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Household waste burning techniques and correlated respiratory indicators in Northern Nigeria: Case study of Gwagwalada Area Council, Abuja Nigeria.

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Abstract. The household waste burning practice and impacts of the waste burning emission on respiratory health of the populace in the Gwagwalada Local Council Area happens frequently, though not well recorded. The goal of this study was to quantify the waste burning occurrence as well as scrutinize the correlation between waste burning practice and respiratory problem in Northern Nigeria with Gwagwalada as case study because is an example of rural settlement growing to urbanites. Questionnaire was utilized to accumulate information from houses in Gwagwalada Area Council Community, Abuja. Total of 150 participants were enrolled and their retorts on household waste burning besides respiratory symptoms were investigated. The participants indicated that their neighbors burn waste frequently, with 67 (44.7%) of them from Gwagwalada Local government (rural zone). The local waste experts collected refuse from 97.0% of these participants at least once per week in the enlightened zone and central but rural is once monthly or not at all. The prevalent lower respiratory sign connected with waste burning was dehydrated cough (31.4%). For Lower and Upper health signs, the participants who participated in the practice of waste burning had a faintly higher commonness of breath shortness (56%) and Water itchy eyes (49%) respectively. For each of lower and upper health signs, the trend is such that 6 month above is greater than immediately, which is greater than those of a month after. These results imply that waste or bush burning effect on health is on the long – term basis.

1. Introduction

The practice of both bush and waste burning serve as supportive part to the problem of open-air effluence in the environment whereas, smoke particles released from this process encompass tiny particles with aerodynamic distances which are mostly significantly less than 2.5 μm [1]. The chemical components of this particular matter are also varied which have been assessed to contain elemental carbon like water-soluble organic carbon (WSOC), polycyclic aromatic hydrocarbons (PAHs) and oxalate, potassium (K), Zinc (Zn), Chlorine (Cl) and so on [2]. Plant-based material has long been assumed through combustion or other processes serve as cause of fine particle organics in the air [3-4]. A host of gases such as CO₂, CH₄, NMHC (nonmethane hydrocarbon), CO and are associated with waste burning, as well as explosive and semivolatile organic compounds [5]. The fine particles have been revealed to infiltrate deep into the lower respiratory system (LRS) through the



lungs besides threatening health of the Family. Waste or bush burning method denotes household burning of garbage by inhabitants at their own property which is a very common throwing away technique utilized in various developing nations [6]. This rubbish can encompass plastics, paper, cardboard, yard trimmings, and several other resources [7-8]. In the combustion system emissions are spontaneously released straight into the air without filtration or treatment so as to confiscate particulate matter, besides the emissions are extremely variable, subject to the situations under which burning occurs [9]. U.S Environmental Protection Agency [6, 10] ascribe that waste burning is detrimental to both human wellbeing and the environment, emissions from this practice can intensify respiratory disease like asthma besides increase the risk of heart sickness. Lemieux et al., [11], reveal that the method could also generate a group of extremely toxic chemicals recognized as dioxins which might then rest on crops or deposit in seaways and disturb the well-being of those who would consume adulterated crops or water. This research will cover waste burning and health impacts study in the Gwagwalada Area council community, Abuja. The research restrictions will embrace the scheme elements of the unified waste burning system and health impact through using unified waste burning(UWB) as an assessment device.

2. Material and Method

Study Area

In this study Gwagwalada town in Abuja was chosen as an example of rural settlement growing to cosmopolitans. Gwagwalada was being ruled by the Kwali Province of the prior Abuja emirate presently Suleja emirate before the creation of Federal Capital Territory. Gwagwalada Area Council was established on 15th October 1984 with the official population number of 158618, inhabitants at the 2006 census. This Area council is one among the five (5) Local Government Area (LGAs) Councils of Federal Capital Territory (FCT) of Nigeria, others are Kuje, Abaji, kwali, Bwari and Abuja city itself. Due to Government seat relocation from Lagos to Abuja in 1992 besides latest demolition of unauthorized buildings in the Federal Metropolitan Center brought massive invasion of people into the Area Council. Being among the rapidest growing urbanized centers in the FCT, the populace to over three million people (3,000,000), the locations are shown in Fig. 1.

