TITLE PAGE

DEVELOPMENT OF FUNCTIONAL GARMENTS FOR PHYSICALLY CHALLENGED WHEELCHAIR AND BEDRIDDEN FEMALES IN BENUE STATE

BY

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P.G/ Ph.D/04/39337

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This thesis has been approved for the department of vocational teacher education, University of Nigeria, Nsukka in fulfillment of the requirement for the degree of philosophy (PhD) in Home Economics Education

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DEDICATION

This research is dedicated

To,

Engr Anebi Agbo

My late Husband, for his high and excellent wishes for me

And to,

Eboyi, Achetu, Ocheikwu, Oine and Anebi (Jnr) my children.

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ABSTRACT

The purpose of the study was to develop functional garments for physically challenged wheelchair and bedridden females (PCWBF) in Benue State, Nigeria. Specifically, the study determined the characteristics and activities of the PCWBF that dictated their garment requirements, garment needs and types preferred by the PCWBF and developed design features needed for the drafting of patterns for functional garments for the PCWBF. Other specific objectives were establishment of average body measurements of PCWBF in small, medium and large sizes, development of basic pattern pieces for the three groups and construction of prototype functional garments (PFG) based on adaptations of the pattern pieces developed. Appropriateness of the PGF on the different sizes of PCWBF was determined by test fitting; fit, comfort, ease of mobility, acceptability, aesthetics and expressive attributes were assessed by the users and the judges. Seven research questions and two null hypotheses guided the study. The research design was Research and Development (R & D). Two models: Function, Expressive and Aesthetic (FEA) model and the Universal Design Principles (UDP) guided the study. The population for the study was 9940 and sample was 653 respondents respectively. The instruments for data collection were Garment Needs Assessment Questionnaire (GNAQ), Body Measurement Chart (BMC), Observation Checklist (OCL) and Garment Fit Assessment Questionnaire (GFAQ). Reliability of GNAQ and GFAQ were tested: inter- rater reliability Coefficient for section A of GNAQ tested using Kendallôs W Coefficient of Concordance was 0.773. Internal consistency for sections B and C using Cronbach Alpha Coefficients yielded 0.643 and 0.764 respectively. Internal consistency for GFAQ were 0.774(fit), 0.688 (comfort), 0.854 (Aesthetics) and 0.725 (expressive) respectively. Data collected were analyzed using percentages and means. One ï way ANOVA was used to test the two null hypotheses at 0.05 levels of significance. Results showed that PCWBF have curved spines, disproportionate torsos and limbs that may be dysfunctional. Garment needs of PCWBF were characterized by need for donning and doffing and concealment of deformed parts of body, emotional, psychological and physical independence indicated by 55.4%, 32.6% and 69.0% PCWBF respectively. Preferred garment designs were ¾ Length, free and short sleeve lengths, cotton fabrics, dull floral colours with aesthetic and expressive features. Size categorization of PCWBF were large (58.4%), medium (26.9%), small (14.7%). A total of 72 basic block patterns were drafted for small, medium and large sizes each for trouser, skirts, blouses, gowns. Thirteen prototype functional garments (PFG) were developed by adapting the basic blocks. All fourteen functional and aesthetic designs were rated above satisfactory (4± 0.33) five expressive designs were rated above satisfactory (3.67 ± 0.5). There were significant differences ($p < 0.05$) between users and judges on physical requirements for concealment of deformity; responses of judges on colour of fabrics needed for PFG for the PCWBF. Recommendations included: Therapy for PCWBF in-patients should include teachings by nurses and Home Economics Extension Agents on functional garment usage. Ready- to- wear functional garments should form parts of the discharge kit for PCWBF on discharge from hospital. Extracts from this study should be included for teaching clothing students especially tertiary institutions.

CHAPTER ONE

INTRODUCTION

Background of the Study

Clothes are complex but very important aspect of everyoneôs life. The quest for suitable clothing for individuals in various endeavours of life is old. Clothes encompass all forms of dresses/ garments, ornaments, foot and head coverings worn on the body for various purposes. Carroll (2001) documented that beginning in the 1940s in the United States of America medical professionals started to examine the relationship between clothing and physical disabilities. Carroll (2001) further noted that clothing is an important facet of human constructed environment surrounding an individual and therefore has bearing on the quality of life. Presently in Nigeria, the health sector and the entire society are concerned about the wellbeing of the physically challenged. This is evidenced by the awakening of different governments to the needs of this group of people. For instance, Ebonyi State government offers automatic employment to disabled graduates of tertiary institutions (Stober, 2009). The federal government through the Ministry for Women Affairs and Social development in conjunction with National Bureau of Statistics is taking a census of all persons with disabilities in Nigerian to enable effective planning for their integration into the society (Michael, 2009). Ikoni and Dura (2011) documented that the National President of Persons with Disability (PD) confirmed the commencement of the formulation of national policies aimed at integrating Persons with Disability into governance. Correct, functional garments has direct bearing with the effectiveness of the Physically Challenged as they get integrated into the society and get engaged in different works of life.

Until recently there has been much controversy on what terminology is appropriate to holistically accommodate without damaging the personality of people with disabilities. Hence, different terminologies were used to describe those with physical impairments especially in relation to their garments. The terminologies include physically handicapped

(Shannon and Reich, 1979), people with physical limitations (Reich and Shannon, 1980), people with special needs (Lamb 1991), physically disabled (Klerk and Ampousah 1996). More recent terminologies include persons with physical challenges, persons with disabilities (Carroll 2001, Chase and Quinn 2003). The argument is that the term physical disability psychologically opens the possibility for personal potential in all human beings, whether able-bodied or handicapped. Handicap is a measure of the individuals own self-perception; an able bodied person may feel óhandicappedô while a person with disability may not feel óhandicappedô (Chase and Quinn 2003).

Different types of physical disabilities or challenges exist among human beings. Stanford (2000) classified physical disabilities as follows:

- Congenital Disabilities, for example Physical Cerebral Palsy, Spinal Bifida, Cystic Fibrosis, Down Syndrome. These originate from birth due to known, unknown or unidentifiable reasons.
- Acquired Disabilities, for example, Spinal Injury, Multiple Sclerosis, Broken limbs, Bone fractures, Alzheimerôs disease (Dementia), arising from infections of immune system, worn out state of the human body and sometimes as a result of accident; natural or unnatural.
- Developmental Disabilities or Learning disabilities for example Attention Deficit Disorder (ADD), Dyslexia, Mental retardation, learning disorder resulting from brain injury.

Reduced or impaired mobility resulting in sitting on wheelchair or bedridden may be the result of disease, spinal cord injury, stroke, amputation, accident or impact and the effect of these challenges are rarely identical. The wheelchair bound or bedridden person lives a relatively sedentary life. Chase and Quinn (2003) documented that body deformations such as spinal curvatures, disparity in length and size of limbs are associated with people sitting on wheelchair or using crutches or bedridden; each person may have peculiar body shapes.

All states of human disabilities in one or the other could hamper complete utilization of part of the human body effectively and therefore has a bearing on the effective and convenient use of garments. Garments are forms of clothes, including gowns, skirts, blouses, shirts or tops, and trousers specially constructed to protect the body from the weather and other environmental hazards, promote health and safety and improve job efficiency. Different degrees of physical disability or physical challenges have peculiar needs of special garments referred to as functional garments. Functional garments are specially constructed body coverings using fabrics that are effective in meeting the specific needs of the wearers in attending to different activities. Sproles and Burns (1994) averred that all clothing (including garments) worn by people perform intrinsic and social-psychological functions. The intrinsic functions of clothing outlined by Sproles and Burns (1994) are; protection, modesty, immodesty and adornment. All of the four intrinsic functions performed by clothing are relevant to the physically challenged person.

Social-psychological functions of clothes, termed the functionality of clothes attend to the following needs;

- need to be up-to-date
- need to adjust to a changing society
- desire to escape boredom
- need for symbolic differentiation
- need for social affiliation.

