



# Gendered Access to Indirect Benefits from Natural Gas Extraction in Kilwa District, Tanzania



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## Abstract

Natural gas extraction contributes substantially to the economy of many countries around the world where natural gas resource is found. Despite its potential benefits, it is not known to what extent the benefits are equally enjoyed by both men and women in the respective host communities. The existing studies focus more on benefit-sharing at the national level and lack gender analysis. Using a cross-sectional design, a study was conducted to establish gendered access to indirect benefits from natural gas extraction. Quantitative data were collected from 373 households and qualitative data through focus group discussions, key informant interviews, and participant observation. Findings revealed that about 53% of community members categorized access to indirect benefits to be of high level. The indirect benefits largely cut across investments and support in education, health, water, and employment opportunities. The study concludes that, while investment by Extractive Companies (ECs) has managed to improve health services the shortage of technical staff has remained unsolved. Likewise, while various benefits revealed to exist in education the chronic problem on girls' dropouts from school remains to be a challenge. Therefore, the study recommends various strategies to be adopted to address the remaining gender-related challenges that limit full enjoyment from ECs' investment among men and women.

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## 1 Introduction

Globally, approximately 70% of the women are poor, and over 65% are illiterate due to inadequate access to resources in the economy (ILO, 1996). Women face gender-based discrimination as reflected by inequalities in access to resources (FAO, 2003; Meinzen-Dick *et al.*, 2017). Inequality between men and women in accessing and controlling resources is closely related to women's poverty and social exclusion. Access is defined as the ability or opportunity to use, manage or control particular resources (Nichols *et al.*, 1999; Ribot & Peluso, 2003). Natural gas extraction is one of the resources that contribute substantially to the economy of many countries, it is expected that women who form the majority of the population should also equally share benefits from extraction investments. Therefore, the natural gas resource should be used to improve the wellbeing of the people around production areas and bridging the gaps between the poor and rich and ultimately help oil and gas companies increase the capacity to gain and maintain a social license to operate (Kemp & Keenan, 2010).

The concept of benefits is subjective and its definition depends on how different professionals and researchers define it (Bekkering & Kleijnen, 2008). In the context of this study, the definition by SIDA (2015), was adopted that defines benefit as opportunity derived from the utilization of natural gas resources by communities living close to mining, depending on the expectations from natural gas mining which can be either direct and/or indirect. It has been argued that natural gas mining can deliver indirect benefits and catalyze economic opportunities for the family unit and enhance wellbeing to communities (Kemp & Keenan, 2010). For example, indirect jobs are found to the company which provides support services to the gas industry, such as catering, transportation, and banks, while induced jobs are generated in entities whose existence depends on the operation of the gas industry, and these include jobs such as shops, hotels, and farms (Kibendela, 2014). In every direct job created by oil and gas companies, there are 1-4 indirect jobs created but most of them are within women's domestic roles, uniforms supply and repair, supply of agricultural produce and clerical support (Scott *et al.*, 2013), still, few women with the required educational background are employed in such businesses (Peprah, 2011). In this way, gender inequality is also evident in access to oil and gas resources. Women, in particular, often miss out on opportunities to access potential benefits from extractive industries (Okereke, 2011; Gyan, 2013; Akabzaa, 2013; Lestari *et al.*, 2016). In spite of the Convention on the Elimination of All Forms of Discrimination Against Women (CEDAW) of 1979, Article 14 which directs state parties to make sure that women have an equal right to access resources and basic services, still, inequality persists between men and women in access to resource and remains an obstacle to women's economic development and constitute the poorest and most marginalized people than men (Ajadi *et al.*, 2015). With this in mind, the study evaluates how men and women around the exploration area take advantage of different job opportunities as created by exploration activities to reduce poverty.