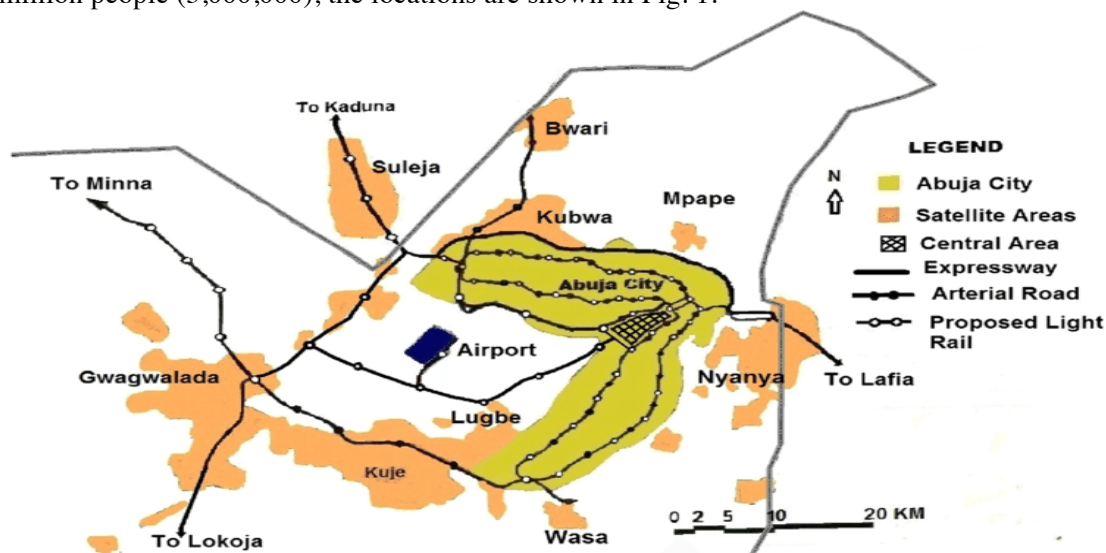


Figure 1: Gwagwalada maps

Research Methods and Sampling approaches

In this study, expert personnel collected information by means of a standardized questionnaire from houses in the Gwagwalada Local government community, Northern Nigeria. The sample size calculation comprised of an extra fifteen percent reserve population to address any likely sample

population loss. WHO endorsed Kish style was utilized for the family participant selection (Kish, 1995). Health related questions respiration were created based on prevailing validated standard surveys by the American Thoracic Society, Respiratory Diseases Survey [12]. The questionnaire was pretested by the means of a pilot study in a diverse public regions in Northern Nigeria. The questionnaire comprised of enquiries on demographics, waste burning method, physician-diagnosed sicknesses and environmental fitness-related history, was given to participants at their home.

3. Results and Discussions

Demographic Analysis

Sex and Occupation

The demographic investigation (Gender and Profession) formed using the three zones Questionnaire that were dispensed to fifty (50) households selected randomly making the total of 150 families are presented in Figure 3.

