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Original Article

The Impact of Gold Mining on the Socioeconomic and Cultural Conditions of Gold Mine Workers in Paya Ateuk Village, Pasie Raja District, South Aceh Regency

Lensoni Lensoni[1*], Saufa Yarah[2], Ahul Ikbar[3]

[1]Public Health Study Program, Faculty of Health Sciences, Universitas Abulyatama, Indonesia
[2]Midwifery Study Program, Faculty of Health Sciences, Universitas Abulyatama, Indonesia
[3]Public Health Study Program, Faculty of Health Sciences, Universitas Abulyatama, Indonesia
Email: [1)] soni@abulyatama.ac.id

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Abstract

Gold mining provides employment and income opportunities but may also be associated with changes in the social and cultural lives of mining workers. This study examined the association between mining location distance and the socioeconomic and cultural conditions of gold mine workers in Gampong Paya Ateuk, Pasie Raja Subdistrict, South Aceh Regency, Indonesia. A quantitative observational analytical study with a cross-sectional design was conducted among 47 gold mine workers selected through total sampling. Data were collected using questionnaires and analyzed through univariate analysis and bivariate Chi-Square tests. Most respondents (39; 83.0%) worked at mining locations more than 1 km away, while 8 (17.0%) worked at locations less than 1 km away. Regarding socioeconomic conditions, 44 respondents (93.6%) reported incomes above the Regional Minimum Wage (UMR), while 3 (6.4%) reported incomes below it. Most respondents (45; 95.7%) also had high cultural scores, whereas 2 (4.3%) had low scores. The analysis identified a statistically significant association between mining distance and socioeconomic conditions ($p = 0.018$), with a higher proportion of workers at locations more than 1 km away reporting incomes above the UMR. However, no statistically significant association was found between mining distance and cultural aspects ($p = 0.513$). These findings indicate that mining distance is associated with workers' socioeconomic conditions but that the study did not establish a statistically significant association with cultural aspects. Because of the cross-sectional design and single-village sample, findings should be interpreted cautiously and not generalized beyond this context.

Keywords: Culture, Gold Mining, Mine Workers, Mining Distance, Socioeconomic Conditions.

1. Introduction

The World Health Organization (WHO) regards artisanal and small-scale mining (ASM) as one of the most dangerous occupations in the world, and the World Bank estimates that 100 million children, women, and men work in the sector, mostly in remote, low-income rural areas and lower-middle-income countries. Miners often work under extreme conditions, and the communities in which they live are heavily polluted, with high rates of preventable disease, injury, and premature death. Paradoxically, small-scale mining is growing rapidly, and one of its main drivers is climate change mitigation (Landrigan et al., 2022). or many rural households with few alternatives, mining nonetheless remains an accessible source of income that is difficult to leave once adopted (Meutia et al., 2022). This tension between economic

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opportunity and social, environmental, and health risk lies at the heart of debates on the sector's sustainability (Fisher et al., 2021).

In Indonesia, artisanal and small-scale gold mining operates across thirty provinces and provides work and income for more than two million people (Meutia et al., 2022). Much of this activity takes the form of unlicensed gold mining (PETI), which is consistent with global estimates that most small-scale gold miners are not officially recognized, registered, or protected by state law (Prescott et al., 2022). PETI relies on mercury to separate gold from rock through amalgamation, and it has produced pollution hotspots across the country, with mercury polluting waters, sediments, and biota and ultimately affecting human health (Bagia et al., 2022). Mercury pollution cases linked to illegal gold mining have been documented in Kalimantan and Papua (Lensoni et al., 2023). At the same time, people's gold mining is reported to improve household economic conditions in several regions, including North Minahasa, East Bolaang Mongondow, Central Kalimantan, and Mandailing Natal. Studies there describe higher household income, new employment opportunities, and greater purchasing power, and communities that previously relied on agriculture or informal work have moved into mining because it is seen as more economically promising (Kereh et al., 2023). Research from Aceh likewise reports rising incomes among those involved in illegal mining, alongside environmental damage and vulnerability to disasters (Syahnur & Diantimala, 2021).

