KABARAK UNIVERSITY
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An assessment of impacts of extractive industries on Air Quality: a case study of gypsum mining in Kajiado, Kenya

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Introduction / Background

1. In the last 10 years, Kenya witnessed increased activity in the extractive
2. Extractive industry is potentially an important contributor to dust accumulation in the atmosphere

Statement of the problem

i. Gap in the analysis of environmental effects of gypsum mining
ii. Gypsum mining literature on air quality site specific and lack in details
iii. Concentration of air pollutants and consequent health effects might continue to accelerate.

Study objectives

The study sought to Investigate the Impacts of gypsum mining on air quality in Kajiado

1. Impacts on Particulate Matter concentrations
2. Impacts on outpatient consultations

Brief literature review

Existing Literature has cases where:

- Particulate matter concentrations higher in open cast areas
- Mining is major contributor to particulate matter concentrations.

Hendryx and Ahern, 2008; Olesugun *et al* ;Chaulya, 2004; Pless-Mulloli, *et al*, 2000

Methodology

i. Primary data -interviews, questionnaire study, Field measurements
ii. UCB Air Sampler for 24Hr PM 2.5 readings
iii. Secondary Data- MoH records for prevalent diseases

Findings / Results

Pm 2.5 readings for two sites- Mine and Control

- At Mine, mean 24 hour PM 2.5 reading was between 132 µg/M^3 and 1444 µg/M^3 .
- daily mean of 570 ± 115 µg/M^3
- At control site, mean Pm 2.5 was between 26.4 µg/M^3 and 573 µg/M^3.
- Daily mean of 83 ± 38 µg/M^3,

Findings / Results

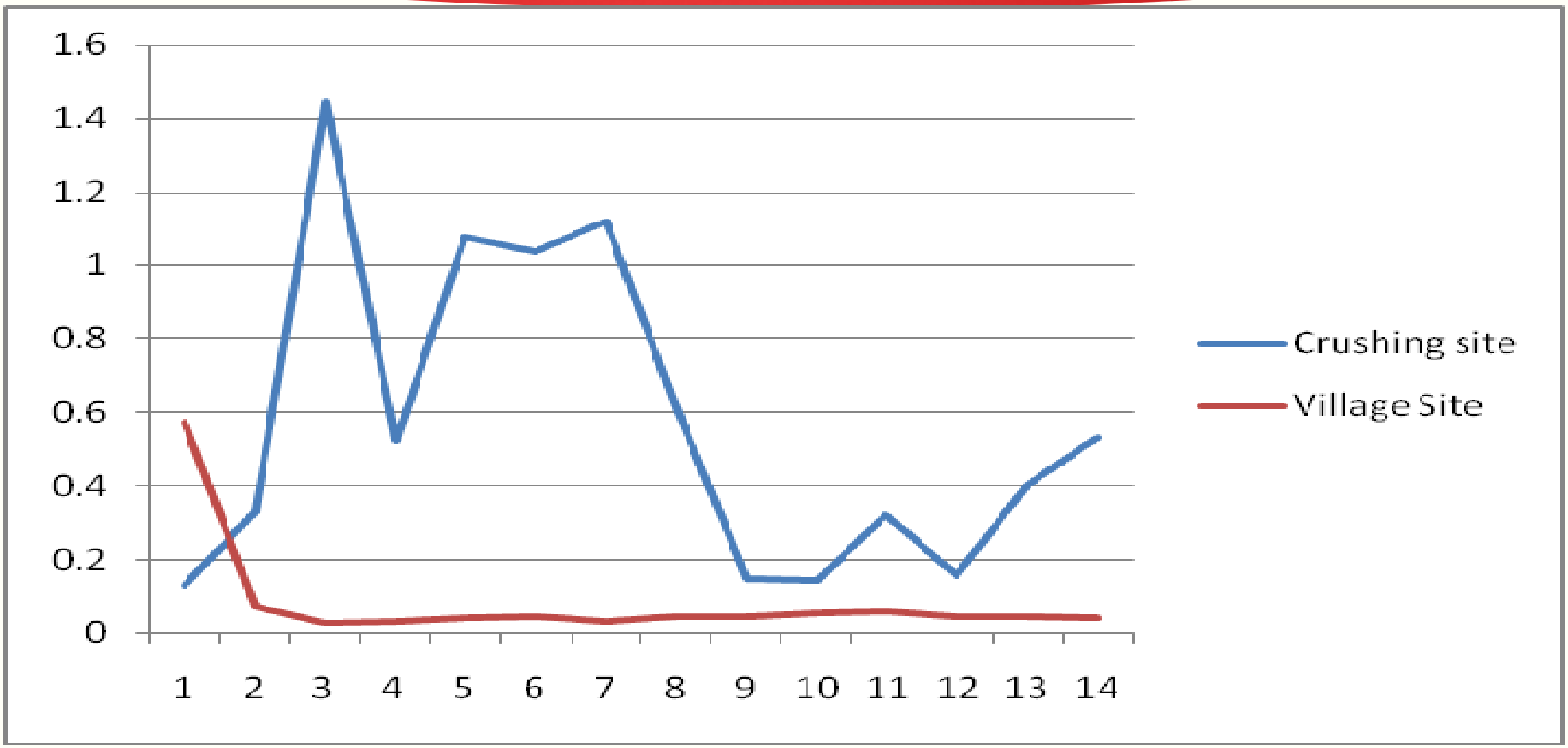
iv. The site to site variations were statistically significant in a two tailed t- test, P ($T \leq t = 0.003$)

