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Acceptability of Locally Produced Nose Mask in a University Community in Ghana

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Abstract

The study looked at the acceptability of cloth nose masks produced during the outbreak of COVID 19 in a public University in Ghana. This study looked into staff consumers' views and experiences with the cloth nose mask produced by the Clothing Production Unit (CPU) of a public university in Ghana. The production quality, durability, comfortability, ease of care and acceptability of the cloth nose was assessed with the intent to use findings to guide future production. The study adopted the descriptive survey design. A self-developed structured questionnaire was used for detail data collection from one hundred (101) respondents who were purposively selected and conveniently reached. The findings generally presented high acceptance level for the cloth nose masks. Specifically, respondents rated sample two (46) and one (44) as the most preferred designs of the cloth nose mask. Also, respondents found the cloth nose masks quality in terms of production

(M=3.84), design (M=3.98), comfort of usage (M=3.77), durability (M=3.97), easiness in caring (M=3.95). The study concludes that the cloth nose masks produced by CPU meet consumer expectations and acceptance. This implies that if production is guided by improved practices the cloth nose masks would serve its intended purpose of controlling the spread of covid-19. Therefore, this survey recommends the adoption of the cloth nose masks to supplement other types recommended for use by World Health Organization (WHO) whilst maintaining and/or improving standards of production.

Keywords: Acceptability, production, cloth nose masks, University of Education, Winneba.

1. Introduction

In December 2019, SARS –CoV-2 generally known as covid-19 broke out in Wuhan Hubei Province, China where the first case was recorded (Kumar, Malviya & Sharma, 2020). On March 11, 2020, it was declared a global pandemic by the director of World Health Organization [WHO] (2020a) and Ghana's Ministry of Health (MoH) confirmed the first two (2) cases of coronavirus on Tuesday, March e13, 2020 (Accra). According to MoH, the individuals had returned from Norway and Turkey (MoH, 2020). Corona viruses are a large group of viruses that are commonly transmitted from animals to humans (Ghana Health Service, 2020). However, viruses can spread from human to human through an infected persons' secretions (cough and sneezing) and by touching infected surfaces. Common symptoms of infection include cold, fever, headache, shortness of breath, cough and pneumonia fatigue, loss of taste, body pains and sore throat (Centre for Disease Control [CDC], 2019). Currently there is no cure for this family of virus. Therefore, preventive measures such as washing of hands, covering mouth and nose when coughing and sneezing, disinfecting surfaces touched etc. have been adopted.

As part of the preventive measures for coronavirus, wearing of nose masks have been introduced and more nose mask designed. The medical nose masks which were non-reusable were the ones commonly used. However, due to inadequate supply and high cost of medical nose mask, the locally made cloth nose mask were improvised and adopted to meet the demands. In view of this, WHO (2020b) and Food and Drugs Authority (2020) proposed standards for the production of cloth nose mask. In Ghana, the Food and Drugs Authority (2020)

specified that fabrics used for the home-made cloth nose masks should be 100% cotton or cotton blend, clean and free from chemicals and where printed fabrics are used, they should have a plain fabric as an inner layer. Due to the above, FDA recommended either calico-vilene (hard/medium)-calico [3layers] as best for reusable nose mask, calico-calico-calico (3 layers) combination ideal for reusable covid-19 or calico-paper fibre-calico (3layers) suitable for only single use.

Earlier, Davies et al. (2013) examined the efficacy of homemade face masks and found it as an alternative for commercially made face masks. Aydin et al. (2020) however, found respiratory droplets of the coronavirus reduced by 94% with the use of cloth face masks.

On design and comfort of using the homemade nose masks, FDA (2020) also enumerated the following specifications: fit highly but comfortably against the side of the face; cover both mouth and nose and secured on the ear without gap; breathable but multiple layers of fabric should be used; should be easily laundered without damage or deformation

This supports what the United State of America Centers for Disease Control and Prevention (2020) recommended that the fabrics used for homemade masks must be tightly woven, breathable and washable. Specifications for dimension of the homemade nose mask were; Length = 25.40cm; Width =15.24cm and Thickness= 3 layers (not less than 0.759mm). For porosity, the NLT should be 1000Pascal while the splash should be alcohol base aerosol.

Clothing Production Industries are very profitable (Quarcoo, 2016) and have existed for years (Rahman & Al Amin, 2016) and their main function is into the manufacturing of textile products and training of people to acquire clothing and textile production skills. The Department of Clothing and Textiles Education under the Faculty of Home Economics Education in the University of Education, Winneba train students in clothing and textiles production and management. A Clothing Production Unit (CPU) was therefore set up to train students and produce to satisfy the clothing needs of the university community. During the outbreak of the novel covid-19, the University management of UEW tasked the CPU to produce homemade nose masks to reduce the spread of coronavirus in the university community.

The CPU consequently produced about fifty thousands of cloth nose mask for the university community. The researchers, who were managers of the

Department's CPU in the university then carried out this study to evaluate the nose mask produced to identify any shortfall for improvement where necessary to enable the production unit remain in business at any point in time as averred by Cooklin (2006) that, customers preference is paramount in clothing production so when consumers, evaluate the cloth nose masks, it will result in a better feedback for improvement. This study therefore assessed consumers' views on the cloth nose mask produced by CPU based on the following: Production, Design, Comfortability, Durability, Ease of Care.

