

Compounding effects of COVID-19 on health and socio-economic needs of artisanal small-scale gold miners at Chawagona site, Bindura, Zimbabwe

Gugulethu Dube^{1*} 

¹Department of Public Health, School of Medicine and Health Sciences, University of Lusaka, Lusaka, Zambia

*Corresponding author: gugulethud@gmail.com

Abstract

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Background: COVID-19 pandemic has apart from causing infections and deaths ravished worldwide economies on a level not experienced before. This disease has shown that it can potentially affect businesses, livelihoods, industries, communities and overwhelm health systems. The ASGM sector which faces a plethora of existing challenges, has not been exempted from these shocks. The intention of this study was to investigate the compounding effects of COVID-19 on the health and socio-economic needs of ASGM in Chawagona farm.

Methods: A mixed methods approach was carried out. The quantitative aspect employed a descriptive non-interventional cross-sectional study and the qualitative component, a case study. A logistic regression model, chi-square and a t-test were used as estimation techniques. Statistical package used was Stata 16. Qualitative data analysis used thematic analysis with CAQDAS. Multiphase sampling techniques were adopted for the survey and in-depth interviews with a total of 181 respondents, all ASGM at Chawagona farm, Bindura, Zimbabwe.

Results: Study indicated that COVID-19 severely affected respondents' main source of income, food security and thereby affecting their health and livelihoods. Results show an association between loss of income and socio-demographic characteristics such as sex, role in the ASGM, education, age, accommodation, household size. They also show that apart from the existing socio-economic conditions, the ASGM KAPs around COVID-19 are influenced by lack of information, lack of access or barriers to health care are more likely to promote non-compliance with preventive protocols.

Conclusion: COVID-19 has compounded the vulnerabilities of ASGM, who already had pre-existing health and socio-economic challenges. As such, there is need for multiple stakeholder interventions in improving health access, structural support, income stabilization, food security and recovery of livelihoods, during and post the pandemic. Therefore, the study promoted the adoption of a broader approach to build capacity and resilience in the ASGM communities in the event of future pandemics.

Keywords: *Artisanal small-scale gold miners, COVID-19, health, socio-economic, pandemic*

INTRODUCTION

Apart from causing infections and deaths, the COVID-19 pandemic has ravished worldwide economies on a level not experienced since at least the 1929 Great Depression. The artisanal small-scale gold mining (ASGM) sector has not been exempted from these shocks. Barring the already known disparities which create disproportionate burdens for this vulnerable group, the pandemic has compounded them to a whole gamut of other burdens [1]. The state announced a raft of measures, including World Health Organisation (WHO) and country-specific protocols to alleviate the debilitating COVID-19 induced shocks. These measures included masking up, hand sanitisers, maintaining physical distancing, travel restrictions, and shutting down businesses, in order to contain COVID-19. Despite these interventions, the effects of COVID-19 have persisted, resulting in increased health and socio-economic disparities for the majority of ASGM communities [2].

Mkodzongi and Zano [3] noted that the ASGM sector is critical in the Zimbabwean economy. Available information shows that at least 40% of mining revenue in Zimbabwe is from this sector and creates employment and additional economic opportunities for many households in the informal sector. The sector is poverty-driven and primarily exposes health and socio-economic inequalities, which are bound to magnify when a shock such as a pandemic is introduced [1]. While the debilitating effects of related pandemics like SARS and Ebola on the welfare of ASGM have been well documented, much less is known about how the novel COVID-19 compounds the needs of many health services and including this vulnerable group [3-9]. Earlier studies of this pandemic offer little insight into the effects brought by COVID-19 on top of the already existing burdens borne by the ASGM. Research on the effects of this topic in sub-Saharan Africa has not developed to offer solid analysis and solutions for mitigating the challenges faced by ASGM in a COVID-19 environment. There is a risk of inappropriate policy interventions leading to the demise of the ASGM sector and economies if scholarly studies like this one are not carried out.

