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Wealth and poverty in mining Africa: migration, settlement and occupational change in Tanzania during the global mineral boom, 2002–2012

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ABSTRACT

This article interrogates place, process and people's quest for enhanced welfare during the 2002–2012 global mineral price boom in northwest Tanzania. Mass in-migration of miners, traders and service providers generated diversified residential settlements. Processes of occupational change and urbanization, catalyzed by acquisition of employment, land, housing and other possessions at six contrasting mining locations were compared from a geo-social perspective. Our surveyed gold and diamond mining sites represented different manifestations of the mining trajectory namely: (1) artisanal rushes, (2) mature artisanal and (3) industrial mining. The article investigates who benefitted locationally and who lost in residents' scrambles to gain improved living standards. Survey data on 216 household heads' occupations, educational backgrounds, consumption and investments were collected, followed by construction of a household welfare index, revealing modest welfare improvements relative to rural consumption norms for the majority of interviewed resident households. However, in line with Picketty's theoretical insights, extreme material inequality surfaced on the welfare spectrum between the outlier affluent and poor quintile groups. Those with higher educational attainment enjoyed superior welfare and occupational status, coalescing towards middle class formation. At the opposite end, single female-headed households stood out as extremely disadvantaged, handicapped by high child dependency ratios and occupational immobility.

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Mining; settlements; migration; occupational diversification; wealth accumulation; poverty; Africa

Artisanal mining is frequently identified with poverty and livelihood vulnerability in the burgeoning literature on African small-scale artisanal mining.¹ Paradoxically, Tanzanian artisanal miners generally acquired the reputation of having economic ambition and personal drive that set them apart from the poverty of local farmers during the global gold boom.² The miners' identification with risk-taking and rugged determination to achieve

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economic betterment is aligned with a persistent historical world view of artisanal mining identified with profit-seeking of a sometimes frenzied character following mineral discovery.³

Between 2002 and 2012, Tanzanian mining settlements attracted especially large numbers of miners as well as non-miners providing services or trade trying to take advantage of the sharp increase in purchasing power prevailing in the mineral-producing settlements. The majority of adults residing in the survey settlements were migrants aware of the rising international mineral prices and locationally positioning themselves in anticipation of direct or indirect economic opportunities. Thus this article surveys mining settlement residents across the occupational spectrum, documenting mining and non-mining households' experience of the 2002–2012 global mineral price boom. In contrast to most mainstream African mining literature of the past two decades, our analytical focus is on migration, settlement and occupational diversification of *residents* in mining settlements rather than artisanal mining or large-scale mining production per se.

It would have taken years to trace the unfolding development of in-migration, settlement and changing types of artisanal mining in any one location. Between 2010 and 2012 when our study took place, we identified a range of mining settlements and selected six sites to survey. In the case of artisanal sites, delineating the rush sites from the mature artisanal sites helped to simulate a comparative temporal frame for artisanal mining in terms of: mineral discovery and production at artisanal rush sites; diminished mineral availability at mature artisanal sites leading to residents' economic diversification into farming, trade and services. Large-scale industrialized mines were the third type of mining settlements surveyed.

Adopting an inter-disciplinary geo-social methodological approach, these sites afforded a comparative overview of processes of dynamic change in Tanzania's mining settlements. The survey evidence provided information for comparing the embryonic and mature artisanal sites' temporal progression along the mining settlement trajectory and for designing a stylized model of the effects of changing mineral availability on artisanal mining settlements' temporally through mineral discovery, excavation, processing, sale and mineral exhaustion.

Utilizing an exceptionally wide angle lens to overview material change catalyzed by migration and settlement, this article offers locational comparison of resident households' demographic composition, educational attainment, occupational divisions of labour, service access, consumption patterns, asset holdings and investment across the six sites. On the basis of our quantitative survey data, a household welfare index was constructed, which enabled us to decipher the relative welfare positions of households within and between settlements.⁴

The next section discusses literature on African mining settlements and advances a conceptual framework for the spatial study of Tanzanian mining settlements, combining locational and sociological comparison. We then briefly review Tanzania's mining history, introduce the six settlement sites and our stylized model of mining settlement trajectories, followed by a specification of our research methodology and tools. The following section compares household migration and demographic patterns between the delineated welfare quintile groups, settlements and mineral types. We then assess the surveyed households' welfare outcomes based on sociological analysis of household occupation, education and social differentiation. The next section presents the survey results on livelihood

diversification and living standard outcomes by welfare groups based on household consumption, asset holding and investment patterns. After this, we explore the confluence of congealing house ownership patterns, urbanization and educated elite middle-class formation in light of Picketty's⁵ 2019 study of global welfare differentiation. The penultimate section summarizes the regional and local processes of Tanzanian mining settlement change during the global mineral price boom, before we conclude.

Literature review and conceptual framework

Relevant African mining settlement literature

Over the last two decades, African mining literature has proliferated with respect to artisanal mining and the relationship between large and small-scale mine production. However, the literature on mining settlements is relatively limited. Articles on African mining settlements and the residential mobility of people moving between mining locations since the turn of the millennium reveals a variety of settlements of different sizes, structure and occupational complexity.

Beginning with the spontaneity of artisanal mining rush sites, Werthmann⁶ describes them as 'spaces on the move ... nomadic spaces ... translocal ... heterotopias ... spaces that are both somewhere and nowhere' that are recognized as 'catalysing processes of urbanization in non-urban places'. The social *mélange* of transient miners fixated on rush site mineral extraction, generally do not cohere as stable residential communities. Werthmann notes that identification amongst artisanal miners derives from their shared occupational ties rather than residential localities, given that the occupants may frequently move on in the interest of finding richer mineral wealth elsewhere. In doing so, artisanal miners' migration paths criss-cross with repeated encounters and the formation of inter-woven friendships or partnerships at new rush sites. Werthmann⁷ aptly identifies this pattern as an *aspatial*, occupational community – a 'community without a locus'.

Mine boom towns are less makeshift, having the benefit of infrastructural investment. Often they evolve from rush sites long past their mineral output heyday, located in convenient locations functioning as service centres providing expertise, equipment and general supplies for miners working in newer but often more remote productive mineral sites.⁸ Rodrigues, Büscher and Cuvulier⁹ observe 'boom towns' in Angola and the Democratic Republic of Congo, which were populated by artisanal miners, noting that such settlements became 'undefined proto-urban spaces' whose consolidation into larger settlements was left in question. Such towns were liable to be eventually located long distances from active sites of mineral excavation when their practical convenience as a 'boom town' had dissipated.

Declining mining settlements are evidenced as scaled-down or abandoned large-scale mine sites in Central and Southern Africa. In Zambia, Mususa¹⁰ observes a mine settlement becoming like a village as an outcome of the removal of welfare provisioning following privatization of a state-owned mine when residents were deprived of free water and subsidized energy supply, sewage and road maintenance. More drastically, Kamete¹¹ documents the collapse of Zimbabwean copper and chromite mining towns in the 1980s that became ghost towns when the foreign mining companies left.

Twenty years hence, many jobless migrated to the ghost towns, and took up residence in the abandoned housing. The new residents were reconciled to living in what they called 'inferior towns' in the country's urban hierarchy. Marais¹² cites the case of South African housing around mines where mining companies cut back or eliminated housing for their workers resulting in unplanned urban sprawl and patchy urban infrastructure and services. Migration to and from mining sites was highly influenced by the wider residential and livelihood alternatives in the regional or national economy. The absence of better options elsewhere made migrating to a crumbling mining settlement worth a try nonetheless.

