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Gendered livelihoods in the artisanal mining sector in the Great Lakes Region

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ABSTRACT

Using data collected from a survey administered at seven mine sites in Uganda, the Democratic Republic of Congo, and Rwanda, this paper examines differences in the livelihoods and economic well-being of women and men involved in artisanal and small-scale mining. To provide a deeper context, the results from the survey are combined with findings from other methodological approaches. The results provide evidence that men have more experience in the mining sector and that men earn more both at mine sites and at activities not conducted at mine sites. The evidence also highlights the need for research on the artisanal mining sector to be gender sensitive, to yield policies that improve the economic well-being of all those reliant on the sector.

RÉSUMÉ

En utilisant les données receuiillies dans le cadre d'une enquête conduite sur sept sites miniers en Ouganda, en République démocratique du Congo et au Rwanda, cet article examine les différences dans les moyens de subsistance et le bien-être économique des femmes et des hommes impliqués dans l'exploitation minière artisanale et à petite échelle. Afin de fournir un contexte plus approfondi, les résultats de l'enquête sont combinés avec les résultats obtenus grâce à d'autres approches méthodologiques. Les résultats montrent que les hommes ont plus d'expérience dans le secteur minier et qu'ils gagnent plus d'argent à la fois sur les sites miniers et dans les activités qu'ils n'y ont pas menées. Les résultats soulignent également la nécessité pour la recherche sur le secteur de l'exploitation minière artisanale d'être sensibilisée au genre en vue de l'élaboration de politiques d'amélioration du bien-être économique de tous ceux qui dépendent de ce secteur.

KEYWORDS

Artisanal small-scale mining; gender; livelihoods; work; economic well-being

MOTS-CLÉS

Exploitation minière artisanale et à petite échelle; genre; moyens de subsistance; travail; bien-être économique

Introduction

The World Bank estimates that approximately 100 million people worldwide – workers and their families – depend on artisanal and small-scale mining (ASM) as compared to roughly seven million people in industrial mining (2013, 1). Although the term "small-scale mining" dates back to the early 1970s, it took until the 1990s for the involvement of women and children in the sector to emerge as a scholarly topic and a subject of public

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policy attention (Hilson 2009). Since that time, the significant involvement of women in ASM has produced an expanding literature exploring the gendered nature of artisanal mining. While the participation rate of women in ASM varies across continents, estimates suggest that across Africa, women account for between 40 and 100% of the ASM workforce (Eftimie et al. 2012, 6). This article seeks to advance knowledge about the gendered livelihoods within ASM in three African nations by presenting research on the nature of the work undertaken within ASM and how women and men organize their labour.

The paper contributes to the scholarly literature on ASM by offering an overview of results from a survey administered at seven different mine sites across three countries: Uganda, the Democratic Republic of Congo (DRC), and Rwanda. The selection of these three countries provides distinct contexts within which to study the gendered nature of artisanal mining activities. The survey responses reveal detailed information on worker characteristics, their occupations at the mine site and off the mine site, the organization of the work at the mine sites, and the role artisanal mining plays in household finances, and offer new insights into the gendered nature of livelihoods that rely on ASM. The findings indicate that such information has policy relevance given that without a nuanced understanding of what happens at mine sites and how women and men construct livelihoods around their mining activities, changes to policies affecting the sector risk ignoring, at best, or potentially harming at worst, those populations whose economic well-being depends on artisanal mine sites.

Situating the research questions

At the broadest level, our purpose in this comparative study is to contribute to the recent research trend to analyse "what artisanal mining is," as opposed to the earlier focus on "what it was not" (Bryceson and Geenen 2016, 300). Our work builds on Bryceson and Geenen's important contribution on artisanal gold mining in Tanzania and the DRC, which discovered similar labour patterns across differing national political contexts and despite the DRC's conflict mineral production experience. Bryceson and Geenen's analysis usefully interrogates labour transformation processes in what they term the occupational "frontier" that is artisanal mining, considering multiple aspects of the sector's internal dynamics, and, particularly useful for our study, examining the extent to which miners act as self-directed agents across particular state formations (Bryceson and Geenen 2016, 301). While their work offers valuable insights into constructions of masculinity among male miners, the labour of women in artisanal mining and the impact of gender on men's labour practices do not figure prominently in their analysis.

Our study more closely aligns with the work of, among others, Jenkins (2014) who has called for a research agenda on women in extractive industries that incorporates women's roles as mineworkers, the gender impacts of mining, the changing gender relations and identities within mining communities, and the gender inequalities and access to the benefits of mining. Like Jenkins, we aspire to make visible the multiplicity of activities in which women engage within the artisanal mining sector, broadly defined, and the challenges they face with respect to sustaining their livelihoods. Jenkins notes the tendency of literature on women workers in the ASM sector to focus on single case studies (2014, 330); in response, we offer a three-country study that allows for the identification of cross-national

trends in women's artisanal mining participation as well as the impact of specific kinds of mines on women's and men's economic engagement and benefits.

Lahiri-Dutt's critical scholarship on women and mining is particularly instructive to this work. Her 2008 observation that "for women to benefit from ASM it is first of all imperative to make their productive work more visible" (as quoted in Jenkins 2014, 332) still resonates, as much remains to be documented about the particular tasks women assume in individual mine settings and how those mesh with or diverge from men's mining and non-mining activities. Lahiri-Dutt's later work (2012) challenges scholars further to rethink mining itself from a feminist perspective and reject conventional understandings of mining as narrowly limited to industrial tasks. Applying a feminist analysis to the study of women in artisanal mining involves integrating understanding of women's household and other care-giving responsibilities that impose an added burden on women's pursuit of economic activity and result in an inevitable time poverty that men may not experience. More recently, Lahiri-Dutt (2015) argues convincingly for consideration of the "feminisation of mining" and calls for researchers to investigate how new gendered geographies are created as poverty pushes women into the artisanal mining sector and the "archetypically hyper-masculine industry" undergoes transformation (523).