In Tanzania, natural gas extraction is in its infancy stage (URT, 2016). Despite the existence of statutory regulations that give guidance on benefits flow from EC to the communities living close to natural gas extraction sites, the existing knowledge about the multiplicity of ways in which women and men living close to extraction sites access indirect benefits from the extractive company (EC) is still scanty and shaky. Studies conducted by the scholars like Lange (2011); Shangvi & Jingu (2013); Kibendela (2014); Boma (2013); Lauwo & Otusanya (2014), focused on analyzing natural gas benefits at the national level leaving behind multiplier effects of natural gas investment among communities residing close to extraction sites. In addition, the studies leave out a key gender aspect that determines access to indirect and direct benefits to host communities.

Therefore, limited information is available on gendered analysis on indirect benefits to natural gas extraction in Tanzania. Focusing on the access to indirect benefits to the community living close to the natural gas extraction site was important to understand whether Tanzania has learned from global gender trends in access to resources and mainstreamed gender on ongoing natural gas extraction. Thus, the findings of this study intended to bridge the information gap identified from the literature and inform planners, policy, and decision-makers on how to improve equitable access to indirect benefits from EI in Tanzania, particularly in Kilwa District. Therefore, this paper sought to answer the following questions: What were men's and women's expectations before natural gas extraction development? What are the indirect benefits accrued from natural gas extraction and what were the gendered levels of access to indirect benefits in the study area?

### *Theoretical framework*

This study was guided by Ecofeminism theory which is also known as Women and Environment theory as developed by Françoise d'Eaubonnein 1974. Ecofeminism theorists hold that there is a special relationship between the oppression of women and the environment in terms of the social construction of knowledge (Manion, 2002; Lozeva & Marinova, 2010). Extraction development is associated with "resource" destructions and communities' livings close to natural gas extraction sites have no exception. In this paper, the term "resources" refers to items that provide daily sustenance for humans including food, water, forests, animals, and agriculture (Laplonge, 2016; Jain *et al.*, 2017). When natural resources become insufficient to support the livelihoods, women experience more adverse effects than men, due to domestic roles of accessing safe water, fuel, medicine and land for crop production (Lozeva & Marinova, 2010; Jean *et al.*, 2013).

Women are always the first ones to recognize livelihood threats because they can quickly respond to those roles (Oluwaniyi, 2011). In the context of patriarchy, men use values and norms to marginalize and foster subordination of women in access to different benefits that emanate from natural gas extraction as a way to dominate the environment and women. In this circumstance, the distribution of benefits like employment, education, and participation in decision-making processes favor men (Oluwaniyi, 2011; Kronlid, 2003; Sholikah, 2014), argues that ecofeminism is a complex theory, not sufficiently precise as it combines environmental issues and gender issues. However, the position of women affected by mining provides evidence to support this theory in this study. Currently, environmental challenges have been observed in the study area. The extraction activities are linked to soil erosion on the western side of Songosongo Island. Land taken for natural gas investments has caused hundreds of people to lose land for crop production, wood for fuel and fresh water at Panga well due to the construction of a TPDC plant. People also are exposed to air pollution caused by plant emissions through gas combustion (Songas, 2002). In view of those environmental challenges, women living close to extraction sites have no right to access affected areas to support their livelihoods. The aim of this paper was to investigate indirect benefits that extractive companies share with men and women living close to mining sites as alternative livelihood support.

## **2 Materials and Methods**

The study was conducted at Songosongo and Somanga Fungu wards in Kilwa District, Lindi Region. These wards were selected for the study because natural gas extractions were taking place and also known as host communities as explained by the Petroleum Act of 2015 Section, 220(5). The Songosongo ward serves two on-shore and three off-shore natural gas wells and plants, while the mainland coast of Somanga Fungu ward is a landing area of natural gas from Songosongo Island and where there are power stations and a gas plant. A cross-sectional research design was employed which allows data to be collected at one point in time and is effective in terms of time and financial resources (Bailey, 1994). A total of 373 respondents were selected from six villages by simple random selection from the village registers. Purposive sampling was used to select two wards whereby natural gas activities were being done. Purposive sampling also was used to select 19 key informants as well as participants in Focus Group Discussions (FGD).

