

# Cumulative Effects of Informal Mining on Local Lives: A Case Study of Obuasi Municipality

Ping Liu<sup>1</sup>, Cyril Ato Simpson<sup>2\*</sup>

<sup>1</sup> College of International Communications, School of Foreign Studies, China Three Gorges University, Yichang, China

<sup>2</sup> Department of International & Regional Studies, School of Foreign Studies, China Three Gorges University, Yichang, China

## Email Address

libby@ctgu.edu.cn (Ping Liu), simpsoncyril11@gmail.com (Cyril Ato Simpson)

\*Correspondence: simpsoncyril11@gmail.com

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## Abstract:

The research investigates the social and cultural impacts of informal gold mining, focusing on Obuasi, Ghana. Using a mixed-methods approach, the study combines qualitative interviews with quantitative data from a Likert scale questionnaire. It finds that while informal gold mining (ASGM) generates employment and stimulates the local economy, it also leads to community structure changes, environmental degradation, and cultural shifts. The study recommends comprehensive legislation, community development, economic diversification, cultural preservation, and health and safety protocols to balance the benefits and drawbacks of ASGM. Future work should focus on sustainable mining methods and alternative livelihoods to ensure long-term stability.

## Keywords:

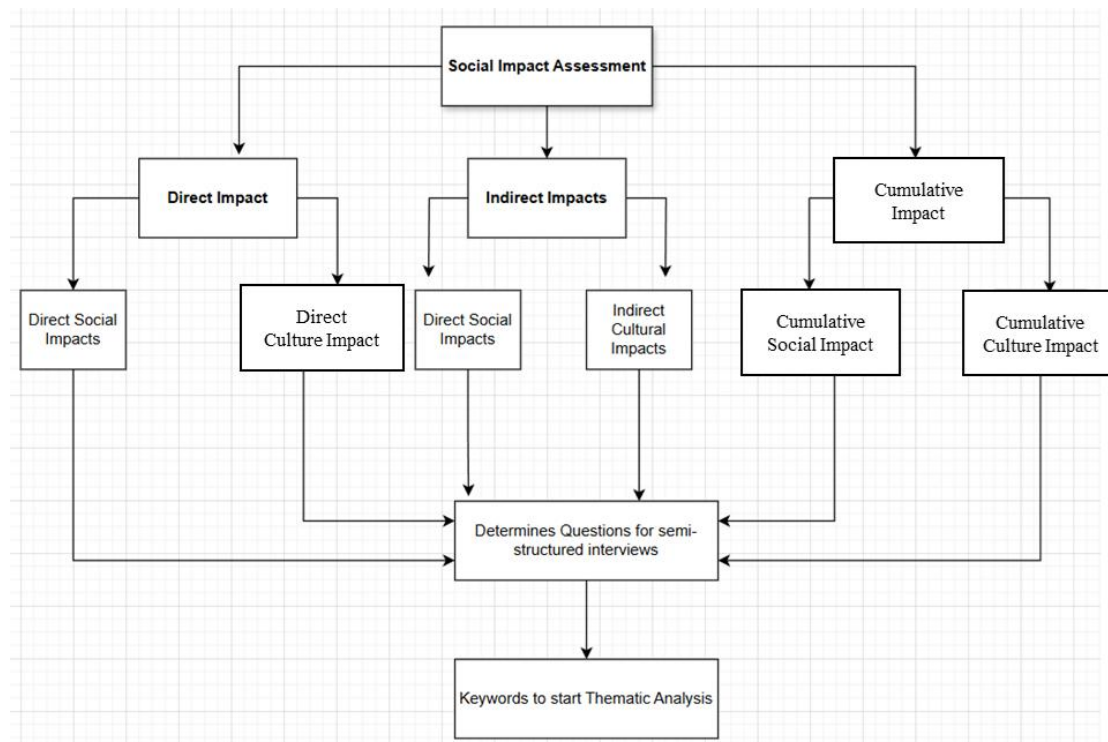
Economic dependence, Social Impact Assessment, Artisanal and Small-Scale Gold Mining (ASGM), Community Development

