

Gendered Influence of Artisanal and Small Scale Mining on Primary School Pupils' Learning Achievements in Western Tanzania

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Abstract

This study explored a critical step towards improving quality of education in ASM area by addressing the problems concerning children's rights and gendered child rearing. It was guided by the social cognitive theory in explaining the role of environment in moulding children's behaviour. It measured three objectives: examining the kinds of artisanal and small scale mining activities contribution to development of adjacent primary schools; assessing the influence of artisanal and small scale mining activities on primary school pupils' learning achievements; and exploring the influence of ASM activities on pupils' learning achievements by gender. It employed a cross sectional survey design and was conducted in Biharamulo District located Western Tanzania. The respondents were head teachers, primary school teachers, primary school pupils, and ASM leaders, obtained through purposive sampling techniques. Data were collected through observation, interviews, questionnaire, documentary review, and focus group discussion. Data were analysed and presented through tables, figures and thematic analysis. Chi-square test was performed to assess the influence of ASM on pupils' learning achievement. It was found that the influence of ASM activities on primary school pupils' learning achievements was significant - $X^2 = 7.133 (1), \alpha = 0.008$, with a symmetric measure coefficient ($\Phi = -.501, \alpha = .003$). The negative coefficient value

of .50 indicates that ASM activities have large negative effect on pupils learning. Gender-wise, ASM activities affected boys more compared to girls - $X^2 = 5.819$ (1), $\alpha = 0.016$, with a symmetric measure coefficient (Phi = -0.69, $\alpha = 0.003$).

Keywords: Child artisans, pupils and small scale mining, gendered child neglect.

Introduction

The concept of Artisanal and small scale mining (ASM) refers to labour intensive mining with low technological methods and belongs to the informal sector of the economy. The influence of small scale mining activities on education is not a new phenomenon in the World history. It goes as far back as 1716 when the first school was built at Joachimstal, Czechoslovakia as the output of mining activities (Choshi, 2001). The mining projects have contributed to social developments, for instance, in Malawi where primary schools were built in different mining places, E.g. the primary school at Mchenga coal mines in Rumphi and at Namadidi lime-making factory, serving the entire community. These primary schools help children living adjacent to the mines to access education, hence reducing illiteracy in the country (Dreschler, 2001).

For years the international community has been commenting on ASM's potential for playing an important role in economic and social development in developing and rural contexts. A 2002 UN-organized conference in Yaoundé, Cameroon emphasized through its "Yaoundé Vision" 50 that if properly harnessed, ASM and partner institutions can contribute to the UN Millennium Development Goals (MDGs). They suggested that strategic support and interventions in ASM could help in achieving universal primary education (UPE) by decreasing the involvement of children in the ASM sector through a process of eliminating the economic benefits of child labour, substituting children's jobs with technology and making school a viable, affordable and accessible alternative to children living in ASM communities (Villegas, *et al.*, 2012). Yet evidence of ASM persistent use of child labour still exists (Thorsen, 2012; Gyamfi, 2014). Although no specific theory has addressed this phenomenon, scholars in different disciplines have tried to highlight the relationship between ASM activities and children's schooling (Jimenez, 2011; Noronha *et al.*, 1998).

The extraction of minerals and precious stones in ASM is governed by complex social hierarchies of land owners, license holders, buyers, watchmen, employers, miners, auxiliary workers, and others who can make a living off the sites. Children, whether directly involved in mining or indirectly through a range of auxiliary services, are usually at the bottom of this hierarchy due to their age, gender and body size which shape the work they do (Thorsen, 2012). However, the International Labour Organisation (ILO) estimates that nearly 1 million children between the age of 5 and 17 years work in the mines and quarries (Gyamfi, 2014).

Dreschler (2002) cites the Tanzania employment ordinance (1995, Section 2), which defines a child as a person under the apparent age of fifteen (15) years. The ordinance emphasizes (in Section 77) that children of apparent age of twelve (12)

years shall not be employed in any capacity of whatsoever. It provides further that no child shall be employed in any employment which is injurious to health, dangerous, or otherwise unsuitable. Yet the persistence of ASM-related child labour is common.

