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Association between Education and Gemstone Mining Practices of Artisanal and Small-Scale Miners in Gilgit-Baltistan, Pakistan

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ABSTRACT

Artisanal and Small-Scale mining (ASM) is ubiquitous throughout Gilgit-Baltistan (GB). It is a major source of livelihood sustenance for thousands of individuals who are directly or indirectly working as ASMs. This essay considers the association between the educational background of 300 ASMs and four scenarios, viz., (1) whether they are allowed to do mining in areas other than their villages, (2) whether they allow a non-GB person to do mining in their area, (3) whether ASMs have the right to sell mined gems to someone other than the shareholders at a price offered by the shareholders, and (4) whether they allow fellow villagers in their established mines while they are not working there. Using the Chi-Square test of association, we find a non-significant association between the educational background of ASMs and the first three scenarios listed above: the test results stand as x2 = 0.109, x2=0.063, and x2=0.087 for the three scenarios, respectively. We found a significant association of x2=0.000 concerning the final scenario, viz., whether respondents would allow fellow villagers to mine in their established mine or not.

1. INTRODUCTION

Artisanal small-scale mining (ASM) is the main source of colored gemstones (Cartier, 2011). There are over a hundred different gemstone varieties and more than fifty producing countries; around 20-30 million people worldwide are attached to the sector, and about 70% to 80% of gemstones are mined by ASMs (Cartier, 2019). ASM-based gemstone mining and trading are complex and the supply chains are characteristically fragmented (Archuleta, 2016). It is a viable avenue for the livelihood of millions of people around the globe (Hilson, 2002), but the informal and unregulated nature of the sector (IIED, 2013) does not translate into substantial economic development of the mining communities (Cartier, 2009). In fact, Ross (2003) has gone to the extent of declaring ASM's extraction of gemstones "lootable" and "unobstructable." Ross (2003) could be right in declaring that the lootable nature of gemstones in the unregulated environment makes them tenable for easy misappropriation by groups of unskilled workers because most miners are vulnerable individuals trapped in vicious poverty cycles. ASMs lack the most basic socio-economic infrastructure that is required for breaking out of extreme poverty (Siegel and Veiga, 2010). They are usually unable to educate their children, develop economically, and boost their productive assets. Informal

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mining is the last option to sustain themselves out of chronic poverty (Lahiri-Dutt, 2018). Others join the ASM driven by the inability to find alternative work that can meet their immediate basic needs (Hilson, 2016; Wilson, Renne, Roncoli, Agyei-Baffour, & Tenkorang, 2015), are engaged in precarious work, and have no access to any form of social protection. They are often with low levels of education, technical capabilities, and entrepreneurial skills. Their lack of formal education reduces their chances of securing decent employment and restricts their use of appropriate mineral extraction and processing technologies. The artisanal miners typically use rudimentary mining methods and the lack of mechanization allows for a highly labor-intensive sub-sector, which enables thousands of men and women to work on an individual basis, as family groups, or as members of cooperatives and other types of legal associations and enterprises. If ASMs operate as extended family businesses, they typically employ ten people per company (Musiyarira, Pillalamarry, Tesh, & Nikowa, 2019).

Just like other small-scale sectors, ASM faces marginalization as miners operate in remote areas with poor market access and transport that contribute towards geographical marginalization and restrict access to information, key inputs, and technologies. Marginalization can also be linked with food insecurity. Murphy's (2012, p. 3) vivid description of "marginal farmers" as those who are "farming yet hungry," can be adapted to ASM as "mining yet hungry." That is, miners lack sufficient income or assets to buy adequate food for themselves and their dependents. In a nutshell, inappropriate technologies, low levels of environmental awareness, poor information, and a low asset base continue this poverty trap. The sector is plagued by so many challenges because governments, development donors, NGOs, and other industry players often neglect to address the structural challenges confronted by this sector. This neglect could be in the form of a lack of appropriate regulative framework, lack of implementation and monitoring of governmental regulations, poor access to financial services, poor social protection, political exclusion, etc. (Buxton, 2013). The variety of traps described above not only makes ASMs phenomenally complex but also ironically the sector is poorly researched. A substantial scholarship has invested in the material properties and sources of gemstone varieties, but there is virtually nothing on investigating the supply chains and challenges linked with their extraction, processing, and trade (Cartier, 2019).