## 1. Introduction

The background of the study focuses on informal mining, a global phenomenon characterized by its reliance on human labor, lack of official licenses, and low productivity [1]. In Ghana, this sector has significant social, economic, and environmental ramifications [2]. Historically, Ghana's gold mining sector has evolved from pre-colonial artisanal practices to a formalized industry post-independence [3]. The Small-Scale Gold Mining Law of 1989 aimed to regulate the sector, but challenges persist due to bureaucratic processes and lack of support [4]. The influx of Chinese miners in the mid-2000s introduced advanced technologies, increasing gold production but also leading to environmental degradation and social tensions [5]. This study investigates the social and cultural impacts of informal gold mining in Obuasi, Ghana, using a mixed-methods approach to provide a comprehensive understanding of these multifaceted effects. [6]

## 2. Literature Review and Theoretical Framework

The research provides a comprehensive overview of the historical background and current state of informal gold mining in Ghana. It traces the origins of gold mining in Ghana to the 15th century and highlights the evolution of artisanal and small-scale mining (ASM) from pre-independence to post-independence [7]. The review emphasizes that informal mining, though illegal, has played a significant role in the local economy, contributing 35% of Ghana's total gold production in 2014 [8]. It also discusses the socio-economic impacts of informal mining, noting that while it creates employment opportunities and stimulates economic growth, it also leads to environmental degradation, health risks, and cultural conflicts [9]. Additionally, the literature review examines the involvement of Chinese miners in Ghana's informal gold mining sector, highlighting their contributions to technological advancements and economic expansion, as well as the social tensions and governance challenges they have introduced [10]. The review further underscores the complexity of the informal mining issue, suggesting that it is not merely an economic activity but is deeply intertwined with social, cultural, and political factors [11]. Overall, the literature review lays the groundwork for the research by providing a multidimensional perspective on the impacts of informal gold mining in Ghana [12].



**Figure 1.** Visual Representation of the Application Process of Social Impact Assessment.

The theoretical framework of the research is grounded in the concept of Social Impact Assessment (SIA), which is a process of evaluating or estimating the social consequences that are likely to follow from specific policy actions or project developments [13]. SIA has evolved from being a part of the Environmental Impact Assessment (EIA) process to a standalone discipline, largely attributed to the enactment of the US National Environmental Policy Act (NEPA) in 1969 [14]. The framework adopts the participatory approach of SIA, which views society and social goals as pluralistic and conflicting. It recognizes that social reality is subjective and shaped by social norms and significances established by its participants [15]. This

approach stresses the importance of considering the subjective viewpoints of all stakeholders in the SIA process. The research questions align with this framework by seeking to understand the direct, indirect, and cumulative impacts of informal gold mining on the social and cultural lives in Obuasi municipality [16]. The framework guides the analysis by providing a structured approach to identify and interpret patterns or themes in the data set, leading to new insights and understanding [17]. (Figure 1)

### 3. Methodology

The methodology section of the research outlines a mixed-methods approach to investigate the impacts of informal gold mining on the social and cultural lives of the Obuasi municipality. The study employed both qualitative and quantitative data collection methods to provide a comprehensive understanding of the multifaceted effects of Artisanal and Small-Scale Gold Mining (ASGM). Qualitative data was gathered through semi-structured interviews with local miners, Chinese miners, and officials from institutions responsible for mining activities. The interviews were transcribed and analyzed using thematic analysis, following a structured process that included transcription, keyword selection, coding, theme development, and conceptualisation. This approach allowed for the identification of patterns and themes in the data, leading to new insights and understanding [18].

Quantitative data was collected using a Likert scale questionnaire distributed via Google Forms, reaching a diverse group of 250 respondents, including local residents, government officials, local miners, and Chinese miners. The responses were analyzed using linear regression in SPSS to assess the impact of ASGM on various social and cultural aspects. The methodology section also addresses the ethical dilemmas faced during the research, such as ensuring anonymity and informed consent, as well as the challenges and limitations encountered during data collection and analysis. These included linguistic barriers, difficulties in gaining access to participants, especially Chinese miners, and the time-consuming nature of the data collection process. The section concludes by discussing the reliability and validity of the data, emphasizing the importance of using standardized questionnaires, interview protocols, and rigorous training for researchers involved in data collection [19].

