materials, which make up around 30–60 per cent (median) of plastics collected for recycling in upper middle-income and lower middle-income countries respectively.[21]

In addition, informal waste workers are much more selective about the material which they collect. Unlike in the high-income countries, where formal recycling is driven by weight-based targets, informal waste workers only pick up material they can sell.[26] This means that 75 per cent of plastic waste collected for recycling by informal waste workers is converted into new products, compared to just 52 per cent in formal systems.[24]

To improve our understanding of the contribution made by informal waste workers, we systematically compiled the most comprehensive and quantitative evidence-base for informal waste sector activities worldwide; reviewing more than



200 reports, scientific studies, and global databases.[5] Our review reflects the incredible diversity of the sector and shows that it is as strong as it has ever been. This makes it all the more important that its participants are included in future policy planning for a Just Transition towards a cleaner world with a thriving circular economy.[11,12,27]

Our first-of-a kind study comprises a global dataset and scientific paper, which summarise the complex operating conditions under which the informal waste sector collects waste.[5] We now have stronger evidence about how much waste primary collectors gather each day; how often they work; and the types of waste they collect. This information has been used to develop models that show the contribution that waste pickers make to plastic pollution mitigation.

Alongside our review of evidence, we also assessed the way that scientists and practitioners gather information about the informal sector. We found large inconsistencies in the methods used and that much of the information, particularly about how many waste pickers exist, does not come from observational measurements. This means that in practice, there is a limited understanding of this large group of people who carry out a vital global service.

Despite the uncertainty over how many waste pickers operate in different regions, there is little doubt that they are currently the most effective global force in the fight against plastic pollution. This is because they remove large amounts of plastic waste from material systems in parts of the Global South where the risk of plastic pollution is greatest. Increased transparency of activities conducted by the informal waste sector could result in considerable benefits to them. Table 1 outlines four of these core benefits, acknowledging that others may exist.

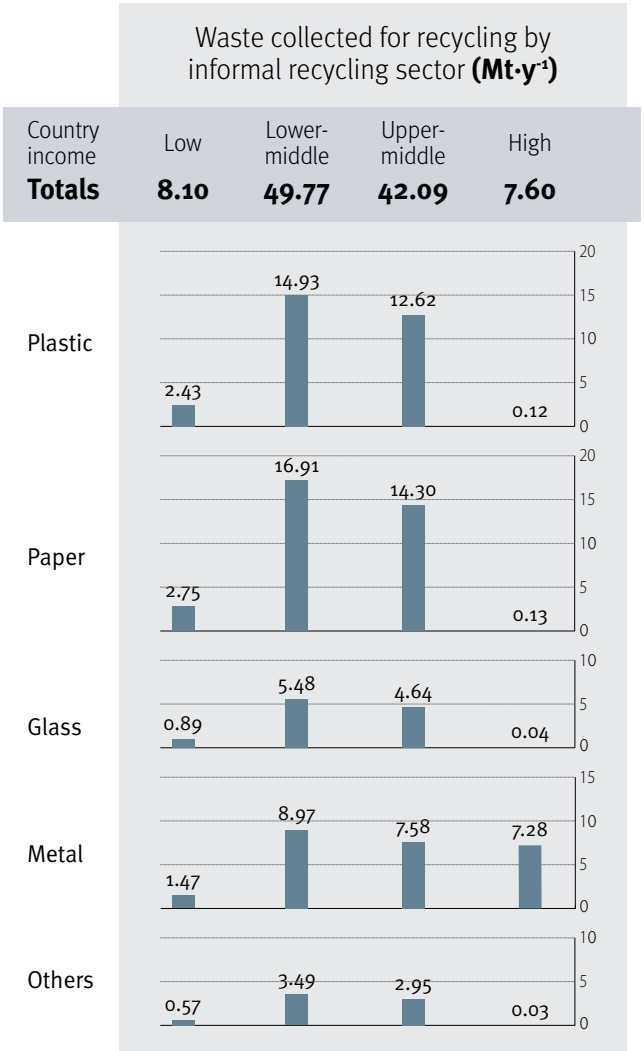


Figure 1: Waste collected for recycling (million tonnes per year) by informal waste workers across global income categories. Numbers in centre of charts are total waste collected for recycling by informal waste sector, also represented by proportional size of each chart. After: Cook, Cottom and Velis.[20]

Note: numbers do not sum due to rounding.

Table 1: Core benefits of quantification of the activities of the informal waste sector.

