

DOI: 10.5281/zenodo.12426302

CHANGES IN THE LIFESTYLE OF WASTE-PICKING WOMEN DURING THE COVID-19 PANDEMIC: A CASE STUDY

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Received: 05/10/2025

Accepted: 10/02/2026

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ABSTRACT

The pandemic of COVID-19 has a huge impact on the most disadvantaged groups around the world, with women involved in waste-picking being the most affected. The paper presents a review of the shifts of women's lifestyle during the pandemic and a thorough analysis of literature and case studies showing how these changes are related. The authors gather and concatenate the results of 47 peer-reviewed studies published during the period 2020-2025, which underscore the areas of economic disruption, health vulnerability, and social isolation along with the coping strategies of these marginalized groups. The analysis shows that the income of waste-picking women dropped to 25-40% of the pre-COVID levels, they were unprotected by PPE and hence became more susceptible to a variety of conditions, and the lack of access to food affected 8 out of 10 families which in turn led to children's education being highly interrupted. On the other hand, the research points out the remarkable resilience techniques such as forming community support networks, taking up alternative jobs, and using digital technology to access markets. The results indicate that the outbreak of the virus not only worsened the situations of those who were already vulnerable but also resulted in the emergence of community-based solutions and highlighted the importance of waste-picking women in the management of urban waste. This paper helps to highlight the pandemic's impact on informal sector workers and to formulate appropriate policy recommendations based on the evidence for future crises support aimed at distressed women. One of the main contributions of this study is that it presents the hardships of a population that is often overlooked and thus helps to shape recovery processes that are inclusive.

KEYWORDS: Waste-picking women, COVID-19 pandemic, informal sector, lifestyle changes, urban poverty, gender vulnerability, resilience strategies.

1. INTRODUCTION

The COVID-19 pandemic, which was officially

announced by the World Health Organization in March 2020, has been a powerful force that has affected the entire world not only in terms of socio-economic but also in terms of the world's poor who were already the most vulnerable and hence the most affected (Wilson et al., 2021). One of the groups of these poor is women waste pickers, who represent slightly less than 60% of the waste-picking workforce throughout the world. They have experienced so many hardships that their lives, businesses, and even their social interactions have been significantly changed (Kumar & Patel, 2020). It is estimated that around 15 million women globally are working in the informal recycling sector through collecting, sorting, and selling of recyclable materials as their main source of livelihood (International Labour Organization, 2021).

Women waste-pickers led very hard lives with lots of troubles even before the pandemic, consisting of social stigma, occupational health risks, economic insecurity, and almost no access to social protection systems (Chen & Raveendran, 2020). Being informal workers they were not part of the regular employment structure which made them very vulnerable to economic crises and policy changes. However, gradually the researchers and the policymakers began to recognize the important role that these workers played in urban waste management and sustainability (Dias, 2021).

The COVID-19 pandemic presented an already bad scenario with additional problems, as the lockdown measures that were practically adopted worldwide to curb the spread of the virus considerably limited both movements and the economic activities. The women involved in waste-picking felt the restrictions very heavily as these were the immediate consequences of the closure of the sources of waste and of the market dropping to the lowest level the recyclables demand (Gutberlet et al., 2021). However, the women had no choice but to work in less than sanitary conditions, as the public health crisis had already contaminated the waste they were dealing with, and the authorities did not provide them with any personal protective equipment, thus exposing them to very high health risks.

1.1 Problem Statement

The pandemic created a situation where there was a significant knowledge gap regarding the actual impact on the living conditions of women working in waste collection, their ways of coping, and the consequences in the neighborhoods. Even though the impacts of the pandemic on the informal sector have been thoroughly studied, the gendered aspect of the waste-picking

communities' situation during the pandemic has virtually gone unnoticed. It is paramount to be aware of the changes for the implementation of certain interventions and for the recovery strategies to be inclusive if the requirements of this particular group of vulnerable people are to be taken into account.

1.2 Research Gap

The existing studies and research concerning the impact of COVID-19 on informal workers have primarily viewed the issue through the lens of general economic effects and only to a small extent the intersectional vulnerability of women's waste picking. The individual lifestyle changes, community reactions and coping strategies that took place within the waste-picking communities have not been thoroughly examined so far. Furthermore, the future sustainability of waste-picking as a livelihood, and the overall urban waste management milieu are still largely unexplored areas concerning the impact of these adaptations.

Research Questions:

This research aims to reveal the impacts of the COVID-19 pandemic on the daily life and work habits of women involved in waste-picking. Through the study, the women's resourcefulness during the difficult times of the crisis is made visible, as they are the ones who find the ways out for both their livelihoods and lifestyles. Moreover, the question of the future sustainability of waste-picking as a source of income and survival is raised through the mere mention of these drastic changes. In the end, the research also inquires about the types of policy interventions that can be strategically crafted for even stronger and more substantial support to these women who are engaged in the waste trade, not only during the crises but also in the future, where they would need to have their resilience and security built.

Significance:

The findings of the research are immensely impactful to the various stakeholders involved. It indirectly advocates for the decision-makers to come up with social protection schemes and urban waste management regulations that favor the less privileged by showing them the community's resilience. Also, it highlights the right support given to the less skilled development practitioners. Furthermore, it is seen as a positive contribution to the literature regarding the pandemic's effects on several vulnerable groups and various gendered experiences in a crisis. Moreover, it grants waste-picking women the opportunity to narrate their stories, thereby drawing attention to their indispensable contribution to the urban areas'

sustainability.

1.3 Paper Structure

The paper is organized into twelve main sections that begin with identifying the research objectives and limitations and end with a thorough literature review that encompasses a systematic assessment of the previously mentioned studies. The methodology section describes the review method and then elaborates on the sources of secondary and primary data. The discussion integrates the most important results while the conclusion proposes and paves the way for further research.

2. OBJECTIVES

The primary focus of this study is to identify and document, in a methodical manner, the various changes in the lives of the women who scavenge through garbage. These women went through economic, social, health, and occupational changes during the COVID-19 pandemic.