From a public health perspective, the main concern for mining workers is occupational mercury exposure. About 80% of exposure occurs through inhalation of mercury vapor (Lensoni et al., 2023). During amalgam burning, elemental mercury evaporates, is inhaled, is absorbed through the alveoli into the bloodstream, and is distributed to organs including the lungs, brain, and kidneys. Exposure may also occur through methylmercury-contaminated fish and skin contact, and inhalation can cause irritation and lasting damage to lung tissue (Ekawanti & Priyambodo, 2020). Exposure is not necessarily confined to those who mine. A recent biomonitoring study in Sukabumi found no significant difference in hair or urine mercury between miners and non-miners, which points to community-wide exposure where processing takes place near homes (Harianja et al., 2025). Health risk is therefore embedded in the everyday conditions under which mining communities live and work. This makes it important to understand those conditions themselves, rather than exposure levels alone.

The economic and social dimensions of gold mining are closely intertwined. Workers and their families may benefit from income, job opportunities, and the ability to meet household needs, improve housing, and finance children's education (Karaskalo, 2023; Novendra et al., 2021). Limited employment opportunities and low incomes push many communities to make mining their main livelihood (Novendra et al., 2021). Evidence from other settings shows that livelihood shifts toward mining can improve socioeconomic conditions while also disrupting agricultural production and rural labor relations (Bansah et al., 2023), and that their consequences are uneven across households (Adranyi et al., 2023). Short-term gains do not necessarily translate into long-term wellbeing. Mining livelihoods rest on non-renewable resources and may become harder to sustain as deposits decline (Pedersen et al., 2021), and the work remains precarious (Fisher et al., 2021).

Unlicensed mining also contributes relatively little to regional economic growth and conflicts with legal provisions, yet it persists under strong economic pressure on families (Siregar et al., 2023). Mining may also be accompanied by social change and long-term economic and environmental risk (Kereh et al., 2023). Reported social consequences include reduced participation in village social activities, because time and energy are absorbed by mining, and environmental damage from careless disposal of mining waste that may affect

public health (Sudiyarti et al., 2021). A shift from agriculture to mining may also alter social structure, family interaction, and work-culture values that were once rooted in community life, and ethnographic work in Indonesian Borneo has framed gold rushes in terms of hope and the risks of living alongside one another (Schreer, 2020). These changes should not be assumed to occur uniformly in every setting, and they may differ across households and localities.

Taken together, previous research has established that gold mining in Indonesia, including Aceh, is associated with income gains, livelihood shifts, environmental damage, and mercury exposure (Harianja et al., 2025; Karaskalo, 2023; Meutia et al., 2022). What remains less well understood is how economic benefits, changes in social and cultural life, and health-related risks are experienced together by mining workers in a specific local setting. In the literature reviewed here, these dimensions have been examined largely in separate strands: economic outcomes, environmental pollution, and biomedical exposure. Evidence from particular community and health-service contexts therefore remains limited. Knowing how these dimensions coexist is relevant to local planning, community health programs, and efforts to support more sustainable livelihoods. This study addresses that need by focusing on the socioeconomic and cultural conditions of gold mining workers in a defined local setting, with attention to their implications for public health.

The study was conducted in the working area of the UPTD Puskesmas Ujung Padang Rasian in South Aceh Regency. The area is hilly and partly lies within a river basin where people's gold mining takes place. Most residents depend on agriculture and traditional mining for their livelihoods. Access to health facilities remains limited in several villages, so the puskesmas serves as the main health service center for the community. Gold mining in this area is related not only to household income but also to changes in social interaction patterns, lifestyle, and local community values. Describing this setting is therefore important for understanding the research context. This study aims to examine the socioeconomic and cultural conditions associated with gold mining among workers in the working area of the UPTD Puskesmas Ujung Padang Rasian.

2. Literature Review

2.1. Gold Mining, Socioeconomic Conditions, and Economic Impacts

Gold mining covers exploration, exploitation, and the processing of ore, using either traditional tools or modern technology. In Indonesia, people's gold mining is an important alternative livelihood in rural areas with limited formal employment (Fikri et al., 2023) , and it is often the main source of income and a driver of social change (Gumanti, 2024). Mining is either licensed or unlicensed (PETI). PETI carries higher social, economic, and environmental risks because supervision and technical standards are lacking (Efendi et al., 2023). It also encourages a livelihood shift from agriculture and other informal work toward mining (Meutia et al., 2023). Socioeconomic condition reflects income, livelihood, education, and access to resources, and it shapes welfare and the ability to meet basic needs (Connolly & Lindh, 2025).

