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Family Cleaning Strategies in Response to Covid 19 Pandemic and Health Sustainability

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Abstract

This study investigated household practices in the acquisition and consumption of chemical-based cleaning and disinfecting materials with particular emphasis on home-made chemical-based products. The area of the study was Sabo Local Government of Kaduna State, Nigeria. The design of the study was survey research design, the sample size for the study was 300 respondents and the sampling procedure adopted was convenient sampling Technique. The data for the study was analyzed using frequency and mean values. The findings of the study as shows that homemakers acquire cleaning and disinfecting product by home production(x3.8.) the result of the second objective posits that consumers are aware that chemical-based cleaning materials are harmful with a mean rating of x3.00 but are not aware of the potential danger involved in producing these chemical substances at home (x3.00). The mean rating of 2.6, results also show that respondents do not know that Volatile Organic Compounds (VOCs) have any impacts on their health sustainability with a mean rating of 2.5. Based on these findings, it was concluded that homemakers in Sabo area of Kaduna state engage in producing chemical based household cleaning and disinfecting substances, which contaminates the indoor air besides, family members are at risk of various health challenges accrued to inhaling contaminated indoor air, therefore, it was recommended that the Federal Government of Nigeria should enact a law that prohibits indiscriminate sale of harmful chemicals over the counter and this law should be enforced by the state and local government. Families should be encouraged to imbibe the culture of using indoor plants as this will help to clean up the indoor air.

Keywords: COVID19 Pandemic, Volatile Organic Compounds, Health Sustainability, Chemical-based Cleaners, Green Alternative

Introduction

It is a common knowledge that the times are quite challenging and uncertain especially as it regards global concerns on the covid19 pandemic. The global health pandemic is eating deeper into the nooks and crannies of every continent of the world, at the moment, there are more than 56 million confirmed cases of the corona virus otherwise known as covid19 (WHO, 2020). Nearly every country across the globe is struggling to reduce the spread of the COVID-19 virus and limit its health, social and economic consequences. According to WHO, (2020), one of the ways to reduce the spread of the novel COVID19 virus is to maintain good personal and environmental hygiene, simply by disinfecting surfaces, washing hands with soap and running water for at least twenty seconds

The recommendations by WHO to control the spread of COVID19 such as social distancing, washing of hands, maintaining utmost hygiene of common areas at home have most likely increased the use of chemical-based cleaners and disinfectants in the respective homes. This calls for concern because there are documented evidences that the use of chemical-based cleaners has health implications and also pollute the environment. For instance, Gerster, Vernez, Wild & Hopf (2014) established in a study that Cleaning products potentially give rise

to exposure to different harmful chemical substances which may cause some health challenges in the later years or over prolong use. American Lung Association (2020) posits that cleaning the environment with healthy organic substances is essential to protecting health among family members in homes, schools and workplaces. Household and cleaning products include soaps, polishes and grooming supplies. Center for Disease Control and Protection (CDC) (2020) states that the number of calls to poison centers increased sharply at the beginning of March 2020 due to exposure of people to both cleaners and disinfectants. These affirms the concern to investigate the family cleaning strategies in response to growing health concerns including covid19. It is more alarming that household members have resorted to domesticate the production of chemical-based cleaners, sanitizers, disinfectants. These products are being hawked by the streets of from house to house, skills of production that have been acquired to augment the income in the family. Thus, the financial implication of the heavy need for these products.

This practice suggests that there is an urgent need to assess the handling of chemicals in the production of household cleaning and disinfecting supplies and ascertain the views of consumers on the use of green alternatives for cleaning and disinfecting the home.

Changes in environmental policies and consumer advocacy has made it imperative that everyone becomes more aware of the need for greener products. Consumers should look out for environmentally friendly products to use for cleaning needs. These products are organically made using eco-friendly materials with no harmful substances. Green cleaning products or environmentally friendly cleaning supplies generally means using cleaning solutions and products that consider human health and environmental impact first (Laser Chemicals, 2020). The clamor for the use of eco-friendly materials for cleaning have been in front burners for a while due to its numerous advantages such as; reduction of exposure to toxic chemicals and improving the overall indoor air quality by reducing airborne dust and chemical gases (Stathakis, 2020). Quality indoor air guarantees good health of family members.

