Developing prototypes of COVID-19 fullness facemask and testing its acceptance among youth in Benue State, Nigeria

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Abstract

Background: In textile, fullness describes the shaping of a garment to aid fitting as well as enhance ease of use without compromising comfort. Within the context of this study, facemasks for preventing COVID-19 are expected to be easy to use while at the same time, ensuring that those who wear them feel comfortable. Despite this, limited studies exist on pattern drafting of facemasks with fullness as well as testing their acceptance.

Objectives: This study sought to: identify prototypes of fullness that can be utilized to make facemask; develop patterns and sew facemask with fullness; and determine the extent to which the developed facemask is accepted and used.

Methodology: Research and development (R&D) design was adopted for the study while two instruments were utilized for data collection. Quantitative method of data analysis was used to analyze the data collected while results were presented in tables.

Results: The result of the study showed that the prototypes of fullness which can be applied in making facemask include: dart, tucks, gathers, pleats, and circular. Additionally, the researchers developed 350 prototypes from each of the fullness facemasks and these were shared to youths with the hedonic scale tests to check their level of acceptance and use of the facemasks. The result shows that the level of acceptance was as follows: facemask with circular fullness (M=3.6; SD=.98), tucks (M=3.5; SD=.56), gathers (M=3.5; SD=.67), pleats (M=3.4; SD=.64), and dart (M=3.3; SD=.54) respectively.

Unique contribution: This work has bridged the gap between disposable facemask and facemask sewn with fullness. This is because the facemask sewn with fullness gives room for: reuse, fitting, ease of use, and gives comfort to the wearer.

Conclusion: Facemasks that meet the needs of youth is likely to be accepted than those that do not meet their design, comfort, and ease of use needs.

Key recommendation: As part of efforts to contain the spread of COVID-19, facemasks should be designed in a manner that will meet the design needs of the target users without compromising their comfort.

Keywords: Pattern drafting; sewing; facemask; fullness; youth; Coronavirus

Introduction

Coronavirus disease (COVID-19) is a serious public health emergency that is currently ravaging the world. It has brought the world to its knee and reminded scientists that they still have a long way to go concerning prevention and control of outbreaks. COVID-19 is one of the most challenging outbreaks in recent history with a global impact on almost all facets of human existence. COVID-19 is caused by SARS-COV2 and represents the causative agent of a potentially fatal disease that is of great global public health concern (Hussin & Siddappa, 2020). A virus is a tiny infectious agent that reproduces inside the cells of a living host; it damages human cells, making the body weak and prone to attack by other diseases. COVID-19 patients experience symptoms like dry cough, fever, headache, weakness of the body, and difficulty in

breathing which if not handled in time, can lead to death (Laren *et al.*, 2020). Since the virus was first reported in China and when it eventually spread to other parts of the world, it has claimed many lives and the number of confirmed cases is on the increase. The World Health Organization (W. H. O.) (2020) says that as at July 28, 2020, a total of 16,341,920 cases have been confirmed globally with 650,805 deaths recorded. Within the same time, Nigeria had a total of 41,180 cases with 860 casualties. The figures keep increasing and one does not really know when it will be over. WHO has declared COVID-19 as a pandemic because of its wide spread across the globe and the sustained risk of further global spread (Enitan *et al.*, 2020).

As a result of COVID-19, movements have been restricted and the global economy has been brought to a standstill. COVID-19 has also leveled humanity. The virus does not recognize religion, political office, economic status, or any other democratic feature. Instead, it affects human beings on an equal level. Gever and Ezeah (2020) note that COVID-19 is a sad reminder that no nation is immune to public health emergency, and one thing that makes the virus most dangerous is the lack of neither a definite cure nor a vaccine for its prevention. Researchers (Sun *et al.*, 2020; Wu *et al.*, *2020*) affirm that no vaccine has currently been approved for COVID-19 and neither is there a defined cure for the virus; rather, what is been used is primarily symptomatic treatments. This means therefore, that prevention is the surest way to contain the virus and reduce its impact on the society.

As part of efforts to contain the virus, the World Health Organization {WHO} (2020) has recommended some preventive behaviour which the general public should adopt. Examples of this behaviour include: regular washing of hand with soap and running water; use of alcohol-based hand sanitizer; observing social distance of at least two meters from person to person; and use of facemask to cover both the nose and the mouth. Among the health behaviour recommended, the wearing of facemask has generated argument and counter arguments among the general public.