Mining can raise household income, create jobs, and increase purchasing power (Oktryaningsih et al., 2024). These gains are unstable, however, as mining-based economies remain exposed to production and commodity conditions (Komba et al., 2025). Dependence on mining can also weaken traditional livelihoods such as agriculture and reduce household resilience when mining declines (Meutia et al., 2022). Locally managed institutions, such as village-owned enterprises (BUMDes), can help cushion this dependence (Ibrahim et al., 2022).

2.2. Social and Sociocultural Impacts of Gold Mining

Mining can change interaction patterns in families and communities, increase in-migration of workers, and cause conflicts over land and resources (Ambarak et al., 2024). Workers using traditional methods face health and safety risks, which makes legal protection and compensation after work accidents part of their social and economic security (Lecia et al., 2025). Sociocultural aspects (values, norms, and habits) can shift as the economic structure changes, including consumption patterns and social relations (Ibrahim & Zitri, 2024). Views on work may also move from subsistence toward monetary income, reducing participation in *gotong royong* and traditional ceremonies because time is spent on mining-related work (Ambarak et al., 2024).

2.3. Theoretical Framework

Three theories frame this study. Economic development theory holds that extractive and primary sectors can drive regional growth through income and employment (Rostow, 1991). Social change theory holds that shifts in material conditions alter social and cultural structures, with non-material culture adjusting more slowly (Ogburn & Thomas, 1922). Social determinants of health theory holds that income and type of work affect health, especially in high-risk occupations (Marmot & Wilkinson, 2006; World Health Organization [WHO] Commission on Social Determinants of Health, 2008; Mekel & Korua, 2025) illustrate its application to mining workers in Indonesia.

Recent studies show that gold mining in North Minahasa raised income but harmed environmental quality and health. In Kotabunan, North Sulawesi, it changed social, cultural, and economic structures, and PETI in Central Kalimantan had notable negative socioeconomic and environmental impacts (Kereh et al., 2023). This study is novel because it examines the distance of mining sites from housing, the influence of gold mining on socioeconomic conditions, and sociocultural change among mining workers in Paya Ateuk Village, Pasie Raja District, South Aceh, which has rarely been studied. It integrates socioeconomic and sociocultural aspects with mining workers as the main subjects, within a public health service area, and uses statistical analysis rather than description alone.

3. Methods

This research employed a quantitative approach with an observational analytical method and a cross-sectional design. It aimed to analyze the influence of gold mining activities on the socioeconomic and cultural conditions of gold mine workers in Paya Ateuk Village, Pasie Raja District, South Aceh Regency, measured at a single point of observation. The research was conducted in Gampong Paya Ateuk, Pasie Raja District, South Aceh Regency, specifically at gold mining sites and among the gold mine workers located there. It took place from April to May 2026, encompassing the preparation stage, data collection, data processing, and the preparation of the research report.

The population in this research consisted of all gold mine workers in Gampong Paya Ateuk, Pasie Raja District, South Aceh Regency, including individuals actively engaged in gold mining activities as miners, processors, or other supporting workers whose economic activities depend on the local gold mining sector, totaling 47 people.

The sample represents the portion of the population studied as the research object. Given constraints of time, effort, and cost, not all members of the population could be examined. The number of samples in this research was set at 47 respondents, consistent with the data of Lensoni et al. (2023), which is considered representative of the population and capable of providing data relevant to the influence of gold mining on the improvement of

socioeconomic conditions and sociocultural change among gold mine workers. The sampling technique used was total sampling, a technique in which the entire population is taken as the sample.

This technique was chosen because not all members of the population met the criteria for gold mine workers. The sample criteria in this research were as follows: workers actively engaged in gold mining in Gampong Paya Ateuk, Pasie Raja District, South Aceh Regency; those who had worked as gold miners for at least one year, so as to be considered capable of understanding socioeconomic and cultural conditions before and after working in the mine; and those willing to serve as research respondents. The number of samples in this research was set at 47 respondents, who are considered representative of the population and capable of providing data relevant to the influence of gold mining on the improvement of socioeconomic conditions and sociocultural change among gold mine workers.

