# BIOPHYSICAL AND ENVIRONMENTAL HEALTH CHALLENGES FROM CEMENT DUST IN ATHI RIVER, MACHAKOS COUNTY, KENYA

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## DECLARATION

**Student's Declaration**

I hereby declare that this research project is my original work and has not been presented to any other examination body.

Signature_____ Date 14/08/23

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**Supervisors' Declaration**

I confirm that this research project has been submitted with my approval as the University supervisor.

Supervisor

Signature_____ Date 14/08/2023

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## ABSTRACT

Cement dust from cement processing plants has major impacts on the biological and physical environment as dust spreads towards residential homes, grazing and farmlands, leading to undesirable impacts. Most people in Athi River practice agriculture and pastoralism as their source of livelihood. When livestock feed on grass covered with cement dust, milk production decreases and health deteriorate. Cement dust also has serious impacts on people's health as people in dust risk zones suffer from respiratory complications. There is urgent need to have cement factories located further away from residential homes to reduce these impacts. Objectives of this study involve examining biophysical and environmental health challenges emanating from cement dust in Athi River. Specifically, the study sort to examine the effects of cement dust on vegetation, human and livestock health and assesses the extent to which settlements are impacted. To achieve this, qualitative data from questionnaires was used. Remote sensing and Geographic Information Systems were used to analyze Land Use and Land Cover for the years 2013, 2018, 2019, and 2020. Key Informant Interviews were done with health officials from Shalom Community Hospital whereby data on different respiratory health problems was obtained for the years 2018, 2019, 2020, and June 2021. Results of this study indicate that residents in Athi River suffer from eye and skin infections, upper respiratory tract infections, asthma, pneumonia. Since 2018, there have been 5084 reported cases of the upper respiratory tract, 3066 cases of the respiratory system, 2972 skin related, 2821 pneumonia, 1985 asthma, 1335 eye infections, and 20 cardio-vascular cases. On livestock health, 62% of interviewed pastoralists complained of poor livestock health attributed to poor quality of feed. In terms of Agriculture, 42% of interviewed respondents complained of dust cover on crops, 44% on leaf necrosis whereas 21% mentioned stunted crop growth. This affects income generation due to low sell of produce. Landsat image comparison during dry and wet seasons show huge increase in land under crops and grass after rainfall. In 2019, farmland area increased from 17.34% to 22.86% during the wet season. One possibility could be dust being washed away by rainfall thus easy visibility of vegetation by satellite imagery. Extent of human settlement is therefore very important to determine how far dust spreads while observing wind patterns. Average wind movement is from the western side of Mombasa cement towards the eastern side of residential apartments. No clear regulations exist on the appropriate buffer away from cement factories. However, literature reviewed in this study indicate that dust spreads up to a distance of 3km. This study recommends a buffer of at least 3.5km away from cement factories. This could help improve people's health and also farmers' produce. Cement factories need to improve on or adopt various mitigation measures such as proper monitoring systems to manage these emissions, adopting the principle of circular economy and industrial symbiosis, fogging method to capture cement dust, and also use of alternative fuels. These will reduce impacts on the biophysical environment and improve people's health thus ensuring sustainable livelihood.