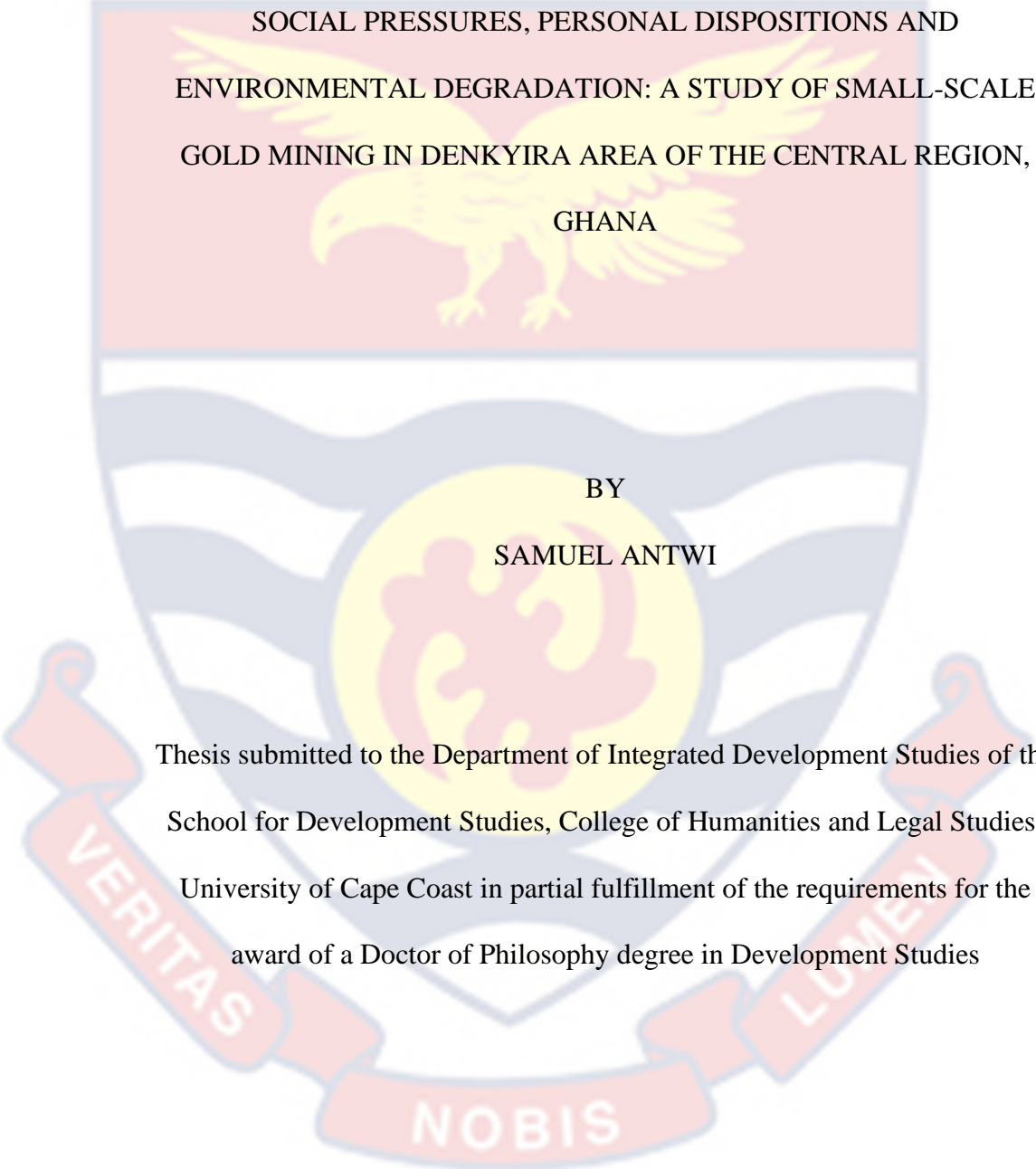




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The background of the page features a large, faint watermark of the University of Cape Coast crest. The crest is a shield-shaped emblem. The top section is a red rectangle containing a yellow eagle with its wings spread. Below this is a white section with blue wavy lines. The center of the shield is a yellow circle containing a red stylized figure. At the bottom, a red banner with white text reads "VERITAS NOBIS LUMEN".

SOCIAL PRESSURES, PERSONAL DISPOSITIONS AND
ENVIRONMENTAL DEGRADATION: A STUDY OF SMALL-SCALE
GOLD MINING IN DENKYIRA AREA OF THE CENTRAL REGION,
GHANA

BY
SAMUEL ANTWI

This thesis submitted to the Department of Integrated Development Studies of the School for Development Studies, College of Humanities and Legal Studies, University of Cape Coast in partial fulfillment of the requirements for the award of a Doctor of Philosophy degree in Development Studies

JULY, 2023

DECLARATION

Candidate's Declaration

I hereby declare that this thesis is the result of my own original research and that no part of it has been presented for another degree in this university or elsewhere.

Candidate's Signature Date.....

Name:

Supervisors' Declaration

We hereby declare that the preparation and presentation of the thesis were supervised in accordance with the guidelines on supervision of thesis laid down by the University of Cape Coast.

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Name:

Co-supervisor's Signature: Date.....

Name:

Co-supervisor's Signature:..... Date.....

Name:

ABSTRACT

The dominant narrative is that, factors driving small-scale gold mining (SSGM) and its negative impacts are poverty, unemployment, global economic order and ineffective enforcement of mining laws. Therefore, successive governments rely on provision of alternative livelihood strategies (improved methods of farming, skills training and strict enforcement of mining laws) to stop this problem. However, these measures have failed to produce the desired results. Hence, this study examines how social pressures and personal dispositions drive people into SSGM in the Denkyira area, Central Region, Ghana. Methodologically, the mixed-methods approach guided the study. Simple random sampling was used to select 183 registered miners and their workers while convenience sampling was used to select 190 unregistered miners and their workers. Also, purposive sampling was used to select 22 key informants. Inferential and descriptive statistics such as binary logistic regression, independent t-test and frequencies were used to analyse quantitative data while qualitative data was analysed based on emerging themes. The study revealed that, material success acquired by friends and family who are miners enticed others to engage in mining. Symbolic meaning people attached to money as a mark of material success also drives people into mining. Miners used the reward of the mines to garner the support of the locals and mined recklessly. Thus, negative impacts of SSGM such as open pits and destruction of water bodies were rampant in the area. Based on the findings, the study recommends that the District Assemblies should produce documentaries on the problems associated with irresponsible mining activities and screen them in all the communities to educate residents on the risks irresponsible mining poses to them.

ACKNOWLEDGEMENTS

This work would not have been completed without the advice, assistance and guidance from my supervisors of the School for Development Studies and Department of Geography and Regional Planning, University of Cape Coast, colleagues and my family.

To be specific, my heartfelt gratitude goes to my principal supervisor, Prof. Stephen B. Kendie of the Department of Peace Studies, School for Development Studies, co-supervisors Prof. Simon Mariwah, Department of Geography and Regional Planning and Dr Emmanuel Yamoah Tenkorang of the Department of Environment, Governance and Sustainable Development, School for Development Studies, Faculty of Social Sciences, College of Humanities and Legal Studies, University of Cape Coast for their academic guidance without which this work would not have been possible. I am also grateful to Dr Raymond Boasinkie, Dr Daniel Ampem Darko of the Department of Sociology and Anthropology, Kofi Yeboah Asare and Robert Ahiadzo of the School for Development Studies, University of Cape Coast, Sule Jotie, Richard Aniagyey, Edna Semenu, Rhodaline Abba and Patricia Miriam Serwaa Ayeh of the Information Services Department, Charity Obeng and Dr King David Zooga for their assistance.

DEDICATION

I dedicate this thesis to my late mother, Agnes Adwoa Odurowaa, popularly called Anty Bomber for all she did for me on her short journey on this earth.



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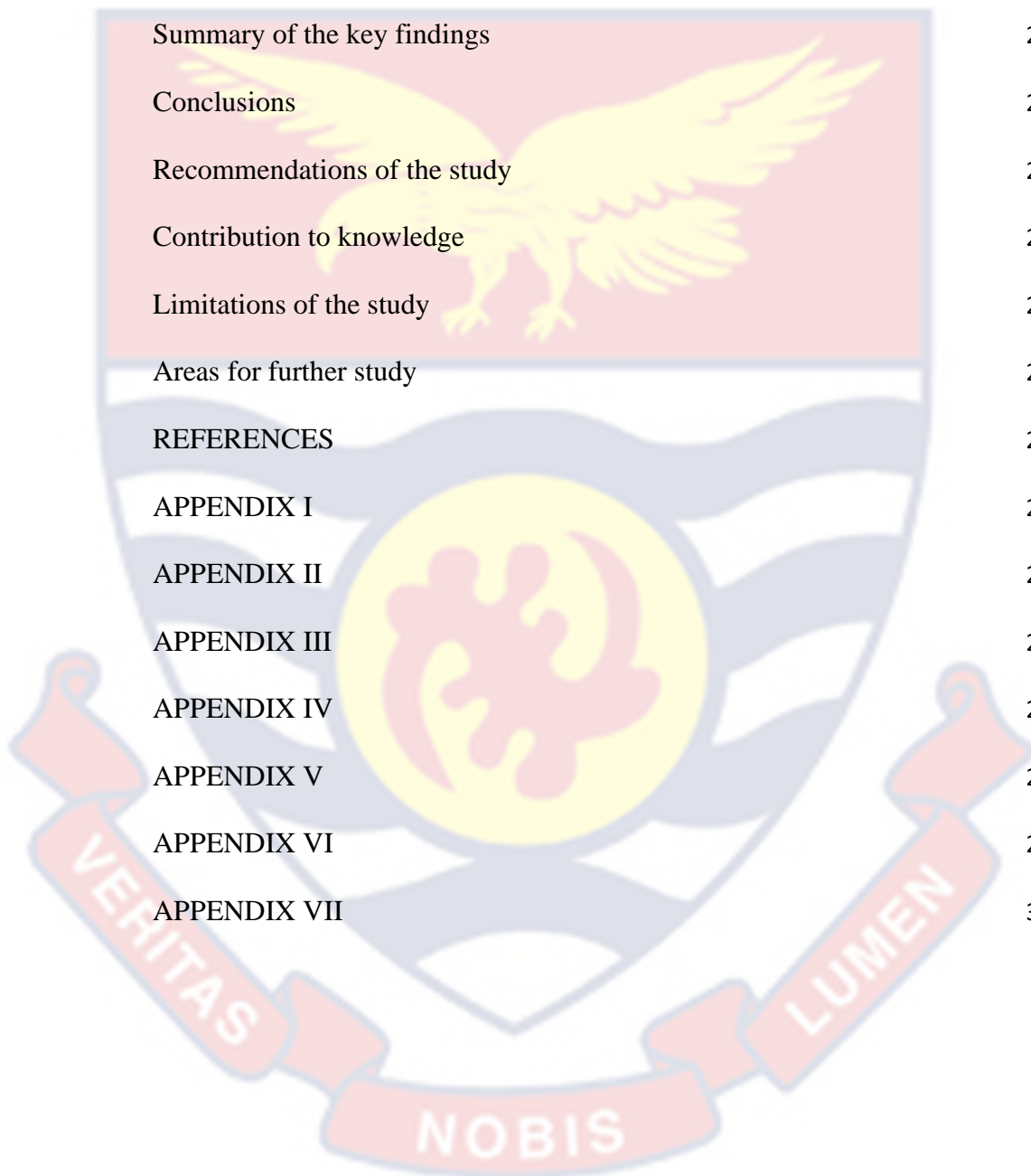
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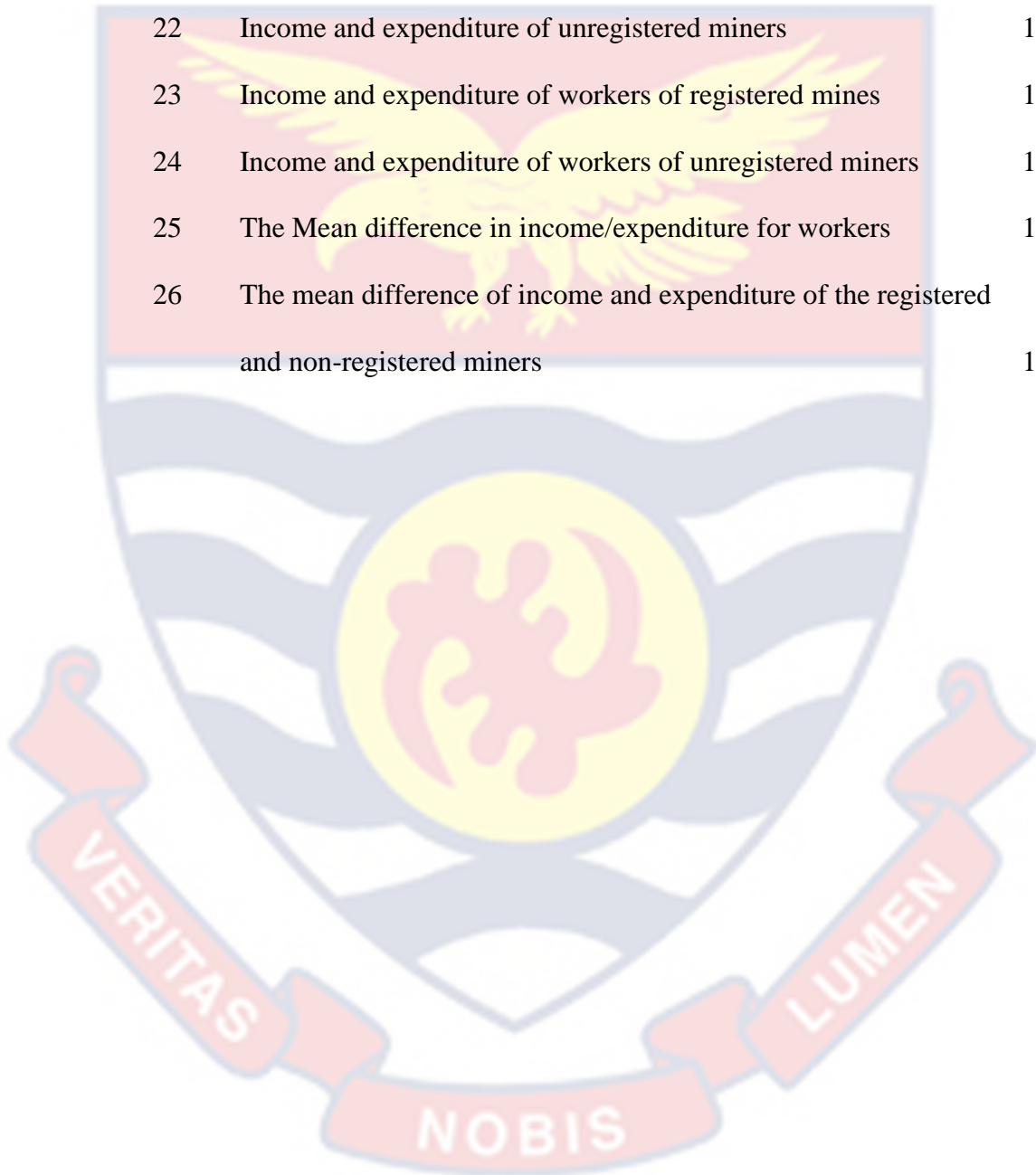
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LIST OF ACRONYMS

CV – Coefficient of Variation

DISEC – District Security Council

EIA – Environmental Impact Assessment

EPA – Environmental Protection Agency

ERP – Economic Recovery Programme

GSS – Ghana Statistical Service

GWCL – Ghana Water Company Limited

L.I. - Legislative Instrument

MAS – Money Altitude Scale

MDC – Movement for Democratic Change

MMIP – Multi-sectoral Mining Integrated Project

PAC – Percentage Accuracy in Classification

PBC - Perceived Behavioral Control

PMGL – Perseus Mining Ghana Limited

PNDCL – Provisional National Defence Council Law

RESEC – Regional Security Council

SADC – South African Broadcasting Corporation

SAP – Structural Adjustment Programme

SD – Standard Deviation

SPSS – Statistical Package for the Social Sciences

SSGM – Small-scale gold mining

UK – United Kingdom

USA – United States of America

WHO – World Health Organization

ZANA-PF – Zimbabwe African National Union-Patriotic Front

CHAPTER ONE

Introduction

Small-scale gold mining (SSGM) is an economic activity Ghanaians have practised for over 2,500 years (Smith, Henry & Frost-Killian, 2016). It was the main commercial activity that funded and supported the rise of some Akan kingdoms in the forest zones in pre-colonial Ghana (McCaskie, 2007). For instance, gold mining and trading supported the political and economic power of the Adanse, Ashanti and Denkyira before the arrival of the Europeans (Kavane, 2015). Before the arrival of the Europeans, the Adanse, Ashanti, and Denkyira traded gold with the Arabs in the Seventh and Eighth Centuries AD (Hilson, 2001). However, after years of colonisation, small-scale gold mining was strictly regulated with the promulgation of laws such as the Gold Mining Protection Ordinance (CAP 149) in 1905 and the 1932 Mercury Ordinance by the British Government due to its negative environmental impacts (Eshun & Okyere, 2017; Hilson, 2002). These regulations marginalised and criminalised the activity of small-scale gold mining to some extent during the colonial era, but did not stop it entirely (Hilson, 2001). After independence, the ban on small-scale gold mining is one of the policies successive governments have depended on to stop the poor ecological impacts of SSGM. As in the colonial era, it has not yielded any significant results. This suggests that enacting and enforcing mining laws are insufficient to solve the environmental impacts of SSGM in Ghana. Therefore, the factors that push people into SSGM must be reconsidered to address its ecological impacts properly.

Background to the study

Generally, the consensus is that factors driving small-scale gold mining and its negative environmental impacts are local and global economic forces such as poverty, unemployment, international development policies and changes in the price of gold at the world market (Hilson, 2001; Hilson & McQuicken, 2014; Kassa, 2019; Romero & Saavedra, 2016). This is because, historically, development policies of the Bretton Woods Institutions in the 1970s, 1980s and early 1990s such as the Economic Recovery Programme (ERP) and Structural Adjustment Programme (SAP) created conditions that pushed many people into SSGM (Hilson & Potter, 2005). For instance, countries which were implementing ERP and SAP were required to liberalise their market, abolish domestic price control, devalue their currency, reform the public sector, reform the agricultural sector, institute measures to promote export, stimulate private sector growth and generate revenue internally (Gyima-Boadi, 1990). The aim was to reduce excessive state control, maintain fiscal discipline and balance of payment deficit and control inflation to revitalise the slumping economies of these countries (Gyima-Boadi, 1990).

Some macroeconomic successes were chalked from implementing the ERP and SAP but the social and economic problems they created made many people poor and unemployed (Gyima-Boadi, 1990). For example, trade liberalisation resulted in unhealthy competition between local and foreign products, killing many local enterprises (Hilson and Potter, 2005). The initiatives to improve efficiency in the public sector such as privatisation of state enterprises including mining corporations, retrenchment of government workers and embargo on upward adjustment of public sector wages created

economic hardships, poverty and unemployment (Hilson & Potter, 2005). Therefore, many people who were impoverished as a result of these policies turn to small-scale gold mining to find a living (Hilson, 2001; Hilson 2002; Hilson, 2013, Hilson & potter, 2005). Ironically, this also painted a picture which suggested that the sector could help alleviate economic hardship, unemployment and poverty created by SAP (Hilson & Pooter, 2005). As Kassa (2019 p.77) put it “The hardship imposed by the SAP is often cited as unleashing greater economic instability in rural economics and households creating even more room for the growth of alternative livelihood strategies. Artisanal mining came to fit this, especially with volatilities in commodity prices”.

The idea was that the informality of the sector increases its associated environmental impacts hiding its job-creating ability for the unemployed and those who were negatively affected by the development policies (Echavarria, 2014; Havel, 2017; Hilson, 2001; Hilson 2002). It was also perceived that the formalisation would help stop the encroachment of foreign mining concessions and gold smuggling to nearby countries (Maconachie & Hilson, 2011; Hilson, 2013). Thus, mining laws in most developing countries were reformed to allow the locals to acquire licenses as small-scale gold miners (Maconachie & Hilson, 2011). In Zimbabwe, the law reform in the mining sector in the 1990s pushed the youth and some farmers whose livelihoods had been negatively affected by drought into small-scale gold mining, however, the reform failed to protect the environment (Gandiwa & Gandiwa, 2012). Similarly, in Tanzania, many of the poor and unemployed went into SSGM around that time (Mwakaje, 2012). Paradoxically, the reform rather increased the negative ecological impacts of SSGM instead of reducing them (Mwakaje, 2012).

Apart from this historical antecedent of SSGM, a change in demand for gold in the world market is also considered as a factor that affects small-scale gold mining activities. For instance, Romero and Saavedra (2016) established linear relationships among increased participation in SSGM activities in Colombia, high mercury pollution in Colombia and high demand for gold in the world market. Landgeland (2015) discovered positive correlations among increased participation in SSGM in Peru, a surge in deforestation in Peru and high demand for gold in the world market.

Poverty and unemployment also drive people into SSGM in Latin America (Gomes et al, 2015). In Sub-Saharan Africa, the high youth population growth rate and governments in the sub-region inability to provide jobs push the youth into SSGM (Hilson & Osei, 2014).

With particular reference to Ghana, the implementation of the SAP led to the importation of cheap foreign products which killed the textile and other local manufacturing industries (Hilson & Potter, 2005). It also led to the removal of subsidies on agricultural inputs which reduced production, and farmers' income dwindling their interest in farming (Hilson & Potter, 2005). The rehabilitation of the cocoa sub-sector and reform of its marketing strategy led to 80,000 job losses at the Cocoa Board (Hilson & Potter, 2005). The devaluation of the cedi also eroded people's disposable income.

The reforms in the mining sector led to the promulgation of the Mineral and Mining Act in 1986, Provisional National Defence Council Law (PNDCL 153). This law replaced the 1905 Gold Mining Protection Ordinance (CAP 149) which banned small-scale gold mining (Eshun & Okyere, 2017). The promulgation of the Mercury Act (PNDCL 217) also repealed the 1932 Mercury

Ordinance Act which outlawed the importation of mercury (Eshun & Okyere, 2017). The licensing of the Small-scale Gold Mining Act (PNDCL 218) was also passed in 1989. These reforms and the impoverished conditions created by SAP pushed many Ghanaians into SSGM around that time and that increased the negative environmental impacts of SSGM (Hilson, 2001; Hilson & Potter, 2010; Hilson, Yakovleva & Banchirigha, 2007). To this extent, Hilson (2013) considered the environmental impacts of SSGM as a by-product of the Bretton Woods Institutions' development policies.

On the changes in demand for gold in the world market, demand for gold decreased in the world market in 2000 and that also reduced small-scale gold mining activity in Ghana (Gbireh, Cobbla & Suglo, 2007). In 2010, the demand for gold increased in the world market and it increased SSGM activity and its negative environmental impacts tremendously in Ghana (Crawford, Agyeyomah, Botchwey & Mba, 2016; Crawford & Botchwey, 2016).

These dominant narratives explaining drivers of SSGM and their negative environmental impacts associated with the sector overemphasise macro-structural factors and leave the influence of micro forces such as peer pressures and personal dispositions on people's decisions to go into SSGM. This is because people's dispositions could push them into SSGM due to the high-immediate-financial reward it offers. These narratives also do not explain how the dispositions of the miners make their engagement in the sector destructive to the environment or otherwise. Attributing factors fuelling SSGM and its negative ecological impacts to poverty and unemployment present all miners in the sector as victims of circumstances. This hides the irresponsible environmental behaviour of some ambitious individuals in the sector under

these abstract entities – poverty, unemployment and changes in demand for gold at the world market. In addition to this, it narrowly presents SSGM as a sector fits for the poor alone neglecting the ecological impacts of the rich who are hugely investing in the sector (Verbrugge, 2014). The extant literature is also silent on the influence of micro-social pressures such as peer pressures on people's decisions to go into SSGM which increase participation to a scale that increases its negative ecological impacts.

The overemphasis on macro-structural factors as drivers of SSGM makes scholars interested in SSGM largely use political ecology theory to explain the negative environmental impacts of the sector (Kervankiran, Dziwormu & Temercin, 2016; Tschakert & Singha, 2007; Hilson, 2001). Ironically, political ecology theory uses power asymmetry to analyse environmental problems associated with resource use patterns that favour the powerful and push the poor to look for a living in ecologically protected areas. The theory is silent on locals' use of a resource and its ramifications on the environment (Khan, 2017). Therefore, its application by scholars such as Kervankiran et al (2016), Hilson and Potter (2005), Hilson and Osei (2014) and Tschakert and Singha (2007) in research on SSGM largely arrived at findings that support the existing narrative (i.e., poverty, unemployment and global economic orders) failing to unveil micro factors that also drive people into SSGM and fuel its negative ecological impacts. For this reason, the theory of planned behaviour which analyses people's actions from micro forces was adopted to examine drivers of SSGM and its negative environmental impacts.

The theory of planned behaviour assesses individual(s) engagement in an action based on their intentions, perceived behavioural control, attitude and

subjective social norm (Ajzen, 1991). Attitude talks about people's intentions to engage in an action based on its desirable outcome (Ajzen, 1991). Gold was a medium of exchange, a symbol of power, wealth, and a mark of high social status in pre-European states in Sub-Saharan Africa thus, many of the inter-tribal wars were waged not only to conquer other tribes but to control rich mineral lands (Nyame, Grant & Yakovleva, 2009). In the Incas civilization, gold was a medium of exchange, a symbol of power, and ceremoniously worn by kings to signify their high social status and closeness to the gods (Cremers, Kolen & Theije, 2013).

Presently, gold is a medium of exchange and an asset which maintains its value for a long period (Shakil, Ishq, Tasnia & Uluyol, 2018). These symbolic meanings associated with gold can drive people to SSGM. This is because the desirable outcome of action pulls people to perform it (Ajzen, 1991). This intention towards participation in SSGM has led to the mechanization of the sector increasing its negative environmental impacts (Crawford & Botchwey, 2016). As eco-feminists argue, the economy that is for subsistence does not deteriorate the environment as compared to the economy for affluence. Tiban (2000 in Osorio, Lobato & Castillo, 2005) also argued that nature suffers if it is used for material gains.

Subjective social norm looks at how friends, peers, family members and neighbours influence others to participate in a particular action (Ajzen, 1991). Therefore, it was used to examine how friends, peers, family members, and neighbours influence others to participate in small-scale gold mining and its ramifications on the environment. The existing literature largely attributes deficiencies in the regulation and enforcement of mining and environmental

laws to inadequate resources of State institutions responsible for monitoring, regulating and enforcing mining laws (Osei-Kojo, Asamoah & Yeboah-Assiamah, 2016). It also considers political patronage as a factor making these institutions ineffective (Danyo & Osei-Bonsu, 2016). However, it leaves how miners exercise their agencies to overcome any structural constraints preventing them from mining.

Perceived behavioural control (PBC) looks at how people seek the co-operation or support of others to perform actions which they cannot do of their own volition (Ajzen, 1991). Therefore, it was used to analyse how miners seek the support of others and mine irresponsibly despite governments efforts to stop reckless mining. The structure and human agency theory talks about how humans' reflexive abilities and knowledge of their environment help them to adjust their actions to overcome structural constraints (Archer, 1995; Giddens' 1984). For instance, Archer (1995) and Giddens (1984) noted that structural property does not determine humans' behaviours but conditions them to vary their actions to overcome constraints in the performance of an action. Bakewell (2010) also noted that humans find ways of performing intended actions even under extreme coercion. Hence, structure and human agency theory was used to complement the theory of planned behaviour to examine strategies miners adopt to mine irresponsibly despite efforts to stop reckless mining in Ghana.

Statement of the problem

Small-scale gold mining is causing water pollution in the Denkyira area in the Central Region. It has destroyed rivers such as Offin and Dia which flow through the area and Pra which flows in some parts of the area (Donker, Nartey, Boateng & Adotey, 2006; Upper Denkyira East Municipal Assembly, 2016). These rivers and their tributaries have been contaminated with silt and heavy

metals such as mercury, lead and zinc deteriorating water quality for people who depend on these rivers (Crawford et al., 2016). The pollution of the water bodies has affected inland fishing reducing the income of people who depend on inland fishing in these rivers (Kpan, Opoku & Anukwah, 2014; Oppong, Voegborlo, Agorku & Adimado, 2010). It has destroyed vegetation cover in some parts of the area and reduced land for farming (Agyei-Manu, Nimoh, Owusu-Peprah & Kyeremateng, 2020). In effect, the cost of living in the area has increased drastically (Agyei-Manu et al, 2020). To solve these negative ecological and socio-economic impacts, successive governments mainly relied on the provision of alternative livelihood programmes such as improved methods of farming, skills training, tree planting, oil-palm seedlings nursery projects and strict regulation of SSGM activity (Hilson & Potter, 2004; Hilson et al., 2007).

The aim is to move the majority of the miners into other income-generating activities and forcefully stop those who are mining but not following environmental laws. This is because unemployment and poverty are largely perceived as factors driving people into SSGM (Hilson & Osei, 2014). Unfortunately, these measures are not producing the intended results as pollution of water bodies (rivers Offin, Dia, and Pra) in the area by the miners has not stopped (Personal Communication with officials of Mineral Commission & Environmental Protection Agency on 16th October, 2020). This is because the rewards of these livelihood programmes cannot be compared to that of SSGM and the use of force has not stopped miners from breaking the environmental laws (Arah, 2015; Hilson & Potter, 2004; Hilson et al., 2007). This means the forces driving people into SSGM are not unemployment and poverty alone otherwise the alternative livelihood programmes should have

produced the intended results. As Smith, Smith, John and Teschner (2017 p. 52) noted “Small-scale gold mining is lucrative and cannot be replaced with low-paid jobs”. Therefore, there is a need to examine other factors such as micro-social pressures and personal dispositions that also push people into SSGM because of its high immediate financial reward to address its negative ecological impacts appropriately.

Objectives of the study

General objective

The main objective of the study is to assess the influence of micro-social pressures and personal dispositions on people’s decisions to enter into small-scale gold mining in the Denkyira area.

The specific objectives of the study are to:

1. Examine the influence of micro-social pressures on people’s decisions to enter into small-scale gold mining.
2. Analyse the influence of personal dispositions on people’s decision to go into small-scale gold mining.
3. Assess the environmental consequences of small-scale gold mining in the Denkyira area
4. Examine the strategies adopted by the miners to garner the support of others in mining.

Research questions

1. How do micro-social pressures influence people’s decision to go into small-scale gold mining in the Denkyira area?
2. How do personal dispositions influence people’s decision to enter into small-scale gold mining in the Denkyira area?

3. What are the environmental consequences of small-scale gold mining in the area?
4. What are the strategies adopted by the miners to seek the cooperation of other stakeholders in mining?

Significance of the study

Studying factors pushing people into small-scale gold mining in the frame of personal dispositions would result in findings that situate the environmental impacts of SSGM in miners' attitudes and motives for entering into mining. In this way, policymakers who want to stop the ecological impact of SSGM would consider strategies that aim at behavioural change in addition to other measures. Equally, examining factors pushing people into SSGM from the perspective of social pressures would reveal how the social system pushes people into SSGM despite its negative environmental impacts and efforts to stop it. Arriving at such findings would go a long way to help policymakers formulate multi-sectorial strategies to deal with the negative impacts of SSGM. The search for factors other than structural factors that push people into SSGM would bring divergence in the literature that explains factors driving people into SSGM. For instance, it would generate debate on the factors pushing people into SSGM in academic circles motivating researchers to further interrogate why people go into SSGM despite growing public concerns on its ramifications on the social system.

The concepts in the theory of planned behaviour which analyze individual's actions based on their motive and others' recommendation, support and cooperation have been adopted to examine how these factors (personal dispositions and social pressures) pull people into small-scale gold mining. Also, structuration theory has been adopted to complement this theory. This is

because the social system coerces people to take certain actions which negatively affect the system itself.

The scope of the study

The scope of the study covers the geographical area of the research and theoretical perspectives. In terms of geographical area, the Denkyira area was the focus of the study. The area is divided into three – Upper Denkyira East, Upper Denkyira West and Lower Denkyira Districts. However, the study was delimited to Upper Denkyira East and Upper Denkyira West Districts because small-scale gold mining is common in these Districts due to the geology of the area which is mainly composed of Brimian and Tarkwain rocks (Smith et al, 2016). As a result of this, placer gold or alluvial gold mining has been one of the occupations along the rivers in the area for the past 2,500 years (Hilson, 2001; Smith et al, 2016; Nzulu, Eklund and Magnuson, 2021).

The theoretical scope centres on the theory of planned behaviour, a micro-social psychological theory. This was because the study departs from the use of macro-structural factors to explain causes of SSGM and uses micro forces to examine drivers of small-scale gold mining.

Organization of the study

This study contains five chapters. Chapter one comprises the introduction of the study, problem statement, objectives, research questions, significance, scope and organization of the study. The theoretical perspective, concepts, literature and empirical reviews and conceptual framework can be found in chapter two. Chapter three covers the philosophical foundation of the study; the study area; the research design; the target population; sampling procedures; instruments for data collection and data analysis. Chapter four consists of the results and discussions of the research questions. The final

chapter (chapter five) contains findings, conclusions, recommendations, limitations, suggestions for further studies and gaps the study filled.



CHAPTER TWO

REVIEW OF RELATED LITERATURE, CONCEPTS AND THEORETICAL FRAMEWORK

Introduction

This chapter contains working definitions of the concepts used to situate the study in context such as gold, personal dispositions and social pressures. It also discusses these concepts and reviews literature related to small-scale gold mining, the negative impacts of small-scale gold mining, and the theoretical and conceptual frameworks of the study.

The value of gold

Scientifically, the atomic number and weight of gold are 79 and 197 respectively (Jones & Fleischer, 1969). On the periodic table, gold forms part of the elements placed in group Ib and this group contains over 30 elements such as copper, iron, silver, nickel, titanium, mercury, manganese, lead, vanadium, tin, antimony, bismuth, arsenic, zinc, cadmium, tellurium, platinum and palladium (Jones & Fleischer, 1969). Gold has a weak covalent ion, therefore, it is electronegative and resistible to oxidation (Kitson, 2012). These chemical properties make gold physically ductile, malleable, lustre, attractive, durable, portable and divisible (Idris et al, 2013). In comparison with other reusable metals such as lead, copper, silver and aluminium which lose their properties and usefulness after being recycled severally, gold relatively maintains its physical and chemical properties after undergoing numerous processes of recycling (Turk, 2012). This means gold can preserve its relevance and value for a long period. To this extent, gold mined today is the same as the one mined over thousands of years ago which has been recycled for over a thousand times (Turk, 2012). In other words, every single piece of gold mined

by mankind still exists with their economic value and industrial worth largely intact.

Gold has dual economic importance, for example, it functions as money and as a commodity. As money, gold serves as a medium of exchange and a store of value (Kitson, 2012). It is the oldest medium of exchange or currency still in circulation today (Capie, Terence & Wood, 2005). This is due to the fact that gold is durable, portable and acceptable globally and easily traded or liquidated in many parts of the world (Capie et al, 2005). As Charles de Gaulle put it “There can be no other criterion, no other standard than gold. Yes, gold which never changes, which can be shaped into ingots, bars, coins, which has no nationality and which is externally and universally accepted as unalterable fiduciary value par excellence” (Capie et al, 2005 p. 343). Putting Charles de Gaulle’s words differently, Millar (2006 P.3) said “Gold is money, and money is gold plus credit and cash. Men can debase credit, even cash, but not gold”.

Gold cannot be artificially debased or devalued because it is relatively insusceptible to inflation, deflation, financial crunch, market shocks, crisis in the banking sector and credit defaults (Millar, 2006). As a store of value, gold can maintain its asset for a long period, a property some products in the stock market such as bonds, treasury bills and equities do not possess (Idris et al, 2013). Also, as compared with the major international currencies such as the United States of America dollars, British Pound Sterling, Japanese Yen and Chinese Yuan, gold can hold its value for a longer period than these currencies (Idris et al, 2013). Simply put, gold value does not depreciate rapidly like the international and national currencies and securities in the stock market. As a result of this property, gold has been used by individuals to protect their wealth

for centuries (Cooper, 1982). Also, it is against this backdrop that the gold standard became the foundation of the world monetary system in the 1870s for some of the world powers such as Great Britain, France, USA, Italy and Japan (Cooper, 1982).

The gold standard, though collapsed in 1914, it resurrected during the economic depression in the 1930s and the USA became the key player in the gold standard around this time till 1971. During that time, the Bretton Woods Institutions became the regulator of the gold reserves in the world monetary system. Fortunately, a huge percentage of the world's monetary gold was owned by the USA and gold price was fixed in dollar terms (Cooper, 1982). The aims behind this world monetary system with gold as the major asset were price stabilization, control of inflation and deflation and resurrection of the economy of the war-torn countries at the time.

The success story of gold in the world monetary system made investment analysts conceive the idea that gold can be used to hedge currencies and diversify business portfolios to protect people's wealth. For instance, a study conducted by Reborado (2013) revealed that gold preserved its value and as such it can be used to hedge the major international trading currencies such as Dollar and Pound Sterling. Baur and Lucey (2009) found that gold maintains its economic value for years and that makes it a commodity which can be used to diversify business portfolios to save investors, their monies and businesses from shocks and financial stress. It may be against this background that central banks across the world demand and hoard gold in times of financial crisis. For instance, some central banks in many parts of the world bought gold to shore up their currency and economy after the 2008 world financial crisis (Cremers et al,

2013). Therefore, gold is money, wealth and treasure and whoever is looking for it is searching for money, prosperity, fame and power. Thus it can attract ambitious persons, power motivational value persons and power money attitudes individuals due to its economic importance. Also, the social system could pressure some individuals to engage in gold mining activity due to its economic importance for social recognition. Therefore, it is not surprising that small-scale gold mining attracts many people with various backgrounds in Asia (Verbrugge, 2014).

Gold mining

Gold mining is an economic activity in many parts of Sub-Saharan Africa due to the geological formation of this area. For illustration, gold is mined in Ghana, Tanzania, Burkina Faso, Mali, Zimbabwe and South Africa. Among these countries, the largest producer of gold is Ghana followed by South Africa. Historically, before the arrival of the Europeans, gold production in Sub-Saharan Africa was mainly artisanal and its trading made some kingdoms in Sub-Saharan Africa rich and powerful. For instance, the ancient Mali Empire and the Ashanti Kingdom were wealthy and powerful due to their control of rich gold mines and trading of gold with the Arabs and the Mediterranean world (Kavene, 2015). In 1800, the demand for gold for industrial, jewellery and investment purposes attracted European merchants to Sub-Saharan Africa (Kavene, 2015).

The presence of European merchants increased gold production in Sub-Saharan Africa resulting in migrants moving to mining communities in search of a better life (Kavene, 2015). This did not only expand the mining communities but also opened them to modern ways of life. A typical example is Cape Town in South Africa and Oboase in Ghana which were said to be

villages with small hamlets but grown to become large towns due to gold mining (Ofosu-Mensah, 2011; Mangondo, 2006). The Europeans also introduced industrial gold mining in the late 1800s and early 1900s in Africa (Gajigo, Mutambetsere & Ndiaye, 2012). Industrial mining brought some economic benefits such as employment to some Africans (Chuhan-Pole, Dabalén, Kotsadam, Sanoh & Tolonen, 2015). It brought revenue to governments and traditional authorities through taxation, licence fees, ground rent and royalties (Jul-Larsen, Kassibo, Lange & Samset, 2006). However, it criminalised small-scale gold mining through a series of laws in colonial and post-colonial Africa until the late 1980s when the ban on SSGM started to relax (Eshun & Okyere, 2017). From the 1990s to the present, successive governments in Sub-Saharan Africa continue to use laws to marginalise and outlaw small-scale gold mining activities (Mawowa, 2013; Spiegel, 2009). Thus it is not surprising that many researchers situate the environmental impact of small-scale gold mining in power asymmetry that disadvantages small-scale gold miners.

Small-scale gold mining

Small-scale gold mining has no internationally agreeable definition due to its heterogeneity (McQuilken & Hilson, 2016). Researchers who try to define it, at best, end up listing some of its myriad characteristics such as methods of extraction, level of output, size of concession, location, group of people involved, the number of people involved, project life span, conditions of service, capital requirement and legal framework guiding the operation. Surprisingly, these characteristics also differ depending on when and where the extraction is taking place. This study would elucidate some of these characteristics which have contributed to the confusion of the definition of small-scale gold mining.

On the tools for extraction and processing, hitherto, equipment mainly used were pickaxe, shovel, cutlass, mattocks, chisel, hammer, bucket, ropes, pans, bowls, metal mortar and pestle, sluice box, blanket, charcoal pot, saucepan and white calico (Adu-Gyamfi, 2014; Adjei, Oladejo & Adetunde, 2012).

Researchers described these tools and methods of production with words and phrases such as rudimentary, manual, primitive and simple hand technology (Cremers et al, 2013; Adjei et al, 2012; Amponsah-Tawiah & Dartey-Baah, 2011). Based on these tools, production capacity and output were low and environmental impact was insignificant (Crawford, et al, 2016).

The manual method has not withered away completely, but currently, some miners use heavy equipment such as excavators, washing plants, water pumps, explosives, ore grinding machines, water platforms (rafts) and suction equipment. The heavy machines have exacerbated the confusion of whether the sector should still be classified as small-scale. This is in view of the fact that, now the method of mining is largely mechanised and the scale of production and output are considerably high which do no longer fits the operations of small-scale gold mining (Crawford, et al, 2016). The mechanisation has also intensified the negative environmental impacts of the sector astronomically (Crawford & Botchwey, 2016). It is against this backdrop that the Multi-sectorial Mining Integrated Project (MMIP) seeks to re-categorize mining to take of medium-scale through the amendment of Regulation 469 of the Minerals and Mining (Health, Safety and Technical) Regulations, 2012 (L.I. 2182) (Ministry Lands & Natural Resources, 2017).

The MMIP document stipulates that “The project will explore the possibility of reviewing the current ASM regulatory framework of introducing

a medium-scale mining category to cover those who operate heavy-duty equipment in their operations but fronting for foreigners” (Ministry of Lands & Natural Resources, 2017 p.23). Page 29 of the MMIP policy also states “For re-categorization of mining to take care of medium-scale mining, Regulation 469 of the Minerals and Mining (Health, Safety and Technical) Regulations, 2012 (L.I 2128) can be explored or looked at” (Ministry of Lands & Natural Resources, 2017 p.29).

The size of concession used for mining differs from country to country, for instance, in Ghana, the maximum land size for small-scale gold mining is 25 acres (Mineral and Mining Act, Act 703). In Peru, a small-scale gold miner can hold up to 5000 acres as a concession with production capacity not exceeding 3500 metric tonnes per year (Markham & Sangermano, 2018). According to the World Bank (2013), it is a mining activity that takes place in the poorest and outmost part of rural areas of developing countries. Conversely, in Ghana, small-scale gold mining is ubiquitous – it takes place in the forest, rivers, within communities and on the roadside (Hilson & Potter, 2004).

The life span of production depends on the possibility and availability of the ore, the content of the ore and climatic conditions, therefore, small-scale gold mining can be ephemeral, seasonal or permanent (Barney, 2018; Hilson & Potter, 2004). The ephemeral life span can be caused by hearsay of gold prove in an area which turns out to be false, due to lack of geo-physical information in the area. In such cases, the mining activity ends abruptly with disappointment. Hilson and Potter (2004) called such situation “hit and miss”. It could also happen when the quality of the ore is good but the quantity is scanty. In this case the gold boom or gold rush attracts many miners to the area, the lucky ones

strike riches but only for a short time (Salman, Soruco & Carrilo, 2013). The life span of the mine could be permanent if the quantity of the ore could last for a long period: in such cases, the miners erect permanent shanty settlements (Hilson et al, 2007). Seasonal miners ply their trade only in the dry season to supplement their subsistence agricultural activity thus they double as farmers/miners (Mkodzongi & Spiegel, 2018; Hilson & Osei, 2014).

The conditions of service of small-scale gold mining borders on sharing of profit, the physical environment in which miners work and labour relations. The profit is shared based on the agreement between miners and the sponsor, typically, miners keep two-thirds of the profit and give the rest to the sponsor (Mkodzongi & Spiegel, 2018; Hilson, 2001). Small-scale gold mining mostly takes place under hazardous working conditions (Cremers et al, 2013), the pits sometimes collapse on them and chemicals used for processing injure their health (Amankwah & Suglo, 2003). In some cases, labour is extracted by force in mining sites in some parts of Latin America (Verite, 2016). The capital requirement to undertake small-scale gold mining is subject to factors such as the aim of the miners and the nature of mining. If the aim of the miner is subsistence, the capital requirement is low and the mining is labour-intensive (Mensah, Mabari, Owusu, Mireku & Kissi, 2015). On the other hand, some small-scale gold miners invest huge capital and heavy equipment in production such that the difference between them and large-scale gold mining is blurred (Mensah et al, 2015). This means the motive for engaging in small-scale gold mining increases its production, output and environmental impacts.