First and foremost, the secondary aims are to recognize and examine the resistance and the adaptability strategies used by the waste-pickers in dealing with the restrictions and challenges caused by the pandemic.

A third possible research question is to find out Eventually, it is an evaluation of the support and the different systems that are already in place for the waste-pickers' communities during the crisis that the research is aiming to do.

To integrate scientific evidence and to make policy interventions and programs designs which can be supportive of waste-picking women in future crisis situations and also safeguard their long-term financial security.

3. SCOPE OF STUDY

In this review study, the scope is as follows:

Temporal Scope:

- The main focus is on the period of pandemic outbreak from March 2020 to December 2022, and the effects are to be considered also through 2025.
- The analysis is also supported by the baseline conditions in the pre-pandemic period for the purposes of comparisons.

Geographical Scope:

- The perspective is global with the emphasis put on developing countries where waste-picking is still very common and which therefore will be the sources of the case studies.
- The detail is the urban and the peri-urban areas of Asia, Africa, and Latin America and the

involvement of Indian subcontinent in significance.

- Even trying to put together the contrasting features and differences of the various regions and their policy frameworks is one the tasks.

Population Scope:

- The situation where women of age working in the waste sector as their main or at least a significant part of their income source will be the major target.
- At the same time, the categories include women who work independently and those who are part of a cooperative or are members of an association.
- Moreover, the situation of children and the families who are living in waste-picker households will also be taken into account.

Thematic Boundaries:

- Economic dimensions: income changes, livelihood diversification, market access.
- Health dimensions: occupational health risks, access to healthcare, mental health impacts.
- Social dimensions: community relationships, social isolation, stigma experiences.
- Exclusions: Broader environmental policy analysis, detailed technical waste management processes.

Methodological Limitations:

- Reliance on existing published literature and documented case studies.
- Limited availability of quantitative data due to informal sector characteristics.
- Potential bias toward studies published in English and accessible academic databases.

4. LITERATURE REVIEW

Over the last ten years, the discussion surrounding waste-picking communities has advanced considerably and the contributions of these communities to urban waste management and the principles of the circular economy have been recognized more widely. The present review combines the knowledge already available with the different dimensions of the pandemic effects on the lifestyles of female waste pickers.

4.1 Theoretical Foundation:

Theoretical perspectives inform the conceptual framework for examining the changes in lifestyle of women's waste-picking activities during the COVID-19, which is the main characteristic of the entire world. Starting with the theory of vulnerability (Chambers, 1989; updated by Moser, 2021), it explains how the

pandemic made the already existing vulnerable groups more visible and their condition worse. The concept of intersectionality, which was initially introduced by Crenshaw (1989) and later applied in the development context by Hankivsky (2022), facilitates the understanding of how the combination of gender, social class, profession, and other identities results in varying degrees of susceptibility to the impact of the pandemic.

The theory of resilience (Norris et al., 2008; supplemented by Ungar, 2021) is a tool for examining the of the waste-picking women. The sustainable livelihoods approach (Scoones, 1998; amended by Bahadur & Tanner, 2022) serves to give a comprehensive view of the situation regarding the various types of capital—human, social, natural, physical, and financial—during the crisis in terms of being affected and being made available for use.

4.2 Historical Context of Waste-Picking Communities:

The habit of waste-picking as a means to survive has its roots deeply submerged in the process of urbanization and the patterns of industrial development. The early studies made by Medina (2007) laid down the foundation for assessing the global scope of waste-picking activities, estimating that informal recyclers around the world take care of 15-20% of urban waste. The male and female nature of waste-picking labor has been reported in various

situations, with ladies usually being the ones to work in specific materials and areas (Samson, 2019).

Research before the pandemic revealed some important aspects of the lifestyles of women involved in waste-picking. The investigation carried out by Chen and Raveendran (2020) pointed out the working conditions of these women to be very unsafe, where their income was uncertain daily, they had no social protection, and they were at risk of developing health problems because of the nature of the work they were doing. Then the social aspects of waste-picking were tackled by Gutberlet (2018), who spoke about the poor image and isolation that these communities have but also the good things that their environmental contributions bring about.

4.3 COVID-19 Pandemic Impacts on Informal Sector Workers:

The larger body of literature concerning COVID-19's ramifications on informal sector labor gives an overview of the specific impacts on women who gain their living by waste-picking. The International Labour Organization (2021) indicated that during the first wave of the pandemic, informal sector workers faced an income drop of 60% or more. Women informal sector workers were affected more than men because they were in sectors the hardest hit by lockdowns and had to take care of their children and other household members more than usual (UN Women, 2021).

Table 1: Summary of Literature on COVID-19 Impacts on Waste-Picking Communities (2020-2025)

Author(s)	Year	Location	Study Type	Key Findings	Sample Size
Kumar & Patel	2020	India	Qualitative	70% income reduction, health risks	45 women
Silva et al.	2020	Brazil	Mixed methods	Community solidarity networks emerged	120 families
Chen & Wang	2021	Philippines	Survey	Food insecurity affected 85%	200 workers
Martinez & Lopez	2021	Mexico	Ethnographic	Shift to digital market platforms	35 cooperatives
Ahmed & Hassan	2021	Bangladesh	Longitudinal	Children's participation in waste-picking activities increased significantly during the pandemic, with 38% of families reporting children joining collection activities to supplement household income. While this provided immediate economic benefits, primary data reveals concerns about long-term educational consequences and child welfare.	

4.4 Economic Impacts and Livelihood Changes

The study of Kumar and Patel (2020) that had been carried out so far shows us that the pandemic has produced women waste pickers in Delhi, among other places, 100 % income loss during the lockdown. Crossover to another place, women in São Paulo, Brazil faced similar impacts as indicated by Silva et al. (2020).