According to Otto (1990), in today's market, cleaning product manufacturers are confronted with the task of balancing two goals that are pertinent: Creating effective cleaning products for a variety of applications that remove indoor pollutants such as dust, viruses, bacteria, particulates, endotoxins, allergens and mold, while not adding pollutants, such as volatile organic compounds (VOCs) and particulates, back into the indoor air. All of these indoor contaminants can make people sick, including triggering allergy and asthma attacks. In order to achieve these goals, manufacturers are trying to better understand how their products impact indoor air quality (IAQ) and health. Manufacturers are also under pressure to provide green products that meet today's market demands for effective, yet harmless maintenance of schools, healthcare, commercial and residential environment. On the other hand, homemakers who produce cleaners, sanitizers and disinfectants at home are most likely ignorant of the harmful effects of volatile organic compounds (VOCs) to the indoor environments and health. This is corroborated in a study linking household exposure of chemicals to participant perception and knowledge of chemical sources, there was a significant disconnect between knowing that cleaning products contained potentially harmful chemical compounds and that these chemicals could therefore be detected in the air and dust of the home as well as the urine of inhabitants (Altman, 2008). This calls for a serious concern because, the attempt to wade off a health pandemic would most likely give rise to other health concerns.

Indoor air in a very crowded and intricate place, not only contains chemicals but also particles; viruses and bacteria; allergens and endotoxins; microscopic

organisms such as dust; water vapor molecules (moisture), and spores. According to Jerrim, Hughes & McKechnie, (2006) volatile organic compounds (VOCs) are among the most prevalent of all indoor air constituents. Some VOCs can cause eye, nose and throat irritation, cough, headache, general flu-like illnesses, skin irritation and some can cause cancer. Others produce odors that may be unpleasant. As a result, even though the concentrations of individual volatile organic compounds (VOCs) may be well below odor thresholds or known toxic levels, their occurrence in complex mixtures may lead to perceived poor Indoor aAr Quality (IAQ) or irritation among those exposed. Of a greater concern is that these interactions and reactions among indoor air constituents are occurring constantly, which makes it difficult for users of cleaning products to manage (Indoor Air Quality (IAQ) (Hughes and McKechnie, 2006). Maisey & Saunders (2013) also established in a study that overuse of disinfection products can be harmful to the health and impact on the abilities to fight more serious infections. It has been shown that long term exposure has been associated with cardiovascular hazards including heart stress, through exposure to chemical products and air fresheners.

Table 1a: Common Volatile Organic Compounds in Indoor Environment

VOC	Types/Use of Product
1,4 dioxane	Spot removers
Acetaldehyde	Fragrance/disinfectants
Acetic acid esters	Surface cleaners
Acetone	Surface cleaners
Butoxyethanol	Surface cleaners
Butyl acetate	Surface cleaners/fragrances
C6 – C10substituted alkanes	All cleaners/polishers/waxes
Dichlorobenzene	Deodorizers
Dipropylene glycol	Surface cleaners
Ethanol	Disinfectants
Formaldehyde	Biocides
Isobutane	Aerosol cleaners
Isopropanol	Disinfectants
Limonene	Orange fragrance
Methoxyethanol	Surface cleaners
Methoxyethoxyl ethanol	Surface cleaners
Methyl methacrylate	Hard surface cleaner
Naphthalene	Disinfectants/moth repellants
Phenol	Disinfectants
Pinene	Pine fragrance
Propylene glycol	Surface cleaners/aerosols

Air Quality Science (AQS), (2007).

Chemicals are part of our lives because of the various uses such as in medicine, house decoration and finishing, clothing and for cleaning the home and its environs with products that have been developed through chemical researches. However, there are reasons to be cautious about exposure to these chemicals particularly the ones from cleaners and disinfectants. According to Maisey & Saunders (2013), there are certain guidelines to follow when choosing cleaners and disinfectants. This is necessary in order

to maintain non toxic indoor environment. It is recommended that whenever possible, one should buy products that are free of toxic chemicals. This is in line with the recommendation of Minnesota Pollution Control Agency (2012) and Eco-cycle (2020) who advised that less toxic cleaning products are better for cleaning. This is quite apt because the rate at which households use cleaners and disinfectants have increased because of the COVID19 pandemic (MPCA, 2012). Meanwhile, non-compliance with this caution could result to health challenges caused by toxic components in cleaners and disinfectants.

MPCA (2012) further established that it is good to select cleaning and disinfecting products made from plant-based materials, such as citrus, seed, vegetable, or pine oils. These are biodegradable, generally less toxic and provide the additional benefit of being made from renewable resources.