The number of people involved per gang of miners ranges from four to nine with each miner performing a specific role but if it is cooperative the

number could be 10 or more (Hilson, 2001). In the late 1980s, governments in many developing countries started formalizing the sector to regularize its environmental impacts and harness its economic potential for national development [A sub-section that will be treated separately in this chapter].

Ironically, it is the formalization process that rendered the operation of some miners illegal and for that matter, there are registered/legal/licensed small-scale gold miners and unregistered/illegal/unlicensed small-scale gold miners (Nyame et al, 2009). Nonetheless, in terms of methods, organizations, intents and purposes, the practical or theoretical differentiations between the two [licensed and unlicensed] are blurred so they are often lumped together in most cases as SSGM (Nyame et al, 2009).

People said to be involved in small-scale gold mining are nomadic or migrants and rural poor (Hilson & Potter, 2004). It also attracts less educated or illiterates (Amponsah & Dartey-Baah, 2012). Furthermore, it helps people who have no skills and limited opportunities to secure jobs in the formal sector find a living (Hilson, 2013; Hilson & Osei, 2014). It may be these socio-economic characteristics of some people who engage in small-scale gold mining that is why the sector has largely been classified as a poverty-driven activity, but not all small-scale gold miners are poor, illiterate and less educated. [Another sub-topic that would be treated in this chapter].

To summarize the heterogeneity of small-scale gold mining, the Global Initiative Against Transnational Organized Crime (2016) grouped all forms of SSGM into five categories. First, traditional artisanal small-scale gold mining - primary gold mining or panning livelihood activity that has been passed on from generation to generation. Second, seasonal small-scale gold mining – a gold

mining activity carried out during the off-peak farming season. Third, permanent cohabitation small-scale gold mining – a small-scale gold mining activity that operates on the fringe of large-scale mining concessions with the consent of the large-scale mines. Fourth, shock SSGM - is a gold mining activity that happens as a result of drought, economic down-turn, conflict and closure of large-scale mines and fifth, influx SSGM – is a small-scale gold mining activity which happens as a result of new gold discovery or “gold rush”.

Personal dispositions that drive people into small-scale gold mining

Allport (1937) defined personal disposition or personality trait as attributes that are characteristic and commonly exhibited by an individual alone. In this study, personal dispositions and personality traits are used interchangeably as they are considered synonymous in both analytical and practical terms. Whether these attributes are situational or permanent in the life of the individual became a debate in the 1980s as research on personality traits at that time either refuted or confirmed the Allportarian sense of disposition. For instance, Michel and Peake (1982) perceived personal disposition as pervasive and consistent across situations and times whereas Buss and Craiks (1983) opined that personal disposition is situational and changes from time to time (Zurroff, 1986). In a reaction to these conflicting positions on the Allportarian sense of traits, Zurroff (1986) stated that whether a trait exists or does not exist depends on the orientation of the researcher and the burden of using a construct to represent it in research also relies on how the social scientist defines it. As if Zurroff's (1986) position has been accepted by social scientists interested in disposition, constructs used to represent personal dispositions differ from research to research.

For example, McCrae and John (1992) identified Five Factor personality traits - openness, conscientiousness, extraversion, agreeableness and neuroticism to measure the depth of an individual's mental and experiential life, prudence in the performance of a task, attitude towards material success, tenderness toward society and feeling of anxiousness, respectively. Ashton and Lee (2009) discovered "Honesty-Humility" as an additional construct to the Big-5 personality traits and named their model "Hexaco". Kerr, Kerr and Xu (2017) identified self-efficacy and innovativeness, locus control, the need for achievement and risk attitudes in addition to the Big-5 factors model as the attributes researchers largely use to describe the disposition of an entrepreneur. Adebowale (2017) used extroversion and introversion as personal dispositions to assess people's emotions and coping strategies in times of bereavement. Melton, Mallory and Green (2010) also used trust, trustworthiness, humility, active listening, resilience, egalitarianism, patience, collaboration and cultural anthropology of individuals to evaluate the leadership disposition of the heads of educational institutions. These examples show that constructs used to assess dispositions depend on the focus of the research, therefore, this study will use values, ambition and money attitude as dispositions of small-scale gold miners.

Mashallah (2015) described values as the foundation of people's behaviour, beliefs and feelings. Implicitly, this description suggests that individuals' cognitive process, affectivity and socialization influence their values. Therefore, values guide decision-making processes, perceptions, preferences and goals, and determine individuals' judgment of what is right or wrong (Mashlah, 2015). Thomas (2013 p. 13) defined values as "Socially and personally shared ideas that are stabilised and represent intrinsic beliefs about

what is good, desirable and righteous". This definition explicitly shows that values are relative and contextual. Thomas' (2013) definition of values aligns with Ab-Halim (2005) idea of how individuals acquire values through social learning and/or enforcement of moral codes by social institutions. Ab-Halim (2005) and Thomas (2013) conception of values also suggests that values are not innate qualities, they are learnt contextually and internalised which guide our moral conduct. Divergently, Callaghan (2015) differentiated values from morality, he defined morality as a set of rules that defined what is wrong or right in a particular group or culture and values as abstract personal and universal internal references that guide individual's decision. This means morality is a collective moral code for a group but values are unique personality traits of an individual of which case-by-case reference of such traits could be made universally.

From the literature review, there is no set of unique constructs that represent values and constructs used to represent values depend on the subject under investigation (Callaghan, 2015; Hsieh, Chen, Mahmud & Nichols, 2014; Nelissen, Djiker & de Vries, 2007). For instance, Guth and Tagiuri (1965) identified five values - the economic man, the theoretical man, the political man, the aesthetic man, and the social man, that individuals developed based on their orientations (Bruno & Lay, 2008). The economic man is said to be interested in profit making and wealth creation; the theoretical man seeks knowledge; the political man continuously pursues personal power and social influence; the aesthetic man may not necessarily be a creative artist but is interested in artistic aspects of life and the social man is kind, unselfish, cares for others and seeks the well-being of all people (Bruno & Lay, 2008). Schwartz (1994) also

identified 10 common motivational values in people that drive them to achieve their goals. These motivational values are self-direction, stimulation, hedonism, achievement, power, security, conformity, tradition, benevolence and universalism. According to Schwartz (1994), each value contains its own motivational goals. Table 1 contains the 10 values and their motivational goals.

Table 1: Schwartz's (1994) 10 values and their motivational goals

Values	Motivational goals
1 Self-direction	Creativity, curiosity, freedom, independent-minded, choosing own goals and self-respect
2 Stimulation	Excitement, ability to take up a challenge, novelty, daring and a varied life
3 Hedonism	Pleasure, self-gratification and enjoying life
4 Achievement	Belief in competence and influence and strive to achieve a social set standard
5 Power	Control or dominance over people and resources, seeks wealth, prestige and social status
6 Security	Social stability and harmony, social order, reciprocity of favour, sense of belonging, and national and family safety.
7 Conformity	Self-discipline, obedience, politeness and honesty
8 Tradition	Respect, commitment and acceptance of customs
9 Benevolence	Seeks others' welfare, helpful, friendly, responsible, loyal and honest
10 Universalism	Understanding, tolerance and protection of people's welfare.

The self-direction person seeks self-enhancement to be autonomous or independent because she/he loves freedom (Table 1). The power person strives for power and authority, search for social status and wealth to control others and hedonistic persons are interested in pleasure and self-gratification. The achievement-oriented person strives for competence, a stimulated person loves variety and embraces challenges in life and the security person cherishes social stability. The conformity person obeys authority and is self-disciplined, the traditional person respects customs and lives according to the tenets of tradition, the benevolent person strives for the welfare of others and the universal person protects the well-being of all people.

Schwartz (1994) established relationships among these values and their motivational goals, concluding that some of the motivational goals are similar while others differ. For instance, there are similarities in motivational goals of people with self-direction and hedonism as such people are likely to be self-centered, seek self-enhancement and personal gratification. On the other hand, the motivational goals of benevolence and powerful persons move in the opposite direction as a benevolent person strives for equality and looks for the welfare of others in terms of access to resources while the power man loves to dominate and control resources for self-benefit. Hence, the benevolent person believes in collective interest, but the power man is self-interested. Likewise, there is a relationship between Guth and Tagiuri's (1965) and Schwartz's (1994) values, for example, the value of Guth and Tagiuri's (1965) economic and power men are similar to the value of Schwartz's (1994) power and self-directional men because they all pursue wealth, social status, self-enhancement, seek authority and are self-interested. Also, the values of Guth and Tagiuri's

(1965) social man is akin to that of benevolent and universal men/women of the Schwartz's (1994) as they all look for the collective development of society and protect the interest and well-being of all.

The second personal disposition of this study is ambition. Ambition has different meanings to different people. Drazic, Petrovic and Vulkelic (2018) considered ambition as individuals' internal energy that drives them to pursue their goals. Barsukova, Mozgovaga and Krishchenko (2015) defined ambition as internal motivational factors that drive people to perform a social activity or push them to glory. According to Hoyland, Hobolt and Hix (2017), ambition is the incentives that drive people to aspire to occupy a higher office. Barsukova (2016) described an ambitious person as one who strives for social recognition and importance thus, such a person struggles to be the shining example among his/her colleagues. Central to these definitions and descriptions is the urge to be famous. They also connote that ambition is a one-time event or an aspiration to achieve a set target.

On the contrary, Judge and Kammeyer-Mueller (2012) considered ambition and achievement as two separate things. They considered ambition as incessant or constant efforts individuals make to improve their conditions. In their view, ambition is not a one-time event but a continuous effort one makes to improve his/her current status. Judge and Kammeyer-Mueller (2012 p. 6) defined ambition as "The persistent and generalised striving for success, attainment and accomplishment". As a consequence, ambitious persons will not be satisfied with how much they have achieved, how far they have gone and will constantly strive to attain more or improve on their current status. This trait of not being satisfied with what one has, associated with ambition makes some

people perceive ambition as a vicious trait. Others also have mixed interpretations of the word [ambition] ranging from positive to negative. For instance, extraversion and conscientiousness were used as mediating factors to evaluate different connotations of ambition in a study conducted by Jones, Sherman and Hogan (2017). Extraversion was associated with the extrinsic worth of an action and conscientiousness was associated with the intrinsic worth of an action. Judge and Kammeyer-Mueller (2012) described extraverts as reward-seeking individuals who have a high desire for tangible outcomes of an action rather than superior performance, therefore, extraverts strive for worldly success instead of competence. Conversely, a conscientious individual is prudent, dutiful and orderly and performs his/her action based on its outcomes but does so meticulously and judiciously (Judge & Kammeyer-Mueller, 2012). However, both [conscientiousness and attitudes of extraverts] seek power, wealth, personal enhancement, authority, social status/recognition and are interested in controlling others and social resources. These characteristics are similar to some of the features of money attitudes persons, hence it is appropriate to include money attitudes in this study.

The perception, importance and symbolic meaning people attached to money, define their attitude towards money (Engelberg & Sjoberg, 2006). People's money attitude influences the process they may follow to get money and their behaviour after getting it (Teneja, 2012). Money attitude affects people's performance at work, it influences individuals' political ideology and affiliation, charity giving, decision-making and concerns for the environment (Roberts & Sepulveda, 1999). Money attitude is learnt through one's interactions with agents of socialisation such as family, friends, peers,

education, social class, religion and the media (Roberts & Sepulveda, 1999). It is a habit one learns from childhood throughout his/her adult life (Purev, 2018). It is a multi-dimensional personal disposition or personality trait people develop towards money (Purev, 2018).

The pioneers in the study of money attitude were Wernimont and Fitzpatrick (1972), however, their work did not get proper recognition because it was not grounded in a strong theoretical background and psychometric analysis (Gasiorowska, 2013). The first social scientists who developed a robust psychometric scale and backed it with a strong theoretical background to measure money attitudes were Yamauchi and Templar (1982) (Gasiorowska, 2013). Yamauchi and Templar's (1982) money attitude scale has four subscales – power-prestige, retention, distrust and anxiety (Gasiorowska, 2013). They named the scale Money Attitude Scale (MAS). The Power-prestige scale measures money attitudes in terms of the symbolic meanings people attached to money such as a sign of success, a tool to gain power or influence in society, an instrument to control others and resources, a means to impress others and a mark of social status and recognition (Yamauchi & Templar, 1982). They used the Retention scale to measure money attitudes such as conservation through proper financial planning, careful budgeting, judicious use of money, spendthrift and planning of one's future financial situation. The Distrust scale measures attitudes such as hesitation, suspicion and doubt in situations involving money. The anxiety scale measures attitudes such as money is the cause of anxiety and money is the protector of anxiety.

Subsequently, other social scientists developed different scales with different factors to measure money attitudes. For example, Furnham (1984)

developed five subscales – obsession, power, retention, security, inadequacy and efforts/ability and Forman (1987) also theorized five subscales – penny-pinching miser, the power-seeking, spendthrift, bargain hunter and gambler to measure money attitudes (Engelberg & Sjoberg, 2006). Tang (1992) developed six subscales – money is good, money is evil, money represents achievement, money is a sign of respect and budgeting is important and money is power to evaluate the Chinese's money attitudes. Gasiorowska (2013) propounded seven subscales – control and planning, power, anxiety, debt aversion, occasion seeking, money as evil and cash to assess money attitudes in the Polish context. Furthermore, Klontz, Britt, Mentzer and Klontz (2012) developed eight scales – money worship, anti-rich, money is bad, money mistrust/openness, frugality/fiscal responsibility, money anxiety, money status and money is unimportant to measure money disorders. Some of the factors of these subsequent money attitudes' scales match that of Yamauchi and Templar (1982), other factors which are not MAS either seek to fit a specific context or address the limitations in MAS.

Similarly, research using Yamauchi and Templar's (1984) MAS either dropped or merged some of the subscales. For instance, Gresham and Fontenot (1989) collapsed distrust and anxiety and added "quality", a construct dropped by Yamauchi and Templar (1982); and Andersen, Camp, Kiss, Wakita and Weyeneth (1993) merged power-prestige and retention into a single factor and distrust and anxiety into a single scale (Roberts & Sepulveda, 1999). Roberts and Jones (2001) in their study of credit card and compulsive buying among students in America dropped "retention" because it did not fit into the context of their study, since students were not expected to be frugal. Also, Henchoz,

Coste and Wernli (2019) dropped retention, anxiety and distrust and used the power-prestige scale because these constructs deal with behaviour but they were only interested in the cognitive or symbolic meaning people attached to money. Since Yamauchi and Templar's (1982) MAS is the most used scale empirically from the literature review and the other scales are outgrowths of it, this study will make use of MAS to assess money attitudes of small-scale gold miners in the Denkyira area in Ghana. Also, Yamauchi and Templar's (1982) scale is considered as the most robust and reliable amongst other money attitude scales (de Kuan, 2017). However, like other researchers, the power-prestige and distrust factors will be considered because the other factors (retention and anxiety) do not fit in the context of this study.

The power-prestige and distrust scales oppose each other. According to MAS, people whose money attitude is power-prestige are likely to perceive having excessive money as a mark of success and high social status, a meter to separate an individual from others, a means to be autonomous and enjoy fame/influence in society. The power-prestige money attitude persons are likely to be materialistic, have a penchant for spending on expensive and luxury items to impress others (de Kuan, 2017). Also, they have compulsive consumption habits (Roberts & Jones, 2001). Since the accumulation of wealth makes such people feel socially powerful, they are likely to be greedy and self-centred (Durvasula & Lysonski, 2010). These suggest that such people may feel helpless, hopeless and unimportant if they do not have money and may do anything for money to avoid experiencing psychological humiliation.

In relation to other money attitude scales, people scoring high on Furnham's (1984) obsession and power factors share the same features as those scoring high on the MAS prestige-power factor. Also, factors such as money is a sign of respect, money represents achievement and money is power, a money attitude scale theorised by Tang (1992), shares similar characteristics with that of the MAS power-prestige scale. The power factor of the Gasiorowska's (2013) scale and money worshipping, and money status factors of Klontz et al (2012) scale share the same characteristics as MAS power-prestige factor. The money worshipper engages in unreasonably risk-taking acts for money and the money-status person likes to acquire money more than any other person around him/her (Klontz, et al, 2012).

On the other hand, distrust people consider money as the root of all evil and also have a negative attitude towards actions which may make them rich or wealthy (Yamauchi & Templar, 1982). They are suspicious of matters involving money and view money as something that could bring them negative consequences (Yamauchi & Templar, 1982). The distrust person does not consider money as a mark of social status and is not a materialistic person who would want to impress others (Durvasula & Lysonski, 2010). The attitude of a distrust person towards money is that of need and not want (Yee, 2009). The characteristics of the money distrust person are akin to that of a money avoidance person who perceives money as a force that could stir up his/her fear (Klonz, Britt, Mentzer & Klonz, 2011).

There are some relationships among Schwartz's (1994) motivational values, the mediating factors of ambition used by Jones et al (2016) and Yamauchi and Templar's (1982) MAS. For instance, some of the attributes of

the self-direction, power and achievement values of Schwartz (1994) are equivalent to that of Yamauchi and Templar's (1982) power-prestige factor and the mediating factors of ambition. The individuals who possess any of these dispositions or traits are said to be extravagant, interested in self-enhancement, seek social recognition, power and worldly success, like to impress others and want to have control over others and resources. However, achievement motivational valued people and conscientious ambitious persons are said to be competent, prudent and dutiful and as such they pursue worldly success, power and social status meticulously and responsibly (Jones et al, 2017; Judge & Kammeyer-Mueller, 2012). Simply put, the achievement motivational valued people and conscientious ambitious persons strive for fame, status, money and power with due diligence, work harder and try to meet the set social standard in the performance of the action that would help them achieve their goals. Therefore, the power-prestige factor of MAS, the power and self-direction motivational values of Schwartz (1994) and extraversion as a mediating factor of ambition by Jones et al (2017) and Judge and Kammeyer-Mueller (2012) will be merged into a single factor as extraversion in this study. Also, achievement motivational value and conscientiousness will be merged into a single factor as conscientiousness.

Likewise, the characteristics of universal motivational valued persons are protection of the well-being or welfare of other people, society and nature. Such people respect equal rights, social justice and place societal needs and environment protection above self-interest (Schwartz, 1994). Since their values are related with that of traditional motivational valued persons, they are likely to be moderate in their endeavor to make money. The values of the hedonistic

person and universal person diverge, as a hedonist is self-interested and always wants to maximize pleasure and sensuous gratification and does so without thinking about effects of it on others (Schwartz, 1994). The difference between the two motivational values and distrust factor of MAS is that in situations which involve money the universal motivated value person will do it in moderation in consonance with respect for the right of others and nature. The hedonist will over perform the action if he/she perceives the action as a means to maximize personal pleasure but the distrust person will not get involved because such person is suspicious of money. Therefore, characteristics of extraversion, conscientiousness, distrust, universal motivational valued and hedonistic motivational valued persons will be adopted and merged with attitude, a construct in theory of planned behavior to study small-scale gold miners in the Denkyira area.

For instance, small-scale gold mining would be attracted to power motivational valued persons, power-prestige money attitude persons and ambitious extraverts due to its high-immediate financial reward as these people are interested in living expensive and luxury lifestyles, want to own properties to impress others, seek worldly success and want to acquire more wealth to mark their high social status. They would also engage in SSGM to make money to wield power and influence in society. They would do so without following the laws governing the ways SSGM should be done because such people are said to have strong desire for the result of an action that would help them acquire wealth rather than following the standard procedures guiding the performance of that action (Jones et al, 2017; Judge and Kammeyer-Mueller, 2012; Schwartz, 1994). They would also employ methods that would increase output to enable them

make excessive money as a sign of worldly success in spite of the effect of methods on the environment.

On the other hand, achievement-motivated motivational valued persons and conscientious ambitious persons would also engage in small-scale gold mining to acquire excessive wealth but would observe all the environmental protocols and mine sustainably. This is because such people are said to be meticulous in their endeavours of pursuing worldly success (Jones et al, 2017; Judge and Kammeyer-Mueller, 2012; Schwarts, 1994). They also follow the laid down procedures governing the performance of an action and do it responsibly (Jones et al, 2017; Judge and Kammeyer-Mueller, 2012; Schwarts, 1994).

Furthermore, the hedonic motivational value person would engage in small-scale gold mining if the reward would enable him/her to pursue pleasure. He/she may also do so without following the environmental laws and as such would destroy the environment. The universal motivational valued person would also engage in small-scale gold mining based on need and not want. The universal motivational valued person would engage in small-scale gold mining only if it is for subsistence or survival and not for affluence. She/he would do it sustainably as such a person is said to be mindful of the well-being of others, cares for nature and depletion of societal resources. Also, such a person will use simple hand tools for the production process and would not mechanise small-scale gold mining as people who are mining for affluence would do to get more money. In all, the distrust money attitude persons would not engage in small-scale gold mining since they are suspicious of actions that involve money and money also stirs up their fears.

Social pressures that can drive people into small-scale gold mining

Social pressure is the influence peers, friends, groups, family and neighbours exert on one another that affects their actions (Novakova & Vavrova, 2015). It can be described as the power groups wield on the actions of a member. Social pressure influences individuals to change their goals, values, thoughts and actions to conform to the group individuals interact with (Gunduc & Eryigit, 2017). It may come in a form of advice or recommendation from a friend or family member to encourage or discourage an individual to partake or not to partake in an action. People succumb to social pressure because they want to be accepted, appreciated or fit in a group (Esiri, 2016). Similarly, people give in to social pressure due to perceived rewards they hope to receive after participating in an action or perceived punishment they are trying to avoid for non-conformity (Esiri, 2016). These suggest that people yield to social pressure because of social approval, social recognition, social disapproval and rewards attached to the performance of an action.

The two main types of social pressure are passive and active social pressures. In passive social pressure, people change their actions and take up that of others because such action pays off or brings social recognition or they have heard positive information about the performance of the action (Calvo'-Armengol & Jackson, 2008). Thus, in passive social pressure people engage in an action not through coercion or persuasions by others but through their own volition due to the outcome of the performance of such action. On the other hand, under active social pressure, people deliberately persuade, encourage, bully or mock others to carry out an action or pay the cost of performing the action to induce others to perform such action (Calvo'-Armengol & Jackson,

2008). Two types of active social pressure - positive and negative active social pressures exist. In positive active social pressure, an individual takes up or subsidises the cost of an action for another individual so that such individual could perform the action with no difficulties (Calvo'-Armengol & Jackson, 2008). Therefore, positive active social pressure is when the cost of the performance of an action is paid or subsidised by someone other than the one performing the action. For example, friend A can offer to pay for a sight-seeing trip for friend B so that friend B participates in the trip.

The negative active social pressure is when an individual bullies, threatens, mocks or ridicules another individual to influence his/her decision to participate in an action (Calvo'-Armengol & Jackson, 2008). Even though taking such action may be beneficial to the bullied or ridiculed individual, it is still considered as negative active social pressure because the individual was coerced to execute the action. Whether negative or positive, active social pressures can enhance or destroy the life of the person intended. For example, friends can mock or ridicule a colleague based on his/her poor academic performance which may influence the mocked friend to learn harder to improve on his/her academic performance. Here the ridiculing is negative, but if the academic performance is improved it could be termed as negative-positive active social pressure. On the other hand, a friend can buy alcohol for another friend which may be deemed as positive but if the alcohol destroys the health of the person intended it is positive-negative active social pressure.

Empirically, social pressure has been used to study the influence of friends, peers, family, neighbours and groups on the actions of individuals. For instance, Vigna, List and Malmendier (2009) used it to study charity donations.

Burrsztyn, Egorov and Jensen (2018) used it to test two school-based cultures – one that stigmatises efforts and one that rewards efforts. Goldberg (2017) used it to study spending culture of agricultural clubs in rural Malawi and found positive correlation between social pressure and the spending habit of the farmers.

In relation to the structure and agency theory, individual's action could be structured by the pressures from friends, peers, family, neighbours, groups of affiliation and the community one lives. Equally, individuals could influence the action of their neighbours, friends and peers through their actions. Therefore, there is a mutual relationship between the structure (social pressure) and the human agency (individual's actions). Likewise, social pressure shares some similarities with Ajzen's (1991) theory of planned behaviour, for instance, researchers studying social pressure are interested in how people change their action based on the influence of others. A situation Ajzen (1999) termed *subjective social norm*. The theory of planned behaviour and social pressure also talk about performance of an action by individuals due to social recognition.

In connection with this study, friends, family, peers, groups and community members can pressure a member of their kind to go into small-scale gold mining because of its economic benefit. They can also provide the necessary support to make entry into small-scale gold mining easy. Similarly, positive information on the reward of small-scale gold mining one has heard could entice him/her to engage in small-scale gold mining. Also, the flamboyant lifestyles of the miners can influence other friends to engage in small-scale gold mining. The affluence lifestyle of members of a group affiliated could pressure

an individual to look for ways of making money to live the same lifestyle. In this case, if small-scale gold mining is considered as the shortest way of making money, it will pull the individual to engage in it. Also, peers can boast of what they have gained after participating in small-scale gold mining to pressure others to join them in engaging in small-scale gold mining. They [peers] can also ridicule a member who refuses to join them in participating in small-scale gold mining, by displaying their wealth and comparing it [the wealth] with that of what the peer who refused to join them has. These show that social pressure could be adopted to study people's decision to participate in small-scale gold mining and its ramifications on the environment.

The pull factors of small-scale gold mining

Small-scale gold mining is said to be driven by poverty since the majority of people who work in the sector do it for subsistence reasons (Osei-Kojo & Asamoah, 2018). This principal narrative characterising small-scale gold mining may be true to some extent; however, it fails to account for other factors that motivate people who are not poor yet engage in SSGM. For instance, in Philippines, the sector presents the opportunity for some considerably wealthy individuals to invest and reap more profit from their investment for extra capital accumulation (Verbrugge, 2014). This investment has transformed the sector from manual to mechanization and the production level does not fit the definition of small-scale gold mining (Verbrugges, 2014). This is an indication of the fact that small-scale gold mining also attracts the rich and gives them the opportunity to expand their capital.

In some parts of Latin America such as Peru and Columbia, small-scale gold mining attracts capital from so many sources including foreign funds

(Verite, 2016). Consequently, classifying the sector as subsistence only is problematic in view of the fact that foreign investors do not invest for subsistence motives. Also, a foreigner who moves his/her capital to invest in another country may be looking for a huge profit and as such that person cannot be classified as a poor searching for survival. Part of the proceeds from small-scale gold mining in some parts of Latin America serves as funding for fire arms use by rebels to fuel conflicts and destabilize peace in the region (Verite, 2016). The quest for wielding excessive power, social influence and acquiring more wealth and greed may be the factors fuelling these resource conflicts, paradoxically, such situations are mostly described as a resource curse hiding the treasure hunt motive of the financiers behind these unfortunate circumstances.

The treasure hunt motive of the sponsors in this sector is not limited to Asia and Latin America alone but also to Sub-Saharan Africa. For example, in Zimbabwe, ambitious individuals looking for an avenue to invest for higher returns turn to small-scale gold mining (Chipangura, 2019). These individuals invest in equipment such as ore grinding machines and also provide food for miners to dig in the mines for gold, thus their financial assistance makes small-scale gold mining flourish in Zimbabwe (Chipangura, 2019). In the case of Ghana, small-scale gold mining is one of the micro businesses that attracts investment from both home and abroad as the sector has become a lucrative business opportunity for Asians and local business entrepreneurs to make a quick profit. The Asians, especially the Chinese, brought in suction equipment with an estimated cost of 153,000 dollars each (Botchwey et al, 2018).

Also, recently, equipment used by miners in this venture requires a considerable amount of capital to purchase or hire for the purposes of mining (Botchwey et al, 2018). Some of these miners are also able to purchase relatively expensive large tracts of farm lands at costs ranging between GHC6,000 - GHC 8,000 per acre depending on the location and the type of crops on the land (Owusu-Boateng, Codjoe & Ofori, 2014). Apart from these investments in the machines and lands, some small-scale gold miners are required to pay huge sum of monies to local chiefs and also provide social amenities such as borehole water and classroom blocks to the communities they are operating in to secure a social license (Arkorful, Acheamfour, Aryeetey & Owusu, 2018). The question one may wish to ask is how can poverty-stricken individuals make these financial commitments before engaging in small-scale gold mining? As it may be the case, it would take an individual with enormous financial muscles to make such investments and payments, thus categorizing all small-scale gold miners as poor does not support the facts on the ground.

Similarly, the argument that small-scale gold mining attracts only less educated, unskilled, people who lack choice and those who cannot find jobs in the formal job markets is not entirely accurate due to the fact that well-educated and powerful personalities such as politicians and chiefs are engaging in SSGM in Ghana (Danyo & Osei-Bonsu, 2016). Also, some small-scale gold mining firms are formally organised and employ clerks, accountants, machine operators, drivers and professional drillers just as any other formal sector job (Hilson & Garfoth, 2013). The salary of labourers working in this sector is even better than some government workers as some of them collect tenfolds of that of public sector workers (Arah, 2015). This may be the reason some of these

workers refuse to work in the formal sector if the opportunity comes (Arah, 2015).

For instance, in Central Kalimantan, Indonesia people prefer to engage in small-scale gold mining than to be employed by oil palm, rattan, banana and rubber plantations operating in the area because small-scale gold mining pays more wages than the plantations (Barney, 2018). Each member of a group of seven miners may receive 21 dollars a day as compared to two dollars per day paid by the plantation owners to their workers (Barney, 2018). Likewise, in Laos, people prefer to engage in small-scale gold mining for 21 dollars a day with freedom instead of working under pressure for four dollars a day with HAGL Rubber Plantation (Barney, 2018). In Columbia, small-scale gold mining pays between 5-20 dollars per day and that makes it more attractive than other manual jobs (Sarmiento et al, 2013). About two decades ago, some small-scale gold miners in Ghana were making an estimated profit of seven dollars a day (Hilson, 2001). Therefore, some people enter into small-scale gold mining based on the rewards it offers.

For illustration, less than five years ago, Chinese small-scale gold miners were making an estimated profit of US\$15,000 per week and Ghanaians whose names have been used as concessioners for these Chinese miners were making US\$4000 to 6,500 per week (Crawford & Boakye, 2016). These huge profit margins of the Chinese and their Ghanaian counterparts created billionaires in China and millionaires in Ghana within a short period through proceeds from small-scale gold mining (Crawford & Boakye, 2016). Also, labourers working in small-scale gold mining earn between 2 – 22 dollars per day (Boadi, Nsor, Antobre & Acquah, 2016). Part of this money was used to

buy expensive gifts such as Ferrari cars for friends in China and in Ghana housing units were built, expensive cars bought and luxury lifestyles led by some of the small-scale gold miners (Arthur et al, 2016; Crawford et al, 2016).

The huge sum of money that people make from small-scale gold mining and its positive impact on the local economy make prostitution, drug addiction, alcoholism and other hedonistic lifestyle flourish in the mining communities (Abissath, 2015). Chipangura (2019) also reported cases in Zimbabwe where small –scale gold miners spend excessively on gambling and entertainment to make themselves happy. This is an indication that some people engage in small-scale gold mining to make “fast money” for self-gratification and as such the venture can attract hedonists. The massive financial reward associated with small-scale gold mining lures some urban dwellers to migrate to rural areas in search of gold and it also makes some rural folks favour small-scale gold mining in respect to other alternative livelihood activities (Arthur et al, 2016; Baga, Angko & Tanyeh, 2016).

For example, Erdiaw-Kwasie, Dinye and Mabunyawah (2014) discovered a case in Prestea and its environ where some youth abandoned formal education and engage in small-scale gold mining because it takes so much time to complete school and the jobs one gets after years of schooling does not pay as much as SSGM does. Also, the luxury items these youth could afford from money they are making from small-scale gold mining are things their elders and parents cannot afford (Erdiaw-Kwasie et al, 2014). Likewise, some cocoa farmers in the Atiwa District, Eastern Region preferred to engage in small-scale gold mining than farming, whereas others have sold their farmlands to small-scale gold miners for quick cash because it is difficult to

maintain the farms and SSGM pays better than farming (Owusu-Boateng et al, 2014).

On the contrary, not all small-scale gold miners benefit from their labour investment, some labourers are poorly paid, especially women and children (Crawford & Boakye, 2016). Also, women and children mostly have access to abandoned low-grade ore which men have already removed quality grade ores (Crawford & Boakye, 2016). Notwithstanding these reports, these people may be having a high hope of making money from their labour investment because small-scale gold mining is the most lucrative business in rural areas in developing countries. As Smith et al., (2017 p. 52) put it “Small-scale gold mining is lucrative and cannot be replaced with low paid jobs”.

These findings and explanations suggest that small-scale gold mining offers quick financial reward and even those doing it for survival are looking for money. The findings also demonstrate that small-scale gold miners are not a homogenous category as different individuals go into it for different reasons. Some people are in it for wealth accumulation while others engage in it for immediate financial relief. Thus, the one-sided perspective that classifies all small-scale gold miners as poor, underprivileged and less educated does not hold in all situations. The sector continues to attract socially and politically connected individuals who are educated and wealthy (McQuilken & Hilson, 2016; Verbrugge, 2014). Hence describing small-scale gold miners as poor risks the need to find the motive of both the sponsors and the gangs doing the manual work of this economic activity. This is because small-scale gold mining could attract ambitious and hedonic persons apart from the poor due to the high financial reward it offers.

Micro social pressures and small-scale gold mining

The financial reward small-scale gold mining offers has made some people who engage in it rich and influential in their community (Ouma, Ting & Pasha, 2017). Consequently, these people also invite their friends, family members and neighbours to join and make money to relieve their financial pressure. For instance, some people become small-scale gold miners upon recommendation by friends who are miners (Kervankiran et al, 2016). Others also move from livelihoods they are engaging in which are not yielding the desired results to small-scale gold mining due to advice from friends and family members who are financially sound as a result of their participation in SSGM (McQuilken & Hilson, 2016). A study conducted by Purwanto (2018) revealed the intricate of social networks that exist in the recruitment of small-scale gold mining in Indonesia. The findings of his study showed that a sponsor depends on miners to find additional small-scale gold miner when he/she (sponsor) needs extra hands and miners also prefer to recruit their friends and relatives to work with in the mines. Also, in Philippines, workers in the sector are largely friends and relatives (Verbrugge, 2014). The finding of a research conducted by Mkodzongi and Spiegel (2018) in Zimbabwe also showed that small-scale gold miners either share kinship ties or are colleagues. Teschner (2012) also discovered that miners working in Prestea and its environs were mainly family and friends. Likewise, the Chinese small-scale gold miners in Ghana rely on social network to recruit their kind (Antwi-Boateng & Akudugu, 2020). Some friends and relatives do not only share positive information of the immediate financial reward SSGM offers to friends or relatives but also provide the

necessary financial and material support to help new comers [miners] survive in the sector (Onumah, Leeuwis, Boamah & Salifu, 2013).

According to Adu, Amponsah and Osei (2016) there is a linear relationship between peer pressure and one's participation in small-scale gold mining. Ouma et al, (2017) also perceive peer pressure as a factor responsible for some people's engagement in small-scale gold mining due to the luxury lifestyle of miners as a result of huge sum of money they [miners] are making in the sector. In Tanzania students drop out of school and join their peers in SSGM due to spending culture of their peers who are small-scale gold miners (Ouma et al, 2017). Similarly, there is a positive association between household size and one's participation in small-scale gold mining (Keita, Ogendi & Owour, 2018). For instance, a household size of six to ten living in mining communities is more likely to participate in small-scale gold mining than a household size of less than six persons (Keita et al, 2018). This shows that the financial needs of a household can pressure a family member to engage in small-scale gold mining. Besides, hearsay of small-scale gold mining ability to reward people who are in it monetarily pushes people to participate in it. A study conducted by Chipangura (2019) discovered that people join small-scale gold mining based on the rumour that it pays better and if they joined they received free informal apprenticeships from the old miners.

These conclusions show that people engage in small-scale gold mining through passive and active social pressures. For instance, people join SSGM through recommendations of the financial reward it offers from friends, relatives and neighbours and or through the support they receive from friends who are miners to their participation in the mining. Others also go into SSGM

through hearsays of the goodies associated with the sector. This micro enlistment could lead to monstrous environmental impacts of SSGM but the existing literature is silent about it.

Environmental impact of small-scale gold mining

Small-scale gold mining is a venture if properly harnessed could bring significant development to many developing countries. However, its negative environmental impacts have become a source of concern to many people who care about the environment. It is causing deforestation, land degradation, water pollution and threatening wildlife safety (Gandiwa & Gandiwa, 2012). For instance, it is destroying vegetation cover in some parts of Latin America such as Peru (Langeland, 2015) and Guyana (Mengistead, 2015). In Asia, it is destroying forests in Laos, Indonesia and India (Barney, 2018). In Sub-Saharan Africa, it is depleting forests in Nigeria (Ako et al 2014) and Cameroon (Funoh, 2014). The destruction of forests, affects hunters, herbalists and firewood collectors' use rights of forest resources (Baga et al, 2016). Deforestation exposes soils to gully and sheet erosion which not only deface the beauty of the landscape but also wash away the soil nutrients (Rahm, et al 2015). A situation which could affect the fertility of the land leading to low crop yield and extinction of certain sensitive plants

The removal of overburden (top-soil) through small-scale gold mining changes the soil composition and texture (Aidoo, 2018). It also takes away the soil nutrients even if the land is reclaimed (Aidoo, 2018). The exposure of ores to air facilitates oxidation to increase the soil pH value making the soil acidic (Kessey & Arko, 2013). This could affect plant growth and the life of micro-organisms in the soil which support the land ecosystem. The oil used to run the

machines and equipment pollutes the soil if it accidentally pours on the soil (Ako, et al 2014).

The use of chemicals such as mercury and cyanide in gold processing pollutes underground water (Ako, et al 2014). Rain-water also washes away the chemicals in the untreated tailing pools to contaminate the nearby streams and rivers (Ako, et al 2014; Mujere & Isidro, 2016). Also, some small-scale gold miners directly discharge tailings contaminated with mercury and other harmful chemicals into water bodies (Mujere & Isidro, 2016). In water bodies, elemental mercury can be converted into methyl-mercury through a reaction with the microbial in the water, carnivorous fish families eat these microbes and that makes methyl-mercury gets into humans through the food chain (Chandiwana, 2016; Bonzongo, Donkor, Nartey & Lacerda, 2004). Methyl-mercury kills Ephemeroptera, Plecoptera and Trichoptera, macro-invertebrates which improve water quality (Chula, Rutebuka, & Yanez, 2013). In soil, elemental mercury slows down plant metabolism and kills soil organisms which support plant growth, a situation which affects crop yield (Chandiwana, 2016).

In terms of anthropogenic mercury emission, small-scale gold mining is the major mercury polluter (World Health Organization (WHO), 2016). Its annual emission is 727 tonnes (United Nations Environment Programme, 2013). The inhalation of elemental mercury in polluted air causes lung and respiratory diseases (United Nations Environment Programme, 2013). Miners may inhale elemental mercury if the gold-mercury amalgam is burnt in the open air to evaporate the residual mercury without the use of a retort (Dorleku et al, 2012). This can result in loss of memory, poor coordination of the thought processes and malfunction of the nervous system (Dorleku et al, 2012). If mercury enters

human body, it can cause malfunction of the kidney and the liver (Ako et al, 2013). It causes cerebral palsy and brain damage in newborns if a pregnant woman is contaminated, a situation which may affect future human resource development (Romero & Saavedra, 2016).

Another activity of the miners that affects the environment is the discharge of sediments into water bodies. This changes water colour, pH value and increases turbidity (Makonese, 2016). It may also silt riverbed to cause flooding. Diversion of water courses by miners affects the water supply for farming and domestic use (Makonese, 2016).

Also, small-scale gold mining affects wildlife as it displaces their habitat and makes them roam around different territories (Chupezi, Ingram & Schure, 2009). The pits trap animals including protected species (Batbayar & Punev-Ochir, 2015) and rangers (Gandiwa & Gandiwa, 2012). The pits also serve as ponds to breed anurans [frogs] (Alvarez-Berrio et al, 2016). However, anurans whose skin easily absorbs chemicals in tailing pools and those which cannot survive without trees die (Adu-Tutu, 2017). This affects the food chain of frog eaters such as snakes, birds and fish and it may increase malaria since anurans eat mosquitos (Adu-Tutu, 2017).

The noise from the machines and equipment used in the mining dislocates birds, affects birds' communications and distorts prey and predator relationships (Alvarez-Berrio et al, 2016). This may affect the natural pollination and dispersal of plants because birds pollinate and disperse plants (Alvarez-Berrio et al, 2016). Also, the explosions of the dynamite used to blast the ores cause structural defects to buildings if the mines are closer to human settlement (Antwi-Boateng & Akudugu, 2020). Due to these ecological

problems, there is a growing public concern for the sector to be properly regulated to reduce these environmental problems.

Formalization of small-scale gold mining

The formalization of small-scale gold mining in Sub-Saharan Africa started in the late 1980s (Dzimunya, Mapambe, Dembetembe & Dzwiti, 2018). It was one of the policies of the World Bank and IMF to streamline and regulate the sector in developing countries (Dzimunya et al, 2018). It led to the enactment of the legal framework under which small-scale gold mining should be operated (Maconachie & Hilson, 2011). Some of the areas the legal framework touches are requirements for registration, licensing, mining methods, equipment to be used, labour force, tenure of the license, where to and where not to mine, size of the concession, among others (Buss et al, 2019). The advocates and framers of the small-scale gold mining laws [host governments and Bretton Woods Institutions] visualized a win-win situation for the miners on one side and the host governments and large-scale miners on the other side (Echavarria, 2014).

On the side of the host governments, World Bank and large-scale mines, the projection was that formalising the sector would bring many benefits, some of which are generation of revenue through taxation, protection of the environment (Havel, 2017; Echavarria, 2014), and prevention of encroachment on large-scale mines (Maconachie & Hilson, 2011). On the side of the miners, it was envisaged that, if they were formalised, their status would be legitimised to grant them access to credit facilities from the State and private financial institutions (Verbrugge & Besmanos, 2016), as well as enjoy technical services such as accurate geological information and periodic occupational training

(Salo et al, 2016). However, the reality is that these benefits have alluded all the parties (host government, IMF and World Bank and large and small-scale gold miners) as miners continue to mine with gross disregard for environmental laws (Dzimunya et al, 2018), and the revenue mobilization has become a mirage (Buss et al, 2019).

The formalization process failed, due to a plethora of problems. For instance, the cost involved was high, official and unofficial charges were many and the process passed through a long chain of government institutions (United Nations Economic Commission for Africa, 2018). The transportation charges from the remote areas where miners operate and district/provisional and regional centres where institutions responsible for the formalization processes are located are also high (Geenen, 2012). What is worsening the matter is the number of times miners have to travel to these centres before they get their documents certified due to cumbersome administrative processes (Geenen, 2012).

Also, the heterogeneity of the sector requires that the legalization process should be participatory, however, the process is also a top-down approach and key stakeholders (miners) are most often excluded in the decision-making process (Verbrugge & Besmanos, 2016). The consequences of this are that the poor and the rich miners have to pay the same royalty and licensing fees and follow the same administrative and environmental protocols or laws (Kinyondo & Huggins, 2019). A situation which may discourage the poor seasonal miner from formalising his/her livelihood. Apart from these problems, miners are required to prepare an Environmental Impact Assessment (EIA)

which is beyond their competence and financial muscle and they have to hire a consultant to perform it for a huge fee (Spiegel, 2015).

Despite this challenge, miners who braced the storm and managed to formalize their business joined their unlicensed colleagues to break the law due to corruption and lack of enforcement of the law. The law enforcement agencies and institutions responsible for monitoring the activities of small-scale gold miners gloss over the negative environmental impacts of the miners and collect money or take a portion of the fortune mined (Antwi-Boateng & Akudugu, 2020). Some of these institutions do not have adequate human and material resources to effectively monitor the miners, thus miners have a field day and mine with gross disregard for environmental protocols (Antwi-Boateng & Akudugu, 2020; Osei-Kojo & Asamoah, 2018). Also rent-seeking and political patronage undermine the efforts of some government officials who would want to enforce the law (Danyo & Osei-Bonsu, 2016). In effect, small-scale gold miners flout mining and ecological laws and enforcement agencies do not apply the law. These narratives place much emphasis on the deficiencies of the structure and failure of state institutions to employ appropriate measures to regulate the sector leaving the reflexivity of human agency that could plan to outwit the efforts of the institutions and breach the environmental protocols.

State institutions that regulate small-scale gold mining and portions of the environmental protocols that guard the activities of miners

The negative environmental impacts of small-scale gold mining prompted the establishment and or delegation of powers to certain state institutions to regulate and enforce the activities of miners which are inimical to the environment. For instance, PNDCL 154 established the Minerals Commission in 1986 with the mandate of developing and coordinating mineral

policies and monitoring their implementations. It was also established to ensure efficient and effective regulations and management of mineral resources. Article 269 (1) in the 1992 Constitution and Act 450 (1993) gave the Commission legal backing to monitor the operations of all mining companies in the country. Section 90 of Act 703 (2006) empowers the Commission to register, supervise and monitor the operations and activities of small-scale gold miners and prospective miners. Some of the activities of SSGM the Commission is charged to monitor relate to efficient and effective methods of mining that do not leave negative environmental impacts and injure human health and safety.