A facemask is a personal protective equipment that is worn by a person to provide shield for the nose and mouth, thus, preventing them from inhaling/taking-in droplets that may contain COVID-19. A facemask can be disposable or reusable. Disposable facemasks are used just once, after which they are disposed of. On the other hand, reusable facemasks can be used many times and washed when they are dirty. Both the disposable and reusable facemasks serve the same purpose and there is no evidence in literature suggesting the contrary. In less developed countries like Nigeria, the reusable facemask has been most preferred because people cannot afford to be buying disposable facemasks on a daily basis. The main challenge therefore is to produce reusable facemasks that are easy to use as well as assures comfort. This can be achieved through sewing using pattern drafting.

Pattern drafting is a term used to describe an engineering approach to producing templates, utilizing a set of measurements obtained from a figure while following a set of guiding instructions (Igbo & Iloeje, 2012). It is after pattern drafting is done that the actual sewing is carried out. Sewing is the stitching together of pieces into whole while fullness is done to shape a garment, aid its fitting, ease of use, and comfort (Anyakoha, 2013). Fullness therefore, is a design or curve that allows for good shape, proper fit, and gives room for comfort to the user while also making a garment to look attractive. In fullness, a person tries to achieve three things; these are: (i) comfort, (ii) ease of use, and (iii) attractiveness. There are various types of fullness; these are: darts, tucks, pleats, gathers, and circular. Fullness can be applied in making facemask to give some pleasant look and comfort to the wearer. People, especially youth have preference for things that are attractive, ease to use, as well as make them comfortable. This view is

supported by the position of Gever (2015) who submits that youth find it interesting to use things that are fitting and comfortable. In this study, the aim was to design facemasks with fullness and test if youth in North Central Nigeria will find them useful.

We focused on youth because they are the backbone of any nation. Youth have the energy and are very difficult set of people to manage. Gever (2015) opines that youth are very delicate to manage. Gever adds that youth in every nation are the most important asset and that investigating the facemask that will be most acceptable by them is an important area of research because it will provide practical evidence on how to combat the virus through preventive health behaviour. Additionally, it is observed that many youth prefer going out without covering their face with mask. The reason could be that some facemask are disposable and they cannot afford it based on the number of their outing or the sewing type of the facemask may not match with their interest in terms of fitting, ease of use, and comfort and so, they prefer to go without it.

Study purpose and significance

This study was carried out to examine pattern drafting and sewing of facemask with fullness for youth as preventive measures to curtail the wide spread of COVID-19 in North Central Nigeria. Specifically, the study tends to: (i) identify the type of fullness that is good for making facemask; (ii) pattern draft and sew five different prototypes of facemask with the fullness identified; and (iii) determine the extent to which youth accept the facemask sewn with fullness.

The findings of this study will help to improve on the use of facemask by youth in places of gathering since the facemask designed with fullness will meet their interest of dressing. This facemask is also washable; it will therefore, make buying of facemask affordable since it will not be disposed after usage. The tailors who normally cut fabric and sew can use these patterns to produce it in mass since a pattern can be laid on several fabrics to cut out many pieces at once. The above benefits can be attained if the finding(s) of this study is published in reputable journals, presented in conferences, or stocked in libraries where it can be made accessible to youth.

Theoretical direction and study hypotheses

To articulate this study, the researchers made use of sex role theory. The sex role theory is a social psychological theory that explains sex disparities and similarities in social behaviour. Alice Eagly suggested the theory in 1987 to explain how people differ in their behaviour based on sex. Eagly devoted a significant part of her career assessing the differences between men and women. The theory argues that gender discrepancy and the inherent physical differences between men and women result to a division of labour in the society. According to the theory, men are normally physically larger and stronger than women. On the other hand, women are usually smaller in size and lack the physical strength which their men counterparts have. The theorists regard these differences as playing a role on the behaviour of both genders (Eagly, 1987).

