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The Suitability of Uniforms worn in a Tropical Climate: The Case of Selected Service Workers in Ghana

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Abstract

This study used mixed method approach to investigate the suitability of uniforms worn by Police Officers, Fire fighters and Nurses in a typical Ghanaian climate. One hundred and fifty participants (150) were conveniently sampled from the Greater Accra Region and Central Region of Ghana. Analysis on fabric suitability was carried out whilst participants were interviewed to ascertain the comfortability of the uniforms they wear. The study found that most of the fabrics for the uniforms were dark coloured with an exception of white uniform worn by some nurses. The average temperature recorded of most of the fabrics were above 37 °C which correspond to the average body temperature of normal human. However, findings from interview showed low approval ratings for some of the uniforms sampled. Excess heating of the body affects certain biochemical activities in the body thus, decreases the quality of sperms and disrupts hormonal activities. It is therefore recommended that the dress codes of these professions should be revised to suit the weather conditions.

Keywords: fabric, colour, comfort, heat, temperature, uniforms

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INTRODUCTION

Humans have basic needs to go about their daily activities and one of these basic needs is clothing. Frings (1999) emphasized among other factors that comfort and functional usage of clothing are of much concern to the consumer. Textiles and clothing have been used basically to offer protection for man (Angelova, 2016; Forster, 2014). Characteristics within fabric such as weave, texture, performance, pattern and colour may help to determine its suitability and function. Textiles and fashion analysts are concerned about how elements within fibres, yarn and fabric can support performance and safety during use (CoDE, n.d). Adding on, Angelova (2016) stated that *"...comfort reflects the individual requirements of people for clothing design, fabrics design, and colours to ensure convenience and confidence in various activities"*. Das and Alagirusamy (2011) also identified thermo-physiology, sensorial or tactile characteristics, physiology and fitting comfort as basic elements of comfort in clothing usage. In view of this, textile and clothing producers and consumers are encouraged to observe and consider safety, protection, comfort and heat retention and radiation during production, acquisition and usage.

Angelova (2016) described the role of textiles used on human body as "barrier" that support exchanges in the form of heat and moisture between external weather conditions and the human body. The temperature of the human body and the environment contribute to comfort in living hence, the use of clothing as a medium to control body temperature is deemed appropriate. Human thermal comfort depends on combinations of clothing, climate, and physical activity (Layton, 2001). The colour and texture of fabrics have been linked with comfort in usage as these remain the first point of attraction to consumers. Hence, it is important for consumers to understand how colours and textures work and their implication on the user in the present of environmental conditions. Dark coloured clothes absorb and retain most heat than light coloured clothes. Light coloured clothes like white shirt reflect most of the sunlight and hence take time to heat up. The thickness of the fabric is an important factor that cannot be overlooked. Texture is described as the surface feel of the fabric (Forster, 2014; Udale, 2014; Das & Alagirusamy, 2011). It has a direct relationship with heat retention. The thicker the fabric the more heat it retains. As part of basic requirements for fabric selection, comfort of usage is paramount but subjective to the fashion consumer.

Therefore, clothing choices made must assist its own thermal control functions under various combinations of environmental conditions and physical activities (Layton, 2001).

Globally, uniforms carry an undeniable symbolic value (Musamba, Thill & Njangala, 2018). Police and military uniforms connote state authority, commands respect and also create unity among those who serve under the flag. Wearing of a service uniform to the police officers and other security services mean representing their home country. It denotes authority, respect and pride. In Congo, for example and most West African countries, lack of provision of new police apparels hinder the execution of their work and thus have a negative symbolic value (Musamba et al, 2018). Adding on, Musamba et al. emphasized that worn out or dirty uniform invites belittling and mockery from the public. Thus, the service uniform by police, military, etc. has psychological effect in discharging their duties, as lack of public respect complicates their work.