Section 93(a) also enforces small-scale gold miners to adopt effective and efficient mining practices to produce gold and protect the environment. The Act (703) was amended in 2015 and 2019 to force small-scale gold miners to protect the environment. For instance, section 99(2a) of the Mineral and Mining (Amendment) Act in 2019 (Act 995) outlaws mining activity that is not registered. Section 99(2b p.3) stipulates that a person who “ Acts or instigates, commands, counsels, procures solicits, or in any manner purposely aids, facilitates, encourages or promotes a small-scale gold mining which has not been sanctioned by mining laws commits an offence and is liable on summary conviction to a fine of not less than ten thousand penalty units and not more than fifteen thousand penalty units and a term of imprisonment of not less than fifteen years and not more than twenty-five years”.

Section 99(6) criminalizes fabrication, manufacturing and the use of floating platforms for dredging minerals along the banks and in natural water bodies. Section 99(7) forbids the provision of excavators to unregistered small-scale gold miners. Section 99(8 & 9) also stipulates that equipment seized from

a person mining in contravention of the mining laws of Ghana should be confiscated by the State. Unit 58(6) of the Mineral and Mining (Health, Safety and Technical Regulations, 2012) (L.I. 2182) states that a holder of a mining permit shall institute steps to make a dam or dump operated or abandoned by him/her a danger free to humans and animals. Unit 81(a) says a manager of a mining exploration programme, shall rehabilitate any land used in the exploration project to its original state.

Also, section 277(a p. 144) of L.I. 2182 stipulates that a holder of a mining lease shall ensure that “pits in the mines do not have the potential to pollute any water source” and section 278 says all shafts and pits of a discontinued mine shall be secured to prevent unauthorized entry. Unit 473 of L.I. 2182 states that mercury shall be used with retort only and by a person who has written permission from the Chief Inspector of Mines. The Act (Act 450) prohibits the destruction of vegetation, flora and fauna, wildlife habitat, biodiversity and forest eco-system to safeguard life support systems. For example, section 18 obliges small-scale gold miners to seek permits from the Forestry Commission before undertaking any mining activity in a forest.

The Environmental Protection Agency (EPA) was also set up in 1994 to control and prevent the discharge of waste materials into the environment; issue environmental permits and pollution abatement notices for controlling the volume, types, constituents and effects of waste discharges. It was mandated to control emissions or any other sources of pollutants and substances which are hazardous or potentially dangerous to the quality of the environment. The Agency is empowered to issue a notice to any person or body whose activities

harm the environment and direct the person responsible to take steps to address the environmental concerns or stop the operations of the project immediately.

The main regulation that guides the work of the Agency is the Environmental Assessment Regulations 1999. Section 5(ei) states that an applicant shall prepare a statement of his/her undertaking to the EPA indicating the environmental health and safety impacts of the undertaking; commitment to avoid any negative environmental impacts of the undertaking and commitment to address any unavoidable environmental and health impacts. Unit 14(i.v p. 6) says “An environmental impact statement for mining and other extractive industries shall include environmental reclamation plan”. Section 24(4 p.9) stipulates that “The environmental management plan shall set out steps that are intended to be taken to manage any significant environmental impact that may result from the operation of the undertaking”.

Act 522 of 1996 empowers the Water Resource Commission of Ghana to take the necessary steps to prevent or stop water use pattern which poses a serious threat to the environment or public health. The Act also empowers the Commission to sanction users who fail to comply with enforcement notices. The Lands Commission is also charged with the responsibility of promoting judicious use of the land following sustainable management principles and the maintenance of a sound ecosystem.

Theoretical framework

This work would be situated in the frameworks of Ajzen’s (1991) theory of planned behaviour and structure and human agency theory because it looks at micro factors which drive people into small-scale gold mining. However, it would talk about political ecology theory before the theory of planned behaviour

and structure and human agency theory would be discussed. This is because political ecology theory is mainly used to explain drivers of small-scale gold mining in terms of macro-structural forces of a global scale and its environmental impacts in developing countries endowed with gold resources.

Political Ecology Theory

The word ecology was first used by Henry David Thoreau, an American naturalist in 1858 (Little, 2007). In 1866, it appeared in the work of German biologist, Ernst Haeckel (Little, 2007). Ecology became a sub-discipline in academia in the 1930s with branches such as natural ecology, human ecology and cultural ecology (Little, 2007). However, it was an American anthropologist, Eric Wolf who coined the phrase political ecology in 1972 to explain cultural adaptation to the environment (Walker, 2005). In the late 1980s, Blaikie and Brookfield propounded political ecological theory to explain land degradation as a result of power asymmetry in the use of resources.

Political ecology theory explains resource use patterns in a framework of power asymmetry and social inequalities that privilege the use right of resources by powerful people (Walker, 2005). It departs from neo-Malthusians' explanation of population explosion as responsible for resource depletion and environmental degradation. The theory situates problems associated with resource use forms in global economic and political considerations. Political ecologists position the use rights of resources in the perspective of Karl Marx's (1818-1883) explanations of the capitalist mode of production that commodifies resources. The commodification of a resource, commercialises its use patterns prioritising its use for economic gain, a circumstance which limits the use right of the poor (Vaccaro, Beltran & Paguet, 2013). The consequence of this is that

the use right of the poor is neglected pushing them [the poor] to look for alternative livelihood in protected areas (Mathevet, Peluso, Couespel & Robbins, 2015).

Similarly, demand for a resource by the core metropolitan centres makes the resource economically viable in the south driving people to engage in its supply for money (Karlsson, 2015). An increase in the supply of a resource may increase its environmental problems enforcing the argument of the political ecology theorists that forces shaping the environment of developing countries are traceable to the resource consumption patterns of the industrialized countries. However, the over-concentration of global economic factors as structures determining resource use patterns neglect the influence of micro or local forces that also affect resource use patterns (Khan, 2017). It may be on this background that Anderson (2011) criticized the political ecology theory for submerging the behaviour of individuals under abstract entities such as colonialism, neo-colonialism and globalization as if these abstract entities do make things happen by themselves.

This means political ecology theory hides reckless human environmental behaviours under abstract entities and leaves the roles of human agency and micro forces in the use of resources that may have consequences on the environment. For this reason, Ajzen's (1991) theory of planned behaviour which analyses the influence of people's intentions, attitudes and subjective social norms in participation in an action would be adopted to study factors that pull people into small-scale gold mining. This is because people's intentions and attitudes can increase the scale of production which may lead to disastrous environmental consequences. Also, structure and human agency theory would

be used to complement the theory of planned behaviour, because society can pressure people to adopt strategies in resource extraction that may have negative repercussions on the environment.

The Theory of Planned Behaviour

The Theory of Planned Behaviour is an extension of the Theory of Reasoned Action and has the assumptions of the Rational Choice Theory. It was propounded by Icek Ajzen in 1991 as a critique of the theory of reasoned action which he (Ajzen) developed with Martin Fishbein in 1975. Fishbein and Ajzen (1975) came up with the theory of reasoned action to ascertain the argument of whether the relationship between attitude and behaviour is direct or otherwise. They aimed to develop a theory to test the authenticity of the notion that attitude and behaviour have linear direction. For example, Allport (1935) critiqued the assumption that the relationship between attitude and behaviour is direct, positing that behaviour represents people's complex systems of beliefs. Doob (1947) also theorized that attitude cannot predict behaviour but could give information about behaviour. Fishbein and Ajzen (1975) were determined to prove the authenticity of these assumptions and that led them to develop the theory of reasoned action which posited that intention rather than attitude determines human behaviour. Fishbein and Ajzen (1975) made *intention* the central thesis of their theory, although, the theory has other constructs such as *attitude*, *volitional control* and *subjective social norm*.

The first construct of the theory is attitude. Attitude is an evaluation of the anticipated outcome of our intended actions or behaviour (Keller & Monica, 2015). It is formed through mental assessment of the outcomes of our behaviour (Keller & Monica, 2015). Therefore, if the mental picture of an outcome of a

behaviour is favourable, beneficial, positive and desirable, the probability of that behaviour being performed is higher than if the anticipated results of our intended actions are opposite.

In the theory, intention is the immediate antecedent of a behaviour. It is a factor that determines the readiness of an actor. It also shows the extent to which an actor is willing to engage in action and how much of an effort she/he is willing to invest in the planning of the action. Thus, the degree of the investment of an effort into planning a behaviour determines the intention of the individual to execute it. It also means the likelihood of individuals acting if they plan to do so will be higher than if they do not plan. Hence the stronger the intention, the greater the performance of the behavior.

Fishbein and Ajzen (1975) considered subjective social norms as perceived social forces that impede or facilitate behaviour. For instance, if the relevant others in one's life approve of the outcome of a certain behaviour, the performance of such behaviour would be higher than if the behaviour is disapproved by the relevant others. Also, a positive social image of an outcome of behaviour could encourage people to engage in it (Lee, Cerreto & Lee, 2010). Therefore, the likelihood of people engaging in an action whose outcome has a positive social image is higher than the action whose outcome has a low or negative social image.

Volitional control is the degree to which people can act on will without any impediment (Fishbein & Ajzen, 1975). However, if people's desire to perform a particular action can be thwarted by perceived or real internal or external constraints then, using the theory of reasoned action in predicting such behaviour could be limited. This means the performance of such action is not

under the individuals' full volitional control. In such a situation (where the performance of an action is not under people's full volitional control) intention cannot predict the performance of the behaviour in question, no matter how strong the intention is. This limitation of the theory of reasoned action prompted Ajzen (1991) to add another construct, perceived behavioural control to overcome the limitation. Ajzen (1991) named his new theory, the Theory of Planned Behaviour.

The central construct of the theory of planned behaviour is perceived behavioural control. Ajzen (1991) defined perceived behavioural control as perceived/real ease or difficulty in the performance of an action. The perceived/real difficulty involves internal and external factors that may hinder the performance of a behaviour in question. For instance, the intention of a Senior High School graduate to pursue further education at the university level is not under his/her full volitional control, it depends on his/her academic performance at the second cycle, cut-off point of the university of interest and parent's financial ability.

The theory of planned behaviour has all the main constructs of the theory of reasoned action (attitude, intention and subjective norm) in addition to perceived behavioural control. Two main pillars that hold perceived behaviour control are - control beliefs and perceived power or actual control (Alselaimi, 2010). Control belief is the extent to which one has control over the perceived or real obstacle that impedes the behaviour of intent (Alselaimi, 2010). Thus, the stronger the control belief one has over perceived or real obstacles determines the performance of the behaviour. In the same vein, if the control beliefs of the individual to overcome the obstacle are low, the performance of

the behaviour will be low. Perceived power is the actual control one has over the performance of an action (Nisson & Earl, 2016). It involves the availability of resources and opportunities to overcome real or perceived obstacles in the performance of an action. Some of the internal powers that may help one to overcome obstacles and facilitate the performance of an action are ability, skills and availability of information (Nisson & Earl, 2016). Money, time, cooperation of others, social support is some of the external resources and opportunities that may help an individual to overcome obstacles and perform an action.

The theory of planned behaviour has received many criticisms, some of which are the following. First, the general assumption of the theory which rests on the rationality of the individuals to make informed decisions based on the availability of information is problematic. This is because unconscious motives sometimes trigger actions (Aarts, Verplanken & van Knippenberg, 1998). Second, the theory is silent on people's past records or memories and demographic characteristics such as age, sex, gender and social status which may also influence behaviour (Alselaimi, 2010). Third, ironically, Ajzen (1991) agreed that other constructs can be included in the theory if the additional construct is empirically supported and applicable to social sciences' prediction of human behaviour (Holst & Iverson, 2011). This is problematic, because, if a theory can admit a construct independent of its original constructs, then that theory will not only outgrow its protagonist but it could also be subjected to distortion. Finally, the main construct in the theory, perceived behavioural control is subjective rather than objective and that also makes its conceptualization and measurement perplexing (Kraft, Rise, Sutton & Royamb, 2005). Based on this, the measurement of perceived behavioural control

depends on complementary ways of quantifying attitudes (Kraft et al, 2005). Conversely, Knabe (2012) has debunked the measurement flaws of the theory, arguing that the perceived limitations of the theory are in most cases related to flaws in research designs and researchers' failure to operationalize their variable as required in Ajzen's (1991) model rather than the theory itself.

The structure and human agency theory

The philosophical perception of the nature of social reality (how human actions should be conceptualized) is a dilemma in social scientific circles. This philosophical dilemma which polarized the method of social scientific enquiry in the classical period still remains a methodological challenge among contemporary social scientists (Rafiee, Mirzaee, Mirzaee & Hashemzadeh, 2014). For instance, some classical social scientists such as Karl Marx and Emile Durkheim conceived human actions as structured by social institutions and as a result, they perceived social reality as objective facts derived from experiences of the social world which should be enquired through the senses (Rafiee et al, 2014). On the other hand, Max Weber and George Herbert considered humans' actions as free will or voluntary and should be inquired subjectively because humans create their own society (Rafiee et al, 2014). The contemporary social scientific research rests on these two ontological and epistemic positions and as such research conducted nowadays is largely a positivistic or hermeneutic approach (King, 2009). Therefore, the nature of social reality (how human action should be conceptualized) still remains dualistic such as macro verses micro, deterministic verses voluntary, reasons verses causes and structure verses human agency in the social sciences.

For instance, Karl Marx, a classical social scientist considered human actions as deterministic and traced this conception to the material conditions of man in the stages of history. To Marx, humans' consciousness is not determined by their state of mind but by their material conditions. Central to Marx's theory of the stages of history is the economy. Marx considered the economy as the base of all the structures of human society which influences the super structures such as religion, education, politics and family. For Marx, these super structures and the base (economy) determine human actions. According to Marx, even though collective humans' actions produce social structures but these structures surpass individuals and determine their actions. As King (2010 p. 66) put it "For Marx society is irreducible to the concept and actions of particular individual. Arising from individual productive activity, society as a grand structure of institutions and conventions, exceeds individuals, determining their understandings and activities". In Marx's view, institutions pre-exist and determine individuals' actions although individuals produce social institutions (King, 2010). Thus, Marx conceived collective actions of individuals as a product of social institutions which are not reducible to individual hence human action is deterministic and not free will.

Emile Durkheim (1895) in "The Rule of Sociological Methods" considered social facts or social institutions as products of humans' actions but independent and external to the individuals and at the same time constrained individuals' behaviour. In Durkheim's assessments, individuals' actions produce social facts or social institutions and by extension the society, however, society and social institutions transcend the individuals and determine their actions. Auguste Comte also viewed individuals as socially constructed rather

than society being constructed by the individuals, though society is an aggregation of individuals and their actions (Dolfsma & Verburg, 2008). In consequence, Durkheim and Comte also perceived human actions as deterministic or structured by the institutions of society.

On the other hand, phenomenologists, interactionists and ethnographers conceive human actions as voluntary or free will and not determined by social forces. They consider human action as strategic and human beings as creative and capable of creating their own world or society (Dolfsma & Verburg, 2008). Phenomenologists and interactionists perceive human beings as rational and responsible for their actions because humans' behaviour is born by their motives, based on the expected result of the behaviour (Dolfsma & Verburg, 2008) Therefore, human action is free will, voluntary, a choice and not deterministic.

This structure and human agency debate still persists and some of the contemporary social scientists who have waded into the argument are Roy Bhaskar, Jugean Habermas, Anthony King, Sewell Jr., Anthony Giddens, Margaret Archer and Pierre Bourdieu. However, this study will focus on the works of Giddens, Bourdieu and Archer. This is in view of the fact that Giddens' (1984) Structuration and Archer's (1995) Morphogenetic theories will be used to analyze data collected which is relevant to the study. Bourdieu's (1972) Theory of Practice has a concept - symbolic capital which talks about the influence of social pressure on people's actions, coincidentally, social pressure is one of the concepts in this study and, therefore, a brief note of Bourdieu's (1972) Theory of Practice in this study may not be out of context.

Giddens' (1984) Structuration theory merges the structure and human agency into two sides of the same coin. According to Giddens structure and human agency work in tandem rather than opposing each other (Sewell, 1992). The structuration theory combines structure and agency into one phenomenon since structure cannot exist without agency (Elbasha & Wright, 2017). Thus, the central theorem in structuration theory is Giddens' concept of "duality". By duality, Giddens means structure and human agency are inseparable, they are intertwined and interdependent. Since human agency draws on structure to act and it is the actions of agency that produce, transform or reproduce the structure. Therefore, "structural properties of a social system are both the medium and outcome of the practices they recursively organized" (Giddens, 1984 p. 25). Giddens rejects the notion that structures are social objective facts which are external and outside the individuals and constrain their actions. For Giddens, structures are not exterior to the individuals, but exist in the memory of the individuals to instantiate actions: hence structures constraint as well as enable actions.

Giddens conceptualised structures as "rules and resources recursively implicated in the reproduction of social system" (Sewell, 1992 p.5). He gave examples of the rules as legislated, formal routines, habits, procedures, formulas, traditions and conventions (Whittington, 2015). He viewed resources as vehicles for power and power as a productive resource that enables the agency to act (Lamsal, 2012). Therefore, rules restrict agents' actions whereas resources facilitate them. For Giddens agency is people's ability to act or the power to act and it is acquired through human agency's access to and application

of structural properties such as rules and resources (Hardcastle, Usher & Holmes, 2005).

In Giddens' judgment, human beings are knowledgeable or better still human beings learn more about their environment and that helps them to acquire considerable knowledge of their social context or system (Hardcastle, Usher & Holmes, 2005). Hence, human beings apply the social context knowledge to their advantage when engaging in an action. Human agency is endowed with reflexive ability that allows for conscious consideration of action before acting and this (reflexive ability) makes humans' actions creative, contingent and free will (van Rooyen, 2013). To Giddens, humans can act otherwise at any point in time in an action (King, 2009). This makes human action a choice, unrestricted or unconstrained and rational.

Giddens' notions of human agency's knowledgeability, reflexivity and capability of acting despite structural constraint suggest that Giddens' theory over-emphasized the power of the human agency to act and also seems to submerge the structure under the human agency (Sewell, 1992). The notion of the inseparability of the structure and human agency or internality of the structure in the memory of the human agency makes Giddens' ontological position idealism and epistemic position interpretivism, even though he claimed that he does not take the side of the nature of reality debate. Giddens' position on the inseparability of structure and human agency prompted Margaret Archer (1995) to propound her Morphogenetic Approach as a critique of the Structuration theory.

Archer (1995) viewed structure and human agency as two distinct separate entities, although one is an extension of the other. Archer argued that

the structure and human agency are two concrete objective realities independent of each other, nonetheless, they intersect and shape each other. As Herepath (2014 p. 858) put it “Archerian approach maintains the ontic differentiation between the structure and agency so that the ontological and conceptual entanglements, which obscure the analysis of their interplay, are unravelled”.

Archer conceptualized structure as emergent strata of the social system that pre-dates and post-dates individuals' actions, although individuals' actions transform the structure (Herepath, 2014). This means structure is erected before and after human actions, thus structure existed before human action but human action shapes the structure. Also, she conceived the structure as the unintended consequences of individuals' actions (Lacroix, 2012). For her human agency does not produce structure, but reproduces or transforms the structure and structure also does not determine human action but condition or orient human action (Lacroix, 2012). Archer considered human beings as strategic individuals whose actions are intentional and purposive (Goodman, 2017). To Archer humans are self-aware of their actions, they also have reflexive ability and are knowledgeable of their social system (Goodman, 2017). Therefore, the structure constrains humans' action, but humans' reflexive abilities enable them to readjust to overcome the structure to achieve the intended action (Goodman, 2017). Archer's explanation of the structure and human agency debate seems not to favour any of the two sides but her ontological and epistemic positions lean toward a positivistic approach. Hence her explanation is more in line with the deterministic side of the nature of the social reality debate.

Another contemporary social scientist who wrote on the relationship between structure and human agency is Pierre Bourdieu. Bourdieu's (1972)

Theory of Practice talks about the mutual reciprocal relationship between the structure and human agency. Bourdieu's theory of practice does not view the relationship of structure and human agency as that of domination of one above the other or subordination of one to another (Rafiee et al, 2014). Bourdieu's theory of practice conceptualized the social system as a system of specialized *fields* (professions) such as education, sports and craft-making. Within each field, there are rules, lexicon and technical abilities that govern the profession and performance of actors in the field. In order to participate in a particular field, one must acquire all the requisite skills that govern the field so that she/he can communicate and compete with other members in the field. Bourdieu referred to the skill sets one needs to participate in the field as *habitus*. Thus, the actor must acquire the habitus of a particular field (profession) before she/he can fully participate in it.

In every field, actors apply their habitus (skills set) concerning others' perception of their outputs. Hence actors' perfection of their output in their various fields depends on their perception of the judgment of others in the social system. Bourdieu refers to actors' perception of the judgment of others of their output [product] as symbolic capital [reputation in the eyes of the others] (Lacroix, 2012). Therefore, the symbolic capital acts like a structure to pre-condition the human agency to perfect its output. This suggests that Bourdieu's human agency is constrained and enabled by the performance of colleagues in the field and the perceived recognition he/she hopes to receive from others about his/her output or produce. This makes Bourdieu's approach intersubjective. If the approach of Bourdieu's Theory of Practice is intersubjective then his epistemic position is interpretivism which suggests that the theory leans toward

voluntarism more than determinism. Therefore, Bourdieu's theory of practice takes a specific stand in the structure and human agency debate.

No matter how one looks at it, the structure and agency debate is back and forth and the argument is similar to the chicken and egg causality dilemma.

The classical social scientists take specific stands in the debate and that also determine their ontological and epistemic positions. The contemporary social scientists are more interested in how the structure and the agency intersect. However, they cannot disentangle themselves from taking a specific epistemic position in their approach to how the structure and agency or the nature of social reality should be inquired. Also, depending on the perspective of the contemporary social scientist, the intersection of the structure and agency is conceived as subjective, objective and intersubjectivity. For instance, Giddens conceptualized the structure and agency as one phenomenon or two sides of the same coin making his approach subjective. Archer viewed the structure and agency as two concrete objective social entities and leaned her approach to positivism. Bourdieu was interested in the relations of agents in a specific field and social relations that develop in reference to the output of the agents that structured the agents' habitus.

Lessons learnt from the theoretical framework

The political ecology theory is largely used to analyze the factors driving people into small-scale gold mining due to the fact that macro-structural forces are considered as factors pushing people into SSGM. Over-emphasis on macro-structural factors has led to the downplaying of the roles of human agency in the scheme of people's participation in small-scale gold mining that may lead to environmental degradation. Situating this in the context of Anderson's (2011)

view, over-concentration of the macro-structural factors as drivers of SSGM submerge the motives and intentions of miners under these macro forces thus their irresponsible environmental behaviour has been attributed to abstract entities such as changes in international commodity prices, poverty, unemployment and lack of choice as if these abstract entities could mine themselves. Based on this, the theory of planned behaviour which uses micro factors to analyze people's actions was used to study reasons people participate in small-scale gold mining and their ramifications on the environment. The structure and human agency theory was used to complement the theory of planned behaviour.

Empirical review

This section reviews empirical works of the theoretical framework of the study and other people's work on small-scale gold mining. In terms of the theoretical framework, the aim was to find how the constructs in the theories were conceptualised in other people's work and also check their explanatory powers. For instance, from the empirical works reviewed on the theory of planned behaviour, attitude is mostly considered as a self-construct which is related to an individual's dispositions (Strydom, 2018). Subjective norm is also related to micro-social pressures. For example, a study conducted by Strydom (2018) considered the influence of friends, family and colleagues on people's behaviour as social pressures. Quick et al (2008) also considered the influence of co-workers, supervisors, managers and spouses on employees' behaviour as social pressures. Perceived behavioural control is more related to self-confidence and the ability to overcome external barriers in the performance of an action (Cook, Dahdah, Norman & French, 2016).

The issue that emerged from the review of literature on the theory of planned behaviour was that researchers who used this theory to predict people's intentions to participate in an action either relied on the original constructs in the theory or introduced additional construct(s) to increase its predictability. For instance, Yazdanpanah and Forouzani (2015) added *moral norms and self-identity* to the standard constructs in the theory to study Iranian students' intention to purchase organic food. The findings revealed that attitude and the additional constructs significantly influenced people's decision to purchase organic food, but subjective norm and PBC did not. They concluded that organic food is not common in Iran, therefore, its recommendation by friends, family and peers [social pressure] was low. Similarly, concepts such as *awareness of the consequences and the need for energy conservation* were added to the constructs in the theory to explain consumers' pro-environmental behaviour in terms of energy conservation (Macovei, 2015). The results indicate that attitude and the additional constructs positively influence people's intentions to conserve energy. The explanatory powers of subjective norm and PBC in Macovei's (2015) study were weak. This is similar to Yazdanpanah and Forouzani's (2015) study.

Kumar (2012) introduced two new constructs – *environmental concern and environmental knowledge* in addition to the concepts in the theory to study people's intentions to purchase environmentally sustainable products in India quantitatively. The result was slightly different from the first two studies as attitude and PBC were variables which influenced people's intentions to consume environmentally sustainable products in India. In terms of ranking the explanatory powers of the constructs, attitude was the strongest predictor in

Kumar's (2012) study. Kumar (2012) concluded that the weak explanatory power of subjective norm [social pressure] was at variance with a collective society such as India. Yadav and Pathak (2016) also added *environmental concern and environmental knowledge* to the theory to examine young consumers' intentions toward buying of green products in India. The results revealed that, although all the constructs were significantly related to people's intentions to purchase a green product, attitude and environmental concern were the main predictors in the study. This result was slightly different from the results of the three previous studies because subjective norm [social pressures] was part of the predictor variables.

In Ghana, Alhassan, Asante, Oteng-Ababio, and Bawakyillenuo et al (2018) used variables such as education level, income level, occupation, availability of information and past experience in addition to attitude, subjective norm, PBC to examine households' waste separation behaviour among residents in Accra and Tamale Metropolitan Areas. The result revealed that variables such as PBC, attitude, income, level of education and occupation influenced household waste separation behaviour, but the subjective norm was the main variable that influenced households' waste separation behaviour among Tamale residents. Based on this finding, Alhassan et al., (2018) concluded that people in Tamale feel socially obliged to separate their waste at the household level due to the communal lifestyle in the area.

Strydom (2018) used the constructs in the theory only to examine waste recycling behaviour in South Africa and found that attitude, subjective norm and PBC were significantly related to the non-recycling behaviour of South Africans. The beta value of subjective norm was the highest among the other

constructs, based on that, the study concluded that South Africans do not feel the social pressure to recycle household waste (Strydom, 2018). This finding is at variance with that of Alhassan et al., (2018) study in Ghana. Davis and Morgan (2008) also applied the standard constructs in the theory to study households waste recycling behaviour of residents in Bristol, United Kingdom and discovered that people were not happy with the recycling system but had a positive attitude toward the reduction of the landfill sites. These results show that the application of the theory on the same subject matter in different contexts produces different findings. In the same way, the application of the theory on the same subject matter but with a different focus also produces different results.

Bashir, Khawja, Turi and Toheed (2019) incorporated personal norms, behavioural intention towards green hotels, environmental consciousness and green consumer behaviour into the theory to analyse consumers' intentions to use green hotels in Pakistan. They substituted the original constructs in the theory with the new concepts introduced and developed a model which centred on these new concepts. The findings revealed that, personal norm predominantly influences people's intention to use a green hotel. This finding shows that "personal norm" which is similar to attitude in Ajzen's (1991) theory has the strongest explanatory power among other variables substituted in the Bashir et al., (2019) study.

From the empirical works reviewed, the results of the application of the theory into research outside the remit of the environment were also different depending on the context and focus of the study. For example, Conner et al., (2007) added moral norms, anticipated regret and past behaviour to the concepts in the theory to study factors that make drivers exceed the posted speed limit in

two different locations in the UK. They discovered that attitude, moral norms, anticipated regret and past behaviour were the variables that explained drivers' intention to exceed the posted speed limit by 10mph in the two study areas. The relationship between PBC and intention to exceed the posted speed limit was insignificant in the Conner et al., (2007) study. Variables such as social distance, tax authority, tax system, compliance and penalty regimes were merged with attitude, subjective norm, and PBC to explain tax compliance behaviour in New Zealand by Smart (2013). The conclusion of the study was that attitude, subjective norm, and PBC were significantly related to tax compliance behaviour in New Zealand. This finding shows that explanatory power of all the constructs in the theory was high.

Satsios and Hadjidakis (2018) used the theory to study the savings behaviour of Pomak households in Greece and found that attitude, subjective norm and PBC have a direct positive effect on Pomaks' intention to save and saving behaviour. This finding is similar to Smart's (2013) finding. A study conducted by Yun and Park (2012) in America and Korea on people's intention to donate organs revealed that American participants feel socially obliged to donate organs but Korean participants do not because culturally Koreans frown on such action. Also, Americans' attitude toward organ donation was strong while that of Koreans was weak. On perceived behavioural control, Koreans feel difficulty in donating organs due to cultural beliefs but Americans do not. This shows that the context of the study determines the explanatory power of the constructs. The findings of a study conducted by Quick et al., (2008) showed that the explanatory power of subjective social norms was the strongest in predicting coal miners' intention to wear hearing protective gear. This finding

shows that the influence of friends and peers at the workplace determines people's decisions to act in a particular direction.

The search for information on the theory of planned behaviour and small-scale gold mining yielded two results - Tweneboah-Koduah, Mann and Adams (2020) and Nwagwu and Igwe (2015). Tweneboah-Koduah et al., (2020) used the constructs in the theory in addition to McInnis and Jaworski's (1989) Motivation, Opportunity and Ability model to predict illegal small-scale gold miners' intention to stop their activity. Attitude was measured with scales such as "Stopping illegal mining activities will protect the environment" and "Stopping illegal mining is a good idea". Subjective norm was measured with scales such as "Most of my friends who engaged in illegal mining have stopped because it destroys the environment and I think I should do the same" and "My family members who engaged in illegal mining have stopped because it destroys the environment and I think I should also stop". The findings revealed that attitude has a direct positive relationship with intention to stop illegal mining but subjective norm has a negative relationship with intention to stop illegal mining. The study did not test the relationship between miners' PBC and intentions to mine illegally. In Nwagwu and Igwe's (2015) study, the explanatory powers of the constructs in the theory of planned behaviour were not tested, instead, the article analysed the responses in reference to the constructs in terms of percentages.

On the structure and human agency theory, largely, researchers who use this theory to analyse social reality either take a stand in the structure and human agency debate or leave their readers to make their judgement. For instance, Moses (1998) adopted discourse analysis to examine Daniel Goldhagen's work

on the Holocaust in the frame of the theory without taking a stand in the reality debate (whether human actions are structured or freed). In Goldhagen's *Hitler's Willing Executioners*, the Nazis' actions during the Holocaust were explained in terms of the general psyche of the German society at the time – annihilation of the Israelis (Moses, 1998). The debate, this generated was whether the Nazis' action was intentional (agency) or structural (acting on behalf of the state). Moses' analysis of the debate was neutral because it did not lean toward the intentionality of the actors or the general psychic of German society at the time [the structure].

In contrast to Moses (1998), Berger (1995) used narrative analysis to reconstruct the survival strategies of two Jews during the Holocaust. In Berger's (1995) view, participants of his study survived the war although eight of their siblings did not through transposition of the socialisation they received before the war. Berger (1995) concluded that his participants survived due to their exposure to other non-Jewish cultures and languages which they used to escape executions during the war. This means Berger (1995) leaned the survival strategies of his participants to the structure. However, Berger's (1995) conviction and attribution of the survival strategies of his respondents to the structure was beside the point. This is because he failed to account for why other siblings of his participants did not survive, although, they all received the same socialisation. Therefore, the deduction one could make is that Berger (1995) failed to account for the human agency of his participants in the scheme of their survival.

Dowding (2008) used structure and human agency theory to analyse the authority power holders exercise in their society. In his view, power is exercised

based on the society that produces the holder but the action of the holder is related to his/her human agency. The central thesis of Dowding's (2008) work was that the human agency of power holders greatly influences how they exercise their authority. Dowding's (2008) work rests on the agency of individuals and not the structures of society. Mahdavi (2008) used the theory to examine democratic dispensation in Iran and concluded that Iran's system of democracy was hugely influenced by her national ethos and contacts with Islamic religion and Western society rather than the personal agency of the country's political leadership. Mahdavi's (2008) conclusion is dissimilar to that of Dowdig (2008).

van Rooyen (2013) used the theory to study the general routines, rules and regulations in the newsroom of the South Africa Broadcasting Corporation (SABC). He used naturalistic observation to collect data. The results revealed that although members of the translating bulletin room were structured due to rules and routines governing the work, they exercised their human agency in the efficient performance of the assigned duties. In this way, they were able to transform the routines and rules in the newsroom and also contribute to shaping the society in which they serve (van Rooyen, 2013). This means human agency can also influence and shape the structure.

In terms of empirical works of small-scale gold mining, this study reviews other related works in Ghana and some developing countries in Africa, Asia and Latin America. The aim was to check whether there are differences in the methods and findings of these studies. For instance, Mawowa (2013) used an interview guide and field observation to study small-scale gold mining in Zimbabwe. The interest of the study was to analyse the incessant increase in

participation of the sector despite government policies to limit people's engagement in the sector in post-2000. The results of the study revealed that although the majority of Zimbabweans who engaged in small-scale gold mining were poor and unemployed their sponsors were powerful businessmen and women, top public servants and bigwigs in the Zimbabwe African National Union – Patriotic Front (ZANU-PF). The findings showed that police chased members of the Movement for Democratic Change (MDC) (the largest opposition party in Zimbabwe) at mining sites but allowed their counterparts in the ruling ZANU-PF to mine (Mawowa, 2013). Mawowa (2013) concluded that the classification of the sector as a poverty-driven activity is over-simplification because it [small-scale gold mining] is a means to acquire both political and economic power in Zimbabwe. Mawowa's (2013) findings and conclusions showed a clear case of rent-seeking in the political economy of Zimbabwe's small-scale gold mining sector because political power is used to access and control economic resource for people affiliated to a particular political party in the country.

The result of this study is different from a study conducted by Kassa (2019) in Ghana and South Africa. Kassa (2019) used a qualitative method to study the political economy of small-scale gold mining in Gauteng Province in South Africa and Obuasi in Ghana. Kassa (2019) selected 12 small-scale gold miners in Obuasi and another 12 in Gauteng Province. The study mainly used an interview guide to collect data. The findings revealed that the state used security agencies and mining codes to marginalise small-scale gold miners and in effect criminalised their income-generating activity. The study also discovered that private security personnel of the mining companies harassed

small-scale gold miners, a process which dispossessed their livelihood and impoverished them further. The study concluded that artisanal small-scale gold mining was not expanding in the two study areas due to oppression from the state and large-scale gold mining companies.

Zolnikove (2020) used convenient sampling to select 21 female small-scale gold miners in Akwatia to study how the ban on mining in 2017 affected the livelihood of miners in Ghana. An interview guide was used to collect data and thematic themes were used to analyse it. The findings showed that participants moved from selling wares to small-scale gold mining because the reward of mining surpassed other livelihood activities in Akwatia. They also moved into small-scale gold mining because they were told it paid better than other livelihoods in the area. Participants also told the researcher that they were unhappy about the ban because it has affected their income generating activity and they cannot afford to pay their children's school fees, and electricity bills and maintain home.

The result of this study is similar to a study conducted by Calvimontes et al (2020) in the Brazilian Amazon on the impact of Covid-19 on small-scale gold miners' livelihood. Calvimontes et al (2020) used quota sampling to select 113 miners, owners of mines, owners of mining equipment shops and government officials. Interviews and narrative analyses were used to collect data. Also, content analysis and framework analysis were conducted with the use of news reports in the media and official technical reports. Participants who were miners said a lockdown on their activity could make them fail to meet their financial obligations at home and daily survival. They said a lockdown would

erode their income and make them more vulnerable. The miners also said they cannot pay bills and maintain home if they do not go to work.

The study concluded that the reason miners could not stop working during the pandemic was the need to meet their daily needs. Calvimontes et al (2020) conclusion suggests that the miners in the study were poor and vulnerable. A study conducted by Persaud, Telmer, Costa and Moore (2017) in Senegal revealed that small-scale gold mining is an income generating activity farmers alternate during the dry seasons to meet their needs. This finding also situates small-scale gold mining in the context of subsistence or a survival strategy only. This is different from a study conducted by Crawford and Botchwey (2016) which considered an increase in gold prices at the world market as a factor which moved people into SSGM. For instance, Crawford and Botchwey (2016) opined that Chinese miners came to Ghana due to an increase in gold prices at the world market.

Lessons learnt from the empirical review

In terms of theories, structural equation modelling is predominantly used to check the explanatory powers of the concepts in the theory of planned behaviour. Methodologically, quantitative methods are mostly used to analyse the results of research that make use of the theory of planned behaviour. On the other hand, qualitative methods are largely used to analyse the results of research that make use of structure and human agency theory from the articles reviewed.

The findings of the articles reviewed on the theory of planned behaviour revealed that attitude was the construct which generally influences people's intention to engage in an action. In a situation where all the constructs have positive significant relationships with the subject under study, the weight of

attitude was largely the strongest among the other constructs. Subjective norm was the second and perceived behavioural control was the last in terms of ranking the constructs regarding how they influence people's intention to act in the articles reviewed. Although this was the evidence in the articles reviewed, it is basic to say that attitude is the variable in the theory which has the strongest explanatory power. The predictability of the constructs depends on the focus of the study, the sample of the study, and the context of the study, among other variables. Equally, researchers who apply structure and human agency in their work lean on the structure or human agency or remain neutral.

In the related empirical works on small-scale gold mining, methods largely used to study it were qualitative. The findings show that mainly people who engaged in SSGM were unemployed and poor. Also, governments use laws to criminalise small-scale gold mining. The works reviewed placed too much emphasis on the diggers and left the sponsors. This obscures the huge investment some rich and powerful people are making in the sector and its impact on the environment.

Conceptual framework

The conceptual framework of this study is based on the objectives and empirical review of the study. The strategies adopted by miners to garner the support of others in the mining centres on perceived behavioural control (PBC). PBC looks at how individual(s) use their internal and external resources to seek the cooperation of others to perform actions they cannot do by their own volition. Therefore, it was used to examine how the miners used the money from the mines to seek the cooperation of other stakeholders in the mining.

Personal dispositions centred on the theory of planned behavior, Jones et al., (2017) and Judge and Kammeyer-Muller (2012) work on ambition, Schwartz's (1994) motivational values and Ymauchi and Templar's (1782) money attitudes. Ajzen's (1991) concept of attitude, characteristics of the power-prestige person of Yamauchi and Templar (1982), the power motivational value of Schwartz (1994) and one of the mediating factors of ambition, extraversion of Judge and Kammeyer-Muller (2012) and Jones et al., 2017 have been merged into one single factor as extraversion. This is similar to a study conducted by Bashar et al., (2019) in which attitude and perceived behavioural control were merged and subsumed under constructs that were added to the standard variables in the theory of planned behaviour to increase their predictive powers.

The achievement motivational value of Schwartz and the other mediating factors of Jones et al., (2017) and Judge and Kammeyer-Muller (2012), conscientiousness have also been merged into a single factor as conscientiousness. The two scales [conscientiousness and extraversion] have been put in the same box because they exhibit the same personality traits or personal dispositions. The only difference between a conscientious person and an extravert is that the former is meticulous and will follow rules and regulations in the performance of a task that would help him/her realize his/her dreams but the latter does not.

The assumption is that the personality traits of both of them would drive them into small-scale gold mining due to its huge immediate financial reward. The two would mechanize and intensify production to increase output to realise their ambitions. However, the engagement of a conscientious person in SSGM

would not lead to environmental destruction whereas the extravert would do. This is because the conscientious person is said to be meticulous and would observe the environmental protocols but the extravert would not. Hence the small broken arrow from the mechanization and intensification of the small-scale gold mining box which does not reach the environmental destruction box at the bottom of Figure 1 represents a conscientious person's participation in SSGM while the black arrow beside it represents the consequence of the extravert participation in SSGM.

The second box under the personal dispositions contains a hedonistic miner. She/he would also mechanize and intensify production to increase output to get more money to satisfy personal pleasure and immediate gratification. It is assumed that such a person's engagement in SSGM could lead to environmental destruction because she/he would not observe environmental protocols. The third box represents universal motivational valued person engagement in SSGM. His/her participation in SSGM would not lead to ecological destruction because the assumption is that he/she would do it for subsistence, and would use simple hand tools with little or insignificant ecological problems and would also observe environmental protocols as he/she cares about nature and others' rights to live.

Ajzen's (1991) concept of subjective norms is the major idea guiding social pressure. This is because subjective norms represent the influence of others on people's behaviour. Advice, encouragement and recommendations from peers, family and neighbours drive individuals into small-scale gold mining to increase SSGM activities. Friends, family, peers and neighbours support their kind to engage in SSGM to increase the scale of participation. The

luxury lifestyle of some who are small-scale gold miners enticed others to engage in mining. The social system places much premium on wealth, which also pressures some people to go into SSGM due to its immediate financial reward. These factors may increase the environmental impacts of SSGM.

Social pressures, whether passive or active have underlying factors that influence individuals to act. The underlying factors are grouped into two. First, the economic benefits and social recognition the performer of the action hopes to receive (Calvo-Armengol & Jackson, 2008). This supports Ajen's (1991) argument that the performance of an action is based on the evaluation of the outcome of the action. Desirable mental judgement of the outcome of an action pushes people to perform it (Keller and Monica, 2015). Second, the group approval the performer of the action hopes to achieve and avoidance of punishment the performer of the action is trying to escape (Esiri, 2016). This study argued that people who are socially pressured act based on one of these underlying factors or a combination of two. To clarify this, another conceptual framework has been drawn to classify the items used in the study to represent passive and active social pressures regarding these factors (see Figure 2 on page 88).

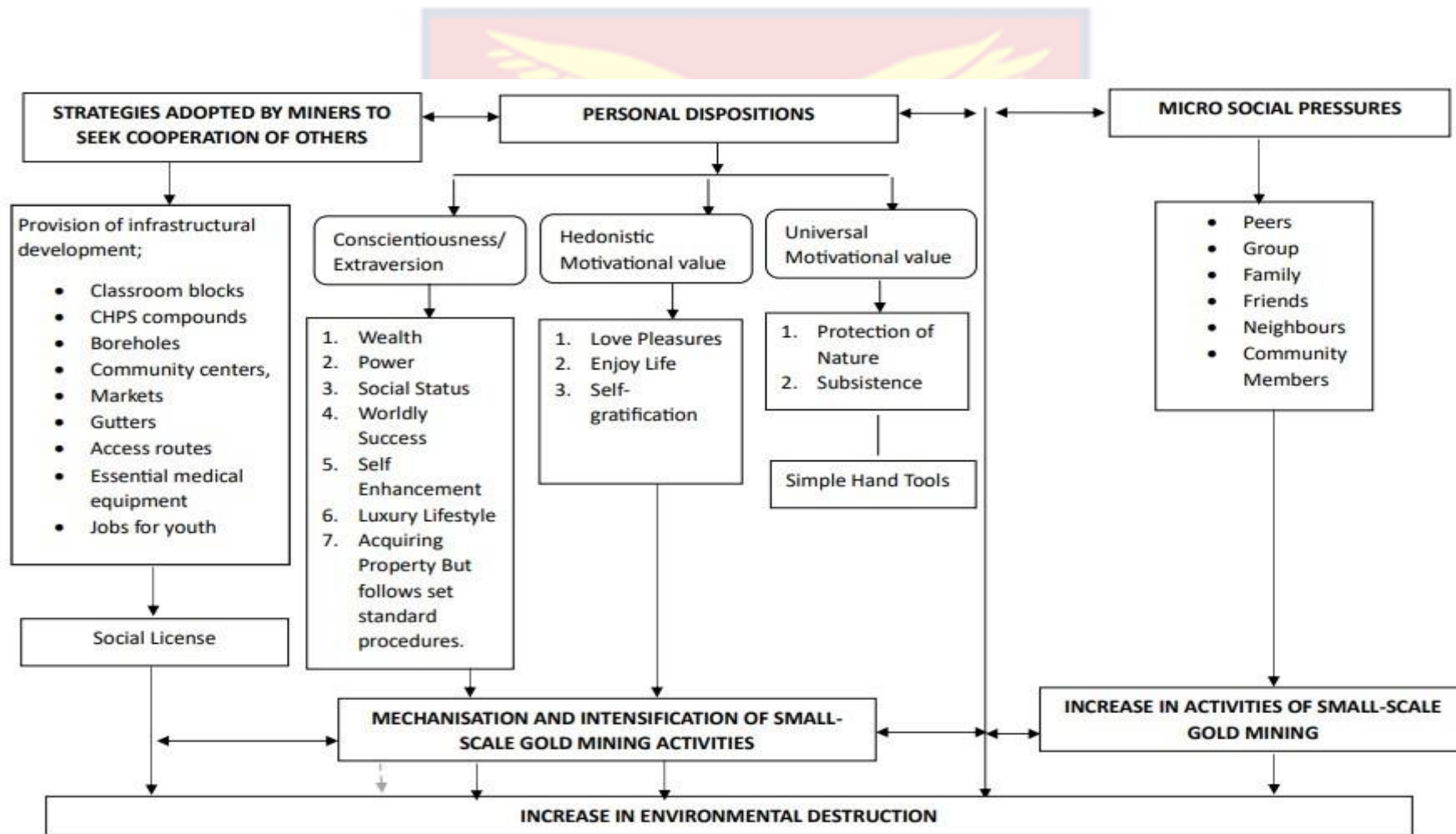


Figure 1: Factors driving small-scale gold mining and its environmental impacts.