Chase and Quinn (2003) asserted that it is important to consider both the physical need and limitations of the individual as well as the psychological impact that a disability can have on that person while designing garments for the physically challenged person. All human beings develop their first sense of self from their own bodies. The physically challenged persons understand ówho they areô based on what they can do on a physical level. A personôs self-perception is strongly affected by how the society views him or her. The two

combined perceptions, physical and social, result in an individualôs self-esteem. Chase and Quinn (2003) noted that when a person becomes disabled, the perception of self is often confused, damaged or even lost. Becoming disabled can be equated to even death. The person goes through grieve and mourning. The process results in some sort of resolution and acceptance of the disability and a willingness to rebuild a sense of self and self-esteem. The individual wishes to look normal again. Consciousness and concern of a patient about clothing and appearance is an indication of psychological recovery (Chase and Quinn, 2003). Appropriate clothing, according to Breza (2007) provides emotional satisfaction for the patients and aids the healing process. Ikoni and Dura (2011) noted that disability is a major cause of social exclusion. Wheelchair bound females, and bedridden people require special clothing for fulfilling both intrinsic and socio- psychological needs such as comfort, ease of donning and doffing, as well as ease in attending to basic daily needs (BDN).

All people have basic human needs; meeting these needs provides satisfaction and enjoyment in life and clothing helps to meet some of these needs. Carroll (2001) reiterated that research in social and psychological context have proved how people with physical disabilities perceive their clothing needs and how external people perceive their clothing needs. Further experiments conducted on people with physical disabilities revealed four reasons why people with disabilities wear clothes were:

(a) Concealment; covering undesirable parts of the body

(b) Deflection to other body attribute less discrediting than their disability

(c) Compensation, expression of mastery in an area that is close to the person with disabilities

(d) Emphasis of social uniqueness of subjectsô situation (uniqueness of disability).

Carroll (2001) argued that parallels exist between the reasons for wearing clothes by people with disabilities and people without disabilities. Chase and Quinn (2003) reaffirmed the need for compensation; a parallel to protection as reflected in choice of appropriate texture

of fabric that should cushion or suit the wheelchair user. The choice of fabric should be comfortable and not abrasive to the body. All special garment needs for persons with physical disabilities or challenges can be met through designing (Chase and Quinn 2003).

Garment fashion for the physically challenged and bedridden female (PCWBF) require updating to enable them feel fulfilled in the society where they had been long forgotten. The need of the PCWBF for new social integration into the society place a demand on garment designers to update their garment designs that will enable them function properly at their points of integration. The old idea of a disregarding or discarding a wheelchair bound person or bedridden individual is fast eroding especially as these group of people make undaunted effort at being recognized by the government.

Designing is aimed at creating a beautiful object that possesses both aesthetics and functionality. Designing is more than just creativity; it entails conceptualization of the needs of the wearer and accommodating the solution to those needs in the design. For instance, in considering the functionality of a designed garment for a physically challenged person, the designer focuses on the physical requirements in dressing that are the results of a particular disability (Chase and Quinn, 2003).The aesthetic aspect of the design; termed the elements of design is viewed as interplay of line, form (shape and space), texture and colour of the garment and other materials used on the garment. These elements of design must be applied artistically. The artistic guidelines that dictate the use of the elements of design are: balance, proportion, emphasis, rhythm and harmony. The elements and principles of design properly applied work together to bring about beauty and effectiveness (functionality) of the designed functional garment for the physically challenged. Designing is the first step in garment development.

Garment development process consist several steps: identification of the needs of the wearers, drafting the patterns and construction of the garments (DeJonge, 1984; Lamb and Kallal, 1992 and Kaiser, 1997). In all, a prototype garment should be produced, tested

and corrected to meet the desired specifications of a design. A prototype garment is a garment made to specification of a design for the purpose of fitting using a cheaper fabric. The beginning of the production process after designing is the development of the patterns termed the block patterns.

The development of block patterns prior to garment construction is very crucial to a dress maker, since it provides opportunity for every correction to be effected after series of fitting using prototype garments on the figure before the final garment construction. Pattern drafting or development is the art of drawing and documenting all instructions needed for constructing a garment or any sewing project using a set of measurements (Weber, 1990; Igbo and Iloeje, 2003). All humans have peculiar shapes and sizes. Size and shape are crucial factors in pattern development. Aldrich (2006) asserted that size system in garments production is based on the body and not the garment; it is viewed in relation to clothing as a designation system which explains the manner in which a garment fits into the wearer. Decker (2007) defines size as the relative bigness, extent and series of standard measurement that are made and sold. No matter the function of any garment on the user, the size must be proportionate to the wearer to achieve the purpose for which it is constructed. Chase and Quinn (2003) noted people with disabilities have peculiar features and needs which should be taken care of in designing his or her garment at the pattern development stage.

Benue State like most other States of the federation is fast developing. Development and growth has its attendant characteristics and challenges. For instance due to population increase, Benue State has witnessed an increased need for transportation. The most popular and easiest modes of transportation for relatively short distances are the motor bikes popularly referred to as ñgoing.ò The use of motor bikes and other forms of transportation have increased the incidence of accident resulting in broken limbs (Acquired disabilities)

and even death. When motor bike accidents occur, the worst hits are those being carried since they have no firm grip on the bike. These victims could be females who rarely ride the bikes themselves but move from one area to another frequently.

Some females have diseases such as paralysis, arthritis and receive medical attention in different hospitals as well as from traditional bone fixers. Worthy of note is also the proneness of middle age females to bone breakage and paralysis than men. Osteoporosis; decreased density of bones resulting in bone fracture, easily is said to be more common among women especially of late to middle age (Kottke 1982). Other causes of wheelchair incapacitation for females include paralysis and stroke as a result of child birth. This makes it imperative for the need for functional clothing for this group of people. These individuals have their own garment needs which are a challenge for large scale manufacturers of clothes.

Statement of the Problem

Women with disabilities comprise a sizeable group and frequently subjected to multiple discrimination; both disability and gender based (Ikoni and Dura, 2011). They are among the vast number of physically challenged persons seeking recognition and integration into work force in Nigeria.

Recognizing that clothes (garments): the second skin are the next closest environment to human body, if the individual is deprived of the opportunity to wear choice garments as well as elaborate desired styles due to inability to move the limbs appropriately the woman with disability is disadvantaged. This aspect of the needs of women with disabilities is often neglected by garment producers. Thorén (1990), Carroll (2001) had noted that todayôs clothing market is not adapted for people with unusual body dimensions and or different kinds of functional impairments.

In garment design, there is constant need for developing designs that are in consonance with current fashion. Fashion is dynamic and changes in garment styles reflect the mood, need and the current issues in a society. The physically challenged need to wear garments that are current in fashion hence current changes in fashion need to be reflected in the design of the garments

Commercial patterns that are made in Nigeria are not available. Commercial patterns specifically drafted for use in construction of functional garments for persons with disabilities are unavailable. Commercial patterns imported to Nigeria are devoid of essential features for direct translation into garments for persons with physical disabilities. Such patterns will require major alterations which can only be carried out by well-trained garment constructors. This poses a problem to garment constructors who are not conversant with pattern drafting prior to garment construction and the wearers.

There is disparity in the size, shape and figure type of the white and black females. For instance, size charts developed for white females are made to fit on the body silhouettes while size charts for African females is characterized by extra allowances for freeness. The implication is that, there is need for establishment of specific patterns for garments for the physically challenged black females using their own anthropometric measurements.

Physically challenged wheelchair and bedridden females require special comfortable garment designs due to their peculiar shapes and sizes to attend to their daily activities. The presence of physical challenges/disabilities robs people of easy movement within their immediate environment as well as interaction with the society in terms of movement, emotional and psychological satisfaction with what they are wearing. Inappropriate garments styles worn for the listed activities hamper easy movement and optimum performance and accomplishment of the persons with physical disabilities.

Garments that provide accessibility for caregivers, relatives of persons with physical disabilities into body parts that require cleaning, medical care and help the caregivers to attend to the needs of the physically challenged person quicker and easier are not available in Benue State and in Nigeria. Persons with physical disabilities need to enjoy better services and less pain or inconveniences in garment usage. Garments with functional elements such as detachable portions, easy-to-handle fasteners enable the physically challenged person to attend to her daily activities with very little or no assistance from caregivers and relatives. However, it was observed that the existing garments worn by physically challenged wheelchair and bedridden females in Benue State are devoid of these necessary design/style components. Physically challenged wheelchair and bedridden females tie wrappers and normal garments that pose restrictions to their movements and hamper caregivers from accessing areas of their bodies that need medical care.

Added to the physical incapacitations, the hospitals are usually inadequately equipped to aid the PCWBF patientsô toileting easily and comfortably or changing their garments. Patients need to doff or don their clothes partially or totally for some medical treatment such as wound-dressing, physiotherapy as well as bathing and toileting. Sometimes the treatments are done inside the wards with scanty screening from the glare of other inmates, especially if the physically challenged or bedridden person is totally incapacitated.