The dresses of nurses and doctors and the manner through which they attend to their patients has a likely effect on the development of a relationship between them (Bond et al., 2010). Psychologically, patients are affected by the manner of dressing by physicians (Palazzo & Hocken, 2010). In some hospitals, different colour codes are used to different patient care staffs from the supportive staff and other surgery staffs. In certain situations, cartoon characters or other playful prints are often customized in staffs' uniform especially for veterinary services or children's hospitals. The level of patients' confidences is often associated with the type of clothing used by the physician. Wearing professional attire, according to Budny, Rogers, Mandracchia & Lascher (2006) commands the most confidence on patients. Confidence levels of patients are significant increased with professional clinical apparel as against casual outfit. In a similar study by Rehman, Nietert, Cope & Kilpatrick (2005), it was observed that confidence and trust of patients was significantly associated with a physician's choice for professional attire. Accordingly, patients were willing to share psychological, social and sexual challenges with physicians that are professionally dressed. Preferences for physicians wearing white coats, short hair and name tags was highly appreciated by patients but rather disapproved of trainers, clogs, earrings and jeans (Hennessy, Harrison & Aitkenhead, 1993).

Clothes to be designed and worn at a specific location, activity and particular climate must consider colour and texture of the textile fabric. Udale (2014) perceived colour usage as seasonal and therefore an important factor in terms of heat absorption. According to Perdakis (2017), dark coloured clothes have lower albedo as it absorbs and retain most heat than light coloured clothes which have higher albedo. On the other hand, light coloured clothes like white shirt will reflect most of the sunlight and hence, takes time to heat up. Heat loss from the body and the feeling of individual comfort in a given environment is much affected by the clothing worn (Ogulata, 2001). Udale (2014) indicated that cold seasons warrant the use of darker colours as against warm seasons. This scientifically implies that the darker a fabric the more heat it retains.

An empirical question that needs to be answered relates to whether basic scientific principles are applied in the choice of colour and type of fabrics for workers in Ghana. Therefore, this study aims to find out the suitability of fabrics worn by Police officers, Fire fighters and Nurses in order to find answers to the application of basic scientific principles in the choice of fabrics for uniforms by these selected professions in Ghana.

METHODOLOGY

The mixed method approach was employed to investigate the suitability of uniforms worn by Police officers, Nurses and Fire fighters in a typical Ghanaian climate. Hundred and fifty (150) participants were involved in this study. Fifty (50) participants were conveniently sampled from each Service. Convenience sampling involves choosing the nearest individual to serve as respondents and continue that process until the required sample size has been obtained (Cohen, Manion & Morrison, 2007). This sampling technique enabled the researchers to easily get in contact with participants to save time and cost. These participants were randomly sampled from Greater Accra Region and Central Region of Ghana. The study was carried out in two phases. The first phase was an interview which aimed at finding the comfortability of uniforms participants wear in their working climate. To confirm the outcome of the interview the second phase was carried out. The uniforms of the workers were hanged in the open daylight for 3 hours from 9.00am to 12.00pm. At the end of the third hour, the temperature of the uniforms as well as the environment was taken respectively. The temperatures of the uniforms were taken for five (5) consecutive days. Data

from the interview were analyzed by finding the ratio of participants who expressed comfortability with their uniforms to the total participants in a working category. The fractions were expressed as percentages which were referred to as approval rates. The average temperature recorded and the approval ratings of the uniforms are presented in Table 1.

RESULTS

Table 1 provides a summary of colours and type of fabrics worn or used by Police Officers, Fire Fighters and Nurses in Ghana. It also shows the average temperature of the fabrics recorded during the day. Black worsted wool fabric of the Police Officer recorded the highest temperature of 39.4 °C whilst the white Dacron fabric worn by Nurses recorded the lowest temperature of 36.2 °C. From the table the khaki and camouflage fabrics worn by Fire Fighters together with white Dacron fabric worn by nurses recorded an approval rating of 100.0% each. The black worsted wool fabric of the police recorded the lowest approval rating of 16.0%.

Table1: Analyses of Fabrics worn by Categories of Workers in Ghana

Category of workers	Fabric type	Colour of fabric	Average temp. (°C)	Approval rate (%)
Police Officers	Worsted wool	Black	39.4	16.0
	Cashmere	Blue-black	37.3	68.0
	Cashmere	Blue-black (Camouflage)	37.7	54.0
Fire Fighters	Khaki	Tan (Brown)	36.4	100.0
	Khaki	Brown with red and black shades (Camouflage)	36.8	100.0
Nurses	Dacron	White	36.2	100.0
	Dacron	Green	38.1	46.0

Source: Fieldwork (2021)