### 4. Discussion and Findings

This chapter presents and analyzes the findings of the study on the social and cultural impacts of informal gold mining in Obuasi Municipality, Ghana [20]. The research employed a mixed-methods approach, combining qualitative interviews and quantitative data from a Likert scale questionnaire to comprehensively understand the multifaceted effects of Artisanal and Small-Scale Gold Mining (ASGM) on local communities[21]. The findings are structured into three sections: direct impacts, indirect impacts, and cumulative impacts, with each section providing insights into the complex interplay between ASGM and local social and cultural dynamics. [22]

#### 4.1. Findings on Direct Impacts

The direct impacts of ASGM on the social and cultural lives of Obuasi Municipality were assessed through a Likert scale questionnaire distributed to 200 respondents, including local residents, government officials, local miners, and Chinese miners. [23] The questionnaire captured opinions on various aspects such as job creation,

environmental degradation, health risks, changes in community structure, and impacts on traditional practices. The results indicate that ASGM has generated significant employment opportunities, with 28% of respondents agreeing and 21.5% strongly agreeing that ASGM has created jobs in the community [24]. However, this economic benefit is accompanied by substantial environmental costs, as 33% of respondents agreed and 35.5% strongly agreed that ASGM has caused environmental degradation. The use of hazardous chemicals in mining has also exposed miners to health risks, with 34% agreeing and 26% strongly agreeing on this point. [25]

The questionnaire also revealed changes in community structure and identity. 35% of respondents agreed and 32.5% strongly agreed that ASGM has altered the community structure of Obuasi, while 27.5% agreed and 38.5% strongly agreed that it has impacted the community's sense of identity. Traditional practices have also been affected, with 30% agreeing and 35% strongly agreeing that ASGM has disrupted traditional customs. These findings highlight that while ASGM has brought economic benefits, it has also led to environmental degradation, health risks, and changes in community structure and cultural identity. [26]

**Table 1.** Descriptive statistic of the direct impacts of informal gold mining on social and cultural lives in Obuasi municipality.

| Item | N.A |      | A.L |      | M  |      | V.M |      | E  |      |
|------|-----|------|-----|------|----|------|-----|------|----|------|
|      | F   | P    | F   | P    | F  | P    | F   | P    | F  | P    |
| 1    | 19  | 9.5  | 30  | 15.0 | 61 | 30.5 | 53  | 26.5 | 37 | 18.5 |
| 2    | 22  | 11.0 | 38  | 19.0 | 50 | 25.0 | 62  | 31.0 | 28 | 14.0 |
| 3    | 15  | 7.5  | 25  | 12.5 | 70 | 35.0 | 60  | 30.0 | 30 | 15.0 |
| 4    | 31  | 15.5 | 42  | 21.0 | 48 | 24.0 | 53  | 26.5 | 26 | 13.0 |
| 5    | 10  | 5.0  | 18  | 9.0  | 70 | 35.0 | 62  | 31.0 | 40 | 20.0 |
| 6    | 14  | 7.0  | 26  | 13.0 | 48 | 24.0 | 77  | 38.5 | 35 | 17.5 |
| 7    | 24  | 12.0 | 26  | 13.0 | 45 | 22.5 | 63  | 31.5 | 42 | 21.0 |