Data were collected using a questionnaire, key informant interviews (KIIs) and Focus group discussions (FGD). The questionnaire was administered to assess respondents' expectations from natural gas development and examine benefit indicators that men and women had. The key informants were purposively

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selected from Tanzania Petroleum Development Cooperation (TPDC), Pan African Energy Tanzania (PAT), Songas, Secondary Schools, Kilwa District Authority, and Ward and Village Executive Officers. The study also involved Eight Focus group discussions (FGD) which were held for women and men separately in order to allow them to express their feelings about natural gas benefits. Secondary data examined including CRS reports and scholarship beneficiaries; were collected from Kilwa District Council (KDC) and Pan African Energy Office.

Qualitative data from FGDs and KIs were reduced into themes and sub-themes through coding and condensing the codes to reflect appropriate objectives. The Statistical Package for Social Sciences (SPSS) software was used for quantitative data analysis. Descriptive analysis was used because it summarizes information, organizes and simplifies a set of scores (Gravette & Wallnau, 2007). Descriptive statistics were used to summarize gender expectations and indirect benefits created by extractive companies and further chi-square analysis was adopted to check if there is an association between gender category and expectations for indirect benefits.

The index was developed to analyze the status of access to indirect benefits in the study area. Indicators such as access such as education, health, water, and induced employment benefits were identified. Each indicator was given a value of "1" for the "Yes" response and a value of "0" for the No response for particular benefits. Access to benefit status was categorized into high, medium and low. The lowest score was 0 to 2.71 while the medium was 2.72, and higher scores ranged from 2.73 to 4.00.

### 3 Results and Discussions

#### 3.1 Gendered expectations from natural gas extraction

The major category (29.7%) of the women had higher expectations in the improvement of health services, compared to 27.6% of men (Table 1). This implies that women had more expectations from EC to improve their access to health services in their villages in reducing the burden of taking care of sick people at long distances. In respect to accessing maternal health observations indicated that Somanga Fungu had a dispensary with limited facilities including laboratory services, 1 labor bed, and medicine. In the focus group discussion at Marendego village women raised the following concern:

*"Our expectations of getting better health services at Somanga Fungu Ward after the investment of natural gas extraction faded away. The situation of health services in our ward is pathetic as the population has increased due to natural gas activities. We have one dispensary with one bed for the labor ward, no electricity and there are not enough health workers as well as medicines. In most cases, nurses provide a medical prescription for TZS 2,000".*

The observation shows that despite Songosongo Island having a Grade 'A' dispensary, still, communities experienced challenges in accessing health services as the dispensary had one auxiliary nurse, 3 labor beds, a dysfunctional ambulance boat and inadequate drugs to reflect community needs. This finding is not in line with Mashindano *et al.* (2008), who reported that the dispensary had a senior clinical officer and two female medical attendants and good facilities meant to handle the outpatient clients. However, during fieldwork, Songosongo dispensary had no service offered and was closed at 12.00 hours due to a lack of health workers.

Table 1  
Gendered expectations from natural gas extraction (n = 373)

Expectations	Women (%)	Men (%)	$\chi^2$	Df	P Value
Sea transport	0.6	5.3	7.602	7	0.369
The market for local products	6.1	4.8			
Land Compensation	6.1	5.8			
Service Levy	1.8	1.4			
Education opportunities	13.9	15.4			

Work opportunities	19.4	16.3
Electricity services	22.4	24.0
Health services	29.7	26.9

The findings presented in Table 1 further show that 24% of the men had higher aspirations on accessing electrical power for domestic use, compared to 22.4% of the women. This connotes that men had more expectations for electrical installation compared to women because the availability of electricity would allow them to invest in printing, welding, and ice block making and using modern facilities in carpentry while previously they were required to walk 90 km to access similar services. Further, 19.4% of the men had more expectation in accessing job opportunities, compared to 16.3% of women. The slight difference in expectations to access employment opportunities between men and women suggests that men look forward to participating in direct employment unlike women expected to get employment in sweeping, cooking and washing clothes as those roles resemble their traditional gender roles.