Building on these insights, we focus on the following research questions: How do women and men in artisanal mining differ in their demographic characteristics, the type of work in which they are engaged, and how they organize their livelihoods? Are these differences consistent across country and type of ore mined? Underpinning these questions is our curiosity about women's agency. This research seeks to compare the options for economic activity women exercise within artisanal mining and how they organize their livelihoods within the ongoing, significant constraints of gender roles.

We approach this research through the lens of women's economic empowerment, examining the range of activities in which they are engaged within the sector, the impact of different types of artisanal mining on their economic well-being, and the nature of their economic activities outside of artisanal mining. We seek to uncover how women and men involved in artisanal mining organize their economic livelihoods and to document the impact of gendered structures and practices on their respective livelihoods. While cognizant of the multiple and complex structural barriers that limit women's autonomy within the artisanal mining sector, our study rejects perpetuating tropes of victimhood and instead focuses on illuminating women's agency in pursuing their livelihoods. Our approach to these questions is comparative not only in terms of geographic location; we believe that examining gender differences is done most fruitfully through the systematic comparison of women's and men's quotidian experiences.

We present the results from a survey conducted in three tin, tantalum and tungsten (3T) and four gold mining sites in the DRC, Rwanda, and Uganda at the beginning of 2016: three mine sites in DRC, and two each in Rwanda and Uganda. The quantitative survey results are supplemented with qualitative results obtained from open-ended questions included in the survey and other research conducted at the mine sites.

Country context

The three countries covered by this study lie in a part of the Great Lakes Region that is richly endowed with natural resources. However, it is also a region with high levels of poverty – some

of the highest levels in the world – with a gross domestic product (GDP) per capita of USD444 for DRC, USD615 for Uganda, and USD702 for Rwanda (World Bank 2017). This juxtaposition is largely attributed to decades of misrule and vicious internal and external conflicts often involving multiple regional and international players (Kanyangara 2016). Poor governance and endless conflicts have had a devastating effect on all sectors of these countries.

Although all three countries had a burgeoning mining sector before and immediately after they gained independence in the early 1960s, years of political anarchy coupled with a slump in world market prices of minerals in the 1980s resulted in a capital flight that debilitated the sector to the extent that, by the 1990s, most exploitation of minerals had become exclusively artisanal (IPIS 2012; UNEP 2012). The decline of the formal industrialized mining sector and the worsening economic situation across the region made artisanal mining increasingly attractive to many men and women despite its many challenges. For example, in Eastern DRC, where two of the study sites are located, about a half million people are estimated to be working in the mines to support themselves, their families, and the wider community (IPIS 2012; Global Witness 2004). It is estimated that ASM supports between 16 and 20% of the DRC population (World Bank 2008). In Uganda, about 200,000 men and women earn their livelihood directly from ASM activities (UNEP 2012), while in Rwanda it is estimated that at least 1.5% of the population is directly dependent on ASM (Nishiuchi and Perks 2014).

Although ASM is traditionally male dominated, it has become an important source of livelihood for many women due to changing economic realities. The increased importance for women is partly because of the relative ease of entry. Compared to other sectors, it is labour intensive and requires no formal education, and little or no capital investment is necessary (Hayes and Perks 2012). In the DRC, women constitute as much as 50% of the ASM workforce (Hinton, Veiga, and Beinhoff 2003) despite the widely prevalent gender discrimination and violence against women (Buss et al. 2017, 15). In Uganda, the growth in gold mining in recent years and the gold rushes of the 1990s and 2000s have attracted growing numbers of women to artisanal mining, although here too women face discriminatory gender norms and the persistent threat of violence (Buss et al. 2017, 23). Currently, about 45% of the ASM workforce are women (Eftimie et al. 2012). On the other hand, in Rwanda, the percentage of women in the ASM workforce stands at about 16%, which is much lower than the average estimates in sub-Saharan Africa (Nishiuchi and Perks 2014). Rwanda is known internationally for its parliamentary representation of women, boasting over 61% women in its legislative assembly (IPU 2017) and ranking fifth in the world in the Global Gender Gap Report of 2016 (World Economic Forum 2016). In mining, however, Buss et al. note that women's participation is "somewhat of a departure from the rural norm" and that women have overall lower educational and socio-economic status in the society (2017, 20).

ASM is organized somewhat differently in the three countries. In Uganda, artisanal mining is still largely illegal, although there is a new draft policy which is seeking to formalize it by issuing location licences[1] to artisans with the requirement that they organize themselves into associations. While the current Mining Act (2003) provides for a location licence, it makes no specific mention of artisanal mining and neither does it attempt to address the capacity challenges those wishing to formalize their activities face. It is therefore not surprising that, presently, ASM in Uganda remains predominantly informal.

On the other hand, Rwanda has taken significant steps to legalize ASM, to the extent that the majority of artisanal miners either work for an established mining company or are members of a registered cooperative (Barreto et al. 2018).

The situation in DRC is more complex. Although ASM was legalized in the 1980s and there have been several efforts to formalize the sector, ASM remains largely informal due to several barriers that prevent miners from joining the formal sector. Furthermore, ASM is widely associated with conflict, particularly in the Eastern DRC, where criminal elements within the Congolese army and police, local militias, and foreign, non-state armed groups vie for control of mining sites. According to an International Peace Information Service (IPIS) 2013–2015 survey conducted in eastern DRC, covering a total of 1615 mines, about 64% of the gold mines and 21% of 3T mines were operating under the influence of armed actors (IPIS 2016). The same survey showed that about 80% of artisanal miners were working in the gold mines while 16% were employed by the 3T sector. Besides the armed groups, traditional leaders/chiefs locally known as "mwami" are often the holders of the land rights where ASM is located and have to be paid some customary taxes/benefits by the mining site owners. Thus, in practice, the DRC regulatory approach is a hybrid of formal and informal institutions whereby mining sites are governed by practical norms – set and negotiated by a mix of customary, state, military, and other power holders (Karaki 2018).

