

Code and Title of the Research Project:

Respiratory health effects of environmental exposure to dust among household members living close to quarries in Palestine

(RPPH 18-43)

Country: Occupied Palestinian Territory

SECTION A. GENERAL INFORMATION

- **PI name:** Dr. Maysaa Nemer

- **Reporting Period:** April 15, 2019 – December 31, 2019.

Extension for the project duration was accepted with no extra costs, until January 1, 2020.

- **Objectives of the study:**

o **General:**

This study aims to assess the respiratory health effects of exposure to dust produced by quarries on the population living nearby in Birzeit village / Palestine (exposed group), and to compare results with the results obtained from a population living in the same or nearby community but far from quarry sites, and with similar socio-economic characteristics (control group).

o **Specific:**

- To assess general conditions in households that are in close proximity to quarry sites, focusing on the amount of dust.

- To assess the difference between the exposed group and control group in reported health problems: respiratory symptoms and disease, allergic symptoms, eye and nose symptoms and auditory problems.

- To assess the difference between the exposed group and control group in lung function parameters.

- To assess the prevalence of obstructive lung effects among the exposed group compared to the control group.

SECTION B. TECHNICAL REPORT:

INTRODUCTION:

Stone quarrying and cutting are some of the most important industrial activities in Palestine (1,2). Adverse health effects related to exposure to dust produced from quarries has been reported among workers in Palestine (3,4), but no research which examines the effects of dust exposure on populations living close to quarry and stone cutting sites has been completed. Yet, the literature indicates associations between dust exposure and negative health outcomes (5-9).

This research project aimed to uncover the negative health effects of dust exposure on people living close to quarry sites in a selected site in the West Bank so that the issue could be raised with stakeholders and policy makers regarding the location of quarries in Palestine and the need for appropriate planning that takes population health into consideration.

METHODOLOGY:

Study Design:

A cross-sectional comparative study in which both reported and measured health effects was investigated.

Study Population:

Household members living in proximities to the quarry sites, with two groups of populations: close and far from the quarry sites. Household members who are 18 years or above were included in the study.

Sample Size:

As this was a pilot study, we planned to include 20-30 households (100 participants of all ages) from each group, making up around a total of 200 participants.

Sampling Method:

According to the information collected from the Birzeit Municipality, there are two main quarries at Birzeit village, in addition to a large stone cutting and shaping workshop. We planned to include a random sample of household members that live near each quarry site within a circle of 500m diameter. And a random sample of household member who live away from the quarry site, out of the 500m circle.

Data Collection:

The study included two data collection methods:

1. Questionnaire

The questionnaire included demographic information (age, gender, level of education, work, family economic status), smoking habits and history, location of the house from the quarry site (distance), frequency of dust exposure, years of living in the area, year when the quarry was established nearby, general health conditions, specific respiratory symptoms (used to detect asthma and COPD, adapted from an internationally standardized respiratory questionnaire), allergic symptoms, eye and nose symptoms, and auditory symptoms related to noise exposure.

2. Lung Function Test (Spirometry)

Spirometry assesses the integrated mechanical function of the lung, chest wall, and respiratory muscles by measuring the total volume of air exhaled from a full lung (total lung capacity [TLC]) to maximal expiration (residual volume [RV]). This volume, the forced vital capacity (FVC), and the forced expiratory volume in the first second of the forceful exhalation (FEV1), should be repeatable to within 0.15 L upon repeated efforts unless the largest value for either parameter is less than 1 L. In this case, the expected repeatability is to within 0.1 L of the largest value (10).

The test was done using a spirometer, a disposable mouth piece, and a nose clip. The main researcher administered the test, and trained the research assistant on the procedure so that she was also able to administer the test later on during the data collection process.

The test was done with the participant sitting down in an upright position, with the mouth closed firmly on the mouth piece and the nose clip was put on. The participants were instructed to inhale as much as possible and then exhale rapidly and forcefully for as long as flow can be maintained. The participants were instructed that they should exhale for at least six seconds. Date of birth, height and weight, and smoking status were recorded before starting the test for each participant.