Source: Adopted from Ajzen (1991), Judge and Kammever-Muller(2012), Schwartz (1994) and Yamuchi and Templar 1982)

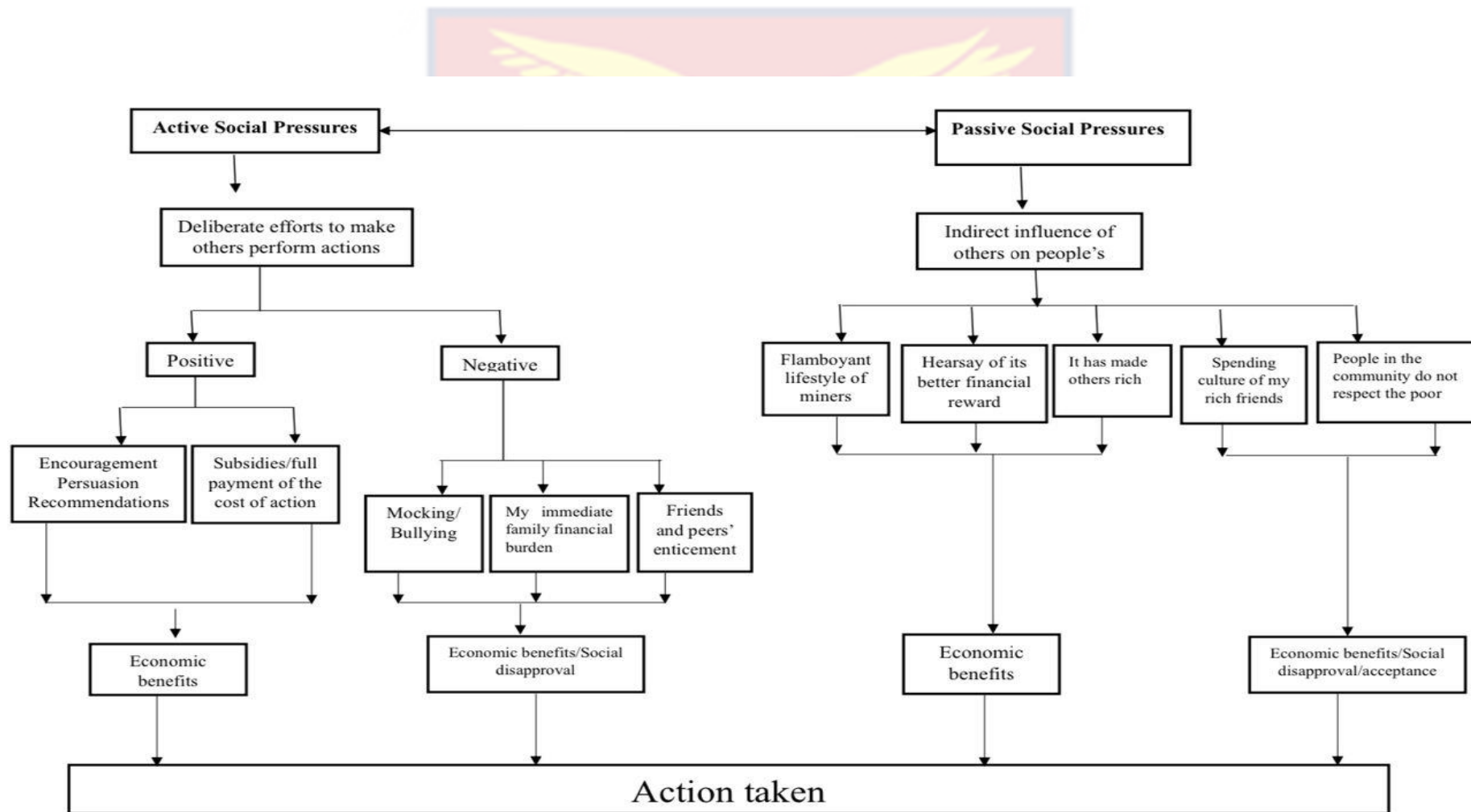


Figure 2: Underlying factors of micro social pressures

Source: Adopted from Ajzen(1991), Calvo-Armengol and Jackson, (2008), Keller and Monica (2015) and Esiri (20216)

CHAPTER THREE

METHODOLOGY

Introduction

This chapter covers the methodology of the study. It comprises the research paradigm, profile of the area, target population, sampling, instruments for data collection and challenges of the study.

Profile of the area

The Denkyira area is one of the lands the Akan-speaking people occupy in south western part of Ghana. It is in the Central Region and consists of three administrative units – Upper Denkyira East, Upper Denkyira West and Lower Denkyira. Gold mining is one of the occupations in the area, however, this study was delimited to Upper Denkyira East and Upper Denkyira West areas since the phenomenon of interest – small-scale gold mining is pervasive in these two administrative units as compared to the Lower Denkyira area (Officials of Mineral Commission at Obuasi and Assin Fosu, Personal Communication, 15th October, 2020).

Geographically, Upper Denkyira East lies between latitudes 5^o. 30' and 6^o. 02' north of the equator and longitudes 1^o W and 2^o W of the Greenwich Meridian. It shares boundaries with Obuasi Municipal, Amensie West and Central Districts in the Ashanti Region, Bibiani-Ahwiaso Bekwai Municipal in the Western North Region, Amenfi West and Wassa Amenfi East Municipalities in the Western Region, Assin North Municipal, Twifo-Hemang-Lower Denkyira and Upper Denkyira West Districts in the Central Region. The total land surface of the area is approximately 1,700 square kilometres. It became Municipal in 2007 by the Legislative Instrument L.I. 1877. According to the 2021 Population and Housing Census, the total number of people living

in the area is 110,141 with an annual population growth rate of 2.4 percent (Ghana Statistical Service (GSS), 2021). The administrative capital of the Municipality is Dunkwa-on Offin.

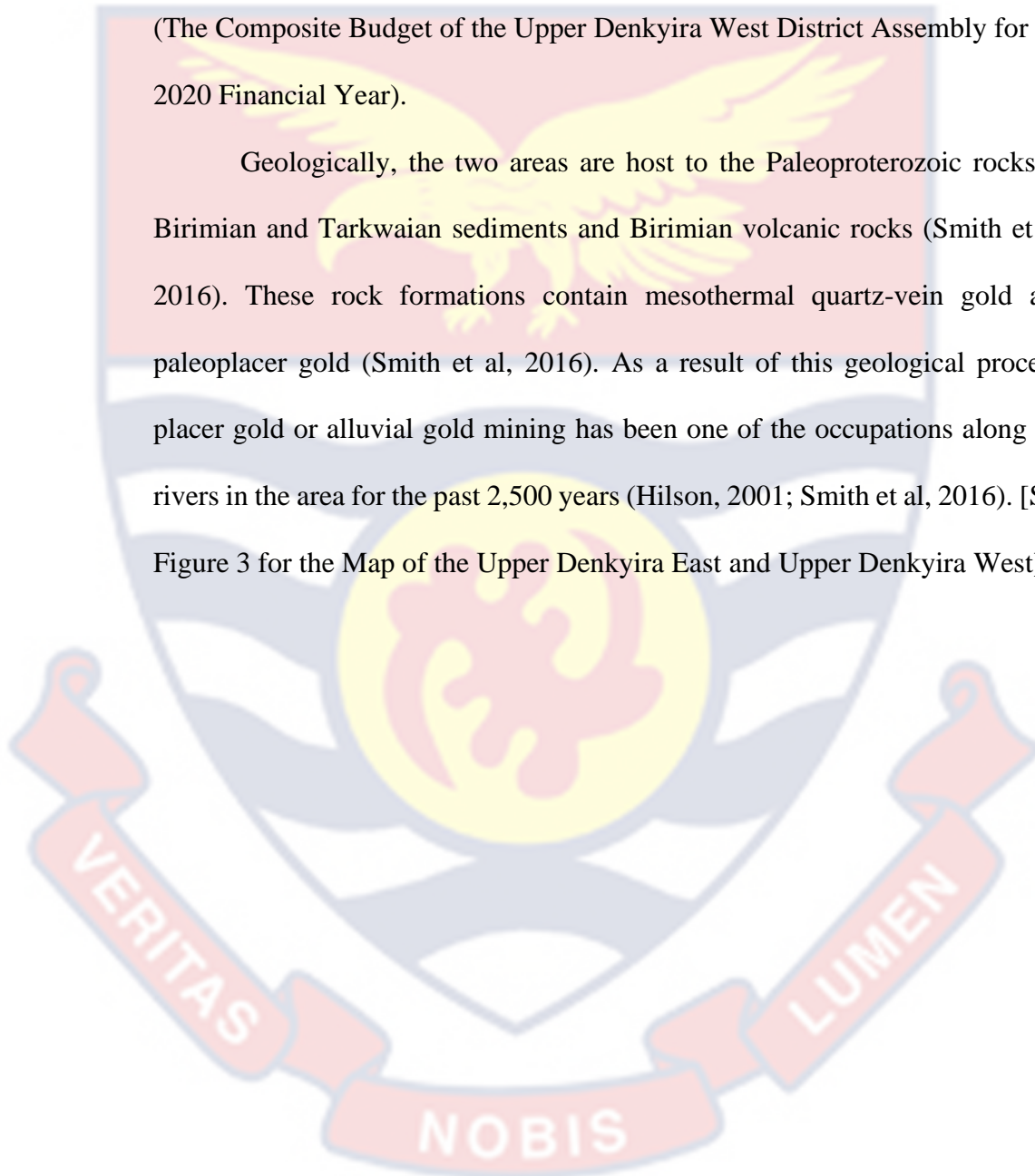
Upper Denkyira West District lies between latitudes $5^{\circ}.31'$ and $6^{\circ}.021'$ north of the equator and longitudes 1° W and 2° W of the Greenwich Meridian respectively. This is because the Upper Denkyira West District was carved out of the then Upper Denkyira East District, now Upper Denkyira East Municipal in 2007. The legal instrument that backs the establishment of the District is L.I.1848 and its administrative capital is Diaso. The total number of people living in the area is 91,025 with an annual population growth rate of 2.4 percent (GSS, 2021). It covers about 579.2 square kilometres of the land surface area in the Central Region.

The major rivers flowing in the area are Pra, Offin, and Dia. Apart from these rivers, streams such as Subin, Ninta, Aponapon, Tutian, and Okumayemfu also flow in the area. The soil in the area is largely forest ochrosols. The area is mainly a semi-deciduous forest zone with three layers of vegetation which is similar to a rain forest. In terms of climate, it falls within the semi-equatorial zone with an annual temperature ranging between 29°C in the hottest month and 24°C in the coolest month. The rainfall pattern in the area is biannual with mean rainfall ranging between 120cm to 200cm. The main rain season occurs in May/June and the lean season occurs in September/November. It is a forest-dissected plateau area and the highest point is about 250 meters above sea level.

The main occupation in the two areas [Upper Denkyira East and Upper Denkyira West] is farming. For example, about 60 percent of the people living

in the Upper Denkyira East area are farmers: they grow crops such as cocoa, plantain, maize, and cassava (The Composite Budget of the Upper Denkyira East Municipal Assembly for the 2019 Financial Year). In the Upper Denkyira West District, agriculture activity employs about 71.1 percent of the population (The Composite Budget of the Upper Denkyira West District Assembly for the 2020 Financial Year).

Geologically, the two areas are host to the Paleoproterozoic rocks of Birimian and Tarkwaian sediments and Birimian volcanic rocks (Smith et al, 2016). These rock formations contain mesothermal quartz-vein gold and paleoplacer gold (Smith et al, 2016). As a result of this geological process, placer gold or alluvial gold mining has been one of the occupations along the rivers in the area for the past 2,500 years (Hilson, 2001; Smith et al, 2016). [See Figure 3 for the Map of the Upper Denkyira East and Upper Denkyira West].



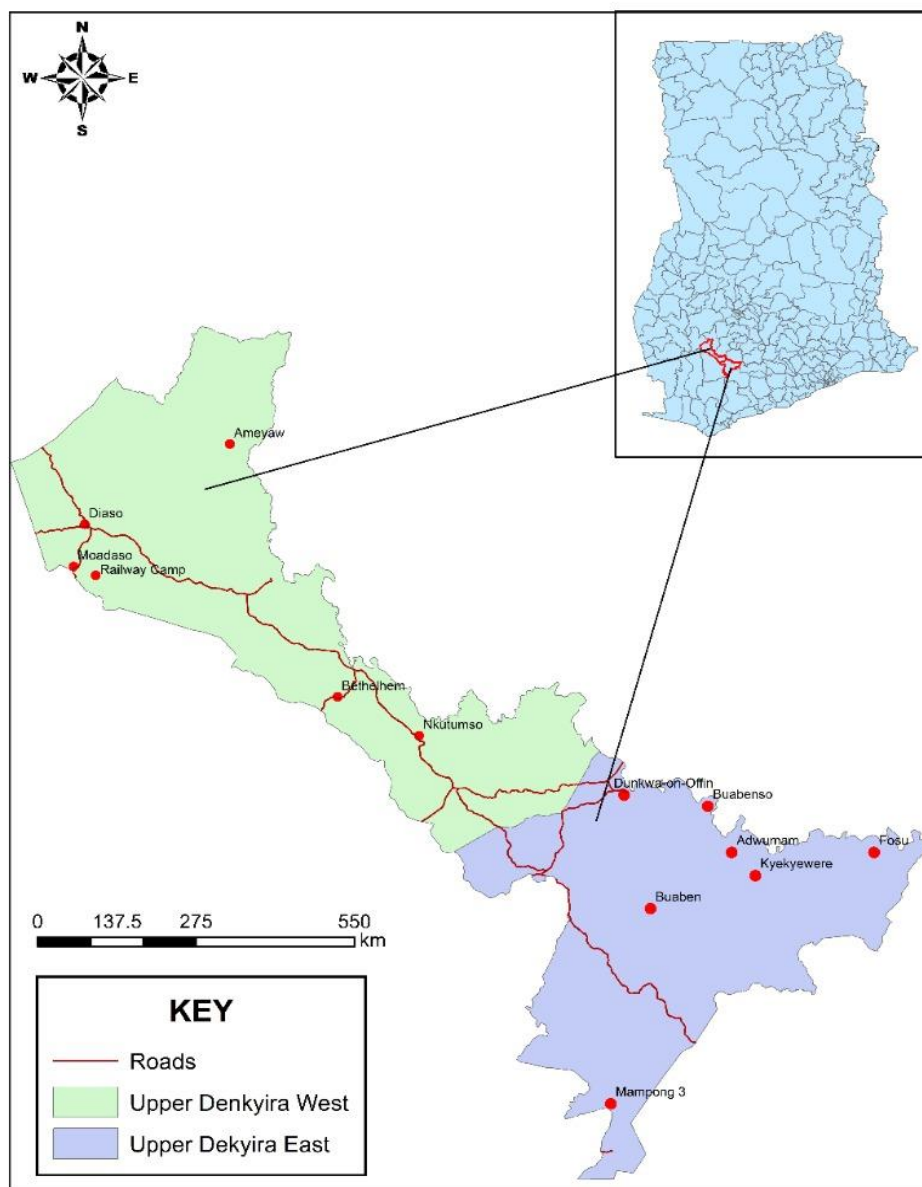


Figure 3: The Map of the Upper Denkyira East and West Districts

Source: Remote Sensing/Geographic Information System Lab., University of Ghana

For instance, in the pre-colonial era, gold mining made Boamponsem I, the king of the Denkyira rich and powerful among the Akans living in the forest zone in the 17th century (McCaskie, 2007). The control of this mineralised land became one of the factors that ignited the war between the Ashanti and Denkyira in the 1690s (McCaskie, 2007). After the defeat of the Denkyira by the forces

of Osei Tutu I, the King of Ashanti, bags of gold were the main booty the victors made away with at Abankeseso, the then capital of the Denkyira (McCaskie, 2007). Also, during the colonial era, the British Government set up several mining camps in and around Dunkwa-on-Offin as Plates 1, 2, 3 and 4 on page 93 show. After independence, Dunkwa State Gold Mine (now defunct) was established in Dunkwa to operate placer gold mining in the Offin River in and around Dunkwa.

Currently, a large-scale gold mining company, Perseus Mining Ghana Limited (PMGL) is operating surface mining in the area. Western Precious Metals, another large-scale gold mining company has since 2014 prospecting for gold in the area. A study conducted by Nzulu, Eklund and Magnuson (2021) also reported that the area is rich in gold which is associated with pathfinding minerals. Therefore, it is not surprising that small-scale gold mining continues to be one of the occupations in the area apart from farming. For example, small-scale gold mining is done in Akyempim, Kyekyerewire, Amofo, Asma Camp, Buabinso, Adwaman, Boadi I and II, Fosu, Akropong, Dunkwa-on-Offin in the Upper Denkyira East Municipal. In the Upper Denkyira West District, small-scale gold mining is taking place in communities such as Akwaboso, Subin, Ameyaw, Amenase, Modaso, Domenase, Ayenfuri and Diaso.

The effects of these mining activities are mixed package. It is a booming economic activity that puts food on the table for many residents. However, it is reducing farming activities and destroying the environment. For example, the local economy is thriving as miners patronise groceries and other wares due to monies they are receiving from the mines (The Composite Budget of the Upper Denkyira East Municipal Assembly for the 2016 Financial Year; The

Composite Budget of the Upper Denkyira West District Assembly for the 2016
Financial Year)

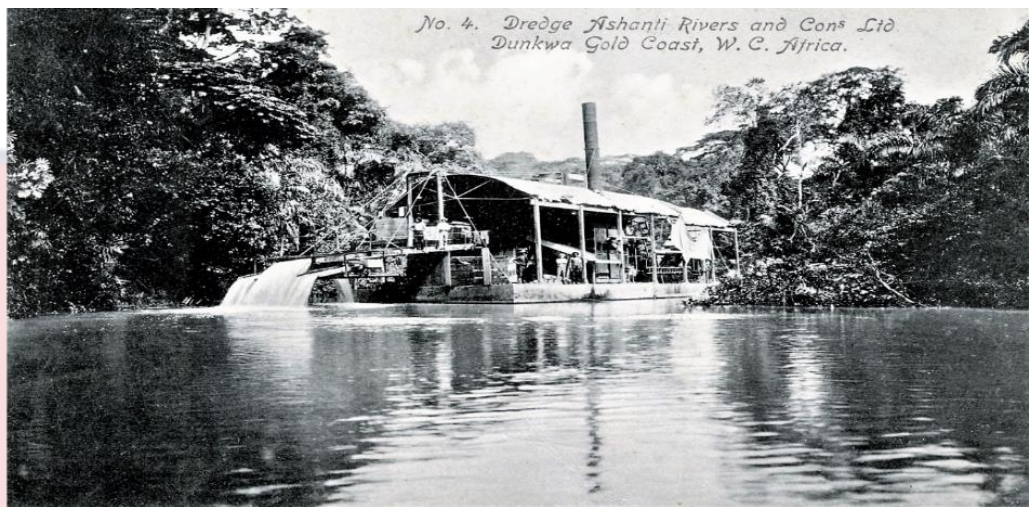


Plate 1: A dredging machine in Offin River at Dunkwa



Plate 2 A dredging machine in Offin River at Dunkwa

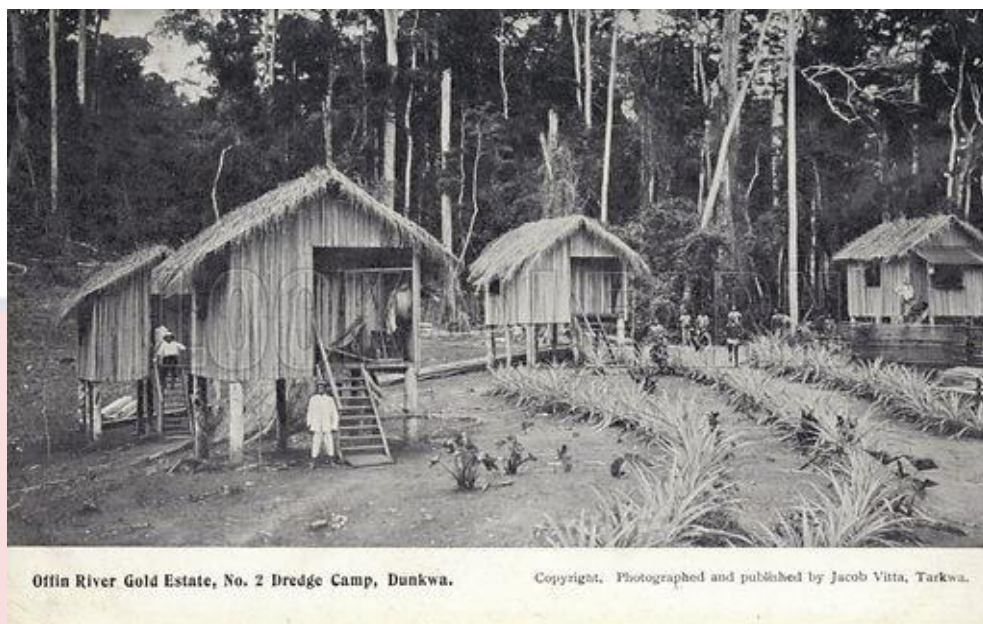
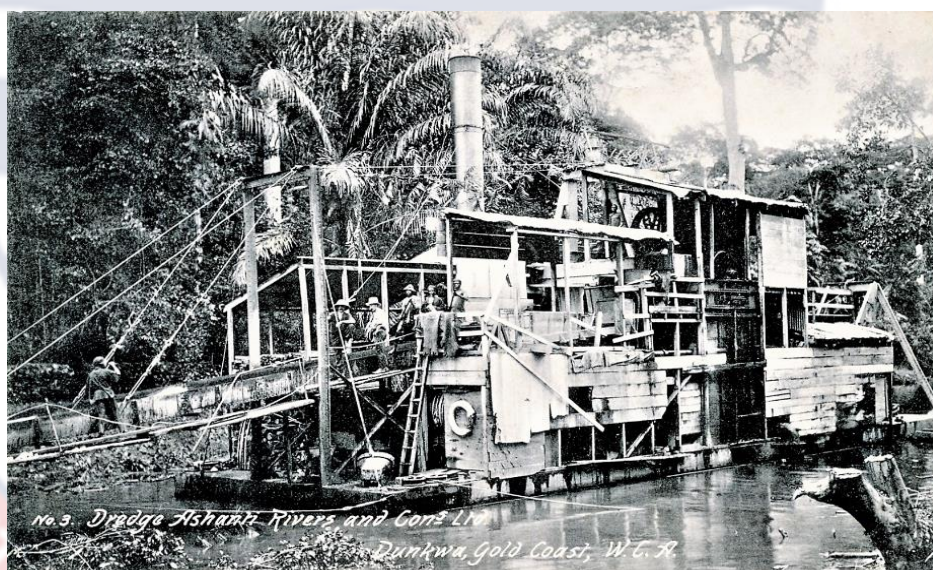


Plate 3: A mining camp at Dunkwa



Photos 1, 2, 3, and 4 credit: Vitta, 1910
Plate 4: A dredging machine in Offin River at Dunkwa

On the other hand, it is reducing land for farming, polluting water for irrigation and domestic consumption, dwindling labour supply for farming and reducing farm outputs in the area. The wet-lands in the area which hitherto were used for rice cultivation are now converted into mining sites, riddled with large holes of stagnant tailing ponds that breed mosquitos. Large tracks of land covered by green vegetation have been turned into deserts by the miners (Agyei-Manu et al., 2020).

A study conducted by Kessey and Arko (2013) revealed that 68 percent of small-scale gold miners in the area burnt gold-mercury amalgamate over an open fire without using retort and 52 percent also discharged untreated tailing into streams. Also, large abandoned mine pits are common in the area (The Composite Budget of Upper Denkyira East Municipal Assembly for the 2016 Financial Year). These pits breed mosquitos making malaria a common disease in the area and when it rains the pits become full of water drowning animals and humans (Agyei-Manu et al., 2020; Crawford, 2016; Rajae, Long, Renne & Basu, 2015). Conversely, Ferring, Hausermann and Effah (2016) reported that some mechanised and un-mechanised miners in the area reclaimed the land after mining while others did not. However, the noise from the machines pollutes the air (Ferring, et al, 2016). The findings of Ferring et al., (2016) show that some miners in the area aim to maximise wealth through mechanisation and intensification of small-scale gold mining but others are just doing it for survival through manual methods.

Research paradigm

The research paradigm for this study is pragmatism. Pragmatism underpins this study because quantitative and qualitative approaches were adopted to examine the variables in the study. Pragmatism is a philosophy of

those who consider human action and experience as reality. To pragmatists, reality is human practical experience with the social and physical world. In pragmatists' philosophy, permanency does not exist since human action is non-linear and the social world is unstable, constantly changing through human thoughts and actions (Taatila & Raij, 2012). Pragmatists explain human action in terms of its consequences because actions are based on their expected outcome which determines the subsequent actions (Dolfsma & Verburg, 2008). Pragmatists consider human thought and action as inseparable. To pragmatists, reality is normative, non-static, contextual, political, and historical which exists apart from human experience. Pragmatists define an object in terms of its utility value, hence they consider what works as reality (Kaushik & Walsh, 2019).

Pragmatists reject extreme positivist and constructivist strands of the nature of reality and truth (Morgan, 2013; Creswell, 2003; Tashakkori & Teddie, 2003). Also, pragmatists avoid adopting only one epistemic position of these two paradigms (positivist & constructivist) and instead merge them into a single paradigm, because for pragmatists a continuum exists between the two extreme epistemic positions (Morgan, 2013; Giacobbi Jr., Poczwadowski & Heger, 2005; Creswell, 2003; Tashakkori & Teddie, 2003). Pragmatists view research process as back and forth between inductive and deductive (Tran, 2017). They break the wall between the subjectivity and objectivity approaches searching for what is meaningful, practical and works between the two (Tran, 2017).

A pragmatic researcher does not focus on the metaphysical or philosophical debate on the nature of reality but pays much attention to the goal of the research and chooses the appropriate method that answers the research

questions and the objectives (Brierley, 2017; Pratt, 2016; Morgan, 2013; Morgan, 2007). Pragmatists are also flexible in terms of which method to use at each point in the research process, thus they mix both quantitative and qualitative methods to inquire social reality (Brierley, 2017). They are interested in the practical aspects of qualitative and quantitative methods that suit the goal of the research instead of worrying about differences between them: simply put, pragmatism is what works in the process of social inquiry (Maarouf, 2019; Creswell, 2003).

Pragmatism has been criticised for narrowing research process to what works. For example, Hall (2013) criticised pragmatism for failing to define “what works” and Biddle and Schafft (2015) also questioned “what works” for whom and to what extent (Maarouf, 2019). Notwithstanding these criticisms, pragmatism has emerged as the philosophical foundation of the mixed methods approach helping many scientists to inquire about social phenomena and gaining practical knowledge to manage life experiences. As Flora and Gillespie (2009, p. 8) put it “For pragmatists, knowledge is a tool for action. Rather than mirroring reality, knowledge mediates our relation to the physical and the social world”.

Concerning this study, values were arbitrarily assigned to three categorical variables [micro social pressures, personal dispositions and people’s decisions to engage in small-scale gold mining] in objectives one and two which demand a quantitative approach. The nature of these objectives also demands that qualitative data should be collected to check where the quantitative and qualitative results converge or diverge in order to explain all the nuances of the subject matter under investigation objectively and subjectively. As Trans (2017)

opined, pragmatism breaks the wall between the subjectivity and objectivity approaches and searches for what is meaningful, practical and works between the two in answering research questions. The nature of the research questions one and two demands that both quantitative and qualitative approaches should be used in answering them. This also supports Brierley (2017), Pratt (2016), Morgan (2013), and Morgan (2007) assertions that pragmatists pay attention to the goal of the research and choose the appropriate method(s) that answers the research questions and objectives and ignore the metaphysical or philosophical debates on the nature of reality characterising positivist and interpretivist's epistemology. As Shorten and Smith (2017 p.75) put it "A mixed-method design is appropriate for answering research questions that neither quantitative nor qualitative methods could answer alone". Objectives three and four do not contain variables that require quantifications. Therefore, they were studied with an interpretive approach only. Pragmatism is what works in the processes of social inquiry (Maarouf, 2019; Creswell, 2003). Therefore, in the case of objectives three and four "what work" was interpretivism's approach because there were no concepts to be quantified that warrant the use of positivist's approach.

Research design

Creswell and Creswell (2018 p.40) described research design as "procedures of inquiry" and named qualitative, quantitative and mixed-method as the three basic types of research designs. The selection of each of these designs is based on the philosophical foundation of the research undertaken (Creswell & Creswell, 2018). The research design for this study is mixed-method because the study is underpinned by pragmatism and as such, it was not limited to one conventional research approach [qualitative or quantitative].

Mixed-method design was chosen because of the nature of research objectives. Thus, both quantitative and qualitative methods were used to collect and analyse data. This was in line with Whitehead and Schneider's (2013) view that the nature of the problem statement and the objectives of the study determine the design to be followed. For instance, a triangulation method (concurrent mixed-method research design) was used to study objectives one and two. This was based on the views of some mixed-method researchers that independent qualitative and quantitative data can be collected and analyzed at the same time to check how the qualitative data relates to the quantitative results (Onwuegbuzie & Collins, 2007; Creswell, Clark, Gutmann & Hanson, 2003). As Shorten and Smith (2017, p.75) put it, "A mixed-method design is appropriate for answering research questions that neither quantitative nor qualitative methods could answer alone". Objectives three and four were studied qualitatively. This is because the nature of these objectives demands a qualitative approach.

Target population

The target population of the study were small-scale gold miners, Assembly Men/Women, traditional leaders, officials of the Environmental Protection Agency (EPA), Minerals Commission, Forestry Commission, Ghana Water Company Limited (GWCL), Local Government and District Police Commands in the area. On the miners, both members of the Small-scale Gold Miners' Association and non-members in the area were selected. This was because, according to Nyame et al., (2009), members of the Miners' Association are not different from non-members in terms of organisation, intents and mining practices. They are categorically homogeneous (Nyame et al., 2009).

Assemblymen and women and traditional leaders were selected to participate in the study because they are the opinion leaders in the area.

The officials of the District Assemblies (DAs), EPA, Minerals Commission, Forestry Commission, GWCL, Municipal and District Police Commands were part of the study because mining affects their official duties. For example, SSGM activities negatively affect water bodies and forests, therefore, officials of the Forestry Commission and GWCL were selected to participate in the study. EPA officials are responsible for environmental management and protection hence they were relevant to the study. The Police Commands are responsible for the maintenance of peace and security in the area, therefore, they were selected to be part of the study. The officials of the DAs and Minerals Commission were selected because they play roles in the licensing of the miners.

Sampling procedure and size determination

Geographically, purposive sampling was used to select one municipal area and a district in the Denkyira area to be part of the study. This was because, the Denkyira area is divided into three local government administrative units – Upper Denkyira East, Upper Denkyira West and Lower Denkyira. According to officials of the Minerals Commission at Assin Fosu and Obuasi who are responsible for mining activities in the Denkyira area, gold mining activities are common in the Upper Denkyira East and West than in Lower Denkyira and as such small-scale gold mining is practised heavily in Upper Denkyira East and Upper Denkyira West (Personal communication, 16th October, 2020). Therefore, based on this statement, Upper Denkyira East and Upper Denkyira West were selected.

The selection of the communities to be part of the study was based on the interaction with the officials of the two local Assemblies (Upper Denkyira East/Upper Denkyira West) and Executives of the Small-scale Gold Miners' Association in the area. The officials and the executives mentioned Akyempim, Kyekyerewire, Amofo, Adwuma, Asma Camp, Buabinso, Boadi I and Boadi II, Akropong, Fosu and Dunkwa-on-Offin as communities in the Upper Denkyira East where small-scale gold mining is heavily practiced (Personal communication with the Executives of the Miners' Association, 15th January, 2021; Officials of the Upper Denkyira East, 14th January, 2021). In the Upper Denkyira West, they said small-scale gold mining is common in communities such as Akwaboso, Subinso, Amenase, Domenase, Ayanfuri, Jaman, Ameyaw, Diaso and Ampabena (Personal communication with the Executives of the Miners' Association & Officials of Upper Denkyira West, 18th January, 2021). Based on this, these communities were purposely selected.

The study was a concurrent mixed-method research design. The relationship between quantitative and qualitative participants was "parallel". This means participants for the quantitative aspects of the study differed from those of the qualitative but were all drawn from the same target population of interest. As Onwuegbuzie and Collins (2007 p. 292) put it "A parallel relationship specifies that the samples for the qualitative and quantitative components of the research are different but are drawn from the same population of interest".

On the quantitative component of the study, members of the registered Small-scale Gold Miners' Association, non-members of the Association and workers of both [members and non-members of the Association] were sampled.

This was because the difference between the two miners (registered and non-registered) and their workers in terms of organisation, intent, purpose, method, and mining practices were said to be none (Nyame et al., 2009). There is no clear distinction between the two miners (registered or non-registered miners) in terms of their mining methods and practices (Nyame et al., 2009).

On the members of the Association (registered miners), the ban on all small-scale gold mining activities in 2017 was said to have reduced their numbers drastically from about 100 to 70 (Personal Communication with Executives of the Association, 15th January, 2021). According to Krejcie and Morgan's (1970) Table, the sample size for a population of 70 is 59. Simple random sampling (lottery method) was used to select 59 members to participate in the study. The procedures followed were that all the names of the 70 remaining members and their telephone numbers were collected from the Executives of the Association. The names and contacts were written on pieces of A4 paper. The names were folded and put in a basket. The basket was shaken vigorously for a minute to draw a participant from the names folded in the basket. The shaking continued till the 59th member was selected. However, 31 out of the 59 selected participated in the study because the rest (28) refused to participate in the study. Also, all efforts made to reach the 21 members who were not drawn to participate in the study to change the sampling to census proved futile. A sample size of 30 and above is said not to violate the distribution of scores (Pallant and Unwin, 2011). Thus, the researcher settled on the 31 registered miners.

The questionnaires were personally administered to the 31 participants by the researcher. Each of the 31 registered miners had people who worked for

them at the mines. These people are called “gangs” and each miner had at least two gangs. The gangs are responsible for digging, washing of the ores and other aspects of the mining. A gang is made up of eight to ten miners (Personal Communication with Executives of the Association, 16th January, 2021).

Simple random sampling (lottery method) was used to select a gang from each of the 31 registered miners who participated in the study. The steps followed were that gangs from each registered miner were labelled as gang one, gang 2, gang 3, etc on pieces of A4 papers. The papers were folded and put in a container. The container was shaken to draw a gang to participate in the study. The same steps were followed for each miner till a gang was selected for all the 31 registered miners.

The average number of workers per gang was estimated at nine, since each gang was made up of eight to ten members (Personal communication with Executives of the Association, 16th January, 2021). Therefore, 31 gangs which were made up of nine members each were 279 [$9 \times 31 = 279$]. From the Krejcie and Morgan (1970) table, the sample size for a population of 279 is estimated at 159. Simple random sampling was used to select 159 gangs to participate in the study. The names and contacts of the workers were collected from their employers. Each name was written on a piece of A4 paper. The papers were folded and put in a bowl. The researcher used his hands to stir and turn the folded papers upside-down in the bowl to draw a participant till the 159th participant was drawn. The questionnaire was personally administered to participants by the researcher. During the administration, seven workers out of the 159 selected refused to participate in the study reducing the gangs working for the 31 registered miners who participated in the study to 152.

Convenience sampling was used to select 31 non-registered miners and 159 of their workers to be part of the study. This brought the total number of samples, convenience sampling was used to select to 190. Convenience sampling was used because the non-registered miners and their workers did not have an existing sampling frame. However, they were easily accessible and available. As Bhardwaj (2019), Sedgwick (2013) and Taherdoost (2016) opined such sampling technique is used if respondents are easily available and accessible. Thirty-one non-registered miners were selected because 31 registered miners participated in the study. The workers of the non-registered miners exceeded that of the registered miners by seven because they were easily accessible and available. Unlike the workers of the registered miners whose sampling procedure [simple random sampling] required rigged criteria and as such refusal of seven to participate in the study could not be replaced.

The unregistered miners and their workers were selected from different communities in the study area. Table 2 contains the number of non-registered miners and their workers selected from various mining communities in Upper Denkyira East.

Table 2: Number of unregistered miners and their workers selected from Upper Denkyira East

Community	Number of non-registered miners selected	Number of workers selected from the non-registered miner
Akyepim,	1	5
Kyekyerewire,	2	12
Amofo	2	9
Asma Camp	2	12
Buabinso,	2	9
Fosu	1	5
Adwaman	1	5
Boadi I and II	2	11
Akropong	2	12
Dunkwa-on-Offin	2	12
Total	17	92

Source: Fieldwork 2022

Table 3 captured non-registered miners and their workers selected from various communities in the Upper Denkyira West.

Table 3: Number of unregistered miners and their workers selected from Upper Denkyira West

Community	Number of non-registered miners selected	The number of workers selected from the non-registered miners
Akwaboso	2	12
Subin	2	9
Ameyaw	2	9
Amenase,	2	9
Domenase,	2	10
Ayanfuri	2	9
Diaso	2	9
Total	14	67

Source: fieldwork 2022

This selection procedure (selecting participants from different locations and times across the study area) was done as part of efforts to reduce sampling errors associated with the convenience samples. Selection of participants from different locations and times in convenience sampling reduces sampling errors (Gobar, Noor & Tajik, 2022).

The questionnaire was personally administered to these categories of participants by the researcher. These categories of participants [unregistered miners and their workers] were selected by non-random sampling, but it does not invalidate the results of the quantitative component of the study. This is because it is false to present random sampling as belonging to quantitative study alone and non-random sampling as belonging to qualitative study alone (Onwuegbuzie & Leech, 2005). As Onwuegbuzie and Collins (2007 p. 282) noted "...both random and non-random sampling can be used in quantitative and qualitative studies". They added that majority of the mixed-method research makes use of non-random sampling no matter the goal (predict, measure changes and understand complex phenomena), objective (exploration,

description, explanation and prediction) and purpose (triangulation or seeking convergence or complementarity) of the study.

This means non-randomised samples can be used in quantitative studies. However, making statistical inferences from non-randomised samples has become a subject of debate in social scientific circles. The social scientists who preached that non-probability samples cannot be used in studies that involved inferential statistics asserted that non-randomised samples contain errors, therefore, the result of such studies cannot be generalised to the population the samples were drawn (Coppock & McClellan, 2019; Onwuebuozie & Collins, 2007; Stratton, 2021). Others held the opinion that samples drawn from non-probability methods are either underrepresentation or overrepresentation of the target population and as such interpretation of the p-value has no meaning or population effects (Hirschauer, et al. 2020). Alvi (2016 p.29) also opined that in non-randomised sampling “The categories of target population are broader enough to be divisible into infinite number of categories within themselves which are contrastingly different from one another and cannot at any cost be a representation of each other”.

Some social scientists also hold the opinion that statistical inferences can be drawn in studies that make use of convenience samples or non-probability samples (Golzar, Noor & Tajik, 2022). However, generalization of the results of such studies applies only to the population the samples were drawn and not to the general population (Andrade, 2021). For instance, Peterson and Merunka (2014) argued that testing the statistical significance of a sample that was conveniently drawn from college students applies only to college students, however, generalizing the result of such study to non-college students is not

applicable. If Peterson and Merunka's (2014) explanation of convenience sampling is anything to go by, then, random samples also suffer the same limitation in generalization (Andrade, 2021). This is because “..the findings of a randomised controlled trial (RTC) that was conducted in adults cannot be generalised to children with the same diagnosis, or the safety profile of an antidepressant in an RTC that recruited non-suicidal patients cannot be generalised to depressed patients who are suicidal” (Andrade, 2021 p.3). Therefore, drawing inferences from samples that were conveniently or purposely selected is not wrong “as long as readers are aware of the subpopulation to which the findings are relevant” (Andrade, 2021 p.3)

This part of the study is not about which side of the debate (the use of non-random samples in quantitative research) is plausible or not especially when “Much of the empirical research on the use of convenience samples suggest that the results obtained using these samples often replicate the results obtained with probability samples” (Kuupnikov, Nam & Style, 2021 p.179). It is about how to follow steps suggested by some social scientists on how to improve convenience sampling selection procedure that makes inferential statistical tests possible. For instance, Jager, Putnick and Bornstein (2017) asserted that the introduction of certain criteria in convenience sampling makes samples to be drawn homogenous which also makes statistical inferences applicable in convenience sampling. For example, a researcher could introduce gender, race and profession such as “black” “female” and “lawyers” in America to make the population homogenous, in such case, drawing statistical inferences with convenience samples selected from such population is methodologically valid (Jager, et al., 2017).

This is because, when the population is homogenous it reduces measurement variability and makes statistical inferences applicable (Peterson & Merunka, 2014). It also makes estimates of the target population accurate, precise and valid (Jager et al., 2017). Another criterion to follow to make statistical inferences applicable in convenience sampling is that the selection of participants must be done at different locations, times and days (Golzar et al. 2022; Stratton, 2012). Also, the researcher can use convenience samples along with probability samples to reduce sampling errors (Simkus, 2023). Selecting large samples also reduces sampling errors associated with convenience sampling (Golzar et al., 2022).

Concerning this study, participants were selected from different locations in the study area (Tables 2 & 3). The convenience samples were used along with simple random samples. The samples selected with the use of convenience sampling technique were relatively large – 190 participants. Per Jager et al., 2017 suggestion on the use of criteria to make convenience samples homogenous to make statistical inferences possible, the criteria the researcher used were “if the person is a small-scale gold miner”, “if the person is working for a small-scale gold miner at mines” and “if the person is doing the mining activity in the areas selected”. Therefore, the statistical inferences made were valid to the population the samples were drawn as asserted by Andrade, 2021. Golzar et al., 2022, Jager et al., 2017, Kuupnikov et al., 2021 and Peterson & Merunka, 2014.

In the qualitative component of the research, all participants were selected through non-random sampling. Purposive sampling was to select three executives of the Miners’ Association to participate in the study. One official

from each of the government institutions (EPA, Minerals Commission, Forestry Commission, GWCL, District Assemblies and District Police Commands) was purposely selected to participate in the study. Three Assembly Men and three traditional leaders from Upper Denkyira East were purposely selected. Another three Assembly Men and three traditional leaders from Upper Denkyira West were also purposely selected to be part of the study. Upper Denkyira East Municipal Assembly has 29 assemblymen but the researcher interviewed only those whose communities were most affected by mining activities. There were 16 assemblymen in Upper Denkyira West but the author interviewed only those whose areas were most affected by mining activities. Also, on the chiefs, only those whose communities were most affected by mining activities were selected. The selection of the assemblymen and chiefs was based on personal communication with government officials and the executives of the Miners Association. [Table 4 contains sample size for each target population]

Table 4: Target population and sample selected

The target population for quantitative data	Sample selected
Registered miners	31
Workers of registered miners (gangs)	152
Non-registered miners	31
Workers of non-registered miners	159
Total	373
The target population for qualitative data	Sample selected
EPA	1
GWCL	1
Forestry Commission	1
Minerals Commission	1
District Assemblies	2
District Police Command	1
Traditional leaders	6
Assembly members	6
Executives of the Miners Association	3
Total	22

Source: fieldwork, 2021

Instruments for data collection

The instruments for data collection were questionnaires, an interview guide, and an observation checklist. The questionnaire was divided into five components (A, B, C, D and E). Part 'A' solicits information on biodata, financial achievement and assets acquired by respondents. Part 'B' collected information on the social achievement of participants and factors motivating them to engage in small-scale gold mining. 'C and D' collected data on personal dispositions and micro-social pressures. The final part of the questionnaire (E) dealt with recruitment and social relations among the miners. Respondents who participated in the quantitative component of the study were 373. They consist of 31 members of the Miners' Association in the area, 152 gangs working under them, 31 non-registered miners and 159 gangs working under them.

The purpose of the collection of this data was to answer questions one and two adequately. A questionnaire was used because the number of respondents who participated in this part of the study was relatively large. Also, the nature of this part of the study (questions one and two) required both quantitative and qualitative data, therefore, a questionnaire was used to collect the quantitative aspect of the data needed for the study.

An interview guide was used to collect data from the executives of the Small-scale Gold Miners' Association, government officials, Assemblymen and traditional leaders. The interview guide largely contained questions on the environmental impacts of small-scale gold mining, measures adopted by the miners to outwit the environmental policy regulators and enforcers and a few questions on factors that motivate people to go into SSGM. The purpose of the use of the interview guide was to gather detailed information on the issues under

study through probe questions. Also, respondents who answered the questions in the interview guide were different stakeholders in the sector and their independent views were needed for comparison. Furthermore, because respondents of the qualitative component of the study were different stakeholders in the sector some of the questions were the same while others differed. This allowed the researcher to collect different and similar views on the same issue which helped to ensure the validity or trustworthiness of the study.