The fundamental assumption of the theory is that discrepancies and similarities arise primarily from the distribution of men and women into social roles within their society. As a result of socialization and the formation of gender roles, the manner in which men and women behave is in line with their gender roles which society assigns to them (Eagly, 1987). The assumption is that gender roles reveal a society's distributions of men and women into homemaker and breadwinner responsibilities and occupation. Eagly *et al.*, (2000) argue that expectations regarding men and women typically suggest status and power differences. The argument here is that gender roles define the way people behave, their views, and opinions about

issues. Therefore, the way male and female youth evaluate and use facemask may also not be the same. They may differ based on gender. Based on this theory, the researchers hypothesized:

H1: There is a significant difference in the responses between the male and female youth on their acceptance and use of facemask sewn with fullness.

Methodology

This study adopted Research and Development (R&D) design. Research and development design is a process used to develop and validate educational products (Gall *et al*., 2007). It has ten steps usually referred to as the "R&D cycle" which consists of studying research findings pertinent to the product to be developed. This design was considered appropriate for the study because it allowed the researchers to: (i) identify fullness design; (ii) select five from the ones identified; (iii) draft and sew 5 selected prototypes of facemask with fullness; and finally, (iv) to evaluate the extent of acceptability by youth. This study was carried out in Benue State, North Central Nigeria. The population of the study was made up 2,084,616 youth in Benue State (National Bureau of Statistics, 2012). The study examined youth of ages 15 to 35 years within the study area. The second phase of the population was made up of home economics lecturers of tertiary institutions in Benue State. Their population is 89. The tertiary institutions in Benue State are: University of Agriculture, Makurdi; Benue State University, Makurdi; Colleges of Education, Oju and Kastina-Ala; Benue State Polytechnic, Okpokolo (Personnel Offices of the Institution, 2018, cited in Kparazua, 2020). The sample size for the study was 385 youth and 89 lecturers of home economics in Benue State. All the home economics lecturers were sampled because they were not many, and this was conducted through the Head of Departments of their schools. The sample for the youth was selected using the Cochran formula. The researchers sampled the respondents through simple social media announcements that were posted on Facebook. Interested persons were requested to contact the researchers for participation. The Facebook announcement explained to the respondents, the advantages of taking part in the study as well as the disadvantages.

Two instruments were used to collect data for the study; these are: a questionnaire and a five points Hedonic scale. The questionnaire was titled 'identification and selection of fullness for making facemask (ISFF).' The questionnaire ilicited information regarding the identification and selection of fullness needed for making facemask. This was responded to by lecturers of clothing and textile in the area of study. Also, the five points Hedonic test scale was used to evaluate the extent to which youth accepted the use of facemask with fullness.The questionnaire had the acceptable benchmark of 2.5 and above and the Hedonic test had the acceptable benchmark of 3.0.

ISFF and 5 points Hedonic Evaluation scale test were subjected to validation by three experts; two lecturers from Home Economics and Hospitality Management Department, University of Nigeria Nssuka, and one lecturer from Vocational and Technology Education, Benue State University, Makurdi. Validates were given a copy of the instrument each for validation. The experts were asked to add or remove any items of the instrument that they did not consider useful to the study. Based on their corrections and suggestions, amendments were made on the instrument before a final version was produced.

The internal consistency of the instrument was established using Cronbach's alpha (α) method. The instrument was administered to 20 randomly selected youth who were not part of the study population. The administered instruments were retrieved and subjected to statistical analysis. The reliability coefficient values of 0.85 and 0.75 were obtained for the instruments.

The researchers made use of mean and standard deviation to analyze the results of the study. The hypothesis was tested at 0.05 level of significance with the use of *t*-test while results were presented in tables.

Results

All the 385 copies of the questionnaire which were administered to the respondents were filled and returned. The sample was 192 males and 193 females. All the respondents were youth because that was the target population of the study. The results of the study were presented in accordance with the study objectives as shown below:

Objective one: The fullness that is good for making facemask.

Table 1: Fullness identification and selection

S/NO	Fullness	$\overline{X}$	SD	Remark
1	Dart	3.0	.67	A
2	Gather	2.5	.45	A
3	Tuck	2.8	.34	A
4	Pleat	3.0	.78	A
5	Circular	3.0	.63	A
6	Oval	2.0	.56	N

Key: $\overline{X}$= Mean, SD = Standard Deviation, A = Agreed and N =Not agreed

Table one result shows that experts in clothing and textiles all agreed that the above fullness can be used in making facemask except item 6, with the average of 2.0 which is below the acceptable limit of 2.5.