Although, there are some studies on evaluation of nose masks such as Chia et al., 2005; Clapp, et al., 2020; Konda et al., 2020; Osseo-Asare, 2022; Mahesh et al. , 2022; Zhou and colleagues, 2018, there is little research on the evaluation of the acceptability of cloth nose mask. Again, every clothing production industry or unit will like to continue in business and this can mostly happen by getting feedback from the customers to know what to produce and improve production. Meanwhile, Mahesh et al. (2022) proposed possible future advancements and promising research avenues in personal protective equipment in their study. The current study, therefore, evaluates the acceptability of cloth nose masks produced in a clothing production unit in a University in Ghana to improve upon production and also standardize a personal protective equipment in case of any pandemic in future.

2. Review of Literature

The theory underpinning this study is the fashion theory by Sproles (1974) who sees fashion in two dimensions. Fashion as an object and a process. The fashion object, in consumer behavior theory, may be a specific stylistic product, and in some cases a technological/product functional innovation or a consumer service. Fashion process is a mechanism of stages by which a potential fashion object moves from its creation to public presentation and public acceptance. In the fashion process, a potential fashion object is introduced to the members of a social system, it is adopted and is ultimately diffused to other social system members to a certain level of acceptance. The fashion process represents a dynamic mechanism by which the object ultimately emerges as an accepted or rejected fashion. The emergence of an object as an accepted fashion in the mass population is a complex and multi-faceted behavioral process (Sproles, 1974) and in this case there was a pandemic in 2019 that demanded that, nose masks be adopted as a matter of urgency for protection and as a clothing item, it became a fashion that needed to be adopted.

According to Sproles (1974), the process of fashion includes: introduction of object; the purpose of the object; the adopters of the fashion item; the motivations for adoption; the level of acceptance; and the dimensions of change over time. In this study, the Object (nose mask) was introduced that is nose masks of various kinds eg. Fabric/cloth mask. Surgical mask, N95 mask, face masks with valves. The main purpose of the nose mask for that matter the cloth nose mask was to protect the masses from being infected by corona virus. For the nose mask to serve this function, there are specifications on the design to enable the nose mask cover the nose and mouth well and the number of layers of fabric to make up the mask. The Adopters of the nose mask basically as almost everyone who cared to live due to the necessity and urgency of wearing nose mask during the corona virus. This placed a mandate on everyone whether young or old to wear the nose mask to prevent corona virus infection. Everyone adopted the wearing of nose mask at the same time. The main motivations for adopting nose mask during covid 19 pandemic was the quest of human beings to be healthy and live long. The level of acceptance of the nose mask was rapid thus almost everyone readily accepted the wearing of nose mask as a matter of necessity. With regards to the dimensions of change over time on the level of acceptance, this was manifested due the decline in the use of nose mask as a result of relaxed restrictions by several countries due to decline of infection rate. Though almost everyone accepted the wearing of nose mask on the break of the corona virus pandemic, they had variety of nose masks to choose from which includes the cloth nose mask. As a fashion object, the level of acceptance of the varieties of nose mask may differ.

Clothing industries are into the production of items worn on the body for several purposes. The emergence of a severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2) that surfaced in China in late 2019, (Kumar, Malviya & Sharma, 2020) added onto the clothing articles produced in the industries thus the production of cloth nose masks for protecting individuals from being infected. Protection is a major ancient function of clothing that is the protection theory proved by many archaeologists and anthropologists that natural elements like leaves, leather, fur, grass, etc. were draped around the body to cover or protect it from harmful external elements (Times and Trends Academy, 2016). Nose mask wearing thus became the fashion of the period between most part of 2022 and 2023. Fashion according to Horn (1968) is a manifestation of collective behavior, and as such represents the popular, accepted, prevailing style at any given time.

The necessity to protect staff of a university in Ghana made the management of this institution to charge the Clothing Production Unit (CPU) to produce cloth nose mask for the safety of its staff. As the staff use the nose mask, it is important to find out their level of satisfaction. This study therefore ascertained the level of acceptability of a cloth nose mask produced in a CPU of a University in Ghana in terms of production, design, comfortability, durability and ease of care.

Production

Studies and authorities indicate certain characteristics and rules regarding the production of cloth nose masks. Edwards (2020) for instance commented:

> Homemade cloth masks can be assembled from many different materials readily available within the community. Yet, preliminary data show that masks made up of two or more layers of cloth are more effective at keeping particle penetration lower than single-layered masks. (p.3)

MacIntyre and Chughtai (2015) also stated that, homemade cloth masks may be made from the following materials: cotton blends, a thick woven fabric like batik, quilting cotton, thick interwoven tea cloth /towel, and/or gauze. In short, if sunlight can penetrate through the mask, then the fabric is too thin and should not be used. Similarly, WHO (2020b) stated that, homemade cloth nose masks should come down below the chin; be a conical or tetrahedral shape; be secured with ties or ear loops; include multiple layers of fabric. Meanwhile, Food and Drugs Authority (2020) specified that fabrics used for the home-made cloth nose masks should be 100% cotton or cotton blend, clean and free from chemicals and where printed fabrics are used, they should have a plain fabric as an inner layer. Due to the above, FDA recommended either calico-vilene (hard/ medium)-calico [3layers] as best for reusable nose mask, calico-calico-calico (3 layers) combination ideal for reusable covid-19 or calico-paper fibre-calico (3 layers) suitable for only single use.