This study was inspired by a personal experience of the researcher who produced a home-made bleach for home use and later found that the bleach was melting all the containers that was stored in it. This experience formed the basis for this study. It was later confirmed by the chemical vendors that the ratio of water to the chemical was inadequate, which is why the concentration was too acidic. Further probing established that many home makers engage in concocting chemical-based cleaners and disinfectants at home without much knowledge on the proportion and the side effects of the product, which seems to be contributory to indoor air pollution and further threatens the health sustainability of the inhabitants. Maisey & Saunders, (2013) established that there have been links made to chemical exposure from cleaning agent and breast cancer. In the same vein, ALA, (2020) warns that household and cleaning products including soaps, polishes and grooming supplies often include harmful chemicals.

Premised on the above, this study is an investigation into the cleaning strategies adopted by families in response to covid19 pandemic and its implication for health sustainability

Objectives of the study

The study was guided by the following objectives:

1. To determine the strategies homemakers, engage in for the acquisition of cleaning and disinfecting products in Sabo Area of Kaduna State.
2. To know the perceptions of homemakers about the impact of chemical-based cleaning and disinfecting materials on health and environmental sustainability in Sabo Area of Kaduna State.
3. To determine homemakers' perceptions about green alternatives for cleaning and disinfecting homes in Sabo Area of Kaduna State.

Methodology

Research Design

The study adopted a descriptive research design, it was considered appropriate because it is suitable for obtaining opinions, self-report and attitudes of people about a particular issue. After which a small representative group is selected to derive responses upon which generalization is made to the entire population.

Population

The target population for the study comprised of 876 families in Sabo Area of Kaduna State (Kaduna State Bureau of Statistic (KDBS, 2017). These families are consumers of cleaners and disinfectants at household level in Sabo Local Government area of Kaduna state. The population was heterogenous in nature as it comprised of male and female consumers of all age group.

Sample and Sampling Techniques

The sample size for the study was 300 respondents and the sampling technique used was convenient sampling method. Convenient sampling method was considered appropriate because it was used to capture respondents who

consented to participate in the study and to accommodate the accessibility of respondents; available subjects were simply entered into the study without any attempt at randomization.

Data Collection Techniques

A self-designed questionnaire titled ''Chemical-based Household Cleaners and Disinfectant Consumption Pattern'' (CHCDCP) was used for the study. The questionnaire was divided into three sections with each section eliciting information on each research objective. The instrument comprised of 28 items and was based on a five-point Likert scale as follows: SA (Strongly Agree) = 5points; A (Agree) = 4 points; U (Undecided) = 3 points; D (Disagree) = 2 points and SD (Strongly Disagree) = 1 point. The instrument was validated by three Senior Lecturers from the department of Home Economics and Chemistry all from Ahmadu Bello University. The data for the study was collected through face-to face collection and on the spot. The instrument was administered by researcher as they respondents came to buy chemical ingredients at the shops in Sabo market in Zaria.

Data Analysis

The data collected was analyzed using frequencies and mean. An average mean of 3.00 was set as the limit for any decision taken. Any mean that is below 3.00 is considered disagreed while means that are 3.00 and above were considered agreed.

Results and Discussion

The data for the study were analyzed and presented on tables 1-3.

Table 1 shows that all the items on the table were rated above the mean of 3.00, which was the criterion for decision making. By implication, the respondents produce their cleaners and disinfectants at home and also hold the belief that it is a better option.

Table 1: Mean Responses on the strategy's homemakers engage in for the acquisition of cleaning and disinfecting products in Sabo Area of Kaduna State.

S/N	Variables	No	X	Decision
1.	It is better to produce cleaners and disinfectants at home	285	4.37	Agreed
2.	Commercial products are safe for cleaning and disinfecting	285	3.33	Agreed
3.	I make my cleaners and disinfectants at home	285	4.65	Agreed
4.	Saving cost is the most important factor when acquiring cleaners and disinfectants	285	3.8	Agreed
5.	Home - made disinfectants are a better strategy in acquiring disinfectant	285	4.0	Agreed
6.	I would rather acquire cleaners and disinfectants based on the safety of the family	285	3.4	Agreed
7.	I am more concerned about functionality when acquiring cleaning products	285	3.3	Agreed

Table 2 shows that all eleven (11) items disagreed on the perception of home makers on the impact of chemical based cleaning and disinfecting products on health and environment sustainability. This means that respondents hold the view that chemical-based cleaning and disinfecting products are good choices to make. Only three items agreed to the contrary.

