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Perceived Effect of Quarry Activities on the Health of Inhabitants of Odeda Local Government Area of Ogun State, Nigeria

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Abstract

The study assessed the perceived effect of quarry activities on the health of inhabitants in Odeda Local Government Area of Ogun State, Nigeria. A multistage sampling technique was used to select 152 household heads around quarry sites. Data were collected through a structured questionnaire and analyzed using tables, means and standard deviation. Results showed that the mean age and monthly income of respondents were 48±15 years and ₦30,197.42±₦15,204.14, respectively. More than half of the respondents were males (55.9%), had primary education (57.2%), and resided within 1 km of active quarry sites (61.8%). Frequent stone crushing ($\bar{x}$= 3.39), drilling ($\bar{x}$= 3.38), and blasting ($\bar{x}$= 3.37) resulted to air ($\bar{x}$= 2.82), noise ($\bar{x}$= 2.80), and water ($\bar{x}$= 2.78) pollutions. Respondents reported high negative health impacts, including psychological stress ($\bar{x}$=2.89), sleep disturbance ($\bar{x}$= 2.78), catarrh ($\bar{x}$= 2.74), and eye irritation ($\bar{x}$= 2.73). Coping strategies included covering food and water ($\bar{x}$= 3.91), seeking clinical treatment ($\bar{x}$= 3.89), and using alternative water sources ($\bar{x}$= 3.89). The study concluded that quarrying poses serious health hazards, requiring the enforcement of buffer zones by government.

Keywords: Perceived Effect ; Quarry effect; Health of inhabitants

Introduction

Quarrying, the process of extracting stone, sand, gravel, and other minerals from the earth is one of the fundamental activities for national development (Ogunleye & Ojo, 2020). It provides the essential raw materials for constructing roads, bridges, houses, and other critical infrastructure that underpin economic growth. The products of quarrying are found almost everywhere in modern life, from the construction of homes and roads to the making of key industrial products (Taiwo & Ogunbode, 2024). In Nigeria, the quarrying sector has expanded significantly as part of the nation's efforts to diversify its economy and support its rapidly growing population and urbanization (Okunlola & Feese, 2023). States rich in mineral deposits, particularly granite in the Southwest region in Nigeria, have become hubs for these exploitation activities, contributing to local economies and creating employment opportunities (Adedeji, 2020; Mbagwu, 2023).

However, the economic benefits of quarrying often come with high environmental and social costs, which are primarily borne by the communities surrounding the sites. The processes involved in quarrying, such as blasting, crushing, drilling, and transportation, release large amounts of pollutants into the environment (Taiwo, & Ogunbode, 2024; Umar, & Oriri, 2023). Studies have shown that these activities can lead to severe environmental degradation, including land degradation, loss of biodiversity, and pollution of air and water resources (Oshim et al., 2024, and Kitole et al. 2025) More critically, these environmental changes pose direct risks to public health (Hassan & Ashade, 2025).

One of the most significant health hazards associated with quarrying is air pollution. The constant release of particulate matter (dust) from quarry operations is a major concern (Hassan, 2023). Studies conducted in Nigeria have consistently linked proximity to quarry sites with a higher prevalence of respiratory illnesses. For instance, research by Chijioke et al. (2024) found that residents near quarry sites in Nigeria reported higher rates of coughing, chest pain, and breathing difficulties. Hassan (2023) equally noted that beyond air pollution, noise from heavy machinery and blasting activities equally constitutes serious health risk. Furthermore, quarry operations can contaminate local water sources. Runoff from quarry sites carry silt, heavy metals, and other chemical residues into streams and groundwater which communities often rely on for drinking, cooking, and processing of farming produce. This contamination often leads to an increased risk of water-borne diseases and skin ailments (Ogunleye & Ojo, 2020).

Odeda Local Government Area in Ogun State presents a classic example of this challenge. It is an area where a predominantly rural agrarian population, whose livelihoods depend on physical manpower. This creates a conflicting situation between the gains of industrial activity and the sustenance of community well-being. Hassan (2022) opines that a community suffering from health issues due to industrial pollution cannot maintain a strong agricultural sector or achieve sustainable development.

Despite the recognized economic contributions of quarrying to the development of Odeda Local Government Area, there is a growing and significant concern regarding the negative health impacts experienced by residents of communities close to these industrial sites. Although several studies have addressed environmental risks linked to quarrying (Taiwo, & Ogunbode, 2024; Witter, 2020) and economic assessment, there remains a dearth of community-driven data and information on the perceived effects of quarrying activities on the health of inhabitants close to active quarry sites. Besides the health effects, the perception, experiences, and life realities of the community members still have limited studies. Without this community-focused data, the true social cost of quarrying remains largely invisible to policymakers, public health officials, and in most cases ignored by the quarrying companies themselves.

This lack of empirical information from the affected populations tend to hinder the development of effective and targeted health interventions now that adaptive social register for social protection is being developed for fragile communities and households in Nigeria. It also makes it difficult to formulate and enforce appropriate environmental regulations that are tailored to the specific local context.