The study was conducted at the Chawagona site, Bindura, Zimbabwe, whose main occupations involve mining and agriculture. Chawagona farm, although initially designated as agricultural/farming land, has rich gold deposits and has become a home to many illegal gold miners, who dig for the precious mineral as a means of survival. This site is very close to Ran Mine, Freda Rebecca Gold Mine, Bindura Nickel

Mine, and is surrounded by many other illegal gold panning sites, some of which share boundaries with the site. Most miners stay in makeshift structures, some are farmers from surrounding resettlement areas. There is a lack of, hygiene practices, sanitation and potable water, schools and primary health care facilities at these small-scale mining sites. The research, therefore, needs to establish the effectiveness of government interventions like restrictions, balanced against survival needs. This study, accordingly, seeks to unpack these challenges, their significance and the compounding effects on the existing challenges the ASGM sector faces.

MATERIALS AND METHODS

Study design

The study adopted a mixed method approach. The quantitative aspect took on a descriptive non-interventional cross-sectional study and the qualitative aspect adopted a case study approach, both conducted at Chawagona farm, enabling the researcher to study the entire population at the farm. The population under study consisted of all 352 ASGM operating at the farm. Study sample was 181, 166 of which responded to questionnaires and 15 to in-depth interviews. The inclusion criteria covered all ASGM men and women aged 18 years and above, directly and indirectly engaged in the gold panning processes of ASGM and the supply chain at Chawagona farm, Bindura. The ASGM should have been residing and working in Chawagona before the advent of COVID-19. Excluded were child miners, ASGM from other mining sites outside Chawagona farm and those who had just recently moved to the site.

Data collection techniques

Data collection was done with the aid of questionnaires and in-depth interviews with selected participants. Quantitative data was gathered using open and close-ended questionnaires during survey. Qualitative data was gathered using an interview guide for the in-depth interviews.

Statistical analysis

Quantitative data gathered was analysed using Stata 16 software package. Descriptive statistics such as frequencies, means and standard deviations used on all explanatory variables to determine the behaviour of the data under this study. Chi-square test also performed to determine the association between our variables of concern and a t-test used to gain insight into the impact of the variables in the study. The logit regression

model was adopted as an estimation technique to analyse the relationship of the variables under study. The qualitative analysis used an electronically computer-assisted qualitative data analysis software (CAQDAS), employing a thematic analysis mixed coding method, which involved inductive and deductive methods.

RESULTS

Participants' socio-demographics characteristics

Results indicate a proportion of 85.33% (n=128) as males and 14.67% (n=22) as females, with n=150. Those aged between 31 and 40 years accounted for 37% (n=52) of participants. The 18-to-30-year age group accounted for 58% (n=87), with 21.33% (n=32) aged between 31-40 years. The 41-50-year age category was 8% (n=12) and 12.67% (n=19) were 51 years and above. The mean age was 34 years, with a standard deviation of 1.19. It was noted that 16.67% (n=25) respondents had no formal schooling, those with primary education were 39.33% (n=59), secondary 34% (n=51), and tertiary level had the least figure of 10% (n=15). Of the respondents, 21.33% (n=32) were single, 58% (n=87) married, 8% (n=12) divorced and 12.67% (n=19) widowed.

The mean monthly income was recorded as US\$227.67. 85.33% (n=128) of respondents rent in makeshift rooms/tents. Among these, 87.5% (n=112) have higher income compared to 16 (12.5%) with lower

income. The differences in income were statistically significant at $p=0.001$. There was a statistically significant income difference of $p=0.034$ between participants from the province (88%, n=132) and those from other provinces (12%, n=18). Heads of households constituted a lesser proportion of 44% (n=66), and the family size mainly ranged from 3 to 5 people per household. This range constituted the highest proportion of participants at n=104 (69.33%), significant at $p=0.001$. Household heads had higher income compared to non-family heads, who had lower income, with a statistically significant difference at $p=0.013$. The difference in income had a $p=0.001$. Most breadwinners had higher income than non-breadwinners, with a p-value of 0.044.