1. Acceptance of informal waste workers within society, reducing stigma, and engendering greater respect from wider communities.
Deeply established prejudices against informal waste sector participants result in their ostracisation, leading to low self-esteem and sometimes to their persecution by wider society.[7,28] Communicating the benefits, particularly for the environment and human health, as a result of informal waste worker's activities could improve their standing amongst the community, reduce potential harm, and increase the potential to access help and services.[29]
2. Inclusion of the informal waste sector's activities in municipal waste management planning and making a case for financial, technical, or operational support.[30]
Informal waste workers recover large amounts of material for recycling in many municipalities throughout the world, reducing the fiscal and operational burden on local authorities who often have limited resources.[31] Providing a scientifically robust quantification of their activities would enable this reduced monetary burden to be calculated, making a business case for the sector's support and investment.
3. Inputs for the planning and implementation of extended producer responsibility schemes (both voluntary and mandated) to ensure that primary collectors benefit directly from remunerative financial instruments.
There is widespread acknowledgment that the implementation of extended producer responsibility schemes should be carried out in a way that includes informal waste workers in their design and implementation.[32] Systems should ensure that informal waste sector participants benefit from remunerative payments and are not absorbed higher up the value chain. As part of the scoping and planning of national extended producer responsibility schemes, a structural assessment and enumeration of the informal sector should be carried out to enable scheme operators to assess the administrative impact and practical considerations for distributing monetary payments.
4. Evidence of plastic pollution mitigation activities to local and national governments for incorporation into action plans and for monitoring efforts to fight plastic pollution.
Within the current plastic governance efforts, it is likely that some form of plastic pollution quantification will be required or considered necessary to establish a baseline and monitor progress towards targets over time. The impact of the informal waste sector on plastic pollution mitigation will form a critical part of such studies, as its activities reduce the overall plastic mass at risk of moving from human controlled systems into the environment particularly in the Global South.

3. A new method for effective enumeration of informal waste sector activities

Several methods have already been formulated for assessing the status and activities of the informal waste sector; for example, focussing on contributions to SDG 11.6.1;[18] assessment of level of integration into formal waste management systems and planning;[7] assessment of living income;[26] and assessment of municipal systems as a whole.[33] However, our systematic review of the informal waste sector revealed high uncertainty about how many waste pickers operate worldwide. We also found that many of the methods used to collect data were insufficiently detailed to enable generalisability of results.



To address this, we developed a new standardised method that can be used to characterise and enumerate the activities of informal waste sector, applied here to primary collectors and designed to be adaptable to any Global South context. Previous approaches came mainly from action research and were not designed for practitioners or with replication in mind. They often struggled to achieve representative samples because there is no reliable prior knowledge of the sector. Our new method enables users to obtain a representative sample in real time, thereby ensuring greater statistical reliability. It is also highly compatible with and complementary to other methods[7,18,26,33] which could be useful to document other aspects of the sector.

The new method involves counting (anonymously) all waste pickers within a defined geographical area (targeted census). Waste pickers are approached at the place where they sell their recycled materials because they will all need to go there at some point. Some of the waste pickers are asked more detailed questions about what types of waste they collect and how much it weighs. By analysing the data from our census in real time, we ensure that this smaller group is representative.

The new method includes principles adapted from 'community-based participatory research.'[34] This involves talking to people who know about the informal sector in the area being studied to find out where people work; how they operate; and how they fit into the local waste management system. This information helps to plan enumeration in the field to ensure that all workers and their activities can be observed. Importantly, we commit to sharing results with the local community, rather than locking it behind a paywall.



Pilot study in Nepal – Informal waste sector quantification

In the second half of 2023, the University of Leeds tested a new method for the quantification of the informal waste sector in the city of Lalitpur, in the Kathmandu Valley of Nepal, as part of a project with GRID-Arendal. With local partners Doko Recyclers and Creasion, the project attempted to locate every 'primary collector' in the city of 300,000 inhabitants. A scoping phase identified the core market areas and places where waste pickers source their materials, giving us a place to start our survey. Ahead of the survey, a participatory engagement workshop was held to help understand the context in which our study would take place. People with interests across the waste system were invited to take part, including waste pickers, itinerant buyers, scrap-shop owners, NGOs, and local government representatives. Mini-focus groups were used to find out where people collect and sell their waste, and whether there are cultural, religious, or ethical sensitivities linked to this profession.

A preliminary assessment of the data revealed 93 scrap centres that purchase material from 1,700 waste pickers working in the city. The vast majority (95%) are men, who use bicycles to collect waste directly from households and businesses. By contrast, women working as waste pickers in the city work almost exclusively on foot, either sourcing material from informal open dumps or working in teams at some of the city's waste transfer stations. We estimate that informal workers collect approximately 16,000 tonnes of waste for recycling in Lalitpur each year, the equivalent of 53 kg per year for every inhabitant in the city. Approximately 20% (3,200 tonnes per year) of this material is plastic waste, comprised of a hugely diverse range of materials, encompassing most plastic item types placed on the market.

4. Interventions to increase visibility informal waste workers

Despite having compiled the most comprehensive macro-scale evidence data set on the informal waste sector based on published literature, we reveal global insufficiencies in the way that the sector's data are collected, processed, and communicated. As we have highlighted, the existence of a scientifically robust data set for informal waste sector activities provides substantial benefits to governments and the informal waste sector itself.

