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Design and Construction of Fabric-Face Mask for Public Primary Schools in Lafia local Government Area of Nasarawa State

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Abstract

This study designed and constructedface mask using fabrics for post COVID-19 usage by pupils in public primary schools in Lafia local government, Nasarawa State.The research design of this study are Research and Development (R/D) and descriptive survey. Population for the study comprised four thousand three hundred and fifty(4,350) public Primary school pupils of ages 3-5 years and6-9 years and 108 teachers. The sample size for this study is three hundred and twenty-five (325) persons made up of two hundred and seventeen (217) pupils and 85 teachers. Sample size was obtained using "Table for Sample size determination from population'' The study was guided by three specific objectives. Instruments for data collection were Measurement fabrictapes and Questionnaire titled"Design and Construction of Fabric- Face Mask (DACFFMQ). Resultswere analyzed using percentage and frequency. Results shows that severalfactors militate against the use of Face Mask by pupils in public Primary schools. Some of the factors are: Poor adult supervision, cultural belief, High rate of activity in class each with (X=3.70) respectively. Result on preferences include mostpreferred shape of designed constructed fabric face masks is cone (45%), most preferred fabric is cotton (60%)and most preferred coloris Sky blue (60%). Pupils selected colors based on the color of their uniforms.

Key words: ***COVID-19, preferred shape, poor adult supervision , Fabric- Face Mask, covid 19 protocols***

Introduction

Children have clothing needs, which are influenced by their peculiar characteristics. Children clothing needs include everything that children need to be suitably and comfortably always dressed, be it in school, home, playground or in bed. Dedic (2007) explains that there are some important considerations that should be put in place while planning additional wardrobe for children, these include comfortability, easily worn or taken off at every point in time and must be soft (Lee, 2017). When planning additional wardrobe for children, comfortability should be considered and must be a prerequisite because some clothing can cause children to be uncomfortably warm or cold. Comfortable clothing for children will allow for absorption and ventilation so that the body moisture can evaporate easily (Lori, 2020). Therefore, cotton and cotton blend fabrics are absorbent and comfortable for children whereas synthetic fabrics are nonabsorbent and uncomfortable.

The Corona Virus (COVID 19) is an infectious disease that cancause respiratory illnesses in humans and affect people's nose, sinuses, or upper throat. COVID-19 spreads through respiratory droplets that people produce when they talk, sing, cough or sneeze. The virus has not been previously identified in humans and was first discovered in Wuhan, China and People can have the virus without ever showing symptoms and can be contagious and not even realize it (Uchida, Kaneko, Hidaka, Yamamoto, Honda, and Takeuchi, 2017).

UNICEF (2020) observed that Children face therisk of being among the biggest victims. All children, at all ages, and in all countries, are being affected, by the socio-economic impacts and, in some cases, by mitigation measures that may inadvertently do more harm than good. This is a universal crisis and for some children, the impact will be lifelong. To reduce the impact of Covid 19, the use of face mask with fabric will be necessary.UN (2020) explains that COVID-19 pandemic presents the greatest test the world has faced since the Second World War. Adjustments must be made on the wardrobe needs of children by planning and adding new clothing items during and after the period of COVID-19 pandemic. Some of the additional wardrobe includes Face mask with fabrics, face shield and hand gloves. (Li, Xu, and Dozier, 2020). Face mask with fabric is one of the most important accessories for children at post COVID-19 era. Face mask with fabric is washable and reusable and usually made of cotton. Face mask with fabric comes with its challenges because of the hygiene practices required for its use, (UNICEF 2020).

According to Klass and Shu, (2020),the best mask is the one that fits, and children will be able to wear for most of the day; to put on and remove correctly, and that the child is comfortable using it. Additionally, for a child's face mask to be comfortable and effective, it needs to fit properly, be made from multiple layers fabric of a breathable fabric, and come in styles and colors appealing to children (Tomlin 2020). For a fabric mask to fit properly on children,Klass and Shu (2020) explain that the fabric mask should cover the nose and mouth and be secured below the chin, should fit snugly against the sides of the face, and allow the child to breathe easily.