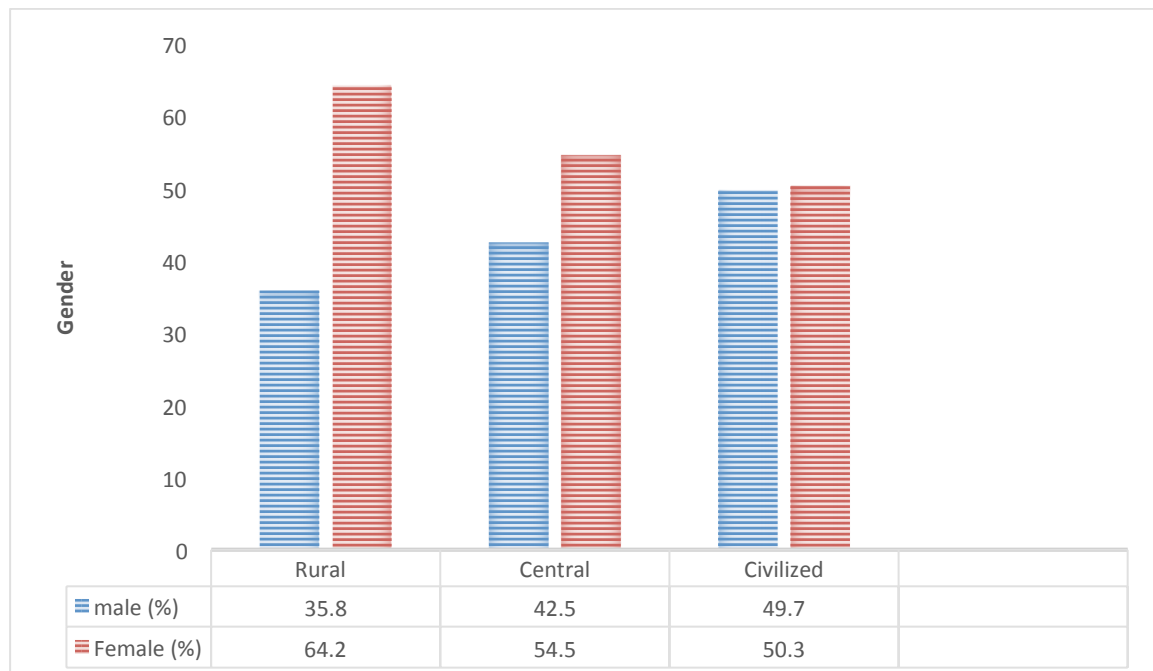


Figure 2: Gender respondent in Gwagwalada, Abuja.

B Age Group

The Age group formed using the three zones Questionnaire that were dispensed to fifty (50) households selected randomly making the total of 150 families are presented in Figure 4.

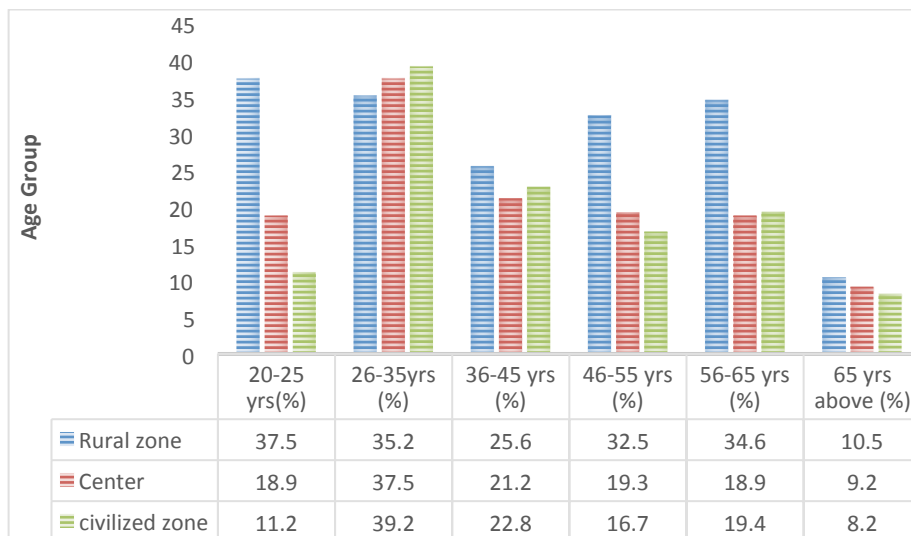


Figure 3: Age group for Gwagwalada, Abuja Resident

Figure 2 – 3 shows the demographic figure (gender and age) for Gwagwalada community, total of 150 participants responded to the questionnaire given with a partaking rate of 98.1%. Contributors were mostly female (50.3 – 64.2%) while men are (35.8 – 49.7%). Age group (26-35 years) has the highest values whereas the lowest fall within 65 years above.

Bush Burning

The Bush burning Frequency formed using the three zones Questionnaire that were dispensed to fifty (50) households selected randomly making the total of 150 families are presented in Figure 4.