The broad objective of this study is to assess the perceived effect of quarrying activities on the health status of inhabitants of Odeda Local Government Area of Ogun State, Nigeria. The specific objectives are to:

1. identify types of quarrying activities experienced by community members in the study area;
2. Identify the types of environmental pollutants perceived by community members as resulting from quarrying activities;
3. ascertain coping strategies adopted by community members to mitigate the perceived health effects of quarrying activities; and
4. ascertain perceived health status of respondents as related to quarrying activities in the study area.

Methodology

The study was conducted in Odeda Local Government Area (LGA) of Ogun State, Nigeria. Odeda LGA is located in the central part of Ogun State and lies between latitude 7°13'N and 7°24'N and longitude 3°31'E and 3°50'E. The population of the study comprised all household heads or adult representatives residing in communities within Odeda LGA.

A multi-stage sampling procedure was used to select the respondents for this study. The first stage involved the purposive selection of 22 communities based on their close proximity (1km-5km) to quarry sites in the local government area (Orile-kenta, Iporo-shogbade, Ojodu, Oba-sokoto, Aralamo, Idobi, Ogijan, Eseke, Edila, Emulu, Agbaje, Luwani, Idera, Eweje, Awala, Agbetu, Orile-ijaye, Aregbe, Obelu, olugboso, Olori, and Segile) based on their direct close proximity to major quarry sites.
Secondly, random sampling technique was used to select the communities including Orile-kenta, Iporo-Shogbade, Ojodu, Orile-ijaye, Aregbe, Obelu, Olugboso, Olori, and Segile out of 22 communities.
Lastly, snowballing technique was used to select 60 percent of household heads [Orile-kenta (30), Iporo-Shogbade (16), Ojodu (13), Orile-ijaye (40), Aregbe (13), Obelu (7), Olugboso (8), Olori (14), and Segile (11)] in the selected communities. A total sample size of 152 respondents was obtained and used for the study.

Variables operationalized for the study were: types of quarrying activities, this was elicited by presenting a list of eleven (11) common quarrying activities, from which respondents were asked to indicate the frequency of each activity using response options daily, twice a day, once a week, and monthly, with scores 4,3,2, and 1 respectively. Perceived environmental risks associated with quarry activities were presented and they indicated the frequency of occurrence of each risk factor using a 3-point scale: Always, Occasionally, and never with scores of 3,2 and 1 assigned respectively. The scores were computed and the mean was derived for each risk factor. For Coping Strategies, respondents were meant to choose from the list of possible coping strategies. This was measured using a 3-point scale of Very effective = 3, Moderately effective = 2 and Not effective at all = 1 and the scores were computed to obtain the mean. Perceived health of inhabitants was measured using a list of ill-health symptoms associated with quarry environment segmented in 4 domains of respiratory symptoms, auditory and stress-related symptoms, water and skin-related symptoms, psychological symptoms and the severity of each symptom was assessed using Always = 3, Occasionally = 2, and Never = 1.

A structured questionnaire was administered to the respondent. Frequencies, means, standard deviation and tables were used to analyze and present the data.

Results

Types of Quarrying Activities

Results in Table 1, show that most respondents observed stone crushing (M= 3.39, SD= 0.54), drilling (M= 3.38, SD= 0.527), and blasting using explosives (M= 3.37, SD= 0.523) as very frequent. These findings are consistent with Hassan (2022), who reported that persistent noise and vibrations from blasting operations and heavy-duty truck movements significantly disrupt the tranquility of neighboring communities in Ogun State, resulting in psychological stress among residents. Collectively, these operations exert considerable pressure on the environment and significantly undermine the ecological stability and overall well-being of residents in the area.

Table 1: Types of quarrying activities

Quarrying activities	Mean	SD
Blasting (use of explosives)	3.37	0.523
Drilling	3.38	0.527
Crushing of stones	3.39	0.540
Haulage (heavy truck movement)	3.37	0.536
Felling of trees/Habitat destruction	3.31	0.683
Road construction in quarry sites	3.24	0.789
Landscape alterations	3.22	0.821
Destruction and removal of topsoil	3.18	0.841
Open pit excavation that disrupts natural drainage system and cause flooding or stagnant water (breeds mosquito)	3.18	0.841
Stockpilling of waste rock/quarry dust heap	3.23	0.801
Water pumping/groundwater disruption which affects water table, drying of well and alter water flow	3.20	0.814

Source: Field Survey, 2025 Mean cutoff = 3.28

Perceived Environmental Risks

Table 2 shows that the perceived environmental risks include: dust pollution (M=2.82, SD=0.389), Noise Pollution from basting and heavy machines (M=2.80, SD=0.404), Water Pollution (M=2.78, SD=0.841). This is in line with Adanu et al. (2025) and Mbagwu (2023), who emphasized that dust and noise constitute the most immediate and widespread environmental stressors for residents living close to granite quarry sites in Ogun State, significantly diminishing their quality of life. Residents in Wales have reported that "filthy" black dust from a nearby quarry covers their homes and causes sore eyes and breathing difficulties (Nemer et al*.,* 2020).