An observation checklist was used to collect data at the mining site of both registered and non-registered miners. The aim was to get first-hand information on the equipment used, mining practices (mechanised or manual), and the impact of the mining activities on the environment and the physical infrastructure in the mining communities. The use of different instruments for data collection also helped the author to compare the similarity or otherwise of the data gathered. For instance, the use of the author's mobile phone camera to take pictures enables the researcher to use photographs to support the data gathered from observation and in-depth interviews. The use of different instruments for data collection also allowed the researcher to compare the data to ensure the validity and trustworthiness of the study.

Pre-testing

A pre-test of the instruments was done at Anyinam, one of the small-scale gold mining areas in the Eastern Region. It started in the second week of December, 2021 and ended in the second week of January, 2022. Thirty-three gangs, three miners and one Assemblyman were selected to participate in the pre-testing. These participants were selected because they have similar characteristics and social status to the actual respondents. The interaction with

these participants helped the author to know how to handle the actual participants. The questionnaire was administered by the researcher to the gangs. The Cronbach's alpha of all the items used to represent social pressures and personal dispositions was .710. [See Appendix VII for details]. An indication that the reliability of the instruments is acceptable. The three miners and the Assemblyman were the respondents for the in-depth interview. The answers provided by them led to re-phrasing of some questions and the inclusion of some probe questions.

Fieldwork

The fieldwork started in October, 2020. It started with a visit to the office of the Mineral Commission at Assin Fosu. The officials at Assin Fosu directed the researcher to the office of the Commission at Obuasi. The officials of the Commission at Oboasi introduced the researcher to one of the executive members of the Miners' Association in Dunkwa. The researcher exchanged telephone contact with the executive member to pave the way for a visit to the Association's office at Dunkwa to interact with some of the executive members. The second visit was a familiarization tour of the area in January, 2021. During this visit, the officials of the Mineral Commission and executives of the Association directed the researcher to some of the mining communities. Another familiarization tour was done in March, 2021. The information gathered from the visits to the area was used in the study.

The data collection started in April, 2022. The first instrument to administer was the questionnaire. It was personally administered by the researcher to the respondents (interview schedules). On the registered miners, the interview schedules were mostly done at the residence of the miners, only a few met the researcher at the Association's office for the interview schedule.

Some of the un-registered miners also allowed the interview schedule to be done at their residences while others met the researcher at beer bars in the communities or their mining sites.

The interview guide was the second instrument used to collect data. All the in-depth interviews were done by the researcher. All of the government officials did the face-to-face in-depth interview at their offices. All the chiefs, assemblymen and executives of the Miners' Association also did the face-to-face in-depth interviews at their residences. The interviews were recorded with the consent of the participants.

The visitations of the mining sites were done with the consent of the miners. Among the registered miners, some gave the researcher directions to their sites while others picked the researcher with their vehicles at his hotel to the sites. Some of the chiefs, assemblymen and government officials spoke to the un-registered miners to allow the researcher to visit their sites. The data collection lasted for five months, thus it ended in September, 2022.

Data analysis

On the quantitative aspects of the study, data collected from the field was imported into Statistical Package for the Social Sciences (SPSS) version 23 for analysis. The biodata was analysed with descriptive statistics. On objective one, the ten items used as micro active and passive social pressures were analysed with descriptive statistics before the inferential statistics. The interest of the descriptive statistics was to check the frequencies of all the items and relate them with the literature. To complete the quantitative analysis binary logistic regression was run with the use of the items conceptualised as micro social pressures and dispositions as independent variables. Five composite questions that demand “yes” or “no” answers were asked with each depending

on the other in descending order and the last response (yes/no) was used to form the dependent variable (The decision to engage in mining). [See questions number 14 to 18 of Appendix I for details].

Binary logistic regression was run because ten categorical items were used as independent variables to represent micro-social pressures in objective one. Another 11 categorical items were used as independent variables to represent personal dispositions in objective two. Two categorical variables (“yes” or “no”) were used to represent the dependent variables - people’s decisions to engage in SSGM. The interest was to explore the relationships of the 10 and 11 independent variables in objectives one and two respectively on the dependent variables. Thus, 21 independent categorical variables’ influence on two categorical dependent variables (yes or no) needed to be explored. This conforms to Pallant and Unwin's (2011) assertion that in binary logistic regression, the dependent variable should have two categorical variables while the independent variable could be continuous or categorical variables.

All the independent variables in objectives one and two and the biodata were run against the dependent variable (decision to engage) in one model since the dependent variable for the two objectives was the same. This was done to derive a single model for the quantitative aspects of the study. Also, this was done because the study seeks to measure the effect of all the independent variables on a single dependent variable (decision to engage). Equally, when the independent variables of objectives one and two were run separately, the model fitness in terms of p values of the Omnibus Tests of Model Coefficients and the Hosmer and Lemeshow Test were not significant. Thus, in addition to the

biodata the model in the study contained 27 independent variables. [See tables 5 and 6 for illustration of how the model was run].

Table 5: objectives, dependent and independent variable

Objective	Dependent variable	Independent variable
Objective one	People's decisions to go into SSGM	Micro social pressures
Objective two	People's decisions to go into SSGM	Personal dispositions

Table 6: Variables, question numbers and measurements

Variables	Question No./specific variable	Measurements
People's decisions to go into SSGM	Question 19 (<i>decisiontoengage</i>)	1= yes 2=no
	Micro social pressures	
	Question 51 (Friendsandpeersrecommendation)	1= very much 2= somewhat 3=never
	Question 52 (Materialandfinancialsupportfromfriend)	1=very much 2= somewhat 3= never
	Question 53 (friendspeersandfamilymaterialenticement)	1=very much 2= somewhat 3= never
	Question 54 (Friendspeersandfamilymocked)	1=very much 2= somewhat 3= never
	Question 55 (Financialburdenofmyimmediatefamily)	1=very much 2= somewhat 3= never
	Question 56 (Flamboyantlifestyleofmyminerfriend)	1=very much 2= somewhat 3= never
	Question 57 (Spendingcultureofmynonminerfriends)	1=very much 2= somewhat 3= never
	Question 58 (Disrespectofthepoor)	1=very much 2= somewhat 3= never
	Question 60 (Wealthyminers)	1=very much 2= somewhat 3= never
	Question 61 (Hearsayofitsbetterfinancialreward)	1=very much 2= somewhat 3= never
Personal dispositions	Question 40 (Tobepowerfulandfamous)	1=very much 2= somewhat 3= never
	Question 41 (Achievedhighsocialstatus)	1=very much 2= somewhat 3= never
	Question 42 (Influentialamongfriendsandfamily)	1=very much 2= somewhat 3= never
	Question 43 (Toberichandwealthy)	1=very much 2= somewhat 3= never
	Question 44 (Acquiredalotofproperties)	1=very much 2= somewhat 3= never
	Question 45 (Mostprofitablelivelihood)	1=very much 2= somewhat 3= never

Table 6: Cont'd

	Question 46 (Getmoregold)	1=very much 2=somewhat 3= never
	Question 47 (Enjoylife)	1=very much 2=somewhat 3= never
	Question 48 (MaximizeDesires)	1=very much 2=somewhat 3= never
	Question 49 (Justmaintainmyself)	1=very much 2=somewhat 3= never
	Question 50 (Noothelivelihood)	1=very much 2=somewhat 3= never
Demographic characteristics	Question 1(Sex)	1=male 2=female
	Question 2 Age	
	Question 3 Education	1=no formal education 2=primary 3=MSLC 4=JHS 5=SHS/Voc/Tech 5=tertiary 6=other
	Question 4 MaritalStatus	1=single 2=married 3=divorced 4=widowed 5=separated
	Question 8 Experience	

Source : Author's construct

Assumptions for normality test

The three key assumptions to check when running binary logistic regression are multicollinearity, sample size and outlier (Pallant & Unwin, 2011). The sample size was 373, relatively enough to run logistic regression. Multicollinearity check was run and in the collinearity statistics columns, all the tolerance values were above 0.10. Also, all the VIF values were below five, an indication that multicollinearity assumption was not violated. The cut-off point for VIF is 10 (Pallant & Unwin, 2011). [Please, see Table 7 for details].

Table 7: Multicolonearity test result

Model	Unstandardize		Standar	T	Sig.	Collinearity	
	d Coefficients	d Coefficients	dized Coefficients			nce	Statistics
	B	Std. Error	Beta			Tolera	VIF
(Constant)	1.149	.330		3.485	.001		
To be powerful	-.137	.135	-.061	-1.020	.309	.715	1.398
To achieve high social	.023	.151	.009	.150	.881	.705	1.418
To be influential person	.120	.108	.068	1.112	.267	.698	1.432
To be rich or wealthy	-.035	.114	-.018	-.304	.761	.772	1.295
Acquire a lot of properties	-.059	.078	-.046	-.761	.447	.714	1.400
It is profitable	.108	.041	.143	2.643	.009	.880	1.137
I use machines to get more gold	-.002	.058	-.002	-.038	.969	.738	1.355
Enjoy life	-.098	.053	-.181	-1.861	.064	.273	3.670
Maximize my desires	.058	.055	.104	1.064	.288	.270	3.705
Just to maintain myself	.041	.029	.082	1.419	.157	.777	1.288
No other livelihood	.062	.030	.114	2.034	.043	.817	1.225
Friends, peers' persuasions	-.057	.074	-.046	-.768	.443	.726	1.378
Friends, peers' support	.001	.030	.002	.031	.975	.779	1.283
Friends, peers' enticement	.026	.044	.043	.580	.562	.479	2.086
Friends, peers' mocked	-.118	.057	-.123	-2.085	.038	.736	1.358
Financial burden of my family	.025	.031	.050	.800	.424	.665	1.503
The flamboyant lifestyle of my friends	.028	.029	.053	.968	.334	.848	1.179
Spending culture of my rich friends	.027	.038	.040	.702	.483	.809	1.236
The poor is respected	.024	.048	.035	.491	.624	.515	1.940
It has made others rich	.007	.031	.011	.209	.834	.910	1.099
Hearsay of its better reward.	-.060	.025	-.143	-2.416	.016	.735	1.360

Source: Fieldwork, 2022 N=373

There was no problem with the goodness of fit of the model when the logistic regression was run, an indication that the outlier assumption was not violated (Pallant & Unwin, 2011). [See Appendix VI for details]. After running the model, the relevant portion of objectives one and two were extracted from the Variables in the Equation table in Block 1 for discussions. Also, descriptive statistics of assets participants have acquired from participation in SSGM were used to strengthen the analysis of objective one. Independent sample t-tests of respondents' weekly and monthly incomes and expenditures were run to strengthen the analysis of objective two.

On the thematic analysis, recordings of the interviews were transcribed and grouped according to issues that were emerging with regard to the research objectives. The issues and the results from the quantitative aspect of the study were discussed and compared with the literature and empirical review as well as the theoretical framework of the study.

Challenges

In some of the mining communities, motor bikes were the main means of transportation and the drivers charged exorbitant fees. The researcher was able to negotiate with the drivers to reduce their charges.

CHAPTER FOUR

RESULTS AND DISCUSSION

Introduction

This chapter presents and discusses the data based on the objectives. Objectives one and two were analyzed with both quantitative and qualitative techniques. The quantitative analyses involve descriptive and inferential statistics. The results of both descriptive and inferential statistics were compared with the qualitative data. The aim was to check the differences and similarities of both qualitative and quantitative data (where they converged and diverged). Objectives three and four were analyzed with only qualitative techniques.

Demographic characteristics

Demographic characteristics are the composition, size and changes of a particular population through birth, death and migration (Mark, Linda, & Scommegna, 2021; Salkind, 2010). Examples of demographic characteristics are age, sex, ethnicity, household size, income, educational attainment, sexual preference, marital status, socio-economic status, and home ownership. [This list is not exhaustive, collection of demographic data depends on the nature of the study]. For this study, demographic data was limited to sex, age, level of education, marital status, working experience, residence, and place of origin (region, district and hometown). Data on sex was collected to know the gender dimension of the issue under discussion. To check the age group who were into SSGM, years engaged in mining, level of education and material success one has acquired through participation in mining, data on participants' age, level of education and years of working experience were gathered. Information on marital status was collected to know the number of miners who were taking care

of their spouses. In all, 373 respondents participated in the quantitative component of the study.

The dimensions of the demographic characteristics were the following: 97.6 percent of the participants were males. This did not come as a surprise because information received from the executives of the Small-scale Gold Miners' Association in the area was that only five of their members were women (Personal Communication with the Executive of Small-scale Gold Miners' Association, 20th February, 2021). The majority (53.1 percent) of the participants were married and almost half (45.8 percent) were single (Table 8).

Table 8: Marital status of participants

	Frequency	Percent
Single	171	45.8
Married	198	53.2
Divorced	2	.5
Separated	2	.5
Total	373	100.0

Source: Fieldwork (2022) N=373

On educational background, majority (58.3%) had completed Junior High School (JHS) and only 1.1 percent had graduated from tertiary schools. (Table 9 contains participants' educational background).

Table 9: Participants' level of education

	Frequency	Percent
No formal education	5	1.3
Primary education	18	4.8
Middle School Leaving Certificate	24	6.4
Junior High School	217	58.2
Senior High School/Voc/Tech	105	28.2
Tertiary Education	4	1.1
Total	373	100.0

Source: Fieldwork (2022) N=373

The mean age of participants was 32 years with a standard deviation (SD) of nine years. The coefficient of variation (CV) of the ages of respondents was 0.281, which means the SD is low. It implies that majority of the respondents were relatively young (below 32 years or just a little above 32 years). The mean years of working experience was 8 years with SD of 5.78. This means majority of the participants had eight years of working experience in small-scale gold mining. Table 10 contains the age and working experience of participants.

Table 10: Age, working experience of participants

	N	Range	Minimum	Maximum	Mean	Std. Deviation	Coefficient of variation
Age	373	57	18	75	32.23	9.081	0.281
Working Exp.	373	39	1	40	8.32	5.783	0.723
	373						

Source: Fieldwork (2022) N=373

The influence of micro-social pressures on people's decisions to go into small-scale gold mining

One of the principal arguments of this study is that micro-social pressures push people into small-scale gold mining and as more and more people participate in SSGM, its negative environmental impacts increase. Based on this argument, respondents were asked to answer a set of ten items (questions) on micro-social pressures. A three-point Likert scale (“Very Much”, “Somewhat” and “Never”) was used to determine how participants rated their engagement in mining regarding the items used as micro social pressures. Micro-social pressures were divided into two – active social pressures and passive social pressures. Each of them has five items. Two of the items of active social pressures (friends and peers’ recommendation and material and financial support from friends and family) were classified as positive active social

pressures. Also, three items of active social pressures (friends and peers' enticement; friends and peers mocked and financial burden of my immediate family) were classified as negative active social pressures.

The classification was done in accordance with Calvo-Armengol and Jackson (2008) and Esiri's (2016) ideas of why people yield to micro-social pressures. [See Figure 2 on page 87 for details]. The total number of respondents who participated in the study was 373. Descriptive statistics was run to give general information about the items. Binary logistic regression was run to test the statistical significance of the variables. The results of the descriptive statistics are the following:

Descriptive statistics on active micro social pressures

The results showed that 96.2 percent of participants were very much influenced by their friends, family, peers and neighbours' persuasions and recommendations on the better financial reward small-scale gold mining offered. Over 50 percent (54.7) were given financial and material support by their friends, family, peers and neighbours to aid them in participating in small-scale gold mining. These results were similar to the information gathered from the interview with the Executives of the Miners' Association. The results of active-social pressures are captured in Table 11 on the next page.

Table 11: Outcome of active-social pressures

<i>Active social pressures</i>	Very Much	Somewhat	Never
1. I got into small-scale gold mining through friends, peers and neighbours' persuasions and recommendation of its better reward	355(96.2%)	13(3.5%)	5(1.3%)
2. My friends and family gave me the needed material and financial support to enable me to participate in small-scale gold mining	204(54.7%)	122(32.7%)	47(12.6%)
3. I got into small-scale gold mining because my friends, peers and family used what they have achieved materially from it to entice me so I succumbed to their demands	28(7.5%)	54(14.5%)	291(78.0%)
4. I got into small-scale gold mining because my friends, peers and family mocked me with what they have acquired through SSGM	9(2.4%)	22(5.9%)	342(91.7%)
5. The financial burden my immediate family placed on me forced me to join SSGM	249(66.8%)	71(19.0%)	53(14.2%)

Source: Fieldwork (2022) N=373

For instance, a member of the executives said he was given assistance by friends and family to aid his participation in mining. Another executive member said his uncle brought him from their home-town to Dunkwa to engage in mining and when he arrived in Dunkwa the uncle gave him all the support he needed before he became a successful miner. Another executive member said his friends persuaded him to join mining because it rewards better than other alternative livelihoods. He continued: *“A friend who was a miner persuaded me to join mining and I don't regret joining it”*.

This result supports Ajzen's (1991) supposition that relevant others in one's life influence them to take a particular action. The result was also similar to that of Onumah et al (2013) who reported that miners do not only persuade their friends and family to join mining but also provide the necessary assistance

to enable them to participate in SSGM. Equally, it was in line with the findings of a study conducted by Chipangura (2019) in Zimbabwe which revealed that small-scale gold miners help, teach and support new-comers to thrive in the sector. Also, it matched the discovery of McQuilken and Hilson (2016) that friends and peers' recommendations made people join SSGM. This implies that positive active social pressures drive people into SSGM because miners persuade and assist their friends and family to engage in mining. It is consistent with Calvo-Armengol and Jackson's (2008) argument that positive-active-social pressures push people to perform certain actions.

The consequence was that it has increased participation in SSGM in the area which had also increased its environmental impacts. Equally, as more and more people engaged in mining the available buffer zones (safe areas) for mining have reduced and that has pushed some miners into protected areas. This partly explains why mining in rivers was a common practice in the area. Similarly, it partially elucidates why unhealthy competition for gold resources in the area had resulted in the use of heavy machines for mining, thereby destroying the environment.

The result showed that 78 percent of participants did not enter into mining because their peers and friends used the material success acquired through mining to entice them. Equally, about 90 percent of the respondents (91.7%) reported that they did not enter into small-scale gold mining because their family members and peers used what they had achieved in mining to mock them. This was confirmed in an interview with the executives of the Miners' Association. They said they were rather persuaded to join mining. This means negative-active-micro social pressure was not part of the factors that drove

people into small-scale gold mining. It differs from Calvo-Armengol and Jackson's (2008) argument that negative-active-micro-social pressures push people to perform certain actions. On the other hand, 66.8 percent went into small-scale gold mining due to financial pressures their immediate family exerted on them. This result is similar to that of Keita et al., (2018) in Mali which discovered that people in households with large size were likely to participate in SSGM due to financial burden placed on them by their immediate family.

Descriptive statistics on passive micro social pressures

The outcome of passive social pressures demonstrates that 56.8 percent were very much influenced by the hearsay of the better reward small-scale gold mining offers. This result is similar to a study conducted by Chipangura (2019) which discovered that hearsay of the better rewards from SSGM pushed people to join it. The result, equally confirms Zolnikove's (2020) finding that people entered into SSGM due to rumors that it pays better. Table 12 presents results on passive social pressures.

Table 12: Descriptive statistics on passive-social pressures.

<i>Scales and items</i>	<i>Passive social pressure</i>	Very much	Somewhat	Never
1.	The flamboyant lifestyle of my friends and peers who are into small-scale gold mining influenced me to enter into it	103(27.6%)	189(50.7%)	81(21.7%)
2.	The spending culture of my rich friends and colleagues who are not miners but financially successful influenced me to enter into small-scale gold mining to make quick money and spend like them	10(2.7)	127(34.0%)	236(63.3%)
3.	The people in my community do not respect poor people, I joined small-scale gold mining to be rich and respected	26(7%)	12(3.2%)	335(89.8%)
4.	I stopped my previous income-generating activity and joined small-scale gold mining because of hearsay of its better financial reward.	257(68.9%)	89(23.9%)	27(7.2%)
5.	I got into small-scale gold mining because it has made others rich	212(56.8%)	63(16.9%)	98(26.3)

Source: Fieldwork, 2022 N=373

The information in Table 12 also shows that nine out of 10 participants (89.8%) never entered into small-scale gold mining because people disrespected the poor in their community. Similarly, 63.3 percent reported that their participation in small-scale gold mining was never influenced by the spending culture of friends and peers who were not miners but rich. This result differs from Kennedy's (2013) assertion that friends' spending culture influenced their peers to search for money and spend. A situation that puts many college students in America in debt (Kennedy, 2013).

The information gathered from the interview, however, revealed that the spending culture of people influenced others to join SSGM. One of the executive members admitted that he joined mining because he realised that the

money his friends could spend on him was far from what he could do. He continued that he was searching for an income-generating activity that could give him the opportunity to also spend on his friends the same way they did for him. Another executive member added that: *“Yes, the spending culture of friends is a factor that moves people into mining”*.

According to Table 12, over 50 percent of participants (56.8%) went into mining because they had seen others who are very rich due to their participation in SSGM. Equally, five out of ten (50.7%) were somewhat influenced by the flamboyant lifestyle of their friends and peers who were small-scale gold miners. As Navakova and Vavrova (2015) opined, people’s actions exert pressure on others to take a certain action. This confirms Calvo-Armengo and Jackson’s (2008) assertion that the behaviours of neighbours influence people around them to engage in certain actions because human beings care about the actions of their neighbours. Likewise, the result is similar to the discovery of a study conducted by Ouma et al., (2017) in Tanzania which revealed that the luxury lifestyle and wealth displayed by small-scale gold miners were responsible for increased participation in SSGM. The study also discovered that school drop-out was high in mining areas as students stopped schooling and joined their friends and peers at the mines to make money and acquire wealth (Ouma et al., 2017).

Equally, a study conducted by Erdiaw-Kwasie Dinye and Mubunyewah (2014) in Ghana revealed that children dropped-out of school and joined their colleagues in the mines because SSGM was making their peers rich and they could afford expensive and luxury items. Erdiaw-Kwasie et al., (2014) found that the youth abandon formal education because it takes too much time to

complete school and the job one gets after years of schooling does not pay as much as SSGM does. This explains why the majority of the respondents (58.2%) did not continue formal education after graduating from JHS. They preferred quick money and acquisition of properties because their colleagues who were into mining were making a lot of money. This indicates that human society cherishes wealth and displays of it.

A study conducted by Crawford and Botchwey (2018) discovered that “Money talks” was the key mantra of the Chinese miners who were illegally mining in Ghana despite government’s efforts to stop them. Crawford and Botchwey (2016) reported that the Chinese were bribing their way through because they knew in Ghanaian society “money talks”. Ghanaian society loves money and respects wealthy people, due to that SSGM would continue to thrive because of the huge financial reward it offers. Regarding the structure and human agency theory, the love for money in the Ghanaian social system had influenced the miners to display their wealth and this was also orienting people around them to engage in mining to make money to enhance their social image. Therefore, comparatively, the display of wealth by the miners was responsible for the negative environmental impacts of SSGM in the area.

Reflection on the Underlying factors of micro-social pressures

A reflection of the underlying factors (economic benefit, avoidance of punishment & social approval or disapproval) considered as reasons that make people succumb to social pressures shows that the main factor pushing people into SSGM was the economic benefits. This is because four items (friends and peers’ recommendation/persuasions, material supports, hearsays of its better reward and it has made others) which scored over 50 percent on the “very much” scale belonged to the economic benefits bloc of the second conceptual

framework. [See Figure 2 on page 87 for details]. The item, “my immediate family financial burden” which also scored 50 percent and above on the very much scale belonged to the economic benefits, social approval and avoidance of punishment bloc. Equally, the variable that scored 50 percent and above on the “somewhat” scale “Flamboyant lifestyle of my friends” belonged to the economic benefits bloc. This implies that the high financial reward small-scale gold mining offers was the main factor driving people into the sector.

Furthermore, the underlying factors of four items (Friends and peers’ mocked, friends and peers' enticement, spending culture of my rich friends and people in my community do not respect the poor) that scored 50 percent and above on the “never” scale belonged to avoidance of punishment and social disapproval block in Figure 2 on page 87. [See Figure 2 on page 87 for details]. This also indicates that people went into mining for the high financial reward it offers and not for avoidance of punishment or social disapproval.

The result confirms a study conducted by Prescott et al., (2019) which revealed that the high financial reward SSGM offers was the main factor driving people into mining. It supports Ajzen’s (1991) assertion that human actions are motivated by the good mental pictures of their outcomes. Thus, participation in small-scale gold mining is likely to increase because people’s engagement in SSGM is based on the desirable mental picture of its outcome. As Phal (2016) noted humans’ actions are strategic, intentional and purposive and Dofma and Verury (2005) asserted that humans’ behaviour is borne by their motives, based on the expected result of the behaviour. This means the negative impacts of SSGM would continue to increase because the intention of the miners was to make money.

Material success of miners

In order to verify the material success of the miners, participants were asked to give an account of the assets they had acquired through proceeds from mining. This was done to determine whether the reward from small-scale gold mining was high or otherwise. Also, it was done to determine the material success miners had achieved from SSGM. An issue that was considered as one of the factors that influenced their (miners) friends, peers and family to join mining. To get a clear picture of the assets, participants were divided into two groups – miners and workers (gangs who work for the miners). The results showed that 39 out of 62 miners had two cars. Six miners had more than two cars, 15 miners had a car and two were yet to acquire one. On accommodation, 16 miners had built two houses, 32 miners had more than two houses, 12 had a house and two were yet to put up a house. All the 62 miners who participated in the study had mining equipment and landed properties. Twenty-two of them had other properties such as hotels, fuel filling stations, super markets, jewels stores, drinking spots, gyms, commercial farms and local gold refinery shops. Table 13 contains the results of the number of vehicles and houses acquired by miners.

Table 13: Number of vehicles and houses acquired by registered and non-registered miners

Response (miners)	Vehicles		Houses	
	Freq	%	Freq	%
None	2	3.2%	2	3.2%
One	15	24.2%	12	19.4 %
Two	39	62.9%	16	25.80 %
More than two	6	9.7%	32	51.60
Total	62	100%	62	100%

Source: Fieldwork (2022) N=62

On the workers, 17 out of 311 workers had cars, 187 had motorbikes and 103 had landed properties. Also, 80 had a house, three had two houses, one had more than two houses and 68 had started building a house. The results of assets acquired by the workers (gangs) of the miners are captured in Table 14.

Table 14: Assets of the workers

	Vehicles		Motorbike		House		Building a house	
	Freq	%	Freq	%	Freq	%	Freq	%
None	294	94.5	124	40.00	231	74.00	311	78.14
One	17	5.5	187	60.00	80	26.00	68	21.86
TOTAL	0	100	100	100	100	100	100	100

Source; Fieldwork, 2022 N=311

In comparison with the mean age of participants [32 years] and the average number of working years (8 years), the assets acquired by the miners and their gangs through participation in SSGM were no mean achievement. This is because Ghana has a housing deficit of 1.8 million according to the 2021 Population and Housing Census (GSS, 2021). A decade ago, the housing deficit was 2.8 million which means it took ten years before the country was able to reduce it by one million, approximately 35 percent (GSS, 2021). Therefore, if a 32-year-old man or woman has three or two houses or is putting up a house for himself/herself, it indicates that the reward of his/her job is high. A potential factor that could pull many people to participate in small-scale gold mining.

Also, ordinarily, not everybody can afford these properties (cars, hotels, fuel filling stations, super markets and jewels), hence, if a small-scale gold miner had acquired these properties the likelihood of the mining activity becoming attractive to his/her friends, peers, family and neighbours is high.

Another potential factor that could pull many people into the sector to increase its negative environmental impacts in the area.

On the contrary, not all of the miners had been successful and acquired properties. One of the executives of the Association opined this during the in-depth interviews. He said mining was not all rosy as many people perceived, adding that there were so many people who had become bankrupt through SSGM. He continued:

Some people have made it through small-scale gold mining, but this does not make it a rosy business such that as soon as you enter you make more money and start buying cars, building mansions and purchasing luxury items. No, it is not all about success, sometimes we fail too. Let me tell you this, the work is not for the faint-hearted persons. Sometimes you can lose everything, I mean all your investment because the land is not good, it did not give you any gold.

Hilson and Potter (2004) called this situation “hit and miss” and attributed it to lack of accurate geological information in Ghana which causes miners to quickly move to an area due to hearsay of gold which most often turns to be false. In such cases, the miners become disappointed and the mining activity ends abruptly (Hilson & Potter, 2004). At times the quality of the ore is good but the quantity is scanty (Salman, Carillo & Soruco, 2013). In such cases, the gold boom or gold rush attracts many miners to the area, the lucky ones strike riches but only for a short time and the late comers lose their investment (Salman et al., 2013). Some researchers considered this small-scale gold mining activity as an ephemeral occupation (Barney, 2018).

Recruitment and social relations of small-scale gold mining

The descriptive statistics of two variables – “We were friends and peers before we became miners” and “Most of the people I am working with are friends and relatives” were also run just to have a fair idea about social relations and recruitment of the gangs (mine workers) in the study area. The interest was to check if members of the gangs on the one hand and their employers on another hand had some form of social relation before they became workers or employees at the mines or otherwise. This is because the literature review shows that the gangs recommend their kind for recruitment at the mines if sponsors (miners) need extra hands and sponsors also depend on their workers to recruit extra hands if the need be (Purwanto, 2018). An argument that supports the view that micro-social pressures increase participation in SSGM and its ecological impacts. Table 15 contains the results of recruitment and social relations of small-scale gold mining.

Table 15: Recruitment and social relations of small scale gold mining

Recruitment and social relations of miners	Very much	Somewhat	Never
1. We were friends and peers before we became miners	264 (70.8%)	86 (23.1%)	23(6.2%)
2. Most of the people I am working with are friends and relatives	261 (70.0%)	90 (24.1%)	22(5.9%)

Source: Fieldwork (2022) N=373

Table 15 shows that 70.8 percent of participants were good friends and peers before they became miners and 70 percent also said they were working with their friends and relatives. The results support the assertion that workers in the sector are largely friends and relatives (Mkodzongi & Spiegel, 2018;

Teschner, 2012; Verbrugge, 2014). It re-inforces the claim that intricate social networks exist in the recruitment of small-scale gold mining (Antwi-Boateng & Akudugu, 2020; Purwanto, 2018). It also shows that micro-social pressures increase participation in SSGM.

Inferential statistics for social pressures

An inferential statistical test was run to test the statistical significance of the variables used as social pressures and personal dispositions in the study. All the independent variables in objectives one and two were run against one dependent variable, the decision to engage in mining. The reason was that the two objectives have the same dependent variable – the decision to engage in mining. Since the dependent variables were categorical and binomial, binary logistic regression was run. All the independent variables in objectives one and two and demographic characteristics except residence, districts and home-towns of respondents were run together in the same model. The districts and home-towns of respondents were excluded because when any of them was added to the model, the SPSS warned the researcher that “variables redundancies and reduction of degree of freedom” had occurred in the model. Participants came from 92 districts and 199 towns. These large numbers could be responsible for the warning [variables redundancies and reduction of degree of freedom] the SPSS gave. Also if the residence was added or removed from the model it did not have any effect so it was removed.

The output of the test showed that no variable was missing and all of the 373 cases were selected. [See Appendix VI for details]. However, when the independent variables were included in the model, the percentage accuracy in classification (PAC) showed a marginal improvement of just 4.5 percent. [See Appendix VI for details]. The full model containing all the 27 predictors was

statistically significant with a chi-square of 94.901, a degree of freedom of 64 and a p-value of 0.007. [$\chi^2(27, N = 373) = 94.901, p < 0.007$]. This indicates that the model was able to explore the relationship between the decision to engage in mining and social pressures on the one hand and the decision to engage in mining and personal dispositions on the other hand.

The chi-square of the Hosmer-Lemeshow Goodness of Fit Test of the model was 6.522 with a significance level of 0.589 and a degree of freedom of 8, an indication of strong support for the model. This is because a large significance level of more than .05 of the Hosmer-Lemeshow Goodness of Fit Test shows the robustness of the model (Pallant & Unwin, 2011). Also, the model was able to explain between 22.5 percent (Cox & Snell R Square) and 38.8 percent (Nagelkerk R Square) of the variance in the decision to engage in mining. It was also able to correctly classify 89 cases. However, only four of the independent variables made statistically significant contributions to the model. [See Appendix VI, Variable in the Equation Table for details].

The relevant portion of objective one in the Variable in the Equation table has been extracted for discussion in this section. This was done to prevent interference of the output of objective one from that of objective two. This is because the independent variables of the two objectives were run in the same model. The output of active social pressures was also separated from that of passive social pressures. [Tables 16 and 17 contain the outputs of active and passive social pressures respectively].

Results of the inferential statistics on active social pressures

The results show that the use of material success achieved by friends, peers, family and neighbours who were miners to entice others was the only active-micro-social pressure that made statistically significant contribution to

the study. This result was consistent with Ouma et al., (2017) study in Tanzania which discovered that luxury items acquired by miners enticed others to join SSGM. It reinforces the finding of a study conducted by Adu et al., (2016) in Ghana which concluded that there is a positive linear correlation between peer pressure and people's decision to engage in small-scale gold mining.

The coefficients of the use of material things acquired by miners to entice their friends, peers and family to engage in mining was positive with a p-value of .037. It means that a unit increase in the acquisition of properties and luxuries items by miners would likely increase the interest of their peers, friends and family to engage in small-scale gold mining by a factor of 3.029. The odds of using material success acquired by miners to entice others was (Exp (B)) 20.663. This implies that people's interest to engage in small-scale gold mining would likely whet by 20.663 times as long as miners' use their material success acquired through mining to entice their peers, friends and family. Inferential statistics of active-micro-social pressures is captured in Table 16.

**Table 16: The influence of active social pressures on people's decisions to go into small-scale gold mining**

	B	S.E	Walid	Sig	Exp (B)	95% C.I.for EXP(B)	
						Lower	Upper
Friends and peers recommendation (1)	.159	1.263	.016	.900	1.173	.099	13.946
Friends and peers recommendation (2)	-37.600	17067.069	.000	.998	.000	.000	.
Material and financial support from friends and family (1)	-.350	.480	.531	.466	.705	.275	1.805
Material and financial support from friends and family (2)	.017	.706	.001	.981	1.017	.255	4.054
Friends peers and family material enticement (1)	3.075	1.712	3.225	.037**	21.655	.755	621.041
Friends peers and family material enticement (2)	3.099	1.693	3.351	.067*	22.183	.803	612.674
Friends peers and family mocked (1)	-23.700	8977.936	.000	.998	.000	.000	.
Friends peers and family mocked (2)	-23.949	8977.936	.000	.998	.000	.000	.
Financial burden of my immediate family (1)	.373	.559	.444	.505	1.452	.485	4.344
Financial burden of my immediate family (2)	.289	.676	.183	.669	1.335	.355	5.024
Constant	-16.731	14091.256	.000	.999	.000		
Chi Square=94.901	Cox&smell r-square= .225		(1) = Very much				
df= 64	Negelkerker r-square= .388		(2) = Somewhat				
p= .007							

** $p < .05$ Friends peers and family material enticement (*Very Much*) and * $p < .1$ Friends peers and family material enticement (*Somewhat*)

The qualitative data supports the inferential statistics. For example, in an interaction with government officials, one of them said many of the miners have built mansions, bought expensive cars and established businesses that enticed others to engage in mining. He said some of them [miners] boast of what they had achieved from mining when they were having a conversation and that enticed others to go into mining. Another official said:

The money, they receive from mining is huge that makes some miners throw their weights about here and there, for instance, they played loud music in their cars, especially the young ones, they show-off, even their body language tells success stories which enticed others, everybody here also knows where they are getting those monies from so why won't they [friends and peers] join them [engage in mining].

An Executive member of the Association said: *“The monies we [miners] donate at funerals and the praises they shower on us after the donation enticed others to join mining”*.

A non-registered miner disclosed that they [miners] intentionally packed their pockets with more money than what they could spend if they went on a drinking spree in their home town. He said the intention was to show that they had money, a factor that enticed others to follow them when they were returning to the mines. This demonstrates that miners' actions were structuring people to join mining. It supports Archer's (1995) argument that human actions create and re-create structures that orient the behaviors of others. It also shows that miners' intention for engaging in small-scale gold mining was not for subsistence which partially explains why the production method has been

mechanized and intensified, increasing the negative environmental impacts of SSGM. This reinforces Tibaan's (2000) assertion that nature suffers if it is used for affluence or material gain.

Inferential statistics on passive social pressures

On the passive social pressures, the only variable that made a statistically significance contribution to the study was “hearsay of its better reward”. However, the coefficient was negative with a p-value of .009 [very much] and .004 [somewhat] respectively. This means a unit increase of information on the good reward small-scale gold mining offers decreases the interest in mining of the one who had gotten that information by a factor of 1.750 [very much] or somewhat 1.546 [somewhat].

The result differs from the qualitative data. For instance, an executive member of the Miners' Association disclosed that he was working as a clerical officer before he joined small-scale gold mining through hearsays of its better financial reward. He said after six months of participation in SSGM, he realized that the information he got about the mining was true and he had engaged in mining for almost 20 years. Another executive also disclosed that he stopped fishing and became a successful miner after he received information about its better financial reward. Table 17 contains inferential statistics on passive social pressures.

**Table 17: The influence of passive social pressures on people's decisions to enter into small-scale gold mining**

	B	S.E	Walid	Df	Sig	Exp (B)	95% C.I.for EXP(B)	
							Lower	Upper
Flamboyant lifestyle of my miner friends and peers (1)	.211	.506	.173	1	.677	1.234	.458	3.328
Flamboyant lifestyle of my miner friends and peers (2)	.655	.630	1.079	1	.299	1.925	.560	6.620
Spending culture of my non-miner friends (1)	19.161	8977.936	.000	1	.998	209765224.603	.000	.
Spending culture of my non-miner friends (2)	19.211	8977.936	.000	1	.998	220515007.842	.000	.
Disrespect of the poor (1)	1.516	1.755	.745	1	.388	4.552	.146	141.990
Disrespect of the poor (2)	-.274	1.568	.031	1	.861	.760	.035	16.435
Wealthy miners (1)	-.102	.498	.042	1	.837	.903	.340	2.396
Wealthy miners (2)	.616	.684	.811	1	.368	1.852	.484	7.080
Hearsay of its better financial reward (1)	-1.744	.664	6.904	1	.009***	.175	.048	.642
Hearsay of its better financial reward (2)	-1.538	.535	8.263	1	.004***	.215	.075	.613
Constant	-16.731	14091.256	.000	1	.999	.000		
Chi Square=94.901 df= 64 p= .007	Cox&smell r-square= .225 Nagelkerker r-square= .388		(1) = Very much (2) = Somewhat					

*** $p < .01$ Hearsay of its better financial reward

The influence of personal dispositions on people's decisions to go into small-scale gold mining

This section looks at the influence of personal dispositions on people's decisions to enter into small-scale gold mining. Personal dispositions were divided into three – ambitious traits, hedonism and universal motivational valued personality. The classification was done based on information gathered from the literature review (Jones et al., 2017; Judge & Kammeyer-Mueller, 2012; Shwartz, 1994; Yamauchi & Templar, 1982). Ambitious trait was subdivided into seven items while hedonist and universal motivational valued personalities were each divided into two items. Thus, the total number of items used to represent personal dispositions were 11. The descriptive statistics is presented in Table 18.

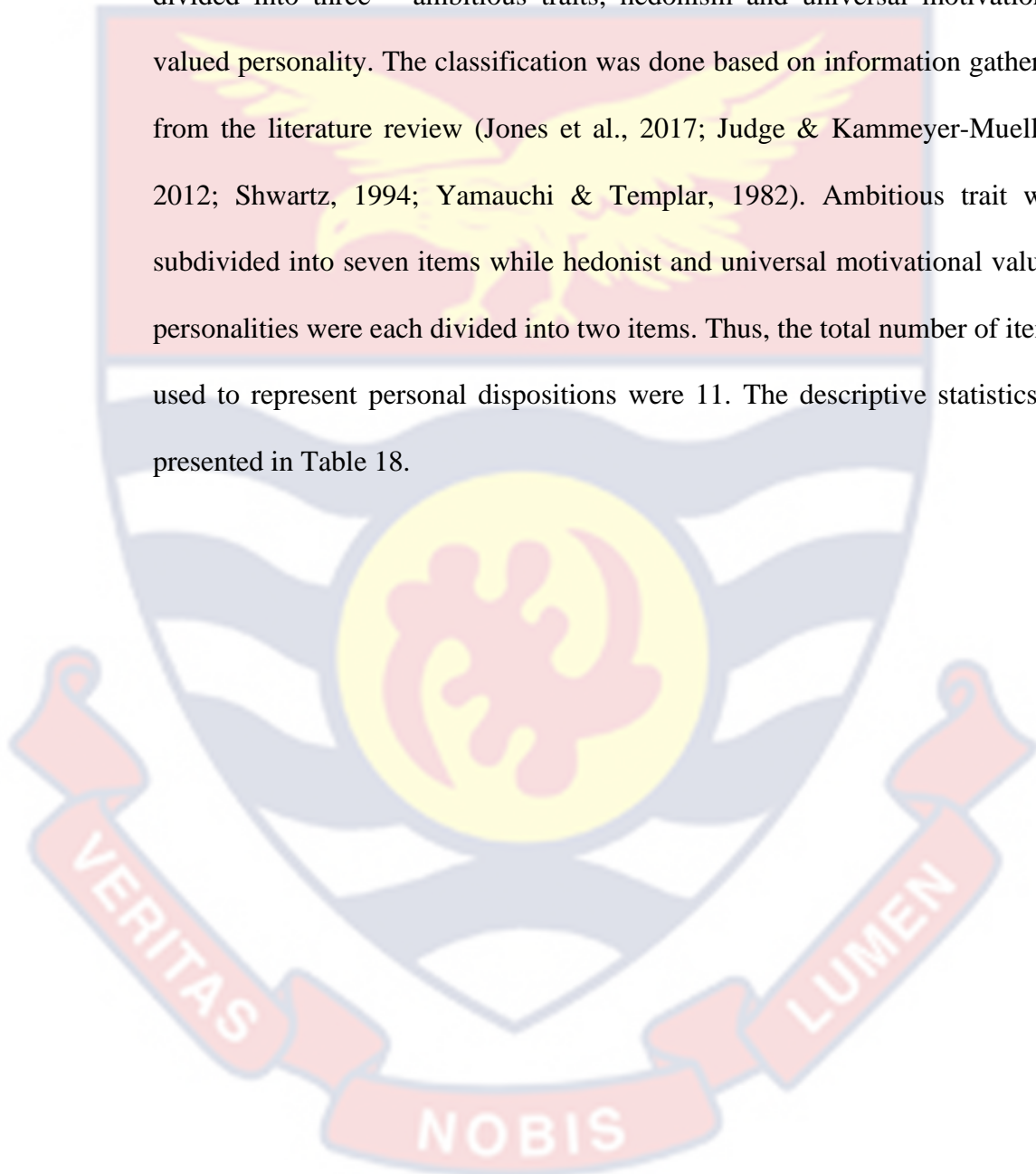


Table 18: Descriptive statistics of personal dispositions

Scales for personal dispositions			
<i>Ambition</i>	Very much	Somewhat	Never
1. Small-scale gold mining can make me powerful and famous	363(97.3%)	10(2.7%)	0
2. Small-scale gold mining can help me to achieve high social status	365(97.9%)	8(2.1%)	0
3. Small-scale gold mining can make me an influential person in my community and among my friends and family	358(96%)	12(3.3)	1(0.3%)
4. Small-scale gold mining can make me rich or wealthy	360(96.5)	13(3.5%)	0
5. Small-scale gold mining can help me to acquire a lot of properties	341(91.4%)	32(8.6%)	0
6. I participate in small-scale gold mining because it is profitable and rewards better than other livelihoods	245(65.7%)	127(34.0)	1(.03)
7. I use machines to engage in small-scale gold mining because it helps me to get more gold	355(92.2)	6(1.6)	12(3.2)
<i>Pleasure</i>			
1. The reward of small-scale gold mining can make me happy and enjoy life	127(34.0%)	192(51.5)	54(14.5)
2. The reward of small-scale gold mining can resource me to maximize my desires and wants	123(33%)	202(54.2%)	48(12.9)
<i>Universal motivational value person</i>			
1. I engage in small-scale gold mining just to maintain myself	62(16.6)	147(39.4)	164(44.0)
2. I participate in small-scale gold mining because I cannot find any other livelihood	57(15.3)	193(51.7)	123(33.0)

Source: Fieldwork (2022) N=373

On the *universal motivational valued personality*, miners who got into mining because they could not find any other livelihood were 51.7 percent. In the case of *hedonism*, 51.5 percent somewhat believed that the reward of small-scale gold mining would make them enjoy life. Also, about half of the

participants (54.2%) somewhat believed that the reward of SSGM would resource them to maximize their desires and wants. The personality traits of these miners were similar to Schwartz's (1994) hedonist motivational valued persons as people with such character traits seek pleasure, self-gratification and enjoy life. Concerning the conceptual framework (Figure 1 on page 86) such participants' engagement in small-scale gold mining would lead to environmental destruction. This is because hedonists do not care about the consequence of their actions on nature or the rights of others as long as it gives them the resources to satisfy their desires (Schwartz, 1994). This partly clarifies why the negative impacts of small-scale gold mining were common in the area.