Medical aids service providers are very few relative to patients on admission in the hospitals or rehabilitation centres. For instance, at the Federal Medical Centre Makurdi, in July 2007, the ratio of nurse to patient on admission especially at night was as 1: 20. It is difficult for these few number of nurses to attend adequately to the relatively larger number of patients without been over stressed and frustrated after a dayôs work. In addition, some hospitals have formulated policies that disallow patientsô relatives from stay in hospitals with their patients due to lack of space and need to ensure hygienic environment. The

absence of patientsô relatives further compounds the problem of donning and doffing by the physically challenged and bedridden to attend to basic needs, while on admission in the hospital. Patients with broken bones, fractured limbs those with excessive weight require extra care to be attended to by relatives and caregivers when there is a need for donning and doffing their garments. Sitting on the wheelchair or bedridden could result in increased weight, stiffness of joints and weakness; compounding the difficulty of donning and doffing garments for the users and the care givers. Garments without special/ functional opening and closures pose more problems than garments with special/ functional opening and closures.

Non availability of functional garments that help PCWBF to attend to daily activities with much ease, and equally enable caregivers and relatives to assist the PCWBF with much ease is a problem in Benue State.

Although, researches on designs and developments of functional/special garments for persons with physical disabilities and people in different professions have been carried out in Nigeria, UK and USA, no specific researches have been carried out to develop functional garments for the PCWBF in Benue State, Nigeria. This gap needs ample attention, hence this study.

Purpose of the Study

The main purpose of the study was to develop functional garments for physically challenged wheelchair and bedridden females (PCWBF) in Benue State.

Specifically, the study.

1. determined the activities of physically challenged wheelchair and bed ridden females (PCWBF) that characterise their garment needs in Benue State
2. determined garments types preferences of physically challenged wheelchair and bedridden females and the judges.

3. determined the characteristics of garment needed by physically challenged wheelchair and bedridden females in Benue State
4. developed design features needed for the drafting of the patterns for garments for physically challenged wheelchair and bedridden females
5. established average body measurements of different sizes of physically challenged wheelchair and bedridden females and grouped them into small, medium and large
6. developed pattern pieces for the three sizes (small, medium and large) of physically challenged wheelchair and bedridden females
7. produced constructed garments based on the adaptations of the basic patterns pieces developed
8. determined the appropriateness of the garments on the different sizes (small, medium, large) users by testing- fitting for fit, comfort, ease of mobility, acceptability, aesthetics and expressive variables of the prototype functional garments
9. determined the judgesô ratings of the appropriateness of the garments in terms of fit, comfort, ease of mobility, acceptability, aesthetics and expressive variables of the prototype functional garments
10. compared the ratings of the users and judges based on fit, comfort, ease of mobility, acceptability, aesthetics and expressive variables of the prototype functional garments.

Research Questions:

The following seven research questions formed the basis of this study.

1. What are the activities of physically challenged wheelchair and bed ridden females (PCWBF) that characterise their garment needs?

2. What types of garments are preferred by the physically challenged wheelchair and bedridden females and the judges?
3. What are characteristics and design features of garments needed by physically challenged wheelchair and bedridden females in Benue State
4. What design features (functional, aesthetic and expressive) are needed for the drafting of patterns for functional garments of PCWBF?
5. What are the average body measurements of the three sizes (small, medium, large) of physically challenged wheelchair and bedridden females needed for drafting patterns for functional garments?
6. What are the mean responses of the physically challenged wheelchair and bedridden females (users) on fit, comfort, ease of mobility, acceptability, aesthetics and expressive variables of the prototype functional garment?
7. What are the mean responses of the judges on aesthetics and expressive variables of the prototype functional garment?

Hypotheses

The following null hypotheses were tested for the study at a 0.05 level of significance.

Ho_1: There is no significant difference in the mean responses of users and judges on the category of requirements that characterised garment needs of physically challenged wheelchair and bedridden females.

Ho_2: There is no significant difference in the mean responses of judges (nurses and Clothing and Textile lecturers) on the aesthetic attributes of prototype functional garments required by PCWBF

Significance of the Study

The positive effect of garments on self-esteem, performance and productivity on persons with disabilities or physical challenges could be enhanced by use of functional garments. Physical disabilities vary, therefore the garment designs that will satisfy the needs of various users must be properly articulated to provide appropriate patterns for subsequent functional garment producers. Functional garments designs aim at fulfilling several functions beyond physical protection of the wearer: the satisfaction of fit, comfort, ease of mobility, acceptability, aesthetics and expressive attributes are inclusive. The considerations of these requirements in the design and development of the functional garments will address the yearnings of persons with disabilities in carrying out daily activities normally with less difficulties and reduce burden on their caregivers and relatives in Benue State, Nigeria.

This study is expected to provide information for the PCWBF and their caregivers on appropriate functional garments. The patterns will provide relevant base for garment producers; the patterns could influence garment manufacturing companies to develop further designs, produce the garments, fit-test on users and create a market niche for persons with disabilities in Benue Nigeria.

The findings of this study, specifically, will provide ready-made patterns for garment production sector of Nigeria economy. Garment production entrepreneurs will benefit from this study since the patterns could be used for mass production of functional garments. Sale of garments produced from the pattern will generate income for such entrepreneurs. The construction of garments will provide employment for the garment construction sector of economy.

The finding of this study is of great significance to the physically challenged wheelchair and bed ridden females in their homes as well as female in-patients. The use of the garments will provide comfort in clothing. Physical and emotional stability will be enjoyed by the physically challenged wheelchair bound and female in-patients since their

movement and participation in the larger society are enhanced. This research will help in providing a variety of suitable garments for a variety of activities for wheelchair bound females. The block patterns can be adapted to produce other interesting styles. The functional garments made using the results of this research will enable smooth operation by physically challenged wheelchair females as they get employment into the civil service.

The aged or elderly and the sick that may have incontinency problems in the use of toilet will also find the garment very helpful. This is because the garments designs also have Universal Design features. Their caregivers will enjoy some relief due to the design of the garment if used appropriately. Nurses (caregivers) and hospital maids will have fewer challenges in attending to the nursing needs of physically challenged wheelchair and bedridden patients especially if the designed garment are constructed and given to the patients. Such employees will face less stress in their work environments. Social workers who attend to garment needs of the physically challenged wheelchair and the bedridden will find their duty easier. Some of the advantages accruing from the use of functional garments will ameliorate the suffering of relatives of wheelchair and bedridden females. This is because, the users of such garments will experience less dependence on their relatives while donning and doffing, receiving medical attention, reaching out to pick some items, toileting by themselves.

The research will provide information for government and private health establishments. The government hospitals have employed garment constructors who do not have knowledge of pattern drafting but can use already made patterns. The drafted patterns resulting from this study will be used for constructing garments for the physically challenged wheelchair and bedridden female in- patients. The provision of the garments to this special group of patients will help the hospitalsô administration to achieve their policies about less involvement by patientôs relatives in the care of in -patients since such patients have greater independence on relatives and hospitalsô care givers and ward attendants. The

use of the functional garments could be introduced to patients in both private and government hospitals via clothing therapists in the hospitals.

Information obtained from this research will help the government to formulate policies in the hospitals that will ensure hygiene and safety of both the workers and the patients especially in relation to clothing. The findings from this study will aid Curriculum planners and the education sector. Schedule of practical for pattern drafting for clothing and textile students especially in tertiary institutions can be guided by the findings of this study. For instance the method of drafting the blocks in this study could be adopted in teaching pattern drafting in the tertiary institutions. The research findings can be compiled as a text book for teaching some courses in Home Economics in tertiary institution. The study of clothing needs of the physically challenged is important since there is a new impetus by the Nigeria government to integrate them into the main stream. The utilization of such materials will be achieved by direct recommendation to the Nigerian Educational Research and Development Council (NERDC) and National University Commission (NUC) which are responsible for reviewing and approving the curriculum of Secondary Schools and Universities respectively.