Design

In considering the design, WHO (2020a) stated that, homemade cloth nose masks must allow for breathing without restriction; It should fit snugly but comfortably against the side of the face and cover the nose and mouth; rest on the bridge of the nose and be moulded onto the face and side of the face. Homemade cloth nose masks should come down below the chin; be a conical or tetrahedral shape; be secured with ties or ear loops; include multiple layers of

fabric. Similarly, Sgtgroup.net (2022) stated that, development (style and design) and workmanship are key to ensure a proper fit of the fabric face mask. It needs to be flat on the skin on all sides, following the face contour and especially the areas around the nose bridge and under the chin. However, Food and Drugs Authority (2020) specified dimension of the homemade nose mask as; Length = 25.40cm; Width =15.24cm and Thickness= 3 layers (not less than 0.759mm).

Comfortability

For comfortability, WHO (2020b) suggested that, homemade cloth nose masks must allow for breathing without restriction; fit snugly but comfortably against the side of the face and cover the nose and mouth o rest on the bridge of the nose and be moulded onto the face and side of the face thus Jeremy (2022) indicated that, the most protective mask you can wear is one that fits well and is comfortable enough to wear consistently. Part of this study therefore evaluates the comfortability characteristics of the cloth nose masks produced in a University in Ghana. Meanwhile Osseo-Asare (2022) suggested in their study that, a study should be conducted to examine the relative fit and filtration of Ghana-made masks.

Durability

According to Sgtgroup.net (2022), a durable cloth nose mask should have headband – made of elastic or cloth tie-straps which should be comfortable and of the right size for the user and should be designed and attached to the fabric so that there is no need for the user to touch the front of the mask. The head band should have a suitable elasticity and elastic recovery, be well fixed to the mask edges, and be able to stand repeated tensions when the user pulls on or takes off the mask.

Ease of Care

In relation to the care of cloth nose masks, homemade cloth nose masks should be able to be laundered, cleaned, or disinfected (CDC, 2020); Homemade cloth masks may be worn up to three hours without an increase in particle penetration (van der Sande, et. al., 2008). Furthermore, WHO (2020b) indicated that, homemade cloth masks must be cleaned daily. If possible, in the laundry with other linen with a water temperature range form 60-90 °C with laundry detergent. If washing machines are not available, washing the mask using hot water in a basin with laundry detergent is also sufficient. If hot water is not available, cold water with 0.05% chlorine should be used. Masks should soak for

30 minutes, and then be rinsed with water and laundry detergent and should be able to be air dried. Meanwhile, WHO (2020b) and CDC (2020) indicated that, the fabrics for cloth nose mask have the characteristics that will allow it to be cared for. In order to be able to care for the cloth nose masks produced by the CPU of a university in Ghana, the staff in charge carefully chose fabrics that will lend itself to adequate care. Part of this study therefore sought to get feedback on the ease of care of the cloth nose masks produced by the CPU from staff consumers who used it.

Related Studies

There are several studies on nose mask such as Verbeek (2020), a recent meta-analysis investigating PPE (personal protection equipment) masks looked at 24 studies with a total of 2.278 participants. Fourteen studies were randomized, one was quasi-randomized and nine had no study design with randomization. Eight studies compared different PPE even though personal protective equipment included more than the mask. Six studies evaluated the quality of the protective equipment. 75% of these studies used a simulated exposure with fluorescent markers tagged on harmless microbes. They concluded that protecting the whole body is not superior to protecting different parts separately. Furthermore, proper donning and doffing protocols were more beneficial in preventing the spread of the disease. Both steps require proper training to be effective; Lipp et al. (2005) investigated the pattern of use and the protective effects of masks on wound infections using a questionnaire in two randomized studies. While the use of MNP was statistically beneficial in a smaller study (n = 200), the same recommendations were not valid when a larger cohort (n = 1250) was studied; Rengasamy (2010) looked at the protective effect of masks for everyday use made from different materials was tested against 20–1.000 nm particles with different velocities and compared to N95 masks. This study found marginal protective effects against exhaled particles. Specifically, depending on the material and dampness, 40–90% of aerosols were able to penetrate through these masks. Li (2008) compared the protective effects of simple MNP with two different N95 masks with different valve systems. In contrast to the commonly available masks, this model had valves placed on the sides and was studied in an experimental setting with artificial droplets. All masks blocked the inside transmission of droplets from the front. The effectiveness of the regular MNP mask was only 95–97% when compared to the N95, which had a protective effect of 99%. Thus, N95 masks offer considerably better protection from influenza and SARS virus infections when compared to other mask types. Smith et al. (2016) analyzed all

the available literature from 1990 to 2014, including 3 randomized controlled studies, one cohort study and 2 case–control studies comparing MNP vs N95 masks. Their meta-analyzis assessed: (a) the laboratory-proven infection rate, (b) influenza-related infections, and (c) work absence secondary to illness in employees. Their results indicated that the overall calculated risk assessment is not considerably improved using more sophisticated N95 masks.