With the exception of Werthmann's and Walsh's studies,¹³ the African mining boom literature generally focusses on individual settlements. Our study extends beyond single sites to consider how miners and non-miners chose their migration destination by weighing the advantages and disadvantages of various settlements. A composite overview of movement to and between different types of settlements, takes account of the fact that mining sites experience their localized mineral booms at different times. Inevitably, restless movement on the part of miners as well as non-miners, generates a dynamic field of migration, settlement and occupational change, as they endeavour to enhance their future standards of living. Abu-Lughod's comparative methodology of settlement types and scale underpins our geographical approach.¹⁴

Conceptual framework for identifying occupational and social differentiated patterns during a mining boom cycle

Our social approach is informed by the classic work of Durkheim¹⁵ who stressed the significance of the industrial revolution for the expanding economic division of labour. Mineral rushes are another form of economic stimulant for occupational diversification. Most recently, Piketty, an economist with a strong sociological perspective, stresses the changing nature of the division of labour and the configuration of political and ideological power embedded in international capitalism. He argues that regimes of inequality through time have been fostered by historically specific views of public morality, which condition and ultimately anchor the emergence of a new status quo. In traditional 'ternary' societies, labour ascription prevailed, characterized by limited occupational differentiation with successive generations performing similar work often identified with peasant agriculture, mediated and controlled by one or another configurations of patriarchal religious and military groups. Such elites contrast with capitalist modernity.

The move from pre-ordained labour ascription to individual labour choice is identified with 'the great transformation' defined by Polanyi¹⁶ as generalized commodification of goods, land, labour and capital to the status of 'owned property'. The resulting ownership regimes are buttressed by a proprietarian ideology that sanctions state-enforced property rights, which are theoretically accessible to all. The hitch is that people must become property owners to exercise their rights.

Modern societies' labour mobility and property ownership afford individual occupational choice and decentralized power distribution amidst the spread of social inequality. Piketty observes fluctuating magnitudes of inequality through time as surplus-generating societies and propertied classes evolve. Under the sway of societal belief in the ideology of self-regulated capitalist markets, inequality becomes entrenched to the

point of being accepted as the natural order of human society. Keeping inequality in check requires redistributive economic policies¹⁷ of the state and other ameliorating agencies. However, in many mining boom circumstances, there are few legal regulations or tax enforcement on artisanal mining to mediate extreme inequalities between boom settlement residents.¹⁸

Piketty perceptively draws attention to the role of education in the formation of a modern national elite and a widening gap for those with none or low levels of formal education as opposed to people who have achieved higher education. The influence of education on wealth distribution will be explored alongside material goods and asset holdings that impact on residents' welfare differentiation in our surveyed mining settlements.

Background history and temporal and spatial dimensions of the study

National post-independence mineral production in Tanzania

Industrial production of gold and diamonds dates back to the British colonial period. After national independence in 1961, President Nyerere placed the country's mining wealth on hold¹⁹ to focus on building a cohesive nation based primarily on smallholder agriculture. The large-scale gold mine at Geita was closed in 1966 and diamond mining at Mwadui was nationalized in 1971.

Following the 1970s' global oil price rise and the country's consequent livelihood crisis in the 1980s, peasant farming took a severe downturn when government marketing services and subsidized inputs drastically declined. Some farmers in mineral-endowed rural areas began mining illicitly on their own land. At the behest of the World Bank and IMF, the national government implemented neo-liberal policies in 1990s, which officially sanctioned local people in minerally-endowed parts of the country to mine, causing artisanal mining activities to multiply. Artisanal and small-scale miners started migrating in large numbers²⁰ to mineral strike sites.²¹ Meanwhile, the government was simultaneously legislating to encourage foreign investment in large-scale mining.

Artisanal and large-scale mining were viewed nationally as an escape from over two decades of economic depression in the wake of the 1979 international oil crisis and declining smallholder peasant farming. From 2002, the international gold price started rising and took-off in 2006 (Figure 1).

Gold's magnetic attraction spurred people to migrate long distances and adopt new mining and non-mining service occupations to enhance their livelihood earnings.²² Occupational change followed with an expanding, diversified mix of miners, traders and service providers migrating to the exceptionally rich mining regions of Mwanza, Geita and Shinyanga in north-west Tanzania. We selected our six survey sites for comparison of different levels of settlement size and type, mining function and mineral type (Table 1 and Map 1).

Tracking artisanal mineral-induced migration and settlement trajectories

Our household survey data collection took place in 2012, at the peak of the international gold price when all three constructs of the mining settlement cycle were in evidence: the rush sites were remote and fluctuated dramatically in size over time; more sedentary mature artisanal sites had chalked up decades of existence; and Geita city represented

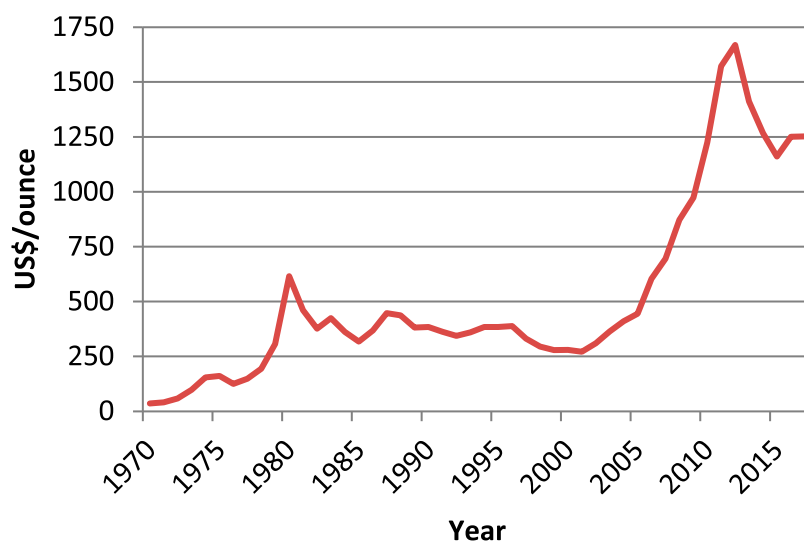


Figure 1. International gold price, 1970–2017 Source: Authors' compilation of www.kitco.com data

an urbanizing large-scale industrial site. Retrospective 2002 comparative data was collected from the sampled residential households to gain insight into households' consumption and asset holding at different stages of the mining settlement cycle and temporal effects of mineral depletion arising from the non-renewable nature of artisanal and large-scale mining.

Mine-led migration is propelled by expectations of riches, but in the first instance migrants' economic decision-making within the settlements is embedded in the logic of risk minimization to ensure *in situ* physical survival of individuals and households.

Table 1. Settlement study sites in northwest Tanzania.

Settlement type/ Characteristics	Gold	Diamonds
Rush sites		
Name of site	IKUZI Geita Region	MWANANGWA Mwanza Region
Mineral discovery	1980s	1940
Population*	3,907	6,054
Site origin/ description	Rush site near traditional village	Rush site near pre-colonial trade center
Mineral discovery	July 2010 rush	1979 surge, 2009 rush
Mature artisanal sites		
Name of site	NYARUGUSU Geita Region	MAGANZO Shinyanga Region
Population*	24,802	11,877
Site origin/ description	Colonial village and early gold exploration	Originally labour camp for miners at Williamson mine in 1940s
Large-scale sites		
Name of site	GEITA, Geita region	MWADUI Shinyanga region
Population*	100,852	9,390
Site origin & description	Founded in 1898 during German colonial rule	Established in 1940
Mineral discovery	1930 mine established, closed 1966, reopened 2000	1930s discovery – mine established in 1940

Source: UPIMA survey data, 2012.



Map 1. Surveyed mineral sites Source: drawn by Michael Shand.

Diminishing mining returns experienced by residents over time propels them towards income diversification and/or out-migration. While a portion of the population leaves settlements either as whole households or individuals within households, others are willing to remain in demographically and occupationally reconfigured households in the face of declining mineral availability at the rush site/boom town. This phase, marked by residential stabilization and continuing mining *in situ* at a reduced intensity and scale where possible, is often when non-mining economic diversification surfaces. Figure 2 stylistically depicts artisanal mining settlement residents’ options as mineral availability diminishes.