Socio-economic impacts on ASGM compounded by COVID-19

Results presented in Figure 1 reveal that the main socio-economic effects felt are food value chains and security, having an effect on livelihoods, with highest mean score of 4.46. Other adverse impacts include little or no income with a mean value of 4.09, the enforcement of lockdowns resulting in lack of savings and poor livelihoods with a mean score of 3.93 and lastly, closely followed by the poverty trap the miners have found themselves in with a mean score of 3.93. This is shown in Figure 1.

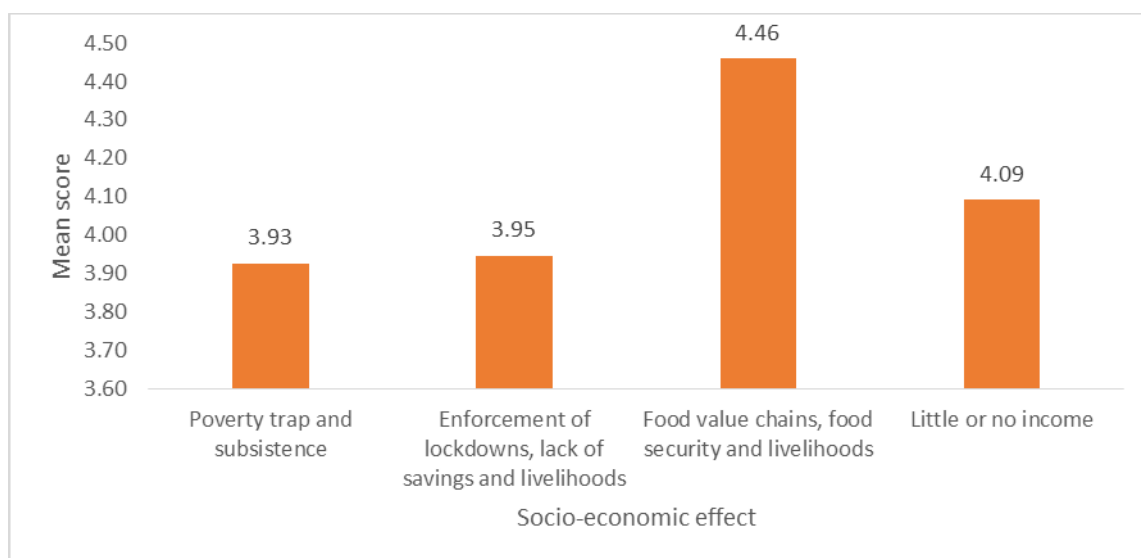


Figure 1: Socio-economic impacts on ASGM compounded by COVID-19

Logistic Regression Analysis of the effects of COVID-19 on income

Table 1 presents crude and adjusted results from the multivariate regression estimation for factors to explain if the respondent's income was affected by the pandemic. More males reported that their source of income was affected by the pandemic by an unadjusted OR=2.21 (95% CI 1.82, 2.91; $p<0.001$) and the adjusted OR of 1.73 (95% CI 1.24, 2.02; $p<0.001$). Age group 18-35 years had a crude OR of 2.99 (95% CI 1.26, 4.94; $p=0.011$), while the adjusted OR was 2.47 (95% CI 1.09, 4.40; $p=0.037$). For participants' marital status, those with partners who cited loss of income had an OR=1.1 (95% CI 0.65, 1.85; $p=0.420$), while the adjusted odds ratio of the same was 1.07 (0.62, 1.82; $p=0.512$).