Methodology

The field research sites in each country were selected by assessment for risk mitigation (issues of security at the site and in transit); accessibility of the site; numbers of women and men working in mining roles and in secondary industries in the mining zone (e.g. food production and sales); the governance frameworks that seek to formalize the mining activities; and consultation with individuals working in, and authorities governing, the ASM zones to ensure that they were in agreement (Buss et al. 2017, 7–8). The research was conducted in three artisanal gold mining zones – two in the DRC and one in Central Uganda. Two artisanal 3Ts sites were situated in South Kivu DRC and the other in Western Uganda. Two small-scale 3T mines in Rwanda – one in the Northern province and the other in the Southern province – were included in the study.

A multi-case design is useful in generating testable hypotheses for future comparative work, although the comparative approach remains open to criticism because of its partial and exploratory nature. As Stretton observes, "comparison is strongest as … a system for questioning, not for answering" (as quoted in Lijphart 1975, 160). The goal of such multi-case comparisons, therefore, is to identify trends and tendencies in each setting which, in turn, can direct future research.

The study used a robust mix of methods to collect the data required, including a sample survey, participant observations, focus group discussions, key informant interviews, and documentary review. The process of the research was such that the findings from the survey guided the issues and questions explored in the qualitative research. While the results in this paper are mainly from the sample survey, qualitative results from the other methodological approaches conducted at the field research sites were used to expand on the quantitative results.

The target sample size for the survey was set at 120 respondents for each mine site. In order to capture all people potentially affected by mining policy, the instructions to interviewers were: "You are not just interviewing miners, but anyone who comes onto the mine site to earn their livelihood. The list of possible respondents could be miners, management, food providers, suppliers, buyers, and sex workers" (from the Survey Handbook prepared for interviewers). There was a deliberate effort to obtain a sample at least half composed of women, but this goal was achieved at only half of the sites. Researchers were instructed to over-sample women as they tend to be a smaller proportion of workers at the mine site. In addition, where the population at the mining sites was dominated by people who are not directly involved in mining activities, as was the case at the gold-rush site in Uganda, the mining population was oversampled so that at least half of the final sample consisted of people who were directly involved in mining activities.

Respondents to the survey gave permission to use their responses for research. They were promised confidentiality – that is, the stored data would not include individual identifiers and they would not be identified through released research results. Some results could not be disclosed to keep the promise of confidentiality. Further, each respondent was asked if they would like to meet in a more private location and interviewers made arrangements to accommodate this request.

The strengths of the survey were the detailed questions on work patterns and the focus on individuals whose livelihoods depend on artisanal and small-scale mining – a still-understudied population. While the resulting data yield unique insights in that we offer a holistic picture of women's and men's economic activities, there are limitations to the survey that must be acknowledged when interpreting the results.

First, the sample size was small for statistical analysis, particularly when subgroups are compared, such as when comparing men and women or comparing mine sites. The relatively small sample size was a result of the need to keep costs contained. Only two mine sites were chosen for each country (three in the case of DRC) to minimize travel costs and to allow other research activities to occur at the same set of mine sites. The budgeted amount for researcher time constrained the goal number of completed surveys at each mine site. The implications of the sample size were that some results cannot be reported to protect the privacy of respondents and that statistically significant differences between subgroups are less likely to be found.

Second, the sample is not a true random sample because of the oversampling of women at all mine sites and the oversampling of individuals engaged in mining activities at some mine sites. The implication of not having a random sample was that the results are not necessarily generalizable for the respective countries but only give a snapshot of the situation. We cannot say that the proportion of men and women in the sample was representative of the population proportion because women were oversampled. We assume that within the sub-groups of men and women the samples are random, and therefore the observed differences between men and women are representative of the population differences.

A third limitation of the survey is that sensitive information and some behaviours that are illegal are not reported. We expected that many illegal activities would not be revealed through the survey so in general our questions did not ask about illegal behaviour, such as child labour or gender-based violence. The responses to questions that we did ask about illegal behaviour would indicate that this behaviour does not occur. We suspect that these responses do not reflect reality. Further, we surveyed adults only.

Results and discussion

Characteristics of the sample respondents

Table 1 presents the characteristics of the respondents by country and by mined mineral type for men and women, respectively. The total sample size was 878 respondents, with 54% of the sample men and 46% women. While there are differences in the percentages of men and women across countries and mineral type, these differences do not necessarily represent a difference in participation by gender at the mine sites; rather, they may only indicate that our attempt to oversample women was more successful at some mine sites than others, and further highlight that this sample is not a purely random sample.

The average age for men and women in the sample is similar – 34 years for males and 33 years for females – and the ages are similar across countries and mineral type, with two exceptions. The average age of men in Rwanda is less than the average in DRC – 32 years versus 36 years – and the average age of women in Uganda is less than the average age in DRC – 31 years versus 35 years. The average age in the sample may be higher than the true age of workers at the mine sites because we only surveyed adults.