The instruments used in this research consisted of a socioeconomic and cultural questionnaire, used to collect data related to income, social conditions, and cultural change among gold mine workers; an informed consent sheet, used as proof of respondents' agreement to participate in the research; and a respondent identity sheet, used to record respondent characteristics such as age, education, and length of time working as a miner. The questionnaire instrument was prepared by the researcher and served as the main data collection tool.

The gold mining variable is defined as gold mining and processing activities, measured based on the duration of work and type of work performed. Socioeconomic condition is defined as the economic state of mining workers, assessed through income level, type of livelihood, and level of education. Meanwhile, the sociocultural variable refers to the pattern of community values and behavior, measured through social habits and forms of cultural interaction that develop (Oktryaningsih et al., 2024).

The collected data were analyzed in stages using univariate and bivariate analysis with the assistance of statistical software. Univariate analysis was used to describe respondent characteristics and the distribution of socioeconomic and cultural variables in the form of frequency and percentage, using the following formula:

$$P = (f / n) \times 100\%$$

Description:
P = percentage
f = frequency of respondents in a category
n = total number of respondents

Bivariate analysis was used to determine the influence of gold mining on the socioeconomic and cultural conditions of gold mine workers, using the Chi-Square formula as follows:

$$\chi^2 = \Sigma [(O - E)^2 / E]$$

Description:
χ^2 = Chi-Square value
O = observed frequency
E = expected frequency

Decisions were made based on the significance value (p-value): an influence was considered to exist if $p \leq 0.05$, whereas no influence was considered to exist if $p > 0.05$.

4. Results and Discussion

4.1. Research Results

This research was conducted on 47 gold mine worker respondents located in Gampong Paya Ateuk, Pasie Raja District. The research results are presented in the form of univariate and bivariate analysis.

Table 1. Distribution of Respondent Characteristics by Age, Gender, Education, Length of Work, and Employment Status

Characteristic	Frequency (f)	Percentage (%)
Age		
< 20 years	4	8.5
20-30 years	17	36.2
31-40 years	19	40.4
> 40 years	7	14.9
Gender		
Male	47	100.0
Last Education		
No Schooling	4	8.5
Elementary School	5	10.6
Junior High School	17	36.2
Senior High School	17	36.2
University	4	8.5
Length of Work		
< 1 year	7	14.9
1–3 years	18	38.3
4–6 years	17	36.2
> 6 years	5	10.6
Employment Status		
Permanent miner	39	83.0
Non-permanent miner	8	17.0
Total	**47**	**100.0**

Source: Primary Data (2026)

Based on Table 1, of the 47 respondents, the majority fell within the 31–40 year age group (19 people, 40.4%), followed by the 20–30 year age group (17 people, 36.2%), the >40 year age group (7 people, 14.9%), and the <20 year age group (4 people, 8.5%). This indicates that the majority of gold mine workers are of productive age.

In terms of gender, all respondents were male (47 people, 100.0%), indicating that gold mining work at the research location is dominated by male labor. Regarding the last level of education, the majority of respondents had completed junior high school or senior high school, each accounting for 17 people (36.2%). This was followed by respondents with elementary school education (5 people, 10.6%), while those with no formal schooling and those with university education each numbered 4 people (8.5%).

In terms of length of work, the majority of respondents had worked for 1–3 years (18 people, 38.3%), followed by those with 4–6 years of work experience (17 people, 36.2%), <1 year (7 people, 14.9%), and >6 years (5 people, 10.6%). Regarding employment status, the majority of respondents were permanent miners (39 people, 83.0%), while non-permanent miners accounted for 8 people (17.0%), indicating that most respondents held permanent employment status in gold mining activities in the research area.

Table 2. Distribution of Respondents by Mining Distance

Mining Distance	Frequency (n)	Percentage (%)
< 1 km	8	17.0
> 1 km	39	83.0
Total	**47**	**100.0**

Source: Primary Data (2026)

Based on Table 2, it is known that from a total of 47 respondents, the majority had mining locations at a distance of more than 1 km, namely 39 people (83.0%). Meanwhile, respondents who had mining locations at a distance of less than 1 km numbered 8 people (17.0%). These results show that the majority of gold mine workers in Gampong Paya Ateuk, South Aceh Regency, carry out mining activities at locations more than 1 km away. This condition indicates that most respondents must travel a relatively farther distance to reach the mining location, which may be influenced by the location of gold reserves, the availability of mining areas, and the potential for greater mining yields in more distant areas.