The results of *ambitious* traits show that about 90 percent (97.30%) believed that the reward of small-scale gold mining would make them very powerful and famous in their society. Similarly, 97.9 percent held the view that the reward of small-scale gold mining would make them achieve high social status. These results matched the data gathered from the interviews with the executives of the Miners' Association. For instance, one of the executives disclosed that, when he arrived at Dunkwa he had nothing and did not know where the next meal would come from. He said, now he has people working for him at his mines and other businesses. He disclosed that a lot of people depended on him for financial assistance and that had made him famous and improved his social status both in his home-town and Dunkwa. Another executive member added that they (miners) helped the communities they mined and that had made them part of the leaders in those communities. As one of the executives simply put it: "*We [miners] are famous and recognized because we*

help people. Majority of us [miners] are generous so we are famous and many people give us respect”.

Over 90 percent (96.5%) of the respondents said mining would make them wealthy. Also, nine out of ten participants (91.4%) reported that mining would enable them to acquire properties. These results were similar to the qualitative data. For instance, an executive member of the Association said mining had made him rich and acquired a lot of properties. He added that some miners lived in mansions while others had built residential apartments and rented them [apartment] to government workers and staff of the large-scale mining company operating in the area.

I have four houses and two cars. One of the houses is in Kumasi.

I have another one in my hometown and two [of the houses] are in Dunkwa. All of the members of the Association have houses in their hometowns and in Dunkwa. Every member has at least two cars. One of the cars is used to support the activities of the work.

The other [car] is used for travelling or attending social activities such as church or funerals, he said

The participants' desire to acquire wealth and properties fits Barsukova's (2016) description of ambitious persons as such people strive to acquire properties for social recognition and importance.

Table 18 also shows that over 90 percent (94.9%) used machines to engage in mining because it would increase the amount of gold to be extracted. The high percentage of participants using machines to engage in mining supports the argument made in the discussion of the social pressures that the aim of the miners was not for subsistence but for capital accumulation as

intentions for participation in SSGM determine the tools to be used to mine. As Mensah et al, (2015) opined, if the aim of the miner is subsistence, the capital requirement is low and the mining is labour-intensive, however, if the aim of the miner is for high profit, production process is capital intensive. If production is capital-intensive the difference between SSGM and large-scale mining is blurred (Mensah, 2015).

The information gathered from the interviews with the executives of the Miners' Association reinforced this result. One executive member said the machines made the work simple, fast and accident-free. Another executive disclosed that the number of machines a miner used determined the amount of gold he/she could extract from the soil. For example, if somebody used one excavator the amount of gold that person would extract cannot be compared with the miner using two excavators, concluding that: *“we use more than one excavator because we want more gold”*.

This means miners were likely to prioritize their intentions for more gold by using machines to engage in mining at the expense of the environment. As Crawford and Botchwey (2016) noted, the use of machines in small-scale gold mining has increased its environmental impacts tremendously because what would take human power years to destroy, machines accomplished it in a few days. The recent intensification and mechanization of small-scale gold mining were responsible for the increase in its negative environmental impacts (Crawford & Botchwey, 2016).

Table 18 shows that 96 percent of participants were optimistic that SSGM would make them very influential in their community and among friends and family. This is consistent with the qualitative data. In particular, one of the

Assemblymen said the miners in the area were very influential people as a result of the huge money they had made from the mines. He disclosed that their [miners] spheres of influence extended to the chiefs and elders in the communities because they [miners] used part of the money to help the communities. He said that the new palace in his community was built by the miners so their [miners] spheres of influence went beyond the residents. *“They (miners) are generous, they help people, even the chiefs call on them if they (chiefs) need help. Because of this, they (miners) have influence in the communities they operate”*, he added.

Furthermore, over half of the participants (65.7%) said small-scale gold mining was very profitable and rewards better than other livelihoods. This confirms Verbrugge's (2014) discovery in Philippines that the small-scale gold mining is profitable and as such wealthy people have invested in the sector for huge profits. The profitability of the sector has led to mechanization of production and as such it no longer fits the definition of small-scale (Verbrugge, 2014).

Inferential statistics for personal dispositions

The dependent variables for social pressures and personal dispositions were the same, hence they were run in the same model. [See data analysis, and assumptions for normality test in chapter three and the introduction of inferential statistics of social pressures in chapter four for details]. Thus, the relevant portion of the model $\chi^2(27, N=373) = 94.901$ was extracted from the variable in the equation table in Appendix XI to check the statistical significance contributions of the variables used to represent personal dispositions. [See Table 19 for details of the extract from the model]. The result shows that only two

variables made statistically significant contributions to the model. “Small-scale gold mining can make me an influential person in my community and among my friends and family” and “I participate in small-scale gold mining because it is profitable and rewards better than other livelihoods” were the variables whose p values were significant. See Table 19 for the results of inferential statistics of the personal dispositions.



**Table 19: The influence of personal dispositions on people's decisions to go into small-scale gold mining**

	B	S.E.	Wald	Df	Sig.	Exp(B)	95% C.I. for EXP(B)	
							Lower	Upper
To be powerful and famous (1)	1.214	1.503	.652	1	.419	3.365	.177	64.039
Achieved high social status (1)	.414	2.314	.032	1	.858	1.513	.016	141.201
Influential among friends and family (1)	2.166	1.061	4.172	1	.041**	8.725	1.091	69.743
Influential among friends and family (2)	20.628	47684.250	.000	1	1.000	909474696.350	.000	.
To be rich and wealthy (1)	-1.795	2.307	.605	1	.437	.166	.002	15.283
Acquired a lot of properties (1)	-.563	.817	.474	1	.491	.570	.115	2.826
Most profitable livelihood (1)	1.233	.444	7.705	1	.006***	3.432	1.437	8.200
Most profitable livelihood (2)	-42.641	41183.470	.000	1	.999	.000	.000	.
Get more gold (1)	-17.840	12782.471	.000	1	.999	.000	.000	.
Get more gold (2)	-40.062	25657.609	.000	1	.999	.000	.000	.
Enjoy life (1)	-.821	.847	.940	1	.332	.440	.084	2.313
Enjoy life (2)	-1.310	1.203	1.187	1	.276	.270	.026	2.849
Maximize Desires (1)	.536	.867	.383	1	.536	1.709	.313	9.348
Maximize Desires (2)	.720	1.218	.349	1	.555	2.054	.189	22.343
Just maintain myself (1)	1.157	.881	1.725	1	.189	3.182	.566	17.896
Just maintain myself (2)	1.575	.964	2.671	1	.102	4.831	.731	31.940
No other livelihood (1)	-1.016	.836	1.477	1	.224	.362	.070	1.864
No other livelihood (2)	.168	.795	.045	1	.832	1.183	.249	5.616
Chi-square = 94.901	Cox&Snow r-square=.225				(1) Very much			
df= 64	Negelkerke r-square= .388				(2) Somewhat			
p= .007								

*** $p < .01$, most profitable and ** $p < .05$, most influential among friends and family

In comparison with the social pressures, the p values of two variables also made statistically significant contributions to the model but the p value of the scale - “Somewhat” of “friends and peers’ enticement” was weak. This confirms the outcome of the empirical review of the study, which revealed that the explanatory power of Ajzen’s (1991) “attitude” or concept used to represent it in research was the highest among the other three main concepts of the theory of planned behavior – subjective social norm and perceived behavioral control. In this study social pressure was used to represent subjective social norms and personal disposition was used to represent attitude.

The results in Table 19 show that “Small-scale gold mining can make me an influential person in my community and among my friends and family” was one of the variables that made a statistically significant contribution to the model. The p-value was 0.041 with a positive coefficient. This means a unit increase in the sphere of influence of a miner in the communities and among family, peers and friends would also increase his/her interest in mining by a factor of 2.166. The odds of a miner becoming an influential person in his/her community and among friends, peers and family was (Exp (B) 8.725. This implies that if a miner becomes an influential person in his/her community or among his/her friends, peers and family as a result of material success achieved through mining it would increase his/her participation in mining by 8.725 times.

This is a clear indication that the symbolic meaning (social influence) respondents attached to gold or money and material things they have acquired from SSGM urged them to intensify the mining activities. The reason for the intensification of the mining activities was that it would help them to make more money for social recognition, influence and fame. People who seek money and

material success for this purpose are classified by Yamauchi and Templar (1982) as power-prestige persons. They seek money for the symbolic meaning attached to it such as a sign of material success, a means to impress others, a mark of a high social status and a tool to gain influence in society (Yamauchi & Templar, 1982). Power-prestige attitude persons are materialistic and believe that the accumulation of wealth makes one socially powerful and influential (De Laude Kuan, 2017). They also make money to impress others (De Luade Kuan, 2017). Therefore, it was not surprising that almost all of the miners were using machines to increase the amount of gold to be extracted. The effect of this was increased in negative impacts of small-scale gold mining in the area.

The p-value (0.041) of the item also implies that the dispositions of the miners were similar to Guth and Tagiuris's (1965) "power and economic men" who seek wealth for social influence. Equally, the result shows that the participants' disposition was not different from Schwartz's (1994) power motivational valued persons who seek wealth and power to control and dominate others and resources. The quest of participants to use the reward of small-scale gold mining to be influential among friends, peers and family also shows that increased participation in SSGM and its negative impacts on the environment were partly caused by both cognitive meaning miners attached to money and how Ghanaian society respects wealthy people. This demonstrates that micro-social pressures and people's dispositions influence their decision to engage in small-scale gold mining. As the arrows in the conceptual framework on page 87 depict, social pressures and personal dispositions dependently and independently push people into small-scale gold mining. This is consistent with Archers' (1995) view that humans' actions are based on the interplay of the

structure and their agencies but inconsistent with Giddens' (1984) view that human action is voluntary and free will. It also implies that Ghana should tackle the problems associated with the sector from both systemic and individual approaches.

The second variable that made a statistically significant contribution to the model was "I participate in small-scale gold mining because it is profitable and rewards better than other livelihoods". Its coefficient was positive with a p-value of 0.006. This implies that a unit increase in profits of miners intensified their participation in mining by a factor of 1.233. The odds ($\text{Exp}(B) = 3.432$) indicate that a miner who had found or considered SSGM to be profitable was 3.432 times more likely to intensify his/her participation in mining than to look for another alternative livelihood. This infers that respondents would not stop mining even if the government provided other alternative livelihoods. It elucidates why the alternative livelihood activities such as the nursery of oil palm seedlings employed by the government to reduce participation in SSGM have not yielded the intended result. A visit to the Oil Palm Seedlings Nursery Project, under the Alternative Livelihood Project funded by the Ministry of Lands and Natural Resource at Kwadwo Krom popularly known as KPK, a community in the area [KPK is a community which lies in the middle of Dunkwa -Ayanfuri road] revealed that the salaries of the workers did not match that of those doing mining.

A study conducted by Arah (2015) also found that SSGM was profitable and the salaries of workers in the sector were even better than the salaries of some people working in the public sector. Arah (2015) concluded that the differences in salaries between miners and some workers in the public sector

were the reason some miners refused to work in the formal sector if the opportunity arose. An interview with one of the government officials also confirmed this fact. The official said any time the District Assembly employed youth from the community, the person worked for less than two months because the salary he/she received was meager and could not match that of what his/her friends were receiving from the mines. As Smith et al., (2017 p. 52) put it “Small-scale gold mining is lucrative and cannot be replaced with low-paid jobs”. This also reinforces the argument made earlier that the sector is lucrative and would continue to thrive.

For example, about five years ago, Chinese small-scale gold miners were making an estimated profit of US\$15,000 per week and Ghanaians fronting for these Chinese miners were making US\$4000 to 6,500 per week (Crawford & Boakye, 2016). These huge profits made some Chinese and Ghanaian small-scale gold miners billionaires and millionaires respectively within a short time (Crawford & Boakye, 2016). Also, labourers working in the sector were earning between 2 – 22 dollars per day (Boah, et al, 2016). Part of this money was used to buy expensive gifts such as Ferrari cars for friends in China and Ghana housing units were built, expensive cars bought and luxury lifestyles led by some of the small-scale gold miners (Arthur et al, 2016; Crawford et al, 2016). The massive financial reward associated with small-scale gold mining lures some urban dwellers to migrate to rural areas in search of gold and it also makes some rural folks favour small-scale gold mining in respect of other alternative livelihood activities (Arthur et al, 2016; Angko & Tanyeh, 2016; Cobbina, 2012).

Monthly and weekly income of the miners and their workers

In order to determine the profitability of the sector, information on how much participants earned per week/month and their expenditure per week/month was collected. All respondents answered these questions except two registered miners who refused to share such information. The figures were juxtaposed with the figures in the latest, Ghana Living Standard Survey (GSS, 2019). The aim was to appreciate the differences of the figures rather than comparisons because the years were not the same. Descriptive statistics of income/expenditure of both registered and non-registered miners and their workers is presented in Table 20.

Table 20: Income/Expenditure of both miners and their workers

	Weekly income	Monthly income	Weekly Exp.	Monthly Exp.
Mean	1144.75	4564.5040	452.0375	1687.2654
Std. Error of Mean	100.725	401.42169	34.39557	110.91554
Median	420.00	1680.0000	250.0000	800.0000
Mode	400	1600.00	200.00	800.00
Std. Deviation	1945.316	7752.74055	664.28887	2142.13491
Variance	3784254.034	60104986.111	441279.708	4588741.964
Skewness	3.478	3.490	5.213	3.641
Std. Error of Skewness	.126	.126	.126	.126
Kurtosis	13.463	13.613	40.947	18.488
Std. Error of Kurtosis	.252	.252	.252	.252
Range	15000	60000.00	7500.00	20000.00
Minimum	0	.00	.00	.00
Maximum	15000	60000.00	7500.00	20000.00
Sum	426990	1702560.00	168610.00	629350.00
Percentiles				
25	400.00	1600.0000	200.0000	800.0000
50	420.00	1680.0000	250.0000	800.0000
75	600.00	2400.0000	300.0000	1200.0000

Source: Fieldwork (2022) N= 373

The figures in Table 20 show that the mean monthly income of participants was GHC4564.50 with an SD of GHC7750.74. This shows that the incomes of the

majority of the miners were widely spread from the mean. For instance, the percentiles show that the majority of them earned between GHC1600 and GHC2400 a month which reinforces the idea that there were many outliers in the income data set. Equally, the mean is greater than the median and the median is also greater than the mode, an indication of positive skewness or outliers in the data. The income of some owners of the mines was huge and that was responsible for the high SD and variance. To get a clear picture of participants' incomes, the data was split into four (registered miners, unregistered miners, workers of registered miners and workers of unregistered miners).

Income of registered and non-registered miners

The results of the income/expenditure of registered miners have been presented in Table 21.

Table 21: Income and expenditure of registered miners

	Weekly income	Monthly income	Weekly Expenditure	Monthly expenditure
Mean	2774.19	11096.7742	1400.0000	4703.2258
Median	2000.00	8000.0000	1000.0000	4000.0000
Mode	2000	8000.00	1000.00	4000.00
Std. Deviation	1935.797	7743.18986	1290.47795	2522.89303
Variance	3747311.8	59956989.24	1665333.333	6364989.247
Skewness	1.771	1.771	3.714	.674
Std. Error of Skewness	.421	.421	.421	.421
Kurtosis	5.347	5.347	17.250	1.260
Std. Error of Kurtosis	.821	.821	.821	.821
Range	10000	40000.00	7500.00	12000.00
Minimum	0	.00	.00	.00
Maximum	10000	40000.00	7500.00	12000.00
Sum	86000	344000.00	43400.00	145800.00
Percentiles				
25	2000.00	8000.0000	800.0000	3200.0000
50	2000.00	8000.0000	1000.0000	4000.0000
75	4000.00	16000.0000	1500.0000	6000.0000

Source: Fieldwork (2022) N=31

The results show that the mean income of registered miners per month was GHC10,967.74 with an SD of GHC7743.19 and a coefficient of variations of 0.70. This infers that the majority of the registered miners earned close to or a little above GHC10,967.74 a month. The mean monthly expenditure of registered miners was GHC4,529 with SDs of GHC2,522.89 and a coefficient variation of 0.5570. This implies that the average registered miner spent close to GHC4,529 a month. In comparison with the average monthly income (GHCC10,967.74 - 4529.00), each registered miner saved close to GHC6,433.74 a month.

On the other hand, the average monthly income of unregistered miners was GHC25,032.26 with an SD of GHC11,441.11 and a coefficient of variation of 0.46. This means most of the unregistered miners earned around 25,032.26 a month. Table 22 presents the results on income and expenditure of unregistered miners.

Table 22: Income and expenditure of unregistered miners

	Weekly income	Monthly income	Weekly Exp.	Monthly Exp.
Mean	6290.32	25032.2581	1625.8065	6412.9032
Median	6000.00	24000.0000	1200.0000	4800.0000
Mode	7000 ^a	24000.00 ^a	1000.00	4000.00
Std. Deviation	2862.907	11441.10680	849.30079	3323.42614
Variance	8196236.559	130898924.731	721311.828	11045161.290
Skewness	.780	.817	2.390	2.509
Std. Error of Skewness	.421	.421	.421	.421
Kurtosis	1.306	1.364	7.530	8.589
Std. Error of Kurtosis	.821	.821	.821	.821
Range	13000	52000.00	4000.00	16000.00
Minimum	2000	8000.00	1000.00	4000.00
Maximum	15000	60000.00	5000.00	20000.00
Sum	195000	776000.00	50400.00	198800.00
Percentiles				
25	4000.00	16000.0000	1000.0000	4000.0000
50	6000.00	24000.0000	1200.0000	4800.0000
75	8000.00	32000.0000	2000.0000	8000.0000

Source: Fieldwork (2022) N=31

The mean monthly expenditure of unregistered miners was GHC6,412.90 with an SD of GHC3,323.43 and a coefficient of variation of 0.5182. This implies that the majority of the unregistered miners spent GHC6,412.90 a month. In comparison with the mean monthly income (GHC25,032.26 – GHC6,412.90), the unregistered miners saved close to GHC18,619.36 a month. This showed that the savings of unregistered miners were almost thrice of that the registered miners. [The average savings of registered miners was GHC6433.74].

The unregistered miners were making huge savings as compared to the registered miners. However, the mean monthly savings of the registered miners was better than the national average monthly earnings of GHC972.00 for all occupations in Ghana (GSS, 2019). It was also better than the sum of the mean monthly earnings of managers (GHC1,937.00), professionals (GHC1,107.00), technicians and associate professionals (GHC1,284.00) in Ghana (GSS,2019). This also confirms the earlier result of this research which revealed that small-scale gold mining is profitable.

Income and expenditure of workers of registered and non-registered miners

The lowest monthly wage of a gang [worker] working for a registered miner was GHC800 and the highest was GHC4000. The results of income and expenditure of registered and non-registered miners are presented in Table 23.

Table 23: Income and expenditure of workers of registered mines

	Weekly income	Monthly income	Weekly exp.	Monthly exp.
Mean	477.04	1901.5789	238.8158	914.4737
Std. Deviation	134.572	539.33256	130.35832	327.42380
Variance	18109.720	290879.610	16993.290	107206.344
Minimum	200	800.00	100.00	200.00
Maximum	1000	4000.00	1500.00	2000.00

Source: Fieldwork (2022) N=152

The average monthly income of workers of registered miners was 1,901.58 with an SD of GHC539.33 and a coefficient of variation of 0.2836. The mean expenditure of the workers per month was 914.47 with an SD of 327.42 and a coefficient of variation of 0.3580. If the expenditure is deducted from the salary, averagely the workers saved almost GHC1000 [GHC987.11 actual savings] a month. The mean monthly savings of the workers of the registered miners was a little higher than the average monthly earnings of GHC972.00 for all occupations in Ghana (GSS, 2019).

For the workers of the unregistered miners, the minimum wage per month was GH1,200 and the highest monthly wage was GHC3,000. The mean monthly wage was GHC1,846.04 with an SD of 413.33. The average expenditure per month was GHC916.67 with an SD of 239.57. Table 24 presents the income/expenditure of workers of unregistered miners.

Table 24: Income and expenditure of workers of unregistered miners

		Weekly income	Monthly income	Weekly exp.	Monthly exp.
N	Valid	159	159	159	159
	Missing	0	0	0	0
Mean		462.14	1846.0377	242.2013	916.6667
Std. Deviation		105.383	413.32707	186.77695	239.57152
Variance		11105.525	170839.264	34885.630	57394.515
Minimum		300	1200.00	150.00	250.00
Maximum		750	3000.00	2500.00	2500.00

Source: Fieldwork (2022) N=159

If the mean monthly expenditure is deducted from the mean monthly salary, the workers of the unregistered miners saved GHC929.37 per month. In comparison with the salary of the workers of the registered miners, the registered miners' workers earned in excess of GHC57.74 over the unregistered miners' workers. However, the average monthly savings of both registered and non-registered miners' workers was greater than the mean monthly earnings of GHC597.00 for

all menial jobs in Ghana (GSS, 2019). This is also a clear indication that relatively, small-scale gold mining pays better than other menial jobs. This clarifies why 80 workers of both registered and non-registered miners had built a house, 68 were putting up a house, 17 had private cars and 187 had motorbikes. It partly explains why alternative livelihood programmes of successive governments in Ghana have failed to reduce participation in small-scale gold mining.

The least paid workers (GHC800) were women who mostly cooked for the male gangs. This is consistent with Crawford and Botchwey's (2016) findings that women are poorly paid in the sector. They received GHC33.33 per day which was above the average income of GHC16.11 per day in rural Ghana (GSS, 2019). They [the low-paid workers] were also better off than workers of the Nation Builder Corps (NABCO) whose monthly salary was GHC700 and had 11 months of their salaries in arrears after the end of the programme.

Also, the conditions of service of the workers [gangs] in the sector were relatively better than that of many workers in the country. To give an instance, each gang received GHC10 a day, two meals a day (breakfast and lunch) for six working days. They enjoyed free transportation to and from work. They received bonuses if they exceeded targets in addition to the wages. Some of them were not spending money on accommodation because they slept in groups in rooms rented by their employers (miners). This implies that the workers in the sector were better off than most first-degree holders working in the formal sector (both public and private) who spent a fortune of their monthly salaries on food, transportation and accommodation.

Independent Sample T-Test of income/expenditure of workers of registered/ unregistered miners

An independent-sample t-test was performed to check the statistical significance of the mean incomes and expenditures of participants. All assumptions of the test were met. The dependent variables (weekly/monthly income and weekly/monthly expenditure) were measured by continuous scales (income/expenditure). Convenience sampling was used to select unregistered miners and their workers but it does not make the result invalid. [See conditions that make inferential statistics possible in convenience samples from the second paragraph on page 104 to the end of the first paragraph of page 109 for your perusal]. As Pallant and Unwin (2011 p.205) asserted that random selection “is often not the case in real-life research”. Thus, the use of convenience sampling to select a subset of the samples does not invalidate the result of the inferential test in this study.

The positive information is that the registered miners and their workers were randomly selected. All the samples were above 30, therefore, violation of the distribution of their scores was tolerated as opined by Pallant and Unwin (2011). The homogeneity of variance test was also taken care of by Levene’s test for equality of variance performed by SPSS.

The output for the workers shows that all the variables violated Levene’s test for equality of variance except the mean scores of the weekly expenditure. Therefore, the figures of equal variances not assumed were reported for the other three variables – weekly income, monthly income and monthly expenditure. The p values of all the variables were not significant which inferred that there were no statistically significant differences between salaries and expenditure of the workers of registered and unregistered miners. See Table 25

for the output on the mean difference of income/expenditure for the workers (gangs)].





Table 25: The Mean difference in income/expenditure for workers

		Levene's Test for Equality of Variances		t-test for Equality of Means						
		F	Sig.	T	Df	Sig. (2- tailed)	Mean Difference	Std. Error Difference	95% Confidence Interval of the Difference	
								Lower	Upper	
Weekly income	Equal variances assumed	8.806	.003	1.090	309	.277	14.901	13.673	-12.003	41.805
	Equal variances not assumed			1.084	286.002	.279	14.901	13.747	-12.158	41.960
Monthly income	Equal variances assumed	10.160	.002	1.022	309	.308	55.541	54.343	-51.389	162.472
	Equal variances not assumed			1.016	282.925	.310	55.541	54.663	-52.058	163.140
Weekly Exp.	Equal variances assumed	.471	.493	-.185	309	.854	-3.385	18.341	-39.475	32.704
	Equal variances not assumed			-.186	283.123	.853	-3.385	18.199	-39.208	32.437
Monthly Exp.	Equal variances assumed	10.669	.001	-.068	309	.946	-2.192	32.431	-66.007	61.621
	Equal variances not assumed			-.067	276.019	.947	-2.192	32.653	-66.475	62.089

Source: Fieldwork (2022) N=311

The reasons accounting for this result were that the work the two groups of workers performed was similar, therefore, they received the same wages or the difference between their wages was negligible. The information gathered from the observation showed that both workers [registered or non-registered] worked between 10-12 hours a day, six days a week and performed the same roles. Also, labour was scarce in the area. As one government official noted, labour was in short supply in the area because of the huge money people received from the mines. He said:

The Assembly engaged some youth in the area as labourers to work for it [Assembly] as casual workers, they [the casual youth labourers] left after withdrawing their first monthly wages because the money we [Assembly] paid them did not match that of what their colleagues were receiving at mining site.

One of the assemblymen had this say: “Many of the youth in the mining communities do not want to do any job apart from legal or illegal mining because of the money involved”.

This confirms the findings of a study conducted by Danyo and Osei-Bonsu (2016) which revealed that demand for labour in SSGM areas is high and this has reduced labour for agriculture and other livelihoods strategies. This means, if a miner fails to pay his/her workers the minimum wages they deserve, such a miner would find it difficult to get people to work for him/her. Hence, the miners paid their workers the amount they deserved according to the roles they played at the mines.

The mean test for registered and non-registered miners

The output of the mean differences in incomes and expenditures of the registered and unregistered miners are captured in Table 26.



Table 26: The mean difference of income and expenditure of the registered and non-registered miners

		Levene's Test for Equality of Variances		t-test for Equality of Means						
		F	Sig.	T	Df	Sig. (2-tailed)	Mean Difference	Std. Error Difference	95% Confidence Interval of the Difference	
									Lower	Upper
Weekly income	Equal variances assumed	4.542	.037	-5.665	60	.000	-3516.129	620.706	-4757.726	-2274.532
	Equal variances not assumed			-5.665	52.689	.000	-3516.129	620.706	-4761.279	-2270.979
Monthly income	Equal variances assumed	4.306	.042	-5.616	60	.000	-13935.483	2481.258	-18898.739	-8972.228
	Equal variances not assumed			-5.616	52.716	.000	-13935.483	2481.258	-18912.882	-8958.085
Weekly Exp.	Equal variances assumed	.228	.635	-.814	60	.419	-225.806	277.468	-780.825	329.212
	Equal variances not assumed			-.814	51.883	.419	-225.806	277.468	-782.616	331.004
Monthly Exp.	Equal variances assumed	1.000	.321	-2.281	60	.026	-1709.677	749.411	-3208.723	-210.631
	Equal variances not assumed			-2.281	55.956	.026	-1709.677	749.411	-3210.955	-208.399

Source: Fieldwork (2022) N=62

Table 26 shows that, the mean weekly and monthly incomes failed the Levene's test for equality of variances, therefore, the results of equal variances not assumed were reported. The mean weekly and monthly expenditures passed the Levene's test for equality of variances. The results show that, the mean difference of all the variables were statistical significance except weekly expenditure. From Table 26, the mean difference of the weekly income between registered and unregistered miners was GHC-3516.13 with a p value of 0.000 and degree of freedom of 52.689. With reference to the descriptive statistics, the unregistered miners saved more income than their registered counterparts. They made excess income of GHC3,516.13 a week than the registered miners. [The reasons for the differences in mean weekly income would be explained in the next sub-section].

The mean difference in monthly income of registered and unregistered miners was GHC-13,935.48 with a p-value of 0.000 and a degree of freedom of 52.716. This demonstrates that the unregistered miners made an excess income of GHC13,936.48 more than the registered miners per month. The mean difference of monthly expenditure was GHC-1709.68 which means the unregistered miners spent an excess of GHC1709.68 than their registered counterparts. [The difference in their weekly expenditure was not significant].

The Cohen's d effect size for the mean weekly income between the two miners was large, approximately 0.348. This implies that the difference between the weekly income of unregistered miners and registered miners was approximately 35 percent in favour of the unregistered miners. The Cohen's d effect size for mean monthly income was also large, approximately 0.345. This infers that the mean monthly income of the unregistered miners was higher than

that of registered miners by approximately 35 percent, approximately. Several reasons are responsible for the huge differences in weekly and monthly incomes.

Reasons for the difference in the mean monthly incomes

The registered miners had been burdened with taxes by the government as much of their incomes go to the State as taxes. On the other hand, the unregistered miners paid no taxes because their activities were not officially regulated by the State, hence they kept all their income. Also, the registered miners might have under-declared their incomes to the researcher for fear of being opened to more taxes by the State. Furthermore, the odds of registered miners spending part of their income to address environmental protocols such as land reclamation, greening, proper discharge of tailing pools and others were higher than the non-registered miners. This is because they [registered miners] were officially regulated by the State and as such must mine responsibly to ensure proper maintenance of the environment, otherwise their license would be ceased by the State. However, the unregistered miners had no obligation to spend part of their income to maintain the environment since their mining activity was not official or sanctioned by the State. These account for the huge differences in the mean weekly/monthly incomes between registered and non-registered miners.

The likelihood of a registered miner avoiding mining in a protected but rich area was higher than non-registered miners since registered miners' activity was regulated by the State. A site observation by the researcher corroborated this assumption. Field observation by the author revealed that none of the registered miners visited was mining in the river or buffer zone (100 meters away from the river). The information gathered from the interviews supported

this fact. For instance, one of the executives of the Association disclosed that he had an opportunity to mine in an area that was rich with gold but he refused because the area was a buffer zone. A government official also told the author that he threatened one of the registered miners during a field inspection with a stoppage order for a protocol the miner was about to breach. He said the rebuked miner got annoyed out of frustration. Later, the official said he realized that the miner had spent much of his profit to maintain the environmental protocols.

This demonstrates that the maintenance of the environmental protocols was eroding part of the income of some registered miners making their savings margin low as compared to the unregistered ones. The probable consequence of this is that it would erode the motivation of the registered miners and they would stop adherence to the environmental protocols, especially, when both miners sell their gold to same buyer at the same price. [Both registered and unregistered miners sell their produce to agents of Precious Mineral Marketing Company, an agency of the government responsible for buying minerals]. Therefore, what is the incentive for the registered miner to adhere to the environmental protocols? Thus, this somewhat explains why some registered miners did not adhere to the environmental protocols. Notwithstanding this fact, small-scale gold mining is profitable because the monthly mean savings of over six thousand Ghana Cedi (GHC6,433.74) by the registered miners was not a meagre income. It was against this background that, some families in the area agreed to use their land for mining and shared the proceeds with the miners. For example, one of the Assemblymen said his family agreed to use their grand-mother's three and a half acre cocoa farm for mining. He disclosed that when they (the family) informed her, she asked them to wait until she died. After her demise the family

entered into an agreement with three miners and made a profit of GHC7,000,000.00 (Seven Million Ghana Cedi), after deductions of all the expenses made during the mining activities on the land, he said.

Three government officials also shared similar information. They said so many farmers had sold their cocoa farms to the miners for huge sums of money. The monies were either used to send their children abroad or build a rental apartments in urban centers such as Kumasi, Obuasi and Dunkwa. One of the officials said the farmers considered cocoa farming as tedious, hence they sold the farms and used the money for something they [farmers] considered meaningful in their lives. A study conducted by Boateng et al (2014) in Atiwa District, Eastern Region also discovered that many cocoa farmers had sold their farms to small-scale gold miners for quick cash because it was difficult to maintain the farms. This showed that extension services provided by the government were not meeting the expectations of the farmers and the price they received from the sale of cocoa beans was not enough as compared to selling the farm to small-scale gold miners or using the land for mining.

The selling of cocoa farms also indicates that the link between technical education and livelihood strategies such as cocoa farming in Ghana was poor. This is in view of the fact that, the educational system in the country has failed to modernize the technology used for land preparation for sowing, nurturing, harvesting and processing of the cocoa beans. A field observation by the researcher revealed that farmers were still using the old methods of harvesting and processing of cocoa beans. These methods for farming cocoa were not only laborious but also time-consuming and expensive which drained farmers' energy and income.

For instance, the farmers still harvested, broke the pod and dried the beans manually, something which could have been done with a simple technology that reduced labour time and energy of the farmers. For example, a simple and cost-effective machine that breaks the pod and separates the beans and other wastes from it [pod] has not been manufactured by the technical educational institutions in Ghana. Hence the educational system should be blamed for failing to develop the appropriate technology that ensures labour efficiency, reduces the burden on the farmers and increases their income.

Failure to produce simple, easy-to-operate and cost-effective local technology to modernize cocoa farming is partly responsible for the reduction of the farmers' interest in farming and selling cocoa farms to the miners. If urgent steps are not taken by the State and the educational institutions to address the matter, almost all the cocoa farms in the mining communities will be sold and destroyed.

The use of family lands for mining also shows how the micro-social structure (family) influences resource use patterns. It indicates that it is not only the powerful or people with political power that influence the use of resources but micro-social powers also influence resource use. This makes political ecology theory limited in explanations of the use of resources because the theory locked the use of resource patterns only in global political and economic forces which favour the powerful and leave the influences of micro local forces such as local chiefs, opinion leaders and family heads. In connection with the structuration theory, it shows how human reflexivity allows people to draw on the social system to make cost-benefit analyses as to where to invest their

resources for more profits. As Giddens (1985) opined, human beings are rational and make rational choices.

Environmental impact of small-scale gold mining

This section aimed to assess the impacts of small-scale gold mining on the environment in the area. To get accurate and first-hand information, the researcher visited some of the mining sites to observe equipment use, mining processes and practices and their impacts on the ecology. The visit was also to observe whether the miners adhered to the mining laws or otherwise. One of the things that guided the observation was information on the environmental management and protocols gathered from the literature review and mining laws and regulations in Ghana. Also, the executives of the Miners' Association were made to share information governing their mining permits and that of their members by the EPA and other State regulatory bodies. Equally, other key informants were interviewed to share their experiences about mining, sites inspections and maintenance and management of the environmental protocols by the miners in the area.

Some of the information shared by the executives of the Association in connection with their mining and environmental permits were the following. Miners operating alluvial mining should not mine in the buffer zone (100 meters away from the water bodies). All pits should be backfilled after mining. All mined land should be reclaimed and revegetated. Warning signs should be mounted in excavated areas or fence should be erected around pits and trenches to prevent humans and animals from falling into the pits. All ponds at the site should be properly maintained to prevent the dirty water from discharging into nearby streams or rivers. All tailing pools should be managed properly to

prevent leakage and contamination of the environment. Dumpsites should be managed to prevent waste from risking people's health and safety.

On the tools used for mining, heavy machines such as excavators, trommels, generators, water pump plants and changfans were largely used.

[Changfan is locally called thothotho]. [See plates 5, 6 and 7 for details].



Plate 5: Excavator at a site at Diaso

Photo credit: Author,2022



Plate 6: Changfan in Offin River at Dunkwa

Photo credit: Author,2022



Plate 7: An abandoned water plant at a site at Akwaboso

Photo credit: Author, 2022

The changfan machine was used as an engine to power locally made rafts popularly referred to as board. The board was used to dredge silt, gravels and gold nuggets from the river bed. The process to separate the silt, gravels and gold nuggets was done in the river and it muddied the water. It also left a heap of gravels and silts on the banks of the river which negatively affects the channels. Similarly, it had eroded and collapsed the side walls of the channels, making some portions of the watercourse shallow and prone to flooding when it rained.

The irony was that, the dredging was performed in a broad day light. The sound of the Changfan machines used for the dredging was loud and noisy. The river passed through people's backyards in most of the communities, but nobody cared about the destruction taking place in the river.

In an interview with one of the government officials, he pointed out that dredging and panning for placer gold in rivers had been banned but some

unregistered miners still performed it. He added that they (government officials) could not stop them [miners] because such miners were protected by the opinion leaders [chiefs and assemblymen] in the area. *“The new mining law, Act 995 has outlawed dredging, but some unregistered miners do it under the protection of the chiefs”*, he said.

Another government official added that:

The rivers which have been polluted run through somebody’s land, so if the land owners disapproved the actions of the miners they would have stopped them. Do you think people can just come from nowhere and start mining in the rivers?

He said pollution of water bodies in the area could stop, only if the custodians of the land asked the miners to stop. Two chiefs denied their involvement in the mining in the water bodies. One of them said his ancestors came to the area to farm so they were not owners of the land and could not give permission to people to mine. He disclosed that a chief from another community whose ancestors gave his great-grandparents the land gave the miners permission to mine in the river. *“We always see the people using the tho-tho-tho machines to mine in the river, but we cannot ask them any questions because we do not own the land”*, he added

The action of the miners who were dredging gold in water bodies was in contravention of the Mineral and Mining (Amendment) Act (Act 995) in 2019. Section 99(6) stipulates that a person who fabricates, manufactures or uses a floating platform for mining or dredging for minerals in natural water bodies in Ghana commits an offense liable to summary conviction to a fine of not less

than 50 thousand penalty units or a minimum prison term of 15 years and a maximum of 25 years.

Also, the action of the chiefs or custodians of the land was in contravention of section 99(2b) of Act 995. Section 99(2b) of the Act 995 says a person who acts or instigates, commands, counsels, procures, encourages, helps or promotes mining activity which is not sanctioned by the laws of Ghana commits an offense and is liable to summary conviction to a fine of not less than 10 thousand penalty units and not more than 15 thousand penalty units or a minimum prison term of 15 years and a maximum of 20 years. Mining in water bodies is prohibited, therefore, the chiefs and assemblymen were violating the law.

Article 269(1) of the 1992 Constitution mandates the Minerals Commission and other State institutions such as EPA and security agencies to arrest and prosecute people breaking mining laws in Ghana. Acts 450 (1993) and 490 (1994) also mandate the Mineral Commission and EPA respectively to regulate mining activities in Ghana. Therefore, for State officials to say that, the chiefs were the rightful people to stop the destruction of water bodies by illegal miners means the laws are just in the books and have no effects. It also means the State officials were not living up to their mandates but drawing their salaries. These would be the popular arguments most people would make, however, the reasons that had made the officials ineffective and unable to enforce the laws would be unfolded as we progress in this section.

For instance, the information gathered from the interview revealed that the main foundation of the local economy was the proceeds from the mines and that had made it difficult to stop it despite its negative effects on the

environment. For example, one government official disclosed that virtually, all the residents were beneficiaries in one way or the other. He explained that chiefs, assemblymen, miners, shop owners, people who had specialized in assembling and repairing the machines, were all benefiting from the mines. This means mining in water bodies and its negative impacts on the ecology would not stop in spite of efforts to stop it. This is because nobody would discourage an activity that puts food on his/her table.

The change from manual or traditional processes of dredging to mechanized dredging was also considered as a major phenomenon that was speeding up water pollution in the area. One of the assemblymen said less than a decade ago people dived into the river bed and used a special basket to pan gold nuggets. He explained that the negative impacts of this process on water bodies was minimal or none. He said nowadays people prefer money instead of the conservation of nature, hence, they use machines to dredge gold and pollute the water bodies. A government official confirmed this observation. He disclosed that before the ban on dredging, some miners used excavators to divert the course of the river and mine. The miners re-directed the water to the original channel after mining but the course of the river became distorted, he added.

The manual method of panning described by the assemblyman was similar to a mining process practiced by a low-income women group living in the lower Subarnarekha River, Jharkhand, India (Barney, 2018). This mining process has no negative impact on the ecology and the income these rural women received from the mines was largely used to maintain their homes (Barney, 2018).

The use of machines to dredge gold from the water bodies had not only changed the colour of the rivers and increased their turbidity but also killed some of the aquatic life. For example, an executive member of the Miners' Association disclosed that the Offin River had been contaminated with heavy metals such as mercury. He said most residents were aware of the pollution and had reduced fishing and swimming in the river. *“There were reptiles such as crocodiles in the Offin, now we hardly see them in the river”*, he added.

The information gathered from field observation also showed that small-scale gold mining activities had destroyed water bodies in the area. For instance, a transient walk along the banks of the Offin and Dia Rivers revealed that mining activities had muddied and slowed the movement of the two rivers. This was similar to the indiscriminate discharge of sediments into the Runde River in Zimbabwe by small-scale gold miners (Makonese, 2016). The river had turned to mud and its turbidity increased (Makonse, 2016). It was also similar to the contamination of fish and other aquatic life in the Masowe Catchment in Zimbabwe by small-scale gold miners (Chandiwana, 2016). In connection with the conceptual framework of the study, the disposition of the miners mining in the river was similar to that of extraverts. Extraverts are interested in achieving material success regardless of the negative consequences of the actions that would lead to success (Judge & Kammeyer-Mueller, 2012).

The pollution of water bodies by small-scale gold mining activities was another manifestation of inadequate linkage between technical education and livelihood strategies in Ghana. This is because Ghanaians had practiced gold panning for over 2,500 years but the technology for panning placer gold by the locals was improved when the Chinese introduced Changfan around 2009 after

the global economic crunch in 2008 resulting in gold price hike in the international market (Crawford & Botchwey, 2016; Crawford et al, 2016). Currently, the Changfan has become a preferred mode of panning alluvial gold in Ghanaian waters due to its efficiency (the number of gold nuggets it extracts a day), an executive of the Association disclosed. He said its efficiency has led many miners to abandon the manual or traditional method. He added that the manual method no longer exists due to the efficiency of Changfan.

Another executive member of the Association disclosed that mechanized gold panning was not new in the area. The Dunkwa State Gold Mine and other mining firms had operated in Offin River in the past. He said the water was clear and fish swam around the machines when the large-scale companies were operating. He added that after the collapse of the large-scale mines, the traditional [manual] process of panning was the method used by the locals until the Chinese brought the Changfan. He said the people embraced the Changfan in spite of its negative impact on water bodies because there was no local alternative to operate sustainable mining, although there are technical/vocational education institutions in Ghana. Therefore, instead of blaming the miners, the traditional leaders, Assemblymen/women and politicians for greed and complicity in the negative ecological impacts of SSGM, part of the blame should be apportioned to the educational system.

The terraces of the Offin and Dia Rivers are rich with gold nuggets due to the overflow of these rivers from time to time. As Hilson (2001 p. 5) noted “Large deposits of placer gold ...occur along the terraces, floodplains, channels and river beds of the Offin, Pra, Ankobra, Birim and Tano rivers, where large Birimian and Tarkwaian gold deposits have experienced several episodes of

erosion and subsequent deposition". Based on this deposition, some miners had dug ponds, a few meters away from the rivers and mined in them (ponds). With reference to the conceptual framework of the study, the dispositions of the miners panning in the ponds could be likened to that of conscientious persons or the values of Schwartz's (1994) universal persons. Universal persons strive for equality, and the welfare of others and are responsible: thus, they are mindful of the negative consequence of their actions to others and nature (Schwartz, 1994). Therefore, this action should have been encouraged to minimize the destruction of the water bodies. However, interaction with a miner who was one of the sponsors of this mining activity showed that the motivation to stay in the ponds instead of the rivers was dwindling.

This is in view of the fact that people mining in the ponds are easily arrested when Operation Halt raids the banks of the rivers. They are easily arrested for the fear of drowning in the ponds if they attempt to run. [Operation Halt is armed military officers from the Ghana Armed Forces charged with the responsibility for stopping irresponsible mining]. On the other hand, their colleagues mining in the rivers dived into them, swam to the other side and ran away. A reason discouraging people from mining on the terraces.

The information gathered from the interview of the Miners' Association revealed that the security personnel sometimes by-passed some miners, arrested others and burnt their equipment. One of them disclosed that the miners spared were mostly affiliated with the ruling political party. He said the commanders gave the officers orders to patrol certain areas and leave other areas. He disclosed that sometimes their colleagues who were politically connected tipped them about the operations of the security men sent from Accra to stop mining

in the area. He said the security officers sometimes sympathized with the poor miners they had been ordered to arrest and burn their equipment. This was due to the fact that their colleagues (other State security men) had also been sent to guard a mining site in protected areas such as forests which belonged to the ruling party apparatchiks. *“Why would they (security officers) not sympathize with the poor miner trying to feed his/her family on a site that can easily be reclaimed”, he asked.*

He said this had lowered the ethical standard of the security men which made them to collect money from the miners. Another executive also said the security officers arrested and burnt machines of miners (both registered and unregistered) who did not have money to pay them. He said sometimes after the arrest, the personnel would negotiate with the miners in the operation van, if the miner could pay, they let him go. He considered the burning of the mining equipment by the security agencies as a decoy used by the government to deceive the public about the fight against irresponsible mining in the country. In his view, it was just to show the public that the government was in control of the situation but the reality on the ground proved otherwise. He said the burning of the equipment was just for a television show.