Comparing the survey results to country-level data (see Table A1), our sample has a higher percentage married – that is, a greater proportion of those working in ASM are married compared to general population. This difference is mirrored by a higher proportion never married in the country-level data than in our sample. There could be several explanations for this difference. Our sample is restricted to those over 18 while the Demographic Health Survey (DHS) data includes respondents over the age of 15 and these younger respondents are more likely to never have been married. We found that a smaller proportion of women were married than men for all three countries, while the country-level data only found that result for Uganda. The country-level data reports, as we do, that a larger proportion of women than men are in the divorced/separated/widowed

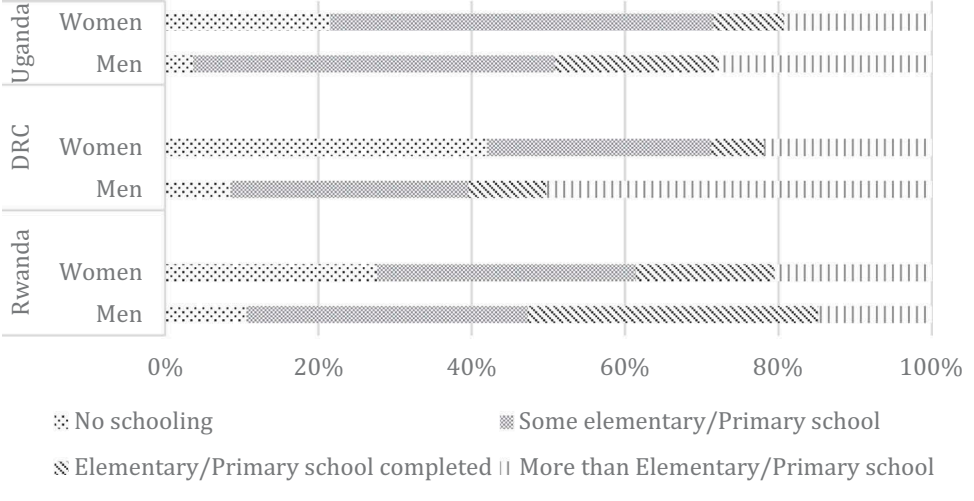

Figure 1. Education.

Table 1. Descriptive statistics by country and mineral mined for males and females (n, %).

Males	Rwanda	DRC	Uganda	Gold	3T	Total
Age (years)	32.2	36.3	34.7	35.3	33.7	34.4
(SD)	11.0	11.2	10.7	10.6	11.5	11.1
Married	93	106	85	122	162	284
	56.0	56.4	78.7	57.6	64.8	61.5
Cohabiting	9	57	9	55	20	75
	5.4	30.3	8.3	25.9	8.0	16.2
Single/divorced/separated/widowed	64.0	25.0	14.0	35.0	68.0	103.0
	38.6	13.3	13.0	16.5	27.2	22.3
Multiple wives	6	23	17	19	27	46
	5.6	14.2	18.5	10.9	14.4	12.7
No schooling	18	16	4	9	29	38
	10.7	8.6	3.7	4.3	11.4	8.2
Some elementary/primary school	62	58	51	59	112	171
	36.7	31.0	47.2	28.2	43.9	36.9
Elementary/primary school completed	64	19	23	24	82	106
	37.9	10.2	21.3	11.5	32.2	22.8
More than elementary/primary school	25	94	30	117	32	149
	14.8	50.3	27.8	56.0	12.6	32.1
Time worked at current mine site (years)	5.69	5.60	5.94	2.93	8.19	5.71
(SD)	6.10	7.28	7.87	3.14	8.48	7.03
Worked at other mines	66	156	27	150	99	249
	38.82	81.25	25.47	70.42	38.82	53.21
Time spent at other mine sites (years)	2.60	4.21	0.73	3.47	3.29	3.39
(SD)	3.5	6.1	0.9	5.5	4.9	5.3
Responsible for selling product	74	175	94	185	158	343
	43.53	94.59	94.95	92.96	61.96	75.55
Sample size	171	192	108	214	257	471
	36.3	40.8	22.9	45.4	54.6	100.0
Females						
Age (years)	33	35	31	34	33	33
(SD)	11	11	11	11	11	11
Married	26	83	66	64	111	175
	31.7	43.7	50.8	41.0	45.1	43.5
Cohabiting	10	51	20	36	45	81
	12.2	26.8	15.4	23.1	18.3	20.2
Divorced/separated/widowed	14	43	21	36	42	78
	17.1	22.6	16.2	23.1	17.1	19.4
Single, never married	32	13	23	20	48	68
	39.0	6.8	17.7	12.8	19.5	16.9
Multiple wives	3	39	26	15	53	68
	7.7	29.8	30.2	15.3	33.5	26.6
No schooling	23	79	28	25	105	130
	27.7	42.0	21.5	16.0	42.9	32.4
Some elementary/primary school	28	55	65	55	93	148
	33.7	29.3	50.0	35.3	38.0	36.9
Elementary/primary school completed	15	13	12	17	23	40
	18.1	6.9	9.2	10.9	9.4	10.0
More than elementary/primary school	17	41	25	59	24	83
	20.5	21.8	19.2	37.8	9.8	20.7
Time worked at current mine site (years)	3.33	6.92	2.38	3.40	5.59	4.72
(SD)	1.86	6.87	2.64	4.93	5.62	5.46
Worked at other mines	18	66	8	35	57	92
	21.69	34.74	6.25	22.58	23.17	22.94
Time spent at other mine sites (years)	2.8	2.1	0.6	2.7	1.7	2.1
(SD)	4.6	3.4	0.4	3.7	3.5	3.6
Responsible for selling product	24	115	92	79	152	231
	28.92	63.54	89.32	57.66	66.09	62.94
Sample size	83	194	130	158	249	407
	20.4	47.7	31.9	38.8	61.2	100.0

SD: standard deviation.

category. Some respondents are in polygamous relationships, and this practice is more common in DRC and Uganda than in Rwanda.

In focus groups and life histories, workers at the mine sites in Rwanda frequently commented that when women get married they are expected to stop working at the mine site. This norm may explain the smaller percentage of women married than men in Rwanda, and it may also explain the higher percentage of divorced/separated/widowed women than men, if it is culturally acceptable for women to return to work at the mine site when there is no longer a husband in their household. This norm was described only in focus groups and life histories for Rwanda, and it does not explain why this difference persists across all countries. Another possible explanation is that traditional norms (at least in Uganda) dictate that married women should not go, without the accompaniment of their husbands, to work in places such as mining sites which are generally considered male dominions, unsafe but also unsuitable for married women, while the converse is not true for married men (Uganda Bureau of Statistics [UBOS] 2019). At the gold rush site in Uganda, it was a common practice for unmarried women working at the site to hire "shadow"[2] husbands to earn social respect as well as to stave off unwanted sexual advances. Similarly, at the tin site in Uganda, none of the miner gangs that were found to have both male and female members had even one woman who wasn't married to a fellow gang member. All these examples show the challenges faced by a married woman to work at these mining sites when her husband is not part of the same mining community.

