



Data Article

In-situ analysis and quantitative dataset of the impact assessment of perceived level of exposure to pollution and health condition



Gloria U. Fayomi*, Ednah K. Onyari*

Department of Civil Engineering, University of South Africa, Florida Science Campus, Cnr Christian de Wet Road and Pioneer Avenue, Johannesburg, South Africa

ARTICLE INFO

Article history:

Received 4 December 2023

Revised 26 January 2024

Accepted 29 January 2024

Available online 5 February 2024

Dataset link: [In-situ analysis and quantitative dataset of the impact assessment of perceived level of exposure to pollution and health condition \(Original data\)](#)

Keywords:

Health
Environment
Assesment
Exposure
Pollution
Population
Resident

ABSTRACT

One of the challenges of rapid climate change evolution and the leading risk factor is increasing air pollution. This work aims to investigate the perceived level of exposure to pollution associated with health outcomes. The study involves two groups of people within the concentrated population of Ewekoro and Ota residents. Considerations were also given to staff of general hospital in the two towns. The resident in perception on pollution generated from the factories and the rate of exposure of the two were noted. The questionnaire totalling 652 was administered putting into the consideration the population and analysis using SPSS. From all indication, the perceived level of exposure and the health condition of the inhabitants in Ota and Ewekoro. The measure taken by the government was seen to be high at 81 % compare to 45 % in Ota industrial estate.

© 2024 Published by Elsevier Inc.

This is an open access article under the CC BY license (<http://creativecommons.org/licenses/by/4.0/>)

* Corresponding authors.

E-mail addresses: fayomgu@unisa.ac.za (G.U. Fayomi), onyarek@unisa.ac.za (E.K. Onyari).

Specifications Table

Subject	Environmental Science (Pollution)
Specific subject area	Environment and Pollution Control
Type of data	Table, Images, Chart, Figure, SPSS Raw data, Analysed
Data Collection	The data acquisition involved 652 questionnaires through a sampling technique. The major distribution and selection is considered with ten houses in major street and every five houses in off street path. The same methodology was considered in Ota with twenty major streets and thirteen minor streets.
Experimental factors	The projection of sixty-eight streets were fathomed in the two location where every ten structure were selected at random in long streets and five houses in short street to make a total of six hundred and fifty-two houses as the sample size.
Experimental features	The main sources of data gathering in this study involve the use of various techniques of data collection of evidence with the use of direct interviews, personal observation and questionnaire. The investigation was done with the data exploration projection.
Data source location	Ota and Ewekoro industrial zone
Data accessibility	Repository name: Zenodo Data identification number: 10.5281/zenodo.10556304 Direct URL to data: https://zenodo.org/records/10556304

1. Value of the Data

- It promotes comparative assessment on the impact of pollution level within the two industrial estate.
- The dataset elucidates the measure taken to reduce the impact of pollutants on the well-being of the dwellers and the various intervention.
- The dataset promote awareness and resource to measure the perception rate of prevalence of common health challenges in both region.
- The data can be used to examine the relationship between the different levels of disposition to various environmental hazards.

2. Background

Air pollution, particularly prevalent in developing nations, poses a significant stroke risk. A 2007 European Commission study linked air pollution, especially from particulates to an increased risk of ischemic stroke, notably among women. This research focuses on Ewekoro and Ota communities in Nigeria, where industrial activities contribute to elevated pollution levels. Ewekoro, with a cement factory, and Ota, housing various industries, were selected for examination. These areas face potential health impacts due to pollutant exposure. Ewekoro, with a population of 93,700 and an area of 635.9 km², is notable for its cement factory emissions. Ota, with 896,700 people and an area of 854.0 km², is a hub for pharmaceuticals, metal production, food processing, and beverages. The dataset generated aims to provide valuable insights into pollution exposure, its impact on health, and an evaluation of governmental measures. This information is envisioned for future use in training machine learning algorithms to monitor pollution levels and forecast health outcomes in the region, contributing to effective public health strategies.'

