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ADVANCES IN SOCIAL HUMANITIES RESEARCH

Earthquake Disaster Preparedness for Circular Migrant Workers in the Informal Sector in East Cempaka Putih Village, DKI Jakarta

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Abstract

Circular migrant workers employed in the informal sector represent a potentially vulnerable urban population whose mobility and limited inclusion in administrative records may restrict their access to disaster preparedness programs. This study aimed to assess earthquake disaster knowledge and preparedness among informal-sector circular migrant workers in Cempaka Putih Timur, Central Jakarta, and examine variations in preparedness across educational levels, age groups, and occupational categories. A descriptive quantitative research design was employed, involving 100 respondents selected through snowball sampling because comprehensive population data and administrative records were unavailable. Data were collected through direct observation, a 20-item multiple-choice knowledge test, and a 17-item dichotomous preparedness questionnaire. Earthquake preparedness was assessed across four dimensions: knowledge and attitudes, emergency response planning, disaster warning systems, and resource mobilization capacity. The findings revealed a persistent discrepancy between conceptual knowledge and practical disaster preparedness. Respondents with junior and senior high school education generally demonstrated higher knowledge and attitude scores than those with primary school education. However, emergency response planning, access to disaster warning systems, and resource mobilization capacity remained relatively low across educational categories. Age-based comparisons indicated that respondents in the older adult age group exhibited particularly low preparedness scores across all assessed dimensions, suggesting heightened vulnerability to earthquake-related risks. These findings highlight the need for community-based disaster preparedness training, accessible early-warning communication, occupation-specific disaster education, and targeted assistance for older circular migrant workers. Overall, the study provides contextual evidence to inform inclusive, community-based earthquake preparedness strategies for informal-sector circular migrant populations. Nevertheless, because of its descriptive design and nonprobability sampling approach, the observed differences should be interpreted as descriptive associations rather than evidence of causal relationships.

INTRODUCTION

Indonesia is highly exposed to various natural hazards, particularly earthquakes, because of its geographical position at the convergence of several active tectonic systems (Vidya et al., 2026). This tectonic setting contributes to frequent seismic activity and

creates substantial challenges for disaster risk management (Irsyam et al., 2010). However, disaster risks are determined not only by the occurrence of natural hazards but also by population exposure, socioeconomic vulnerability, and community capacities to anticipate, respond to, and recover from hazardous events (Haddow et al., 2017; Smit & Wandel, 2006). Indonesia's Law No. 24 of 2007 (Republik Indonesia, 2007) recognizes disasters as events or series of events that threaten and disrupt human lives and livelihoods, while the United Nations International Strategy for Disaster Reduction emphasizes the importance of community capacity in determining disaster impacts (UNDRR, 2009; UNISDR, 2005). Consequently, earthquakes should be understood not merely as geophysical phenomena but also as complex socioeconomic challenges requiring coordinated preparedness at individual, community, and institutional levels. Jakarta presents distinctive challenges in earthquake disaster preparedness because of its high population density, extensive infrastructure networks, and intensive economic activities. Although Jakarta is not directly situated above the major subduction zone south of Java, the metropolitan area remains exposed to seismic hazards originating from regional active faults and the southern Java megathrust system. Irsyam et al. (2010) emphasized the importance of seismic hazard mapping for disaster risk assessment and urban planning, particularly in densely populated areas where earthquake impacts may extend beyond locations near the epicenter. Accordingly, Jakarta's earthquake risk must be evaluated by considering building density, population mobility, infrastructure vulnerability, and socioeconomic conditions rather than geographical proximity to seismic sources alone.

Community preparedness constitutes a fundamental component of effective earthquake disaster risk reduction. Beyond recognizing the possibility of an earthquake, preparedness involves developing emergency response plans, identifying evacuation routes, understanding disaster warning information, securing essential supplies, and mobilizing available resources during emergencies (Rahayu et al., 2008). The preparedness assessment framework developed by LIPI-UNESCO/ISDR (2006) and discussed by Hidayati et al. (2008) identifies four principal parameters: knowledge and attitudes, emergency response planning, disaster warning systems, and resource mobilization capacity. These dimensions provide a comprehensive basis for evaluating whether individuals and communities possess the knowledge, practical skills, and resources necessary to respond effectively to earthquake hazards. Importantly, awareness of earthquake risks does not necessarily translate into adequate preparedness, as individuals may understand potential hazards without developing appropriate emergency plans or acquiring the resources needed for timely protective action.

The challenges associated with earthquake preparedness become increasingly complex among highly mobile urban populations. Jakarta serves as one of Indonesia's principal destinations for labor migration because of its concentration of economic, commercial, service, and informal employment opportunities. According to the statistical data cited in this study, approximately 18.3% of workers in Jakarta were classified as having circular or nonpermanent mobility, exceeding the reported national average of

7.3% (Badan Pusat Statistik [BPS], 2020). These mobility patterns reflect Jakarta's role as a major employment center attracting individuals who temporarily relocate for economic opportunities while maintaining social and economic connections with their places of origin. The concept of nonpermanent population mobility has been discussed by Mantra (2000), Standing (1985), and Zelinsky (1971), who examined migration patterns involving temporary residence, periodic movement, and continuing relationships with origin communities. Unlike permanent urban residents, circular migrant workers frequently occupy rented accommodations, boarding houses, employer-provided housing, relatives' residences, or other temporary living arrangements that may not be consistently reflected in official population records. In this study, circular migrants were operationally identified as individuals residing in their destination areas for periods ranging from at least 24 hours to six months without intending to settle permanently. Their continuing relationships with their communities of origin, maintained through family connections, property ownership, social networks, or economic activities, distinguish their mobility patterns from permanent migration.