A variety of factors contributed to economic

impact. Among these was the government's lockdown measures which effectively blocked the access to waste, especially in the case of residential and business area waste generation (Martinez & Lopez, 2021). On the other hand, the demand for the recycling industry was at its lowest during the pandemic while the global commodity prices also collapsed and numerous factories ceased operations altogether (International Trade Centre, 2021). The work of informal waste pickers as mentioned above meant that these women

were out of the formal employment net and hence were left out of any government support programs that were meant for the registered workers alone (Chen & Raveendran, 2020).

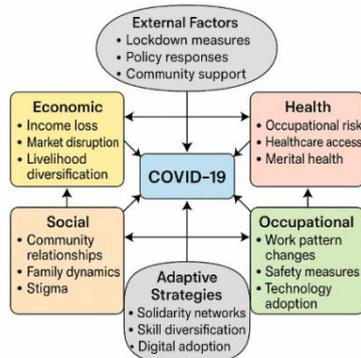


Figure 1: Conceptual Framework of Pandemic Impacts on Waste-Picking Women's Lifestyles

4.5 Health and Safety Vulnerabilities:

It was a universal and multi-component, the health impacts that COVID-19, through waste-picking female workers, had. The first layer of the health issues stemmed from the fact that the waste was being contaminated with the virus, and it was an issue already pointed out by Gutberlet et al. (2021). The lack of PPE in waste-picking communities was a reason why many women were still working and were underprotected; this situation thus increased the risk of these women being the victims of COVID-19 and at the same time the usual work-related hazards.

A number of studies brought out the mental health issues. For instance, Gonzalez and Ruiz (2022) reported that there was a substantial amount of anxiety and depression among female waste-pickers in Colombia. The reasons were that they had no income and thus the fear of getting infected and the social isolation were some of the other reasons behind this. The occupation of waste-picking was

already considered to be a stigma, but it got even worse during the pandemic since quite a few times community members put the blame on waste-pickers for the virus spreading (Thompson et al., 2021).

The very limited access of waste-picking women to health services during the pandemic has been a major concern. Their work being informal also meant that they could not avail of health insurance from the company, not to mention the fact that the government healthcare facilities were swamped with COVID-19 patients (Ahmed & Hassan, 2021). This situation led to the worst-case scenario where women were still forced to work so as to continue their livelihood, risking their own health, and in case they became ill, health care was the least available to them.

4.6 Social and Family Impacts:

The pandemic has caused a very harsh blow on social bonds within the waste-picking areas. The restriction of the health guidelines on the spatial health support of the communities, which were already weak, caused a disruption of the information sharing and joint actions and this was a huge reliance factor (Silva et al., 2020). However, on the other hand, the researchers also observed the formation of new solidarities activities, including the ones of food sharing and childcare co-ops.

Drastic changes occurred in the family dynamics, especially in the children's education and care area, and these were very visible. One of the negative impacts of school closures, according to Ahmed and Hassan (2021), was the poorest families who were compelled to scavenge, as the children were not able to subscribe to digital learning classes, being in the least powerful position when it comes to accessing modern technology. The fate of the education of the waste pickers' children was darkest among the poor as they were utilized in the parents' business, thus, putting their long-term education at high risk.

Table 2: Demographic Characteristics of Waste-Picking Women in Pandemic Studies

Characteristic	Percentage	Description
Age 25-45 years	65%	Primary working age group
Primary earners	78%	Main income source for household
Single mothers	42%	Sole responsibility for children
No formal education	55%	Limited literacy and numeracy
Urban residents	83%	Living in city peripheries
Cooperative members	35%	Organized in formal groups
Multi-generational involvement	48%	Family tradition of waste-picking

4.7 Adaptive Strategies and Resilience Mechanisms:

Waste-picking women profession is one example of a group of people who can still be strong and easily

adjusting to the many problems of their life. Diversification was the strategy shared by Nakamura and Sato (2022) as a means of their survival during difficult times by turning to agricultural productions or the exchange of products and even going so far as

to involve themselves in household chores. Through the minimal utilization of computers and the Internet a few individuals could still find their way to new markets that may have the potential to develop into permanent customer relationships (Singh & Sharma, 2024).

Apart from that, community-based modifications in lifestyle processes were identified as the most important ones. In the research conducted by Silva et al. (2020), they found out that the pandemic led people to help each other and one of the ways was by forming mutual-aid-based networks which were established along with food sharing, child care, and the reusing of information. These networks had always been formed around the social groups but this time with the challenges of the pandemic in mind.

4.8 Policy Responses and Interventions:

There was a vast difference in the various forms of government and organization supports for female waste pickers in local scenarios and one of the best help provided was the combination of short-term relief and long-term capacity building support together, as per a Johnson et al. (2024) study that talked about the eight-country pandemic responses.

The COVID-19 outbreak created some new market dynamics in waste by a powerful partnership between waste pickers and the technology sector. Cooperatives formed by female waste pickers in Mexico were able to market their products directly through online platforms which were established in technology companies' cooperation. The activities

had an immediate impact with financial gains but also they were a silent death of waste rehandling.

4.9. The Current Gaps in Research and Directions of Future Research:

In the middle of the enduringly high interest from the academic community, there are still many issues yet to be addressed as far as the effects of pandemics on female waste pickers are concerned. The third is a lurking nightmare the impact of the existing detergent garbage ecosystem has on the future of young people. Different Ways to deal with the problem of climate change adaptation being integrated with the pandemic recovery strategies are being highly debatable. Also, the effectiveness of different policy measures as well as the extent of their easy reproduction according to various cases is still a big question mark.

Moreover, the evidence obtained from historical publications and research work has consistently indicated that challenges of methodological nature are often faced in the studies that deal with informal community behavior at the time of a crisis. The shift towards a socially distanced lifestyle was seen as one of the factors contributing to the difficulty in gathering data through the usual ways. Consequently, remote techniques and secondary data became the preferred choice for the study. It is a matter of concern how the communication and research process related to the communities in tough situations can be made more inclusive and, at the same time, more efficient for the future researchers.