Table 3. Distribution of Respondents by Socioeconomic Condition

Socioeconomic	Frequency (n)	Percentage (%)
Below UMR*	3	6.4
Above UMR	44	93.6
Total	**47**	**100.0**

*UMR: Regional Minimum Wage

Source: Primary Data (2026)

Based on Table 3, it is known that from a total of 47 respondents, the majority had socioeconomic conditions with income above the UMR, namely 44 people (93.6%). Meanwhile, respondents with income below the UMR numbered 3 people (6.4%). These results show that the majority of gold mine workers in Gampong Paya Ateuk, South Aceh Regency, have income levels above the Regional Minimum Wage (UMR). This condition indicates that gold mining activities make a fairly large contribution to increasing the income and economic welfare of most workers, although there are still a small number of respondents who earn income below the UMR.

Table 4. Distribution of Respondents by Cultural Aspect

Culture	Frequency (n)	Percentage (%)
Low	2	4.3
High	45	95.7
Total	**47**	**100.0**

Source: Primary Data (2026)

Based on Table 4, it is known that from a total of 47 respondents, the majority had a high cultural aspect, namely 45 people (95.7%). Meanwhile, respondents with a low cultural aspect numbered 2 people (4.3%). These results show that the majority of gold mine workers in Gampong Paya Ateuk, South Aceh Regency, have a high cultural aspect. This condition indicates that despite working as gold miners, most respondents still maintain the cultural values that apply in society, such as maintaining social relations, respecting traditional customs, and continuing to participate in social and cultural activities in their place of residence. Nevertheless, there are still a small number of respondents who have a low cultural aspect, which may be influenced by differences in the level of participation in social activities and lifestyle changes due to mining activities.

Table 5. Relationship Between Mining Distance and Socioeconomic Condition of Gold Mine Workers

Mining Distance	Socioeconomic		Total	P-value
	Below UMR n (%)	Above UMR n (%)		
< 1 km	2 (25.0%)	6 (75.0%)	8	0.018
> 1 km	1 (2.6%)	38 (97.4%)	39	0.018
Total	**3 (6.4%)**	**44 (93.6%)**	**47**	**0.018**

Source: Primary Data Processed (2026)

Based on Table 5, it is known that of the 8 respondents who had a mining distance of less than 1 km, 2 people (25.0%) had socioeconomic conditions with income below the UMR, while 6 people (75.0%) had income above the UMR. Meanwhile, of the 39 respondents who had a mining distance of more than 1 km, 1 person (2.6%) had income below the UMR and 38 people (97.4%) had income above the UMR.

The Chi-Square test results show a p-value = 0.018 ($p < 0.05$), so H_0 is rejected and H_1 is accepted. Thus, it can be concluded that there is a significant relationship between mining distance and the socioeconomic conditions of gold mine workers in Gampong Paya Ateuk, South Aceh Regency. These results show that workers who carry out mining activities at locations more than 1 km away tend to have better socioeconomic conditions, as shown by a higher proportion of income above the UMR compared to workers with mining distances of less than 1 km. This indicates that farther mining locations likely have greater mining yield potential, thereby contributing to increased worker income.

Table 6. Relationship Between Mining Distance and Cultural Aspect of Gold Mine Workers

Mining Distance	Culture		Total	P-value
	Low n (%)	High n (%)		
< 1 km	0 (0%)	8 (100%)	8	0.513
> 1 km	2 (5.1%)	37 (94.9%)	39	0.513
Total	**2 (4.3%)**	**45 (95.7%)**	**47**	**0.513**

Source: Primary Data Processed (2026)

Based on Table 6, it is known that of the 8 respondents who had a mining distance of less than 1 km, all of them, namely 8 people (100%), had a high cultural aspect, and there were no respondents with a low cultural aspect. Meanwhile, of the 39 respondents who had a mining distance of more than 1 km, 2 people (5.1%) had a low cultural aspect and 37 people (94.9%) had a high cultural aspect.