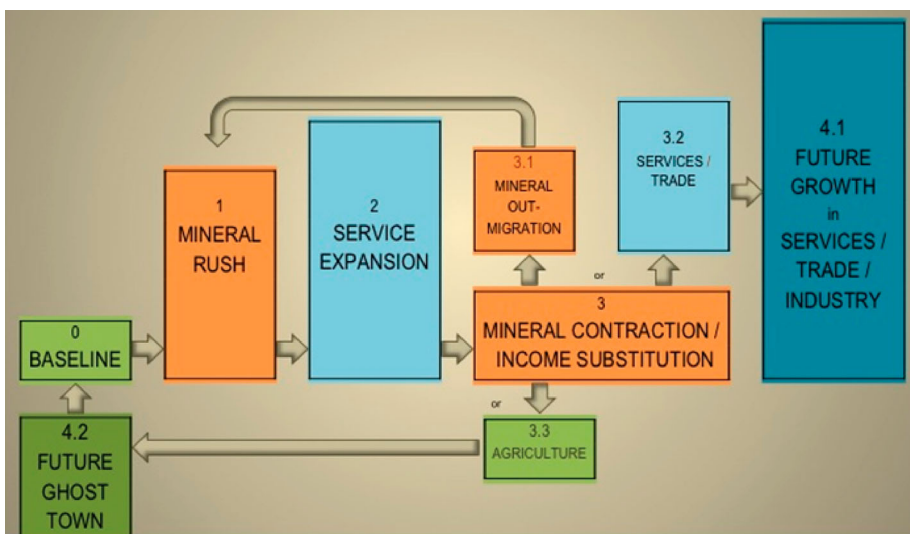


Figure 2. Artisanal mining settlement trajectory. Source: drawn by Deborah Bryceson.

In the initial rush site phase, population influx is stimulated by rising mineral production. News of the discovery of gold travels quickly, facilitated by mobile phones. Artisanal miners amass at the site, their numbers are spurred by the spread of rumours about the estimated richness of the deposit. The distance between the strike site and the closest existing population concentration has bearings on the rush site's settlement pattern. In the case of Ikuzi gold rush site, the influx of migrant miners was estimated between 9,000 and 13,000 people. At the outset, young men, living in makeshift circumstances, primarily slept under tarpaulins, with relatively few women and children on site. Most of the men focussed entirely on mining in the hopes of gaining quick profits. Outside of food and drink purchases, their earnings were generally invested elsewhere with only a few considering the rush site their home and even fewer planned to retire there. The diamond rush site was embedded in an existing settlement. Incoming migrants could rent rooms in the houses of local residents.

Mature artisanal mining settlements took the form of diversification and service sector expansion, corresponding to population growth, often connected with family formation and size expansion. Demographic balancing of the sex ratio is a defining characteristic of settlement maturity. Mining continues to be pursued by many, alongside an influx of population with an increasingly diversified division of labour, spanning trade, services and agriculture. Housing becomes well established, albeit mostly self-built, using local materials, notably wood and sun-dried bricks. The wider array of income-earning opportunities and consumption enhances the range of productive and social service facilities on site. The willingness among residents to invest in housing, electricity generators and businesses *in situ* is evident, although it does not preclude investing in housing or businesses elsewhere.

If mineral availability starts plummeting, mature settlements lean towards three main actions: first, out-migration to another mining or non-mining location, on the part of the entire household or just the mining breadwinner of the family; second, household diversification into multi-occupational services and trade expansion, which can strengthen the settlement's resilience and possibly replace mining as residents' leading source of income-earning, or indeed entirely displace mining; finally, and often alongside one of the above, agriculture becomes a vital fallback for *in situ* household survival. Men may migrate to other seemingly more profitable mining sites. Women household members and their children tend to be left behind in the settlement reliant on farming activities.

The progression of the mining settlement trajectory described here is site-specific and, when all sites are taken into account, they depict a complex inter-related mesh of individual settlements experiencing different, erratic outcomes based on the contingent circumstances of the decision-makers at any one time. Their settlement mining trajectories do not proceed in a fixed, straight-line sequence. Individual persons or households may move between settlements driven by economic ambition, financial acumen, convenience, or necessity, while others, more rooted, stay behind for an array of reasons: ownership of existing *in situ* assets like housing, and land, family ties, children already in school, etc. An artisanal settlement's size and continuing existence depends on the extent of out-migration; if extreme the settlement becomes a ghost settlement.

The regional interplay of spatial migration, locational settlement and rapid occupational change is driven by migrants' optimism about mineral discovery. But over time, pessimism inevitably surfaces as the depleting localized mineral supply and the non-renewable nature of a localized economy based primarily on mineral excavation

exerts a dampening effect on the settlements and the region as a whole. While an international mineral price rise can provide a kick start to regional dynamism, over the long run, local economic diversification into non-mining activities is vital for regional economic sustainability.

Linkages between artisanal and large-scale mining (LSM)

Large-scale mine settlements are radically different in nature, being the creation of corporate planning of international mining companies and subject to national laws and government regulation of the host country. The growth of closed mining settlements is controlled by the mining company, as exemplified in the case of Mwadui diamond mine where housing was restricted to company employees or hired contractors. At Geita Gold Mine (GGM), there was a relatively small mining compound for senior staff, primarily expatriates. Most Tanzanian employees lived in Geita, where the population of 100,000 residents had grown rapidly in response to the stimulus of demand for goods and services on the part of GGM's relatively well-paid work force. Their purchases fueled a proliferating service sector and livelihoods, albeit not a large enough demand to absorb the abundance of migrant labour in the city. Formal employment opportunities in the LSM sector favoured the well-educated and technically trained, who were relatively restricted in number. The problems of inadequate labour absorption and a labour force with a yawning gap between educated, skilled workers as opposed to far more numerous unskilled workers generated welfare imbalances. The existence of artisanal mining activities alongside large-scale industrial mining gave rise to conflictual circumstances, often worsened by the effects of mineral depletion. Some artisanal miners were displaced from their mining sites by large-scale mining operations (Figure 3).

Artisanal mining residents marginalized from their former diggings, were tempted to resort to stealthy forays into the premises of the mining company to remove mineral tailings and

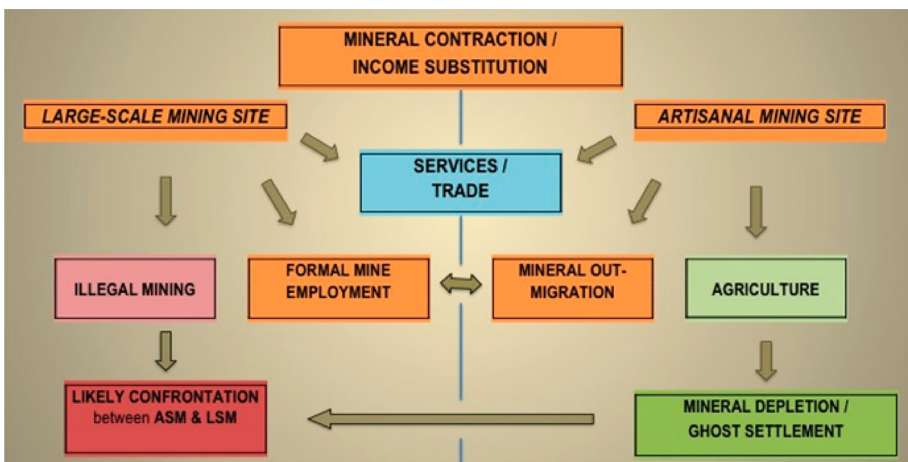


Figure 3. Spatial and temporal interaction between artisanal and large-scale mining. Source: drawn by Deborah Bryceson.

transport them back to their settlement to process for residual gold extraction. GGM and especially Mwadui diamond mine both experienced such encroachments on their property.²³

Field methodology and measurement of inequality

Having stylistically outlined the artisanal mining settlement trajectory and linkages of artisanal and large-scale mining in the face of diminishing mineral returns, this section describes our Urbanization and Poverty in Mining Africa (UPIMA) methodology for surveying 216 residential households and the construction of a weighted consumption index for comparison of household welfare levels.