On the other hand, child education in ASM areas has attracted debate all over the world because access to education is generally very poor in the artisanal mining areas. In 2009-2010, the net enrolment rate was 60.6 per cent, and only 56.3 percent of children completed primary school (Jimenez, 2011). For instance, in India, the majority of people living in ASM areas lack education despite of the modern education systems and adult literacy programs, as skills are regarded to be more lucrative than education. This appears to be resulting in adolescent girls deciding to assist their mothers at the quarries rather than pursuing education (Noronha, Khalwadekar, & Mahambre, 1998). In Mali, child labour in artisanal mining is attributed to lack of access to education. In Tanzania, child labour issues were raised in several studies of mining, particularly those led by the ILO. As has been noted elsewhere, children engage in ASM related activities, particularly in the gold mining areas. Many school children undertake what are regarded as 'petty chores' in the ASM industry. School boys, far more than girls, in Nyarugusu and Mgusu mines were found in the processing tasks such as carrying ore to washing places, washing the ore, amalgamation, and manual crushing of tailings (Mwaipopo *et al.*, 2004).

Many children fit ASM-related work around schooling, while others leave primary school for mine work (Mwaipopo *et al.*, 2004). This highlights an important point on the potential influence of ASM activities on students' learning. The reviewed studies however, did not discuss the influence of ASM on primary school pupils' learning achievement. Hence our study sought to fill-in the gap by:

1. Examining the kinds of contribution made by artisanal and small scale mining activities to development of adjacent primary schools in Biharamulo District.
2. Assessing the influence of artisanal and small scale mining activities on primary school pupils' learning achievements in Biharamulo District.
3. Exploring the influence of ASM activities on pupils' learning achievements in Biharamulo District by gender.

Method

Participants

Fifty eight participants were recruited for this study, using simple random and purposive techniques. Out of those, 12 teachers were selected randomly, while 36 pupils, six head teachers and four ASM leaders were purposively selected. Participants' age range was 10 to above 50 years. Gender representation was observed in recruiting pupil participants.

Design

This study was designed to assess two categorical variables, namely gender difference in the influence of ASM activities (independent variables) and primary school pupils' learning achievements (dependent variable). Chi-square tests were performed to test if there was significant difference between the learning

achievements of pupils from ASM areas and from non-ASM areas. Also the test of no significant difference in the influence of ASM activities on boys' and girls' learning achievements was performed. This design was deemed appropriate for categorical variables and small sample.

Materials

The study employed questionnaire for primary school teachers, interview guide for head teachers and ASM leaders, and focus group discussion guide for pupils. Observation and documentary review checklists as well as a camera and phone recorder were also used to collect data. Specifically, observation field notes and photographs of children's involvement in ASM activities were taken.

Procedure

Questionnaires were distributed to teachers at schools and collected as soon as the participants finished filling them. Head teachers and ASM leaders were interviewed in their respective offices. Focus group discussion (FGD) was held with six to seven pupils from ASM areas per school. FGDs were held in exclusive classrooms on premises, moderated by the researcher. A question, "How do ASM activities affect your studies" was posed to participants in each FGD. They were encouraged to be frank and to feel free to decline at every point. Participants' informed consents were obtained continuously, while ensuring confidentiality of their private information. Prior to their participation in the study, pupils were given letters explaining the purpose of the study to seek permission from their parents and guardians. Only children 10 years of age and above with signed permission from their parents/guardians participated in FGDs. During the data collection, the researcher explained the reasons of the study to respondents and personal identifiers were not used on pieces of data collected. That's why photographs were artistically reconstructed in order to secure pupils' faces from being identified. In the report, the researcher acknowledged sources of ideas wherever they have been used and discribed the surveyed school using letters, instead of real names.

Results and Discussion

ASM Contribution to Adjacent Primary Schools

Slightly more than half (59%) of the respondents said that the ASM sites contribution to development of adjacent primary schools was not much. Table 1 presents participants' responses on ASM sites' contribution to adjacent primary schools.