> If a woman is working in the mine and the husband isn't, chances of such a marriage to survive are minimal. Some husbands think that when the woman comes to work in the mine then she is a harlot! (Life Histories, Woman Miner, Gold Site – Uganda)

The level of education is low among artisanal miners (Figure 1). Comparing the survey responses and the country-level data, the percentage of women who have no education in the general population is smaller than in our sample and the percentage of men with more than a primary education[3] is larger than in our sample. Among the general population and in the sample of ASM workers, women have lower levels of education than men do. The difference observed in educational attainment between women and men among ASM workers is, at least partly, explained by a country-wide differential in educational attainment.

Work history

Table 1 also presents a summary of the respondents' work history in mining, at both the current mine site and other mine sites.

On average, men have spent one more year at the current mine site than women have. Across the three countries, the average tenure for men was the same. For women there were differences in the average tenure across countries. Women in DRC have been working at the current mine site longer than women in Rwanda and Uganda have. The different pattern across the countries for men and women raises the question of whether the labour supply of women was more sensitive to local conditions than the labour supply of men.

The majority of men (53%) have worked at other mine sites, but only about a quarter (23%) of women have experience at other mine sites. Previous work at a mine site is most common in DRC and least common in Uganda. The pattern of previous experience at

another mine site across the countries is similar for both men and women, which suggests that the unique process of mining development in each country influences the pattern across countries.

Comparing those respondents who have worked at other mine sites, again men have a longer tenure at the other mine sites than women do. Men in DRC have more previous experience at another mine than do men in Rwanda and Uganda, while for women, there is no difference across countries.

Regardless of how experience is measured, men have more experience at mine sites than women do. On average, men have been at the current mine site a year longer than women have. They are more likely to have worked at another mine site than women have and, conditional on working at another mine site, men spent more time at the other site than women did. The practice observed in Rwanda that women leave the mine site when they marry could be part of the explanation for this situation in Rwanda, as this mandatory departure would decrease the amount of experience women accumulate. The overriding reasons are also likely to do with gender norms and roles, given a woman's household responsibilities, particularly child care, which may limit or even prevent her effective participation in ASM work, let alone seeking work opportunities in distant places (IGF 2018).

> One of the challenges I have been having is working at the mine after the death of the old woman who used to look after my children. But as for now, I am trying to overcome that challenge by taking children in boarding schools. And when they are in holidays, I employ a maid that I pay 80,000 shillings a month. If the maid is not around, I leave the children with neighbours who cook food for them. (Life Histories, Woman Miner, Gold Site – Uganda)

A majority of the sample has responsibility for selling their products, with men being more likely than women to have some responsibility. However, there are differences across the countries. While Uganda and DRC have similar proportions, the proportion of the sample with responsibility is significantly smaller in Rwanda. The organizational structure at the mine sites is likely to explain much of the difference in the percentage of the sample with responsibility for selling their product. The gold site in Uganda is an informal organization where many workers work for themselves and so have the responsibility to sell their own product. The organization in Rwanda is more formal, with clearly defined managers and contractors who hire workers. It is, then, the responsibility of these managers and contractors to sell the product.

Activities at mine site

Table 2 summarizes the activities in which respondents engage at the mine site (note that respondents were allowed to report multiple activities). It is clear that there is a divide of activities by gender. For example, the most common activity for men is to be a digger (64%), while only 15% of women are diggers. For women, the most common activity is to be a carrier of ore or sand (27%), while only 10% of men are in this category. While a gender divide exists, there is no activity that is exclusively completed by one gender.

Women are involved in a wider range of activities than men are. For men, after being a digger, the next most common activity is panning at 26%, and then there are two categories at 10%. For women, after the activity of ore carrying, there are three categories between 22 and 23% and then three categories between 14 and 17%.

Table 2. Activities at mine site by gender (*n*, %).

	Male	Female
Head of mining team/chef d'équipe/head of mill	52	8
	11.04	1.97
Digger	301	58
	63.91	14.25
Washing the ore	22	59
	4.67	14.50
Grinding the ore	8	83
	1.70	20.39
Sluicing	47	3
	9.98	0.74
Panning	121	80
	25.69	19.66
Carrier of ore	46	112
	9.77	27.52
Carrier of water or firewood	30	76
	6.37	18.67
Administrative work	5	6
	1.06	1.47
Trading in the mineral/product	35	32
	7.43	7.86
Selling food/water for personal consumption	7	96
	1.49	23.59
Selling other provisions for either personal consumption or production	7	36
	1.49	8.85
Selling services (including sex)	11	18
	2.34	4.42
Open-cast mining	2	16
	0.42	3.93
Other	16	11
	3.40	2.70
Total	471	407
	100	100

Organization of work at the mine site

Table 3 present the summary statistics for organization of work at the mine sites for men and women, respectively.

There are significant differences in hours worked per day across groups. Men work more hours than women (7.6 vs 6.9 hours). Both men and women in Uganda work more hours a day at the mine site than do respondents in Rwanda and DRC. The difference in working hours between men and women is most likely due to the women's household responsibilities. Men at 3T and gold mine sites have workdays of similar length (7.8 and 7.5 hours), while women at gold mine sites work on average an hour longer per day than women at 3T sites do (7.5 vs 6.5 hours). A possible explanation for the longer working hours in Uganda is that, in general, women and men in these particular sites in Uganda work for themselves rather than as employees for a company or an individual, and their compensation is dependent on their productivity. Indeed, participatory observations at the Uganda gold mine site revealed that work continues overnight, which may not be allowed at sites controlled by companies.