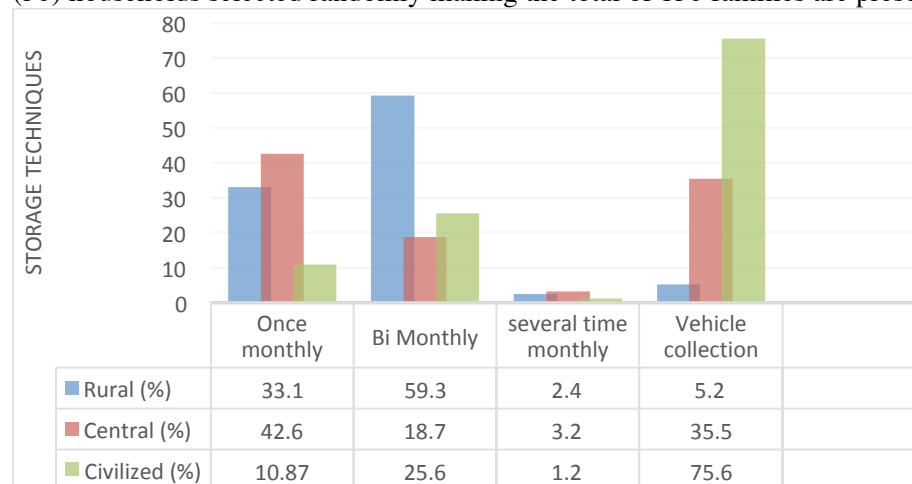


Figure 4: Burning Frequency by Residents of Gwagwalada Abuja

Figure 4 demonstrate that the bush burning practice happened in 83% of the households often once and twice monthly. Eighty-two (82.0%) contributors who practice bush burning burned garbage twice monthly and remain populace burned it once a month. The nonrural area of Gwagwalada local government accounted for 50 of 150 households (33.3%) that practice waste burning. One hundred fifty contributors stated that their neighbors burn waste habitually, with 67 (44.7%) of them from the Gwagwalada Local government (rural zone). The local waste experts gathered garbage from 97.0% of these contributors once per week in civilized zone and central but rural is once monthly or not at all.

Health effect of bush burning in Gwagwalada community

Lower airways signs

The lower health signs made using the three zones Questionnaire that was dispensed to fifty (50) families selected randomly making total of 150 people are presented in Figure 5.

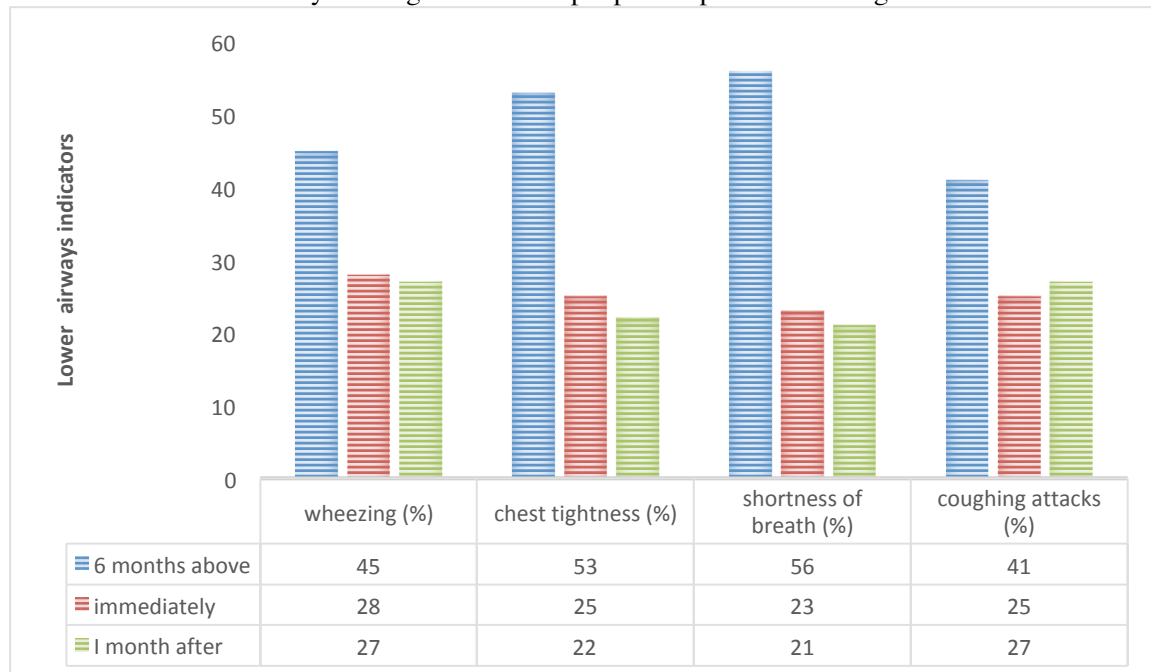


Figure 5: Lower illness indicators of Gwagwalada Abuja Resident

Upper airways indications

The Upper health signs formed using the three zones Questionnaire that were dispensed to fifty (50) households selected randomly making total of 150 families are presented in Figure 6.