The findings also show that 4.8% and 6.1% of women and men had lower expectations to supply goods and services to the ECs. Very few (0.6%) of men expected to have an improvement in sea transport services, compared to 5.3% of the women. This implies that men were more used to local transport (boats) from Kilwa Kivinje or Somanga Fungu to Songosongo compared to women. These findings explain the remarks provided by [Burke \(1999\)](#), that once extractive companies implement aspirations, concerns and expectations from communities residing close to extraction sites it is definitely that fairness in the distribution of benefit-sharing will be achieved. However, [Arya & Zhang \(2009\)](#), suggest that the Corporate Social Responsibility policy should evaluate community expectations as effective way of promoting and addressing social problems that will help host communities to realize the benefits. Despite slight descriptive differences in expectations from natural gas among men and women, the findings were not statistically significantly associated with the sex of respondents ( $\chi^2 = 7.602$ ,  $df = 7$ ,  $p = 0.369$ ). This is probably because men and women interviewed came from the same area that experienced similar kinds of challenges in accessing social services.

### 3.2 Health and water services provided by three extractive companies

Table 2. shows the health and water services provided by extractive companies. Songosongo and Somanga Fungu wards had dispensaries owned by the Government. Songosongo dispensary was renovated by Songas and furnished with water facilities by Pan African Energy Tanzania Limited (PAT). This implies that distance to access health services reduced as well as the improvement of health facilities. The findings are in line with [Mashindano et al. \(2008\)](#), who argued that the improved health services at Songosongo ward influence the said dispensary to acquire a Grade "A" status. The same was not done at Somanga Fungu dispensary. Despite Songosongo having a good dispensary, they experienced challenges of having too few health workers and inadequate drugs and other equipment. As a result, PAT provided a doctor to the dispensary twice a week to serve the community.

Table 2  
Health and water services provided by the three extractive companies

Company	Water	Health
Songas	-	Renovated Songosongo health center
Pan Africa Energy Limited	Water distribution at Songosongo	Construction of Nangurukuru hospital Medical facilities at Songosongo Medical counseling- Songosongo Built maternity waiting forward ( <i>Mama Ngojea</i> ) HIV/AID training
TPDC	-	Ambulance boat from Songosongo to Kivinje

On the other hand, PAT in collaboration with Kilwa District Council constructed a hospital and workers' houses at Nangurukuru, maternity waiting home commonly known as “*mama ngojea*” at Kinyonga District hospital. This implies that extractive companies reduced the walking distance for women to access safe delivery care for mothers and children which will reduce mortality among infants and young children. In addition, PAT was also involved in two water projects for seawater purification and construction of water reservoirs at Panga natural water spring. PAT also invested in safe water services throughout Songosongo Island, contrary to the previous situation when women used to walk for 2 to 3 hours to fetch domestic water (Songas, 2002; Mashindano *et al.*, 2008).

### 3.3 Indirect employment opportunities

The results in Table 3 show the highest categories (34%) of the women were self-employed in ice processing activities while men who were doing those activities were only 28%. On the other hand, 29% of women, compared to 26% of men was engaged in the storage and transport of fish to other towns and shops. This is due to the ecological zones of the Kilwa coast that is home to various fisheries (Nakamura, 2011). This connotes that women were more active in post-harvest fishing activities due to the presence of electricity that attracted various people to be self-employed. A good proportion of women were engaged in ice processing activities to preserve fish and fish business. Table 3 also indicates that the few (9%) women were self-employed in the restaurant business compared to 14% of the men. This implies that the presence of workers from TANESCO and TPDC plants influenced communities to open restaurants. In the due process, other businesses like transport services, particularly motorcycle taxi (commonly known as *bodaboda*), car/motorcycle tires repair and guest house businesses were growing very fast to support the available activities as influenced by the presence of electrical power in the study area.