If you see it [burning of equipment] on television it is just for PR work, the government is pretending. Everything is camouflage, it does not solve any problem. It looks as if the government wants to win the battle in the media, he added.

This information was confirmed by some government officials. One of them said certain miners were targeted and arrested while others went about their illegal business freely in the water bodies. Another also said there was no

justice, fairness and equality in the application of the law, a situation which had made the protection of the environment difficult and problematic. He added that politicization of the application of the mining laws had made the issue complex and sometimes they [government officials] were in a fix. He concluded that:

Sometimes, you do not even know what to do to this or that miner depending on the political party in power. It did not start with the current administration. It is a common phenomenon with the two major political parties in the country (New Patriotic Party and National Democratic Congress).

This means the State had created the conditions for the officers to be corrupted and this would negatively affect the fight against illegal mining.

The burning of the mining equipment by the military personnel was in contravention of the mining regulations. For instance, section 99(8) of the Mineral and Mining Amendment Act in 2019 (Act 995) states that when a person is arrested for breaking mining regulations, the equipment used for mining and minerals extracted should be seized and kept in the custody of the Police. Section 99(9 pp.4-5) also says “A court that convicts a person for any offense under subsection (2),(3),(5),(6) or (7) shall in addition to a penalty that the court may impose, order the forfeiture of any equipment or products seized under subsection (8) to the State”. Hence the action of the military officer was not backed by law.

The narratives of chiefs and assemblymen promoting illegal mining and the government assisting some miners and harassing others show that the chiefs and opinion leaders were in competition with forces within the government for access and control of gold resources in the area. Therefore, registered or

unregistered miners in the area had the support of either the chiefs and opinion leaders or that of the State to survive. This has created mistrust between the central government and its local security agency, the District Security Committees (DISECs) of the two assemblies. [DISEC comprises District Police Command, officers of Migration Service, Fire Service and other security agencies in a particular district. It is headed by the District Chief Executives]. On the other hand, it had created mistrust among the traditional authorities, the Miners' Association, officials of the DAs and elements of the central government.

For instance, government officials in the area considered the deployment of officers from Accra to the area to fight irresponsible mining without the involvement of the local State security agents (the two DISECs) as a lack of trust between the local and central governments.

This is a misnomer because the President who is the Commander-In-Chief of the Ghana Armed Forces appoints the DCEs. The DCEs also report security matters in the area to the President. Yet DAs and DISECs are not part of the fight against illegal mining”, a government official said.

He added that DISECs became aware of the presence of military officers in the area in the media. Another government official said unless the military officers ran into problems, the local State security agents and officials would not know that they were in the area. He said because of that, some government officials are not bothered about the irresponsible mining taking place in the area.

The chiefs, opinion leaders and executives of the Miners Association also considered the deployment of army officers to the area as a ploy by the

central government to control access to the gold resource for its party members only. In their opinion, the government was using that ploy to seek rent from its rank and files in the area. This was one of the reasons some chiefs and opinion leaders helped miners who were not politically connected. [The other reason will be dealt with in the next section]. For instance, some chiefs and landlords sought the assistance of the assemblymen to release miners who had been arrested by the State security personnel.

Also, based on the same reason, the Association formed a parallel task force to monitor irresponsible mining in the area. An executive said the Association bought a Toyota pick-up for the task force to patrol all the mining sites in the area. He disclosed that private security personnel of the unregistered miners who were politically connected had offensive weapons such as guns and machetes. He said the armed private security personnel of the politically connected unregistered miners prevented the Association's task force from entering their sites. On one of the occasions, an executive member who had joined the task force was clubbed by one of the private security personnel of such miners, he added.

This shows that the Association neither trusts DISECs nor the central government. Therefore, it [Association] refused to resource any of them and formed its private task force to monitor the poor impacts of mining. The mistrust among the various stakeholders in the sector is a threat to security and development in the area.

On a walk along the banks of Offin River, the researcher chanced on an empty army boat belonging to the Ghana Armed Forces surrounded by changfan machines. [See plate 8 for details]. This was a confirmation that some miners

were not afraid to mine in a protected area. As William Shakespeare (1564-1616) said in “Measure for Measure”, the law is a scarecrow



Plate 8: A mini-army-boat and Changfan machine anchored at the “harbour” in Dunkwa-On-Offin

Photo credit: Author, 2022

Also, all the communities visited did not depend on surface water for domestic chores (drinking, cooking and washing). The urban communities such as Dunkwa, Diaso, Ayanfuri, Subin and Akwaboso depended on mechanized boreholes while the rural communities depended on unmechanized boreholes. Some of the manual boreholes in the rural mining communities were constructed by the miners.

In an interview with the officials responsible for water supply in the area, they said largely all mining communities in Ghana do not rely on surface water in the mined communities for domestic chores. They cited Obuasi as a typical example. They said that even though Obuasi and its environs are endowed with many rivers, it depended on River Odaw which was far away from the area. This partly explains why chiefs and opinion leaders in the

communities visited did not care about the destruction of the water bodies in their communities. They did not feel the negative impact of mining activities in water bodies in their area directly. If the rivers were the source of potable water they depended on, they would not have traded the water bodies for money. It looks as if they were not bothered by the long-term negative effects of mining activities on their lives.

In one of the communities visited, the chief directed the researcher to visit a particular site where some unregistered miners were operating before he could grant the researcher an audience. To the Chief, the visit would help the researcher to appreciate the issue properly. When the researcher got to the site, it was a vast area covered by mounds of heap leach pads (mining waste) from a large-scale gold miner that had been left for years. Thus, the area was an old site for dumping mining residue. The area had been partitioned into phases and the researcher visited only two of them – phases three and five.

The distance between phases three and five was approximately 1,600 meters. At phase three, there were hundreds of unregistered miners using changfan machines to grind the leach pad to process the near-powdered sand for gold in sluice boxes. They used excavators to bring the high mounds down before they used shovels to lift the leach pad into the changfan machines for grinding. They used water pumping generators to pump the water up for use. The dirty water was re-directed downstream through shallow tracks and pumped up again for reuse. This water recycling practice by the miners was a good environmental practice. However, the blankets from the sluice boxes were washed in rubber bows and the process left powdered sand under the bows. After this process, mercury was poured into the powdered sand and they used

their bare hands to mix them. The mercury acts like a magnet to attract the gold. After collecting the mercury-gold amalgamates from the bowl, the residues were poured on the ground although some of the mercury were in the residues. At phase five, the miners were using the same process. At the outskirts of the same community, some residents had mounted changfan machines and miners who did not process their leach pad at the site brought them in tricycles for processing. The residue mixed with mercury was poured on the ground at the outskirts of the community too. [See plate 9 For details].



Plate 9: Leach pad grinding machine at the outskirts of a community

Photo credit: Author, 2022

The possibility of the mercury leaching to pollute underground water this community depended on was high [They depend on mechanized borehole water]. Rain water could also carry the mercury into nearby streams to endanger aquatic life and animals (both farm and non-farm animals) which depended on the streams. In this way, mercury would get into the human food chain. Mercury

pollution is said to be common in small-scale gold mining areas. For example, a study conducted by Ako et al (2014) reported that the use of chemicals such as mercury to process gold pollutes underground water.

The sale of mercury to unregistered miners was prohibited by the Mineral and Mining Act, (Act 703) in 2006. Also, section 473 of Mineral and Mining (Health, Safety and Technical) Regulation, 2012 (L.I-2182) specifies that application of mercury in small-scale gold mining should be done in a retort and such permission shall be granted by the Chief Inspector of Mines only. Therefore, the actions of the unregistered miners were unlawful and harmful to themselves, others and the environment. With reference to the conceptual framework, the disposition of the miners was that of extraverts. They did not care about the negative consequence of the action that would bring them worldly success.

The activities of the miners had also destroyed the vegetation in the area. The mined areas were almost bare [see plates 10 and 11 on the next page for details]. Also, many of the changfan machines were old and emitted black smoke [carbon dioxide] into the air. The emission of carbon dioxide into the atmosphere depletes the ozone layer. The loud noise from the machines was another air pollutant in the area. In the long term, the smoke and noise would negatively impact on the health of miners.



Plate 10: Destruction of the vegetation cover at the leach pad site

Photo credit: Author, 2022



Plate 11: A water bank at the leach pad site

Photo credit: Author, 2022

At phase three, the researcher observed that the unregistered miners were harmoniously mining with a large-scale mining company. Although, there was no physical boundary between them, each of them (large/small miner) knew

where not to cross. The unregistered small-scale gold miners asked the researcher not to move beyond a certain point at the imaginary boundary. The author was told that if he crossed the imaginary boundary, the workers of the large-scale miner would mistake him for one of the small-scale miners and this could cause them problems. One of the small-scale gold miners disclosed that they were free to operate if they obeyed the verbal agreement between them and the large-scale gold company. He added that the security personnel from the State or large-scale mining company operating in the community did not harass them if they obeyed the verbal agreement. One of the agreements was that the unregistered miners should not fight among themselves at the site and they should also avoid any form of conflicts among themselves at the site. Due to that, they had formed a committee to settle their disputes. Another agreement was that they should not go to places they had not been allowed to mine.

Global Initiative Against Transnational Organised Crime (2016) called this harmonious mining agreement between large and small-scale miners as cohabitation. The cordial relationship had given the locals access to their gold resource for self-development. The agreement had also fostered peace among the miners on the one hand and between the miners and large-scale company on the other hand. A situation that would bring development to the community. This differs from the findings of Kassa's (2019) study in Obuasi, Ghana and Gauteng Province, South Africa where the State and large-scale mining companies used security personnel to harass and marginalize small-scale gold miners.

The negative impacts of the excavators and other heavy machines on the environment were in two folds. They had pre and post-mining negative impacts

on the ecology. On pre-mining impacts, one of the assemblymen explained that the machines destroyed trees and people's farms on their way to the sites. A situation which had created so many conflicts between the miners and farmers in some communities. In some cases, he said the conflicts become physical and threatened peace in the affected community.

On the post-mining, he disclosed that some registered and unregistered miners refused to reclaim the land. Another assemblyman confirmed this information and added that the opened pits had become breeding grounds for reptiles and frogs. He asserted that some of the opened pits had been filled with rain water which drowned animals and humans occasionally. A study conducted by Batbayar and Punev-Ochir (2015) also reported that the pits of small-scale gold miners trapped animals including protected species. According to Gandiwa and Gandiwa (2012), SSGM pits trapped humans in Zimbabwe. The pits sometimes served as ponds to breed anurans [frogs] (Alvarez-Berrio et al, 2016).

One of the executives was of the view that the orders given to security officials deployed from Accra to burn the excavators were partly responsible for numerous mining pits in the area. He said there was no reasonable justification for such orders. Instead, he said, the security personnel should have been asked to supervise the miners to use the excavators to cover the pits. *“What will they [those who gave the orders] lose if they tell the officers to supervise the miners to use the same machines they use to dig the pits to close them”* he said.

He also disclosed that on some occasions, their members would reclaim the land only for some unregistered miners to open the pit and re-mine. If this

went on unnoticed, the concessionaire was blamed for a crime he/she had not committed, he added.

Another executive said some miners refused to reclaim the land after mining because geological data in the area was not accessible. As a result of that, he said many of them relied on luck. Thus, if they found no gold after mining it landed them in debt. He said this was one of the issues causing land degradation in the area. On the mining expenditure, he said the owners of excavators hired it for GHC5,000 for eight hours. The operator of the excavator charged GHC400 as a stipend for every eight hours aside from his/her weekly wage of GHC750. He said the most efficient excavator consumed 250 liters of diesel every eight hours and added that the most efficient water pumping plant also consumed 100 liters of diesel in the same eight hours. He disclosed that most of the machines they used were old and consumed fuel more than the figures mentioned. He asserted that an acre of land cost over GHC25,000. After payment of the said amount to the land owner, the miner had to pay between GHC4000-8000 to the tenant farmer on the land. He explained that, besides these expenditures, the miner had to pay his/her workers, the chiefs, elders of the community and other expenses. He, therefore, asked: *“if one gets nothing from the land after these expenditures where would he/she get the money to reclaim the land”*.

The third executive disagreed with this narrative. He said some of the miners had invested in excavators only and sometimes it was difficult to use the excavator to cover the pit. He added that he had bought a bulldozer purposely to cover every pit he opened. He asserted that whether he got gold or not from the land, he covered all the pits and closed the mines as stated in his EPA

permits. He said he would not be pleased if people talked ill about him, therefore, in everything he does he make sure that it follows the laid down procedures.

One of the chiefs also disagreed with the first executive. He said most miners took samples of the soil for laboratory analysis before mining, therefore, any excuse that no gold was found was mainly lamed. This shows that some registered and unregistered miners do not follow environmental protocols and mining laws. Section 81 of L.I. – 2182 enforces licensed miners to rehabilitate land used for exploration to its original state after exploration. Section 480 of L.I.-2182 also requires registered small-scale gold miners to revegetate mined land and backfill all pits and trenches one month after mining. Sub-section 14(iv p.6) of the Environmental Assessment Regulation, 1999 says “An environmental impact statement for mining and other extractive industry shall include reclamation”. Therefore, the refusal to close all pits and rehabilitate the land after mining is a breach of law.

In connection with the concepts of the study, the disposition of the third executive could be likened to that of conscientious persons. A conscientious individual is prudent, dutiful and orderly and performs his/her action based on its outcomes but does so meticulously and judiciously (Judge & Kammeyer-Mueller, 2012). However, that of the first executive was similar to the traits of extraverts. Extraverts are reward-seeking individuals who have a high desire for tangible outcomes of an action rather than superior performance, therefore, extraverts strive for worldly success without prudence in the performance of the task that gives them worldly success (Judge & Kammeyer-Mueller, 2012).

In one of the sites visited, the miner had reclaimed and re-greened [planted cash crop] the land after mining. However, the growth of some portions of the vegetation was stunted and dried. This was an indication that the soil nutrient had been depleted after mining as certain elements of the soil had been removed during excavation and reclamation processes. Since it took years before the land was formed, it would also take some years before the soil would regain all the nutrients. It is simple, one cannot take certain elements out of land and expect that it would bring forth quickly with the application of chemicals such as fertilizer. For instance, a study conducted by Aidoo (2018) reported that the removal of overburden (top soil) by small-scale gold miners changes the soil composition and texture. It also takes away the soil nutrients even if the land is reclaimed.

Also, many of the sites were riddled with ponds of different colours which the miners used to wash the gravels. [see plates 12 and 13 for details].



Plate 12: Another pond at a site at Akwaboso

Photo Credit: Author, 2022



Plate 13: A yellowish pond at a site at Diaso

Photo credit: Author, 2022



Plate 14: A reclaimed land destroyed by erosion at Akwaboso

Photo credit: Author, 2022

Mounds of white gravels, over-burdens and top-soils were also common in many of the sites. In the outskirts of some of the communities visited, there were large uncovered mining holes closer to people's homes. [See plates 15 for details].



Plate 15: An abandoned pit filled with water at Subin

Photo credit: Author, 2022



Plate 16: A land riddled with erosion after removal of the vegetation at Subin

Photo credit: Author, 2022



Plate 17: A vast vegetation destroyed by SSGM at Dunkwa

Photo credit: Author, 2022

The destruction of the environment was due to the method of mining (open cast or surface mining) used in the area. Therefore, it was not surprising to see that the land and vegetation in the area had been degraded, a problem one of the chiefs also confirmed. He disclosed that the first President of Ghana, Dr. Kwame Nkrumah refused to sign the agreement to allow surface mining in the country due to its negative impact on the environment. He added that the Bretton Woods Institutions were able to convince the late President, Jerry John Rawlings to sign the agreement to allow surface mining in Ghana in the 1980s. He disclosed that it was only foreign large-scale gold mining companies who were operating surface mining in Ghana in those days. However, he said nowadays some wealthy Ghanaian small-scale gold miners are also operating open-cast mining in the country. The result of allowing Ghanaians to operate surface mining was the negative environmental impact the country is grappling with nowadays, he added. Asamoah et al., (2017) also reported that in the mid-

1980s the government of Ghana prioritized the financial rewards of mining at the expense of the environment and signed surface mining agreements with foreign interests.

People were also mining in their backyards. The researcher was told that mining in the backyard was common practice because members of a family could agree and mine on their land and share the proceeds. This also shows how micro-social structures such as family influence the use of resources and its impact on the environment.

The strategies adopted by the miners to garner the support of others in the mining

The goal of this section is to explore strategies used by miners to garner the support of others and mine irresponsibly. This is because, without the cooperation of the locals, reckless mining cannot be done since they (locals) are the people who feel the severity of the negative impacts of irresponsible mining. Secondly, it was to study tactics adopted by the miners to outsmart law enforcement agencies and mine irresponsibly apart from paying bribes. This was because strategies adopted by successive governments to stop irresponsible mining are not yielding the desired results making the negative environmental impact of mining common in SSGM areas (Crawford & Botchway, 2016). Also, findings of research on why governments' efforts failed to stop irresponsible mining in Ghana largely conclude on corruption and political patronage (Osei-Kojo, Asamoah & Yeboah-Assiamah, 2016; Danyo & Osei-Bonsu, 2016; Crawford et al, 2016). This makes it look as if miners outsmart the regulators with schemes, tricks and games or were ahead of the governments all the time. Therefore, understanding some of the strategies adopted by the miners to seek the cooperation of the locals or outsmart regulators would help solve

environmental problems associated with the sector. Based on this, key informants were asked to share their experiences on why poor mining practices continue in the area despite efforts to stop it.

The information gathered revealed that registered and unregistered miners' activities were inspected by the regulators (Mineral Commission and EPA). On the registered miners, site inspections were done randomly and regularly. The sites of unregistered miners were inspected if government officials chanced on them on their way to inspect a registered miner's sites due to a lack of data on the unregistered miners. If the officials chanced on them (unregistered miners) they (officials) advised them (unregistered miners) on best practices of mining to reduce or stop their negative impacts on the environment. *"When we see them [unregistered miners] on their sites, we approach them and advise them on the best mining practices and leave,"* one of the government officials said.

The data collected also revealed that both registered and unregistered miners had been trained on the best mining practices such as waste disposal and land reclamation by government officials responsible for environmental management. The relations between registered miners and government officials were said to be cordial. The relations between unregistered miners and government officials were also cordial.

This shows that the regulators and enforcers knew some of the unregistered miners, but could not stop them (unregistered miners) from operating or breaking the mining laws. The reason why the law regulators and enforcers cannot stop the unregistered miners from breaking the laws was partly

explained in the previous section another part will be explained in this section as we progress.

All the key informants did not consider mining at night as a strategy to conceal a breach of environmental protocol. Some of the miners [both registered and unregistered] ran shifts (day/night) especially those who did not have their own machines. This was due to the fact that the excavator owners hired the machine for GHC5,000 every eight hours whether the miner used it or not. Thus, it made economic sense to run a shift system to save costs and keep the business running. The noise of the machines, especially the excavators was said to be louder in the night which made the night shift unconcealable.

Also, all of the key informants except one government official were unanimous in their opinion that a breach of environmental protocol could not be covered -up by a miner. They said the environmental impacts of mining could not be hidden. They were of the view that a novice in the sector could easily notice the negative impacts of mining if he/she sees one. They cited the ecological foot-print of an excavator as an example. As one of the executives simply put it: *“Any official who cannot notice a breach of mining protocol has deliberately refused to notice”*

On the contrary, one of the government officials said if the severity of the breach was not high it could go unnoticed. He said if the *effluent* [the trapped dirty water] flowed into a nearby stream unintentionally, the miner could refuse to report it after correcting it. He added that if the amount of effluent that flowed into the stream was not much to change the colour of the stream, the breach could not be noticed. The following is the extract from the interview: *“It depends on the quantity of the dirty water that has leaked into the nearby*

stream. If the amount of the dirty water is not enough to change the colour of the stream we would not notice”.

This information shows that the regulatory bodies were under-resourced and did not have the requisite tools to detect certain negative environmental impacts of the miners. Equally, it indicates that the officials were largely relying on observation with little or no laboratory analysis of the soils, streams and plants of the sites they inspected. Therefore, they (officials) were not in a position to detect all the negative impacts of mining. This is similar to Osei-Kojo et al., (2016) conclusion that the regulatory bodies were under-resourced to effectively monitor the impacts of the miners.

The information presented shows that there were no special strategies to cover up a breach of environmental protocol. Inadequate logistics and corruption were somewhat remotely responsible for bad mining practices in the area. However, the main reasons some miners mined irresponsibly were the financial and material support they are providing the communities they are operating as the first column of the left side of the conceptual framework shows. [Please check page 86 for details]. The miners (registered/unregistered) had become development partners providing social infrastructure in the communities. On education, they had constructed classroom blocks and provided furniture for some basic schools in the area. They [miners] had become the sponsors of some students in the second cycle and tertiary schools in the mining communities. [See plate 18 on page 200, a classroom block built by a miner in one of the communities for details]



Plate 18: A classroom block built by a miner for one of the communities

Photo credit: Author, 2022

On health, they had renovated hospitals and Community-Based Health Planning Services (CHIP) Compounds in the area, provided essential medical equipment for these health facilities and paid the medical bills of some needy residents. They had also constructed boreholes for most of the mining communities. Some feeder roads which were unmotorable as a result of rains had been reconstructed by the miners. In addition to this, they had constructed some access routes for some communities and street gutters to properly direct drains in many communities in the area. *“They [miners] renovated the District hospitals, donated personal protective equipment and other essential medical supplies to the hospitals during the Covid-19 period”*, one of the opinion leaders said

One of the assemblymen had this to add: *“They (miners) support some parents to take care of their children in second cycle schools and sponsor some students in tertiary schools”*.



Plate 19: A CHIP Compound built a miner for one of the communities

Photo credit: Author, 2022

On the local economy, the miners had built market centers in many communities for market men and women to sell their wares in a comfortable environment. They had provided jobs for the youth in the area. The workers of the miners and themselves served as customers for shop owners to boost the local economy. They had also provided community centers and street lights for many settlements in the area.

The community centre and market were built by the miners. Also, they [miners] do not ask for certificate before they employ the boys in this community, unlike the large-scale mining company which uses certificate requirement to deny the boys [youth in the area] jobs. Most of the youth have been employed by the small-scale gold miners, so yes, we see what they [miners] are doing for us, one of the chiefs said

On peace and protection of the law, armed robbery was said to be a major security concern for about ten communities in some parts of the area. To solve this problem, they [miners] completed an abandoned housing project that belonged to one of the communities through consultation with the chief. After completion, the block was used as a Police post. It served as both residential apartments for officers and an office for the Officer-in-Charge.

One of the assemblymen in the affected area disclosed that policemen were posted to man the post through the intervention of the miners. When the police arrived, they mounted a checkpoint at one of the adjoining roads linking Dunkwa – Diaso. The police personnel also started patrolling the area and the robbery stopped. These interventions were similar to the findings of a study conducted by Arkoful et al (2018) which reported that small-scale miners provide social amenities to the communities which they operate to secure social licenses.

Provision of this development infrastructure from the proceeds of SSGM had made some chiefs, assemblymen and residents realize the need to allow SSGM to thrive despite its negative consequences on the environment. This is because the communities see and feel a direct impact of their gold resource through the miners. For instance, one of the chiefs disclosed that, economically the impact of the small-scale gold miners was felt by the residents than the large-scale mining firm operating in the area. He cited a cash donation of GHC120,000.00 the miners gifted his community at a fundraising ceremony. *“Where did they [miners] get the money from”*, he asked rhetorically.

One of the assemblymen suggested that the informal social and economic relations that existed between the miners and the communities should

be formalized. He said he preferred a situation where all the communities would come together to establish a fund to enable the miners to contribute formally to development in the communities.

This shows that the government had neglected part of its responsibility of providing social amenities for some of these communities. The traditional and opinion leaders in these communities and the miners were using the local resource for self-development. The destruction of the environment was a by-product of this self-development at the local level. Nevertheless, the destruction would continue because the traditional leaders considered it as a trade-off of their self-determination to provide infrastructural developments in their communities. For instance, one of the chiefs justified the negative impacts of the mining activities on the environment. He said: *“Such is human character, there are good people and bad people, therefore, refusal of some miners to reclaim the land should not stop mining in this community”*. He added that he and the elders of his community would not stop small-scale gold miners from operating in the area because the miners were helping the community with development infrastructure.

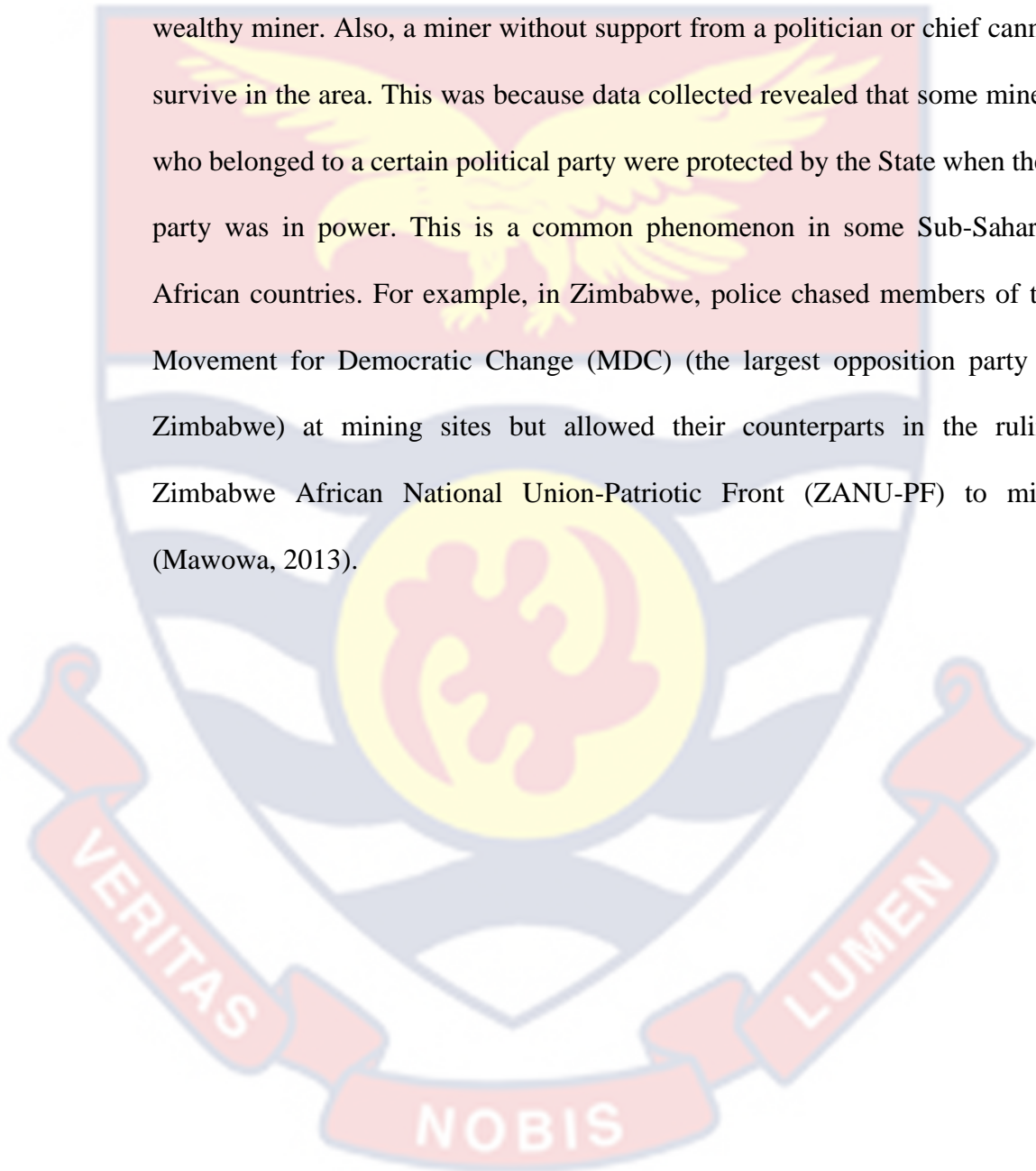
The information given by some assemblymen confirmed the justification of the chief. One of the assemblymen disclosed that he tried to stop a miner from mining in a protected area but the elders of the community told him that they gave the permit to the miner because they would use the proceeds to develop the community. Another assemblyman also said a miner refused to reclaim a site after mining. He asked the miner to reclaim the land because the holes were closer to the community. He said the miner reported the matter to the elders and he was asked to leave him alone. He said he got help from another

miner to fill the holes. He disclosed that some chiefs had received cars as gifts from the miners in addition to the development projects constructed in their communities and that had given the miners social license to do what they wanted in the area.

This is another incident which shows that local powers (in this case traditional authorities) also influence resource use patterns, a reality political ecology theory does not look at (Khan, 2017). [The political ecology theory uses power asymmetry to explain how global economic and political forces affect the use of resources. It does not talk about how local people also affect the use of resource (Khan, 2017)]. With reference to Ajzen's (1991) theory, the proceeds from the mines have become the means miners use to seek cooperation of the local stakeholders in the sector. The main construct in Ajzen's (1991) theory is perceived behavioural control (PBC). PBC involves the availability of resources and opportunities to overcome real or perceived obstacles in the performance of an action. In this case, the miners used the proceeds from the mines as PBC to get the support of the locals. In connection with the structuration theory, the proceeds have become a structural property the miners use to take action. As Giddens (1984) noted structures are resources that enable agency to take actions.

The study results show that the money involved in the sector is huge. Therefore, successive governments seek rents from their rank and files in the sector and pretend to stop irresponsible mining. The traditional and opinion leaders in the area have become aware of this reality, hence they also allow other miners to mine. This is because they want to benefit from the resources on their land.

The result also shows that small-scale gold mining has become the means to seek both political and economic power in the area. One could only make it overnight financially in the area if he/she is a politician and miner at the same time, or a miner protected by a politician or politician supported by a wealthy miner. Also, a miner without support from a politician or chief cannot survive in the area. This was because data collected revealed that some miners who belonged to a certain political party were protected by the State when their party was in power. This is a common phenomenon in some Sub-Saharan African countries. For example, in Zimbabwe, police chased members of the Movement for Democratic Change (MDC) (the largest opposition party in Zimbabwe) at mining sites but allowed their counterparts in the ruling Zimbabwe African National Union-Patriotic Front (ZANU-PF) to mine (Mawowa, 2013).



CHAPTER FIVE

SUMMARY, CONCLUSIONS AND RECOMMENDATIONS

Introduction

This chapter covers a summary of the study, key findings, conclusions and recommendations, as well as contributions to knowledge and suggestions for further studies.

Summary of the study

The goal of the study was to assess the influence of micro-social pressures and personal dispositions on people's decisions to engage in small-scale gold mining in the Denkyira area in the Central Region of Ghana. It also assessed the environmental impacts of small-scale gold mining and strategies adopted by the miners to garner the support of others of other in the mining.

Methodologically, mixed-method was used to achieve the goal of the study. Purposive sampling was used to select 22 respondents from four different target population groups (government officials, executives of the Miners' Association, assemblymen and traditional leaders) to participate in the qualitative aspects of the study. In addition, simple random sampling was used to select 183 registered miners and their workers while convenience sampling was used to select 190 non-registered miners and their workers to participate in the quantitative component of the study. In all, 373 respondents participated in the quantitative aspect of the study. The quantitative data was analysed with inferential statistics such as binary logistic regression and independent sample t-test. Also, descriptive statistics such as frequencies and standard deviation were used to analyse quantitative data to give general information about the variables in the study. The qualitative data was transcribed and analyzed based on the emerging themes.

Summary of the key findings

Based on the specific objectives, the following key findings emerged from the study:

1. The main reason people participated in small-scale gold mining in the area was its economic benefits. The economic benefit is huge, making mining attractive to many people. It also sustains the interest of the miners in the sector, hence, they are unable to stop mining, or better still they find it difficult to leave mining because its economic benefit is huge. Thus, mining activity was widespread in the area.
2. Similarly, participants considered small-scale gold mining as the most profitable economic activity which would make them influential, powerful and achieve high social status. They consider acquisition of material success as a means to attaining social recognition and the shortest way to realize this is mining. This has also made small-scale gold mining activities common in the area
3. The material success acquired by friends, peers, and family who are miners enticed others to engage in small-scale gold mining. The properties such as luxury cars, fuel filling stations and mansions acquired by some of the miners create a desirable picture of the reward of the mines in the minds of others and pull them into SSGM. This has also made small-scale gold mining activities rife in the area.
4. Negative impacts of small-scale gold mining such as open pits, destruction of water bodies and vegetation covers were rampant in the area. One of the reasons responsible for this was that, largely, every member of the communities visited was a beneficiary of the mines and

had, therefore, turned a blind eye to the ecological impacts of the mining activities. Also, factors driving people into SSGM made them (miners) adopt the mining method (mechanization) which aggravates the poor ecological impacts of the sector.

5. Successive governments seek rent from their agents in the sector and miners who are not politically connected also use the proceeds from the mines to seek the support and cooperation of the locals. These situations have made regulators and enforcers of the mining laws ineffective worsening the negative impacts of SSGM.

Conclusions

Based on these key findings, the following conclusions have been drawn:

Social pressures are partly responsible for the increased participation in small-scale gold mining in the area. This was because miners intentionally or unintentionally used their material wealth to entice their friends, peers and family members to engage in mining.

People who are obsessed with power, fame, wealth, properties and high social status have high desires to participate in small-scale gold mining because of its huge financial reward. This shows that personal dispositions or individuals' innate qualities (traits) influence their decisions to engage in SSGM. It also means the symbolic meaning people attached to money as a mark of success, a tool to gain power, influence, status in society and a means to impress others drive them into small-scale gold mining. Therefore, partially, the negative ecological impact of small-scale gold mining in the area is socially constructed.

Mining laws and regulators of SSGM have become ineffective, and irresponsible mining was rampant in the area because successive governments seek rent and protect their members in the sector.

Small-scale gold miners (registered/unregistered) who are not politically connected use the proceeds from the mines to provide development infrastructure in the communities they are operating to secure social licenses. This helps the miners to garner the support and co-operation of the traditional leaders, assemblymen/women and residents in the area to mine irresponsibly.

Recommendations of the study

Based on these conclusions, the following recommendations have been drawn:

Recommendation for the District Assemblies

1. The District Assemblies in the area should produce documentaries on the negative impacts of irresponsible mining and screen them [documentaries] in all the communities to educate the residents on the risks irresponsible mining poses to them in the near future. This would stop the problem.
2. The District Assemblies should also charge and empower the chiefs and assembly members in the area with the responsibility of stopping all unsustainable mining activities in their respective areas. The chiefs and assembly members who would help in maintaining the mining protocols must be rewarded and praised in all regional and national media outlets. The chief who fails to stop irresponsible in his area should not be recognised by the Regional and National House of Chiefs and the District Assemblies should also deny him all the privileges and courtesies. He should be shamed in all regional and national media

outlets to compel him to do the needful. The 1992 Constitution places all minerals under the President, therefore, such chief should be arrested and prosecuted by the State. The assemblymen who do not help in the maintenance of the environmental protocols should be removed from their positions and banned from any elective position in their entire life.

A by-election should be organised to fill the position.

Recommendations for the Government

1. The government should resource District Security Committee (DISEC) and Regional Security Committee (REGSEC) and task them to stop irresponsible mining activities in the area.
2. A District Chief Executive who fails in this task should be removed from his/her post. All heads of security agencies in the area and the District Coordinating Directors who will fail in this task should be sanctioned.
3. The government should also stop rent-seeking in the sector and sanction its rank and files in the sector so that it would have the moral right to prosecute chiefs who are promoting irresponsible mining in the area and arrest unsustainable miners.
4. The government should resource the Geological Survey Department to gather data on minerals deposits in Ghana so the miners will know where to and where not to mine to reduce land degradation and unnecessary de-vegetation of mining activities.

Recommendations for the regulators

1. The miners are aware that there are gold nuggets in the river beds, therefore, they (miners) would not move out of the water. To solve this problem, the regulators should liaise with the miners and the technical/vocational educational institutions in Ghana to develop

appropriate mining technology for the miners to reduce the negative impacts of mining on the environment. This is because the lack of appropriate technology to mine sustainably was partly responsible for the miners' dependence on the Changfan machine which is destroying water bodies.

Recommendations for miners (registered/non-registered)

1. The executives of the Small-scale Gold Miners' Association should encourage the non-registered miners to register their businesses to reduce harassment from the State and also reduce the negative impacts of their activities on the environment. This is because if all the miners register their business, it would enable the regulators to have an accurate data-base of all the miners which will go a long way to ensure proper regulation of all mining activities in the area.
2. All the miners (registered/non-registered) should assist the regulators and enforcers of the mining and environmental laws to weed out their colleagues who are breaking the law because if the negative impact increases and the State bans all small-scale gold mining they lose their livelihood and income.

Recommendation for chiefs/assemblymen/residents

1. The chiefs, assemblymen/women and residents should team up with the regulators to form local Environmental Neighbourhood Committees to help monitor and inspect mining activities in the area to reduce the negative impacts of mining on the environment. This would also give the regulators local social support to develop the courage to stop miners who are breaking the law.

Contribution to knowledge

Previous studies consider poverty and unemployment as the factors driving small-scale gold mining activity and its negative environmental impacts. Also, they overemphasize the demand for gold in the world market as a global factor fuelling the negative ecological impacts of mining in developing countries. This study departs from these macro structural explanations on unsustainable mining and situates the causes and negative impacts of small-scale gold mining in micro factors such as peer pressure.

Similarly, the existing literature largely explicates ineffective enforcement of mining and environment laws on bribery and corruption on the part of the regulators. This study revealed that this assertion is not necessarily the case as miners used the proceeds from the mines to seek the cooperation and support of the opinion leaders and community members to mine irresponsibly. Therefore, this work argues that the locals trade social amenities and financial support provided by the miners for the poor ecological impacts of mining.

Limitations of the study

Convenience samples were used for the quantitative aspect of the study but such samples were selected from different communities and they were also used along with simple random samples to reduce the sampling errors. Therefore, the result of the study is valid. Also, respondents' bio-data were not taken into consideration as far as social pressures and personal dispositions were concerned. However, participants' ages, years in mining and educational backgrounds were used to analyse the assets they had acquired through mining to give readers a fair idea of how the material success miners have achieved through SSGM pull certain age groups and educational backgrounds into SSGM.

Areas for further study

Based on these findings, further study in the following areas is required:

1. The study briefly discussed the relationship between the local economy and small-scale gold mining. However, not much information was gathered on this, because it was not part of the objectives. An ethnographic study on the relationship between the local economy and small-scale gold mining and how this increases participation in small-scale gold mining leading to its negative impacts is required to help resolve unsustainable mining in the area.
2. Although the study was about the environmental impacts of mining, it did not differentiate the various types of mining in the area and the contribution of each mining activity to the negative impacts. Five types of mining activities were observed – rock mining, remining at leach pad, shootings, alluvial mining at banks of the rivers and alluvial mining in the rivers. A study on the assessment of environmental impacts of different mining activities would help policy makers and regulators know where to strengthen their efforts to help stop or reduce unsustainable mining.

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APPENDIX I**Questionnaire for Miners**

My name is Samuel Antwi, a student of the School for Development Studies, University of Cape Coast, Cape Coast. I am collecting data for my thesis on the topic: social pressures, personal dispositions and environmental degradation: A study of small-scale gold mining in the Denkyira area in the Central Region as part of requirements for the completion of the academic work.

I would be grateful if you could answer the following questions to enable me to complete the thesis. Please, your participation in this student research work is free and you are assured that the information provided would be protected as required by the Ethical Review Board of the University of Cape Coast. Thanks for your participation in this work.

A**Biodata**

Kindly tick what is applicable to you

1. Sex
 - Male
 - Female
2. Age
 -
3. Level of Education
 - No formal education
 - Primary education
 - Middle School Living Certificate
 - Junior High School

- Senior High School/Voc/Tech
- Tertiary Education
- Others (Specify).....

4. Marital Status

- Single
- Married
- Divorced
- Widowed
- Separated

5. Place Region, District and home town

- Region.....
- District.....
- Hometown.....

6. Where do you Live

- a. A camp at site
- b. In the community

7. How many years have you been doing it

Financially Achievements

- 8. Approximately, how much income do you make in a week from doing this work
- 9. Approximate income for a month
- 10. Approximately, how much do you spend in a week from the income you get from this work
- 11. Approximate expenditure for a month?

-

Assets acquired

12. Items the proceed from the mines has been used to acquire or spend on
(please tick as many as possible and fill the necessary column)

Items	Yes	No	How many
Maintain home			
Have fun with friends			
Help family members, friends and others			
Cloth			
Jewellery			
Motorbike			
Television set			
Mobile phones			
Car			
Landed properties			
House			
Building a house			
Mining equipment			
Others (specify)			

B (Social achievements)

13. Socially, what have you achieved from the money you have gained from small-scale gold mining (tick as many as possible)

	Yes	No
Respects from friends, peers and community members		
I have become one of the successful people among my peers, friends and family		
Influential in decision making among my friends and family because I can help		

Motivation factors

14. Has small-scale gold mining made others rich?

a. Yes

b.No

15. If yes, do you consider those people as powerful in this community

a. Yes

b.No

16. Are they famous in this community?

a. Yes

b.No

17. Do people respect them?

a. Yes

b.No

18. Do these factors (small-scale gold mining, making others rich, powerful, famous and respected) influence your decision to engage in mining

a. Yes

b.No

C (Scales for personal dispositions)**Please tick the appropriate box**

Scales for personal dispositions			
<i>Items/scales for ambition</i>	Very much	Somewhat	Never
Small-scale gold mining can make me powerful and famous			
Small-scale gold mining can help me to achieve high social status			
Small-scale gold mining can make me an influential person in my community and among my friends and family			
Small-scale gold mining can make me rich or wealthy			
Small-scale gold mining can help me to acquire a lot of properties			
I participate in small-scale gold mining because it is profitable and rewards better than other livelihoods			
I use machines to engage in small-scale gold mining because it helps me to get more gold			
<i>Pleasure</i>			
The reward of small-scale gold mining can make me happy and enjoy life			
The reward of small-scale gold mining can resource me to maximize my desires and wants			
<i>Universal motivational value person</i>			
I engage in small-scale gold mining just to maintain myself			

Scales for personal dispositions			
<i>Items/scales for ambition</i>	Very much	Somewhat	Never
I participate in small-scale gold mining because I cannot find any other livelihood			

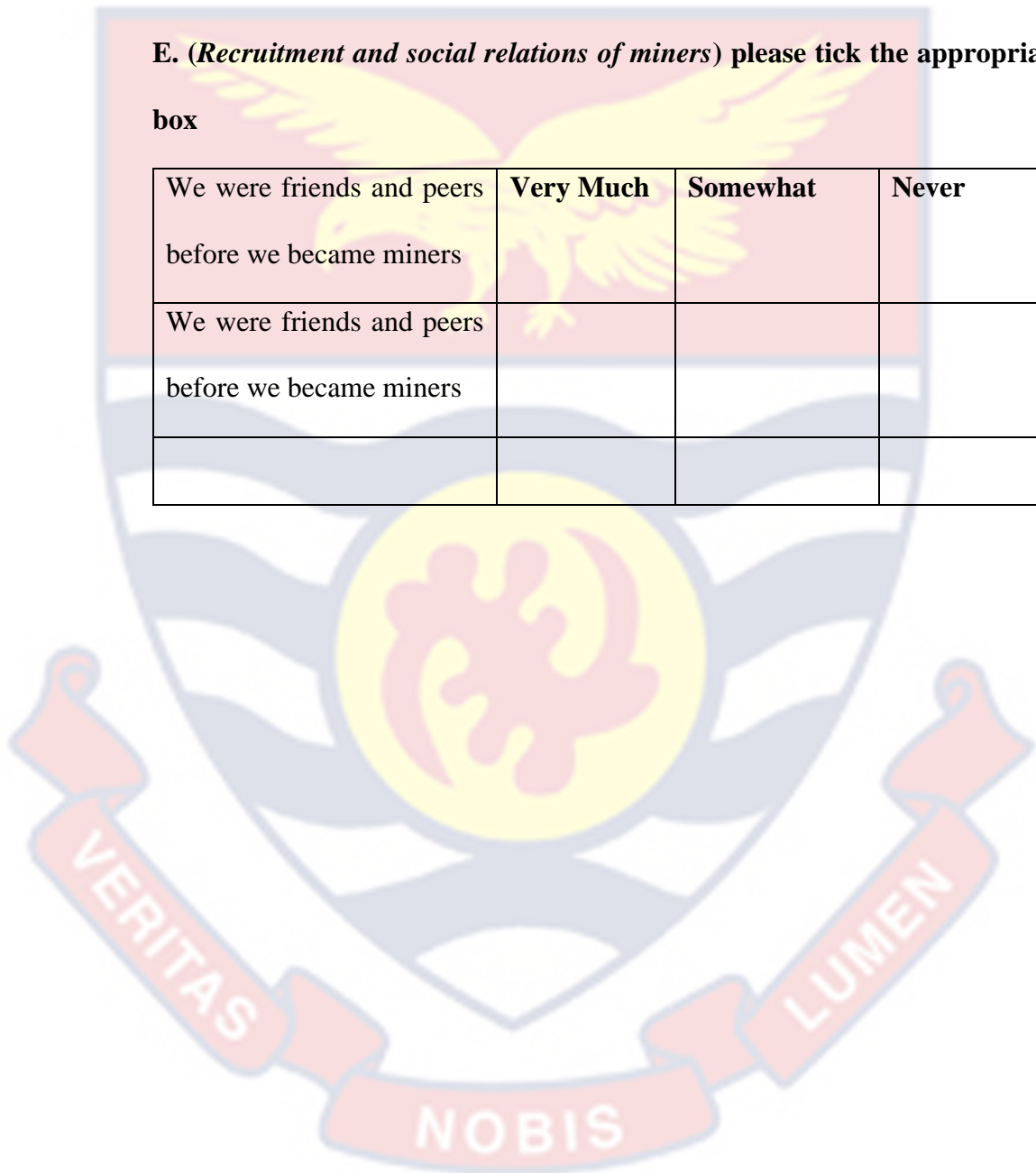
Scales for social pressures			
<i>Items/Scales for active social pressures</i>	Very Much	Somewhat	Never
I got into small-scale gold mining through friends, peers and neighbours' persuasions and recommendation of its better reward			
My friends and family gave me the needed material and financial support to enable me to participate in small-scale gold mining			
I got into small-scale gold mining because my friends, peers and family used what they have achieved materially from it to entice me so I succumbed to their demands			
I got into small-scale gold mining because my friends, peers and family mocked me with what they have acquired through SSGM			
The financial burden my immediate family placed on me forced me to join SSGM			
<i>Passive social pressure</i>			
The flamboyant lifestyle of my friends and peers who are into small-scale gold mining influenced me to enter into it			
The spending culture of my rich friends and colleagues who are not miners but financially successful influenced me to enter into small-scale gold mining to make quick money and spend like them			
The people in my community do not respect poor people, I joined small-scale gold mining to be rich and respected			
I stopped my previous income-generating activity and joined small-scale gold mining			

because of hearsay of its better financial reward.			
I got into small-scale gold mining because it has made others rich			

D. (Scale for social pressures) please tick the appropriate box

E. (*Recruitment and social relations of miners*) please tick the appropriate box

We were friends and peers before we became miners	Very Much	Somewhat	Never
We were friends and peers before we became miners			



APPENDIX II

Interview guide for the Executives of the SSGM Association and some selected unlicensed miners

My name is Samuel Antwi, a student of the School for Development Studies, University of Cape Coast, Cape Coast.