The differences across groups in terms of the proportion that work all months of the year are similar to those for hours worked per day. Men are more likely than women to work at the mine all months of the year (93% vs 80%). Across the countries, respondents are more likely to work all year in Rwanda than in Uganda and more likely to work all year

Table 3. Organization of work at mine site by country and mineral mined for males and females (*n*, %).

Males	Rwanda	DRC	Uganda	Gold	3T	Total
Hours worked at mine site per day	7.09	6.46	10.59	7.76	7.53	7.64
(SD)	2.23	2.65	1.28	3.46	2.04	2.78
Worked all year	166	166	92	179	245	424
(%)	97.08	87.83	94.85	89.50	95.33	92.78
Monthly earnings	110.92	450.89	519.05	593.41	133.02	336.13
(SD)	97.56	256.76	898.64	1312.81	138.30	906.21
Daily earnings	4.43	18.72	20.31	23.85	5.51	13.59
(SD)	3.94	48.97	33.85	50.61	6.26	35.06
Females						
Hours worked at mine site per day	5.35	5.67	9.60	7.45	6.48	6.86
(SD)	2.10	2.20	1.17	3.59	1.80	2.68
Worked all year	82	134	85	114	187	301
(%)	98.80	71.28	80.95	87.02	76.33	80.05
Monthly earnings	109.63	188.02	408.17	438.16	131.84	243.23
(SD)	110.85	240.52	1318.04	1238.84	231.84	709.88
Daily earnings	4.37	7.65	16.51	18.02	5.27	9.84
(SD)	4.42	9.74	53.45	50.57	9.25	31.70

SD: standard deviation.

in Uganda than in DRC. Men at a 3T site are more likely to work all year than those at a gold site (95% vs 90%), while for women the reverse is true (76% vs 87%). Women working at gold sites work as long as their male counterparts do, unlike women working in 3T sites who are significantly less likely to work all year than men are.

Men are more likely to work in a team or group at the mine site than women are (81% vs 58%). For both men and women, respondents in Uganda are more likely to report working in a team than are those in DRC or Rwanda, and those in DRC are more likely to report working in a team than those in Rwanda are. Men working at a gold site are more likely to report working in a team than those working at a 3T site, while for women the opposite is true; women working at a 3T site are more likely to report working in a team than those at a gold site. The differences in team work are generally associated with the type of activity engaged in – for example, diggers (who are mostly men) were more likely to work in teams as compared to water carriers (who are mostly women).

To create a variable for monthly earnings, currencies were converted to 2015 USD using the purchasing power parity (PPP) rate calculated by the World Bank (2017). PPP rates for 2015 were available for Uganda and Rwanda, but not for the DRC. For the DRC, the PPP rate from 2013 was used, which is justified by the low (and similar) rates of inflation since 2013 in the DRC and the US. The PPP rates used were 1 USD equals 270.77 RWF, 579.01 fc, and 1185.80 UGX. The earnings of respondents who reported their income per day were multiplied by the number of days they reported working in a month. The earnings of respondents who reported their income per week were multiplied by four (four weeks in a month). The earnings of respondents who reported their income per season were divided by three (three months in a season). The earnings of respondents who reported their income per year were divided by the number of months they reported working in a year.

To create a variable for daily earnings, the earnings of respondents who reported their income per week were divided by six. The earnings of respondents who reported their income by month were divided by the number of days they reported working each

month. The earnings of respondents who reported their income per season were divided by the number of days they reported working each month, times three (three months in a season). The earnings of respondents who reported their income per year were divided by the number of days they reported working each month, times the number of months they reported working in a year.

The difference in monthly and daily earnings between men and women is not statistically significant; however, the point estimate for both monthly and daily earnings is less for women. Reported monthly earnings were over USD100 lower for women compared to men, and daily earnings were over USD4 lower. The lack of statistical difference in earnings between men and women was likely a result of the large variation in reported earnings and the small sample size.

The differences in earnings across countries and mineral types are statistically significant. Men in Rwanda earn less than those in Uganda and DRC, while women in Rwanda and the DRC earn less than those in Uganda. For both men and women, respondents working at a gold mine earn more than do those at a 3T mine. All results hold whether looking at monthly or daily earnings.

Organization of work not at mine site

The majority of the sample report working at activities not at the mine site. Nearly 50% of men engage in work away from the mine site, as do 63% of women. Respondents working at a 3T site are more likely to be working at another off-site activity than those working at a gold site. Men in the DRC are less likely to work at other activities than men in the other two countries. Women in Uganda are less likely to work at other activities than women in the other two countries, although more than half still work at other activities. The remainder of the results in Table 4 only include individuals who work at other activities that are not at the mine site.

The activities worked at outside of the mine site vary, but they can be grouped into three broad categories: agriculture, retail, and services. Of those engaged in activities away from the mine site, 82% of men and 89% of women are engaged in agriculture, 10% of men and 11% of women are engaged in retail, and 13% of men and 6% of women are engaged in services. Respondents could report being engaged in more than one activity. For all countries, the most common other activity is agriculture; however, the next most common type of other activity varies across the countries. In the DRC, more men are involved in services than in retail. In Rwanda, more women are involved in services than in retail, while the reverse is true for DRC and Uganda.

Men and women report working similar hours at the other activity (4.4 hours for men and 4.8 hours for women). For men, there are statistically significant differences across the countries. Men in the DRC work more hours at other activities than men in Rwanda, who work more than men in Uganda. Men in 3T work almost one hour more per day at other activities than do men in gold. For women, the hours worked at other activities are similar across countries and mineral types.

Women are more likely than men to work at the other activity all months of the year (57% vs 47%). This result is a reversal of the activity at the mine site, at which men were more likely to work all year than women. For both men and women, respondents are more likely to work all year in DRC than in Rwanda and more likely to work all year in Rwanda than Uganda. Men in gold and 3T are similar in their likelihood of working all year

Table 4. Work outside of mine site by country and mineral mined for males and females (*n*, % or SD).