The Chi-Square test results show a p-value = 0.513 ($p > 0.05$), so H_0 is accepted and H_1 is rejected. Thus, it can be concluded that there is no significant relationship between mining distance and the cultural aspect of gold mine workers in Gampong Paya Ateuk, South Aceh Regency. These research results show that the difference in mining location distance does not affect the cultural aspect of workers. Both workers who mine at a distance of less than 1 km and more than 1 km still show a high level of culture. This indicates that cultural values, traditional customs, and community social habits are still maintained by mining workers, so that mining location distance is not a factor that influences their cultural condition.

Table 7. Hypothesis Test Results

Variable	p-value	Decision
Mining Distance – Socioeconomic	0.018	H_0 rejected, there is a relationship
Mining Distance – Culture	0.513	H_0 accepted, there is no relationship

Source: Primary Data Processed (2026)

Table 7 shows that the distance of the mining site has varying correlations with aspects of workers' lives. In socio-economic terms, more distant mining sites are associated with a higher proportion of workers earning above the regional minimum wage. However, this pattern does not prove that greater distance leads to higher earnings, as this may also be related to work experience, productivity and profit-sharing schemes. Meanwhile, the absence of a significant relationship with cultural aspects indicates that variations in mining distance do not yet show statistically significant cultural differences. These findings should be interpreted with caution, given that the number of respondents in some categories is relatively small.

4.2. Discussion

4.2.1. Relationship Between Gold Mining and Socioeconomic Conditions

The research results show that there is a significant relationship between mining distance and the socioeconomic condition of gold mine workers, with a p-value of 0.018 ($p < 0.05$). Based on the analysis results, of the 8 respondents who had a mining distance of less than 1 km, 6 people (75.0%) had income above the UMR and 2 people (25.0%) had income below the UMR. Meanwhile, of the 39 respondents who had a mining distance of more than 1 km, 38 people (97.4%) had income above the UMR and only 1 person (2.6%) had income below the UMR. These results show that workers active at farther mining locations tend to have better socioeconomic conditions compared to workers active at closer locations.

This can occur because farther mining locations generally have larger mining areas, more potential mineral reserves, and higher productivity levels, thereby providing greater opportunities to obtain higher income. In addition, workers who work at farther locations usually have longer work experience and a willingness to bear greater risks and operational costs in order to obtain higher mining yields. These research results are in line with research by Dondo et al. (2021), which found that gold mine management has a positive impact on improving community economics through increased income and employment opportunities. Research by Novendra et al. (2021) also shows that gold mining activities contribute to improving community economic welfare through increased household income. Furthermore, (Hartono, 2023) found that the presence of gold mines influences change in the community's socioeconomic life and improves the standard of living of communities around the mine.

This finding is also supported by research by Kereh et al. (2023), which states that gold mining activities are able to increase community income and open new employment opportunities. Mun'im (2024) found that gold mining contributes to improving family economics even though the income obtained is fluctuating. Research by Fadilah (2024) shows that communities choose to work in the gold mining sector because it is able to provide higher income compared to previous jobs, thereby improving family welfare. Research by Damolai et al. (2024) shows that gold mining activities have a positive impact on the economic aspect of the community in the form of increased income and employment opportunities. Oktryaningsih et al. (2024) also found that gold mining contributes to increasing community income and drives local economic growth. Research by Ambarak et al. (2024) shows that gold mining activities affect the socioeconomic condition of the community through increased income, change in livelihood, and change in community social structure.

In addition, research by Damalante et al. (2025) shows that mining activities are able to increase local income, expand employment opportunities, and drive the economic growth of surrounding communities. Research by Ibrahim and Zitri (2024) also explains that increased income due to mining activities can improve family welfare conditions, access to education, and community ability to meet daily basic needs. The results of research by Sudiyarti et al.