Nonpermanent population mobility presents significant challenges for inclusive disaster risk management, particularly regarding population identification, emergency communication, evacuation planning, and humanitarian assistance. Alfana et al. (2020) emphasized the importance of accurate migrant population data in disaster management, noting that incomplete administrative records may complicate the identification of affected individuals, the coordination of emergency responses, and the distribution of assistance. When circular migrant workers are inadequately documented in both their places of origin and temporary destinations, local authorities may encounter difficulties determining their locations, assessing their vulnerabilities, and identifying their immediate needs during disasters. These challenges become particularly critical during the initial emergency response period, when timely information and coordinated interventions are essential for protecting affected populations. Informal-sector workers may face additional vulnerabilities because their employment arrangements frequently lack formal contracts, stable working conditions, and institutional protection mechanisms. Their livelihoods may depend on daily earnings, flexible working hours, and frequent movement across different urban locations. The occupational categories represented in this study included street vendors, parking attendants, app-based motorcycle taxi drivers, construction workers, domestic workers, tailors, shoe repair workers, motorcycle washers, mosque personnel, and barbers. This occupational diversity demonstrates that informal-sector circular migrant workers constitute a heterogeneous population with varying employment conditions, mobility patterns, socioeconomic resources, social networks, and access to disaster-related information.

The vulnerability of informal-sector workers may be further intensified by limited financial resources, unfamiliarity with temporary residential environments, and restricted participation in community-based disaster preparedness activities. Individuals dependent on daily income may experience difficulties allocating financial resources for emergency supplies or maintaining adequate disaster preparedness arrangements. Furthermore,

temporary residents may have limited knowledge of local evacuation routes, neighborhood emergency procedures, and community warning systems, particularly when their work schedules restrict participation in residential activities. Such circumstances may create discrepancies between general earthquake awareness and the practical ability to respond effectively during emergencies. Occupational characteristics may also shape access to geographical information and community networks. For example, highly mobile workers, such as app-based motorcycle taxi drivers and parking attendants, may encounter diverse urban environments and information sources, whereas workers employed primarily in private residences may have fewer opportunities to participate in neighborhood communication networks. However, these potential differences require empirical examination rather than assumptions based solely on occupational categories. Previous disaster preparedness research in Indonesia has examined various population groups and geographical contexts. Nada et al. (2022) investigated earthquake and tsunami preparedness among school communities in Banda Aceh, while Alhadi et al. (2014) examined community preparedness for earthquake and tsunami hazards in Padang, including the relevance of local knowledge and cultural practices. Paramesti (2011) highlighted the importance of disaster risk knowledge and community perceptions in the Pelabuhan Ratu Bay area, whereas Budimanto et al. (2017) investigated associations among disaster knowledge, attitudes, basic skills, and preparedness among nursing students. Collectively, these studies underscore the importance of disaster knowledge and contextual characteristics in shaping preparedness, although their findings cannot be directly generalized to highly mobile informal-sector workers.

Despite the growing body of research on community disaster preparedness, limited attention has been directed toward circular migrant workers employed in the informal sector, particularly those residing temporarily in densely populated urban environments. Previous investigations have predominantly focused on school communities, university students, healthcare personnel, and administratively registered residential populations (Alhadi et al., 2014; Budimanto et al., 2017; Labudasari & Rochmah, 2020; Nada et al., 2022; Paramesti, 2011; Zainatunnisa & Satria, 2018), leaving the preparedness conditions of highly mobile informal workers comparatively underexplored. This represents an important research gap because circular migrants may experience distinct vulnerabilities arising from temporary housing arrangements, unstable employment conditions, limited administrative recognition, and inconsistent access to community disaster preparedness programs. The contextual novelty of this study lies in its focus on informal-sector circular migrant workers as a potentially underserved population within urban disaster risk management. By examining individuals who maintain temporary residence and employment arrangements while remaining connected to their communities of origin, the research extends existing preparedness assessments beyond permanent residential populations. This perspective is particularly relevant to metropolitan areas characterized by substantial population mobility, where inclusive disaster risk reduction strategies must

account for both permanent residents and temporary populations exposed to similar environmental hazards.