Males	Rwanda	DRC	Uganda	Gold	3T	Total
Worked outside of mine site	100	69	66	79	156	235
	58.48	35.94	61.11	36.92	60.70	49.89
Agriculture	93	48	52	99	324	193
	93.00	69.57	78.79	69.72	92.57	82.13
Retail	2	7	14	14	9	23
	2.00	10.14	21.21	17.72	5.77	9.79
Services	7	16	8	17	14	31
	7.00	23.19	12.12	21.52	8.97	13.19
Hours worked	4.45	5.30	3.37	3.81	4.67	4.39
	2.54	2.70	3.47	3.25	2.76	2.95
Worked whole year	45	44	10	30	69	99
	46.88	64.71	21.74	51.72	45.39	47.14
Monthly earnings	86.60	254.86	304.19	359.93	107.27	192.42
	91.28	626.27	462.93	619.45	206.56	412.86
Daily earnings	11.19	13.75	25.15	26.78	11.58	15.03
	14.62	27.77	54.56	58.36	16.18	31.61
Females						
Worked outside of mine site	54	135	68	63	194	257
	65.06	69.59	52.31	39.87	77.91	63.14
Agriculture	47	121	62	46	184	230
	87.04	89.63	91.18	73.02	94.85	89.49
Retail	1	20	6	10	17	27
	1.85	14.81	8.82	15.87	8.76	10.51
Services	7	7	2	7	9	16
	12.96	5.19	2.94	11.11	4.64	6.23
Hours worked	4.16	4.88	5.03	4.61	4.83	4.78
	2.17	2.12	2.73	2.78	2.17	2.33
Worked whole year	32	98.	12	45	97	142
	59.26	72.59	19.67	80.36	50.00	56.80
Monthly earnings	49.18	45.89	121.90	126.09	44.69	68.21
	70.46	92.17	246.36	243.76	83.96	152.65
Daily earnings	5.12	3.52	5.65	5.53	4.25	4.53
	8.49	4.63	11.35	11.11	6.99	8.03

SD: standard deviation.

at activities not at the mine site (52% and 45%), while women at a gold mine site are more likely to work all year than those at a 3T mine site (80% vs 50%).

For both men and women, earnings are higher for work at the mine site than for other activities. We were not able to conclude that men earn more than women at the mine site, but for work at other activities men have higher earnings than women. Men who work at activities outside of the mine site have average monthly earnings of USD192 and average daily earnings of USD15. Women have lower earnings at outside activities than men. Their average monthly earnings are USD68 and their average daily earnings are USD4.50. For activities not at the mine site, men earn almost three times as much as women do. These results indicate that women are more likely to work all year at other activities than are men and earn less than men do.

The lower earnings for women at other activities could be due to limited opportunities for women, systematic discrimination, or a higher obligation to provide for their household. This result also suggests that women could be taken advantage of at mine sites. Work at the mine site is relatively more important for women because their earnings at their next best opportunity are much lower than for men.

The average earnings for workers at gold sites is higher than for workers at 3T mine sites. Women working at gold sites work as long as their male counterparts do, unlike women working in 3T sites who work for significantly less time than the men. This raises the question of whether women are more responsive on the margin to differences in earnings.

Using GDP per capita as a general yardstick for measuring income provides a comparison of monthly earnings reported in our survey; however, these averages are not directly comparable. GDP per capita divides annual GDP by the population, which includes individuals who work as well as those who do not and provides a sense of the resources potentially available to the population in that country. Our sample is entirely composed of individuals who work, and the average earnings reported are average earnings for the employed. These earnings are likely used to support other members of the household.

The World Bank (2016) reports that in 2016 Rwanda had the highest GDP per capita of the three countries (USD703), followed by Uganda (USD615), with DRC in third (USD445). Both male and female respondents in Uganda report higher earnings at the mine site and from other activities than respondents in Rwanda or DRC, which does not correspond to the ranking according to GDP per capita. Similarly, men in the DRC report higher earnings at the mine site and at other activities in our survey than do respondents in Rwanda.

Household finances

Table 5 presents summary statistics on the contribution the respondents make to supporting their dependents and their households.

Table 5. Household finances by country and mineral mined for males and females (*n*, %).

Males	Rwanda	DRC	Uganda	Gold	3T	Total
Main contributor for dependents	77 58.78	152 82.61	104 96.30	182 88.35	151 69.59	333 78.72
How much money do you contribute?						
None or less than half	37 26.24	7 3.83	N/A	6 2.93	39 17.18	45 10.42
Half	32 22.70	25 13.66	N/A	23 11.22	40 17.62	63 14.58
Majority, but not all	63 44.68	72 39.34	54 50.00	80 39.02	109 48.02	189 43.75
All	9 6.38	79 43.17	47 43.52	96 46.83	39 17.18	135 31.25
Females						
Main contributor for dependents	45 60.00	117 61.58	65 50.78	102 66.23	125 52.30	227 57.76
How much money do you contribute?						
None or less than half	22 28.57	56 29.32	44 34.65	37 23.87	85 35.42	122 30.89
Half	14 18.18	30 15.71	15 11.81	34 21.94	25 10.42	59 14.94
Majority, but not all	16 20.78	46 24.08	29 22.83	35 22.58	56 23.33	91 23.04
All	25 32.47	59 30.89	39 30.71	49 31.61	74 30.83	123 31.14

Respondents with dependents were asked if they were the main contributor of money for their dependents. For men, 79% responded that they were the main contributor of money, while only 58% of women indicated that they were the main contributor. For men, the difference across countries is statistically significant, with more men at Uganda mine sites indicating that they were the main contributor than men at mine sites in DRC or Rwanda. More men indicated they are the main contributor in DRC than in Rwanda. For women, the difference across the countries is not statistically significant. The difference across mineral types is the same for men and women. More respondents from gold mine sites report that they are the main contributor than respondents at 3T sites.