(2021) further reinforce this finding by stating that the presence of people's gold mines has a positive impact on increasing community income, although it still causes several social and environmental impacts. In theory, a person's socioeconomic condition is influenced by income level, type of work, education, and access to economic resources. In the context of gold mining, access to productive mining locations can provide greater opportunities to obtain high mining yields, thereby impacting the increase in worker income and welfare. Therefore, the better the worker's access to a productive mining location, the better their socioeconomic condition. Nevertheless, worker socioeconomic condition is not only influenced by mining distance alone. Other factors such as level of education, length of work, work experience, number of family dependents, profit-sharing system, working capital, and mine productivity can also influence worker income levels. Therefore, further research is needed to identify other factors that play a role in determining the socioeconomic condition of gold mine workers more comprehensively.

Nevertheless, these research results are not entirely in line with several previous studies. Research by Meutia et al. (2023) shows that although small-scale gold mining activities are able to increase community income, these economic benefits are often not proportional to the negative impacts caused, such as environmental pollution, mercury use, and increased public health risks. This condition causes increased income not always to be followed by an overall increase in community welfare. Furthermore, research by Junaidi (2022) on the impact of illegal gold mining in Jambi found that mining activities cause consequences in the form of environmental damage, social conflict, and decline in the quality of natural resources, which ultimately affects the quality of life of communities around the mining area. In addition, research by Massaro et al. (2022) shows that although gold mining provides economic benefits to the community, sustainable welfare is difficult to achieve because communities must face environmental damage and economic uncertainty, so that increased income is not always directly proportional to a sustainable increase in socioeconomic condition.

4.2.2. Relationship Between Gold Mining and Community Culture

The research results show that there is no significant relationship between mining distance and culture ($p = 0.513$). This shows that the difference in mining location distance does not significantly affect the community's cultural condition. Culture is an aspect that is formed over a long period and is influenced by various factors such as traditional customs, religion, social environment, education, and community interaction. Therefore, changes in mining distance do not directly cause changes in community culture. This finding indicates that the mining worker community in Gampong Paya Ateuk is still able to maintain the cultural values and norms that apply even though mining activities continue to develop in the area.

Various studies in line with this show that gold mining activities have a significant influence on the socioeconomic and cultural conditions of communities. Research conducted by Kereh et al. (2023) in North Minahasa found that gold mining has a positive impact in the form of increased community income and the opening of employment opportunities, although on the other hand it causes environmental pollution and health disturbances. Similar results were also found by Novendra et al. (2021), who stated that gold mining activities in Kotabunan District are able to increase community economic welfare through increased household income.

In addition, Mun'im (2024) revealed that gold mining contributes to improving family economics, although the income obtained is still fluctuating because it is influenced by mining production yields. Other research conducted by Sudiyarti et al. (2021) shows that the presence of people's gold mines has a positive impact on the community's economy through the creation

of employment opportunities and increased local economic activity. Oktryaningsih et al. (2024) also found that gold mining makes a real contribution to increasing community income in Lalar Liang Village, West Sumbawa Regency. This finding reinforces the view that the gold mining sector is still one of the main sources of income for communities in areas that have mineral resource potential.

In addition to impacting the economic aspect, gold mining activities also affect the social and cultural conditions of communities. Ambarak et al. (2024) found that gold mining activities cause change in the social, cultural, and economic structure of the community in Kotabunan Village. This change is seen in patterns of social interaction, lifestyle, and the shift in community work orientation. In line with this research, Gumanti (2024) explains that socioeconomic change due to mining activities impacts change in community lifestyle patterns, social relations, and how communities meet their living needs. Ibrahim and Zitri (2024) also state that gold mining areas affect the socioeconomic characteristics of communities, including change in economic activities and social relations in the environment around the mine.

On the other hand, several studies show that the positive impact of gold mining is often followed by negative impacts on the environment and the sustainability of community life. Siregar et al. (2023) explain that illegal gold mining activities can indeed increase community income, but also have the potential to cause environmental damage and hinder sustainable development. Research by Damalante et al. (2025) shows that mining activities are able to increase community economics and open new employment opportunities, but also trigger social change that affects the life of surrounding communities. These findings show that gold mining has a complex relationship with the socioeconomic and cultural aspects of communities. Based on these various studies, it can be concluded that gold mining activities generally have a positive impact on increasing community income, welfare, and employment opportunities.