Prateek and Raina(2020) reveal that Face masks with fabric for children come in three styles: pleated, cone, and flat. Pleated masks expand to cover the nose and chin, whereas cone-shaped masks are shaped to arch up over the nose, and many extend below the chin. Flat masks are simple rectangles of fabric and are less likely to conform to the face. Both pleated and cone-shaped masks are good for children. Both styles should fall just below the eyes and go up higher on the nose. (Prateek and Raina 2020)

The European Centre for Disease Prevention and Control (2020) observed during seasonal influenza outbreaks in Japan, the use of masks was more effective in higher school grades (9-12-year-old children in grades 4-6) than lower grades (6-9-year-old children, in grades 1-3) due to the discomfort of hanging the face mask and children unstableness. Children between 3 and 11 years old were significantly less protected by mask compared to adults, possibly related to inferior fit of the mask, children high activity rate and lack of coordination. Szalinski, (2020) Further showed evidence of some protective effect for influenza for both source control and protection in children, although overall compliance with consistent mask wearing, especially among children under the age of 13, was poor because of children poor management, (Prateek and Raina, 2020).

Face mask with fabric is very important as an additional wardrobe for children because it forms part of the comprehensive package that can prevent and control the transmission of certain viral respiratory diseases,face mask with fabric will prevent the spray of sneeze particles from entering another person's nose or mouth. It can also help stop kids from biting their nails, picking their nose, sucking their fingers, and other habits that might cause inadvertently spread of the disease.Therefore, this study designed and constructed face mask using fabrics to curb the spread of Covid 19 among public primary school children.

Objectives of the study

The objectives of the study are as follows.

1. Identify the preferred styles, fabrics, and color types of Face Mask for Children in Public Primary Schools at post Covid 19 Era
2. Identify factors militating against the use of face masks by public Primary School pupils in Lafia.
3. Examine hygiene practices of Public Primary School pupils in Lafia.

Methodology

Research design

The research design adopted for this study was Research and Development (R&D) and descriptive survey. Research and Development is an industry-based development instrument in which the findings of research are used to design new products and procedures, which then are systematically tested in field, evaluated, and refined until they meet specified criteria for effectiveness, quality, or similar standards (Gall, Gall, and Borg 2007). This research was conducted in two phases: Phase one entailed construction of different styles and sizes of face masks using standard measurements of pupils from selected primary schools in Lafia Metropolis. Different colors of cotton fabrics were used for producing the facemasks. Three sizes: small, medium and large were produced using three approved cotton fabrics by Nasarawa State Committee on COVID 19 (NSCC). In phase two, survey was used to address research questions 2 and 3. This involved distribution of selected constructed Face Masks for assessment by pupils and Teacher.

The steps adopted in carrying out the study in phase are represented in flow chart fig 1.