Based on these considerations, this study aimed to assess earthquake disaster knowledge and preparedness among informal-sector circular migrant workers in Cempaka Putih Timur, Central Jakarta, and identify descriptive variations according to educational attainment, age group, and occupational category. The assessment focused on four preparedness dimensions: knowledge and attitudes, emergency response planning, disaster warning systems, and resource mobilization capacity. The findings were expected to provide empirical insights into the preparedness characteristics and potential vulnerabilities of circular migrant workers, thereby informing more inclusive and context-sensitive disaster risk reduction initiatives. From a practical perspective, the research sought to support local government agencies, disaster management institutions, and community organizations in developing accessible disaster education programs, strengthening emergency communication systems, and improving preparedness assistance for temporary urban populations. Academically, the study contributes contextual evidence concerning the relationship between population mobility, socioeconomic characteristics, and disaster preparedness. Nevertheless, because the research employed a descriptive design without inferential testing to establish causal relationships, differences across demographic and occupational categories were interpreted as observed patterns and tendencies rather than evidence of causal effects.

METHOD

This study employed a descriptive quantitative research design (Sugiyono, 2016) in Cempaka Putih Timur, Central Jakarta, from June to July 2025. The target population consisted of circular migrant workers employed in the local informal sector who temporarily resided or worked in the area without intending to settle permanently. Because a comprehensive population sampling frame was unavailable, the minimum sample size was estimated at approximately 96 respondents using the Lemeshow formula. A total of 100 respondents were subsequently recruited through nonprobability snowball sampling. Participants represented various informal occupational categories, including street vendors, parking attendants, app-based motorcycle taxi drivers, construction workers, and domestic service workers. The sampling approach facilitated access to a relatively mobile and administratively underrepresented population, although it limited the representativeness and generalizability of the findings.

Data were collected through direct field observations, a 20-item multiple-choice questionnaire assessing earthquake disaster knowledge, and a 17-item dichotomous questionnaire measuring disaster preparedness. The preparedness instrument comprised four dimensions: knowledge and attitudes (five items), emergency response planning (seven items), disaster warning systems (two items), and resource mobilization capacity (three items). Responses were assessed using a dichotomous scoring system based on the procedures established in the original study. Data collection involved identifying eligible participants, recruiting additional respondents through participant referrals, administering

the research instruments, and documenting relevant demographic and occupational characteristics. However, detailed instrument validity testing and numerical reliability coefficients were not reported, limiting the assessment of the instruments' psychometric properties.

Data were analyzed using descriptive statistical techniques, including frequency distributions, percentages, and preparedness-level classifications. Respondents' earthquake knowledge and preparedness scores were categorized according to the percentage-based classification criteria applied in the study. Comparisons were conducted across educational attainment, age groups, and occupational categories to identify variations in preparedness patterns. The analysis particularly examined discrepancies between earthquake knowledge and practical preparedness, including emergency response planning, access to disaster warning information, and resource mobilization capacity. Findings from occupational categories with relatively small numbers of respondents were interpreted cautiously. No inferential statistical tests or causal modeling procedures were reported. Consequently, the results were interpreted as descriptive patterns among the 100 participating circular migrant workers rather than statistically established associations or causal effects of educational, demographic, or occupational characteristics on earthquake disaster preparedness.

RESULTS AND DISCUSSION

Characteristics of Respondents and Research Areas

The characteristics of the respondents show that circular migrant workers in Cempaka Putih Timur are a heterogeneous group. Based on the latest education, 29% of respondents are elementary school graduates, 38% are junior high school graduates, and 33% are high school graduates. This composition shows that most of the respondents have primary to secondary education. Differences in education levels are important because disaster materials, information literacy, and the ability to access knowledge sources can differ between levels.

By age, 32% of respondents were in the late adolescent group of 17-25 years, 29% in early adults 26-35 years, 17% in the late adult 36-45 years, 9% in the early 46-55 years old, and 13% in the late elderly 56-65 years. Thus, the young productive age group dominated the sample, but there was also a significant proportion of the older age group. The presence of the elderly in the circular migrant group shows that nonpermanent work mobility is not only carried out by young people.

The character of the job shows a strong dominance of traders, namely 71% of respondents. The rest consist of 8% parking attendants, 6% online motorcycle taxi drivers, 5% construction workers, 5% domestic assistants, and barbers, mosque administrators, motorcycle washers, tailors, and shoe soles, 1% each. The dominance of traders affects the data structure and makes interpretation according to work need to be done carefully. Professions represented by only one respondent cannot be generalized, but still provide an overview of the variation of experiences within the informal sector.

Spatially, the research location was dominated by settlements, boarding houses and rented houses, neighborhood roads, public facilities, and centers of economic activity. This situation is relevant for circular migrant workers because temporary housing is often close to work locations or social networks of fellow migrants. In the context of a disaster, temporary attachment can cause respondents to be more familiar with work routines than environmental disaster procedures. The availability of evacuation routes, knowledge of safe points, and access to local information are important components that are not always obtained automatically just because a person has lived in an area for some time.