Objective two: The procedure for drafting pattern and sewing facemask with fullness.

Table 2: Drafting and sewing facemask with different fullness designs

S/N	Line	Drafting/Sewing	fullness	Methods
1	A – B A – C CDB	Draft	Dart	-Length of the mask from ear to ear
		Sew		-Measurement from nose to below the mouth
				-Complete the rectangle
				-Fold the rectangle into ½
				-Fold the ½ into 2 again
				-Snap to remove a gozet of 1 inch from both ends of the folded lines.
				-Lay and cut on the fabric.
				- Unfold it and 3 lines will appear on the paper
				-Stitch the snap areas and attach elastic band on

				both ends
2	A – B A – C CDB	Draft Sewing	Gather	-Length of facemask from ear to ear side. -Measurement from nose to below mouth x2 -Complete the square -Fold the square into ½ -Obtain the center and mark edges -From the marked point, measure ¼ of the real measurement of nose to mouth, mark it and add seam allowance -Lay the pattern on fabric and cut out the piece -Stitch from the marked points to the edges and draw to gather and curve the middle -Attach elastic band on both ends
3	A – B A – C CDB	Draft Sewing	Tuck	-Length of facemask from ear to ear side. -Measurement from nose to below mouth x2 -Complete the square -Fold the square into ½ to obtain the middle -Unfold the square and an impression line will appear, mark the middle at both edges -From the marked point, measure up and down, ¼ of the real measurement and add seam allowance. -Lay the pattern on the fabric and cut -Fold in a tuck of ¼ on the two ends to curve the middle, stitch and hem all rough edges. -Attach elastic band.
4	A – B A – C CDB	Draft Sewing	Pleat	-Length of facemask from ear to ear side. -Measurement from nose to below mouth x2 -Complete the square -Fold the square into ½ to obtain the middle -Mark 1 inch on the right and wrong edge of the square x3, add seam allowance and cut.

				- Lay the pattern on fabric and cut out. -Trace the marked areas on the paper to the fabric - Hold the edges with 1 inch pleat with pins -Stitch on the held areas to give a curve in the middle and attach elastic band.
5	A – B A – C CDB	Draft Sewing	Circular	-Length of facemask from ear to ear side. -Measurement from nose to below mouth x2 -Complete the rectangle -Fold the rectangle into ½ -Unfold the rectangle; an impression line will appear and cut through the line to divide into 2 pieces. Fold the two separate pieces into 4 and slash from the cut line towards the edge, but not through. -Spread with 1 inch interval on a separate paper, and add seam allowance. -Cut out and stitch back the middle to obtain a curve. Attach elastic band.

The table above shows the step-by-step approach for drafting pattern and sewing facemask with fullness.

Objective three: To what extent did the youth accept the use of facemask sewn with fullness?
Table 3: The *t*-test, mean, and standard deviation analysis for comparing data obtained from youth in Benue State on the extent to which they accepted the use of facemask sewn with fullness.

Table 3: Acceptance level of the developed prototype of facemask sewn with fullness

S/NO	Prototype of facemask sewn with fullness	$\overline{X}$	SD	Remarks
1	Facemask with Dart fullness design	3.3	.54	Accepted
2	Facemask with Gathers fullness design	3.4	.67	Accepted
3	Facemask with Tuck fullness design	3.5	.56	Accepted
4	Facemask with Pleat fullness design	3.4	.64	Accepted
5	Facemask with Circular fullness design	3.6	.98	Accepted

Key: $\overline{X}$= mean, SD =Standard Deviation

Table three result shows that the youth accepted the use of all the prototype of facemask sewn with fullness design. Since all the mean ranges from 3.3to3.6, all were above the acceptable limit of 3.0.The simple implication here is that the developed facemasks in this study received acceptance among the target population.

Test of Hypothesis

H1: There is a significant difference in response between the male and female youth on their acceptance and use of facemask sewn with fullness.

The above hypothesis was formulated to determine if the acceptance of the prototype facemasks differed according to gender. The result is presented in the table below:

Table 4: *t*-test analysis of differences in mean response for male and female youth on their acceptance and use of facemask sewn with fullness.