Table 1: Respondents' Views on Kinds of Contribution from ASM Sites to Adjacent Primary Schools (N=58)

Kind of Contributions	Frequency	Percentage
Pupil Porridge	9	15.5
Pupil Uniform	5	8.6
Pupils' Stationary	5	8.6
Classroom & Teachers' house Building	2	3.4
Others not Listed	3	5.1
None	34	59
Grand Total	58	100

Source: (Field data, 2015)

Among other reasons for ASM miners' failures to contribute something for to the development of the adjacent primary schools include their unwillingness. According to respondents, sometimes school administrators and village authorities had to exert pressure on miners in order to get some contribution. These findings somehow contradict the existing literature. Studies in the Republic of South Africa and Malawi have indicated that, ASM projects had positive social impact of skills development and the potential to uplift rural and sometimes poorer communities (Dreschler, 2002). It has been documented that in partnership with the Department of Education, they built primary schools in different mining places and provided infrastructure to schools including classrooms, teaching and learning materials, administration blocks, water provision, boarding facilities for children with special needs, and a security guard house (Dreschler, 2002). No evidence indicates that ASM miners were pressurized to give these contributions.

Unfortunately, the reasons as to why the Beharamulo ASM miners were unwilling to contribute could not be established in this study. At best, participants reported that some miners lacked awareness on the importance of contributing to development of their primary schools. It was lamented that ASM miners do not realize that they should give back to the community in terms of contribution to social services for the treasures they accumulate from the area. E.g. miners also don't seem to understand that building classrooms, teacher houses, and making desks for pupils can be productive in the long run.

Influence of ASM Activities on Primary School Pupils' Learning Achievements

Data on this theme are presented in three parts: engagement of pupils in ASM activities, effects of ASM activities on pupils' learning outcome and academic performance of pupils from ASM areas and non-ASM areas in that order.

Engagement of Pupils in ASM Activities

Findings have shown ways the school children involve themselves in ASM activities. Particularly in the gold mining areas, many school children undertake ASM-related activities regarded as *Nyoka wa shimoni*, literally 'pit snakes'. As *nyoka wa shimoni*, they do all sorts of odd jobs from spying to stealing mineral particles. School boys and girls, in mining sites are found in the processing tasks such as carrying sand containing mineral particles, washing or cleaning minerals, extracting minerals, selling food and taking care of siblings during ASM activities.

Table 2: Respondents' Views on Pupils' Engagement in ASM Activities (N=58)

S/N	ASM Activities	Frequency	Percent⁰%
1	Carrying sand with minerals to washing areas	11	18.9
2	Washing minerals	12	20.6
3	Taking care of sibling during ASM activities	8	13.7
4	Selling foods and drinks	2	3.4
5	Mineral extracting	4	6.8
6	All of the above mentioned	3	5.1
7	None of the above mentioned	18	31
8	Grand Total	58	100

Source: (Field data, 2015).

One of the standard seven pupils, aged 15 years bragged in FGD that he is *mwoshaji* (*Mineral cleaner*) because he has been working as mineral cleaner for the past four years (See Figure 2). During the fieldwork, the researcher came across some children who were engaging in ASM activities due to their parents' involvement in mining as shown in Figure 1.



Figure 1: A Picture of Children Engaging in ASM Activities

Source: (Reconstructed from field data photographic information, 2015)

The observation around the mining sites during fieldwork revealed that children were carrying out ASM activities including carrying sand with mineral particles, extracting minerals during school time (See Figure 1 and Figure 2). When they were asked if they were pupils, they responded affirmatively and admittedly confessed that they skipped school for two days. This finding was corroborated by pupils' own accounts in the FGD where they disclosed having regularly involved in ASM activities.



Figure 2: A Picture of Pupils Washing Minerals at a Mining Site.

Source: (Reconstructed from field data photographic information, 2015).

One of the head teachers lamented that this practice is fostering the persistence of child labour in ASM areas:

School administration has no full support from ASM leaders in reproaching and stopping pupils' involvement in ASM activities. Instead, they protect truant pupils in order to continue working with them (Translated from Kiswahili, 2015)

The study also revealed that most children in ASM activities work on contract basis whereby parents or elders pay them immediately after completion of an activity. This shows that ASM families depend on child labour in some areas in order to earn living. This observation concurs with Kuramoto (2001) who observed that the mining families conserve cultural patterns that justify child labour, especially in the areas where migrant labour from agricultural communities is concentrated. The involvement of children in ASM activities affects their schooling in terms of attendance and completion. Those children whom the researcher came across washing minerals during schooling hours justified missing school in order to earn money to support their family:

We have not gone to school today because our mother is sick and at home there is no money for her treatment, even for buying our basic needs. Our father passed away so we have to struggle for life (Researcher's translation, 2015).