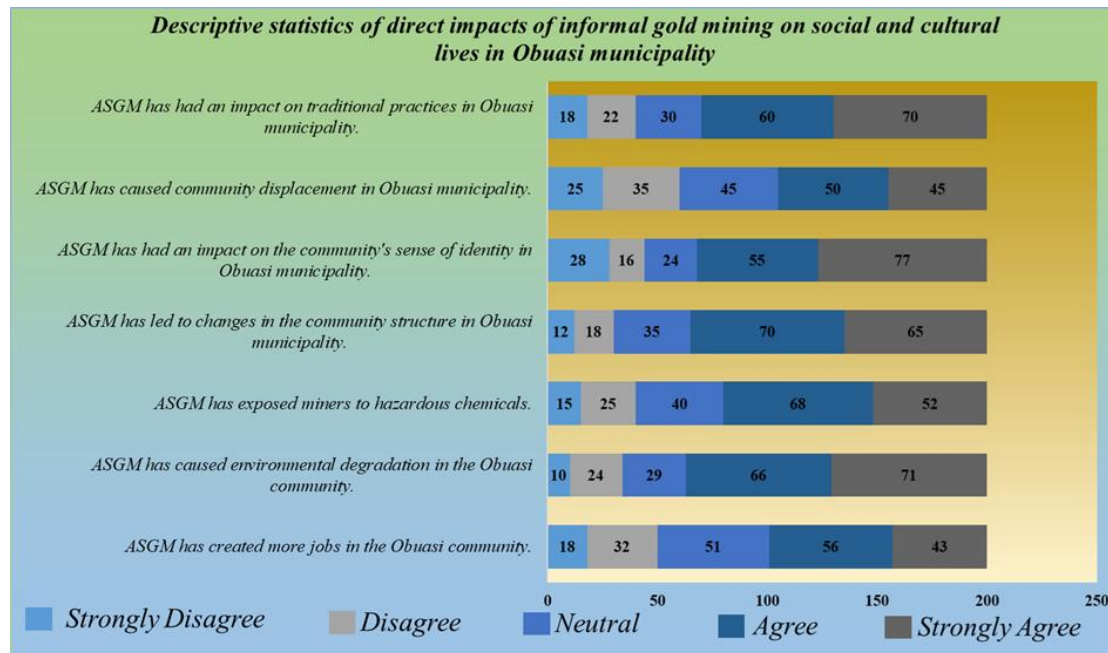
#### 4.2. Analysis of Direct Impacts

The analysis of direct impacts reveals a complex interplay of benefits and challenges. While ASGM has created jobs and increased incomes, it has also led to environmental degradation, health risks, and changes in community structure and cultural identity. Deforestation, water pollution, and soil erosion pose long-term threats to the sustainability of the community. The use of chemicals like mercury not only endangers miners' health but also contaminates water sources, affecting the broader population. Changes in community structure and cultural identity reflect the influx of migrants and the shift in economic focus from traditional occupations like agriculture to mining, which may gradually erode social cohesion and traditional values.

**Table 2.** Results for Linear Regression on Direct Impacts.

| Model      | Sum of Squares | F       | Sig   |
|------------|----------------|---------|-------|
| Regression | 271,299        | 644.723 | <.001 |

Simple linear regression was used to assess whether ASGM significantly predicts traditional practices in Obuasi municipality. The results of the regression suggested that ASGM significantly explained 93% of the variance,  $R^2 = .95$ ,  $F(1,8) = 644.72$ ,  $p < .001$ . ASGM significantly impacts traditional practices in Obuasi municipality,  $\beta = .499$ ,  $t = 2.915$ ,  $p < .001$  predicted traditional practices in Obuasi municipality.



**Figure 2.** Descriptive Statistics of Direct Impacts.

### 4.3. Indirect Impacts

The indirect impacts of ASGM were assessed through questions on economic growth, new settlements, social tensions, cultural exchanges, health issues, social services, and the impact on religious or spiritual sites. The results indicate that ASGM has boosted the local economy to varying degrees, with 30.5% of respondents indicating a moderate impact, 26.5% a significant impact, and 18.5% an extremely significant impact. However, this economic growth has also led to the emergence of new settlements, raising concerns about land use and resource allocation. 25% of respondents noted a moderate impact, 31% a significant impact, and 14% an extremely significant impact.

Social tensions arising from ASGM were reported by 35% of respondents as moderate, 30% as significant, and 15% as extremely significant. These tensions often stem from competition over mining sites and resources. Cultural exchanges between Chinese and local miners were noted by 24% of respondents as moderate, 26.5% as significant, and 13% as extremely significant. While these exchanges promote integration, they also risk cultural dilution. Health issues resulting from environmental impacts were reported by 35% of respondents as moderate, 31% as significant, and 20% as extremely significant. The strain on social services was indicated by 24% of respondents as moderate, 38.5% as significant, and 17.5% as extremely significant. Lastly, the impact on religious or spiritual sites was reported by 22.5% of respondents as moderate, 31.5% as significant, and 21% as extremely significant.