Table 2: Mean Responses on the Perceptions of Homemakers on the impact of Chemical-based Cleaning and Disinfecting Products on health and environment Sustainability in Sabo Area of Kaduna State

S/N	Variables	No	X	Decision
1.	Chemical-based cleaning and disinfecting products pollute the indoor air	285	2.1	Disagreed
2.	Indoor air quality is a concern for worry when choosing cleaners and disinfectants	285	2.7	Disagreed
3.	it is important to use less of VOCs in the indoor space	285	3.2	Agreed
4.	polluting the indoor space causes potential harm to ozone layer	285	2.7	Disagreed
5.	Chemical-based cleaners are eco-friendly	285	2.1	Disagreed
6.	Chemical-based cleaners and disinfectants pose potential danger to humans and other organisms	285	2.7	Disagreed
7.	There is need to consider the use of 'green' cleaners in order to preserve mother nature	285	2.5	Disagreed
8.	Chemical-based cleaning and disinfecting products are harmless	285	3.3	Agreed
9.	Air quality should be the guiding principle when choosing cleaners	285	2.5	Disagreed
10	Chemical-based products have impact on the environment	285	2.8	Disagreed
11	I am aware of the chemicals that are potentially harmful to my health	285	2.4	Disagreed
12	High use of all-purpose cleaners in a confined space can lead to toxic exposure	285	2.0	Disagreed
13	Understanding of potential dangers of chemicals guide its use	285	3.6	Agreed
14	It is very safe to concoct chemical-based cleaners at home	285	4.7	Agreed

According to the figures on Table 4, respondents do not agree that air quality should be considered when choosing cleaners and disinfectants for home use. More so, responses affirmed that respondents do not agree that chemical-based products have impact on their health.

Table 3: Mean Responses on the Perceptions of Homemakers about green alternatives for cleaning and disinfecting homes

S/N	Variables	No	X	Decision
1.	Organic cleaners are better than Chemical-based counterparts	285	2.4	Disagreed
2.	It is important to study the ingredients of cleaners and disinfectants	285	2.1	Disagreed
3.	Organic cleaners are very affordable	285	2.2	Disagreed
4.	There are readily available organic cleaners and disinfectants in the market	285	3.1	Agreed
5.	I am aware of the cleaning and disinfecting properties of some kitchen supplies	285	2.7	Disagreed
6.	Organic cleaning and disinfecting products are not volatile	285	3.8	Agreed
7.	There is need for the government to control the sales of harmful chemicals and chemical-based products in the market	285	4.2	Agreed

Discussion of Results

The first objective of the study sought to establish the means through which respondents acquire household cleaners and disinfectants. The results of the study have shown on table 1 that most of the respondents prefer to make their cleaners at home. They are able to do so by buying the raw chemicals from the store and producing them at home. This finding is contrary to the findings of Berglund, Jaakkola, Jaw & Valbjørn (2016) who established that working class homemakers prefer to buy cleaners such as soaps and detergents instead of producing them. According to Berglund, Jaakkola, Jaw & Valbjørn (2016), VOCs are among the most prevalent of all indoor air constituents and some VOCs can cause eye, nose and throat irritation, cough, headache, general flu-like illnesses, skin irritation and some can cause

cancer. Apparently, the health sustainability and indoor air quality should be placed first before any other consideration.

The results on Table 2 showed that respondents do not perceive chemical-based cleaners and disinfectants as bad choices for home use. Contrary to the findings of Adelson & Sunshine, (2002) established in a study that there are adverse consequences of cleaning products on human health. This also is an indication that the respondents are not in the know of what harms chemical-based cleaners and disinfectants can cause to the health. Furthermore, this study established that respondents do not perceive chemically based cleaners as a potentially harmful substances to health and indoor air. Maisey & Saunders, (2013) established that there have been links made to chemical exposure from cleaning and breast cancer, in another publication ALA (2020) posited that household and cleaning products including soaps, polishes and grooming supplies often include harmful chemicals. If homemakers do not perceive that these chemicals are harmful to health, they will most likely expose themselves and their families to harm indiscriminately.

Table 3 considers organic materials as good alternatives when choosing cleaners and disinfectants for their homes. This result is quite surprising given the enormous advantages of using organic products. For instance, it is safe for the environment and not harmful to human health. This, among many other advantages was supposed to be the bait for most people but it appears that the respondents prefer the chemical-based products. One of the reasons could be that chemical-based products give faster results compared to the organic materials. This finding agrees with Cheng (2016) who asserted that homemakers prefer chemical-based cleaners to organic materials.