Some children are involved in ASM activities due to involvement of their parents (reference is made to Figure 1). In a casual conversation with children during fieldwork observation, one of the children aged seven years disclosed:

Whenever I ask my mother when I will start schooling, she says next year because there is nobody to take care of my young sister (Researcher's translation, 2015).

Effects of ASM Activities to Pupils' Learning Outcome

The implication of ASM activities for pupils' learning outcome was the gist of the matter for this study. Table 3 shows respondents' accounts on the implications of ASM activities to pupils' participation in learning.

Table 3: Respondents' Response on Implications of ASM Activities to Pupils' Learning Outcome (N=58)

S/N	Outcomes	Frequency	Percent %
1	Poor attendance	15	25.8
2	Moral decay	5	8.6
3	Late coming	6	10.1
5	Early marriage	8	13.7
6	School Dropouts	10	17.2
7	All above mentioned	6	10.1
8	Disagreed	8	13.7
	Grand Total	58	100

Source: (Field Data, 2015)

Poor attendance and school dropouts were the leading effects of ASM activities on pupils' learning. One of the head teachers reported that ASM activities affect pupils school attendance and completion as many pupils who come from ASM areas do not complete standard VII due to influence of former school dropout pupils who seem to be earning some money from ASM activities. In the FGD, one standard seven girl lamented on how ASM activities affected her studies and her sister's who got married early:

I could have been in form two now. In the year 2009 my parents shifted from Ushiroombo to Busili purposely to engage in ASM activities. By then, I was in standard three and my elder sister was in standard six. When we arrived we did not continue with studies until 2011 when I repeated standard three. But my sister couldn't; instead she got married in 2013 (Researcher's translation, 2015).

Table 4: Registered Pupils from ASM Areas for Current Standard Seven Pupils since year 2012 to March 2015

Schools	Std Four			Std Seven			Dropouts		
	Boys	Girls	Total	Boys	Girls	Total	Boys	Girls	Total
A	15	7	22	9	3	12	6	4	10
B	8	5	13	5	3	8	3	2	5
C	X	X	X	X	X	X	X	X	X
D	10	16	26	8	12	20	2	4	6
E	7	2	9	5	0	5	2	2	4
F	9	6	15	6	3	9	3	3	6
Grand Total	49	36	85	33	21	54	16	15	31

Source: (Field Data, 2015)

X = school C by 2012 had no standard Four.

Records of attendance and registration of pupils from ASM areas were reviewed. Table 4 shows the pupils from ASM areas who were registered in all five primary schools between 2012 and 2015. School C was established in 2010 that's why in year 2012 it had no standard four pupils. The data show a total of 85 registered pupils (49 boys and 36 girls) in 2012. In 2015, the number of pupils had dropped to 54 registered pupils (33 boys and 21 girls). In other words, 31 pupils (16 boys and 15 girls) had dropped out of schools. Among other reasons for school dropout for were ASM activities and girls were early pregnancy. Only two pupils died.

Academic Performance of Pupils from ASM Areas and Non - ASM Areas

The academic performance of pupils who came from ASM areas and those from non ASM areas were compared (See Table 5). Annual examination results of 36 pupils (18 who came from ASM areas and 18 from non ASM areas) were analyzed using Chi-square test to assess significant difference in the influence of ASM activities on pupils' learning achievement. Table 6 shows the Chi-Square test results, while Table 7 shows the symmetric measure coefficient.

Tables 5 and 6 reveal that pupils who come from non-ASM activities had good performance academically. Only five (05) out of 18 had low academic performance, while 14 out of 18 of those from ASM areas performed poorly. Table 6 shows that the corrected value of 7.133, with an associated significance level of 0.008, which is smaller than the alpha value of .05. This indicates that the result is statistically significant, indicating that ASM activities have significant influence on pupils' learning achievement. The Phi coefficient value of symmetric measure shown in Table 7 is -.50, suggesting a large effect on pupils' learning achievement that leads to pupils in mining areas not studying well. Indeed, ASM activities lead to pupils' poor classroom attendance, moral decay, school dropout and early marriage. They are bound to affect pupils' learning achievement negatively.