The effect of COVID-19 on the income of those who had secondary level education or less had an unadjusted OR=1.55 (95% CI 1.43, 1.70; $p<0.001$), while those with tertiary level education had an OR of 0.53 (95% CI 0.47, 0.70; $p<0.001$), and they had adjusted OR=1.73 (95% CI 1.57, 1.95; $p=0.001$) and OR=0.75 (95% CI 0.57, 1.01; $p=0.236$) respectively. On whether participants' province of origin and number of household members had an effect on their loss of income, the results were non-significant at both unadjusted and adjusted estimates, however the role of being miner/crusher in the ASGM and being head of house, reported significant results. Total and partial loss of income had significant results $p<0.001$, at both crude and adjusted estimates.

Table 1: Results of logistic regression for unadjusted and adjusted estimates for participants characteristics and effects of COVID-19 on ASGM income

Variable	Unadjusted		Adjusted	
	OR (95% CI)	P-value	OR (95% CI)	P-value.
Age group				
18-35 years	2.99 (1.26-4.94).	0.011*	2.47 (1.09-4.40)	0.037*
35+ years	1.00. -	-	1.00 -	-
Sex				
Male	2.21 (1.82-2.91)	<0.001**	1.73 (1.24-2.02)	<0.001**
Female	1.00 -	-	1.00 -	-
Marital Status				
With partner	1.11 (0.65-1.85)	0.420	1.07 (0.62-1.82)	0.512
Without partner	1.00 -	-	1.00 -	-
Education				
Secondary or less	1.55 (1.43-1.70).	<0.001**	1.73 (1.57-1.95)	0.001
Tertiary	0.53 (0.47-0.70)	<0.001**	0.75 (0.57-1.01)	0.236
Province				
Yes	1.02 (0.47-4.59)	0.591	1.24 (0.91-5.10)	0.761
Household head				
Yes	1.97 (1.04-3.43)	0.022*	2.29 (1.12-4.37)	0.021*
Household #				
1-5	1.00 -	-	1.00 -	-
>5	1.32 (0.93-1.85)	0.117	- -	-
Role in ASGM				
Miner/Crusher	3.98 (2.54-7.65)	0.004*	4.73 (2.76-8.66)	0.008*
Loss of income in ASM				
Total loss	2.26 (1.82-2.71)	<0.001**	1.82 (1.56-2.23)	<0.001**
Partial loss	2.92 (2.46-3.67)	<0.001**	2.57 (1.94-3.18)	<0.001**

OR=Odds Ratio CI=Confidence Interval *significant $p<0.5$ ** $p<0.001$

Knowledge, attitudes and practices (KAPs)

Knowledge on COVID-19

On knowledge about COVID-19 one of the participants stated,

"We are supposed to wear masks, avoid crowded areas, sanitise and do social distancing". [Petty commodity broker]].

Attitudes on COVID-19

Results showed that participants had both negative and positive attitudes toward COVID-19. One of the participants indicated some degree of positive attitude towards COVID-19. The participant stated:

"Because I do not know who has it, I am scared to have it and get sick because I will not be able to work. So many things have changed because of Corona". [Gold buying agent].

However, other participants in the interviews had negative attitudes towards COVID-19 one of them remarked:

"We get Zumbani, we drink it, we steam with it. It helps those with the flu. However, I do not think we have Covid here." [Stone crusher].

COVID-19 practices

The following are some of the verbatim accounts of the participants concerning this theme: One participant indicated:

"You see that bucket there? I wash my hands, and I got a mask I wear to town so that I avoid arrest for not wearing it." [Miner]

Another participant added:

"I steam and inhale much steam to clear my lungs. I drink some concoctions to clean my blood. I now drink Zumbani and eat lots of lemons. I feel

DISCUSSION

In the demographic analysis of the respondents, it was observed that the majority of participants in this study were males. This finding aligns with the broader trend in the mining industry, where women are typically underrepresented [9,10,11, 12]. The dominance of males in artisanal and small-scale gold mining (ASGM) can be attributed to gender bias prevalent in mining environments. Additionally, the age distribution of the participants indicated that the most prominent group of miners fell within the age range of 18 to 30 years. This age group corresponds to the most productive segment of the population, which is consistent with the characteristics of ASGM in Zimbabwe [13]. Conversely, the age group with the fewest respondents was those aged 41 to 50 years.