Some scholars have given exposures on evaluation of nose masks. Clapp, et al. (2020) for instance observed that, face covering FFEs, that is the consumer-grade masks and improvised face coverings varied widely, ranging from 26.5% to 79.0% FFE. Modifications intended to enhance the fit of medical procedure masks improved FFE measurements from 38.5% (unmodified mask) to as much as 80.2%. Chia et al. (2005) used a questionnaire to analyze the perception of doctors, nurses and other personnel on the role of PPE (= personal protective equipment) during the SARS-outbreak in Singapore over a period of 2 months in 2003. In summary, 32.5% of doctors, 48.7% of nurses and 77% of the administrative personnel thought that a simple MNP would be sufficient to prevent the SARS-infection. It was evident that even qualified staff did not have sufficient knowledge on the protective properties of face masks during a pandemic. This study highlights the importance of adequate communication, education and exchange of information in a timely fashion. Also, Zhou et al. (2018) examined the role of various features on N95 masks, including valves for a more comfortable breathing, on the rate of infection. The endpoint was the retention of small particles of around 2.5 µm. The results revealed that the protective effect was sufficient against the examined viruses including influenza and rhinovirus and Konda et al. (2020) investigated the use of different materials on the effective filtration capabilities of masks for everyday use. They demonstrated that a combination of different materials such as cotton and silk, can be more effective than one material alone. Moreover, they revealed that densely woven cotton provides significantly more protection than cotton with looser weaves. A proper fit is particularly important to avoid leakage. The authors recommended the use of cotton masks that have a high protective effect and only little restriction when breathing.

Osseo-Asare (2022) also studied how people were able to quickly popularize nose masks in 2020, noting the key role women seamstresses played alongside public leaders, the Ghana Standards Authority, and the police who used punitive punishments and coercive tactics to encourage sustained use as the pandemic continued. The study looked at the history and cultural use of nose masks in

an African country, comparing their use and adoption to other national mask responses, including those in the United States, Japan, and the Czech Republic. It stated that nose coverings in Ghana represented a rapid adoption of a low-cost technology and can be used as a continuation of low-cost solutions to healthcare crises in West Africa. Simultaneously, they can be a point of rupture and significant change since Ghanaians did not wear textile face masks prior to 2020. The study stated that, countries like Ghana, as well as other regional neighbors like Senegal and Nigeria certainly adopted masks and popularized their use in the early days of Covid in an unexpected but fortuitous trend to fight a new disease.

Mahesh et al. (2022) studied into a holistic overview of innovations made in face masks and their corresponding impact on human health and environment. Strategies with SDG3 and SDG12, outlining safe and proper disposal of solid waste, have also been discussed. Furthermore, employing the CFD paradigm, a 3D model of a face mask was created based on fluid flow during breathing techniques.

3. Methodology

A descriptive cross-sectional survey was used for this study and the study was approached quantitatively. The Senior and Junior staff of the University of Education, Winneba constitute the population for this study. The purposive and convenience sampling techniques were adopted to reach one hundred (101) senior and junior staff (respondents) because, the time of data collection, only these category of staff had been given the cloth nose mask. A self-developed five-point Likert scale questionnaire with a range of Excellent (5); Very good (4); Good (3); Faily good (2); Bad (1) was used to gather data from respondents. The content and face validity of the instrument was attained by giving the instruments two experts to go through and assess the quality (free from vague sentences, academic style, grammar, and consistency) of the content of the instruments to ensure they cover the full domain of the study and construct validity was ensured by basing the indicators and measurements in the instrument on existing knowledge from authorities such as WHO, food and drugs board etc. on the production, design, comfortability, durability and care of cloth nose masks. The reliability of the questionnaire was determined using Cronbach's alpha formula valued from 0 to 1 with a reliability coefficient of questionnaire on production (0.874), design (0.749), comfortability (0.844), ease of care (0.852) with a mean of (0.830).

4. Results and Discussion

Data on quality attributes of the production, design and comfortability, durability and ease of care factors of the nose mask were collected with a five-point Likert scale items i.e., Excellent (5); Very good (4); Good (3); Faily good (2); Bad (1)

Table 1

Production Factors

Statements	N	Mean	SD	Min	Max
The nose masks were firmly stitched	101	4.16	.821	1	5
The colours of the threads used for sewing the nose mask match with the fabric	101	4.14	.749	2	5
The size of the nose masks fits my nose and mouth well	101	3.71	1.134	1	5
Elastic and straps were firmly stitched	101	3.76	.750	1	5
The length of elastic and straps were appropriate	101	3.59	.839	1	5
Multiple layers of fabric were used for the production of the nose mask	101	3.91	.826	1	5
The face masks were of the required sizes	101	3.54	.900	1	5
Fabric used were closely woven	101	3.84	.674	2	5
Mean of Means		**3.84**	**.835**		

Source: Authors compilation based on the field survey

Table 1 explored five (5) factors against the staff consumers of nose mask to assess their satisfaction and acceptability of the nose mask. The table showed that under the production factor, 'The nose masks were firmly stitched' and 'the colours of the threads used for sewing the nose mask match with the fabric' recorded the highest average 4.16 and 4.14 respectively.