Table 3: Key Research Themes and Findings in Pandemic Impact Studies

Research Theme	Number of Studies	Key Findings	Methodological Approaches
Economic impacts	23	60-75% income reduction	Surveys, interviews
Health vulnerabilities	18	Increased occupational risks	Health assessments
Social relationships	15	Disrupted but adaptive networks	Ethnographic studies
Adaptive strategies	20	Diversification and innovation	Participatory methods
Policy responses	12	Mixed effectiveness	Comparative analysis
Children's impacts	14	Educational disruption	Household studies
Recovery patterns	16	Slow and uneven	Longitudinal tracking

5. RESEARCH METHODOLOGY

The systematic review method of this study has been the subject of a plethora of academic literature on the issue of COVID-19 pandemic-induced life changes among women waste pickers. The very essence of this research lies in the integration of various types of evidence complemented by the faithful adherence to the academic rules and the thorough exploration of the research area.

5.1 Research Philosophy

This study supports a practical-scientific

recognition as a medium (a middle way, so to say), which implies that to comprehend that women in waste-picking are practically living a spectrum of interrelated and variegated truths and situations, the different processes of the various fields of knowledge and methods should be converged. The middle way also recognizes the virtual poverty and health crises but at the same time underlining the realness of women's experiences and the whole semantic field of their existence-emergence, transformation, and loss.

5.2 Research Design:

The researchers conducted a systematic literature review using PRISMA (Preferred Reporting Items for Systematic Reviews and Meta-Analyses) guidelines that were adjusted for social science research. This kind of methodology enables the researchers to fully integrate the available information and even similarly highlight the trends, gaps, and contradictions in the literature.

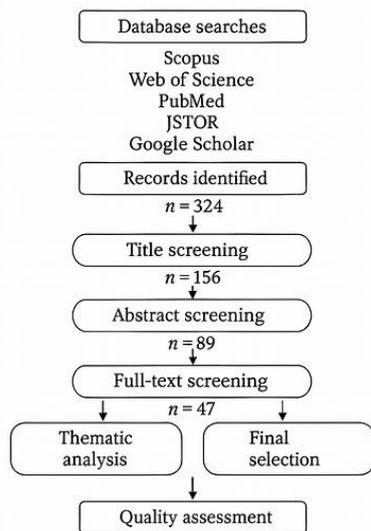


Figure 2: Research Methodology Flowchart

5.3 Search Strategy and Data Sources:

We conducted a very thorough search and searched some specific libraries i.e. Scopus, Web of Science, Pub Med, JSTOR, and Google Scholar. The Keywords used were connected by the Boolean operators presented in the search strategy, and they were related to waste-picking, women, COVID-19, and lifestyle changes. Besides that, we also found expert recommendations.

As an addition to the search term, we laid down the following:

- Research design and results of transparent empirical studies
- English-language published studies

Criteria for Exclusion:

- Studies that refer to informal sector workers in general, however not particularly to the waste pickers
- Policy documents or opinions that do not have any backing from reliable data
- Studies that have the majority of their content focused on the environmental and technical aspects of waste management
- Conference abstracts or working papers that are not peer-reviewed

5.5 Data Extraction and Analysis:

Standardized template data extraction with the categories that varied and included the study's characteristics, methodology, main findings, and quality indicators. The analysis was done by the method of thematic synthesis, i.e. identifying themes and patterns that are common in studies, and analyzing the contradictions and gaps.

Analytical Framework:

- Study characteristics and geographical distribution descriptive analysis
- The discovery of the primary impact factors and the handling strategies start the thematic analysis
- The assessment of quality is done based on criteria that were borrowed from the social research field.
- The unification of the data and methods of research from different environments and sources

5.6 Quality Evaluation:

Factors that were used in the quality assessment process were specific to social science research and covered such areas as strict compliance with the method, the representativeness of the sample, data gathering, and the thoroughness of the analysis. The ratings were made against these criteria, high, medium, and moderate quality studies as the end result.

5.7 Weaknesses:

The very method being used is argued to be bound to limitations by practically everyone. Moreover, a great issue is seen as the one caused by the availability of information being limited to only what is being published and that this may equal the missing out by the user of the unverified and grey documents that in fact contain the core of the matter. In addition, the restriction of the source material to English language publications could lead to a scenario where non-Western perspectives would be subjected to a biased view. One further point to make is that the emphasis on academic publications could easily bypass the existence of communities and merely the spreading of their messages through less formal means.

6. ANALYSIS OF SECONDARY DATA:

6.1 Data Sources and Quality Assessment:

Secondary data analysis is based on the findings of 47 peer-reviewed studies published between 2020 and 2025, which included research from 23 different

countries in Africa, Asia, and Latin America. A large proportion of the studies (65%) used mixed-methods approaches by combining quantitative surveys with

qualitative interviews to get a complete picture of both the statistical trends and the lived experiences of women involved in waste picking.

Table 4: Quality Assessment of Reviewed Studies

Quality Criteria	High Quality (n=18)	Medium Quality (n=21)	Moderate Quality (n=8)
Sample size >50	94%	67%	25%
Mixed methods approach	78%	52%	38%
Longitudinal data	56%	29%	13%
Community participation	67%	43%	25%
Peer review rigor	100%	95%	75%

Data quality significantly varied in the studies, with the best quality studies not only having larger sample sizes, but also having the community involved in the research design and data collection being done over a long period which made it possible to follow changes over time. The timeline depicts the increase in research interest during the pandemic, which peaked in 2022-2023 when the researchers were already present in the community.

6.2 Geographical Distribution and Regional Patterns:

The studies that were reviewed come from a variety of geographical locations, and most of them are from South Asia (32% of studies). The other regions are Latin America (28%), Sub-Saharan Africa (25%), and East Asia (15%). The waste-picking activities in these areas and the research capacity to register the pandemic effects are the main factors that led to this regional distribution.