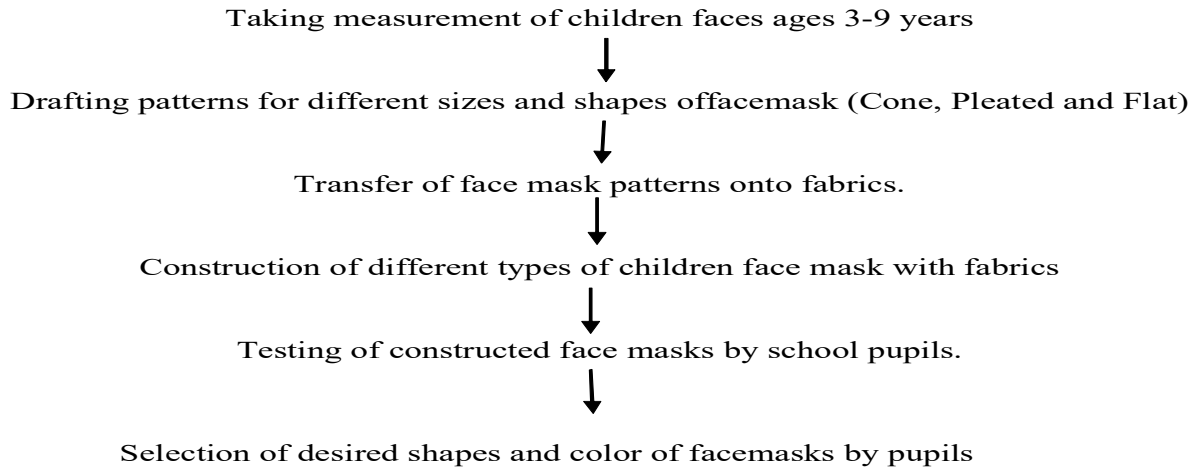


Figure 1: Flowchart for production of styles of facemasks using different fabric Colors.

Area of the Study

The research was conducted in Lafia metropolis the capital of Nasarawa State.Lafia majors as one of the three senatorial zones as well as Local government headquarter in Nasarawa state. Others senatorial zones in Nasarawa state are Akwanga and Keffi. Lafia is one of the oldest towns in Nasarawa state. Lafia metropolis comprise of three zones: Lafia central, Eastand North. Due to its dual position as both State capital and senatorial headquarter, there are several government owned primary schools otherwise called public schools. public primary schools distributed in the different zones to carter for the increasing population.

Population for the Study

The population for the studyis a target population of four thousand, four hundred and fifty-eight (4458) respondents, made up of 4350 pupils and 108 teachers. This comprises all the teachers in public primary schoolsin Lafia metropolis, source:Local Government Education Authority (LGEA).The population of the study was drawn from public schools as follows:

Lafia Central-

i) LGEA Practicing Ombi1,
ii) Ta'al Model School, Jos Road,
iii) St Primary School Anwan alago,
iv) St James Primary school, Timber Shade,

Lafia North:
i) LGEA Primary School SabonPegi,
ii) LGEA Primary School, Shabu,

Lafia East:
i) LGEA Primary School Gayam ward,
ii) LGEAprimaryschool,Tudun Kwandara,
iii) LGEA special Primary School, Dunama,
iv) iv) LGEA Primary School, Lafia East

Sample and Sampling Techniques
The sample size for this study is three hundred and twenty-five (325) persons made up oftwo hundred and eighteen (218)pupils and 85 teachers.Nwana (2015) explained that when a population is in thousands 5% or less of the population could be used as sample. A table of sample size selection from given population by Emaikwu 2019 was used to selecttheeighty (85) Teachersfrom population of 108 teachers in the selected Government Primary Schools in Lafia.

Method of Data Collection
Two types of instruments were used for Data collection: Fabric measuring tape for taking measurements for construction of Face Masksand a questionnaire titled:Design and construction of face masks for pupils (DACFMPL). Prototype Fabric- Face Maskwas constructed by the researchers using the average face measurement of government primary school pupils with breathable cotton fabric. The questionnaire comprises of 4 rating scale of preference with; 4 -Strongly Agreed (SA), 3- Agreed (A), 2- Disagreed (D) and 1-Strongly Disagreed (SD). This was administered to the respondents with the help of two research assistants. The respondents were given two days with in which to study and respond to questionnaire. The questionnaire were administered by hand to teachers in their classrooms while 217 pieces of Fabric Face mask were constructed and tested by pupils from the 10-Government primary schools. In each school, different sizes, small medium and large each were tested on eight pupils making up 24 for each school. This exercise was monitored by the classroom teachers and the researchers. Both students and teachers were given copies of the questionnaire to fill.