Our field data collection was undertaken between May 2011 and July 2012 beginning with the selection of the six study sites, evenly divided between gold and diamond sites and subdivided into early artisanal rush settlements, mature artisanal settlement, and large-scale industrial urban mining settlements. At the outset of the field study, key informants, encompassing elderly residents, government officials and local leaders, were interviewed in the district/regional headquarters. Our research tools included a stratified random sample household questionnaire survey (See online supplemental [Appendix A](#)), administered to 36 randomly sampled households in each settlement, and the construction of a welfare index (Appendix B) for the spatial analysis of the social welfare status of the 216 surveyed households.

The survey questionnaire deliberately did not include direct questions on households' total monetary income given such questions were unlikely to be precisely known because of the erratic income streams of most households. Furthermore, such questions can annoy or offend respondents, compromising openness between the survey interviewer and interviewee. The collected data on consumption and household possessions provided a snapshot of household welfare and wealth status at the 'mineral face' of Tanzanian mineralization in 2011–2012 with some questions on the households' housing and occupational situation ten years before.

Mining settlements are particularly difficult places for gaining an objective assessment of income and well-being. Residents tend to be cautious and circumspect about their income status and generally avoid ostentatious displays of wealth in housing or their day-to-day consumption. Nonetheless, at the time of a mineral strike, miners flush with cash often engaged in lavish celebratory expenditure. In contrast to such spenders', there were many savers' whose residential sojourn in the mining settlement was an exercise in deferred consumption for purposes of accumulation.

Given residents' reluctance to talk about their income earnings, avoidance of conspicuous consumption and the necessarily spartan housing and lack of access to basic services found in makeshift rush sites, we collected extensive information on the household head and members' primary and secondary income sources, numbers of earners, access to land and other property, investments and housing standards. This information constituted a detailed account of households possessions and housing both on site and elsewhere, enabling us to construct the welfare index and delineate five welfare groups based on local people's valuation of their consumption goods and housing standards. The index affords an overview of processes of household accumulation and impoverishment (Appendix B).

Household members' mobility and multi-locational backgrounds were taken into consideration with respect to income sources and the transfer of household income into

Table 2. Migration and settlement patterns in overall study.

Welfare quintile groups	Poor	Below average	Average	Above average	Affluent	All
HHH's average wealth index scores	4.8	7.1	8.5	10.2	18.1	9.8
No. of households	43	43	43	43	44	216
Native born household heads (HHH)	12%	19%	14%	12%	16%	15%
HHH migrants' years residence in settlement	8	17	11	14	14	13
Average year of migrant HHHs' arrival	2004	1995	2001	1998	1998	1999
No. of settlements lived in before	2.5	2.3	2.2	3.0	2.6	2.5
Female HHHs as % of total households	33%	19%	15%	7%	7%	16%
HHHs without spouse %	63%	30%	14%	13%	14%	27%
No. of household members	3.6	5.0	5.5	5.8	6.5	5.3
% of dependent members in household*	18%	22%	40%	37%	45%	28%
HHH's average age	41.7	45.9	46.6	46.5	48.7	45.9
Senior female's average age	34.1	35.6	38.6	35.2	41.2	36.9

Source: UPIMA survey data, 2012.

*Defined as number of sons, daughters and parents of the head of household as % of total household membership.

housing and investments on or off-site. The next sections analyze the household survey data by mineral type and settlement types, followed by a section discussing the livelihood patterns and economic differentiation that surfaced.

Migration, demographic patterns and settlement differentiation

Migrants' duration of residence in the settlement is likely to play a role in wealth accumulation. Apart from the strong prevalence of native-born residents in the diamond rush site who registered a 'below average' welfare score, the other settlements showed a trend towards higher welfare scores with increasing length of residence in the settlement (Table 2). The 'affluent' group's residence was over twice the duration of the 'poor' suggesting that arriving at a mining site first can be highly beneficial.

The most striking feature of the households in the 'poor' welfare group was that 90% of 'poor' household heads did not have a spouse. Of the households without co-residence of a conjugal couple, half consisted of female heads of households who had child dependents, whereas the other half were primarily single men resident in the rush settlements, aged in their 30s. Given the presence of many young single male miners, the average age of 'poor' heads of households was low and their household size was very small relative to other welfare groups.

The distinctions between the two spouseless sub-groups had significant implications for whether they were structurally or just circumstantially 'poor'. Single men new to mining were generally unencumbered by dependents. Meanwhile, middle-aged or elderly widows, as female heads of households with high dependency ratios, had very different future prospects. The former were aspirant and likely to move up the status hierarchy as they gained experience in mining, whereas older women with dependents tended to be trapped in deepening poverty, with children lacking educational opportunities and adequate nutrition.

Juxtaposing quintile welfare scores in the settlements (Figure 4), the majority of the 'poor' were resident in the rush sites, whereas the majority of the 'affluent' were found in the large-scale settlements (both gold and diamonds). In between the 'poor' and 'affluent' quintiles: the 'below average' resided primarily in the rush sites; households

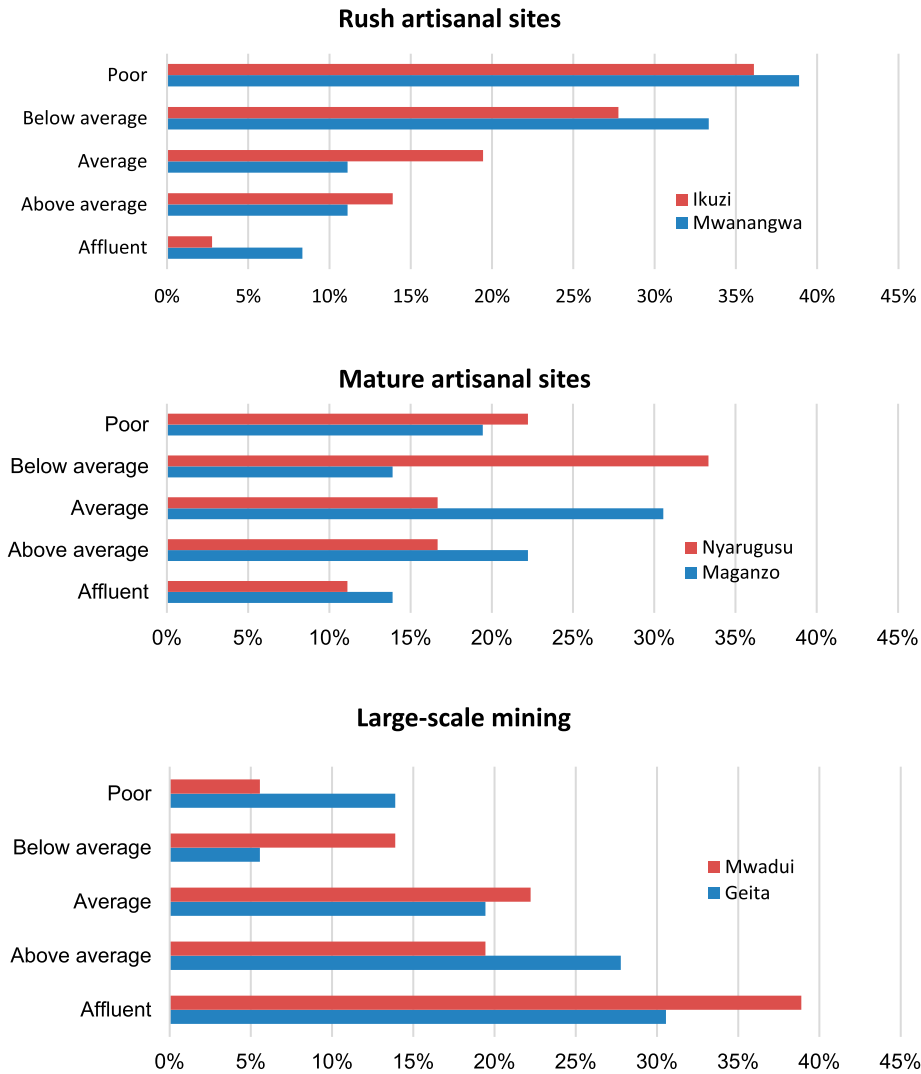


Figure 4. Settlements’ welfare status by wealth quintiles/settlement/mineral type* (% of settlement population) Source: UPIMA survey data, 2012 * Note: gold settlements (red), diamond settlements (blue)

with ‘average’ welfare scores spanned mature and LSM diamond sites with a smaller showing of households at mature artisanal and LSM gold sites. The ‘above average’ category was dominated by the mature artisanal and LSM gold sites, followed by the mature artisanal gold site.