It is self-evident that the informal waste sector should be able to continue to carry out its critical role without its participants being exposed to harm, and with the support from governments and wider society.[35] Wider interventions have been proposed which would enable workers to continue operating whilst reducing hardship and improving prospects. These include the legal protection of informal waste workers by providing the possibility to self-organise, provision of healthcare, education, and housing[32] and, if desired, integration into formal waste management planning.[7]

Designing and implementing 'Just Transition' solutions and measures for the informal waste sector will require the robust enumeration and quantification of informal waste sector characteristics, prevalence, and productivity. This approach will support evidence-based needs assessments, the creation of design inclusive extended producer responsibility schemes, and the monitoring of their efficacy. Therefore, four interventions are proposed, aimed at increasing the visibility of the informal waste sector through legal recognition and strengthening data collection on their work at several levels (Table 2). These interventions would have a substantial impact on informal waste collectors' lives and are an essential part of a Just Transition towards safer working practices, a functional circular economy, and a world without plastic pollution.



Table 2: Interventions to increase visibility of the informal waste sector through data gathering, processing, and management.

1. Legal recognition and registration
Legal recognition of informal waste workers and the benefits that they bring to the economy, society, and the environment Informal waste workers should have the right to be recognised for the services they provide to the circular economy, waste management and plastic pollution mitigation. Formal recognition in national legislation should include the right to: • Participate in national or local registration schemes.[36,37] This would facilitate access to social labour protection and increase the availability and quality of data on the sector. Schemes must be voluntary, operated under strict data protection protocols, and should not pose a disadvantage for non-participants. • Carry out their activities legitimately, without fear of being criminalised.[37] Establishment of informal waste work as a legitimate profession facilitates their integration into society and reduces the risk of harassment and abuse. • Obtain work permits in the case that they are immigrants.[38,39] Legitimisation of the profession reduces the inherent vulnerability of informal waste workers and facilitates access to social and labour protection.
2. Recognition by national statistics institutes
Requirement of national statistics institutes to obtain, analyse and report data on informal waste workers activities A mandated requirement for national statistics institutes[40] to report on informal waste sector activities would increase the visibility of the sector to wider society and establish their vocation as a legitimate profession. Specifically: • Aggregation and interpolation of data on the prevalence of the sector from registration schemes, censuses, and surveys.[19] This would enable national and local authorities to plan for the provision of social and labour protection and to assess the impact on their health. • Analysis and modelling of informal waste workers' activities to estimate the contribution of the sector to waste management, the circular economy, and plastic pollution prevention. This would improve the accuracy of national waste management data and contribute to the monitoring of plastic pollution mitigation activities and commitments required by the international legally binding instrument on plastic pollution, currently under negotiation.[41] • Clearly distinguishing between informal waste sector activities and illegal activities,[19] the former of which must be recognised as a legitimate, legal profession.
3. Inclusion in national census and surveys
Inclusion of informal waste workers as an occupational category in national censuses and surveys Obtaining data on the informal waste sector via national censuses and surveys can provide detailed enumeration at local and national level. Unlike many localised cohort studies, which our research[5] shows are often based on availability sampling, censuses have the potential to reveal the presence of informal waste workers who are less visible but are nonetheless carrying out a substantial role in waste collection or valorisation. Specifically, censuses should include informal waste working as an occupational category.

Table 2 *(continued)*

4. Capacity building and support for self-enumeration
Enablement of informal waste workers to self-enumerate their activities, facilitated by waste picker associations or advocacy organisations The visibility of informal waste workers (as established in Table 1), provides substantial benefits to the sector and wider society. There is increasing recognition that self-ownership of data on the sector can empower informal waste workers and be used to strengthen the case for ongoing integration and improved levels of social and labour protection. The process of data collection can be carried out by governments, informal waste sector associations or advocacy organisations, academics, consultancies, or the informal waste workers themselves. However, the involvement of informal waste workers should always be encouraged regardless of the data collection agent. All data gathering should take place as part of a process of co-creation and as part of a participatory engagement process. Specifically, the following steps are proposed: • Establish a standardised methodology for the collection of representative and scientifically generalisable data on informal waste sector prevalence and activities. We have already proposed such a methodology and tested it once in the field, but acknowledge that other methods may emerge and could be considered as alternatives. • Undertake training and capacity building for informal waste worker advocacy and membership organisations to enable them to carry out scientific studies to enumerate and characterise the activities of the informal waste sector. Importantly, data collected on informal waste workers must always be co-owned and available to all under open-data and open-science principles and should never be retained privately.

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This paper communicates the main findings of a project which sought to improve the way that data on the activities of the informal waste sector are collected, and which has developed a preliminary model to quantify the contribution of the informal waste sector to the mitigation of plastic pollution in the Global South.

Informal waste workers make a substantial contribution to the global circular economy. However, until now, data on the activities of this complex community has been sparsely and inconsistently collected. This pioneering project presents the results of a systematic review of historical evidence on the productivity and prevalence of the sector, as well as the results of a new methodology that offers a consistent and scientifically robust approach to gathering data on this important global cohort.