Table 1. Characteristics of the study respondents

Characteristics	Groups	n (%)
Education	Elementary/equivalent	29 (29%)
Education	Junior High School/Equivalent	38 (38%)
Education	High School/equivalent	33 (33%)
Age	17-25 years old	32 (32%)
Age	26-35 years old	29 (29%)
Age	36-45 years old	17 (17%)
Age	46-55 years old	9 (9%)
Age	56-65 years old	13 (13%)
Jobs	Merchant	71 (71%)
Jobs	Parking attendant	8 (8%)
Jobs	Online Motorcycle Taxi	6 (6%)
Jobs	Building workers	5 (5%)
Jobs	Domestic Assistant	5 (5%)
Jobs	Haircut	1 (1%)
Jobs	Mosque manager	1 (1%)
Jobs	Motor wash	1 (1%)
Jobs	Tailor	1 (1%)
Jobs	Shoe soler	1 (1%)

Source: research data (2025).

Knowledge and Preparedness Based on Education Level

The results of the knowledge test showed clear differences according to the level of education. In elementary school graduates/equivalent, only 17.24% of respondents were in the very good category and 17.24% in the good category. As many as 37.93% were in the fairly good category and 27.58% in the poor category. This means that only 34.48% of elementary school graduates were in the top two categories. These findings show that most of the respondents with basic education still have not strong knowledge about earthquake disasters.

In junior high school graduates/equivalent, the distribution of grades is more even. The category of very good, quite good, and not good reaches 26.31%, respectively, while the good category is 21.05%. There is no one category that is very dominant. This pattern can be read as a transition period: higher formal education than elementary school has provided a knowledge base, but the level of understanding of respondents is not yet uniform. Some respondents have high knowledge, while other groups are still at a sufficient or insufficient level.

A different pattern was seen in high school graduates/equivalent. As many as 69.69% of respondents were in the very good category and 21.21% in the good category. Only 9.09% were in the good category and no respondents were in the poor category. If the very good and good categories were combined, 90.90% of high school graduates were at a high level of knowledge. This data is one of the strongest findings in the study because it shows a consistent education gradient, especially when comparing elementary and high school graduates.

The findings support the view that formal education can expand the ability to receive, understand, and assess disaster information. However, the data do not show that education automatically results in practical readiness. This is seen when the knowledge score is compared with the four preparedness parameters. In elementary school graduates, knowledge and attitudes are at 60% and are categorized as low according to the preparedness classification. Emergency planning is 55.17%, warning system is 55.17%, and resource mobilization is only 41.37%. All parameters are in the low category, with resource mobilization close to the very low category limit.

In junior high school graduates, knowledge and attitudes reached 65.26% and were in the high category. However, three practical parameters remained low: emergency planning 54.89%, warning system 50%, and resource mobilization 51.84%. This means that knowledge improvement has not been followed by the formation of plans, access to information, and the ability to mobilize emergency needs adequately.

In high school graduates, the pattern is even more pronounced. Knowledge and attitudes reached 68.48% or high category, but emergency planning was only 54.12%, warning system 45.45%, and resource mobilization 47.48%. Thus, high school graduates who had excellent knowledge test results still showed weaknesses in the implementation aspect. This difference shows that disaster education programs do not stop enough at the delivery of concepts. Respondents also need training opportunities, information on evacuation routes, understanding of warning sources, and logistical readiness and assistance networks.

When the three levels of education were compared, education appeared to be the most strongly distinguishing aspects of knowledge. High school graduates consistently had the highest levels of knowledge, while elementary school graduates had the lowest. However, the three practical indicators did not show a comparable improvement. Even in high school graduates, the alert system and resource mobilization were still low. This pattern is in line with the framework of Paton and Johnston (2001) that preparedness is influenced not only by knowledge, but also by social conditions, experiences, resources, and environmental contexts.

In the context of circular migrants, knowledge and practice gaps can be explained through several mechanisms. First, workers may know that earthquakes are dangerous, but are unaware of local procedures in temporary residences. Second, informal workers may never participate in simulations because they are not connected to schools, offices, or formal institutions that host the exercises. Third, income limitations can reduce the ability to prepare emergency bags, logistics, insurance, or reserve funds. Fourth, disaster

information can be obtained in general through social media, but specific information regarding evacuation routes and warning systems at the environmental level is not necessarily available or understood.

These results have important implications for program design. Education that is only in the form of one-way counseling will increase knowledge, but it does not necessarily change preparedness behavior. For circular migrants, training should include simple action exercises that can be done in a short period of time: recognizing safe points during shocks, determining exit routes, recording contact numbers, identifying gathering points, preparing personal medications, and establishing a support network with colleagues or fellow temporary residents. In this way, conceptual knowledge can be translated into operational habits.

Table 2. Distribution of knowledge test results by education

Education	Excellent	Good	Pretty good	Less good
SD	17,24%	17,24%	37,93%	27,58%
Junior High School	26,31%	21,05%	26,31%	26,31%
High School	69,69%	21,21%	9,09%	0%

Source: processed from the results of the study (2025).

Table 3. Preparedness by level of education

Education	Knowledge & attitude	Contingency plan	Warning system	Resource mobilization
SD	60.00% (R)	55.17% (R)	55.17% (R)	41.37% (R)
Junior High School	65.26% (T)	54.89% (R)	50.00% (R)	51.84% (R)
High School	68.48% (T)	54.12% (R)	45.45% (R)	47.48% (R)

Remarks: T = high; R = low. Source: research results (2025).