The poverty at both artisanal rush sites related to rush sites tending to be uninhabited areas prior to their rapid mineral-led influx of population. Incoming migrants came willingly despite the lack of infrastructure and service delivery at the site. Their decision to migrate was usually based on speculation rather than information about the actual size and richness of the mineral deposit, especially in the remote sites. The Ikuzi migrants inevitably experienced inadequate housing, sanitation, health and educational services.

Material deprivation was inherent in the rush site experience relative to the other settlements types.

By contrast, the Mwanangwa diamond site was a pre-existing village settlement, which mitigated some of the infrastructural and service constraints. However, the diamond rush site displayed the widest within settlement wealth differentiation. Diamond mining is generally identified with more extreme status differences than gold. Diamond traders are known for offering exploitatively low prices, claiming to be authorities on the worth of traded diamonds. Artisanal gold miners had the advantage of getting daily internet information on the world price for gold upon which they could bargain for better prices.

The prominent presence of 'below average' households in Mwanangwa diamond rush and Nyarugusu mature gold sites indicates that artisanal miners faced disadvantageous conditions compared to the more diversified occupational population residing in large-scale mining sites. On the basis of settlement considerations alone, these findings support the artisanal mining impoverishment thesis. However, before jumping to conclusions, occupational and demographic dimensions, particularly the influence of the age of the household head and the associated stage of the family life cycle, needs to be integrated with the settlement household comparisons.

Household welfare and wealth outcomes: influence of occupational and social differentiation

Having reviewed the evolving material context of the settlements in which residents earn their livelihoods amidst changing mineral availability and mineral price fluctuations, this section focusses on the differentiated welfare outcomes arising from the diversity of residents' livelihood patterns. Bearing in mind that 94% of all surveyed household heads were migrants, our analytical starting point was residents' settlement decision-making. Our selection of case study sites was chosen to reflect the types of mining and stages of mineral availability.

The mobility and settlement patterns of occupationally diverse decision-making agents orbits around evolving locational availability of minerals beginning at the point of discovery, through intensified exploitation, followed by the gradual diminishing supply and overall cumulative consequence of the mining trajectory on agents' mining activities. This is evidenced in residents' temporal and spatial patterns of migration, occupational selection, mineral exploitation and land use change.

Data on heads of households' main and secondary income-earning pursuits, as well as those of the senior wife were collected to ascertain strategies of occupational specialization as opposed to diversification. The nature of housing, asset accumulation and household consumer goods ownership is summarized in the calculation of welfare scores, serving as an indicative proxy for households' livelihood capacity.

Occupational differentiation.

Differences in surveyed households' main occupational income source was associated with highly variable status outcomes. Households who pursued artisanal mining ($n = 65$) or farming ($n = 50$) as their main income source, constituted 53% of the sample. These two occupational groups spanned all five status quintiles, whereas the other occupations spanned four quintiles, suggesting that caste-like occupational rigidities had not formed.

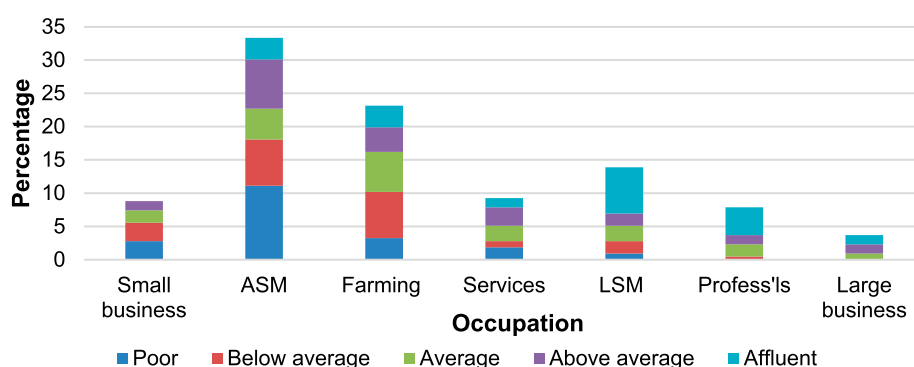


Figure 5. Household heads' by main occupation & welfare quintile* (% household heads) Source: UPIMA survey data, 2012.

Nonetheless, an occupational hierarchy of low, medium and high-earning occupations is revealed in Figure 5.

The above histograms provide visual comparison of welfare in the sample as a whole. At the low end, the 'poor' are concentrated primarily in artisanal mining (57%), farming (16%) and small-scale business (14%). At the high end, the wealthy are composed of large-scale mining employees (34% of the 'affluent' category), professionals (21%), farmers (17%) and artisanal miners (17%). How artisanal miners fared was influenced by their demographic profile, social background and history of savings and investment.

Why are the 'poor' primarily artisanal miners? It should be noted that there were older artisanal miners in Geita's large-scale mining site with high welfare scores that were doing well, hinting that welfare was an outcome of interlocking influences of household heads' mining settlement site and the progression of their household life cycles. Artisanal miners, who eventually achieved financial success, were likely to move into other occupations in trade or services based on their accumulated wealth and property holdings.²⁴

Educational and social differentiation

Educational qualifications of the heads of households mirrored rising economic status measured by the correlation between welfare index scores and education levels.²⁵ Comparing average welfare scores of each quintile, the 'affluent' quintile's mean average

Table 3. Household heads by welfare quintile and socio-economic characteristics.

Welfare quintiles	Poor	Below Average	Average	Above average	Affluent	Overall average
HHH's average wealth index scores	4.8	7.1	8.5	10.2	18.1	9.8
Major regional ethnic concentration ^a	58%	72%	65%	48%	49%	58%
Urban-born	16%	21%	19%	14%	27%	19%
HHH's education index scores ^b	0.9	1.0	1.3	1.4	1.9	1.3
% of household heads	20%	20%	20%	20%	20%	

Source: UPIMA survey data, 2012.

^aPercentage of household heads who identify as Sukuma, the region's dominant ethnic group.

^bThe weightings for the household heads' education index are: 1 = Primary, 2 = Secondary, 3 = College and 4 = University

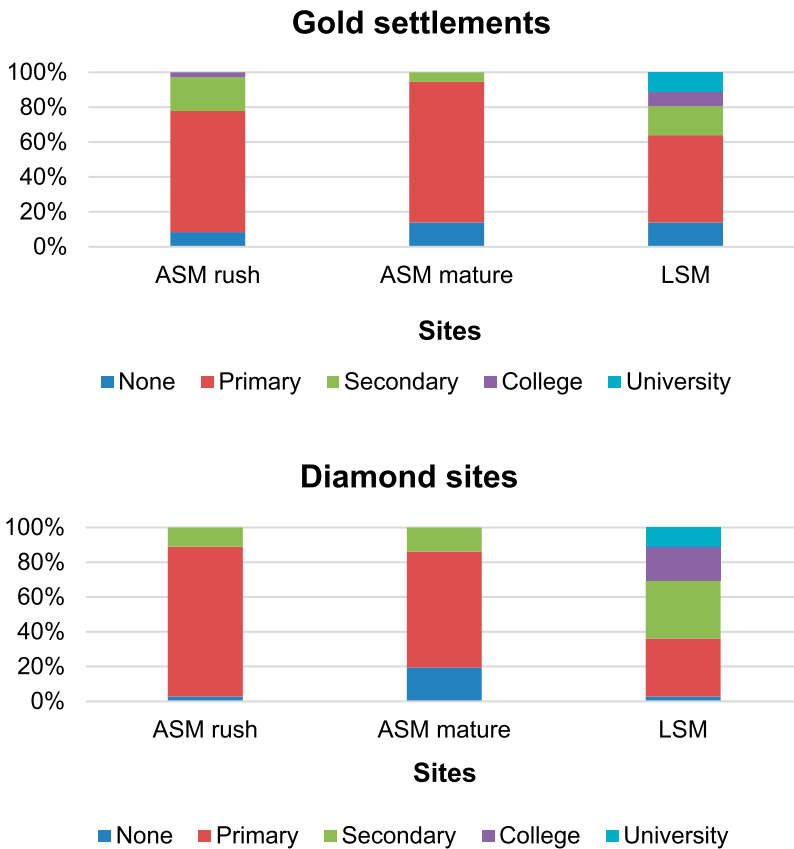


Figure 6. Household heads' education level by settlement typ. Source: UPIMA survey data, 2012.

exceeded that of the 'poor' by a factor of four, whereas the average of the education score for the three middle quintiles was a factor of two below the top quintile (Table 3).