Regarding income, the study estimated that the average monthly income for ASGM participants in Bindura, Zimbabwe, was approximately US\$227.67. Notably, the results indicated that a significant proportion (82%) of ASGM participants had incomes exceeding the total consumption poverty line (TCPL) of US\$72.61 per individual per month, as defined by ZimStat (2021). However, a critical insight emerged when considering family units, as the majority of ASGM participants (70%) came from families consisting of 3 to 5 individuals, suggesting that, despite individual incomes surpassing the TCPL, families as a whole still lived below the poverty line. This underscores how the economic activities of the ASGM sector were adversely affected by the COVID-19 pandemic, resulting in reduced incomes.

The study highlighted that the marginalization and lack of formalization in the ASGM sector left its participants vulnerable to various social and economic challenges. This vulnerability is consistent with the observation made by Lahiri-Dutt [12,13], who described the average miner as trapped in a cycle of poverty. Many turn to artisanal mining as an economic lifeline due to limited educational opportunities and employment prospects [14,15]. The advent of COVID-19 exacerbated the already precarious situation of ASGM participants, leading to reduced income and living standards. The pandemic posed unique challenges, including lockdowns and the enforcement of containment protocols, which further constrained the ASGM sector.

Interestingly, female respondents were

less likely than their male counterparts to report a significant impact on their income due to COVID-19. This gender-based difference can be attributed to the diversified income-generating activities of males, such as farming, casual labor, formal employment, or vending. The pandemic's labor market effects were more pronounced for men, as noted by Béland et al. [2]. Similarly, Woodhill's [16,17] study found that informants from various sectors reported reduced income from mining operations across different education levels.

The study's results also indicated that both partial and total income loss due to COVID-19 were significant, with individuals who reported partial loss typically belonging to higher income bands. This partial loss allowed some participants to offset the income shocks caused by the pandemic. These findings align with the observations of Arndt et al. [1], who reported that lockdown policies posed a particular threat to households with low-income levels dependent on labor-based activities. Importantly, all respondents faced an equal likelihood of income shocks across their various income sources due to the pandemic [16].

Furthermore, the study explored participants' knowledge and attitudes toward COVID-19. It was noteworthy that all participants were aware of COVID-19 protocols and regulations. Their attitudes toward the pandemic varied, with some displaying a positive understanding of its transmission and the importance of testing and vaccination. Conversely, others exhibited negative attitudes, downplaying the virus's severity, often equating it to a common flu or believing in myths about immunity. Many participants mentioned using traditional remedies like Zumbani (*Lippia javanica*) for managing respiratory symptoms, despite these practices not being endorsed by health experts as effective measures against COVID-19 [17-20].

The study's findings shed light on the socio-economic impact of the COVID-19 pandemic on the ASGM sector, highlighting the vulnerability of marginalized miners. The results also underscored the need for targeted interventions and education to address misconceptions about COVID-19 and improve mitigation strategies within this vulnerable community.

CONCLUSION

As demonstrated in this study, the ASGM face compounded vulnerabilities during a pandemic due to pre-existing challenges. These

span across health challenges where the ASGM is at the lower end of the access chain, compounded by the fact that it is mostly not officially recognised as a legalised sector. There is need therefore, for the government to specifically extend the health coverage to this community to address their specific needs and challenges. The government's response to launch COVID-19 specific economic stimuli packages for distressed companies and households needs to be deliberately extended to the ASGM as a critical player in the Zimbabwean economy to safeguard mining communities' livelihoods. The key areas requiring support can be summarised as being, supportive legislation, financial support, safety and health (compliance) and social support. Post

DECLARATION

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