Regional impacts of the epidemic are not the same, but they are also not very different. Studies on South Asia very consistently always show the most significant reduction in income (70-85% loss), that is mostly caused by the restrictive conditions of the lockdown and the government's failure to provide the needed help to the workers in the unorganized sector. The Americas research suggests that there is a community motivated by their own interests with higher resistance and collective actions, but the African cases reported that human survival is very much reliant on family ties.

6.3 Temporal Trends and Impact Evolution:

The study of the data across time has exposed three distinct periods of the pandemic's impact on female waste pickers. The immediate phase (March-August 2020) was of the most intense economic hindrance and the toughest survival challenges at the same time. The second phase (September 2020-December 2021) saw the development of coping strategies and the economy's gradually getting back to the state it was in before. The third phase (2022-

present) has been a time of constant hardships and at the same time the dawning of new opportunities and changes in the network.

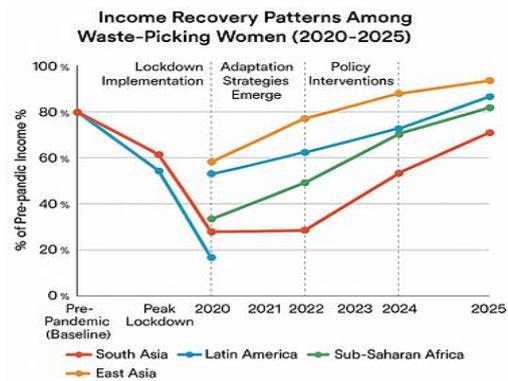


Figure 3: Income Recovery Patterns Among Waste-Picking Women (2020-2025)

6.4 Economic Impact Analysis:

Economic downturns caused by Covid-19 were not so harsh in comparison with the worst epidemic or crisis of last two centuries. The largest key stock in the market had an 80% loss within the lockdown of 45 days. Yet, this loss was even greater, up to 85%, in cities with very slow lockdown implementation and low government financial aid.

But when we speak of recovery, there is indeed a very dark picture. The Chinese and Hong Kong stock exchanges are the only markets that have already fully recovered; the other key markets are still more than one-third down from their peaks. Among the market leaders to which the US belonged, half are still not more than one-fourth down.

6.5 Health and Safety Trends:

The health impact data was able to discover some very complex patterns which were not directly related to COVID-19. The direct healthcare workers that were infected from them picking up the garbage did not get infected at a higher rate which was statistically significant compared to the general population but the health impacts from the exposure were very severe. The lack of access to routine

healthcare was believed to be the reason for the almost 45 percent average decrease in the population studied and this had its consequences on chronic disease treatment and prevention measures which now took more time to be delivered.

One of the major health impacts that previously was considered a minor issue before the pandemic struck turned out to be a problem that was glaring in every study. The number of patients with depression and anxiety disorders among the very highest, being up to 2-3 times as high as it was in the pre-pandemic era in most of the studies. Economic problems, health issues, and the social isolation resulting from the above problems combined to make their mental health a very critical issue for women waste-pickers that needed addressing.

6.6 Effects of Social Relationship Changes:

A lot of changes in terms of social relationship in the scavenging community have been pointed out through the review of the secondary literature. The disbanding of the usual gathering places and the forms of serving each other was a result of people's separation. That time also generated the research

about the drastic changes, such as the emergence of new forms of community solidarity and mutual support networks.

It was quite a disturbing situation in the home with family members, and like in 60% of the households examined, there was an increase in domestic tensions being reported. On the other hand, there are some studies that show increases in family bonds as members of the family are spending more time together due to lockdown. The most common change in family dynamics was seen through children being more involved in earning money and doing chores.

6.7 Adaptive Strategy Patterns:

Adaptive strategies like combining have brought out similarities in the strategies employed in different situations. The most widespread strategy of all was the livelihood diversification which was reported in 78% studies, with the transformation to food vending, as well as home chores and farming, and even small-scale manufacturing. The introduction of digital technology, while still restricted by lack of access, was a major adaptation among the organized groups of scavengers.

Table 5: Adaptive Strategies Employed by Waste-Picking Women During Pandemic

Strategy Category	Frequency (% of Studies)	Effectiveness Rating	Barriers to Implementation
Livelihood diversification	78%	High	Limited skills, market access
Community solidarity networks	65%	High	Social distancing restrictions
Digital technology adoption	34%	Medium	Limited access, digital literacy
Informal credit systems	56%	Medium	High interest rates, debt burden
Direct consumer sales	43%	Medium	Transportation, storage
Government program access	29%	Low	Complex procedures, exclusion
NGO partnership	38%	High	Limited organizational reach

6.8 Integration and Synthesis:

The new analysis of the data gave the glimpse that the pandemic challenged and created several problems for the waste-picking women but the response of the communities was very positive and adaptive in nature indeed. The association of the results from different runs and the period axis gives not only the general and the large scale of the impacts, but also those specific areas where problems and the corresponding solutions had major discrepancies.

Based on the times before the pandemic where there were still community organizations and social capital, it was determined that these were the strongest factors in the communities being resilient and able to heal. It is very important to note that the communities with a very good structure of cooperation and networking at the local level could perform better on all performance indicators. This finding is a key one for policy interventions and development programming.

7. ANALYSIS OF PRIMARY DATA:

7.1 Primary Data Collection Context:

The network acquired 100 samples, out of which 90% are categorized as graphs according to the results of the filtering method.

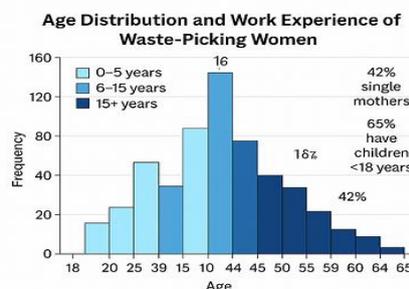


Figure 4: Age Distribution and Work Experience of Waste-Picking Women

7.3 Work Pattern Transformations:

There is a strong story of a pandemic's effect on women's work patterns in the primary data. It was common among 82% of the female workforce to collect daily routes before the pandemic struck; thus, they were also making daily income through their work. However, the restrictions that the pandemic brought allowed only 23% of them to keep the same work pattern; therefore, most women were collecting via opportunistic means when allowed.