The overall mean of 3.84 indicates that, staff consumers of the cloth nose mask were generally satisfied with the production factors however, to establish the level of satisfaction of the customers with the various production factors, Kruskal Wallis H test was performed at 0.05 significant level and presented in tables 2 and 3.

Table 2

Ranks Descriptive of Production

Item	Department/ Unit/ Section	N	Mean Rank
The nose masks were firmly stitched	Sanitation	27	54.87
	Security	28	47.75
	Hall Staff	6	54.33
	Others	40	50.16
	Total	101	
The colours of the threads used for sewing the nose mask match with the fabric	Sanitation	27	45.69
	Security	28	55.71
	Hall Staff	6	48.92
	Others	40	51.60
	Total	101	
The size of the nose masks fits my nose and mouth well	Sanitation	27	55.44
	Security	28	44.98
	Hall Staff	6	59.17
	Others	40	50.99
	Total	101	
Elastic and straps were firmly stitched	Sanitation	27	59.43
	Security	28	45.95
	Hall Staff	6	52.00
	Others	40	48.70
	Total	101	
The length of elastic and straps were appropriate	Sanitation	27	62.44
	Security	28	42.96
	Hall Staff	6	65.00
	Others	40	46.80
	Total	101	
Multiple layers of fabric were used for the production of the nose mask	Sanitation	27	51.65
	Security	28	44.96
	Hall Staff	6	46.92
	Others	40	55.40
	Total	101	

The face masks were of the reqired sizes	Sanitation		27	58.07
	Security		28	41.46
	Hall Staff		6	58.17
	Others		40	51.83
	Total		101	
Fabric used were closely woven	Sanitation		27	48.06
	Security		28	51.13
	Hall Staff		6	49.58
	Others		40	53.11
	Total		101	

Table 3

Table 2 Test Statistics[a,b]

	The nose masks were firmly stitched	The colours of the threads used for sewing the nose mask match with the fabric	The size of the nose masks fits my nose and mouth well	Elastic and straps were firmly stitched	The length of elastic and straps were appropriate	Multiple layers of fabric were used for the production of the nose mask	The face masks were of the required sizes	Fabric used were closely woven
Kruskal-Wallis H	1.150	2.125	2.648	4.574	10.724	2.584	5.817	.656
Df	3	3	3	3	3	3	3	3
Asymp. Sig.	.765	.547	.449	.206	.013	.460	.121	.884

a. Kruskal Wallis Test

b. Grouping Variable: Department/ Unit/ Section

The Kruskal-Wallis H test showed that except for the production factor 'The length of elastic and straps were appropriate', there is no statistical significant differences in the production factors between the different staff consumers.

Hence, the factor, 'The length of elastic and straps were appropriate' is statistically significant between the different consumers with chi-square=10.724, p-value=0.013 and with the mean ranks of the factor score for the departments; sanitation, 54.87; security, 47.75; hall staff, 54.33; others, 50.16.

Staff consumers' acceptability of the design of the cloth nose mask was also assessed and presented in table 4.

Table 4

Design Factors

Statements	N	Mean	SD	Min	Max
The design of the nose mask suits the intended purpose	101	4.17	.792	1	5
The colours were appealing	101	4.07	.742	1	5
The colours reflect universities colours	101	4.36	.614	3	5
The straps fit the ears well	101	3.67	.939	1	5
The shape of the design is appealing	101	3.90	.806	1	5
The mask covered both the mouth and nose completely	101	3.94	.780	1	5
The masks were secured on the ear without gap	101	3.74	.943	1	5
Mean of means		**3.98**	**.802**		

Source: Authors compilation based on the field survey

Under design factor, the factors; 'the design of the nose mask suits the intended purpose' and 'the colours reflect universities colours recorded the highest average of 4.17 and 4.36 respectively. Colours were appealing (4.07), ability to cover both mouth and nose completely was (3.94), the shape of the design is appealing (3.9), the masks were secured on the ear without gap(3.74) the strap fits the ear well (3.67) followed respectively. In exploring further the effects of the design factors on staff consumers, Kruskal Wallis H test was performed at 0.05 significant level and presented in tables 5 and 6.