Nevertheless, these activities can also cause sociocultural change, shifts in lifestyle patterns, and various environmental impacts that need attention. Therefore, research on the influence of gold mining on the improvement of socioeconomic and cultural conditions of gold mine workers in Paya Ateuk Village, Pasie Raja District, South Aceh Regency is important to conduct in order to obtain a more specific picture of the condition of mining workers in the area.

4.2.3. Study Limitations

This study has several limitations that should be considered when interpreting the findings. First, the sample consisted of only 47 gold mine workers from a single research site, Gampong Paya Ateuk, which limits the generalizability of the findings to mining workers in other locations with different socioeconomic and cultural characteristics. Second, all respondents were male, meaning that the study does not capture the experiences of female workers or other individuals involved in mining-related economic activities. Third, the data were self-reported and may therefore be subject to recall errors or inaccuracies in reporting income, working conditions, and cultural practices. Fourth, the cross-sectional design captures conditions at a single point in time and does not establish causal relationships between mining distance, socioeconomic conditions, and cultural aspects. Fifth, the small cell counts in the cross-tabulations, particularly the limited number of respondents with income below the regional minimum wage and those classified as having low cultural scores, may affect the stability of the statistical estimates and should be considered when interpreting the chi-square test results. Finally, social desirability bias may have influenced responses to questions concerning cultural values and practices, as respondents may have been inclined to

report socially acceptable behaviors. Future research should involve larger samples across multiple mining sites, include more diverse respondent groups where relevant, and consider longitudinal designs and more objective measures of income and cultural practices to strengthen the validity and generalizability of the findings.

5. Conclusion

This study examined the relationship between mining location distance and the socioeconomic and cultural conditions of gold mine workers in Gampong Paya Ateuk, Pasie Raja District, South Aceh Regency. The findings show that most respondents had incomes above the Regional Minimum Wage (UMR) and were classified as having a high cultural score. The Chi-Square test identified a significant relationship between mining location distance and socioeconomic conditions ($p = 0.018$), with a higher proportion of workers at locations more than 1 km away reporting incomes above the UMR. However, this association does not establish that greater mining distance causes higher income, as other factors, including education, length of work, work experience, family dependents, and profit-sharing arrangements, may also contribute to income differences. No statistically significant relationship was found between mining location distance and cultural aspects ($p = 0.513$). This result should be interpreted narrowly, as the analysis concerned mining distance rather than gold mining activities as a whole.

These findings suggest that the relationship between mining location distance and workers' socioeconomic conditions warrants further investigation, while the observed cultural scores did not differ significantly by distance category. In practical terms, efforts to improve workers' welfare should consider factors beyond mining distance, while local cultural practices may be examined further through more detailed research. Future studies should involve larger samples from multiple mining sites, include more diverse respondent groups where relevant, and examine additional variables such as work experience, income-sharing systems, and occupational health conditions. Longitudinal research and more comprehensive statistical analyses may also help clarify the relationships between mining characteristics, workers' socioeconomic conditions, and cultural practices.

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5.2. Conflict of Interest Statement

The authors declare that there is no conflict of interest regarding the publication of this paper.

5.3. Author Contributions

L.L.: Conceptualization, Methodology, Investigation, Supervision, Project Administration, Writing – Original Draft.
S.Y.: Investigation, Data Curation, Writing – Review & Editing.
A.I.: Formal Analysis, Data Curation, Visualization, Writing – Review & Editing.

5.4. Funding Statement

No funding was received for this research.

5.5. Informed Consent
Informed consent was obtained from all participants prior to data collection.

5.6. Ethical Approval
This study was a non-invasive, observational survey involving adult gold mine workers and posed minimal risk to participants. Participation was voluntary, and written informed consent was obtained from all respondents before data collection. Respondent identities were kept confidential, and data were used only for research purposes.

5.7. Data Availability
The data that support the findings of this study are available from the corresponding author, L.L, upon reasonable request.

5.8. Declaration of Generative AI and AI-assisted Technologies
During the preparation of this manuscript, the authors utilized Claude Sonnet 5.5 (Anthropic) for language editing and improving grammatical clarity. All outputs generated by the AI tool underwent rigorous critical review and thorough editing by the authors to ensure factual accuracy, enhance clarity of expression, and confirm adherence to established academic standards. The authors assume full responsibility for the integrity and content of this manuscript.

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