3. Data Description

The survey on the perceived level of exposure to pollution and health condition, analysis of measures taken by individual and government between Ota and Ewekoro industrial estate was

Table 1

Demographic information of study area.

	OTA %		EWEKORO		TOTAL	PERCENTAGE
Age Distribution						
15-19	20	6%	19	6%	39	6%
20-24	54	17%	43	13%	97	15%
25-29	66	22%	102	31%	168	26%
30-34	57	18%	83	25%	140	21%
35-39	26	8%	32	9%	58	9%
40-44	31	9%	15	5%	46	7%
45+	45	14%	11	3%	56	8%
No response	21	6%	27	%	48	7%
Total	320	100%	332	100%	652	100%
Sex Distribution						
Male	191	59%	141	46%	345	53%
Female	118	36%	175	53%	293	45%
No response	11	4%	3	0.9%	14	2%
Total	320	100%	329	100%	652	100%
Religion						
Catholic Christians	124	38%	199	59%	323	50%
Non Catholic Christians	162	51%	60	18%	222	34%
No response	34	11%	73	22%	107	16%
Total	320	100%	332	100%	652	100%
Educational Qualification						
SSCE	111	35%	91	27%	202	31%
Tertiary Education	181	56%	227	68%	408	63%
No response	28	8%	14	4%	42	6%
Total	320	100%	332	100%	652	100%
Monthly Income						
5,000-15,000	49	15%	24	7%	73	11%
16,000-25,000	69	22%	80	24%	149	23%
26,000-35,000	67	21%	75	23%	142	22%
36,000-45,000	34	11%	55	16%	89	14%
46,000-55,000	16	5%	24	7%	40	6%
56,000-65,000	8	3%	5	2%	13	2%
66,000+	37	12%	26	8%	63	9%
No response	40	13%	43	13%	83	13%
Total	320	100%	332	100%	652	100%
Type of property						
Tenement apartment	135	42%	199	59%	334	52%
2b/r flat	88	27%	109	33%	197	31%
Others	77	24%	20	6%	97	14%
No response	20	6%	4	2%	22	3%
Total	320	100%	332	100%	652	100%
Approximate Distance in metre						
Less than 100m	79	29%	57	17%	136	21%
100m-549m	140	44%	168	51%	316	48%
550m-999m	32	10%	29	6%	61	9%
1km+	50	16%	63	18%	113	17%
No response	19	6%	15	5%	34	5%
Total	320	100%	332	100%	652	100%

conducted. Table 1 and Table 2 shows the demographic Information of study Area and the perceived level of exposure to pollution and health respectively. Table 3 shows the Chi-square test value with critical value analysis. The analysis on measure taken by individual and by government is presented in Tables 4 and 5 respectively with consideration on some key parameter to the dweller. Some of this measures include, formal complaints, made group protest, community disallow future sitting, alert public health officer, live with it and no response. The chi-square test was used to determine the association between the perceived level of exposure to pollution and health condition of the inhabitants. From the date, the chi-square value is greater than the critical value. In other words, there is an association between the perceived level of expo-

Table 2
Perceived level of exposure to pollution and health.

TOWNSHIP	HEALTH CHANENGESCAUSES			TOTAL
	NO RESPONSE	Other causes	Industrial causes	
Ota (causesof pollution)				
Other causes	7	0	0	7
Industrial causes	2	26	11	39
No response	3	23	238	263
Total	11	49	249	309
Ewekoro (causes of pollution)				
Other causes	3	0	2	5
Industrial causes	58	14	249	321
No response	2	10	1	3
Total	63	14	252	329
TOTAL				
Industrial causes	60	37	487	584
Other causes	4	26	12	42
No response	10	0	2	12
Total	74	63	501	638

Table 3
Chi-square test values.

Township	Critical value	DF	Critical Value
Ota			
Pearson chi- square	284.060	4	.000
Likelihood ratio	121.404	4	.000
N of value cases	309		
Ewekoro			
Pearson chi- square	10.087	4	.039
Likelihood ratio	7.827	4	.098
N of value cases	638		
Total			
Pearson chi square	198.968	4	.000
Likelihood ratio	113.989	4	.000
N of valid cases	638		

Table 4
Analysis on measures taken by individuals.