### 4.4. Findings on Indirect Impacts

The indirect impacts of ASGM were assessed through questions on economic growth, new settlements, social tensions, cultural exchanges, health issues, social services, and the impact on religious or spiritual sites. The results indicate that ASGM has boosted the local economy in various ways, with 30.5% of respondents indicating a moderate impact, 26.5% a significant impact, and 18.5% an extremely significant impact. However, this economic growth has also led to the emergence of new

settlements, raising concerns about land use and resource allocation. 25% of respondents noted a moderate impact, 31% a significant impact, and 14% an extremely significant impact.

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**Table 3.** Descriptive statistic of the indirect impacts of informal gold mining on social and cultural lives in Obuasi municipality.

| Item | N.A |      | A.L |      | M  |      | V.M |      | E  |      |
|------|-----|------|-----|------|----|------|-----|------|----|------|
|      | F   | P    | F   | P    | F  | P    | F   | P    | F  | P    |
| 1    | 19  | 9.5  | 30  | 15.0 | 61 | 30.5 | 53  | 26.5 | 37 | 18.5 |
| 2    | 22  | 11.0 | 38  | 19.0 | 50 | 25.0 | 62  | 31.0 | 28 | 14.0 |
| 3    | 15  | 7.5  | 25  | 12.5 | 70 | 35.0 | 60  | 30.0 | 30 | 15.0 |
| 4    | 31  | 15.5 | 42  | 21.0 | 48 | 24.0 | 53  | 26.5 | 26 | 13.0 |
| 5    | 10  | 5.0  | 18  | 9.0  | 70 | 35.0 | 62  | 31.0 | 40 | 20.0 |
| 6    | 14  | 7.0  | 26  | 13.0 | 48 | 24.0 | 77  | 38.5 | 35 | 17.5 |
| 7    | 24  | 12.0 | 26  | 13.0 | 45 | 22.5 | 63  | 31.5 | 42 | 21.0 |

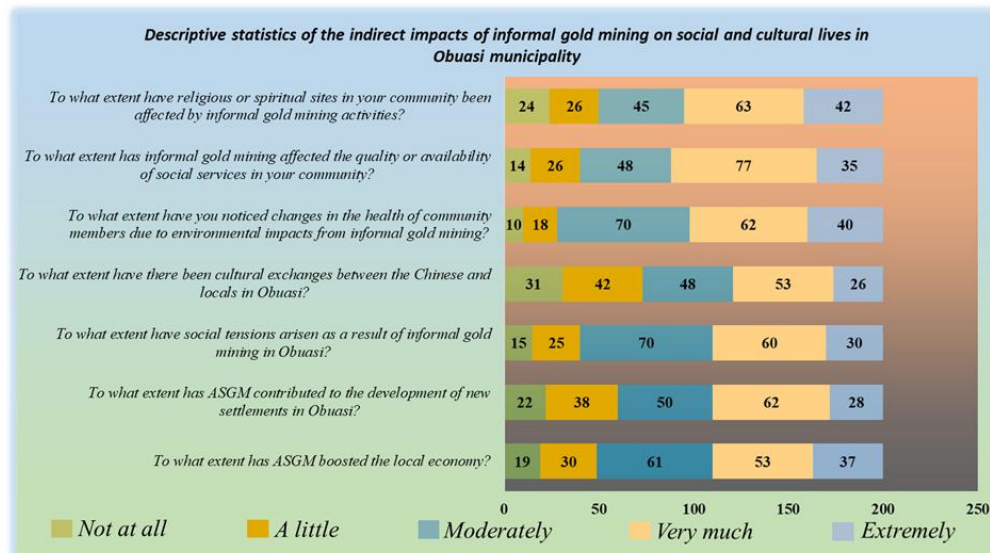
#### 4.5. Analysis of Indirect Impacts

The analysis of indirect impacts highlights the broader social and cultural consequences of ASGM. Economic growth, while benefiting the local economy, has also led to economic dependence and inflation, making it difficult for the community to transition to more sustainable economic activities. The emergence of new settlements has raised concerns about land use and resource allocation, while social tensions between local and foreign miners have strained community relationships. Cultural exchanges, though promoting integration, risk diluting local cultural practices. Health issues resulting from environmental degradation and the strain on social services further complicate the situation.