Preparedness by Age Group

Analysis by age shows that preparedness does not move linearly from young to old. Each group has a different combination of advantages and disadvantages. In the group of late adolescents 17-25 years, knowledge and attitudes reached 66.45% and emergency planning reached 66.80%; both were in the high category. However, the warning system was only 51.61% and resource mobilization was 50.55%, both low. The young group appeared relatively good in knowledge and planning, but were not yet strong in the access to the warning system and resource readiness.

In the early adult group of 26-35 years, knowledge and attitudes reached 70%, the highest score for the parameter among the reported age group. However, emergency planning was only 52.86%, alert systems 58.33%, and resource mobilization 55.56%. All three parameters were categorized as low. This pattern shows that productive ages with relatively good access to information do not automatically have operational readiness. Work, time, income, and involvement in environmental activities can be barriers that are not measured in depth in the study.

The group of late adults 36-45 years showed the most unbalanced pattern. Knowledge and attitudes were at 67.05% or in the high category. The ability to mobilize

resources even reached 74.52% and was also in the high category. However, the emergency plan was only 49.59% and the warning system was very low, at 23.53%. The contrast between high mobilization ability and a very low warning system suggests that the ownership of networks or resources does not necessarily mean that workers have access to structured disaster information. This group may be able to rely on family, friends, funds, or experience, but have not been integrated into local information systems and procedures.

In the early elderly group of 46-55 years, knowledge and attitudes were 68.89% and emergency planning was 65.11%, both high. Alert systems and mobilization ability were 55.55% respectively and were in the low category. These findings suggest that life experiences can help shape understanding and plans, but technical limitations, technology access, and coordination ability can inhibit other parameters.

The late elderly group of 56-65 years old is the most vulnerable group. Knowledge and attitudes were recorded at 36.92%, emergency planning at 41.76%, warning systems at 34.61%, and ability to mobilize resources at 28.23%. All four are in the very low category based on the research classification. These values indicate that disaster interventions that are general in nature are at risk of not reaching the needs of the elderly group. They may face physical barriers during evacuation, limitations in using applications or digital channels, and different support networks from younger workers.

The age difference is also seen in the results of the knowledge test. The group of late adolescents had 41.93% of respondents in the very good category, early adults 33.33%, late adults 52.94%, early elderly 55.55%, and late elderly only 7.69%. In the late elderly, the good category was the largest, which was 46.15%, followed by quite good 30.77% and poor 15.38%. This pattern shows that knowledge does not always decline simply with age; experience can strengthen knowledge in late adulthood and early adulthood, but at a later age, obstacles to access to information and other limitations can arise.

Jafari (2016) emphasizes the importance of learning from disaster experiences in strengthening preparedness. In the context of this study, groups of late adults and early elderly may gain an understanding of life experiences and longer exposure to earthquake events. However, experience does not always result in integration with modern warning systems. Therefore, disaster programs for circular migrant workers need to use a combination of approaches: drawing on the practical experiences of older groups while providing technology support and easily accessible information.

For young people, the challenges are different. They have relatively easy access to digital information, but the ability to prepare emergency resources can be limited by economic conditions or the nature of work. High work mobility also makes them change locations frequently, so one evacuation route or one gathering point is not always relevant. Programs for young people can utilize digital media, simple maps, short content, and worksite-based simulations. For the elderly group, information needs to be simplified, repeated, delivered through non-digital channels, and associated with the support of people around them.

Age data confirm that uniform preparedness policies will result in different effectiveness. One common module may be too basic for certain groups, but too complex for others. Age-sensitive interventions need to consider physical capacity, experience, information acquisition habits, and the ability to use technology. Such approaches are becoming increasingly important in circular migrant groups because they do not always have nuclear families near the work site.

Table 4. Preparedness by age group

Age	Knowledge & attitude	Contingency plan	Warning system	Resource mobilization
17-25	66.45% (T)	66.80% (T)	51.61% (R)	50.55% (R)
26-35	70.00% (T)	52.86% (R)	58.33% (R)	55.56% (R)
36-45	67.05% (T)	49.59% (R)	23.53% (SR)	74.52% (T)
46-55	68.89% (T)	65.11% (T)	55.55% (R)	55.55% (R)
56-65	36.92% (SR)	41.76% (SR)	34.61% (SR)	28.23% (SR)

Description: T = high; R = low; SR = very low. Source: research results (2025).

Preparedness by Type of Job

The type of work also showed important variation. On the knowledge test, traders had the most diverse distribution: 26.76% were in the very good category, 21.17% were good, 29.57% were good, and 22.53% were poor. Since traders made up 71% of all respondents, this distribution showed that the largest group in the sample did not have a uniform level of knowledge. Some traders had a good understanding of disasters, but more than half were still in the good or poor category when the categories were combined.

Online motorcycle taxi workers showed very high knowledge results, namely 83.33% were in the very good category and 16.67% in the good category. Parking attendants showed the same percentage distribution. In construction workers, all respondents were recorded in the very good category. Domestic assistants had a distribution of 40% very good, 20% good, and 40% quite good. Professions represented by only one respondent produced a single score: hairdressers were very good, mosque administrators were not good, shoe solers were good enough, tailors were good, and motorcycle washers were good. The results of a group of one respondent cannot be used for generalization, but confirm heterogeneity in the informal sector.