Table 5: Response of Pupils on the involvement in ASM Activities in Relation to their Academic Performance (from documentary review N=36)

			Pupils' Academic Performance		Total
			Low Academic Performance	Good Academic Performance	
Are you involved in ASM activities?	No	Count	5	13	18
		Expected Count	9.5	8.5	18.0
	Yes	Count	14	4	18
		Expected Count	9.5	8.5	18.0
Total		Count	19	17	36
		Expected Count	19.0	17.0	36.0

Source: (Field data, 2015).

Table 6: Chi-Square Test of Results of Table 5

	Value	Df	Asymp. Sig. (2-sided)	Exact Sig. (2-sided)	Exact Sig. (1-sided)
Pearson Chi-Square	9.028 ^a	1	.003		
Continuity Correction ^b	7.133	1	.008		
Likelihood Ratio	9.456	1	.002		
Fisher's Exact Test				.007	.003
Linear-by-Linear Association	8.777	1	.003		
N of Valid Cases ^b	36				

a. 0 cells (.0%) have expected count less than 5. The minimum expected count is 8.50.

b. Computed only for a 2x2 table

Source: (Field data, 2015)

Table 7: The Symmetric Measure Coefficient of Tables 5 and 6

		Value	Approx. Sig.
Nominal by Nominal	Phi	-.501	.003
	Cramer's V	.501	.003
N of Valid Cases		36	

Source: (Field data, 2015)

These findings are consistent with Fuller et al., (cited in UNICEF, 2000) who revealed that to achieve academically, children must attend school consistently. A child's exposure to curriculum—his or her 'opportunity to learn'—significantly influences achievement, and exposure to curriculum comes from being in school. Similarly, a study of village-based schools in Malawi and many others found that students with higher rates of attendance had greater learning gains and lower rates of repetition (Miske, Dowd et al., cited in UNICEF, 2000).

Influence of ASM Activities on Pupils' Learning Achievements by Gender

A significant gender difference in the influence of ASM activities on pupils' learning achievement was explored. This question was posed to two groups of respondents namely, head teachers and teachers. Documentary review was also used to verify the difference and relationship between boys' and girls' learning achievements. Figure 3 shows respondents' accounts on how boys and girls are affected differently by ASM activities.

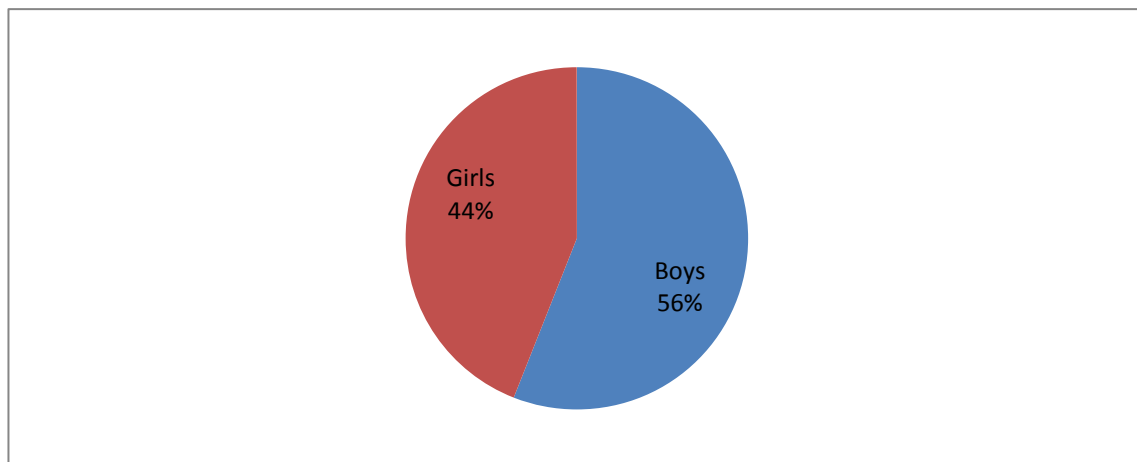


Figure 3: ASM Activities Effects to Pupils by Gender (N=18)

Source: (Field data, 2015).