Artisanal Small-Scale Mining in Gilgit-Baltistan: Background Context

Gilgit-Baltistan (GB) spans an area of 72,496 square kilometer (Km2). Its mountainous terrain has a significant reservoir of valuable gemstones (Shah, Khayyam, & Mumtaz, 2021) including gold (Alam et al., 2020; Riaz et al., 2017), attracting an unknown number of local actors as ASMs. Gilgit-Baltistan possesses a significant quantity of gemstone resources, which attracts the engagement of numerous miners in their exploration (Shah et al., 2021). Its rugged mountain terrain is too difficult if not impossible to administer in the true sense of the term. It is definitely so in the case of mineral resources for the following reasons. According to an official of the GB's mineral department, the department "has a shortage of human resources to monitor 72,000 square kilometers. We have just 30 to 40 staff members for the entire region." Secondly, according to the interviewees from the GB's local community and staff members of the mineral department, the department was set up in the early 2000s. Yet, the department has relatively recently taken steps to streamline the leasing process in the gemstone sector. According to the latest policy, it is now "compulsory that one person should be local from GB or if a foreign company does not have a community (support) they should do partnership with local companies. Until one of these conditions is fulfilled, we cannot process the case [for lease application]" (GB's Minerals Department official). This measure was adopted because the public was against leasing mines in the communal lands around villages.

There is no record of when ASM began in the region. It seems safe to state that the people of GB have been engaged in full-time or part-time ASM for quite some time; the region is very rich in a variety of resources. GB has 32 distinct varieties of Gemstones including gold (Riaz et al., 2017). Partly because of the government's lack of support to the locals and partly because of the distant location of the mining areas, ASM has evolved into a viable livelihood strategy for the people. Each village or group of villages has developed mechanisms for investment in and the distribution of the mined gemstones. Firstly, it is a convention that only the inhabitants of each village have the right to do mining in the communal lands. In fact, some villages have even developed normative standards whereby villagers do not excavate in a mine that has been already started by one or a group of fellow villagers; a prospective miner from a village can only mine an existing mine if it has remained dormant for two to three years. Secondly, ASM in GB explosives-oriented. However, as per the latest regulations, only an officially approved gemstone lease is eligible for acquiring explosives. Since almost all ASMs in GB are "illegal," miners use various tactics to acquire explosives. The description of those tactics is beyond the scope of this paper, but it is worth noting that, as stated above, miners group up to do mining. Typically, an ASM group would comprise a person responsible for the provision of explosives, another would invest in the provision of fuel (diesel/petroleum) for power generators and drilling machines and yet another would work as a supplier of food rations and other consumables.

2. METHODOLOGY

The data for this paper is drawn from a research project funded by the Higher Education Commission (HEC) of Pakistan. The project broadly focused on the analysis of factors influencing the extraction, processing (cutting and polishing), identification, and trading of gemstones in Swat district of Khyber Pakhtunkhwa (KP) and Skardu district of Gilgit-Baltistan (GB) region. We adopted a three-phased exploratory sequential design on the logic of mixed methods research. The adoption of the qualitative-quantitative duo was in response to Cartier's (2019) complaint about the paucity of research on the gemstone sector. At the time when we began fieldwork, there was virtually no systematic treatment of issues concerning the extraction, processing, and trade of gemstones in either of the two regions, viz., Swat and Skardu. Thus, initially, we conducted four stakeholder workshops, two in Khyber Pakhtunkhwa (Charsadda and Swat) and two in Gilgit-Baltistan (Gilgit and Skardu). This was followed by semi-structured interviews (SSIs) with miners, government officials, traders, and lapidarists in Swat (KP) and Skardu (GB). Next, we thematically analyzed the qualitative dataset in light of the project objectives, which informed the

construction of questionnaires for surveys of miners in Swat and artisanal small-scale miners (ASM) in Skardu. Finally, we surveyed a sample of 300 respondents engaged as full-time or part-time artisanal small-scale miners (ASMs) in Skardu.

Ideally, the survey should have been conducted by adopting probability sampling. However, we used convenient sampling for the selection of 300 respondents, which is due to the following reasons. Firstly, there was no pre-existing sampling frame of ASMs to draw a sample of 300 respondents. Two obvious factors explain this. According to the mineral department, all those ASMs which are not registered as leases with it are "illegal;" being under-cover, there is no way a full register of all the ASMs in the target area could be known or knowable (Bangash & Owais, 2023; Shah et al., 2021). As mentioned above, with just 30 – 40 staff members, GB's mineral department being in its infancy cannot be expected to monitor the actors and sites of ASM as they are often at high altitudes, some of which are distant from the roadside by two to four days trek. Secondly, as an alternative, we could have mapped all the villages in Skardu district where ASMs have been working either part-time or full-time during the mining season. However, this was almost impossible in terms of budgetary resources and time commitment for the completion of this project. Consequently, we adopted convenience sampling. We relied on two locals as enumerators for quantitative data collection. The enumerators were trained and sensitized about data collection procedures, and ethical requirements of (i) informed consent, (ii) confidentiality, (iii) anonymity, and (iv) no harm.