Sampled responses from Police Officers

Most of the Police Officers interviewed reported that the black worsted wool uniform absorbs heat and make them feel uncomfortable during sunny days. The blue-black uniforms (cashmere and camouflage) are a bit lighter and so they prefer wearing it to the black worsted wool. Samples of responses provided by Police Officers are as follows:

Police Officer 1: *"I feel normal in the black uniform when I'm in the office but when I move out and the weather is hot I feel uncomfortable because I sweat a lot working outside. In the office the temperature is quiet cool due to the roofing and the artificial fans installed".*

Police Officer 2: *"The black uniform is good for the cold and not the sunny times. When I wear the black uniform under the sun, I feel uneasy. So I usually prefer the blue-black camouflage which is a bit manageable when I wear it on a sunny day".*

Police Officer 3: *"Personally I don't like black clothes it gives me heat rash. Uniform is black, I don't feel comfortable in it but that is the uniform given to us so I have to wear it. The blue-black uniform is better than the black one but different occasion calls for particular uniform". I prefer the blue-black camouflage".*

Police Officer 4: *"Our uniforms absorb heat especially the dark one (black). So we normally use the camouflage (blue-black) when we go for vigorous activities like operations. The dark one is for official duties. The dark one is good when weather is cool". I prefer the blue-black camouflage".*

Police Officer 5: *"If am on the day duty and am in the sun I sweat a lot especially when am in the black uniform. I feel okay when am on night duty. All the uniforms retain heat but I prefer working in the blue-black camouflage".*

Sampled responses from Fire Fighters

All the officers interviewed said good things about the uniforms (100.0% approval rate). The uniforms are light and do not absorb much heat. They are comfortable wearing them during all weather conditions. Samples of responses provided by Fire Fighters are as follows:

Fire Fighter 1: *"All the uniforms are okay for me. I don't feel any discomfort when*

I wear both uniforms. I only sweat when I walk briskly. The Khaki and the camouflage are durable uniforms”.

Fire Fighter 2: *“I feel comfortable with the uniforms at normal weather conditions.*

At extreme sunny condition I feel a bit hot when I am outside and it is a normal condition for harmattan season”.

Fire Fighter 3: *“I am comfortable. I do not have any reservation about the Uniforms”.*

Fire Fighter 4: *“The uniforms are good for all weather conditions. I do not sweat when I wear any of the two. In terms of preference I like the khaki”.*

Fire Fighter 5: *“Personally I don’t feel hot when I wear the uniforms. I haven’t heard any complain from my colleagues about the uniform. It is good for any weather condition”.*

Sampled responses from Nurses

Out of the fifty (50) Nurses interviewed twenty five (25) wear white uniform and the rest green uniform. All Nurses wearing white reported they are comfortable in the uniform throughout the day (100.0% approval rate). The other twenty five (25) Nurses reported that their comfortability in the green uniform depends on the weather condition of the day (46.0% approval rate). They are less comfortable during sunny days but feel okay when the weather is cool. Samples of responses provided by Nurses are as follows:

Nurse 1: *“Sometimes when the weather is too hot, working in the green uniform makes me feel a bit warm but if I enter the ward I feel a bit okay as compared with the general office. Probably, the ventilation in the ward is helping”.*

Nurse 2: *“The uniforms vary in weight and colour. I officially wear the green. In the sunny weather I sweat a lot working in the green uniform. I feel uncomfortable sometimes. However, when I get to the office the feel is a bit better than working outdoor because of the fans installed in the office”.*

Nurse 3: *“I feel okay wearing the green uniform during the night shift. I sweat a lot when am working during afternoon shift especially attending to emergency cases”.*

Nurse 4: *“Working in a hot weather is not easy so I always put on the scrub when I am at ward. The scrub is lighter than the uniform”.*

Nurse 5: *“I don’t feel hot in the white uniform. It is a nice uniform and I feel neat in it. I prefer the white uniform to the green uniform”.*