Delimitations

The study was delimited to adult females with physical challenges with restricted movement of the lower limbs that are wheelchair bound or bedridden. Full description of clinical ailments of the patients/ physically challenged wheelchair and bedridden females is beyond the scope of this study. A non- randomized selection of respondents was used for the garment needs assessment and appropriateness determination in the study. Hence, the findings of this study may be generalized only on the smaller population and the sample used within the geographical area covered. The study was delimited to three sizes (small, medium, large) according to the measurements utilized for the study and the styles and quality of the garments developed.

CHAPTER TWO

REVIEW OF RELATED LITERATURE

This chapter on literature review will be carried out under the following sub- headings:

1. Conceptual Framework

- Garment Needs of Patients
- Physical Disabilities
- Garment Design, Development and Evaluation
- Needs Assessment for Garment Development
- Specifications for Designing Functional Garments for Persons with Physical Disabilities
- Comfort in Garment Usage

2. Theoretical Framework

- Protection Theory
- Adornment or Decoration Theory

3. Review of Related Empirical Studies.

4. Summary of Literature Reviewed.

This research was guided by two existing models. The first is based on the model formulated by Lamb and Kallal (1992) known as Function, Expressive and Aesthetic (FEA) model. This model aided in organizing the thinking of this research and generating ideas for the new functional garments.

Figure 1: The FEA consumer needs model (Lamb and Kallal, 1992)

The FEA model as illustrated in figure 1 has the following components:

i) The consumer is the central focus

ii) The cultural surrounding of the consumer (user) is considered in the design

iii) The design researcher establishes the design criteria in the initial steps.

iv) The finished product must meet the design criteria; the requirements for the finished product.

Morris (2006) averred that the FEA considerations for design are not mutually exclusive but interrelated and that a good design balances the three. FEA consumer needs model according to Moris (2006) is an effective way of producing garments for a target market. The FEA models comply with the target consumer cultural beliefs, sociological ideas and personal values. The FEA model classifies the requirements for the design as Functional, Expressive and Aesthetic aspects. In the development of the new garments for the physically challenged wheelchair and bedridden females, functional attributes comprise of fit, ease of wearing and taking off otherwise known as donning and doffing, comfort, ease of mobility which are paramount. Expressive requirements of the design of clothing for

the physically challenged wheelchair and bedridden females include variables such as role or status in the society. The integration of the physically challenged into the society and the secular work force will place demands on employment and leadership roles for the users. Clothing preferences by users also explains expressive requirements of the users. Aesthetics greatly determine acceptability of products including garments. Aesthetics is the overall appearance; comfort, fashion ability, durability (Carroll, 2001). Carroll (2001) however noted that opinions of what is appropriate clothing differs based on usage background and age of the wearer.

The second model for this research is based on Universal Design Principles (UDP) as identified by Centre for Universal Design (CUD) (1997). The principles ensure that the products would be:

i) Equitable/reasonable in use

ii) Flexible in use

iii) Simple

iv) Intuitive

v) Tolerant of error

vi) Low in physical effort

vii) Possess size and space for use.

This research guided by the Universal Design Principle ensures a variety of users; the bedridden, wheelchair bound females and females who have difficulty in donning and doffing easily to go to toilet, and attend to other needs due to long standing illnesses. There is flexibility in use since more than one size of users can utilize one product due to incorporation of adjustable openings and closures. The instruction for use is simple and intuitive. There is no dangerous implication if instruction for usage is wrongly applied. Hence the design has tolerance for error. The design also allows low physical effort by the users to use the functional garments. The design takes into consideration size and space for

the users. This is achieved in the design by using mean of the different measurements of the three categories of users namely small, medium and large. The garments are not tight fitting in order to allow for ease of movement and comfort. Fig 2 is an illustration of the model for functional garments for the PCWBF.

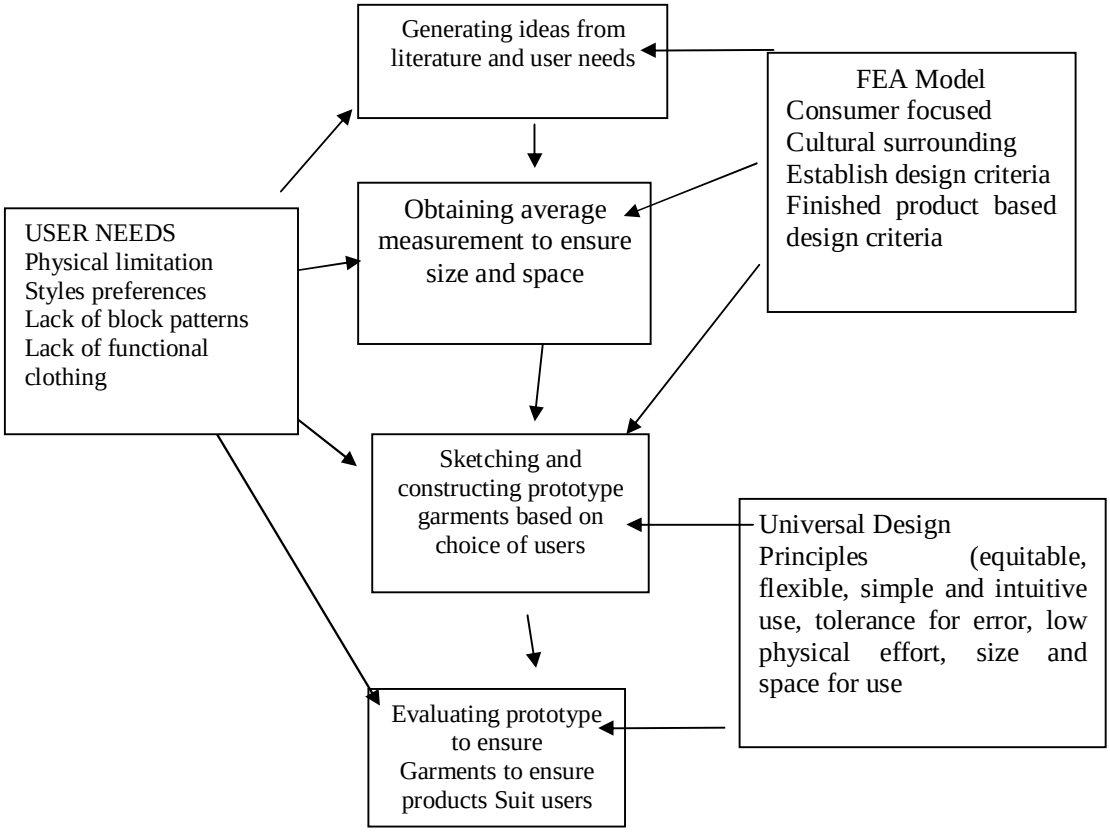


Figure 2: Model for Functional Garments for the Physically Challenged Wheelchair and bedridden Females in Benue State.

There is a growing interest and emphases on the functionality of clothing to the wearer. The effect clothes have on the wearer is very important to the designer as well as the wearer. Functional garment designing focuses on designing to meet the needs of individuals or groups of people with peculiar needs. The FEA model, because of its emphasis on functionality of the product have been utilized by different functional garment designers especially at the preliminary stage of idea generation or brainstorming, evaluation stages of the design and in needs assessment studies (Choo,2006; Holland, 2007).

Garment Needs of Patients

The garments needs of patients differ at various times. A patient is a person who is receiving medical care in a hospital. An in-patient is a patient who goes into hospital to receive care and stays there while the treatment progresses. Professional-patient relationship is highly important, since this is the human context in which decision-making occurs (Merenstein and Gardner, 2002). For instance, Merenstein and Gardner, (2002) also documented the use of clothes such as rolled blankets for proper positioning of neonates to enhance infant mortality. They advocated use of rolled blankets to facilitate side-lying, spine positioning, correct bracing of the feet; all of which must be used with caution to avoid adverse reactions resulting in death of the infant. Merenstein and Gardner (2002) noted that swaddling of neonates in the intensive care unit (ICU) with extremities flexed simulates the uterus position and perform the following functions:

1. Improves flexed posture and flexor muscle tone.
2. Facilitates behavioural responses and
3. Improves the development of primitive reflexes.

The use of containment with soft bedding for physiologically compromised term and preterm infants is safe and appropriate in a neonatal intensive care unit (NICU) setting (Merenstein and Gardner, 2002).