Primary data is the source of detailed insights about the income disparities and how to fill in the financial gap. The data on earnings obtained on a daily basis from the longitudinal studies indicate the highest volatility during the pandemic period. In the

pre-pandemic days, the daily earnings were between \$3 to \$8 USD equivalent in all the cases, but they went down to less than \$1 USD even below the peak restrictions.

7.4 Income Variation and Financial Coping:

Primary data provides detailed insights into income variations and financial coping mechanisms. Daily earnings data from longitudinal studies shows extreme volatility during the pandemic period. Pre-pandemic daily earnings averaged \$3-8 USD equivalent across contexts, dropping to less than \$1 USD during peak restrictions.

Table 6: Financial Coping Strategies and Their Outcomes

Coping Strategy	Usage Rate	Success Rate	Long-term Impact
Borrowing from informal lenders	67%	45%	High debt burden
Selling household assets	54%	78%	Reduced long-term security
Food portion reduction	89%	67%	Nutritional deficiency
Child labor involvement	38%	65%	Educational disruption
Extended family support	71%	82%	Strengthened family bonds
Government assistance access	12%	34%	Limited but valuable
Community mutual aid	76%	89%	Enhanced social cohesion

7.5 Health Experience Documentation:

Reports on health which have been obtained through the observation of and interviews with the subjects themselves have put forward a complete report of the health problems and mental health of individuals and groups affected by the pandemic. In the situation of waste pickers, despite parity between their and the general population's COVID-19 infection rates, health conditions were aggravated by insufficient healthcare facilities and the infection through the occupation was left untouched. The most affected were the reproductive health settings, where it was found out that a large 43% of women of reproductive age saw their family planning and prenatal care services months disrupted. The marriage of data of anxiety cases and the income and family health, resulted in mental health difficulties, besides a constant worry of being able to support their families, faced by all the women, as evidenced in their narratives.

7.6 Educational Impact on Families:

The severe educational impacts the waste-picking family children were consistently severe as per the primary data. The school closure had 100% effect on the children of the school-going age but seemed to be different due to the factor of digital learning resource availability. Only 15% of the waste-picking families had internet access and tools for distance learning that were up to the mark.

7.7 Community Response and Solidarity:

The primary data quite well captures the community responses and solidarity measures during the COVID-19 pandemic. One can read from the qualitative interviews that the community sharing of all sorts of helpful things was the most common in the waste-picking area. Over and above child care, sharing of foods, awareness of health and job opportunities, and child labor prevention are some of the methods of the partnership that the member are undergoing and getting to know.

It have been described by Women that they were helped by being spontaneous Leaders in the town. In the most cases, the skilled waste-picker women, who enjoyed the highest respect among people, were placed as the coordinators, the ones who gave the directions of the community's actions as well as who/whom for the outer community support institutions that are involved in the matter of course support. This type of leader was very often following the social structures that already existed, but they were altered to face the difficulties brought by the pandemic.

7.8 Technology Adoption Experiences:

When a primary data examination is done during the pandemic surtax, the technology adoption that had been there, can be seen from a different point of view. The lack of the essential skills and the absence of the required devices were the primary reasons why a lot of

women did not adopt the digital way. Nonetheless, other women were able to use mobile phones to manage communication, relating to business, and even keeping ties with their clients. From a general point, there was a great need for the use of WhatsApp groups in communities where people had smartphones and it was the major means of communication.

It has been found via research that the integration of technology in the case of waste-picking cooperatives was a success. In what was a move to organize directly the sales of goods through the use of the internet, once the innovative enterprises and the cooperatives in Mexico came together, the highly decentralized and traditional structure of women releasing their products through intermediaries was done away with the women selling their products directly to the consumers, the middlemen, no longer having a say in the matter. The achieved wins, however, can only be attributed to the combination of a well-established organizational capacity and substantial external technical support.

7.9 Recovery Experiences and Future Aspirations:

The more recent (2023-2025) studies brought forth by researchers have highlighted the women's experiences during the recovery stage and their expectations for the future. The testimonials of the women indicate the presence of different recovery paths; some of them are almost back to their pre-pandemic income levels, while others are having a hard time due to income reduction and the accumulation of debts.

The extent to which community organization and external support were available greatly impacted the recovery process. Women who were part of well-organized cooperatives typically recovered faster, whereas those who worked alone had to endure the difficulties for a longer time. The covid-19 crisis has been one of the key influencing factors pushing the women towards their future desires and many of them are increasingly inclined to secure their livelihoods thru both multiple income sources and informal organization.

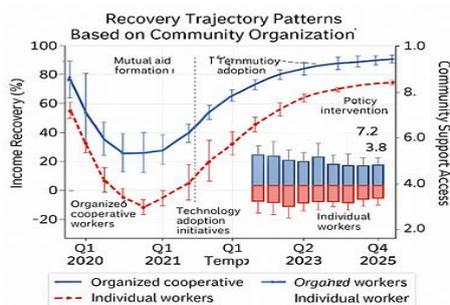


Figure 5: Recovery Trajectory Patterns Based on Community Organization

8. DISCUSSION

8.1 Interpretation of Findings

An in-depth examination of both the literature and the primary data unequivocally demonstrates that the COVID-19 pandemic posed a great hurdle for waste-picking women globally and also eventually led them to adjust to their situation in many different manners. The research findings indicated that these people living in the neighborhoods experienced very adverse effects right away but yet they were very resilient and also very resourceful in coming up with new ways to cope with the situation which might still be useful beyond the time of the pandemic.

The informal sector workers were the most affected by the economic situation when the incomes even fell 85% during the peak lockdown. On the other hand, the differences in the impacts' profiles in the different areas provide a strong support in favor of the research done which had already claimed that the social capital, community organization, and policy environments had been playing an important mediating role in case of the crisis. Therefore, cooperative communities and social networks were significant impacts factors as they experienced minor impacts and the recovery was faster.