The educational levels of the rush and mature artisanal sites were remarkably similar, overwhelmingly dominated by household heads with primary school education, with an upper fringe of households heads with some secondary school education and a lower fringe without any formal education (Figure 6). By contrast, the large-scale mining settlements evidenced a full range of educational levels with a much reduced presence of primary school educated residents,²⁶ a more prominent presence of secondary school training, and approximately 20-25% with post-secondary education.

Primary education was given emphasis throughout the 1970s under Nyerere's presidency. Thereafter, the country's economic slump in the 1980s largely prevented the expansion of secondary education in the country's vast expanse of rural areas, leaving a severe bottleneck in higher education. Unwittingly Nyerere's effort to safeguard egalitarianism by prioritizing a universal primary education policy to the detriment of secondary school development, left the vast majority of children limited to a maximum of seven years of primary schooling. Very few could advance to secondary schools, with the knock-on consequence of an exceptionally small segment of the population attending secondary school, let alone college or university training.²⁷

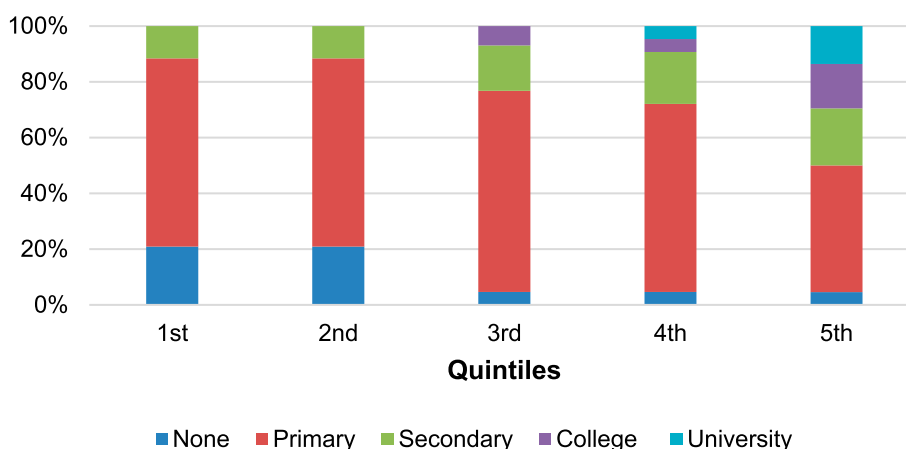


Figure 7. Household heads' education level by welfare quintiles Source: UPIMA survey data, 2012.

Despite Tanzania's rapid mineralization over the last twenty years, a clear divide still remains between the educated, who can obtain white collar professional jobs, as opposed to the less educated in informal unskilled manual work and trade. The low level of education permeates the welfare quintiles with the exception of the top quintile (Figure 7).

An elite in the highest welfare quintile resided primarily in the large-scale mining settlements, with the advantage of superior education endowments, and/or investment capital at their disposal. Only a small number of the households in the top quintile were restrictively primary-school educated and only one had no education. Amongst the relatively uneducated within the affluent quintile, some were native-born, who had gained an income from renting rooms, houses or selling property at the mining sites in Geita, Tanzania's fastest growing city. These findings reflect Tanzania's consolidating

Table 4. Household labour patterns, housing, consumption and investments by welfare quintile.

Welfare quintiles	Poor	Below average	Average	Above average	Wealthy
No. of households	44	43	43	43	43
% of HHHs with:					
Household head with secondary activities	53	58	60	72	65
Senior female (SF) primary activities	30	60	58	58	40
SFs engaged in farming primarily	16	42	33	37	19
Average number of household income sources	1.7	1.9	2.0	2.4	2.2
Receiving remittances (%)	0	7	2	14	12
Receiving rental income (%)	0	7	7	28	39
Land access (%)	53	88	86	83	94
Food supplied from own land	60	84	79	74	88
Food purchase as % of HH expenditure	86	78	72	69	60
Average no. of houses owned by HHH	1.0	1.2	1.1	1.4	1.4
No. of rooms in house (excl toilet, kitchen)	2.4	3.6	3.9	5.1	6.1
Average occupants/room	1.8	1.5	1.6	1.4	1.4
Household heads saving money (%)	26	21	37	35	52
No. of investments per household head	.09	.21	.44	1.39	1.43
No. of loans given minus received	-.171	-.019	.150	.370	.364
Students in household membership (%)	14	22	36	35	39

Source: UPIMA survey data, 2012.

capitalist economy in the early twenty-first century, and relate to Piketty's observations about the inequities embedded in educated elites' determining role in global history.

Occupational pathways, living standards and coalescing class differentiation

The millennium global mineral boom represented a period of new opportunities and risks. This section outlines the salient labour diversification and welfare patterns associated with survey heads of households in the five welfare quintiles (Table 4).

The 'poor' quintile were demographically distinct, composed mostly of young, single-headed artisanal migrant miners engaged in arduous work under uncertain, makeshift circumstances, but bent on getting ahead once their mining career progressed. Most expected to marry and be part of a conjugal household in which husband and wife pooled their joint incomes. However, this trajectory did not generally apply to the female heads of households. Most were older with child dependents making remarriage less likely. After losing their spouse through out-migration or death, many female heads of households in mining settlements did not have extended family links elsewhere to fall back on.²⁸ They were the most economically vulnerable group in our study.

However, our survey could not capture the full extent of impoverishment caused by the global mining price boom, since an *in situ* sample survey precludes analysis of migrants who arrived in the mining settlement but were forced to leave, failing to secure or losing viable employment and residential access. So too, there were instances of incoming migrants intending to trade or run a business who arrived too late to establish a workable niche, or encountered misfortune in the form of a mining accident or a debilitating disease like AIDS. And not least, there was considerable under-employment in Geita, where artisanal miners were losing informal access to digging sites through displacement by Geita Gold Mine's large-scale open cast mining operations.

The 'below average' quintile, with almost identical educational endowments as the poor tended to be native-born, representing an ethnic concentration of local Sukuma, with traditionalist beliefs and strong agro-pastoralist inclinations (Table 4). Most prevalent in the diamond rush site, they were generally composed of artisanal miners, farmers and traders, whose defining characteristics were a low level of education and a negligible asset base. In the gold settlements, the group was residentially concentrated in the mature artisanal mining settlement. Several were without a secondary income-generating activity. Many were farming because of insufficient earnings from mining or trading.

The below average household heads and spouses tended to lack secondary income sources. Paradoxically, despite their households' orientation towards farming and cattle-keeping, and enjoying the highest land access and food supplied from their own land, food purchases consumed a large percentage of their household expenditure. This group had the lowest savings level and a negative net loan balance (Table 4).

The 'average' welfare group, most evident in the mature artisanal diamond site, consisted primarily of artisanal miners, small businessmen and some large-scale mining employees. Materially aspirant, they nonetheless struggled to retain economic viability. Much depended on their ability to move away from primary reliance on mining towards a sustainable mix of diverse economic activities. They formed an indeterminate

group who pivoted on the threshold of upward or downward class differentiation, and possible decline into the precarity of casualized labour.