During interviews with the head teachers, they reported that the effect of ASM activities on pupils' learning achievements varies with gender. Head teachers said that most pupils who engage in ASM activities are boys and academically they do not perform well compared to girls. This is because boys spend much time on ASM activities hence being absent from school more. From the documents reviewed, namely registration book, attendance book and previous annual examination results of 2014, it was found that 38 pupils (21 boys and 17 girls) dropped out of schools between 2012 and 2015. This suggests that boys were more likely to be affected by ASM activities than girls. A chi-square test of no significant difference by gender was performed to examine the relationship between ASM activities and pupils' academic achievement (See Table 8, 9 and 10).

Table 8 shows 18 head teachers and teachers' responses to the question: "is there significant difference in the influence of ASM activities on academic performance of pupils by gender?" Respondents correctly said boys are affected more by ASM activities than girls and so they perform poorly. Only three girls out of eight performed poorly, all 10 boys performed poorly. There is no down in this case that ASM activities influence on boys' learning achievement than girls'. Table 9 shows the corrected value of 5.819, with an associated significance level of 0.016, which is smaller than the alpha value of .05. This means that the null hypothesis of no significant difference in the influence of ASM activities on academic achievement of boys and girls is not retained. Boys are more affected academically than girls. The phi coefficient value of "symmetric measure" is -.69, suggesting a large effect of the influence of ASM activities on boys' academic achievements as a result of boys in mining areas not studying well. It is thus, recommended that the government and other education stakeholders should prevent the involvement of children in ASM activities, regardless of their gender.

Table 8: The Influence of ASM Activities on Pupils' Academic Performance by Gender (N=18)

		Academic performance of pupils basing on gender		Total	
		Low performance	High performance		
Gender which is mostly involved in ASM activities	Girls	Count	3	5	8
		Expected Count	5.8	2.2	8.0
	Boys	Count	10	0	10
		Expected Count	7.2	2.8	10.0
Total		Count	13	5	18
		Expected Count	13.0	5.0	18.0

Source: (Field data, 2015)

Table 9: The Chi-Square Test of Results on the Influence of ASM Activities on Pupils' Academic Performance by Gender.

	Value	Df	Asymp. Sig. (2-sided)	Exact Sig. (2-sided)	Exact Sig. (1-sided)
Pearson Chi-Square	8.654 ^a	1	.003		
Continuity Correction ^b	5.819	1	.016		
Likelihood Ratio	10.685	1	.001		
Fisher's Exact Test				.007	.007
Linear-by-Linear Association	8.173	1	.004		
N of Valid Cases ^b	18				

a. 2 cells (50.0%) have expected count less than 5. The minimum expected count is 2.22.

b. Computed only for a 2x2 table

Source: (Field Data, 2015)

Table 10: The Symmetric Measure Coefficient from Tables 8 and 9

		Value	Approx. Sig.
Nominal by	Phi	-.693	.003
Nominal	Cramer's V	.693	.003
N of Valid Cases		18	

Source: Field Data (February, 2015)

Conclusion

A number of conclusions are drawn regarding the research objectives: First, ASM activities have negligible positive contribution to primary school pupil's learning achievements given that the owners of ASM sites barely contribute to social service projects unless pressured in some ways. Unintended negative contribution include school dropout among pupils due to failure to get school contributions such as token money for school feeding- i.e. porridge, uniforms, school infrastructure building, among others. Second, poor attendance and school dropout as a result of involvement in ASM activities mostly contribute to the negative influence on pupils' learning achievement as exemplified by Chi-square test— $X^2 = 7.133 (1), \alpha = 0.008$, with asymmetric measure coefficient (Phi = $-.501, \alpha = .003$). Third, the most negatively affected pupils' gender performance-wise as a result of ASM activities is male— $X^2 = 5.819 (1), \alpha = 0.016$ with the asymmetric measure coefficient value (Phi = $-0.69, \alpha = 0.003$). This indicates that ASM activities exert negative influence more on academic achievement of boys than girls'. Nonetheless, children should be protected from involvement in ASM activities, regardless of their gender.

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