The results presented below are quantitative in nature, but where needed we have subscribed to qualitative data for giving contextual information. The quantitative data is presented at the univariate level of analysis with the help of frequencies and the association between variables is drawn at a bivariate level using chi-square test statistics.

3. RESULTS & DISCUSSION

The above table draws an association between the educational background of the respondents and three statements about ASMs' normative practices concerning gemstone mining in Gilgit-Baltistan (GB). The first statement is about non/permission to do mining in an area other than ASM's native villages. The results show that a significant majority of the respondents, i.e., 268 out of 300 stated that they were not allowed to do mining in areas other than their native villages. These included 87 illiterates while the rest were educated; 59 had primary level education, 42 were middle pass, 28 matriculates, 11 intermediates, 32 undergraduates, and 9 MA/MSc were degree holders. The remaining (32 out of 300 respondents) responded that they were allowed to do mining in an area other than their native villages. These included 7 illiterates, 6 primary educated, 12 middle pass, 1 matriculates, 1 intermediate pass, 4 graduates, and 1 masters graduate. At the bivariate level of analysis, we observe a non-significant association (x2 = 0.109) between the educational background of the respondents and the prospects of mining in an area other than their native villages. It is almost an unwritten covenant that only natives of a village have the right to do mining in the communal lands or mountain areas which has been legally and customarily declared as within the village jurisdiction. In this regard, quite a few interviewees referred to the historicity of "Wajib-ul-Arz" during the qualitative data collection. Wajib-ul-Arz is a land revenue record document, which, according to a bulletin of the Federal Judicial Academy (FJA),

Table 1
Univariate frequencies and bivariate chi-square test statistics

Variables	Education	Yes	No	Total	Chi-Square Statistic
Are you allowed to do mining in an area other than your native village?	Illiterate	7	87	94	P = 10.397 x2 (0.109)
	Primary	6	59	65	
	Middle	12	42	54	
	Matric	1	28	29	
	Intermediate	1	11	12	
	BA/BSc/BS	4	32	36	
	MA/MSc	1	9	10	
	Total	32	268	300	
Do you allow a non-GB person to do mining in your area?	Illiterate	14	80	94	P = 11.960 x2 (0.063)
	Primary	9	56	65	
	Middle	7	47	54	
	Matric	2	27	29	
	Intermediate	5	7	12	
	BA/BSc/BS	10	26	36	
	MA/MSc	2	8	10	
	Total	49	251	300	
Will you allow a fellow villager to do mining in your established mine while you are not working there?	Illiterate	22	72	94	P = 31.497 x2 (0.000)
	Primary	15	50	65	
	Middle	13	41	54	
	Matric	6	23	29	
	Intermediate	8	4	12	
	BA/BSc/BS	22	14	36	
	MA/MSc	5	5	10	
	Total	91	209	300	
Have you the right to sell mined gems to someone other than the shareholders at a price offered by the shareholders?	Illiterate	7	87	94	P = 11.040 x2 (0.087)
	Primary	2	63	65	
	Middle	5	49	54	
	Matric	2	27	29	
	Intermediate	0	12	12	
	BA/BSc/BS	7	29	36	
	MA/MSc	0	10	10	
	Total	23	277	300	

> *…. records various customs and usages of [a] village. It expressly lays down the mode and manner of the use of shamilat land and also the scheme of partition as to what should be the scale for distribution of this land in case of partition. … Thus, whenever settlement takes place in an estate or village, and record of rights is prepared, there shall be prepared a proper Wajib-ul-Arz which shall contain a statement of customs concerning Common Land/Shamilat, its cultivation, and the enjoyment of the proceeds thereof, rights of grazing etc [sic] in common land. (FJA, 2016, pp. 24-25)*

the socio-legal indubitability of the ownership of communal lands coincides with the above findings. Hence, the impermissibility of non-villagers to mining in the communal lands.