Breza (2007) maintained that comfort in clothing program is a great source of relief for patients in helping them maintain their dignity. Breza (2007) further noted that during times of illness, this is especially important since a patientôs emotional well-being can be vital to their recovery. The mental health policy executive and mental health adverse event committee formulated guidelines for patientôs clothing on mental health aimed at providing safety in clothing and reducing risk factors. This policy acknowledges the importance of mental health inpatients. The outcomes of the policy are:

- Expected reduction in the risk of suicide and or self-harm associated with patient clothing in inpatient setting.
- Consistent regional policies and procedures for the appropriate clinical risk management of patients setting in South Australia.

Safety of patients can be enhanced by careful consideration of clothing. Various categories of patients were included in the above policy:

- Open ward inpatient setting in metropolitan and county areas
- Closed ward inpatient settings in metropolitan Adelaide
- High dependency inpatients units
- Intensive care units (where there is difference between high dependency and intensive care)
- Medical wards, emergency departments and emergency extended care units that many manage mental health patients in a non-psychiatric setting.

The committee listed some clothing items that may be harmful to mental health patients, these include: belts, foot wear laces, cords in pyjamas or tracksuits, plastic bags, jewelry, under wears such as braziers and adhesive tapes. The committee recommended voluntary confiscation of non-safe clothing items with due explanation to patients; to protect his or her personal dignity, rights, privacy and self-respect. It therefore stipulated that clothing of inpatients be comfortable, appropriate and provide for a personôs self-esteem, dignity and safety. Durable clothing that is not easily torn such as: elasticized track suites, or pyjamas, clothing made of stretch fabrics like T-shirts or jeans and shoes with Velcro fasteners were recommended for especially mental health patients (Patient Clothing ON MHunitsInterim [1]).

The garment needs of patients differ; hence several garment designs for different patients are needful. According to Milne (2007), Collette Wong together with her students undertook garment designs for women with Osteoporosis and compiled a list of common

fitting, proportion and styling characteristics that provide for ease of movement and visual appeal. Reich and Otten (1991) similarly, conducted a research to access clothing needs of arthritis patients and how individual physical conditions affect clothing usage. Special garment designs for arthritis patients to ease ñdonning and doffingò have been undertaken by different researchers. Modern designs include use of Velcro® or zippers rather than buttons. Generous elastic waist bands, special neck lines, grab loops in slacks, culottes and pants for easy donning and doffing form parts of the designs. Other designs include: rare closure (open back), adaptive side zip pants 55cm long on both sides as well as Velcro ® closure foot wears.

Garment design could be specific for illnesses resulting in specific disabilities as earlier noted. However, applying universal design in garment design provides usability to wider potential users especially as inpatients in hospitals. Burgstahler (2007) noted that application of universal design principles to products and environments meet the needs of wide variety of people with different characteristics. For example, a wedding gown which comprises of separate gown and overcoat as well as adjustable waist to ankle length has wider usage for various sizes of brides. A stretch jeans trouser is usable by various people with differing anthropometric measurements at least within a given range.

Many ideas and general designs features have been produced but few patterns or no patterns exist with specific detailed instructions for making garments for hospital in patients with specific ailments (Carroll, 2001). Carroll (2001) noted rightly that a physically challenged person, particularly an adult, should be able to obtain special clothing without having to make or adapt patterns themselves. Existing commercial patterns are devoid of specific details for the sick and probably the physically challenged. Most seamstresses and tailors employed to sew inpatient garments are not specialized pattern drafters and will need readymade patterns for such specialized clothing. Adaptations of commercial patterns to

produce garments for people with varying levels of disability require certain skills (Kernaleguen, 1978 and Hoffman, 1979) in (Carroll, 2001).

Physical Disabilities

The UN Convention on the Rights of Persons with Disabilities (2007) states that; persons with disabilities include those who have long term physical, mental, intellectual or sensory impairments which in interaction with various barriers may hinder their full and effective participation in society on equal basis with others. Physical disability is generally defined as restricted capability to perform particular activities: an inability to perform some or all the tasks of daily life (Kottke, 1982). Medical definitions of disability include; a medical condition restricting activities, a medically diagnosed condition that makes it difficult to engage in the activities of daily life. The Americans with Disability Act (ADA) of 1990 defines disability as:

(1) A physical or mental impairment that substantially limits one or more major life activities.

(2) A record of having such impairment.

(3) Being regarded as having such impairment (Dell Orto & Marinelli, 1995 in Carroll, 2001).

Medical and rehabilitation literature refers to disability as ñthe various impact of chronic acute conditions on the functioning of specific physiological systems on basic humanôs performance and on peoples functioning in necessary usual, expected and personally desired roles in society,ò (Jette, 1994). This definition implies that disability results from several effects on different parts of the organs of the body, finally spreading to essential parts of the body whose performance are reduced. The result of disability impacts on human performance which in turn impact on interaction with the society. Disability could manifest on any part of the human body which could be visible or invisible. The effect is manifest on interaction with other people. For instance, an arthritis affected arm

may appear healthy but may be incapable of being stretched normally and fully during a hand shake.

Physical disability manifests in different parts of the body which could be visible or invisible. Hoffman (1979) noted that physical disability could be temporary such as broken limbs and hips. Others are minor such as impaired vision that can be modified by corrective lenses. Some disabilities are regarded as severe, however the individual is still capable of participating in community life on different levels with others especially when physical and social barriers to mobility have been removed (Hoffman, 1979). Some of the different types of physical disabilities are arthritis, autism, blindness, colour blindness, carpel tunnel syndrome, cataract, cerebral palsy, deafness, Down syndrome, emphysema hearing impairment, mental retardation, multiple sclerosis, muscular dystrophy, paralysis, paraplegia, Parkinson disease, spinal bifida, stroke, disabilities caused by turned syndrome. The ñdonningò and ñdoffingò of garment pose a challenge to individuals with any of the above categories of ailments (Webb-Lupo & Lester, 1999).

The major origins of the different disabilities are classified as follows:

- Congenital
- Developmental
- Acquired.

Noticeable overlaps and ambiguities exist between the above disabilities (Carroll, 2001). For example, blindness could result from childhood diseases such as measles or by an accident. Similarly an amputation could result from developmental or congenital disease or by an accident (acquired disability). Inability to use the leg as a result of arthritis (developmental) could also occur.

Physical disabilities that affect free movement of the limbs include: arthritis, fractures, paralysis, muscular dystrophy, spinal bifida and strokes of various degrees. In addition to difficulty in movement from one place to another, individuals with such

disabilities are faced with difficulty in ñdonningò and ñdoffingò their garments. ñDoffingò and ñDonningò entail lifting, upward or downward motions, flexing the limbs. Reich and Shannon (1980) grouped common physical limitations for clothing research into six namely (a) Lower leg (b) Lower torso (c) Upper torso (d) Hand (e) Arm and (f) Neck.

The social model of disability sees the issue of "disability" mainly as a socially created problem, and basically as a matter of the full integration of individuals into society, (included in disability rights). In this model, disability is not an attribute of an individual but rather a complex collection of conditions, many of which are created by the social environment. Hence, in this model, the management of the problem requires social action. It is viewed as the collective responsibility of society at large to make the environmental modifications necessary for the full participation of people with disabilities in all activities life.

Garments Design, Development and Evaluation

The generation of ideas for garment design is achieved through many activities. Idea generation involves using the designerôs perception of the relationships between garments, styles and the state of the fashion. Purcell and Gero (1998) noted that sketches influence the creative thinking of designers. Designers also use their perceptions to evaluate and selectively generate only appropriate designs (Eckert and Stacey, 2001). Eckert and Stacey (2001) stated that idea generation also involves active control of the context which is the source of inspiration in their immediate surroundings. Idea generation also emanates from memories for other designs the designers had seen; including other objects and images. Eckert and Stacey (2001) noted that the most powerful influence on pattern synthesis action are the design elements, desires and constraints in conscious awareness or available in the design visual field.

Obtaining information about user needs is an essential part of the design process (DeJonge, 1984; LaBat 1992). Visible sources of inspiration such as user needs can trigger

design ideas. Carroll (2001) added that in developing user models, the user is at the centre of a sphere with culture as a filter between user and Function, Expressive and Aesthetics (FEA) factors. This research utilizes the Lamb and Kallal (1992) Function, Expressive and Aesthetics (FEA) user needs model as a guide in development of questions for the user interviews to generate ideas for the development of the new functional garments for the physically challenged wheelchair and bed ridden females in Benue State. The components of FEA model earlier highlighted and illustrated in figure 1 are achieved through many processes. Developing design criteria entails charting, ranking, weighing specifications to set priorities among many needs and drawing out interactions that exist among the specifications (Lamb and Kallal, 1992).