Table 3  
Indirect employment opportunities (n = 373)

Opportunities emerged	Women (%)	Men (%)
Ice business	34	26
Fish business (Storage of fish and transporting them to other towns)	29	28
Restaurants (Food vending)	9.0	14
Car/Motorcycle tire repair	-	10.0
Motorcycle taxi ( <i>bodaboda</i> )	4.0	7.7
Guesthouse	3.0	8.0
Shops/Kiosk	-	12
Food store	6.0	3.8
Saloon	1.8	-
Stationery	1.2	-
Music library and phones changing	-	0.6

### 3.4 Indirect Educational benefits

The findings in Table 4 indicate that Songas offered scholarships annually to three (3) best students, one boy and two girls per school, who were selected to join secondary schools. Kilwa, Rufiji and Mkuranga were the beneficiaries of this project. This was also supported by a key Informant from Songas who argued that:

*“Once standard seven examination results are out, Corporate Social Responsibility Officers in collaboration with Head teachers, select 3 best students for the program, and those names must be approved by appropriate village meetings, in order for the students to qualify for the scholarship”.*

The program offered scholarships to different villages to join Kinjumbi secondary schools. Up to 2015, approximately 255 students from 32 primary schools. The majority (64%) being girls, compared to 36% of the boys had benefited from the scholarships. On the other hand, from 2011, PAT granted scholarships to 10 students from Songosongo to study at Makongo secondary school in Dar es Salaam. In 2015, a total of 39

students benefited from this program whereby the majority (67%) of the boys and almost one third (33%) of the girls benefited. However, in 2015, this project stopped after the construction of Songosongo secondary school. This signifies that the education programs were intended to improved gender access to education with a special target to female students from host communities in having equal access to education and skills.

Table 4  
Gender distribution of scholarships beneficiaries

Company	Categories	Location	Fund allocated	Girls %	Boys %
Songas	Secondary school scholarships of 3 best students @ primary school	Kilwa district Songosongo SomangaFungu	TZS 240,000 per student	162(64)	93(36)
PAT	10 students. Secondary	Songosongo		13 (33)	26(67)
	3 Teachers	Songosongo	TZS 12 226 368	3(100)	-
BG group Pavilion Energy, Exxon Mobil, and Statoil	Vocational training	Kilwa- VETA Lindi		73(33)	150(67)

In response to the demand for skilled labor in natural gas extraction and related services, joint venture of the companies which aimed at developing a Liquidated Natural Gas (LNG) Plant in Tanzania; including British Gas (BG) group Pavilion Energy, Exxon Mobil and Statoil that; sponsored a large proportion (67%) of the boys followed by 33% of the girls to study at Lindi Vocational Education Training Authority (VETA). The students got trained in the fields of food preparation, plumbing, and pipefitting, welding, and fabrication, carpentry and joinery, motor vehicle mechanics as well as electrical installation and maintenance, Laboratory Assistant and English language. This could also mean that male and female youth living close to extraction activities were equipped with the necessary skills needed by the oil and gas companies and related services. This further suggests that youth were prepared to have access to direct benefits in terms of employment opportunities in the sector.

The findings in Table 5 indicate that Songas supported education through the construction of Kijumbi secondary school and its laboratory whereby 42.5% of the girls and 57.5% of the boys benefited. Songas also renovated Songosongo primary school and provided books to eight secondary schools, whereas PAT supported education through construction of Songosongo Secondary school whereby, in 2015, 60% of the girls and 40% of the boys benefited. The construction of Songosongo kindergarten benefited 134 children. This implies that the rate of enrolment of both genders from kindergarten, primary and secondary schools, and vocational training increased through scholarships and construction of new schools. However, evidence on record shows that in 2014, a total of 255 students benefited from the scholarship but a total of 81(32%) students were disqualified from future support due to pregnancy and poor performance in their annual examinations (Songas, 2014). This implies that it will take time to reduce the current Kilwa District Council illiterate level of 46% due to the school drop up (UTR, 2013).