The findings regarding non/permission to a non-GB person to do mining in ASMs' area are in consonance with the above findings. The majority of the respondents, i.e., 251 out of 300, including 80 illiterates, 56 primary-educated, 47 middle-passed, 27 matriculates, 7 intermediate pass, 26 undergraduates, and 8 holding MA/MSc qualifications did not allow a non-GB person to do mining in their area. The rest of the respondents, i.e., 49, including 14 illiterates, 9 primary level education, 7

middle-passed, 2 matriculates, 5 intermediate, 10 undergraduates, and 2 with MA/MSc qualified confirmed to allow the non-GB persons to do mining in their area. Here too we find a non-significant relationship (x2=0.063) between respondents' education and the non/permission to allow a non-GB person to do mining in ASM's areas. It has been already pointed out in relation to the preceding findings that, conventionally, only a native of the village is allowed to do mining in his area. However, there is another reason for not allowing a non-GB person to do mining in the area. Historically, GB has been considered a sensitive region due to its geostrategic location. Yet, it has hardly had its fair share of resources from the federal government. In 2009, the government of Pakistan issued the "Gilgit-Baltistan (Empowerment and Self-Governance) Order." This allowed GB to act autonomously via its own legislative assembly. Subsequently, in 2015, the elections to the legislative assembly were held. Nonetheless, in November 2021, a participant in a stakeholder workshop, complained that GB was

> *… a sarzameen e bay-ayeen [a land without constitution], because until 2017/18 the mineral department [of GB] was directly under the Federal control. Literally, we [the residents of GB] are sitting naked and without government support on gold mines. … in the eyes of the [federal] government, we are neither males nor females… How come you expect us to allow a non-GB person to lease mines in our lands when we have never been treated as equal citizens?*

The reference to "neither males nor females" resonates with a widespread perception of the low standing of persons identified with the third gender. They are referred to as hijras in the vernacular and the term is used to taunt someone (a person or a group) as impotent and without any power or significance. When the workshop participant made the above remark none of the 16 participants contradicted him; instead, most of them nodded, indicating that they also felt the second-hand treatment of GB people by the government of Pakistan. This, in essence, explains the reason for the majority of respondents' position on not allowing leases to non-GB persons.

The findings regarding the non/allowance of fellow villagers to do mining in an established mine in the native village are in contrast to the preceding findings. That is, 209 out of respondents 300, including 72 illiterates, 50 with primary level education, 41 middle-passed, 23 matriculates, 4 intermediate pass, 14 undergraduates, and 5 MA/MSc degree holders said that they would not allow a person from their village to do mining in their established mine while they were not working there. Only 91 respondents consisting of 22 illiterates, 15 primary educated, 13 middle pass, 6 matriculates, 8 intermediate pass, 22 undergraduates, and 5 MS/MSc degree holders confirmed to allow a person from their village to do mining in their established mine while they are not working there. At bivariate analysis, a highly significant association (x2=0.000) resulted between the educational background of the respondents and the mining permission for a person belonging to native villages to do mining in the established mines of others. These results were further validated during interviews that if a mine remained closed for 2-3 years, then another person from the village could do mining there. It could be the reason that the locals have a homogeneous social structure where they easily accommodate each other.

The final stated in the above table draws an association between ASM's educational background and their right to sell mined gems to someone other than the shareholders at a price offered by the shareholders. In this regard, the majority of the respondents, i.e., 277 out of 300 including 87 illiterates, 63 primary educated, 49 middle-passed, 27 matriculates, 12 intermediates, 29 undergraduates, and 10 MA/MSc qualification-holders negated that they had the right to sell mined gems to someone other than the shareholders in a price offered by the shareholders. The remaining, i.e., 23 out of 300 respondents, including 7 illiterates, 2 primary educated, 5 middle-passed, 2 matriculates, and 7 undergraduate pass considered that they had the right to sell mined gems to someone other than the shareholders at a price offered by the shareholders. The results show a non-significant association (x2=0.087) between respondents' education and the right to sell mined stuff to someone other than the shareholders at a price offered by the shareholders. It could be the reason that mined gems could only be sold to the shareholders if they offered a good price as per the market rate. However, if someone offered a higher price than the shareholders then the miners had the right to finalize the deal. These results also show the pivotal role of shareholders in buying mined gems due to their investment in machines, explosives, fuel, and food.

4. CONCLUSION

This paper tested the association between the educational background of 300 respondents engaged in artisanal and small-scale miners (ASMs) and (1) whether they are allowed to do mining in areas other than their own villages, (2) whether they allow a non-GB person to do mining in their area, (3) whether ASMs have the right to sell mined gems to someone other than the shareholders at a price offered by the shareholders, and (4) whether they allow fellow villagers in their established mines while they are not working there. With regard to scenarios (1) through (3) we found non-significant results of x2 = 0.109, x2=0.063, and x2=0.087 for the three scenarios, respectively. We found a significant association of x2=0.000 with respect to the final scenario, viz., whether respondents would allow fellow villagers to mine in their established mine or not. The paper finds that the local people of GB are not allowed to do mining in areas other than their native villages and communities. Similarly, non-GB people are also not allowed to do mining in ASMs' areas. However, a person belonging to a native village has the right to do mining in the established mines of others after the closure of a mine for 2 to 3 years.

Conflict interests

The authors declare no conflict of interest.

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