Data Analysis Techniques
Method of data analysis adopted the mean and percentage. A criterion Mean($\bar{X}$) of 2.50 was used for the study such that a mean score of 2.50 and above signifies acceptance while a mean score below 2.50 signifies rejection. Values in percentages lower than 50% are termed too low and unacceptable

S\N	Items	$\bar{X}$	Remarks
1.	Lack of Maintenance	3.50	Agreed
2.	Unfit	3.30	Agreed
3.	Discomfort	3.10	Agreed
4.	Durability	2.20	Disagreed
5.	Unavailability	3.30	Agreed
6.	Lack Accessibility	3.50	Agreed
7.	Acceptability	1.70	Disagreed
8.	Breathing difficulty	3.20	Agreed
9.	Poor adult supervision	3.70	Agreed
10.	Lack of Compliance	3.30	Agreed
11.	Ignorance on impact of Covid 19	3.10	Agreed
12.	Unstableness in class	3.50	Agreed
13.	Cultural belief	3.70	Agreed
14.	High rate of activity in class	3.70	Agreed
15.	Low teacher: pupil ratio in class	3.20	Agreed

Table 2 shows that 45% respondents preferred cone shape Fabric Mask while 60% respondents preferred cotton for the construction of Fabric -Face Mask for Primary School Pupils. Sky blue had the highest score(30%) in color selection while red and royal blue were the least preferred each with a score of (5%) respectively. There researchers observed that sky blue the is a major color in school uniforms among pupils in Lafia. All schools selected color type based on their school uniforms.

Table 2: **Percentage Responses of pupils on Preferred Styles, Fabrics and Color of Fabric Face Mask**

S\N	Items	Frequency(N=218)	Percentage
A. STYLES			
1	Cone	9845%	
2	Flat	3315%	
3	Pleated	8740%	
B. FABRIC TYPE			
1	Cotton	13060%	
1	Silk	6530%	
2	Wool	2210%	
C. COLOUR TYPE			
1	Army green	2210%	
2	Lemon green	2210%	
3	Royal Blue	11 5%	
4	Turquoise blue	22	10%
5	Sky blue	65	30%
6	Light brown	2210%	
7	Coffee brown	22	10%
8	Red check	115%	
9.	Purple	22	10%

Fig 1: Constructed Flat Face Mask with Fabric for Public Primary School



Fig 2: Constructed Pleated Face Mask with Fabric for Public Primary Schools

Table 3 shows that Hygiene Practices most under undertaken by pupils in Public Primary Schools Lafia is cutting hair regularly, $\bar{X}$= 3.50.The least practiced hygiene among pupils in Lafia are Wash hands regularly (= 1.50) and wash genitals after toileting (= 1.20).

Table 3: Response of Pupilson Hygienepractices in Lafia.M= 218

S/N	primary school pupils' hygiene practices	Mean ($\bar{X}$)	Remark
1.	Taking bath regularly (at least twice a day)	3.00	Agreed
2.	Clean the classroom/ environ regularly	2.80	Agreed
3.	Trim nails regularly	3.20	Agreed
4.	Cut hair regularly	3.50	Agreed
5.	Wash / clean hands regularly	1.50	Disagreed
6.	Wash hands before eating	2.80	Agreed
7.	Bath mandatorilyafter school	3.00	Agreed
8.	Wear clean fresh clothes after school	2.00	Disagreed
9.	Wash genitals after toileting	1.20	Disagreed
10.	Wash mouth and brush teeth at least once a day	2.50	Agreed
11.	Sneeze / cough/ yawn into elbow	2.40	Disagreed

Discussion of finding

The result from this finding reveals factors militate against the use of Nose Mask by public Primary School. The findings buttress claims by Van der Sande, TeunisandSabel,(2008) that the use of face masks was more effective in higher school grades (9-12-years-oldthan children than lower masks grades (6-9-year-old children, in grades 1-3) due to the discomfort of wearing it and children unstableness.Canini, Andreolettiand Ferrari (2010) suggested that children between 3 and 11 years old were significantly less protected by fabric mask wearing, this is possibly related to inferior fit of the fabric mask, children high activity rate, lack of coordination and poor management mentality, thereall pose challenges for children to wear Fabric Face Masks.