The 'above average' group's mining trajectory was locationally concentrated in mature artisanal or large-scale mining sites. They were on a transitional path to non-mining success based on diversification into services or capital investment derived from mining career savings. They considered the level and quality of their children's education vital to upward mobility. Their agricultural practices represented sideline investment, which contributed to household food supply. However, they were still dependent on food purchase, generally out of culinary preference for certain types of food rather than for staple food needs.

The 'affluent' quintile consisted of large-scale mine employees, professionals in the service sectors and a few rich farmers with rental property, residing especially in the large-scale mining settlements of Geita and Mwadui. Their superior asset endowments included land holdings, multiple house ownership, and relatively big houses. The ability to save, invest and educate their children, set them apart from 'average' and 'above average' households (Table 4). Their long-term security and coherence as a class rested heavily on the continuation of large-scale mine production and the formal education of their children to meet the challenges of the future labour market. Affluent middle-class parents in mining settlements were eager to send their children to 'better' schools in the district or regional capital city,²⁹ contributing to generational transmission of middle class elitism.

The 'average', 'above average' and 'affluent' welfare groups represented incremental improvements along the mining settlement trajectory. They leaned increasingly towards income diversification with multiple, varied sources of income, which helped smooth the household budget in the event of mishap or collapse of a specific income stream. These three groups displayed incremental welfare improvements through the acquisition of roomier houses, higher rental income, savings, net investments and the highest educational investment.

The confluence of patterns of asset ownership, urbanization, an emerging middle class and an educated elite.

Housing investment and urbanization

An urbanization process permeated Tanzania's northwest mining region.³⁰ Urbanism is defined as a way of life and attitude of mind, that embraces occupational diversification, individualism, non-kin associational ties, cosmopolitanism, secularization, status-seeking social behavior and class formation.³¹ The surveyed mining settlements experienced urbanizing growth to different degrees depending on the phase of the mining settlement trajectory and the migrant/non-migrant composition of the residents.

The proliferation of secondary income sources and higher educational investment characterized the top three welfare quintiles. Household asset accumulation was more markedly associated with the large-scale mining settlements where urbanization was most progressed (Table 4). An emerging middle class was readily observable in both of the large-scale mining settlements. Over one-third of surveyed households with 'affluent' or 'above average' status were connected to employment in professions or large-scale mines. Their resilience amidst global market fluctuation derived from their salaries and diversified business interests. Significantly, this group evidenced

the highest degree of marital conjugal coherence, a notable characteristic of middle-class life.³²

However, income derived from asset and property ownership was not the monopoly of the professionally-employed population. Some local farmers were actively benefiting from their land ownership and existence as landlords of rental housing, which elevated them to a local elite status. So too, a few artisanal miners in the top quintile had small business start-ups that had gained momentum, while some retired artisanal miners managed to accumulate savings to launch businesses in district or regional towns, albeit with mixed success. What these anomalous households had in common was their zeal for investing in housing for their *in situ* families and for earning rental income in their immediate locality or elsewhere in the mining region. Green³³ has documented Tanzania's emerging middle class's penchant for constructing houses outside some of Tanzania's major urban centres.

Meanwhile, some signs of embryonic elite formation were coalescing within the mature artisanal sites, through a highly eclectic occupational configuration combining artisanal mining, large businesses and farming. Over 20% were categorized in the 'above average' welfare score. In the rush sites, only 4% of the surveyed households achieved an 'affluent' or 'above average' status based on their artisanal mining or farming activities. Invariably, those status-holding households were landowners with expanded portfolios, from which they gained rents, remittance payments or business investment returns.

Examining the theory and practice of middle class elite formation.

Piketty's observations about elite formation amongst the educated are reflected in the changing patterns of occupation, consumption, and asset holdings, which surfaced in our survey. The development of middle classes has been an integral part of the rise of capitalism historically. The existence of an aspirant middle class's acquisition of education, specialized training and on-the-job experience in professional occupations and commerce facilitates the emerging capitalist social order.³⁴ Distinctively, a middle class perpetuates itself through investment in their own human capital and that of their families, evidenced in their concern to provide their children with good formal education.³⁵

The ILO³⁶ estimated that Africa's middle class (defined as those earning \$4-13 per day/capita) more than tripled between 2001 and 2011 from 11 million to 35 million, but was still dwarfed by the extremely poor (129 million), moderately poor (73 million) and the near poor (64 million). Kharas³⁷ estimates that middle classes in Africa amounted to only 2% of the 1.8 billion of the world's middle-class population. Lentz³⁸ and Melber et al.³⁹ give credence to an emerging African middle class but stress its precarity rather than its prosperity.

The World Bank⁴⁰ officially announced that Tanzania had attained lower middle income status in 2020. Nonetheless, published economic data to substantiate the growth of a middle class in Tanzania at present was lacking at the time of our study.⁴¹ Our comparative survey findings indicate on-the-ground welfare polarization between the highest quintile with a strong representation of affluent urban-educated households in contrast to 'poor' and 'below average' artisanal rush and mature mining settlement households.

Emergence of an educated elite and meritocratic wealth distribution

In 2012, Tanzanian mining afforded hundreds of thousands of people a livelihood directly as miners or indirectly as traders and service providers dependent on the economic multiplier effect generated by mining. Artisanal mining was still a relatively easy entry sector with an open mining frontier and land availability for home-grown food supply in many localities, a vital supplement to household welfare and an important fall-back when mining returns started declining (Table 4).

Despite the levelling influence of mass migration to mineral rush sites, Tanzanian educational policy dating back to the late 1970s afforded very minimal provision for secondary education.⁴² Hence the few household heads with upper secondary school, college or university degrees were in a far stronger position to gain an advantageous position and boost their welfare, be it in mining, non-mining formal employment or through savvy investments than the many with no or only primary school education. Consequently, there was a large gap between the 'poor' with a mean average educational index score of 0.9 and welfare score of 4.8, as opposed to the 'affluent' households' education score of 1.9 and far higher welfare score of 18.1. By contrast, the combined average score of the middle quintiles had an education index score of 1.2 (range: 1.0-1.4), much closer to that of the 'poor' than the 'affluent', and an average welfare index score of 8.6 (range: 7.1-10.2), falling far short of the welfare enjoyed by the elite residing primarily in the large-scale mining settlements (Tables 2 and 3). Thus, already at the time of migrants' arrival during the millennium mineral price boom, migrants' bifurcated educational backgrounds distorted the possibility of a 'level playing field'. Table 3 shows that the affluent quintile had a far higher education index score (1.9) compared with the lower quintiles, averaging just 1.2.

However, this low percentage of secondary and higher educated Tanzanians was beginning to be addressed by the survey households in the three highest quintiles. In those households, students comprised 37% of household membership (range: 36% – 39%), as opposed to only 18% (range: 14% – 22%) in the two lower quintiles, pointing to the disparity between poor as opposed to better-off parents' willingness or capability to make educational investments to improve their children's future occupational prospects (Table 4).

Given the relative poverty of the two lower quintiles, government remedial policies to equitably address the educational needs of poorer children should have been implemented at primary as well as secondary levels of schooling during the mineral boom from increased mineral tax revenues. A decade later that imperative remains.⁴³

Summarizing global, regional and local processes of change during the mining boom

The global mineral price boom of the new millennium marked a profoundly capitalist experience in Tanzania, encompassing accelerating commodification of labour, land, services and amenities, formerly provided through family or communal exchange within traditional agrarian households in Tanzania. The mineral boom propelled many away from ascriptive occupational patterns passed down to family members from one generation to the next. Instead, individuals disengaged from household strictures to exercise

individual occupational choice. Mass in-migration to mining settlements was motivated by expectations of improved livelihood earnings superseding what was obtainable on Tanzanian smallholder farms.⁴⁴

During Tanzania's 2002–2012 mineral boom, mining became a highly attractive occupation in which people gained new livelihoods with some able to devise a specialized mining career path or more often a diversified occupational portfolio. Traders' and service providers' in-migration to the urbanizing mining settlements was driven by the enhanced purchasing power emanating from the ASM and LSM mining sectors. When miners' returns changed for better or worse, they tended to branch into trade or service provisioning. Mining settlement residents particularly in the towns strove to become house owners, landlords and entrepreneurs; some achieving middle-class elite positions, which accorded with Piketty's argument that property owners gain economic power and social status relative to others.