Measures Taken by Individuals	Ota	Ewekoro	Total
Made formal complaint to government	82	26%	83
Made a gang up protest	31	10%	68
Community resolve to disallow future sitting	38	12%	24
Alert public health officer about the danger	33	10%	44
Live with it	101	32%	91
No response	35	11%	22
Total	320	100%	332

sure to pollution and the health condition of the inhabitants in Ota and Ewekoro. Therefore, H0 is rejected and H1 is accepted. Table 4 shows that the highest percentage of the respondents took no measures than to live with the problems. We have 32% Ota and 27% Ewekoro. In Ota 10% and 20% Ewekoro made a gang up protest. 12% in Ota and 7% Ewekoro resolve to disallow future siting of factories. A respondent in Ewekoro has a higher percentage with (81%) that indicated government effort to abate the problem than Ota with (45%). Measures was also taken by the factories to abate the problem The highest measure taken was provision of electricity with 25%,51% in Ota and Ewekoro respectively.

Table 5

Analysis on measures taken by government.

	Ota %		Ewekoro %		Total
Measures Taken by Government					
Effort was not taken	152	49%	44	13%	196
Effort was taken	140	45%	267	81%	407
No response	28	8%	21	6%	49
Total	320	100%	332	100%	652
Measures Taken by the factories					
Provision of electricity	79	25%	174	53%	253
Paying compensation	37	12%	80	24%	117
Providing good roads	33	6%	6	2%	39
Providing water	15	5%	15	4%	30
Nothing will compensate	128	41%	28	8%	156
No response	28	8%	29	8%	57
Total	320	100%	332	100%	652

Table 6

Percentage circulation of causes of health challenges in Ota and Ewekoro.

Causes of health challenges	Ota	% N	Ewekoro	% N	Total	Percentage
Industrial causes	249	78%	252	76%	501	79%
Other causes	49	15%	14	4%	63	9%
No response	22	7%	66	20%	74	12%
Total	320	100%	332	100%	652	100%

Table 7

Percentage perception on rate of prevalence of common health challenges.

Perception of Rate of Prevalence								
Common health challenges	Ota				Ewekoro			
	None	Low	Medium	High	None	low	Medium	High
Eye irritation	4%	17%	43%	7%	2%	8%	36%	4%
Chest pain	7%	21%	34%	8%	2%	8%	36%	4%
Cough	5%	5%	32%	40%	2%	11%	28%	45%
Wheezing	11%	20%	33%	8%	12%	10%	21%	18%
Tuberculosis	17%	23%	22%	4%	12%	42%	8%	12%
Allergic reaction	13%	18%	24%	14%	2.5%	4%	17%	36%
Asthma	9%	13%	34%	15%	0.6%	7%	26%	34%
Skin irritation	10%	22%	32%	8%	1%	7%	23%	28%
Chronic bronchitis	15%	22%	24%	3%	3%	15%	22%	5%
High BP	10%	22%	30%	4%	3%	8%	27%	9%
Cancer	14%	15%	28%	6%	2%	10%	28%	15%
Hearing impairment	9%	14%	37%	12%	0	12%	27%	13%
Sleep disturbance	6%	13%	21%	27%	0.6%	7%	36%	15%

The result of the survey in [Table 6](#) shows that Ota respondents perceived that in their areas were from industrial causes (78%) and (76%) from Ewekoro respectively. The pattern of percentage distribution of houses in relation to distances away from industries also has the same rate from [Table 7](#). The comparative view of this chart is presented in [Figs. 1 and 2](#) respectively. No doubt, health constrains implies that the closer they are to the industries the more they are affected with health issues. [Tables 8 and 9](#) shows the common health challenges rated as perceived and witnessed by the respondents. It also indicates percentage distribution of high and medium prevalence health challenges. It is evident from the result that the respondents rated cough as the most common health challenge in the two study locations.