Table 5

Ranks Descriptive of Design

Item	Department/ Unit/ Section	N	Mean Rank
The design of the nose mask suits the intended purpose	Sanitation	27	52.15
	Security	28	51.04
	Hall Staff	6	42.17
	Others	40	51.53
	Total	101	
The colours were appealing	Sanitation	27	46.28
	Security	28	55.71
	Hall Staff	6	39.50
	Others	40	52.61
	Total	101	
The colours reflect universities colours	Sanitation	27	45.85
	Security	28	54.43
	Hall Staff	6	31.17
	Others	40	55.05
	Total	101	
The straps fit the ears well	Sanitation	27	62.33
	Security	28	41.38
	Hall Staff	6	41.75
	Others	40	51.48
	Total	101	
The shape of the design is appealing	Sanitation	27	56.24
	Security	28	54.34
	Hall Staff	6	32.50
	Others	40	47.90
	Total	101	
The mask covered both the mouth and nose completely	Sanitation	27	60.28
	Security	28	44.77
	Hall Staff	6	32.50
	Others	40	51.88
	Total	101	

The mask were secured on the ear without gap	Sanitation	27	61.04
	Security	28	44.96
	Hall Staff	6	39.50
	Others	39	48.87
	Total	100	

Source: Authors compilation based on the field survey

Table 5

Test Statistics[a,b]

	The design of the nose mask suits the intended purpose	The colours were appealing	The colours reflect universities colours	The straps fit the ears well	The shape of the design is appealing	The mask covered both the mouth and nose completely	The mask were secured on the ear without gap
Kruskal-Wallis H	.737	3.203	5.959	9.095	5.689	8.042	6.409
Df	3	3	3	3	3	3	3
Asymp. Sig.	.864	.361	.114	.028	.128	.045	.093

a. Kruskal Wallis Test

b. Grouping Variable: Department/ Unit/ Section

In exploring further the effects of these factors, there is no statistical significant differences at alpha 0.05 in the design factors except '*The straps fit the ears well'* and '*The mask covered both the mouth and nose completely*' factors which explains that the consumers are more particular about the above two factors than the others (see Table 4.1). Thus, the Kruskal Wallis H test shows that, the factors, '*The straps fit the ears well*' and '*The mask covered both the mouth and nose completely*' is statistically significant between the different consumers with chi-square=9.095 and 8.042 respectively, p-value of 0.028 and .045 respectively with the mean ranks of the factor score for 'The straps fit the ears well' of the departments/unit; sanitation, 62.33; security, 41.38; hall staff, 41.75; others, 51.48 ; and with the mean ranks of the factor score for 'The mask covered both the mouth and nose completely' of the departments/unit; sanitation, 61.04;

security, 44.96; hall staff, 39.50; others, 48.87.

To further investigate, the design of the nose masks that were most preferred, the staff of the university were presented with pictures of the different styles of cloth nose masks that were produced and the responses ranked. Sample one is designed with an elastic strap to hold the ear, sample two has two long straps at both ends made from either the fabric the nose mask is made of or a stitched bias strip for tying around the head for fit, sample three has a bias tape stitched round to fit the ear and sample four has short straps made of bias straps used to tie around the ear.

Figure 1. Sample One

Figure 2. Sample Two

Figure 3. Sample Three

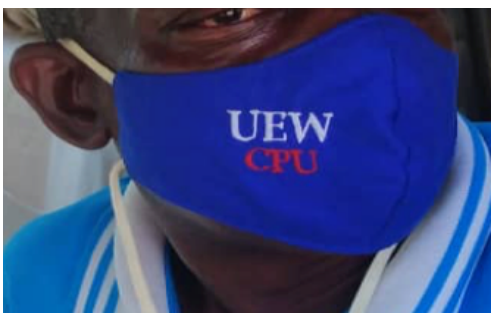

Figure 4. Sample Four

Most staff preferred samples two (46) and one (44) respectively out of the four samples presented to them.

The study further assessed the comfortability of the cloth nose mask when worn by staff consumers as presented in table 7.

Table 6

Comfortability Factors

Statements	N	Mean	SD	Min	Max
The mask fits me well	101	4.01	.948	1	5
The size is okay for my face	101	3.91	.838	1	5
It is easy to wear the nose mask	101	4.11	.789	1	5
I can breathe through it easily	101	3.55	1.033	1	5
I find it easy to secure the elastic or straps against the ear	101	3.68	1.053	1	5
The strap does not give me any discomfort	101	3.65	.990	1	5
The fabric feels cool against the skin	101	3.91	.838	1	5
The elastic feels painful at the back of my ears	101	3.59	1.044	1	5
The fabric used for the nose mask was suitable to allow air in and out when breathing	101	3.53	1.020	1	5
Mean of means		**3.77**	**.950**		

Source: Authors compilation based on the field survey

Under comfortability, fitness recorded a mean of (4), size was (3.9) easy of wearing (4.1), breathability was (3.5 comfortable with strap (3.9), coolness of fabric against the skin (3.9), pain at the back of the ear (3.5), suitability of fabric to breathing (3.50)

Overall mean was (3.7) indicating that consumers agreed to the statements raised that the nose mask was comfortable to wear.

To establish the level of satisfaction of staff consumers on the various comfortability factors, Kruskal Wallis H test was performed at 0.05 significant level and presented in tables 7 and 8.