But these trends existed on the shaky foundation of an ephemeral global mining price boom. For individuals and households, good judgement and/or luck led people to promising mining sites, but no amount of hard work or capital investment can circumvent the eventual consequences of diminishing mineral access at later stages of the artisanal and large-scale mining settlement trajectory.⁴⁵ Traders and service providers were likewise economically vulnerable to dwindling local mineral availability or global mineral prices dropping below local production costs.

Diversified income-earning patterns in mature artisanal settlements surfaced in the face of declining mineral availability, underpinned by the desire to retain residence in the settlement. Entrepreneurs were generally restricted to owning small restaurants and bars. Artisanal rush sites by their very nature rarely reached a stage of expanded labour diversification. They were populated overwhelmingly by specialized miners willing to live in makeshift housing conditions, but poised to move with alacrity when they heard of a more profitable rush site elsewhere.

Household welfare and the achievement of material wealth relied on occupational adaptability as well as marital conjugality. Those without spouses in their middle and old age were liable to fall into a poverty trap as evidenced by the fate of female heads of households and spouseless elderly male household heads in the 'poor' and 'below average' quintiles. Single men and women migrating to mining sites, who established enduring conjugal relationships, found it easier to supplement their main occupation with diversified secondary sidelines and deployed other household members to do the same, seeking an upward trajectory of material attainment and capital investment over time.

These settlement strategies nurtured vibrant regional market exchange but always subject to eventual diminishing mineral resources that could undermine local purchasing power and erode the economic viability of residents' main and secondary income-earning activities. When this happened, possession of savings or exchangeable material assets assisted people's efforts to reconfigure their occupational pursuits or move to find more remunerative work elsewhere. The welfare of the residential population was heavily influenced by investment in buildings and infrastructural improvement. Property acquisition and house building, central pillars of capitalist accumulation and welfare-enhancement generated by hard-work, luck and saving practices, were achievements

that made it difficult for households to choose whether to ‘stay or move on’ when their settlements’ mineral output started diminishing.⁴⁶

Conclusion

This article’s aim is to present an analytical dissection of unfolding welfare outcomes over the course of Tanzania’s processes of gold and diamond discovery during the 2002–2012 global mineral boom. Similar to Durkheim’s identification of the catalyzing influence of the Industrial Revolution in Europe on people’s occupational change and Polanyi’s recognition of the move towards generalized commodification, interactive processes connected with the social and economic opportunities of the mineral boom spurred Tanzanian household decision-making about migration, settlement and occupational choice leading to new livelihood patterns and the possibility of asset accumulation and house ownership. Education levels surfaced as a decisive influence on household welfare outcomes, providing impetus to urbanization, elite formation and class differentiation.⁴⁷

The existence of extremes of poverty and wealth at the margins, reflected in our survey, resonates with Piketty’s argument about the formation of modern national elites and the outcome of polarized education levels. The gap between ‘affluent’ and ‘poor’ households at opposite ends of the welfare spectrum was wide, particularly for older female-headed households experiencing a poverty trap.

For most other residents, the mineral price boom provided opportunities for households’ enhanced consumption, skill acquisition and investment in children’s education for households at middle levels. Occupational diversity and rising educational investment in a mining region held lasting value in the face of the inevitable realities of non-renewable mining’s fluctuating fortunes and eventual downturn.

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Notes

1. Hilson, “Small-scale mining,” Grätz “Morality, risk and rules in West African artisanal gold mining,” Tschakert, “Artisanal mining,” Maconachie and Hilson, “Recognizing and nurturing artisanal mining,” Hiron, “Shifting sand,” Geenen, *African Artisanal Mining*.
2. Bryceson and Jønsson, “Gold digging careers.”
3. Goodman, *Gold Seeking*, Gray, *Gold Diggers*.
4. Bryceson et al. “Mining mobility.”
5. Picketty, *Capital and Ideology*.
6. Werthmann, “Following the Hills,” 112–113)
7. *Ibid.*, 129.
8. Walsh, “Hot money,” “After the Rush,” Büscher “Urbanisation.”
9. Rodrigues, Büscher and Cuvulier, “Boomtown urbanization.”
10. Mususa, *Life on the Copperbelt*.
11. Kamete, “Mining and urbanization in Zimbabwe.”
12. Marais, “Mining towns.”

13. Werthmann, "Gold rush in West Africa" and Walsh, "Hot Money."
14. Abu-Lughod, "Challenge of comparative case studies."
15. Durkheim first published his book *The Division of Labour in Society* in 1893.
16. Polanyi, *The Great Transformation*.
17. Piketty, in *Capital and Ideology*, stresses the efficacy of progressive taxation regimes, housing, education, health food, and basic income subsidies to help the poor.
18. Bryceson, "Artisanal gold rush mining and frontier democracy."
19. Nyerere, an ardent opponent of South Africa's apartheid policy, avoided the possible politically destabilizing influence of South African investment in Tanzanian mineral production.
20. The International Labour Office (ILO), "Social and labour issues in small-scale mines" estimated the number of artisanal miners in Tanzania totaled between 450,000 to 600,000. Gold miners constituted approximately two-thirds of that total.
21. Bryceson and Jønsson, "Gold digging careers."
22. Jønsson and Bryceson, "Rushing for gold."
23. Mwaipopo, "Ubeshi."
24. Bryceson, Jønsson and Shand, "Mining mobility."
25. R^2 measured .2152.
26. The number of years that they actually attended primary school varied between 1 and 7 years, most leaving after four years.
27. Cooksey, "Tanzanian Secondary Education."
28. Bryceson, Jønsson and Verbrugge, "For richer, for poorer."
29. Ibid.
30. Bryceson et al., "Mineralized urbanization in Africa."
31. Simmel, "The metropolis and mental life."
32. James, *The Middle Class*.
33. Green, "Making Africa Middle Class."
34. James, *The Middle Class*.
35. Piketty, *Capital and Ideology*.
36. ILO, *Global Employment Trends*.
37. Kharas, "The emerging middle class."
38. Lentz, "African middle classes."
39. Melber et al., *The Rise of Africa's Middle Class*.
40. World Bank, <https://blogs.worldbank.org/africacan/what-does-tanzanias-move-lower-middle-income-status-mean>.
41. Moyo et al., "Attaining middle income status."
42. In 1980, Tanzania had one of the smallest secondary school systems in the world relative to the size of its population. As of 1997, less than 6% of Tanzania's school-age children were in school, see <https://databank.worldbank.org/source/world-development-indicators> (accessed 14 March, 2021).
43. In December 2021, the World Bank approved a \$500 million 'BOOST Primary Student Learning Program for Results' aid program, for 12.3 million students, but no provision for secondary schooling. Many private secondary schools have opened in the last two decades, which are unaffordable for poor families. See <https://www.worldbank.org/en/news/press-release/2021/12/17/tanzania-more-than-12-million-children-to-benefit-from-improved-preprimary-and-primary-education>. (accessed 6 June, 2022).
44. Phillips et al., "Tanzania's precious minerals boom."
45. Pedersen et al., "Mineral exhaustion."
46. Bryceson, et al., "Mining mobility."
47. Radley, tracing class formation amongst artisanal Congolese miners in neighbouring Kivu in Eastern DRC, documents the existence of a local ethnic mining elite, which invested heavily in their children's education with aspirations for them to be university-educated (Radley, "Class Formation.") Dumett observed similar class differentiation to the extent of emergence of an African entrepreneurial and educated middle class in

Ghana during the country's late 19th century gold boom (Dumett, *El Dorado in West Africa*).

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