Where design specifications are to be drawn for a design of a functional garment, needs assessment of the users are obtained for various design criteria and cross matched with other design criteria to assess if there is conflict or no conflict. Design specifications which do not conflict directly with others are designated 1 and are accommodated with careful modifications. Design criteria which conflict with others are assumed to be unsafe and are designated 0. Specifications which do not conflict with others at all are considered safe and designated 2.

Functional criteria or requirements are very essential in designing garments for the physically challenged. It is concerned with the productôs ability to perform functions needed by the user as incorporated in the design. The functional requirements of the design according to Carroll (2001) include variables such as fit, mobility and ease of donning and doffing. Other functional attributes of the FEA model are: wearing comfort, thermal regulation, protection from threats and nuisances, range of motions and a number of task related needs. The functional requirements are influenced by the userôs cultural environment and the activities he or she is capable and permitted to carry out. For instance, some cultures create a sharp distinction between the clothes of males and females while some cultures are

liberal about what is worn by the different sexes. An understanding of the limitations of the culture and the users of the end products is important. Expressive requirements of FEA model address the non- verbal messages relayed through the product. Colour, fabric type and clothing accessories, symbols have been used to a great advantage in conveying non-verbal message in clothing design. For example, a garment with a neck tie convey official ness on the wearer. Colours have been used to depict inner feelings of joy, sorrow, delight, religious affiliation in garments (Sproles and Burns, 1994). However, various interpretations may be attached to the same design components depending on the cultural setting. Chase and Quinn (2003) asserted that the physically challenged wheelchair person requires all components of design elements like everyone else. Physically challenged persons are more highly been intergraded into the larger society. They enjoy circular employment, and participate in different activities of life, hence their need for more functional clothes. Physically challenged persons desire to wear clothes that can also convey non-verbal messages to the people they interact with. Aesthetics in clothing are very significant factors in clothing selection by people. Aesthetics culminates in durability, comfort and fashion ability and total pleasing appearance to the eyes. A design of a garment that can perform most functions but are not aesthetically acceptable may be rejected by the target user for which the design is meant. In generating the design ideas using the FEA model, the needs assessment of the Physically Challenged and the bedridden females must be carefully undertaken.

Designing is the most fundamental original step in bringing about a garment. Garment designing involves knowledge of drawing, building garment models and experimenting on what has been developed. According to Carroll (2001) designing of garments in effect represents creativity and ability to restructure and assemble through visual thinking various elements, such as shapes, colours and textures as an entity. Vandehear (2004) asserted that design uses information from the natural world and sciences

in an effort to imagine what could exit. Vandehear (2004) added that design is the human power of conceiving, planning, and making products that serve human beings.

Clothing for women especially is designed to meet their interests based on how they look in certain out fits or dress (Robertson 2008). All clothing, according to Robertson (2008) is designed to emphasize certain areas of the body. The garment may also purposely de-emphasize certain areas of the body; creating desired look and feel by the wearer.

In the apparel industry, according to Frings (1991), Diamond and Diamond (1996); designing is traditionally a creative process which involves the elements of colour, fabric, line (visual direction), shape (Silhouette), as well as the principles of proportion, balance, repetition, emphasis and harmony. Designing is the first component of product development process (Carroll, 2001). Garment designing is both a science and an art. The science aspect involves studying the fundamental principles and methods with application of scientific data. The art aspect involves creative manipulation of existing natural shapes and forms and translating same to desirable features that inform current fashion. This later aspect needs natural ability of the designer which can also be developed with practice. User needs form important aspects of designing garments. Six model stages of apparel design process: problem identification, exploring the problem, searching for alternatives, evaluating and making decisions, specifying the solution(prototype development and evaluation) and communicating the solution were posited by DeJonge (1984), Lamb and Kalla (1991), LaBat and Sokolowski (1999). The designing of garments rest on the fact that garments must fit properly on the figure. In order to achieve proper fit, the designer conceives the idea about how the product should look and translates the idea first on paper and finally into fabric for the development of the product. Any original creation depends on the manipulation of the above principles (Carroll, 2001).

Stone (1999) classified product development into two, namely-consumer driven product development and industry product development. Frings (1991) explains the general

ideas behind the importance of consumer focused product development in clothing industry: it involves finding a market niche around a particular life style and developing a product that fits that identity and staying with it. Some key research studies in clothing design theory have supported efforts to create a user (consumer) model for product development. These include Lamb and Kallaôs (1992) functional, expressive and aesthetic (FEA) user needs model; Regan, Kincade and Sheldon (1998); LaBat and Sokolowski (1999).

Product development is the formulation of new item for use by generating ideas from different sources. Ideas are sourced by various methods including literature. Assessment of user needs provide the impetus for development of a new product, in this case a prototype functional garment for the physically challenged female. Usually several stages or steps are involved in the development of a new product. The development of a product involves keeping it in good condition and measuring its performance and effectiveness.

Product development according to Glock and Kunz (2000) is the designing and engineering required to make products serviceable, producible and profitable. In the apparel industry product development is a continuous process involving different units namely; the sample maker or designer. The designer works and changes the design until the design satisfies the demand of the market. Carroll (2001) noted that product development in garment production take different forms. For instance the market driven product development described by Stone, (1999) for ready to wear consumer products typical of U.S. undergoes six stages consisting of: (a) planning the line, (b) creating the design concept, (c) developing the design (d) planning production, (e) production and (f) distributing the line. Another form of product development in the clothing industry is the consumer driven product development. Stone (1999) describes it as a product development that has the consumer at the central focus. This method of product development starts with the consumer in mind. The needs of the consumer form the motivation to design and

produce the garment. The FEA model earlier described in fig 1 is used to guide the five stages of product development given by Carroll (2001) as:

(a) Problem identification, exploration, preliminary ideas (idea generation)

(b) Design refinement, prototype development (sketching and constructing of first garment)

(c) Evaluation of the product (evaluating feasibility and planning production)

(d) Implementation

(e) Re-evaluation of the product to ensure consumer satisfaction.

Carroll (2001) averred that the consumer product development is used by clothing industries in recent times against industry driven product development where products were dictated to consumers. This current research is also consumer focused. Its emphasis on functionality of the product have been utilized by different functional garment designers especially at the preliminary stage of idea generation or brainstorming, evaluation stages of the design and in needs assessment studies (Cho, Komatsu, Invi, 2006; Holland, 2007).

Pattern making, grading and sizing have always preceded clothing development and manufacture. Several stages are also undertaken to develop pattern to different sizes through a whole process of pattern grading. The master pattern is graded (made into various sizes). A marker is created to accommodate all patterns pieces, sizes of the patterns, and quantity of items, hence whether garments are to be produced in large or small quantities patterns are indispensable. Use of patterns creates among many other advantages precision, cost reduction and standardization to fit large groups of people. Development of pattern is the link between designing and production of garments in the fashion industry. Pattern development aggregates the three dimensional figure of the wearer. The involvement of numerous abstract deductions and calculations take care of the length, width and depth of the figure. Developed patterns only become meaningful when translated into a form wearable on a figure. Bray (1987) noted that pattern designing and drafting even though

more complicated than modelling on the figure is preferred for its universality in application especially for mass garment production.

Bray (1987) noted that the most effective method of testing patterns by designing students is by placing the patterns on the figure or on the stand. The author reiterated that it is useful to develop the habit of experimenting with various proportions such as depth of neck lines, or of yokes, width of panels; regular viewing of the outcome to judge the effect in front of a mirror while planning the pattern was recommended. Bray (1987) noted that badly planned style lines become noticeable when viewed with the pattern tested on a stand or the figure. The correction of such wrong style lines early in the process of pattern designing brings about perfect garments. Bray (1987) therefore asserted that an effective pattern designer requires developing an eye for good line and proportion; this to improve taste and judgment. Testing of patterns as well as all ready- to- wear garments on the wearer requires understanding of the relations between body shape and clothing (Hsu, 2007).This process is also termed fitting.