Table 7

Ranks Descriptive of Comfortability

Item	Department/ Unit/ Section	N	Mean Rank
The mask fits me well	Sanitation	27	57.76
	Security	28	43.07
	Hall Staff	6	51.50
	Others	40	51.91
	Total	101	---
The size is okay for my face	Sanitation	27	49.46
	Security	27	46.04
	Hall Staff	6	63.83
	Others	40	52.21
	Total	100	----
It is easy to wear the nose mask	Sanitation	27	42.63
	Security	28	57.21
	Hall Staff	6	44.00
	Others	40	53.35
	Total	101	----
I can breath through it easily	Sanitation	27	56.24
	Security	28	48.07
	Hall Staff	6	50.33
	Others	40	49.61
	Total	101	
I find it easy to secure the elastic or straps against the ear	Sanitation	27	56.56
	Security	28	51.27
	Hall Staff	6	40.00
	Others	40	48.71
	Total	101	
The strap does not give me any discomfort	Sanitation	27	58.94
	Security	27	52.72
	Hall Staff	6	36.67
	Others	40	45.38
	Total	100	

The fabric feels cool against the skin	Sanitation	27	51.17
	Security	27	57.26
	Hall Staff	6	40.50
	Others	40	46.99
	Total	100	
The elastic feels painful at the back of my ears	Sanitation	27	60.28
	Security	27	54.54
	Hall Staff	6	43.42
	Others	40	42.24
	Total	100	
The fabric used for the nose mask was suitable to allow air in and out when breathing	Sanitation	27	62.50
	Security	28	47.95
	Hall Staff	6	45.50
	Others	40	46.20
	Total	101	

Source: Authors compilation based on the field survey

Table 8

Test Statistics[a,b]

	The mask fits me well	The size is okay for my face	It is easy to wear the nose mask	I can breathe through it easily	I find it easy to secure the elastic or straps against the ear	The strap does not give me any discomfort	The fabric feels cool against the skin	The elastic feels painful at the back of my ears	The fabric used for the nose mask was suitable to allow air in and out when breathing
Kruskal-Wallis H	4.300	2.688	5.216	1.461	2.444	5.760	3.225	8.110	6.497
Df	3	3	3	3	3	3	3	3	3
Asymp. Sig.	.231	.442	.157	.691	.485	.124	.358	.044	.090

a. Kruskal Wallis Test

b. Grouping Variable: Department/ Unit/ Section

The test statistics revealed that, among the nine (9) comfortability factors, one (1) of them was statistically significant at alpha value of 0.05. This factor was 'the elastic feels painful at the back of my ears' with chi-square value of 8.110, and p-value of 0.044 (see table 5.1). This means, the effect of the elastic feels painful at the back of my ear is an unpleasant effect that has the potential to minimize the usage of the nose mask among the four consumers.

Staff consumers were also assessed on the durability of the cloth nose masks and this is presented in table 9.

Table 9

Durability Factors

Statements	N	Mean	SD	Min	Max
The colours do not run (fade when washed	101	4.16	.900	1	5
The stitches do not fail (remove) when washing	101	4.05	.787	1	5
The stitches do not fail (remove) when wearing it	101	4.01	.831	1	5
The straps do not come off during use	101	3.89	.848	1	5
Straps do not tear off during use	101	3.85	.930	1	5
It does not scorch (burn) when ironing	101	3.95	.765	1	5
The straps do not tear off during washing	101	3.86	.773	1	5
Mean of means		**3.97**	**.833**		

Source: Authors compilation based on the field survey

Responses on the durability factors of the locally manufactured nose mask indicated that, colour fastness recorded a mean of (4.1), stability of stitches to washing was (4.0), stability of stitches to wearing (4.0), straps not coming off (3.8), straps do not tear (3.8), does not burn during ironing (3.9), straps not tearing during washing (3.9)

The overall mean (3.9) indicates that the respondents agree that the nose mask is durable.

In order to ascertain whether the cloth nose masks can be easily cared for, the following data was collected as shown in table 10.

Table 10

Ease of Care

Statements	N	Mean	SD	Min	Max
The mask is easy to wash by hand and by use of machine	101	4.22	.777	1	5
The mask is easily laundered without damage or deformation	101	4.08	.665	1	5
The dyes in the fabric used were not bleeding in water when washed	101	4.10	.735	1	5
The mask dries quickly after washing	101	3.74	.869	1	5
The mask can withstand high temperature	101	3.85	.846	1	5
The mask can easily be stored and carried about	101	3.91	.774	1	5
The fabric used is not damaged by disinfectants	101	3.72	.743	1	5
Mean of means		**3.95**	**.770**		

Source: Authors compilation based on the field survey

Table 10 presents data on ease of care with the following mean recordings. Washability by hand and machine recorded a mean of (4.2), resistant to damage and deformation during washing (4.0), stability of the dye in the fabric when washed (4.1) dries quickly after washing (3.7) ability to withstand high temperature (3.8), ease of storage and carrying around (3.9), ability to withstand disinfectants (3.7)

The overall means was (3.95) which indicates that the nose mask is easy to care for.

5. Discussion

Generally, the factors under production met the satisfaction of the staff consumers of the University (mean of means: 3.84) however, the findings indicated that, the all staff were more satisfied with the factor 'The length of

elastic and straps were appropriate' than other factors under production overall. The production of locally manufactured nose mask with woven and knitted materials during the Covid-19 pandemic has helped the local industry to gain recognition. According to Mueller et al. (2020), the concept behind the production of locally manufactured nose mask is to help both the rich and poor to afford for the mask because of its reusable feature.