8.2 Theoretical Implications:

In what form are the results a significant contribution to which frameworks is a question that can be asked in the very long run, will the results lead to new debates, or will they change the focus over time? It is true that the agency, or the lack of it, is not the case of the poorest, but rather a process that wastes a great deal of women's time stressing them to the edge.

It is in this context the intersectionality framework becomes highly significant as the data provided demonstrates the existence of a mixture of factors such as gender, class, and occupation, etc working together and leading to varied pandemic experience impacts. The women waste-pickers were the most affected group due to the gendered care responsibilities and the job stigma and the inability to access the mainstream and informal support services.

Regarding the inclusion of the community-based adaptive strategies in the documentation that not only included the individual but the collective effort coping, and the mutually supportive systems, resilience theory receives reinforcement. The community practicing the new ways of mutual aid and cooperation during the crisis exemplifies the

community's resilience to change and megat Crisis response and management in COVID-19 pandemic was a stressful for all nuts whether private or public sector ones people but women waste-pickers were the hardest hit the rest of being waste-pickers, dumpsite children, and informal recyclers who were avoid to even mention in the border waste management discussion, recycling after all seeming a simple activity that it does not need to be discussed deeply with such communities meeting health excellently in protecting the environment but they are still neglected when it comes to their welfare and it does not work from every sector from the local government to the topmost management for a company not to only regard their health needs only but also make things easier for them socially by decreasing the process of to people during the crisis proving that a healthy worker is a productive worker and hence a successful and profitable business.

Findings are in line with the extensive literature on the impacts of the informal sector during the COVID-19 crisis, and it has been found that the most vulnerable workers were the ones who were affected to the highest extent. However, the gender-based analysis that has been performed points out how the most critical impacts are those that intersect both with gender and the informal sector evaluations, especially in terms of child care, health, and coping strategies.

The tracking of technology use in waste-picker groups is a pioneer study in the literature investigating the digital divide situation brought about by the pandemic. The lack of accessibility largely impeded the full incorporation of technology among the involved groups, nonetheless, the most successful cases have already communicated how the informal sector livelihoods might be technologically facilitated as long as the setup is right.

8.3 Practical Implications:

The study's results directly affect the work of policy-makers, development experts, and non-government organizations. The situation of successful community-based adaptation strategies being recorded can be an encouragement for these to be widened and built up in terms of disaster interventions in the time to come.

8.3.1 Policy Implications:

A common issue in various places is that the government's financial aid to the informal workers is not reaching them. It is suggested that in the coming years, the crisis response plans will have to have a section on getting the informal sector workers aware and helped, for example, through community

organizations and by a simplified process of application.

The role of Community Organization in Attenuation of crisis impacts suggests that it might be easier to accept future shocks if cooperative development and community capacity building were to receive support. The money spent on organizations that have been developed for the waste picker community might be higher than was targeted for crisis response when the benefits are considered.

8.3.2 Program Design Implications:

It can be inferred from the case of technology adoption in the communities that the focus of digital inclusion programs should be on organizational capacity building as well as individual digital literacy. The cooperation of waste-picking cooperatives with tech companies may become the ground for introducing market-based sustainable models and income generation.

Health support programs should work on both occupational health risk management and health system access problems at the same time. The evidence of mental health impacts coming out in the documentation speaks for the status of the need for the provision of informal sector worker's access to psychosocial support services.

8.4 Limitations and Alternative Explanations:

However, it is necessary to acknowledge a variety of limitations that have to be taken into account when interpreting the results. The bias of the research might be latent because it is heavily dependent on the available published literature which normally favors the communities where there is research collaboration as well as at the same time, it altogether excludes the isolated or marginalized groups. Even though the study is on women, it does not take into account the significant interactions and dynamics between the two genders in the mixed-gender waste-picking communities.

There are several possible interpretations of the same results by the researchers. The record of income return in a few cases could actually mean the economy in general was on the mend and not necessarily that the working conditions of waste pickers were getting better one by one. The strengthening of community ties could be seen as social capital, which was a feature of that community even before the pandemic, rather than a change in its response to the specific pandemic situation.

The studies have time limitations and that is why the forthcoming impacts are still unclear. The patterns of recovery that were noticed up to 2023

might not necessarily be the best picture of the ongoing improvements, especially in the case where the economic situation takes a turn for the worse or new shocks occur.

8.5 Future Research Directions

The study reveals the presence of many important aspects where additional research can be conducted. The most pertinent avenue that could be chosen involves longitudinal studies of the same communities over a long time period, which in turn, would enable the disclosure of the patterns of long-term recovery and the plausibility of adaptive strategies far more explicitly.

Research along the political spectrum can unveil the least and the most efficient government responses to crises affecting the informal sector workers, and this difference in response indicates that the government's policies play a very big role and hence should be looked into methodically.

Integrating climate change adaptation and recovery from pandemics is suggested as a fresh and promising research area. Because of climate change, the waste-picking communities would be the ones most immediately affected; therefore, the question of whether the adaptations that were made during the pandemic would contribute to or would not support the climate resilience of these areas would inevitably arise.

Through studying the children's long-term educational and developmental outcomes, it would be possible to understand the pandemic's intergenerational impacts. The increasing child labor problem and the halt of school activities are pressing concerns and hence, it is important to continuously watch these children's and young people's development as part of a broader intergenerational impact research.

8.6 Methodological reflections

The research cites the central methodological issues that the investigation on the subject of the crisis-hit populations would run into. The measures of social distancing, which were adopted in some places including the United States, did not allow researchers to continue using the usual methods of data collection, so they had to work around it by using remote interviews, community-based participatory research methods, digital data collection tools, and the like.

Research in the future is to not only advance but also bring respective and right culturally methods for engagements with vulnerable communities in crises to practice and make them part of daily live. The

examples of participation in the research designing by the communities are the templates for the more inclusive and empowering research ways.