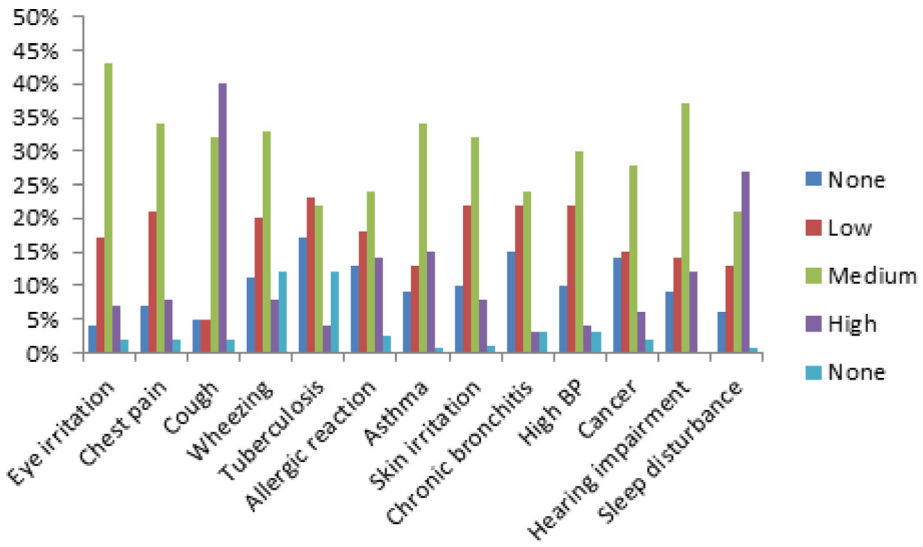


Fig. 1. Distribution perception of the rate of health challenges prevalence in Ota.

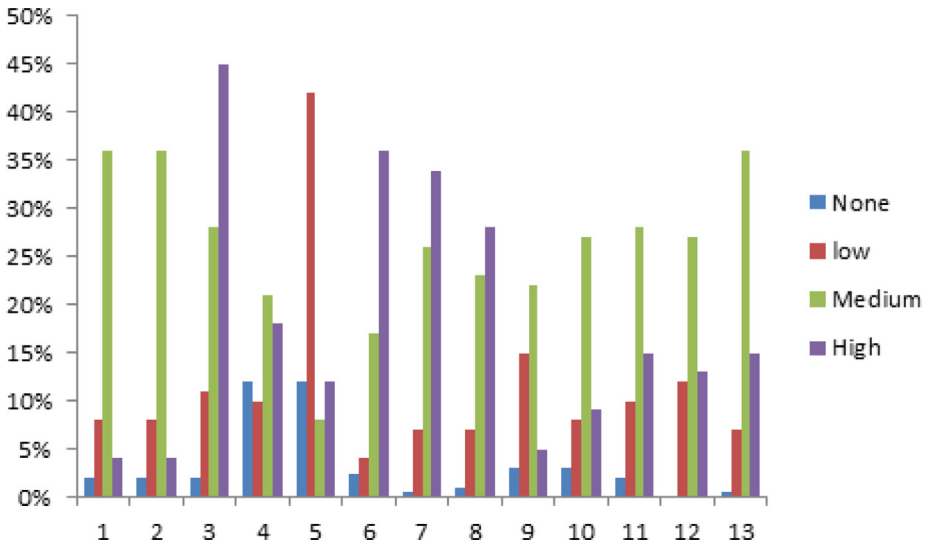


Fig. 2. Distribution rate of health challenges prevalence in Ewekoro.

Table 8
Percentage distribution of high prevalence health challenges.

High prevalence health challenges	Ota	Ewekoro	Total
Cough	40%	45%	85%
Allergic reactions	14%	36%	50%
Asthma	15%	34%	49%
Skin irritation	8%	28%	36%
Sleep disturbance	15%	27%	42%

Table 9

Percentage distribution of medium prevalence health challenges.