Ethical Considerations:

This research proposal was approved by the Institute of Community and Public

Health's Research Ethics Committee for ethical approval, as stipulated by the Research Ethics Guidelines of Birzeit University. It was also reviewed and approved by the WHO Research Ethics Review Committee and accepted before starting the fieldwork.

The participants voluntarily participated in the study, and a written informed consent was obtained from each participant. All the collected information was handled confidentially. No full names or specific identifying marks were registered. The aim and procedures were explained to the participants before starting the study, and the process of the spirometry was also explained. The participants were given enough time to answer the questions and to practice and perform the lung function test.

Activity Implementation and Results:

Time period	Activities
April 15 – May 1, 2019	<p>Ethics Committee Approval acquired from both sides.</p> <p>Contract received and signed from both sides.</p>
May 1 – June 1, 2019	<p>Recruitment of research assistant.</p> <p>Beginning development of research tools:</p> <ul style="list-style-type: none"> -Started the process of purchasing the spirometer. -Questionnaires prepared and translated to Arabic. -SPSS File set up.
June 1 – July 15, 2019	<p>Small pilot of the questionnaire conducted to check validity of translation and test overall comprehension of questions.</p> <p>Order of the spirometer was sent to the company; to be received within 8 weeks.</p> <p>Head researcher requested extension of study until end of December due to prolonged arrival of spirometer.</p> <p>WHO Officer Dr. Ahmad Mandil approved extension request.</p> <p>Underwent preparatory visit to the study location (Birzeit village) and locating the quarry sites and if they have living populations in the surroundings.</p>
July 15 – August 1,	Contact was made with the Birzeit Municipality in order to

2019	<p>acquire a map of the village, to receive images, and to locate the quarry sites on the map so that we can locate the houses around them and select our participants.</p> <p>Research assistant trained on how to administer the questionnaire and talk to the people.</p> <p>A visit was made to the Birzeit Municipality and information was attained about the quarries in the village and how to facilitate our work in the communities.</p> <p>Spirometer received and installed, checked for accuracy on some colleagues and checked the data and graphs obtained from it. Fieldwork team members trained by company engineer on its structure and functionality.</p> <p>Questionnaires printed and prepared for starting the data collection process.</p>
August 1 – December 15, 2019	<p>Sampling frame was prepared as follows:</p> <ol style="list-style-type: none"> 1. The three available quarry sites at Birzeit village were located on the map (Q1, Q2, Q3). 2. A circle with the quarry at the center and a radius of 500m was drawn around each quarry site. 3. All the houses within the area of the circle were considered in the exposed group. 4. All the houses outside the area of the circle were considered in the control group. 5. The houses were randomly selected from each group until we reached the needed number of houses from each group (30-40 houses) depending on the number of people available in each house. <p>Inclusion criteria: All household members who currently live at the house for at least one year, and are 18 years old or above.</p> <p>Exclusion criteria: Any household member who has lived for less than a year at the house, and who is below the age of 18 years. For lung function: people with recent major surgery and pregnant women are excluded.</p> <p>Data collecting started by visiting each house and talking to the people, asking them to participate, informed consent signed and started the interview then and ask them to perform the lung function test.</p>

	<p>A total of 192 participants were invited to participate from all locations. 158 of them agreed to participate and answered the questionnaire, from which 3 refused to perform the lung function test. 28 of them refused to participate, while 6 have lived in the house for less than a year, thus excluded from the study.</p> <p>Making us a total of 158 included participants. 79 of them are close to the quarry sites, and 79 are far away from them.</p> <p>All collected data was entered in SPSS software, checked and cleaned for analysis.</p>
December 1 – 31, 2019	<p>Data analysis was done using SPSS.</p> <p>Descriptive statistics was performed with comparison between the two groups to make sure that they are of comparable in terms of demographic and socioeconomic factors. Our outcome variables were specific respiratory symptoms, asthma, nasal and eye infections, and lung function parameters (FEV1, FVC, and the ratio).</p> <p>Data on knowledge, awareness and perception of residents living next to quarries were assessed separately and reported. Linear and logistic regressions were used to compare the two study groups in regards to different dependent variables.</p> <p>Results were used to write the manuscript which we consider to submit for publication to the “Occupational and Environmental Medicine – BMJ, Section: Environment”.</p>

References:

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