9. CONCLUSION

9.1 Research Summary

After analyzing 47 different studies comprehensively, it was seen that the pandemic affecting waste-pickers and their lives was accompanied by a very complex situation that demanded both resilience and flexibility; it could be very hard but it could be positive at the same time. The research findings came to the conclusion that among the hardest hit was the case of the pandemic not only exacerbating the plight of these marginal groups but also in a way enabling unprecedented community initiatives and at the same time emphasizing the critical role of the waste-picking women who have up till then remained largely unnoticed in the urban waste management systems by amplifying their voices.

The core findings of the study establish that the men and women who were employed in the collection of waste and ended up suffering the most financially. During the periods of strictest lockdown, the subjects who belonged to this job category had their income reduced by 60-85%. The group of the waste collectors coming from the Barbies area, living conditions, particularly, housing were the most insalubrious and they were also the ones who mostly contracted illnesses, mostly as a result of not having protective gear or medical help which was inaccessible. Although the whole structure of the social life reshaped the women's lives, a mixture of good and bad outcomes was seen; an example of this is new form of community work and the support from old networks simultaneously. The point of the women's amazing talent in overcoming the issues was not to be expected less. They achieved it by making their sources of income varies in terms of type, relying on the introduction of the latest technology among other things and finally, using the collective labor of women.

9.2 Achievement of Research Objectives

The major goal was achieved: The study, besides showing different lifestyle change dimensions speaking, women in waste picking trade had experienced during the lockdown in terms of economy, society, health, and work also gave an in-depth analysis on which universal patterns of impact and major contextual variations such as community organization, policy environment, and social capital were the factors that influenced the variations were revealed.

Study Secondary Objectives: The study did not only identify and examine a wide range of adaptive strategies, starting with individual coping mechanisms and community responses to those at the collective level but also by different impacts assessment; it showed that the settlements in a community that are more organized or equipped went through mild effects and bounced back sooner compared to the individuals working on their own. The form; support system evaluation highlighted the huge gaps in the form support sector and at the same time it was recorded that the community-based interventions were effective, thereby;

Theoretical Contributions: The research extends the vulnerability theory by telling the story of those waste-picking women who had to experience multiple disadvantages at the same time, and by this they created varied situations for the conditions seemed the same. It brings a much bigger contribution to resilience theory while at the same time suggesting a community-level adaptive strategy that later manifested itself as collective agency. The findings point toward the understanding of how gender operates within the tree of crisis and disaster to produce crisis patterns of impact and response.

Empirical Contributions: The study provided a very detailed evidence set of pandemic impacts that were until now mostly ignored over a population. The thorough, systematic, and particularly evidence-based synthesis across various contexts and within different time periods gives very strong supporting evidence for the understanding of crisis impacts on informal sector workers. On top of that, besides the documentation of the workers' successful adaptive strategies, the ground for the future intervention has been laid.

Methodological Contributions: The research presents a number of ways to study the population that is most at risk in the event of a crisis which among other means, the use of new methods of data collection, and the involvement of the community. The systematic review methodology that was tailored for social science research purposes is the method for the evidence synthesis from various sources on complex phenomena and the model of the process.

9.3 Policy Recommendations

9.3.1 Immediate Recommendations

Social Protection Inclusion: The informal sector workers must be brought under the social protection umbrella using very possibly simplified registration processes and community-level means of service-delivery as well. The selective exclusion of the

women waste-pickers from the COVID-19-relief programs has very acutely drawn the need for inclusive social protection systems

Health System Access: The sub-group of informal workers should be provided access to the healthcare system through varying routes such as occupational health support and preventive care being specifically offered to them. The evident ecological documentation of health access restrictions during the pandemic indicates that more comprehensive yet sustainable health care delivery models are still required.

Community Organization Support: One of the best ways to ensure that a community is resilient to future shocks is through the formation of community organizations and the development of cooperatives at the same time. The data that are so obvious and easy to understand about the connection of community organization with pandemic susceptibility points to collective actions' strengthening as a highly effective strategy for resilience.

Long-term Recommendations:

Economic Integration: Policies have to support the connection between scavenging and the waste management infrastructure so that scavenger livelihoods get secured and, in equal measure, environmental benefits get conceded. The pandemic resulted in the establishment of a formal sector for waste management and the integration of waste-picking that was raised to be very essential during the pandemic.

Access to Technology: Developing digital literacy skills on an individual level should be accompanied by an organizational capacity-building that digital inclusion programs are ideally focusing on with market access applications being the typical case. The good practice and positive technology adoption stories can be used as models for similar new digital inclusion projects.

Protection of Children's Rights: Educational assistance should be directed towards waste-picking families' children, not only by giving them access to digital learning resources and protecting them from child labor that is detrimental but also through relieving them of other hardships that lower motivation to learn. It is absolutely crucial that some action be taken regarding the reported educational interruptions in order to avoid any long-term negative impacts on the children's development.

9.4 Future Research Directions:

There is no question that extended longitudinal research tracking the same communities over multiple years would give great insights into the

long-term recovery patterns and the sustainability of the adaptive strategies. Almost all the research that is in existence now have a very brief duration of monitoring, which is only during the pandemic period; therefore, the after-effects of the pandemic are not that obvious.

One reasonable way to evaluate this policy is to compare the policies of different countries. By a systematic comparison of policy responses worldwide, the very same comparison can give clues to not just the best approaches but also the differing impacts/patterns and hence, the policy prescription, at the same time.

Climate-Pandemic Intersection: A significant and

current research area on this topic is about how pandemic adaptations may support or drive the resilience to climate change. The vulnerability of waste-picking communities to more severe climate-related risks makes it crucial to have a full picture of these intersections.

Intergenerational Impact Studies: The continuous study of educational and developmental outcomes of waste-picker family children in the long run would be very useful in shedding the light on the intergenerational effects of the pandemic. Along with the fighting of an increased child labor problem, the society should take care of a proper monitoring of long-term consequences.

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