Garment fit, according to Marshall, Jackson, Kefgen and Touchie-Specht in Anikweze (2003) is the correspondence in form of a piece of clothing to the wearerôs body. The science of fitting the clothing to the wearers by understanding the relation between garment and body shape is termed clothing ergonomics. Hsu (2007) noted that well-fitting garment is important for the quality of life

Fit in clothing must combine aesthetics and comfort while attending to different activities such as standing, sitting, walking and bending. Aesthetics include the total appearance; including the appearance of the fabric in relation to the design of the garment while comfort refers to accommodation of ease for various activities indulged in by the wearer. Lawson and Lorentzen (1990), (Ring, 2001) both noted that the consumer determines what culminates in good fit therefore an understanding of consumerôs perception is very imperative. The perception of fit may vary among different individuals who could

also be influenced by various factors such as age, cultural background and individual variations for example, figure type of the individual. Some guidelines for assessing clothing fit have been offered by clothing specialists viz:

(a) Garment should conform to the contour of the figure if it is a fitting gown.

(b) The amount of ćeaseô on the final garment depends on the prevailing fashion. However there must be enough ease for comfort for the wearer (not too tight)

(c) Shoulder seams should fit smoothly extending from the base of the neck to the shoulder. Even if the design is of a wide neck line, there should be smooth display of the contour of the shoulder seam relative to the neck line, (no sagging)

(d) All vertical seams must sit properly. E.g. The CF, CB, SS (Side seam) should be centred on the figure.

(e) Seams introduced into the design such as princess lines, yokes should sit smoothly with no strain or twisting. The basic silhouette seam lines should be smooth on the body. Darts must point to the fullest parts of the body (hip, bust, lower shoulder blade)

(f) Machines stitches must sit correctly on the body without gapping or pulling.

(g) Collars should sit properly relaxed and well positioned on the neck.

(h) Flaps on a garment should be smooth and becoming on the garment.

(i) Armholes should fit properly round the arm without gaping or been too tight causing discomfort.

(j) Sleeves should hang properly, ensuring good display of the grain line, patterns or design of the fabric. Check length of sleeve with elbow bent.

(k) Opening incorporated on the garment such as zips, buttons, hooks should give enough ease for donning and doffing. Slits on the lower hems of shirts must be smooth and not too long for comfort.

(l) Design details such as godgets, pleats, gathers, tucks, gussets, elastics, slings etc. should appear smoothly on the figure.

(m) All decorative details such as pockets, russet flowers, buttons placed correctly translate the garment to a smooth and beautiful product.

(n) Waisted dress should meet natural waistline.

(o) Pocket openings and pleats lie flat while standing.

(p) No horizontal or diagonal folds or wrinkles unless as part of design.

(q) Darts where ever positioned should sit correctly on the wearer

The Fit of garment also represents a relative term since it is seen in relation to the shape of the garment and that of the figure. A garment that has a lot of ease built into the design but hangs well on the wearer can still be said to fit well. Some garment designs require various amounts of ease basically to enable the wearer enjoy ease of mobility and comfort. Ease may also form part of the design for the garment. Well fitted garments must follow the body outline.

Various individuals have different figure types. Clothing are designed to suit different figures; especially female clothing. A more comprehensive difference exists between the seated figure and the standing figure. The figure types have been categorized by different authors based on some prominent features of the human body. Olaitan and Mbah (1991) categorized figure types as follows: short and plump, short and slender, tall and slender, and tall and plump. The categorization is similar to those readily used by several other authors: Webb-lupo and Lester (1987); Weber (1990); The general consensus is to categorize figure types based on relation between height of the figure and proportions of the body parts (Weber, 1990). While some bodies are well proportioned (height, weight and body parts) others are disproportionate. The proportionate figures are termed ideal figures while the disproportionate are termed figures with flaws.

Spencer (2003) categorized figure types into three, namely:

1. Straight

   Straight /wide rib cage

   Little / no waist line

   Flat hips /thigh

2. Tapered

   Short rib cage and /low bust

   Visible waist line

   Rounded hips/thighs

3. Curved

   Long and/ tapered rib-cage

   Obvious waist line

   Flared hips/thighs

The above categorization, apparently are based on three distinct body parts viz the chest cavity, the trunk and the hip of a straight figure.

In considering the relationship of figures of wheelchair users and their garment requirements, Chase and Quinn (2003) noted that the seated figure takes on an entirely new structure which reflects on the clothes worn. According to Chase and Quinn (2003), when seated, the spine curves forward and stretches, causing the waist line of the garment to drop in the back. This drop can be taken care of by increasing the level of the back waistline especially of trousers. Inactivity or ineffective use of the lower limbs, sometimes lead to disproportion in size of lower and upper torsos of the body. Pants (trousers) could tighten around thighs and crotch and cut the skin if the wheelchair user dons normal trousers (Chase & Quinn, 2003). Another figure problem identified by Chase and Quinn (2003) with wheelchair users is the tendency of the body to spread particularly in the thighs and buttocks. Hence, Chase and Quinn (2003) recommended that extra ease should be

incorporated into the stylish, pleat-front parts of trousers for wheelchair users. The use of knit fabrics for comfort in movement was also recommended by the authors.

Chase and Quinn (2003) noted that in the seated position the legs are bent. The length from hip to ankle increases as the measurement is taken over the bent knee and the designed trouser should accommodate this extra length. Chase and Quinn (2003) therefore recommended the positioning of pockets on lower thighs of trousers for wheelchair user so as to combat excessive straining by the user and undue bunching in the lap area while lifting items out of the pocket by the wheelchair bound person.

Needs Assessment for Functional Garment Development

Needs assessment is very necessary in garment designing especially when garment is targeted at specific consumers as in the case of the Physically Challenged and bedridden females in this research. Needs assessment involves evaluating needs based on understanding of the situation. Altschuld and Witkin (2000) defined needs Assessment as a systematic process by which needs are identified and documented. Needs assessment also entails identification of requirements, priorities and preferences of garment designs and styles that are important to particular consumers. While assessing the garment needs of any group of people, the social and psychological aspects of assessment would also be considered. The assessment of movement and impact also form aspects of needs assessment in clothing design. In every society the social attitudes and values of the people influence their conduct choice of dress. The socio-psychological clothing needs according to Weber (1990) and Watkins (1995) reveal the following needs:

a) Clothing preferences of users
b) Values that influence the ultimate acceptance of the designed garments
c) Acceptance of the specific designs

In addition to generating socio-psychological clothing needs, Haar (1998) documented the inclusion of assessment of activity, environment of the subject for who the garment is to be

designed. This can be done by observation over a period of time, interview of subjects and document review. Activity assessment could include, assessing size of pockets for its functionality, suitable brims on hats for farmers and suit, thermal assessment of fabrics under specified conditions (Altschuld and Witkin, 2000).

Clothing needs according to Weber (1990) are clothing that satisfy the functions of survival, safety and security (protection), identity, modesty, status symbol, and decoration. One or more of the above functions of clothes is fulfilled in other to satisfy the clothing need of an individual. Needs assessment with regards to garment is therefore an exercise that is directed toward identifying, knowing and documenting the garment requirements of the person that can comfortably assist the wearer to attend to his or her day to day activities. There is a marked difference between garment needs and wants, however, needs are to be prioritized over wants (Weber, 1990). Needs assessment for garment is particularly important if the garments will serve functional roles. The various activities indulged in by the wearer as well as his or her surrounding are also necessary to observe in order to correctly assess garment needs (Webb-Lupo and Lester, 1987) and articulate the design details in the functional garment by a designer. Various approaches have been utilized by clothing and textile design researchers to assess needs and proffer solution to the problem. Vandehear (2004) stated that needs assessment involves formulating ideas through systematic process to identify needs, documenting the needs, picturing the strength and weakness with the view to using the information to solve the existing problem. Vandehear (2004) noted that needs assessment also includes identification of issues, setting priorities, designing and creating styles in clothing.