V. During the rainy season, site to site variation more pronounced, 1675±769 µg/M^3 at the crushing site and 59 ±33 µg/M^3 at control

Findings / Results

Mine Crushing Site				Control Site (Homestead)		
Sample	**mean**	**Min**	**Max**		**Mean**	**Min**
1	132 ± 7	13	3946		573 ± 13	270
2	332 ± 8	153	5340		71 ± 0.3	68
3	1444 ± 11	1246	6538		26 ± 0.1	26
4	524 ± 5	452	4015		30 ± 0.3	28
5	1075 ± 30	273	6205		40 ± 1.6	39
6	1036 ± 28	381	7729		46 ± 0.5	41
7	1119 ± 37	302	8137		29 ± 0.4	27
8	613 ± 13	350	4798		45 ± 0.3	42
9	150 ± 2	58	699		46 ± 0.1	44
10	147 ± 5	752	679		53 ± 0.1	51
11	323 ± 2	176	998		59 ± 6.5	49

Findings / Results



Findings / Results

most prevalent diseases

- Respiratory Tract Infections (RTI) such as Bronchitis, pneumonia, coughing Nasal congestion.
- Skin Infections -wounds, rushes and lesions;
- Eye Infections, Abdominal diseases, Malaria,
- Typhoid fever and Urinary Tract Infections

Findings / Results

n September 2018

187 (47%) of the outpatient consultations were diagnosed as URTI cases,

. 32 (8%) skin disorder complaints

i. 30 (7.5%) as eye infections.

Reported cases varied per medical facility.

EAPC staff clinic, 42 (62%) sought URTI

. PCEA dispensary 89 (74%) sought URTI related treatment.

Conclusions

- WHO Pm 2.5 concentration value given as 25 µg/M^3
- NEMA air quality guidelines (RoK, 2006) allow a 24 hour average of 75 µg/M^3
- Analysis of air samples indicated elevated particulate matter concentrations
- outpatient record perusal revealed high respiratory effects associated with gypsum mining dust.

Recommendations

The location of mining sites in areas near residential places need to be discouraged.

The mining operation areas should be located in areas buffered by vegetation particularly dust attenuating plant species that would act as sink blocks for the offensive particulate matter

Areas for further study

The contributions of wind speed and temperature to the PM 2.5 concentration scales adopted in mining sites.

References

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2. **Chaulya, S. K. (2004).** Assessment and management of air quality for an open cast coal mining area. *Journal of environmental management,* Vol. 70(1) 1 - 14.
3. **Hendryx, M. and Ahern, M. (2008).** Relations between health indicators and residential proximity to coal mining in West Virginia. *American Journal of Public Health,* Vol.98(4)669-71.