I am collecting data for my thesis on the topic: social pressures, personal disposition and environmental degradation: A study of small-scale gold mining in the Denkyira area in the Central Region as part of requirements in the completion of the academic work.

I would be grateful if you could help me to answer the following questions to enable me to complete the thesis.

Please, your participation in this student research work is free and you are assured that the information provided would be protected as required by the Ethical Review Board of the University of Cape Coast.

Thanks for your participation in this work.

A (Personal dispositions)

1. What are some of the things you think the reward of SSGM can help you to achieve? Example, money, properties and etc Probe: In which ways could the reward of SSGM enhance one's social status?

In which ways could the reward of SSGM enhance your social status?

2. What have you achieved from SSGM? Have you acquired some assets?

Can you give me examples of the assets? What have these assets made you in the eyes of your friends, family and community members?

Has mining increased your income and what does that mean to you?

Do you see any difference now and before you started mining? In the next two or three years, what do you expect from mining? example riches, famous etc.

3. If you compared the reward of SSGM with that of other livelihoods in this community which of them is profitable and why is it profitable? How can this influence your decision as to where to invest your resources and why?

How can this influence other people's decisions as to where they should invest their resources?

4. Why do you use machines and not simply hand tools to engage in SSGM?

Probe: in your opinion why do some of your colleagues use machines to engage in SSGM?

5. How do you use the money you receive from SSGM?

B (Social pressures)

6. How did you get into SSGM? How can a friend, family member or neighbour influence you or someone to get into SSGM?

Probe: How can you also influence a friend, family or neighbour to join SSGM?

7. How and why can the lifestyle of your friends who are miners influence you or others to join SSGM

Probe: please in your view how can the lifestyle of people who are not miners influence you or others to join SSGM?

8. In your opinion how can the social system influence somebody to go into SSGM?

C (Environmental impacts of SSGM)

9. How do you relate with the government officials monitoring your activities?

Probe: Can you tell me a bit more about your relationship with the government; is it official or friendly? How do you communicate with them? do they know the problems you face at your site?, and are they helpful?

10. Can you tell me the standard practice of these officials?

Probe: what do they look out for when they visit your site, what do they monitor?

11. How do you get notifications before they visit your site?

Probe: a day or week notice?, please do they come in groups or individually?

12. If there are any sanctions, how are the sanctions carried out if one breaches the environmental protocols?

Probe: how do the environmental officials react if they find out that somebody has breached or is breaching the environmental protocols?

Probe: how do they (officials) resolve such problem? Please, if you breached the protocols how do you resolve them so that the officials could not notice?

Please, is it possible for one to cover-up a breach of the protocols from the environmental officials? What are some of the ways one can use to cover-up a breach of the protocols from the environmental officials?

13. Have any of your colleagues been cautioned or sanctioned by these officials before for breaking the environmental protocols?

Probe: in case a colleague breached any of the environmental protocols how do you help him/her to resolve the problem caused? In case some of the officials notice the breach of the protocols how do they resolve such problem?

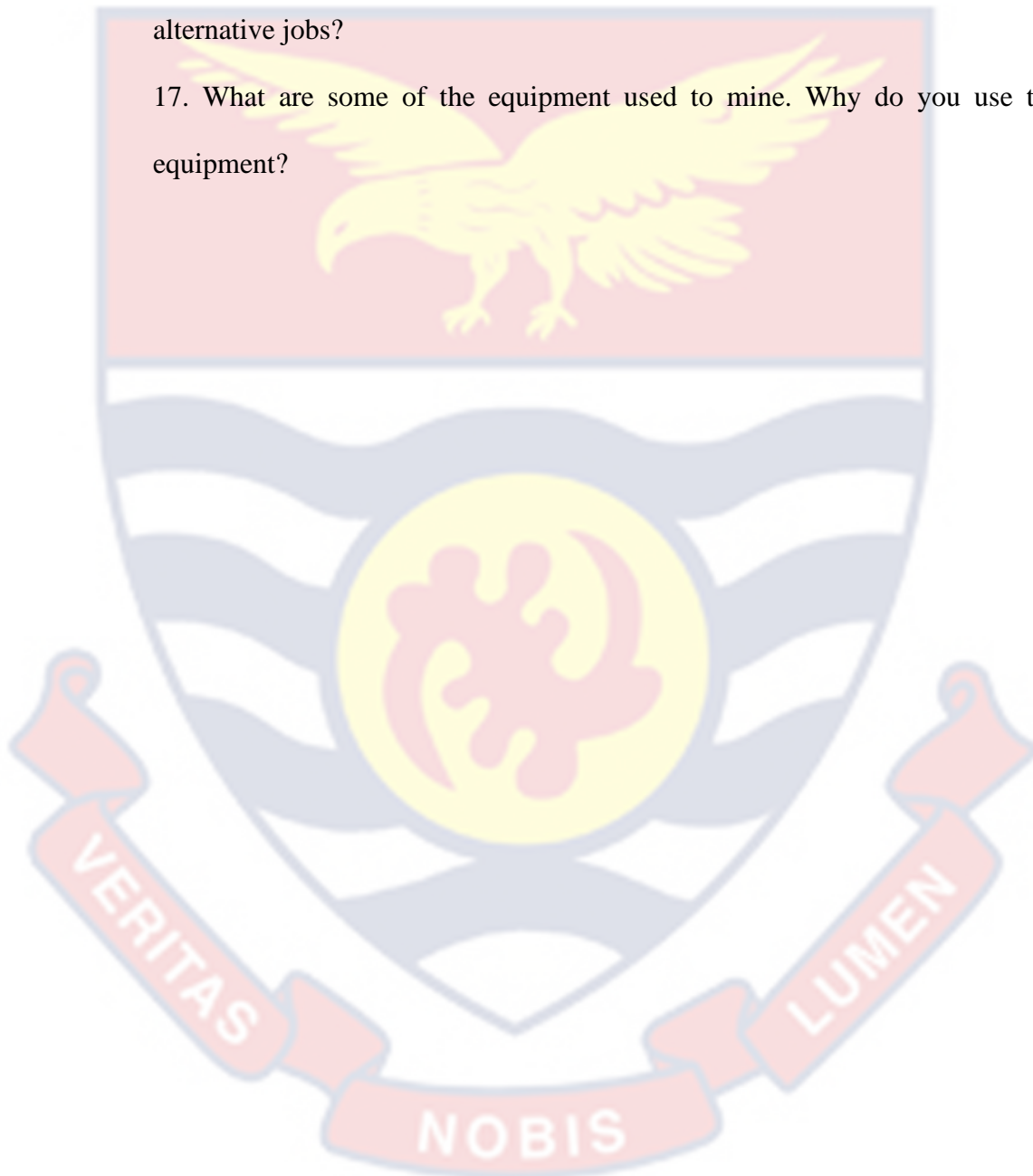
14. Why do some miners operate at night?

Probe: How possible is it for one to mine without his/her operation being noticed by the authorities?

15. Present and previous governments have used draconian measures to stop negative impacts of small-scale gold mining but it still persists. In your candid opinion, why has that not been effective?

16. In your opinion, how can this problem be solved besides provision of alternative jobs?

17. What are some of the equipment used to mine. Why do you use this equipment?



APPENDIX III

Interview guide for government officials

My name is Samuel Antwi, a student of the School for Development Studies, University of Cape Coast, Cape Coast.

I am collecting data for my thesis on the topic: social pressures, personal disposition and environmental degradation: A study of small-scale gold mining in the Denkyira area in the Central Region as part of requirements in the completion of the academic work.

I would be grateful if you could help me to answer the following questions to enable me to complete the thesis.

Please, your participation in this student research work is free and you are assured that the information provided would be protected as required by the Ethical Review Board of the University of Cape Coast.

Thanks for your participation in this work.

Object one

1. What are the equipment miners use for mining when you visit their site? What may be the reasons they use such equipment?

Objective two

2. Please, what are some of the social factors that you think can influence people to go into SSGM? How can a friend, family member or neighbour influence someone to get into SSGM?

Objective four

3. How do you relate with the miners?

Probe: official or friendly?

4. How is notification given before inspecting mining sites?

Probe: a day or week notice? why

5. What do you look out for when you go for site inspection?

Probe: how do you react if a miner has breached any of the laws when you go for site inspection?

6. How is the information about site inspection shared, for example among colleagues in other regions? Do they do the same? How similar is the conversation in all the site inspection experiences?

7. From your experiences, is it possible for some miners to breach the environmental protocols and conceal them? How can this happen? What are the measures you think some miners could adopt to cover up a breach of the environmental protocols?

8. Why do some miners operate at night?

9. From your experience, what can a miner do to outwit regulators or law enforcement agencies of his/her poor mining practices?

10. Present and previous governments have used draconian measures to stop the negative impacts of small-scale gold mining but it still persists. In your candid opinion, why do you think this is so? And why does it still persist in spite of efforts to stop it?

11. In your opinion, how can this problem be solved?

APPENDIX IV**Interview guide for Assembly Men/Women and traditional leaders in the
area**

My name is Samuel Antwi, a student of the School for Development Studies, University of Cape Coast, Cape Coast.

I am collecting data for my thesis on the topic: social pressures, personal disposition and environmental degradation: A study of small-scale gold mining in the Denkyira area in the Central Region as part of requirements in the completion of the academic work.

I would be grateful if you could help me to answer the following questions to enable me to complete the thesis.

Please, your participation in this student research work is free and you are assured that the information provided would be protected as required by the Ethical Review Board of the University of Cape Coast.

Thanks for your participation in this work.

Objective two

1. Please, what are some of the social factors you think can influence people to go into SSGM? How can a friend, family member or neighbour influence someone to get into SSGM?

Object three

2. What are the equipment miners use for mining when you visit their sites? What may be the reasons they used such equipment? What are the possible environmental consequences of the equipment used in mining?

Objective four

3. How do people react to the negative environmental impacts of small-scale gold mining in your community?

Probe: what is the medium through which, the pollution takes place in your community? (, water, land, air?)

Probe: can you share some of your experiences when you visit mining sites, if you complain of a breach of the environmental protocols how do the miners react to your complaints?

4. The information in the public domain is that some miners operate at night, have you experienced such a thing before? What would make one do such a thing in the night?

5. In your experience, what could a miner do to outwit policy regulators and enforcement agencies of poor mining practices?

6. Present and previous governments have used draconian measures to stop the negative impacts of small-scale gold mining but it still persists. In your candid opinion, why do you think this is so?

7. In your opinion as the Assemblyman/woman, how can the problem of mining be solved apart from the provision of adequate resources for the regulators, alternative jobs for miners and increase of salaries of the regulators?

8. What are the equipment miners use for mining when you visit their site? What may be the reasons they used such equipment?

9. Please, what are some of the social reasons you think influence people to go into SSGM? How can a friend, family member or neighbour influence someone to get into SSGM?

APPENDIX V**Observation checklist at the mining site****A. Tools used**

- hand tools – pickaxe, shovel, chisel, hammer, rope
- machines – excavator, bulldozer, trommel, generator, water pump

B. Site

- mining processes – manual or mechanised, alluvial, open cast, deep shaft, narrow pit,
- mining practices -
- pit covered/uncovered
- overburden – used to backfill pit or unused
- water pollution – waste directed into rivers/streams, mining is done in the streams or beside river banks, washing the ore in a river or close to a river
- air pollution – dust pollution, noise pollution, mercury burnt in the open
- tailing pool – re-use, left-over

C. Social life after work

- relax at drinking bars
- go home to the family
- night club
- how they dress after work

D. The physical infrastructure of the mining communities

- some valuables and property acquired

APPENDIX VI

All the tables of the SPSS output of the module

Case Processing Summary

Unweighted Cases ^a		N	Percent
Selected Cases	Included in Analysis	373	100.0
	Missing Cases	0	.0
	Total	373	100.0
Unselected Cases		0	.0
Total		373	100.0

a. If weight is in effect, see classification table for the total number of cases.

Dependent Variable
Encoding

Original Value	Internal Value
Yes	0
No	1

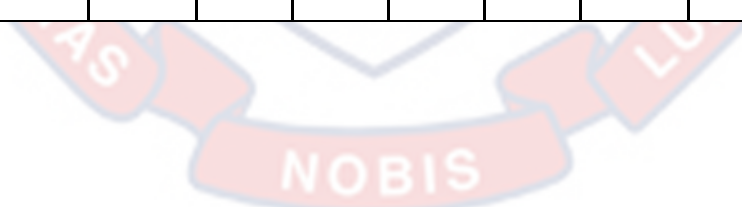


Categorical Variables Codings

		Frequency	Parameter coding														
			(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)	(14)	(15)
Region of Bono		7	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000
origion	Central	106	1.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000
	Oti	9	.000	1.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000
	Ashanti	38	.000	.000	1.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000
	Bono East	16	.000	.000	.000	1.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000
	Western	10	.000	.000	.000	.000	1.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000
	Upper East	41	.000	.000	.000	.000	.000	1.000	.000	.000	.000	.000	.000	.000	.000	.000	.000
	Upper West	26	.000	.000	.000	.000	.000	.000	1.000	.000	.000	.000	.000	.000	.000	.000	.000

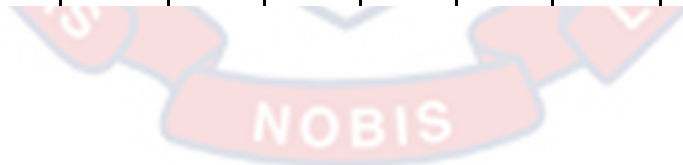


Volta	34	.000	.000	.000	.000	.000	.000	.000	.000	1.000	.000	.000	.000	.000	.000	.000	.000
North East	4	.000	.000	.000	.000	.000	.000	.000	.000	.000	1.000	.000	.000	.000	.000	.000	.000
Nothern	21	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	1.000	.000	.000	.000	.000	.000
Ahanfo	5	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	1.000	.000	.000	.000	.000
Savannah	14	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	1.000	.000	.000	.000
Eastern	31	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	1.000	.000	.000
Greater Accra	4	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	1.000	.000
Western North	7	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	1.000





Level of Education	No formal education	5	.000	.000	.000	.000	.000										
	Primary education	18	1.000	.000	.000	.000	.000										
	Middle School Living Certificate	24	.000	1.000	.000	.000	.000										
	Junior High School	217	.000	.000	1.000	.000	.000										





	Senior High School/Vocational/Tertiary Education	105	.000	.000	.000	1.000	.000											
	Marital status																	
	Single	171	.000	.000	.000													
	Married	198	1.000	.000	.000													
	Divorced	2	.000	1.000	.000													
	Separated	2	.000	.000	1.000													
I stopped my previous income-	Very much	212	.000	.000														
	Somewhat	63	1.000	.000														



generating activity and joined small-scale gold mining because of hearsay of its better financial reward.	Never	98	.000	1.000															
Small-scale gold mining can make me	Very much	360	.000	.000															
	Somewhat	12	1.000	.000															



an influential person in my community and among my friends and family	Never	1	.000	1.000													
I participate in small-scale gold	Very much	245	.000	.000													
	Somewhat	127	1.000	.000													





mining	Never																	
because it is																		
profitable																		
and rewards		1	.000	1.000														
better than																		
other																		
livelihoods																		
I use	Very																	
machines to	much	355	.000	.000														
engage in	Somewhat	6	1.000	.000														

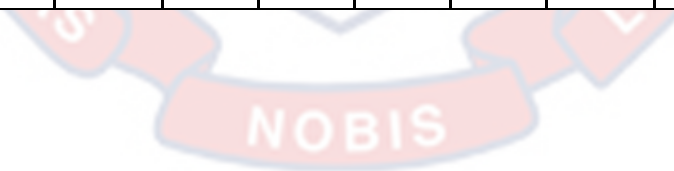




small-scale gold mining because it helps me to get more gold	Never	12	.000	1.000													
The reward of small-scale mining can make me happy and enjoy life	Very much	127	.000	.000													
	Somewhat	192	1.000	.000													
	Never	54	.000	1.000													



The reward of small-scale mining resource to maximize my desires and wants	Very much	123	.000	.000														
scale gold mining can me	Somewhat	202	1.000	.000														
to maximize my desires and wants	Never	48	.000	1.000														
I engage in small-scale gold mining	Very much	62	.000	.000														
gold mining	Somewhat	147	1.000	.000														





just to Never																	
maintain myself	164	.000	1.000														
I participate Very	57	.000	.000														
in small- much																	
scale gold Somewhat	193	1.000	.000														
mining Never																	
because I																	
cannot find	123	.000	1.000														
any other																	
livelihood																	
I got into Very	355	.000	.000														
small-scale much																	



gold mining	Somewhat	13	1.000	.000														
through	Never																	
friends, peers																		
and																		
neighbours'																		
persuasions		5	.000	1.000														
and																		
recommenda																		
tion of its																		
better reward																		
I got into	Very																	
small-scale	Much	257	.000	.000														
gold mining	Somewhat	89	1.000	.000														

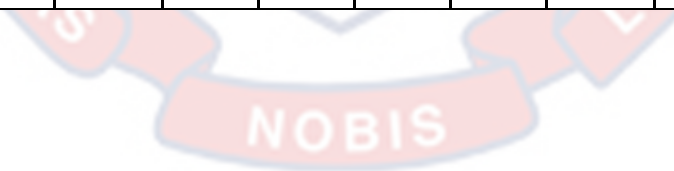


because it Never																			
has made	27	.000	1.000																
others rich																			
The people in Very	26	.000	.000																
my much																			
community somewhat	12	1.000	.000																





do not Never																	
respect poor																	
people, I																	
joined small-	335	.000	1.000														
scale gold																	
mining to be																	
rich and																	
respected																	
The spending Very	10	.000	.000														
culture of my much																	
rich friends Somewhat	127	1.000	.000														





and	Never																		
colleagues																			
who are not																			
miners but																			
financially																			
successful																			
influenced		236	.000	1.000															
me to enter																			
into small-																			
scale gold																			
mining to																			
make quick																			
money and																			



spend like them The Very flamboyant much lifestyle of Somewhat my friends Never and peers who are into small-scale gold mining influenced me to enter into it	103 189 81	.000 1.000 .000	.000 .000 1.000																
---	------------------	-----------------------	-----------------------	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--



My friends Very	204	.000	.000																
and family much																			
gave me the Somewhat	122	1.000	.000																
needed Never																			
material and																			
financial																			
support to	47	.000	1.000																
enable me to																			
participate in																			
small-scale																			
gold mining																			
The financial Very much	249	.000	.000																
burden my Somewhat	71	1.000	.000																

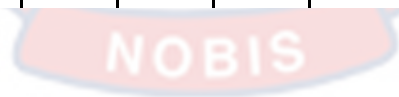


immediate family placed on me forced me to join SSGM	Never	53	.000	1.000															
I got into small-scale gold mining	Very Much	28	.000	.000															
	Somewhat	54	1.000	.000															



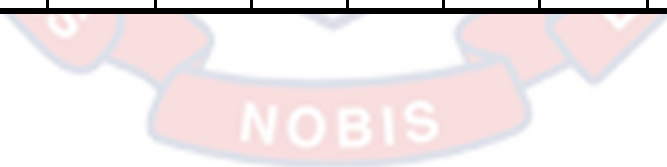


I got into Very	9	.000	.000															
small-scale much																		
gold mining Somewhat	22	1.000	.000															
because my Never																		
friends, peers																		
and family																		
mocked me																		
with what	342	.000	1.000															
they have																		
acquired																		
through																		
SSGM																		





can make me	Somewhat																				
rich	or	13	1.000																		
wealthy																					
Small-scale	Very																				
gold mining	much	365	.000																		
can help me	Somewhat																				
to achieve																					
high social		8	1.000																		
status																					
Sex of	Male	364	.000																		
Respondents	Female	9	1.000																		



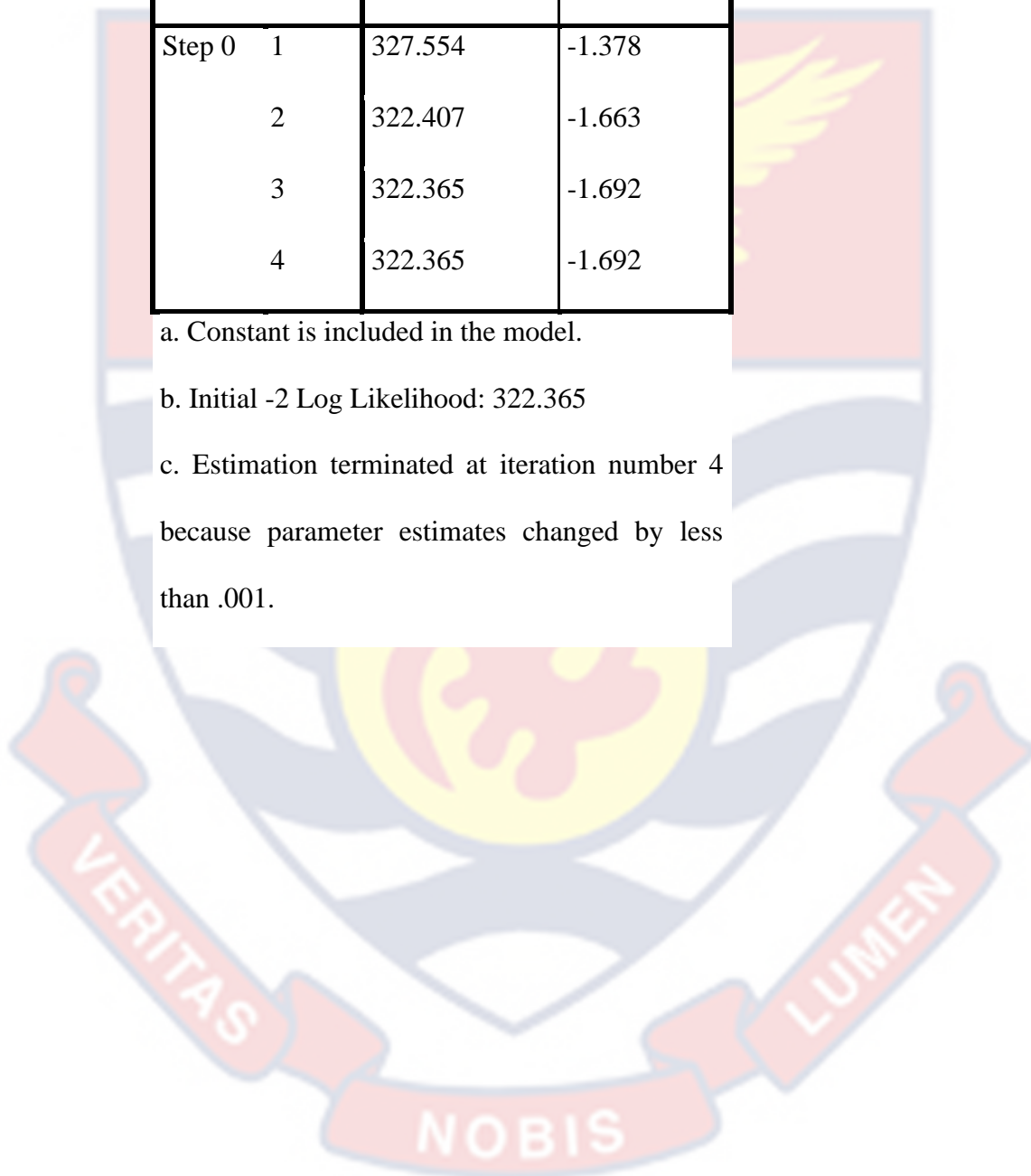
Block 0: Beginning Block**Iteration History^{a,b,c}**

Iteration		-2 Log likelihood	Coefficients
			Constant
Step 0	1	327.554	-1.378
	2	322.407	-1.663
	3	322.365	-1.692
	4	322.365	-1.692

a. Constant is included in the model.

b. Initial -2 Log Likelihood: 322.365

c. Estimation terminated at iteration number 4 because parameter estimates changed by less than .001.



Classification Table^{a,b}

	Observed	Predicted		
		Do these factors(small-scale gold mining, making others rich, powerful, famous and respected) influence your decision to engage in mining		Percentage
		Yes	No	Correct
Step 0	Do these factors(small-scale gold mining, s making others rich, No powerful, famous and respected) influence your decision to engage in mining	315	0	100.0
		58	0	.0
Overall Percentage				84.5

a. Constant is included in the model.

b. The cut value is .500

Variables in the Equation

	B	S.E.	Wald	Df	Sig.	Exp(B)
Step 0 Constant	-1.692	.143	140.248	1	.000	.184

Variables not in the Equation

	Score	df	Sig.
Step 0 Variables Sex(1)	.138	1	.710
Age	.583	1	.445
Education	8.765	5	.119
Education(1)	1.439	1	.230
Education(2)	.024	1	.876
Education(3)	3.815	1	.051
Education(4)	4.495	1	.034
Education(5)	.275	1	.600
MaritalStatus	3.729	3	.292
MaritalStatus(1)	.004	1	.952
MaritalStatus(2)	1.817	1	.178
MaritalStatus(3)	1.817	1	.178
Region	15.455	15	.419
Region(1)	.027	1	.870
Region(2)	1.698	1	.193
Region(3)	.184	1	.668
Region(4)	1.137	1	.286
Region(5)	4.678	1	.031
Region(6)	.551	1	.458
Region(7)	.342	1	.558
Region(8)	1.289	1	.256
Region(9)	.744	1	.388
Region(10)	.027	1	.869
Region(11)	2.307	1	.129
Region(12)	.018	1	.894
Region(13)	.009	1	.926
Region(14)	.744	1	.388
Region(15)	.921	1	.337
Experience	3.190	1	.074

Tobepowerfulandfamous(1)	.241	1	.623
Achievedhighsocialstatus(1)	.556	1	.456
Influentialamongfriendsandfamily	1.021	2	.600
Influentialamongfriendsandfamily(1)	.843	1	.358
Influentialamongfriendsandfamily(2)	.185	1	.667
Toberichandwealthy(1)	.633	1	.426
Acquiredalotofproperties(1)	.248	1	.619
Mostprofitablelivelihood	4.903	2	.086
Mostprofitablelivelihood(1)	4.782	1	.029
Mostprofitablelivelihood(2)	.185	1	.667
Getmoregold	1.650	2	.438
Getmoregold(1)	1.123	1	.289
Getmoregold(2)	.492	1	.483
Enjoylife	2.787	2	.248
Enjoylife(1)	.666	1	.414
Enjoylife(2)	.947	1	.330
MaximizeDesires	.926	2	.629
MaximizeDesires(1)	.164	1	.686
MaximizeDesires(2)	.390	1	.532
Justmaintainmyself	5.907	2	.052
Justmaintainmyself(1)	.063	1	.802
Justmaintainmyself(2)	3.500	1	.061
Noothervivelihood	9.456	2	.009
Noothervivelihood(1)	2.954	1	.086
Noothervivelihood(2)	9.006	1	.003
Friendsandpeersrecommendation	.935	2	.627
Friendsandpeersrecommendation(1)	.000	1	.987
Friendsandpeersrecommendation(2)	.933	1	.334

Materialandfinancialsu pportfromfriendsandfa mily	1.869	2	.393
Materialandfinancialsu pportfromfriendsandfa mily(1)	.851	1	.356
Materialandfinancialsu pportfromfriendsandfa mily(2)	.531	1	.466
friendspeersandfamily materialenticement	.601	2	.740
friendspeersandfamily materialenticement(1)	.026	1	.872
friendspeersandfamily materialenticement(2)	.365	1	.546
Friendspeersandfamily mocked	2.389	2	.303
Friendspeersandfamily mocked(1)	.123	1	.725
Friendspeersandfamily mocked(2)	1.273	1	.259
Financialburdenofmyi mmediatefamily	1.320	2	.517
Financialburdenofmyi mmediatefamily(1)	.000	1	.988
Financialburdenofmyi mmediatefamily(2)	1.275	1	.259
Flamboyantlifestyleof myminerfriendsandpee rs	3.510	2	.173
Flamboyantlifestyleof myminerfriendsandpee rs(1)	.938	1	.333
Flamboyantlifestyleof myminerfriendsandpee rs(2)	3.508	1	.061
Spendingcultureofmyn onminerfriends	1.674	2	.433
Spendingcultureofmyn onminerfriends(1)	1.277	1	.258

Spendingcultureofmyn onminerfriends(2)	1.627	1	.202
Disrespectofthepoor	2.057	2	.357
Disrespectofthepoor(1)	.843	1	.358
Disrespectofthepoor(2)	.184	1	.668
Wealthyminers	.994	2	.608
Wealthyminers(1)	.906	1	.341
Wealthyminers(2)	.195	1	.658
Hearsayofitsbetterfinan cialreward	4.335	2	.114
Hearsayofitsbetterfinan cialreward(1)	2.096	1	.148
Hearsayofitsbetterfinan cialreward(2)	1.105	1	.293
Overall Statistics	85.932	64	.035

Block 1: Method = Enter**Omnibus Tests of Model Coefficients**

		Chi-square	Df	Sig.
Step 1	Step	94.901	64	.007
	Block	94.901	64	.007
	Model	94.901	64	.007

Model Summary

	-2 Log likelihood	Cox & Snell R Square	Nagelkerke R Square
1	227.465 ^a	.225	.388

a. Estimation terminated at iteration number 20

because maximum iterations has been reached. Final

solution cannot be found.

Hosmer and Lemeshow Test

Step	Chi-square	df	Sig.
1	6.522	8	.589

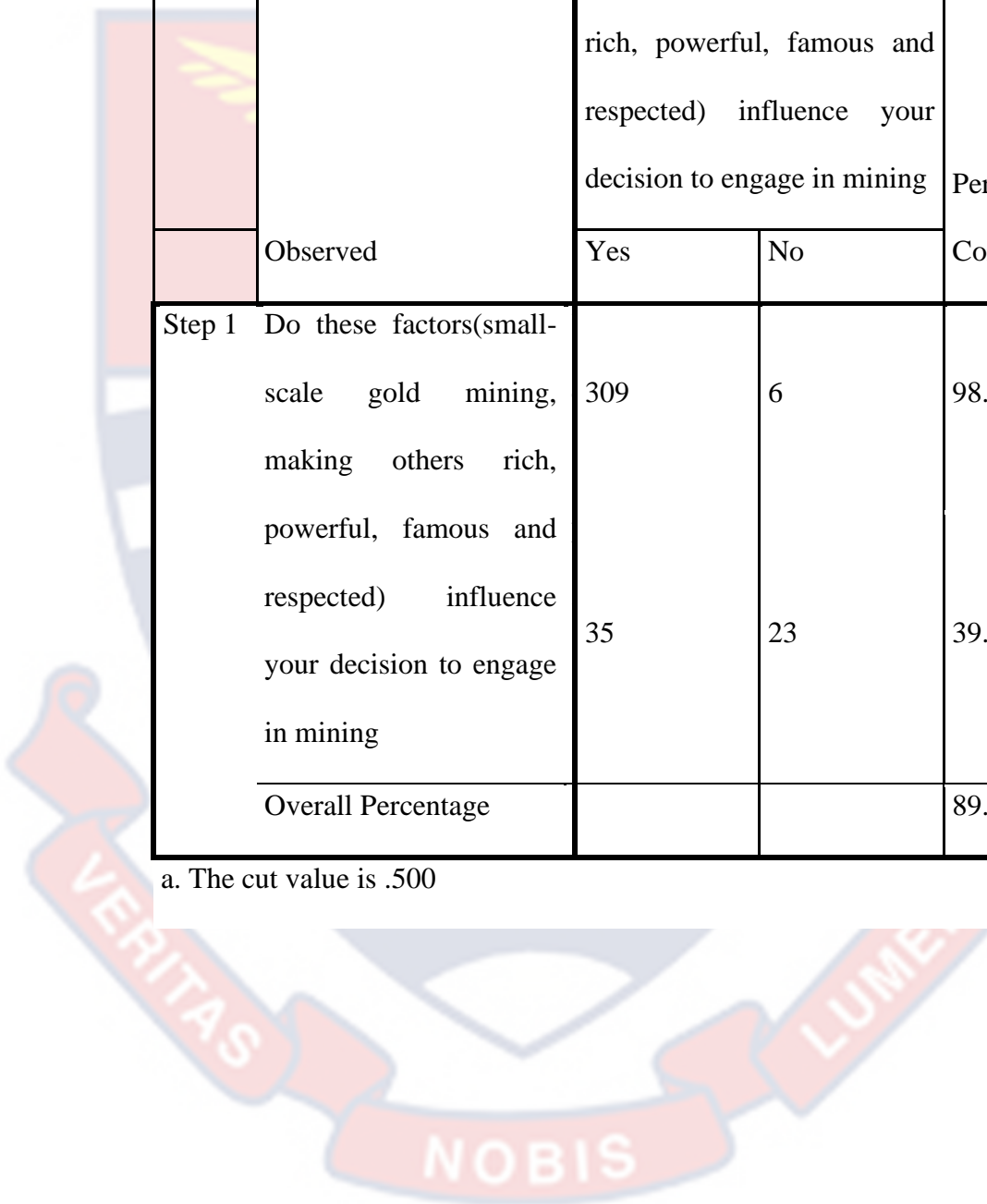
Contingency Table for Hosmer and Lemeshow Test

		Do these factors(small-scale gold mining, making others rich, powerful, famous and respected) influence your decision to engage in mining = Yes		Do these factors(small-scale gold mining, making others rich, powerful, famous and respected) influence your decision to engage in mining = No		Total
		Observed	Expected	Observed	Expected	
Step 1	1	37	37.000	0	.000	37
	2	37	36.752	0	.248	37
	3	35	36.045	2	.955	37
	4	34	35.457	3	1.543	37
	5	34	34.606	3	2.394	37
	6	34	33.485	3	3.515	37
	7	32	31.631	5	5.369	37
	8	32	29.310	5	7.690	37
	9	28	25.257	9	11.743	37
	10	12	15.457	28	24.543	40

Classification Table^a

	Observed	Predicted		
		Do these factors(small-scale gold mining, making others rich, powerful, famous and respected) influence your decision to engage in mining		Percentage
		Yes	No	Correct
Step 1	Do these factors(small-scale gold mining, making others rich, powerful, famous and respected) influence your decision to engage in mining	309	6	98.1
		35	23	39.7
	Overall Percentage			89.0

a. The cut value is .500



Variables in the Equation

	B	S.E.	Wald	df	Sig.	Exp(B)
Step 1 ^a						1491571313
Sex(1)	39.544	25657.609	.000	1	.999	88525408.000
Age	-.083	.056	2.176	1	.140	.920
Education			6.952	5	.224	
Education(1)	-2.525	1.926	1.719	1	.190	.080
Education(2)	-2.090	1.797	1.354	1	.245	.124
Education(3)	-1.666	1.674	.990	1	.320	.189
Education(4)	-.791	1.699	.217	1	.641	.453
Education(5)	-1.943	2.606	.556	1	.456	.143
MaritalStatus			2.267	3	.519	
MaritalStatus(1)	.348	.558	.388	1	.533	1.416
MaritalStatus(2)	2.727	1.951	1.954	1	.162	15.288
MaritalStatus(3)	1.033	1.901	.295	1	.587	2.811
Region			12.205	15	.663	
Region(1)	19.710	14091.256	.000	1	.999	363101899.527
Region(2)	.386	18735.578	.000	1	1.000	1.471
Region(3)	19.366	14091.256	.000	1	.999	257276896.974
Region(4)	19.838	14091.256	.000	1	.999	412792906.929
Region(5)	22.000	14091.256	.000	1	.999	3584011955.424
Region(6)	19.562	14091.256	.000	1	.999	313075317.816
Region(7)	18.311	14091.256	.000	1	.999	89628655.017
Region(8)	18.418	14091.256	.000	1	.999	99706619.507
Region(9)	.786	23776.312	.000	1	1.000	2.194
Region(10)	19.230	14091.256	.000	1	.999	224695905.724
Region(11)	21.456	14091.256	.000	1	.999	2081478944.903
Region(12)	19.079	14091.256	.000	1	.999	193180287.326
Region(13)	19.432	14091.256	.000	1	.999	274965754.535
Region(14)	.698	24063.728	.000	1	1.000	2.009
Region(15)	20.982	14091.256	.000	1	.999	1295016764.560
Experience	.065	.066	.960	1	.327	1.067

Tobepowerfuland famous(1)	1.214	1.503	.652	1	.419	3.365
Achievedhighsocialstatus(1)	.414	2.314	.032	1	.858	1.513
Influentialamong friendsandfamily			4.172	2	.124	
Influentialamong friendsandfamily (1)	2.166	1.061	4.172	1	.041	8.725
Influentialamong friendsandfamily (2)	20.628	47684.250	.000	1	1.000	909474696.350
Toberichandwealthy(1)	-1.795	2.307	.605	1	.437	.166
Acquiredalotofproperties(1)	-.563	.817	.474	1	.491	.570
Mostprofitablelivelihood			7.705	2	.021	
Mostprofitablelivelihood(1)	1.233	.444	7.705	1	.006	3.432
Mostprofitablelivelihood(2)	-42.641	41183.470	.000	1	.999	.000
Getmoregold			.000	2	1.000	
Getmoregold(1)	-17.840	12782.471	.000	1	.999	.000
Getmoregold(2)	-40.062	25657.609	.000	1	.999	.000
Enjoylife			1.439	2	.487	
Enjoylife(1)	-.821	.847	.940	1	.332	.440
Enjoylife(2)	-1.310	1.203	1.187	1	.276	.270
MaximizeDesires			.483	2	.785	
MaximizeDesires(1)	.536	.867	.383	1	.536	1.709
MaximizeDesires(2)	.720	1.218	.349	1	.555	2.054
Justmaintainmyself			2.742	2	.254	
Justmaintainmyself(1)	1.157	.881	1.725	1	.189	3.182
Justmaintainmyself(2)	1.575	.964	2.671	1	.102	4.831
Nootherlivelihood			6.249	2	.044	
Nootherlivelihood(1)	-1.016	.836	1.477	1	.224	.362
Nootherlivelihood(2)	.168	.795	.045	1	.832	1.183

Friendsandpeersr ecommodation			.016	2	.992	
Friendsandpeersr ecommodation(1)	.159	1.263	.016	1	.900	1.173
Friendsandpeersr ecommodation(2)	-37.600	17067.069	.000	1	.998	.000
Materialandfinan cialsupportfromf riendsandfamily			.640	2	.726	
Materialandfinan cialsupportfromf riendsandfamily(1)	-.350	.480	.531	1	.466	.705
Materialandfinan cialsupportfromf riendsandfamily(2)	.017	.706	.001	1	.981	1.017
friendspeersandf amilymaterialent icement			3.419	2	.181	
friendspeersandf amilymaterialent icement(1)	3.075	1.712	3.225	1	.037	21.655
friendspeersandf amilymaterialent icement(2)	3.099	1.693	3.351	1	.067	22.183
Friendspeersandf amilymocked			.084	2	.959	
Friendspeersandf amilymocked(1)	-23.700	8977.936	.000	1	.998	.000
Friendspeersandf amilymocked(2)	-23.949	8977.936	.000	1	.998	.000
Financialburden ofmyimmediatef amily			.478	2	.788	
Financialburden ofmyimmediatef amily(1)	.373	.559	.444	1	.505	1.452
Financialburden ofmyimmediatef amily(2)	.289	.676	.183	1	.669	1.335
Flamboyantlifest yleofmyminerfri endsandpeers			1.142	2	.565	

Flamboyantlifestyleofmyminerfriendsandpeers(1)	.211	.506	.173	1	.677	1.234
Flamboyantlifestyleofmyminerfriendsandpeers(2)	.655	.630	1.079	1	.299	1.925
Spendingcultureofmynonminerfriends			.011	2	.995	
Spendingcultureofmynonminerfriends(1)	19.161	8977.936	.000	1	.998	209765224.603
Spendingcultureofmynonminerfriends(2)	19.211	8977.936	.000	1	.998	220515007.842
Disrespectofthepoor			3.250	2	.197	
Disrespectofthepoor(1)	1.516	1.755	.745	1	.388	4.552
Disrespectofthepoor(2)	-.274	1.568	.031	1	.861	.760
Wealthyminers			.942	2	.625	
Wealthyminers(1)	-.102	.498	.042	1	.837	.903
Wealthyminers(2)	.616	.684	.811	1	.368	1.852
Hearsayofitsbetterfinancialreward			11.737	2	.003	
Hearsayofitsbetterfinancialreward(1)	-1.744	.664	6.904	1	.009	.175
Hearsayofitsbetterfinancialreward(2)	-1.538	.535	8.263	1	.004	.215
Constant	-16.731	14091.256	.000	1	.999	.000

a. Variable(s) entered on step 1: Sex, Age, Education, MaritalStatus, Region, Experience, Tobepowerfulandfamous, Achievedhighsocialstatus, Influentialamongfriendsandfamily, Toberichandwealthy, Acquiredalotofproperties, Mostprofitablelivelihood, Getmoregold, Enjoylife, MaximizeDesires, Justmaintainmyself, Notherlivelihood, Friendsandpeersrecommendation, Materialandfinancialsupportfromfriendsandfamily, friendspeersandfamilymaterialenticement, Friendspeersandfamilymocked, Financialburdenofmyimmediatefamily, Flamboyantlifestyleofmyminerfriendsandpeers, Spendingcultureofmynonminerfriends, Disrespectofthepoor, Wealthyminers, Hearsayofitsbetterfinancialreward.

Step number: 1

Observed Groups and Predicted Probabilities



141	S	N**	.078	Y	.922	3.440
151	S	N**	.154	Y	.846	2.346
168	S	N	.532	N	.468	.938
195	S	N**	.040	Y	.960	4.925
207	S	N**	.459	Y	.541	1.086
221	S	N**	.123	Y	.877	2.666
271	S	N**	.065	Y	.935	3.783
277	S	N**	.127	Y	.873	2.617
286	S	N**	.033	Y	.967	5.419
292	S	N**	.079	Y	.921	3.405
309	S	N**	.086	Y	.914	3.260
313	S	N**	.040	Y	.960	4.910
319	S	N**	.067	Y	.933	3.726
338	S	N**	.077	Y	.923	3.468
368	S	N**	.264	Y	.736	1.671
372	S	N**	.177	Y	.823	2.153

a. S = Selected, U = Unselected cases, and ** = Misclassified cases.

b. Cases with studentized residuals greater than 2.000 are listed.



APPENDIX VII

Reliability Statistics

Cronbach's Alpha	Cronbach's Alpha Based on Standardized Items	N of Items
.710	.777	21