In every production, most especially, those involved with the human health, there are standards and criteria that needs to be followed. In Ghana, for example, the Standard Authorities and the Food and Drug Authorities are the two regulatory bodies that oversea adherence of criteria. The production of the nose mask by the CPU is believed to meet the standard required. The locally manufactured nose mask produced by CPU has some range of thicknesses with three-ply of layers and with an elastic strand. The layers of the nose mask have some ability to protect the wearer against the virus and bacteria in particle droplets. According to one study, a locally woven face mask with three layers can provide up to 50% or even greater protection (Van-Straten et al., 2021). Nevertheless, Buami et al. (2021) is concerned with the thick nature of the fabric used; in that, there is limited air penetration despite the fact that they might trap virus and other germs. Thus, this has make producers of the locally manufactured nose mask had three layers of fabric to ensure conformity of their production with the standards proposed by the regulatory authorities so as to obtain market and trust from the public.

The staff consumers in the University were satisfied with the design of the locally manufactured nose mask (mean of means: 3.98). However, a further analysis showed a smaller mean rank of hall staff consumers. They (hall staff members) happened to have smaller mean rank as compared to other department/unit/section consumers. This means that, if nothing at all is regarded about the design of locally manufactured nose mask, hall staff members are particular about the design. Thus, it is through the design factors that will trigger the interest in for example, hall staff members, to use the nose mask. Nevertheless, staff consumers reported that, "the mask covered both the mouth and nose completely" which meets with the standard by WHO (2020a) standard that, one must ensure that the mask covers your mouth and nose and ensures a good seal around.

The findings about the comfortability of the nose mask, most especially, the elastic band has proven with time that its stretching effect is considered as

unbearable or nuisance by the wearer. The test statistics identified among the factors listed about the comfortability of the nose mask depicts that, consumers of locally manufactured nose mask are not comfortable with the elastic band. This finding is consistent with Oppong et al. (2021) on the general public choice of nose mask, in that, most consumers do not want tight/fitting nose mask where at the end of wearing the nose mask, there is a chance of developing blisters. Additionally, Liao et al. (2021) are of the view that the tightness of the nose mask does not guarantee the safety of the user, instead, the safety of the user is based on the observation of Covid-19 protocols and handling of the nose mask. Wang et al. (2020) added that individuals do not know how to thoroughly clean the locally manufactured nose mask before reusing

On the contrary, staff consumers of locally manufactured nose mask are excited with the fitness of the mask, in that, the strands fit the ears well and the mask cover both mouth and nose completely. Thus, inferably, it can be said that, regardless of other factors, the two factors, 'the strand fit the ears well and the mask covers the mouth and nose completely' are major factors for consideration the usage of locally manufactured nose mask. Nevertheless, Kisielinski (2021) on assessment of the breathability of nose mask concluded that nose mask that is fitting has the tendency to increase the resistance of the in-flow of oxygen and out-flow of carbon dioxide. Azuma et al. (2018) added that, the danger with having such nose mask can lead to cardiac compensation of the pulmonary (rapid heartbeat that can lead to heart failure and its immediate impact). Furthermore, Sharma et al. (2020) added that continuous wearing of mask provides an infectious epidemiology risk of self-contamination both within and outside by the wearer, especially with their contaminated hands. Furthermore, exhaled air soaks the mask, which accumulates infectious organisms from the nasopharynx as well as from the ambient air on the exterior and interior of the mask.

But this, does not necessarily mean, nose mask should not be worn, instead, the nose mask produced must meet high quality standard and wearers must practice and observe proposed protocol and hygiene practices to minimize the spread of the disease. The staff consumers of the cloth nose mask unanimously agreed that, the masks are durable (**3.97)** and easy to care for (3.95) that is easily laundered without damage or deformation, dyes in the fabric used were not bleeding in water when washed, mask can withstand high temperature, fabric used is not damaged by disinfectants and these will withstand the care practices stated by WHO (2020a) that, recyclable textile masks can be washed and disinfected either with high temperature (≥+ 60 ° C) or by hydro-alcoholic solution.

6. Conclusion and Recommendation

The acceptability of the locally manufactured nose mask is subjective to the consumer's desire regardless of manufacturers' adherence to requirement. In this study, consumers of the locally manufactured nose mask were satisfied with the standard of the nose mask except for the elastic strand that fitted the ears tightly causing an unpleasant effect on the ears. Additionally, consumers emphasized their level of satisfaction with how the mask covered both the nose and mouth. Nevertheless, consumers of CPU nose mask are not comfortable with the elasticity of the strands, hence, in subsequent production, CPU should produce nose mask that is fitting yet the elastic strand should have no adverse effect on the wearer. Additionally, the generalization of this study becomes difficult because of its limitation to a particular caucus. Thus, in order to generalize the findings of the study, the sample choice and size should be carefully chosen. Additionally, in order to ascertain the level of acceptance of locally manufactured nose mask by the public, it is recommendable that a comparative study between the surgical and locally manufactured nose mask be conducted.

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