Table 2: Perceived environmental risks

Environmental risks	Mean	SD
Dust Pollution	**2.82**	0.389
Noise Pollution from basting and heavy machines	2.80	0.404
Water Pollution (streams, wells)	2.78	0.841
Ground Vibration (from blasting)	2.77	0.422
Waste water discharge (runoff from washing aggregates)	2.70	0.472
Fuel and oil spillage from quarry machines that contaminate soil and water body	2.70	0.475
Heat generation from heavy machine, and exposed rocks	2.72	0.449
Gaseous emissions (smoke, fumes) from trucks and blasting	2.73	0.501
Reduced visibility due to dust particles in air	2.68	0.494
Landscape/visual pollutants (ugly changes to the natural environment)	2.66	0.527
Light pollution especially at night from bright artificial lights used during quarry operation	2.69	0.518

Source: Field Survey, 2025 mean score = 2.73

Coping Strategies Adopted by Community Members to Mitigate the Perceived Health Effects of Quarrying Activities

Table 4 reveal that the majority of the respondents identified consistent covering of food and water as the most effective coping strategy, (M= 3.91, SD= 0.281). Results also indicated that the use of alternative water sources such as sachet water (M= 3.89, SD= 0.329), seeking clinical treatment (M= 3.89, SD= 0.329), and temporarily leaving the house during blasting activities (M= 3.89, SD= 0.308) were highly effective measures for managing the impacts of quarrying activities. These findings are supported by Hassan (2022b), who observed that residents in Ogun State often adopt immediate and localized protective measures to mitigate health risks and loss of serenity associated with nearby quarry operations.

However, the high effectiveness ratings assigned to these coping strategies also underscore the significant burden placed on households. The need to purchase alternative water sources and seek frequent medical treatment, as highlighted by Agboola et al. (2024), imposes additional financial strain on households already facing low monthly incomes and declining agricultural production resulting from environmental degradation.

Table 4: Coping strategies adopted by community members to mitigate the perceived health effects of quarrying activities

	Means	SD
Staying indoors and keeping windows and doors closed	3.75	0.643
Consistent covering of food and water	3.91	0.281
Using herbal remedies for symptoms	3.88	0.344
Temporarily leaving the house during blasting	3.89	0.308
Using alternative water sources (like sachet water) for drinking	3.89	0.329
Seeking clinical treatment	3.89	0.329
Frequent cleaning of homes and utensils	3.88	0.404
Avoid quarry roads to reduce exposure	3.88	0.344
Installing protective nets on doors and windows to reduce dust	3.70	0.755

Source: Field Survey, 2025 Mean cutoff= 3.85

Perceived Health Inhabitants

Respondents also reported sleep disturbance (M= 2.78, SD= 0.418), catarrh (M= 2.74, SD= 0.438), and eye irritation (M= 2.73, SD=0.445) as persistent health challenges. These findings are strongly supported by Hassan (2022b), who emphasized that persistent noise and loss of serenity associated with quarrying activities in Ogun State result in significant psychological stress and sleep deprivation among residents living close to quarry sites.

The high proportion of respondents with high health impacts reflects the intense environmental pollution, particularly dust and noise, identified in earlier sections of this study. As noted by Taiwo and Ogunbode (2024), Adu-Prah and Agyemang (2024), and the cumulative effects of physical, environmental, and psychological stressors in quarrying communities constitute a significant public health burden that adversely affects the overall well-being and productivity of the rural population.

Table 5: Perceived Health of Inhabitants

Perceived Health	Mean	SD
Difficulty breathing	2.61	0.504
Chest pain	2.58	0.558
Catarrh	2.74	0.438
Persistent cough	2.64	0.507
Hearing difficulty	2.62	0.487
Sleep disturbance	2.78	0.418
Frequent headaches	2.70	0.458
Feeling stressed or anxious	2.68	0.466
Skin irritation/rashes	2.66	0.474
Stomach problems after using water local	2.59	0.507
Eye irritation	2.73	0.445
Perceived Psychological Symptoms	2.89	0.316

Source: Field Survey, 2025 mean cutoff= 2.69

Conclusion and Recommendations

This study concluded that quarrying activities constitute a major environmental and public health concern in the study area, producing pollutants that constitute a high environmental risk and stressors in the communities. Perceived health problems, including respiratory symptoms, hearing difficulties, skin irritation, sleep disturbance and psychological stress were high. Also, perceived health status of respondents had significantly positive relationship with their perceived environmental risks. Respondents employed coping strategies such as staying indoors, frequent cleaning, covering water and food, and seeking medical treatment in order to reduce the effects of quarrying activities.

The ministries of Environment, Lands and Survey, and Physical Planning should strictly enforce mandatory buffer zones between quarry sites and residential areas to reduce human exposure.

The ministries of environment, health and rural development should compel quarry operators to install and consistently use wet suppression systems and dust collectors on crushers, drilling rigs and haulage routes.

State government should mandate that quarry companies, as part of their Corporate Social Responsibility (CSR), sponsor regular medical screening and outreach programmes for affected communities.

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