The result in table 2 shows that the preferred style, fabric, and color of Face Mask with by the pupils in Public Primary Schoolswere cone (90%) and pleated (40%), cotton (45%), sky blue respectively. This finding agrees with the study of Onur andSaif, (2020) who reported thatcone-shaped masks are shaped to arch up over the nose, and may extend below the chin, pleated masks expand to cover the nose and chin, giving more space for breathing. Flat masks are simple rectangles of fabric and are less likely to conform to the face. A study carried out by Onur and Saif, (2020) shows similarity with this study because the use of cone-style face masks achieved a better seal on children when they put it on their faces than the pleated or flat face masks.Comfort is fundamental to any clothing usage.

Result in table 2 on the preferred fabric shows that cotton was most preferred (60%). The finding of the studysupports the report of UNICEF/ WHO (2020) that fabric weave should be paramount in selecting fabrics for use as face masks. How well various fabrics face mask stop particles with high-velocity spray during coughing or sneezing infected is very important to both the wearer and those around.The more densely woven the fabric is, the better it can block particles. The weave of the fabric should allow good breathability of a Face Mask.Facemask with two layers of fabric offers a great balance of protection and breathability (Aydin, Emon, Cheng, Hong, and Saif, 2020).

Preferred colorof face masks by pupils was sky blue (30%). There were wide variations among pupils on color selection, however, the choice of sky blue is likely be orchestrated by the predominant color of their school uniforms which is sky blue. Another factor responsible for the variation in selection of color is that pupils selected colors that corresponded to the color of their school uniforms. The finding of this research has relevance to earlier report by Pancare (2018) that cool colorslike blue and green tend to have calming effects, hence the choice of light blue is ideal for the learning environment.

Result in Table 3 shows that some basic hygiene practiceslike regularly hand washing ($\bar{X}$=1.50) and washing genitals after toileting($\bar{X} = 1.20$)of Public Primary School pupils was still low or poorly practiced. This finding is short of COVID- 19 Hygiene rule that stipulates that individual should clean hands frequently with alcohol- based hand rub or soap and water (https:// www.who.int>diseases>adv...) Several studies carried out in various places indicated similar findings concerning hand washing. A study carried out by Ohaka, Oluwaleyimu, and Okeke (2020) explains that only 68(34%) pupils always wash their hands, 87(43.5%) sometimes and only 45(22.5%) of the pupils wash their hands after sneezing. In another study by Talukdar and Baruah (2015) among primary school children showed that, 68(34%) always, 87(43.5%) and sometimes and 45(22.5%) of the children washed their hands after using and toileting before and after eating. There is an indication of poor hygiene practices amongpupils in public schools in Lafia. The implication of the findings of this research in collaboration with reports by some researchers is that there is need to exert more pressure on COVID -19 stake holders to emphasize more on hand washing by pupils especially in public primary schools.

Conclusion

The study investigates the designing and construction of Face Mask with Fabric for children in Public Primary Schools in Lafia during post COVID-19 Era, in Lafia.Pupils in lafia schools are favorably disposed to use of fabric face mask and pleated styles. Based on the color selection method especially it will be good to produce colors of fabrics face masks that correspond to the color of their school uniforms. The paper concludes that due to the many factors militating against usage of fabric face mask, pupils will need close supervision by teachers for effective management and usage of fabric face masks.

1. There is need to exert more pressure on COVID -19 stake holders to emphasize more on hand washing by pupils especially in public primary schools in lafia.
2. Teachers should properly supervise pupils on the proper use and maintenance of face masks to avoid health challenges from resulting.
3. Indigenous dress makers should be supported by government to identify best fabrics and mass produce face masks that are readily available to school going children at affordable cost.

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