The high level of knowledge of a particular job can be related to the character of the job. Online motorcycle taxis interact with digital applications, maps, news, and many urban areas. Parking attendants are in public spaces and interact with many people. Building workers work closely with physical structures and safety practices. However, this study did not measure exposure to information or training specifically for each profession, so the explanation should be understood as contextual interpretation, not evidence of cause and effect.

For preparedness, this article groups respondents into traders and non-trader informal workers. In traders, knowledge and attitudes are at 62.53% and are in the high category. Emergency planning is 56.33% and resource mobilization is 52.11%, both low. The alert system is even only 42.96% and is in the very low category. This pattern is

important because traders are the largest group in the study. They have a sufficient basic understanding, but are weakest in their connection to the warning system.

In non-trader workers, knowledge and attitudes were 67.59% and were in the high category. The other three parameters remained low: emergency planning 56.17%, alert system 56.90%, and resource mobilization 57.48%. Compared to traders, the warning system in the non-trader group was higher, but it was not yet in the high category. Thus, the two main occupational groups showed the same general pattern: knowledge was higher than practical readiness.

The gap in traders can be understood from their working conditions. Traders can work long hours, depending on the location of the business, and prioritise the sustainability of income. The time to attend formal training is limited, while disaster warning information is not necessarily available at the trading location. Street vendors or small traders may also face the dilemma between saving themselves and safeguarding the merchandise that is the main capital. In the research questionnaire there was a question about the rescue of valuables, which suggests that economic considerations can intersect with safety decisions.

For non-trade workers, low emergency plans and resource mobilization indicate that better mobility or access to information is not enough. A worker can use a smartphone every day, but does not have a family communication plan during an earthquake. Workers can know earthquake news, but do not know the nearest gathering point. Workers may also have an extensive social network, but have never discussed the division of roles during disasters. Preparedness requires transforming information into procedures.

Findings by work provide the basis for different intervention strategies. Traders can be reached through markets, business locations, associations, environmental managers, and community activities. Online motorcycle taxis can be reached through digital channels or driver gathering points. Construction workers can obtain disaster materials that are integrated with occupational safety. Domestic assistants require approaches that can enter the domestic environment, for example through RT/RW, environmental managers, or short, independently accessible materials. The very small professional groups in the sample need to be further researched before designing specific interventions.

The results of the study also show that the warning system is one of the weakest components. In traders the value is very low, while in some age groups it is even lower. This suggests problems not only in the ability of the individual, but possibly also in the connection with information channels. Migrant workers who live temporarily may not be members of citizens' communication groups, do not attend neighborhood meetings, or do not know official sources of information. When a disaster strikes, delays in information can increase confusion, especially if the worker is far from a temporary residence.

Therefore, urban preparedness systems need to think about how information can reach people who are not registered as permanent residents. Warning channels should be easy to find, accessible without residency requirements, and understood by workers with different educational backgrounds. Information can be placed in markets, terminals, bases, places of worship, boarding houses, rented houses, and centers of economic

activity. Temporary housing managers can also be involved to convey emergency procedures to new residents.

Findings on resource mobilization also show consistent weaknesses. Readiness of funds, logistics, medicines, P3K, and relief networks requires economic and planning capabilities. Informal workers whose income is not fixed may view an emergency fund as a secondary need rather than a daily expenditure. Therefore, preparedness messages need to be realistic and not demanding expensive equipment. Simple emergency bags, storage of essential medications, copies of documents, contact numbers, drinking water, and meeting point agreements can be designed at a low cost.

Overall, the analysis of employment reinforces the study's main conclusion: cognitive capacity is better than operational capacity. This phenomenon does not mean that disaster education fails, but it does suggest that education must be linked to training, access to information, and resources. Circular migrant workers need a flexible approach because they live between two social spaces: the home area and the destination area. Programs that are only permanent domicile-based will easily miss them.

Table 5. Preparedness of traders and non-trader informal workers

Working groups	Knowledge & attitude	Contingency plan	Warning system	Resource mobilization
Merchant	62.53% (T)	56.33% (R)	42.96% (SR)	52.11% (R)
Non-Merchant	67.59% (T)	56.17% (R)	56.90% (R)	57.48% (R)

Remarks: T = high; R = low; SR = very low. Source: research results (2025).

Integrative Discussion and Policy Implications

When the results based on education, age, and employment are read in an integrated manner, three major patterns are seen. First, knowledge is a relatively stronger component than other components of preparedness. Many subgroups achieve high categories in knowledge and attitudes, but remain low in emergency plans, warning systems, or resource mobilization. Second, certain groups have sharper vulnerabilities, especially the late elderly and elementary school graduates. Third, the problem of the warning system appears repeatedly in several groups, so it needs to be seen as a problem of access and integration, not just a lack of individual knowledge.