**Table 2.** Results for Linear Regression on Indirect Impacts.

| Model      | Sum of Squares | F       | Sig   |
|------------|----------------|---------|-------|
| Regression | 271,299        | 633.766 | <.001 |

Simple linear regression was used to assess whether ASGM significantly predicts boosted the local economy in any way. The results of the regression suggested that ASGM significantly explained 93% of the variance,  $R^2 = .95$ ,  $F(1,8) = 633.76$ ,  $p < .001$ . ASGM significantly impacts traditional practices in Obuasi municipality,  $\beta = .499$ ,  $t = 6.893$ ,  $p < .001$  predicted local economy in Obuasi municipality.

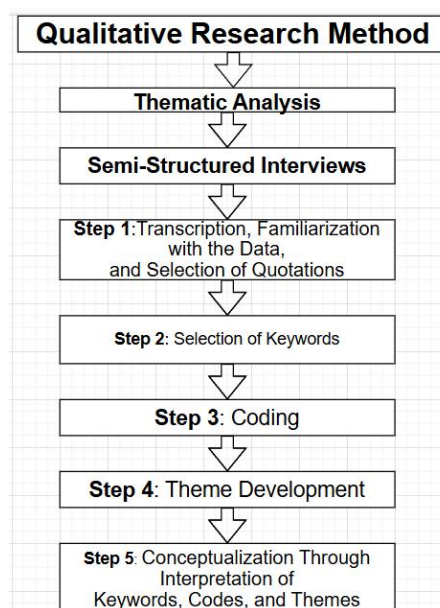


**Figure 3.** Descriptive Statistics of Indirect Impacts of ASGM.

#### 4.6. Thematic Analysis Findings

Thematic analysis of interview data revealed several key themes: economic dependence, social and cultural changes, economic inflation, family and community disintegration, and social and cultural tensions. Economic dependence reflects the growing reliance of the community on ASGM income, making it difficult to transition to more sustainable economic activities.

Social and cultural changes encompass conflicts between local and foreign miners, as well as shifts in traditional family roles. [27] Economic inflation highlights the rise in prices for basic goods and services, exacerbating economic disparities. Family and community disintegration reflects the altered dynamics of family roles and responsibilities due to increased mining activities, leading to social fragmentation. Social and cultural tensions stem from cultural misunderstandings and conflicts between Chinese and local miners. (Figure 4)



**Figure 4.** Process for Thematic Analysis.

#### ***4.7. Findings from Thematic Analysis***

The thematic analysis of informal gold mining's social and cultural impact on Obuasi Municipality revealed several critical insights. The research followed a structured process, including transcription of interviews with local miners, Chinese miners, and officials, followed by a meticulous selection of keywords and coding of data segments. This analysis identified key themes reflecting the multifaceted influence of Artisanal and Small-Scale Gold Mining (ASGM) on the community [28].

One major theme was economic dependence, characterized by job creation and income increases but also leading to economic vulnerability and inflation. The data showed that ASGM has become a significant source of livelihood for many residents, with miners and related service providers benefiting from the economic boost. However, this dependence makes the community susceptible to market fluctuations and mining sector instabilities.

Social and cultural changes emerged as another prominent theme, encompassing shifts in family structures, community cohesion, and cultural identity. The research found that ASGM has altered traditional family roles, with more members engaging in mining activities, which has disrupted conventional dynamics and responsibilities. Community cohesion has been strained due to disputes over mining sites and resources, particularly between local and foreign miners, leading to social tensions and a potential erosion of cultural identity.