DISCUSSION OF RESULTS

The results generally present dark colours dominating among light colours as uniforms. Dark colours are potential heat absorbers (Forster, 2014; Hollen, et al. 1995). Long use of dark colours during warm seasons affects the user in terms of comfort and health related issues. The nature of activity of these professions place them in active mood regardless of the environment in which they operate hence, might affect behaviour in the discharge of duty (Johnson, 2013). The Ghana Police Service wears blue-black cashmere, black worsted wool and camouflage (multi-coloured) fabrics for official duties. These are strong and durable fabrics. The worsted wool is tightly woven fabric which is very thick and normally suitable for cold seasons. Cashmere is a type of wool that is soft and light. The camouflage uniform is made of a blend of cotton and wool and share similar positive characteristics as indicated above. Data from Table 1 indicates that the worsted wool absorbs more heat than the camouflage as well as the blue-black cashmere, with the average temperature measured as 39.4 °C, 37.7 °C and 37.3 °C respectively. Police officers are exposed to a range of environmental conditions of which they are to discharge their duties effectively. More often their activities are outdoor exposing them directly to the outside environmental conditions most especially the heat from the sun rays. Udale (2014) argued that colours such as black and brown as dark colours suitable for cold seasons and not warm seasons. Hence, the use of dark coloured fabrics as uniforms by the police places them at risk of not feeling comfortable. The long term effects of dark coloured uniforms are also real.

The Fire Fighters wear tan khaki and camouflage (with red and black patches). These fabrics are made of a blend of cotton and wool. They are durable and are worn for both official and operational duties. The average temperature measured for the tan khaki and the camouflage were 36.4 °C and 36.8 °C respectively (see Table 1). Nurses wear white dacron and deep green dacron fabrics to work. Dacron polyester is very durable but less absorbent (Forster, 2014). Dacron polyester has high tensile strength and also has resistance to bleach. The

average temperature recorded for the white and green uniforms were 36.2 °C and 38.1 °C respectively (see Table 1). This shows that the green uniform absorbs more heat than the white uniform.

Data from Table 1 shows a relationship between the average temperature of fabric recorded and the approval rate of the fabric. The higher the temperature recorded the low the approval rate and vice versa. Fabrics that recorded low temperature had higher approval rate and those that recorded higher temperature had low approval rate. The approval rate of worsted wool, worn by the Police Officers and green Dacron worn by Nurses are 16.0%, and 46.0% respectively. These fabrics recorded high average temperatures of 39.4 °C and 38.1 °C respectively. All the fabrics worn by the Fire Fighters recorded low temperatures and an approval rating of 100.0%. Data gathered from the experimental phase is consistent and confirms the assertions and responses given by the participants in the first phase of the study. Concerns were raised on fabrics that recorded temperature higher than that of average human body temperature (37.0 °C). These fabrics absorb heat and transmit the heat to the body and this affect human body heat balance and behaviour. Heat is one of the major environmental conditions that affect men's fertility (Health Engine, 2009). The body overwork to minimise the stress imposed on it and restore its heat balance. Additionally, findings by Health Engine (2009) proved that men's fertility was affected when exposed to heat. Thus, long term use of dark coloured uniforms by these professions has the potential of influencing the quality of sperms produce by men. The use of light-coloured clothes could be most appropriate for Police Officers, Fire Fighters and Nurses in Ghana giving them comfort and protection from potential health hazards as they discharge their duties effectively.

CONCLUSION AND RECOMMENDATIONS

The average temperature recorded for black, blue-black and green coloured fabrics were higher than normal human body temperature. The light-coloured uniforms (khaki brown and camouflage, white Dacron) received higher approval ratings than the dark coloured uniforms. The results indicated that most of the Police Officers are not comfortable in their dark coloured uniforms, the blue-black cashmere is the most preferred amongst their uniforms. Fire Fighters are comfortable with their uniforms. The tan uniforms did not retain much heat compared to that of the Police Officers. Unlike the white uniform for the Nurses,

the green uniform absorbed and retained heat thus make the Nurses uncomfortable during sunny hours while in green uniform.

The study concludes that dark coloured uniforms worn by the Police, Fire Fighters and Nurses are not comfortable for use in warm temperate like Ghana. This confirms what literature is suggesting that people in colder climates to wear thick and dark clothes to prevent the body from losing heat to the surroundings whereas those in warmer climates are to wear light clothes. There is therefore the need for the Ghana Police, Fire Fighters and Health Service to take a review on what is prescribed to be worn in order secure the health and attitude of their members in the discharge of their duties. A longitudinal study on this issue could be extended to other regions to establish consistencies in findings or otherwise. Additionally, an empirical experiment could be carried out to validate the extent to which dark coloured clothes influence these professions' attitude and general health.

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