The first pattern emphasizes the difference between knowing and being able to do. In disaster education, information about the cause of an earthquake, building hazards, or basic actions during a shock is important. However, practical preparedness demands skills built through experience and practice. A person can answer knowledge questions correctly but has never practiced outside the building, has not determined a family meeting point, or has not prepared basic needs. Therefore, the results support the importance of repetitive and contextual exercises.

Dodon (2013) places preparedness as an action that makes the response more effective when a disaster occurs. Hidayati et al. (2008) also show that preparedness includes several complementary components. If only one parameter is strong, the preparedness system still has gaps. In circular migrant workers, these gaps become more important because they may not have stable formal support in the destination area.

The second pattern relates to capacity inequality. Elementary school graduates have low preparedness scores on all indicators, while the final elderly are in the very low category. This group needs an affirmative approach, not just receiving the same material as other groups. Visual materials, simple language, hands-on demonstrations, and short exercises are more appropriate than long theoretical explanations. Mentoring can utilize neighborhood leaders, co-workers, boarding house owners, or trusted community members.

Especially for the terminally elderly, preparedness must include aspects of physical limitations. Evacuation routes that are theoretically safe are not necessarily able to be taken quickly by workers with mobility limitations. Information systems that are only application-based can also exclude them. Therefore, inclusive disaster design needs to use a combination of digital and non-digital media and ensure that there are people who can help vulnerable groups.

The third pattern is the weak warning system. Very low scores in the group of late adults and traders indicate that information channels have not been perceived as part of daily readiness. Alert systems should be understood as a communication ecosystem. Official information needs to reach people in markets, streets, workplaces, rented houses, and public spaces. Migrant workers should not rely solely on information from families in the area of origin or social media that is not always verified.

This condition is related to the problem of data collection. Alfana et al. (2020) emphasize the urgency of migrant worker data in disaster situations. Data collection does not have to be interpreted as burdensome administrative control, but can be positioned as a protection mechanism. A simple registration system at the environmental or temporary residence level can help with information dissemination, needs mapping, and post-disaster search. However, the system needs to be designed with high mobility and the possibility of workers moving.

The results of the study also show the need to build preparedness in informal work sites. So far, disaster programs are often easier to implement in schools, offices, hospitals, or formal institutions because there is an organizational structure and a list of members. The informal sector does not have the same structure. Therefore, the intervention model needs to move to the space where workers are actually located. Markets, motorcycle taxi bases, shopping areas, places of worship, construction sites, boarding houses, and rented environments can function as educational points.

A work-based approach will help make the material more relevant. Traders need strategies to prioritize personal safety without getting stuck rescuing merchandise. Online motorcycle taxis require an understanding of safety when on the road or outside of familiar territory. Building workers need to relate earthquake hazards to the risk of structures, falling materials, and evacuation procedures. Domestic assistants need to recognize safe points and exit routes in the home where they work. These differences show that preparedness is not enough to convey with one common message.

In terms of policy, the research results support strengthening collaboration between the village government, BPBD, RT/RW, boarding or lease owners, market managers,

worker communities, and local business actors. The government does not have to organize all training directly; what is important is to ensure that standard information, materials, and referral channels are available. Local communities can be an extension that reaches workers who are not bound by formal institutions.

Non-formal education becomes the most realistic strategy. Programs can be created in 20-30 minute sessions with core materials, demonstrations, and simple simulations. Materials can be repeated periodically as the migrant population changes. Static posters need to be equipped with QR codes leading to evacuation maps or official information, but non-digital alternatives must still be available. Information can be created in simple, action-oriented language: what to do in the event of a shock, where to move after a shock, how to contact family, and what to prepare.

Preparedness also needs to be seen as a process, not a one-time training result. Migrant workers can come and go, so one annual activity is not enough. A brief disaster orientation for new residents of boarding houses or rented houses can be a simple innovation. Residence managers can indicate exits, open areas, gathering points, and emergency numbers. In markets or trade centers, managers can install easy-to-read evacuation maps and conduct simulations that do not interfere excessively with economic activities.

The research findings are in line with the idea that community resilience requires a combination of knowledge, social networks, resources, and adaptability. Paton and Johnston (2001) emphasize the relationship between vulnerability, resilience, and preparedness. For circular migrant workers, social networks can serve as important assets. Co-workers and fellow migrants can be a source of information, evacuation assistance, and post-disaster support. Preparedness programs can leverage existing networks rather than constantly building new structures.

The study also shows that circular migrant groups cannot always be described as vulnerable in all aspects. Some groups demonstrate excellent knowledge or high mobilization skills. This means that they have social assets and experience that can be used in programs. A strengths-based approach is more productive than just looking at shortcomings. Knowledgeable workers can be engaged as community mobilizers, while those with broad mobility can help with the dissemination of information.

However, the interpretation of the results should take into account the nature of the sample. Snowball sampling is used because the population is unknown and difficult to record. This technique is effective for finding respondents, but it can result in concentration on specific social networks. The dominance of traders of 71% also makes the overall results strongly influenced by this group. Therefore, advanced research needs to expand the territory, balance the types of work, and use designs that allow for stronger comparisons.