The theme of economic inflation highlighted the rise in costs for basic goods and services, making it difficult for non-mining households to afford necessities and exacerbating economic disparities within the community. This inflationary pressure has significant implications for the cost of living and access to essential resources.

Family and community disintegration was also identified, with the involvement of additional family members in mining activities leading to changes in traditional roles and increased economic pressures. This has resulted in social disintegration and strained community relationships.

Lastly, social and cultural tensions were noted, particularly regarding cultural exchanges between Chinese and local miners. While there have been some integrations and mutual learning, these have been overshadowed by cultural misunderstandings and conflicts, creating a complex social dynamic within the community.

These findings underscore the need for balanced policies that address the economic benefits of ASGM while mitigating its adverse effects on the social fabric and cultural heritage of the Obuasi community. The research calls for comprehensive strategies that ensure sustainable development, social equity, and cultural preservation in mining-affected areas.

#### ***4.8. Cumulative Impacts on Community Structure and Identity***

The cumulative impacts of ASGM in Obuasi Municipality are long-term and aggregated, resulting from the combination of direct and indirect impacts over time. These impacts manifest as broader social and cultural changes affecting the community's overall well-being and sustainability. Key cumulative impacts include changes in community structure and identity, economic dependence and inflation, health risks, social tensions and cultural conflicts, and alterations in traditional social practices and cultural identity. These findings underscore the need for comprehensive

policies that address the sustainability and social equity of mining activities to ensure the long-term well-being of the community. [29]

## 5. Conclusions

The social and cultural impacts of Artisanal and Small-Scale Gold Mining (ASGM) in Obuasi Municipality presents the conclusion, future research prospects, and recommendations. The conclusion summarizes that ASGM has a complex impact on local communities. It brings economic benefits like job creation and boosts the local economy. However, it also causes environmental damage such as deforestation and water pollution, and poses health risks from exposure to harmful chemicals like mercury. Furthermore, ASGM leads to changes in community structures and cultural identities, and can erode traditional practices and values.

Regarding future research, the chapter suggests several avenues for further investigation. It highlights the need for long-term studies on the environmental impacts of ASGM and its effects on community health. Research into cultural preservation and identity within affected communities is also proposed, alongside studies on economic diversification and social cohesion. Additionally, the chapter points out the importance of examining gender and social inequality issues within ASGM, particularly the roles and challenges faced by women and marginalized groups. [30]

The recommendations provided in the chapter are designed to address the multifaceted impacts of ASGM. They include a thorough review of policies to allow a controlled allocation of small-scale mining licenses to foreign miners, provided they meet strict criteria related to sustainable practices and community engagement. The chapter also calls for stronger regulatory frameworks and capacity building for sustainable development. It advocates for inclusive mining practices that involve the community and share benefits, as well as the proper implementation of social impact assessments to evaluate the sociocultural effects of mining projects.

Moreover, the recommendations emphasize the importance of community development programs to improve infrastructure and services, economic diversification to reduce reliance on mining, cultural preservation initiatives to protect traditional practices and heritage, and strict health and safety measures to protect miners and local communities. These recommendations aim to ensure the benefits of ASGM are distributed more equitably and contribute to the sustainable development and resilience of affected communities. In essence, the chapter provides a roadmap for harnessing the economic potential of ASGM while mitigating its negative social, cultural, and environmental effects.

## Conflicts of Interest

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

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## About the Authors

Dr. Ping LIU is a senior lecturer at China Three Gorges University and a PhD candidate at Universiti Tun Hussein Onn Malaysia. She worked as a visiting scholar at London South Bank University in the UK in 2013 and at the University of Alberta in Canada in 2019. Her research interests include, but are not limited to, cross-cultural communication and management, global governance, and teaching Chinese/English as a second language. In recent years, she has been focusing on international and regional studies, having presided over or participated in more than 10 scientific research projects, and has published over 10 research papers in prominent academic journals.

Cyril Ato Simpson is a graduate student at China Three Gorges University. He focuses his research on International and Regional Studies, specializing on Sino-Africa relations in the natural resource sector. He had his undergraduate education at the University of Ghana where he majored in History.

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