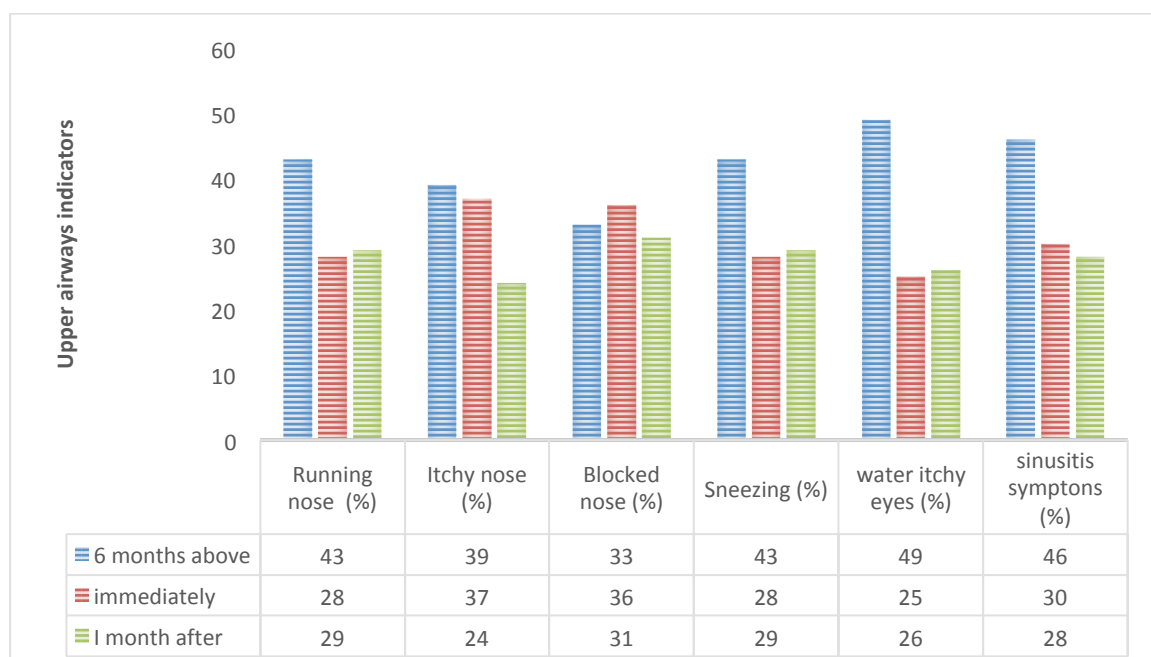


Figure 6: Upper illness indicators of Gwagwalada Abuja Resident

Figure 5 and 6 shows the trend for the lower and Upper health signs, the contributors who engaged in the waste burning practice had a faintly higher occurrence of breath shortness (56%) and water itchy eyes (49%) respectively. For each of the lower and upper health signs, the trend is such that 6 month above is greater than immediately, which is greater than those of one month after. These results imply that waste or bush burning effect on health is on the long – term basis.

Conclusion

In this study, total of 150 participants were enrolled and their retorts on household waste burning besides respiratory warning sign were investigated. The contributors who engaged in the waste burning practice had a faintly higher occurrence of cough, water itchy eyes and physician-diagnosed asthma. For lower and upper health signs, the participants who participated in the practice of waste burning had a faintly higher prevalence of breath shortness (56%) and Water itchy eyes (49%) respectively. For each of lower and upper health signs, the trend is such that 6 month above is greater than immediately, which is greater than those of a month after. Furthermore, there is probable disclosure misclassification, specifically those who do not burn waste but are still vulnerable to air pollutants from their neighbors' waste burning. Conclusively, these results imply that waste or bush burning effect on health is on the long – term basis.

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