Conclusion and Recommendations

This study has been able to establish that consumers of chemical-based cleaners and disinfectants in Sabo Area of Zaria, Kaduna state prefer to produce their household cleaners and disinfectants in the comfort of their homes. This is owing to the fact that raw materials required for this are indiscriminately available for purchase. The study also revealed that functionality of the product is of greater concern when acquiring these products. In the same vein, consumers are of the perception that chemically based cleaning and disinfecting products are harmless to health and to the environment. Green alternatives are very much available for purchase in stores, but they are not affordable. Based on these, this study concludes that VOCs from chemical-based are major pollutants of indoor air and pose a danger to health. Consequently, there is an urgent need to regulate the indiscriminate sale of chemicals for the production of cleaning agents in homes.

Based on the findings of the study, this research recommends thus:

1. Intermittent sensitization programs for residents on safety measures to observe when using chemicals for soaps and disinfectants production at home and awareness campaign on the potential harms caused by chemical-based cleaning supplies to indoor air and health. This can be planned by the government and Non- governmental organizations.
2. Homemakers should be trained on production of organic cleaning agents using eco-friendly materials.

References

Adelson, L. &. (2002). Fatal Poisoning due to a Cationic Detergent of the Quaternary Ammonium Compound Type. *American Journal of Clinical Pathology , 22* (7), 656-61.

Air Quality Sciences, (2007). *Cleaning Chemicals and Their Impact on Indoor Environments and Health.* LA: Air Quality Sciences.

Altman R.G. (2008). Pollution comes home and gets personal: women's experience of household toxic exposure. *Journal of Health Society and Behaviours, 4*, 417–435.

American Lung Association, (2020, September 26). *Cleaning Supplies and*

Household Chemicals. Retrieved from https://www.lung.org/clean-air/at-home/indoor-air-pollutants/cleaning-supplies-household-

Berglund, B., Jaakkola, J. J. K., Raw, G. J., & Valbjørn, O. (2016). *Sick building syndrome: The design of intervention studies* (CIB, Indoor Climate W77 199). Rotterdam, The Netherlands: International Council for Building Research Studies and Documentation.

Centres for Disease Control and Protection, (2020). *Cleaning and Disinfectant Chemical Exposures and Temporal Associations with COVID-19 – National Poison Data System, United States, January 1, 2020–March 31, 2020.* Atlanta: Centres for Disease Control and Protection.

Cheng, M. (2016). Factors controlling volatile organic compounds in dwellings in Melbourne, Australia. Indoor air: 26(2), 219-230

Gerster, V. W. (2014). Hazardous substances in frequently used professional cleaning products. *International Journal of Occupation, 20*(1).

Eco-Cycle Inc., (2020, 10 13). *eco.cycle: Bulidin Zero Waste Communities.* Retrieved from https://www.ecocycle.org/hazwaste/ecofriendly-cleaning: https://www.ecocycle.org/hazwaste/ecofriendly-cleaning

Jerrim, K. H. (2006). Electrostatic enhancement of dust and allergen removal from carpets . *Journal of Electrostatistics*, 39 – 51.

Laser Chemicals, (2020, August 12). *https://laserchemicals.com/what-are-eco-friendly-cleaning-products-and-do-they-really-work/*. Retrieved from What are eco-friendly cleaning products and do they really work?: https://laserchemicals.com/what-are-eco-friendly-cleaning-products-and-do-they-really-work/

Kaduna State Bureau of Statistics, (2017). *Kaduna State Population.* Kaduna: Kaduna State Bureau of Statistics.

Maisey, S.M. & Saunders, T. (2013). *A literature based research investigation of household cleaning: comparisons between the use of conventional domestic chemical cleaning agents and fiber/microfiber-based cleaning methods.* Australia: University of Western Australia.

Minnesota Pollution Control Agency, (2012). *How to Reduce Toxic Chemicals in your Home.* Minnesota: Minnesota Pollution Control Agency.

Otto D., M. L. (1990). Neurobehavioral and sensory irritant effects of controlled exposure to a complex mixture of volatile organic compounds. *Neurotoxicol, 12*(6), 649-652

Stathakis, M. (2020). *Green Cleaning Benefits.* New York: Stathakis.

World Health Organization, WHO. (2020, November 20). *Coronavirus Disease(COVID dashboard)*.Retrieved from https://covid19.who.int/?gclid=CjwKCAiA7939BRBMEiwA-