Respondents were asked to indicate how much of the money contributed to their household comes from them. The scale used was "None," "Some, but less than half," "Half," "Majority, but not all," and "All." For the results presented in Table 5, the bottom two categories were combined into a "None or less than half" category.

The distribution of responses is different for men and women, as can be seen in Figure 2. Greater proportions of women report "None or less than half" and "All" than men, and a greater proportion of men report "Majority, but not all." For men, there are significant differences across countries. The distribution of responses from the Rwanda mine sites includes a smaller proportion of men reporting "All" than men from DRC or Uganda. For women, the distributions do not vary across the countries. The distributions also vary across the mineral type. A greater proportion of men at gold sites (47%) than at 3T sites (17%) report contributing all the money to the household. For women, the difference across mineral types is at the bottom of the distribution. A greater proportion of women at gold sites report contributing half of the household's money (22%), compared to 10% of women at 3T sites.

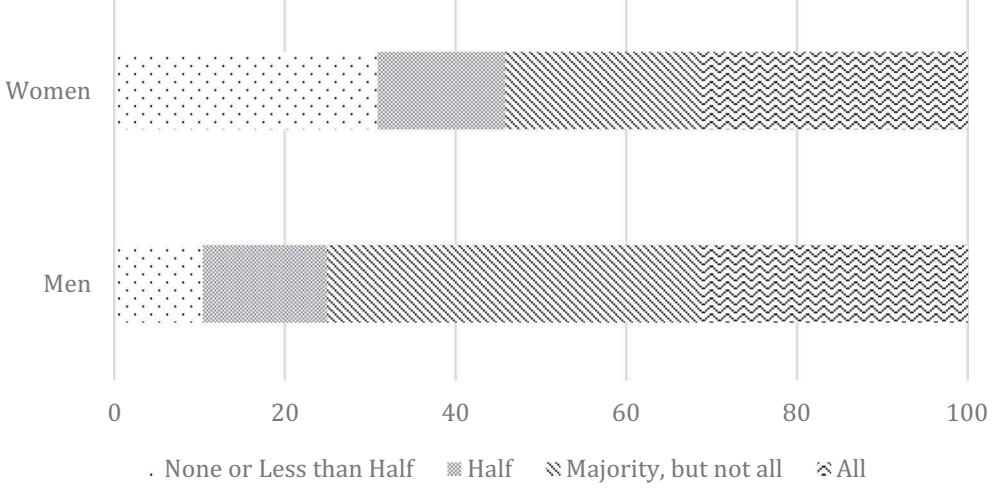

Figure 2. Contribution to dependents.

Conclusion

This survey was administered to a unique sample often forgotten or marginalized in the discussion and development of mining policy. The results presented allow for a better understanding of the complexity of labour activities undertaken at artisanal and small-scale mining sites and capture a more complete picture of workers' lives and the choices they make to organize their livelihoods. The survey was administered to a non-random sample of workers at a select number of mine sites, limiting its application to the general population of workers. Nonetheless, the results present the characteristics and livelihood decisions made by many workers at ASM sites.

Two results are important to consider. First, men have more experience. Second, men earn more, both at the mine site and at activities not at the mine site. The results from the survey document the range of activities in which workers at the mine sites are engaged. They also raise important questions for future study about how women and men arrange their livelihoods around work at artisanal and small-scale mines. For example, the findings confirm that women work more outside the mine site than do men. Further investigations of what drives women to be involved in multiple economic activities, despite their higher earnings on the mine site, are needed to ascertain whether women are making their own strategic choices to engage in multiple economic activities or whether there are pressures and/or constraints that dictate their labour choices. The results also reveal interesting conclusions that could be probed further for information about gender differences with respect to family contributions. Respondents reported an overall gender gap of 21% between men and women with respect to their roles as the main contributor of money for their dependents.

While our analysis offers a gendered comparison of women and men across space, additional study of differences among women and men in single settings – including, for example, with respect to marital status, age, and whether they have children – could reveal further insights about why economic livelihoods are organized in particular ways.

Notwithstanding the questions these initial findings raise, the results presented confirm the research benefits that follow from Lahiri-Dutt's (2012) call to develop a new feminist epistemology of mining that explores women and men's lives in extractive industries beyond the boundaries of traditional thinking about gendered mining roles. Further comparative, gender-sensitive research that systematically compares the experiences of women and men across the full range of activities associated with ASM will yield important insights into the barriers to, and opportunities for, women and men's economic empowerment in artisanal mining and the policies needed to enhance their economic well-being.

Notes

1. A location licence is a licence for prospecting and mining operations by methods which do not involve substantial expenditure or the use of specialized technology.
2. A shadow husband is a husband of convenience whereby the woman sets the terms of the relationship and the man names his price.
3. To calculate the percentage of the DHS sample with more than a primary education, the categories *secondary* and *more than secondary* were combined.

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Appendix

Table A1. Education and marital status from Demographic Health Survey (DHS) data.

	Rwanda[a]		DRC[b]		Uganda[c]	
	Women	Men	Women	Men	Women	Men
Marital status (age 15–49)						
Married	34.5	32.9	46.5	42.8	30.3	34.1
Living together	17.2	17.2	17.7	11.7	30.3	19.4
Divorced/separated/widowed	10.4	1.7	9.7	3.7	13.5	5.2
Never married	37.8	48.2	26	41.8	25.8	41.3
Education						
No education	19	13.4	15.4	4.1	9.6	3.8
Primary	66.1	70.6	36.9	21.8	57.4	54.9
Secondary	13.2	13.2	44	65.3	25.1	28.8
More than secondary	1.6	2.6	3.7	8.8	7.9	12.4

[a]Source: NISR [Rwanda], MOH [Rwanda], and ICF International. 2015.
[b]Source: MPSMRM and ICF International. 2014.
[c]Source: UBOS and ICF International. 2017.