In addition, the percentage categories used in this study have relatively specific thresholds. A value of 60%, for example, is categorized low because the high category starts at 62.60%. Interpretations should not look at category labels without paying attention to their numerical values. Traders with 62.53% were just below the 62.60%

threshold, but in the results of the study were noted as high on certain sections. Small differences around category boundaries suggest that substantive analysis is more important than labels. This article retains the original values and categories used in the table of research results, but emphasizes general patterns rather than debates over very small differences.

From a policy perspective, the results of the research lead to five main needs. First, inclusive disaster literacy for basic education. Second, simulations and practical exercises that can turn knowledge into action. Third, information and warning systems that do not depend on domicile status. Fourth, special interventions for elderly workers. Fifth, light and dynamic data collection mechanisms for circular migrant workers. These five needs are complementary and cannot be replaced by just one program.

If applied consistently, these interventions can strengthen preparedness not only for circular migrant workers, but also for other urban groups with high mobility. Large cities are increasingly populated by people moving between where they live, work, and their areas of origin. Today's disaster risk management needs to acknowledge this reality. Inclusive urban preparedness must be designed based on who was actually in the city when a disaster occurred, not just who was recorded as a permanent resident.

Table 6. Directions of preparedness interventions based on research findings

Main problems	Groups that need to be prioritized	Direction of intervention
Basic knowledge is not yet strong	Elementary school graduates; some traders	Visual, short, repetitive, and action-based non-formal education
Low contingency plan	junior high school/high school; early adult; trader/non-trader	Simulation of evacuation routes, gathering points, family communication, P3K
Low alert system access	Traders; late adults; elderly	Multi-platform information channels, local information boards, cost/market/RT-RW integration
Low resource mobilization	Graduates of ELEMENTARY/JUNIOR HIGH/HIGH SCHOOL; young and elderly	Simple logistics preparation, relief network, gradual emergency fund
Elderly vulnerability	Late elderly	Evacuation assistance, non-digital materials, buddy system, special training for vulnerable groups

Source: author's synthesis based on research results (2025)

Limitations Of Research

The study has several limitations. First, the design used is descriptive so it cannot prove a causal relationship between education, age, type of work, knowledge, and preparedness. The difference in percentages between groups only shows patterns in the respondents studied. Second, the snowball sampling technique was chosen because the circular migrant population is difficult to record, but this technique can produce network bias because respondents tend to recommend individuals who are in the same social circle.

Third, the distribution of job types is unbalanced. Traders account for 71% of respondents, while some jobs are represented by only one person. The findings for professions with very small number of respondents cannot be generalized. Fourth, the preparedness instrument uses dichotomous answers so that it has not captured variations in intensity, plan quality, or depth of respondents' experiences. Fifth, the study did not examine other factors such as length of stay in Jakarta, direct experience of earthquakes, marital status, income, quality of residence, smartphone ownership, and involvement in the community.

CONCLUSION

The findings from 100 informal-sector circular migrant workers in Cempaka Putih Timur, Central Jakarta, revealed variations in earthquake disaster knowledge and preparedness across educational levels, age groups, and occupational categories. Although respondents demonstrated varying degrees of conceptual awareness regarding earthquake hazards, this knowledge did not consistently translate into adequate practical preparedness. Emergency response planning, access to disaster warning systems, and resource mobilization capacity generally remained less developed than disaster knowledge and awareness. Respondents aged 56–65 years exhibited particularly low preparedness scores across all four assessed dimensions, indicating potential vulnerabilities among older circular migrant workers. Other age groups demonstrated inconsistent preparedness patterns, suggesting differences in their capacity to anticipate and respond to earthquake emergencies. These findings highlight the importance of addressing the gap between disaster awareness and practical readiness through targeted, accessible, and context-sensitive preparedness initiatives. Nevertheless, because the study employed nonprobability snowball sampling and descriptive statistical analysis, the observed differences could not establish causal relationships or provide population-representative estimates for all circular migrant workers in Jakarta.

Future research should employ broader and more diverse recruitment strategies, establish the validity and reliability of earthquake knowledge and preparedness instruments, and evaluate the effectiveness of community-based disaster education, practical evacuation simulations, and accessible early-warning communication systems through longitudinal or intervention-based research designs. Disaster management authorities, neighborhood administrative units, market managers, accommodation providers, and informal worker associations should collaborate to strengthen inclusive earthquake preparedness programs. Recommended interventions include providing clear evacuation route information, establishing accessible emergency communication channels, disseminating emergency contact information, and conducting brief, practical disaster response drills adapted to workers' varying schedules and occupational conditions. Particular attention should be given to older circular migrant workers and individuals whose temporary residential status limits their participation in neighborhood preparedness activities. Strengthening coordination among local institutions and informal worker communities may improve access to disaster risk information, enhance

emergency response capacity, and promote more equitable disaster preparedness among mobile urban populations.

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AUTHOR'S CONTRIBUTION

The author fully contributes to the formulation of the main idea idea, collects library data, analyzes and interprets the primary text of the figure, and prepares the manuscript. All authors have agreed on the final version of the manuscript.

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