Grouping	N	Mean	Std	t	Df	Sig.(2 tailed)	Decision
Male	193	3.2	.46				
Female	192	3.1	.48	9.663	65	0.61	NS

Key: N = number of students, Std = standard deviation, t = t – cal, df = degree of freedom, sig = p value, D = decision, NS = not significant.

The essence of the result presented in table four above was to determine if male and female youth differed in their acceptance of the developed fullness prototype facemasks. The result of the study showed no significant difference ($p > .05$) in the mean scores of both male and female youth who took part in the study. Therefore, the hypothesis was not supported and we concluded that gender did not influence the acceptance of the developed facemasks among the youth examined.

Findings and discussion

The result in table one shows the response of the clothing and textile lecturers from the study area on the selection of prototypes of fullness that can be adapted into making facemask(s) and these were selected: Darts, Tucks, Pleats, Gathers, and Circular. This result is in agreement with Anyankoha (2013) who identified fullness design in sewing a garment and this is applicable to facemask. The result is also in congruence with Igbo and Illeoje (2012) who drafted garments with fullness to ensure fitting, ease of use, and to give comfort to the wearer. This implies that facemasks sewn with fullness will ensure fitting to the wearer; in this context, the youth.

Table two shows the developmental step-by-step stages of making prototypes of facemask with fullness, drafted and sewn following the basic block method. The basic block method was used in the light of the drafting terms of Igbo and Illoeji (2012) who stated that the basic block in pattern drafting is useful in garment making. The selected fullness were each drafted, laid, cut, and were sewn into 350 prototypes facemasks by the researcher with the help of two research assistants .

Table three results show the mean and standard deviation of the acceptance of the facemask sewn with fullness by male and female youth within the study area. The result revealed that all the youth accepted the use of prototypes of facemask which includes: circular (with the mean of 3.6), followed by tucks, pleats, gathers, and darts with mean of 3.5, 3.4, 3.4, and 3.3 respectively. Since all this mean values were above the cut off value of 3.0, it is a clear indication of their acceptance. The analysis from the hypothesis showed that the respondents did

not significantly differ based on gender. The results of this study did not support the theoretical postulation of Eagly (1987) who argues that gender roles influence people's behaviour.

Conclusion/recommendations

The conclusion of this study is that youth in Benue State accept the developed COVID-19 facemasks with fullness design. This is because such facemasks are easy to use, attractive, and ensures their comfort. The results of this study have implications on literature, theory, and health promotion. Concerning literature, the current study has extended previous studies (Gever & Ezeah, 2020; Sun *et al*., 2020; Wu *et al*., 2020) on COVID-19 by developing and testing a particular facemask type meant for a segment of the society. This information will be beneficial in triggering debates on how to prevent COVID-19. The result also have implications on the theory of sex role by showing that during outbreaks such as COVID-19, people of similar age group may not significantly differ in their response to ways of preventing contracting such an outbreak. This aspect of the result will be useful to future researchers who may wish to apply the theory in their studies. Finally, this study has implications on health by making a case for the need to segment the audience based on age during health campaigns. Also, this information will be useful to health educators when designing and implementing health campaigns. The researchers make three recommendations. First, there is need to segment the general public based on age when designing and implementing health campaigns. In the second place, it is recommended that as part of efforts to contain the spread of COVID-19, facemasks should be designed in a manner that will meet the design needs of the target users without compromising their comfort. Further studies should be conducted to examine people of other age group for better understanding.

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Conflict of interest

Authors declare no conflict of interest

Appendix: Photos of youth using facemask sewn with fullness











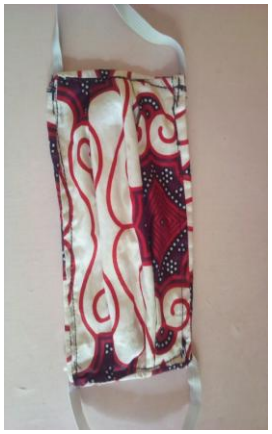






Photos of Facemask Drafted and Sewn with Fullness

Facemask with Tuck fullness



Facemask with Gathers Fullness

Facemask with Pleat fullness

Facemask with Dart fullness