Table 5  
Constructed and renovated schools in the study area

Company	Type of benefit	Area	Amount TZS	Girls %	Boys %
PAT	Kindergarten	Songosongo	109 Mil.	134	
	Secondary school	Songosongo		72(60)	48(40)
	Hostel (bed and mattress)	Songosongo	157 Mil.	55(100) students	-
	Secondary schools-Laboratories construction	Kilwa district (Songosongo and Kinjumbi)	70 Mil.		
TPDC	Primary school renovation	Songosongo	500,000/=		
	Contribution of laboratory	Songosongo	15 Mil.		
Songas	Construction of primary and Secondary school	Kinjumbi Secondary (SomangaFungu)		94(42.5)	127(57.5)

The results in Table 6 show that SONGAS and PAT supplied textbooks, desks, computers and installed electricity in 26 secondary schools in Kilwa District. During in-depth discussions, one of the key informants from Marendego commented that:

*"The received support solved the problem of books, desks, power, laboratories, and shortage of library in our schools. Currently, the learning environment has improved, and students are provided with quality education; we thank ECs for their support".*

This finding suggests that investment in education by extractive companies has improved students' learning environment and probably will increase the performance of secondary schools in Kilwa District. These findings are similar to findings by [Chediell et al. \(2000\)](#), who found that students' performance in secondary education examination is directly linked to material inputs such as textbooks, teachers' quality, availability of libraries and laboratories with equipment and basic facilities.

Table 6  
Other educational benefits

Company	Type of benefit	Area	TZS
Songas	2100 text Books	8 Secondary schools Kijumbi inclusive	20 Mil.
	450 desks	Primary schools SomangaSimu inclusive	66 Mil. 1500 students benefited
PAT	Installation of solar panel	26 Kilwa secondary schools	
	Text Books	Songosongo for kindergarten, primary & secondary	TZS 23,188,915 More than 200 students benefited
	Computer and projector in 26 secondary schools	Kilwa district	

### 3.5 Level of access to indirect benefits

The results in Table 7 indicate that the mean average index was 2.71 which is categorized as a high level of access to indirect benefit-sharing from extractive companies. Specifically, findings revealed that 53.9% of the respondents were at a high level of access to indirect benefits from natural gas. This might have been contributed by different education opportunities offered by the extractive companies and availability of electricity which attracted different income-generating activities. This finding is contrary to what [Emel et al.](#)

(2012), who conducted a study in gold mines in Tanzania, found that the status of education to the communities close mining sites has not improved due to lack of enough books, teachers, electricity and unavailability of scholarships from the extraction companies for students. This further implies that Songas, TPDC, and PAT have done a lot to improve access to education for girls and boys from marginalized communities living close to extraction sites, while about 46.1% of the respondents experienced low levels of indirect benefits.

Table 7  
Indirect access to benefit index (n = 373)

Scores	n	%
1	181	48.5
2	118	31.6
3	74	19.9
Total	373	100
Mean Index	2.71	
Std Deviation	0.777	
Level of access to the indirect benefit		
Low access	172	46.1
High access	201	53.9

#### 4 Conclusion

It is concluded that men and women living nearby the extraction sites experienced a high level of access to various indirect benefits from ECs. The companies offered different education benefits such as scholarships, construction of new schools, renovation of schools, provision of learning materials, renovation of hospital and supply of freshwater. It is also concluded that, despite extractive companies' improvement of health services, shortage of health workers and drugs limit the success of closing the gender gap in access to health services which affect disproportionate women and men. Women are affected mostly due to their diverse gender needs and roles like taking care of sick people and needs related to maternity services. It is recommended that the local government should prepare a conducive working environment for public servants to settle and work in the study area.

It is also concluded that education opportunities offered by the extractive companies have successfully increased the number of children who access education but with limited success in addressing the challenge of girls drop out of school. This long-term gendered challenge in education will continue to hinder the objective of building human capital in the host communities. Therefore, it is recommended that Kilwa District Council Authority in collaboration with communities should formulate a strategy that will facilitate the successful completion of secondary education by scholarship beneficiaries.

Furthermore, the installations of electricity have opened up various indirect alternative livelihood strategies which are in line with ecofeminism theory. Therefore, it is recommended that efforts are needed from Kilwa District Council, extractive companies investors and non-governmental organizations (NGOs) to build business capacity for community members engaging in fish business. The focus should be among other areas include fish processing, storage and transportation to meet a wide range of fish markets that foster host communities' access to benefits.

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