Medium prevalence health challenges	Ota	Ewekoro	Total
Wheezing	33%	21%	54%
Chest pain	34%	36%	70%
TB	22%	8%	30%
Skin irritation	32%	23%	55%
Chronic bronchities	24%	22%	46%
High BP	30%	27%	57%
Cancer	28%	28%	56%
Hearing impairment	37%	27%	64%

4. Experimental Design, Materials and Methods

The study uses a quantitative data collection method. This approach comprises the use of questionnaire, direct interviews, and personal observation [1–3]. The data sources were utilized to ensure comprehensive exploration of the investigation. All the data collected for the purpose of this study were analysed using statistical techniques such as tabulations, bar-charts and histogram, frequency polygon, and cross tabulations at appropriate levels of analyses was employed during the process of data analysis and presentation [4–6]. Chi square was used to determine the association between the perceived level of exposure and health conditions of the inhabitants as stated in the hypothesis. The study population include men and women aged 18years and above in Ota and Ewekoro township.

Limitations

Despite being one of the biggest datasets on inhabitants in Ota and Ewekoro, the sample is not entirely representative of the smallholder population in the town. Owing to financial constraints, the author conducted interviews with 652 residents. Therefore, it is advised that new surveys be conducted in order to expand and enhance the current datasets.

Ethics Statement

The ethical standards for publication in Data in Brief are met by this work. There are no human subjects involved. The Information on informed consent and the necessity of ethical approval was given before questionnaire was administered and this also include consent for the minor less than eighteen. Social media platform data has been fully anonymised in accordance with the platform's guidelines for data redistribution.

Data Availability

[In-situ analysis and quantitative dataset of the impact assessment of perceived level of exposure to pollution and health condition \(Original data\)](#) (Zenodo)

CRediT Author Statement

Gloria U. Fayomi: Conceptualization, Methodology, Data curation, Writing – original draft, Validation, Writing – review & editing; **Ednah K. Onyari:** Supervision.

Acknowledgement

The authors acknowledged the support made by University of South Africa toward a postdoctoral research fellowship opportunity.

Declaration of Competing Interest

The authors declare that they have no known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper.

References

- [1] S. Maji, S. Ahmed, M. Kaur-Sidhu, S. Mor, K. Ravindra, Health risks of major air pollutants, their drivers and mitigation strategies: a review, *Air Soil Water Res.* (2023) 16, doi:[10.1177/11786221231154659](https://doi.org/10.1177/11786221231154659).
- [2] Shapiro J.S., Pollution trends and US environmental policy: lessons from the past half century review of environmental economics and Policy Volume, 2022, 16, Number 1, 2022
- [3] I. Manisalidis, E. Stavropoulou, A. Stavropoulos, E. Bezirtzoglou, Environmental and health impacts of air pollution: a review, *Front. Public Health* 8 (2020) 14 Feb 20PMID: 32154200PMCID: PMC7044178, doi:[10.3389/fpubh.2020.00014](https://doi.org/10.3389/fpubh.2020.00014).
- [4] G. Shaddick, M.L. Thomas, P. Mudu, et al., Half the world's population are exposed to increasing air pollution, *npj Clim. Atmos. Sci.* 3 (2020) 23, doi:[10.1038/s41612-020-0124-2](https://doi.org/10.1038/s41612-020-0124-2).
- [5] G.D. Thurston, H. Kipen, I. Annesi-Maesano, J. Balmes, R.D. Brook, K. Cromar, et al., A joint ERS/ATS policy statement: what constitutes an adverse health effect of air pollution? An analytical framework, *Eur. Respir. J.* 49 (1) (2017) 1600419, doi:[10.1183/13993003.00419-2016](https://doi.org/10.1183/13993003.00419-2016).
- [6] R.M. Shaffer, S.P. Sellers, M.G. Baker, R. de Buen Kalman, J. Frostad, M.K. Suter, et al., Improving and expanding estimates of the global burden of disease due to environmental health risk factors, *Environ. Health Perspect.* 127 (10) (2019) 105001, doi:[10.1289/EHP5496](https://doi.org/10.1289/EHP5496).