There are varieties of needs assessment techniques documented by Vandehear (2004). The various types of needs assessment/techniques are available as a basic step to garment design. These include: informative approach, survey approach, social indicator technique

and nominal group process. The type of technique chosen by a researcher depends on time available for the research and circumstances. The techniques are:

a) Key-informant technique: A researcher solicits individuals who are knowledgeable about current fashion, fabrics, garment styles, garment types and the target population in a particular environment. These individuals sometimes termed fashion analysts study fashion trends assist in planning and predicting the future of fashion in their society. Information about the present clothing situation, fashion, material needs in the society are obtained from the fashion analysts using semi-structured questionnaire. The main advantage of this system is that it is quick and less expensive while information obtained is applied generally. The information may however be misleading since the actual users are not contacted.

b) Survey technique: Sproles and Burns (1994) averred that survey can be used to measure a variety of behavioural dimensions relevant to fashion trends. The data collected is used to make a general clothing recommendation for the general population. This method provides a scientific base for making recommendations for a specific clothing need for a target population. Sproles and Burns (1994) noted that the measurement of current norms of dress in the society be used to determine the fashions strongly endorsed in the consumersô social environment. Such surveys are also used to forecast fashion trends in a society. This survey method is however expensive and may require technical skills. According to Altschuld & Witkin (2000) survey technique utilizes the collection of data or information using questionnaire from a sample of target population of the intended beneficiaries of the designed garment such as, artists, farmers, sports men and youths.

c) Social indicators technique: This technique is based on descriptive statistics found in public sectors, libraries, reports. Social indicators such as the current fashion index, garment prize index, availability index and current garment index existing in a country or economy are used to make projection for the clothing needs at present or future. The social indicator technique is tied to the theory that new fashions evolve from previously existing

fashions in continuous manner (Sproles and Burns, 1994). Sproles and Burns (1994) noted that the concept of historical continuity could be used to analyse short-run changes in design details and colors. This technique provides an assessment for the clothing needs of the entire population. The technique does not give room for specific need of an economy (Altschuld & Witkin, 2000).

d) Nominal group process technique: In this technique, idea is generated by gathering information from individualsô ideas in a face-to-face non-threatening situation. The designer may generate ideas from Consumer Panels who keep records of their clothing acquisition or the panel could be made up of fashion innovators. This process allows for maximum creative participation of group members of associations and individuals. However, according to Bertzina (2007) this technique may not yield sufficient data and require additional survey.

The current research adapted survey and nominal group techniques to assist in generating ideas in assessing the garment needs of the physically challenged and bedridden females in Benue State. Needs assessment may also involve assessment of the physical size and body frame of the wearers of the designed garment. Various people have differing body structures and sizes and designers must make large enough garment sizes to accommodate the extra portions of the individual. The use of patterns prior to garment construction allows for adjustment to suit the various sizes required (Igbo and Iloeje, 2001).

Needs assessment is required for garment in designing. Weber (1990) averred that everyone has some basic needs belonging to different levels of importance namely; survival, safety and security, belonging, self-esteem and fulfilment. As people set priorities for their hierarchy of needs and as one is met there is a move to another level of needs. The classic hierarchy of needs proposed by Maslow (1954) in Weber (1990) can be used as model for classifying garment needs of people. Sproles and Bums (1994) noted that clothing plays

very vital roles at all levels of the needs of everyone. Emotional needs often create want but wants are different from needs, (Weber 1990).

Needs assessment stage explores the problem developed in the first stage. Bye (2010) asserted that problem solving design research brings about new knowledge which is translated into garment specifications. Bye (2010) added that identified needs could be solved using a problem ï solving design research; by practice and testing to discover new knowledge or product. Clothing needs assessment aims at satisfying different facets of clothing needs using various means of obtaining information. Some of the classification of needs assessment that pertains to functional garment include: Socio-psychological assessment and thermal assessment.

Socio-Psychological Assessment

Watkins (1995) noted that socio-psychological assessment of clothing needs entails obtaining data from users about their clothing preference and values which will affect ultimate acceptance or rejection of new designs. Values, prejudice, what people believe in personally and socially reflect their choices in terms of aesthetics, personal prestige and status. Existing clothing culture of the environment to benefit from the new design should be considered in the needs assessment. For instance, needs assessment standards for community clothing that has been subjected to disaster solicit information on the following:

(a) The social and cultural considerations on customary provision of clothing.

(b) The level of inadequacy or insufficiency of clothing items that may affect adversely the health, dignity and well-being of men, women, children and infants of all ages.

(c) The risk to life as a result of lack of such clothing needs.

It is equally necessary to ensure that the users are capable of tolerating specific design features included in the garments. Such design features should not be in conflict with each other on design matrix drawn out. For instance, in improving the design of cold

weather clothing, the designer must ensure that the clothing are not made at the expense of mobility, facility, dexterity or individual effectiveness (Grunnert 2007).

Thermal Assessment

Insulation of clothing material may be estimated using one of several simple techniques (Goldman and Kampmann, 2007). One method used the thickness calculated from increase in circumference of various body segments such as head, hand and torso with an adjustment when the space between layers occupied only by trapped air was greater than 0.5 centimeters, (Goldman and Kampmann, 2007). Another method that can be used according to Goldman and Kampmann (2007) is that, since thickness tends to be a linear function of fabric weight for conventional clothing materials, total insulation could be estimated from clothing ensemble weight; a relationship of 0.35c/o per kg of clothing weight.

Activity Assessment

An assessment of the activities of the intended wearer of the designed garment is equally important. This can be achieved by observing closely the activity as it is been performed in the natural state by interacting with the target users of the garment (Watkins, 1995). According to Watkins (1995), decisions concerning ease, fit and cut of garment can only be taken correctly when the designer knows the environment and activities of the wearer. Thompson (2010) suggested that if the conditions do not permit direct observation, the activities could be filmed or a simulation of the activity may be erected and observed. Information obtained could aid the designer in creating designs that do not conflict with the userôs activities (Thompson, 2010). For instance, in design of functional garments for forestry students, design should satisfy user activities of squatting, bending to prepare plant nursery beds, raising arm to cut branches of trees and many other activities of the students. Provisions should be made on the garments to accommodate ease of movement of arms,

flexing of knees and necessary padding to avoid hurting sensitive parts of the body of the users.

Specifications for Designing Functional Garments for Persons with Physical Disabilities

Meinander and Varheennaa (2002) asserted that in garment design both aesthetical and practical aspects should be fulfilled. Hence such garments should have characteristics that will meet both the physical and psychological limitations of the individual. Most physically challenged individuals fall into one or two classes of physical posture: the seated figure and the standing figure hence, while designing garments for Physically Challenged individuals, each individual should be seen as one with a distinct set of physical and psychological limitations (Chase and Quinn, 2003). When planning a garment, Chase and Quinn (2003) recommended that all the aspects of a particular limitation must be taken into account.

Designing aims at solving specific problems. Chase and Quinn, (2003) documented that the success of a design depends on how well the designer has combined aesthetics and technical expertise to solve the problems and therefore recommended that designing functional garments for the Physically Challenged should incorporate certain attributes. The clothing should be comfortable, easy to put on and take off, easy to maintain, and beautiful. Beauty comprise of quality of fabric such as lovely to touch, approved colour and style that complements the body and complexion of the wearer. Chase and Quinn (2003) however differentiated the designing of adaptive institutional clothing from functional clothing for the physically challenged. According to Chase and Quinn (2003), adaptive institutional clothing is clinical in nature. It calls attention to itself and the wearer in a negative way because it addresses the disability rather than the person wearing the garment. Chase and Quinn (2003) stressed that designing clothing for the Physically Challenged requires a combination of the many skills such as aesthetic sensibilities, fashion awareness, knowledge

of fabrics, pattern making, and construction. Designers should know individual needs and preferences of the wearer, input from therapists, medical personnel who work with similar problems and the Physically Challenged that experiences the difficulties. Clothing for wheelchair users must be versatile to accommodate the unique needs of the wearers involved in work, recreation, special occasions or simply relaxation at home. Chase and Quinn (2003) averred that the clothing for the physically challenged can be as stylish, sophisticated and current as the work done by any ñSeventh Avenueò designer. Good visual designs are relevant in the garments of wheelchair bound persons as in the garments of the people without physical disability. However, clothing for the physically challenged often deviates from the usual shapes in order to be more functional and minimize flaws (Johnson, 2009). Grunnert (2009) added that such clothing should enhance safety, independence and mobility.

Grunnert (2009) insists those designers of clothing for wheelchair users should know that clothing hangs differently depending on the personôs posture; when seated clothing for typical users bunch up around the waist and back. Longer-length sweaters peasant styles-tops, tunics and cardigans may also pose a hazard if they hang near top of the wheels and can entangle easily. Grunnert (2009) therefore documented that clothing for wheelchair users should be cut differently to enhance safety, independence and mobility using the following specification:

1. Longer neck-to-waist ratio: This is the portion of the garment from the neckline to where it touches near the waist. Adaptive clothing is often cut with this section longer in front than in the back so that the back of the garment does not bunch up when seated.

2. Longer-length on skirts on the front side: In the seated position, skirts tend to ride up in the front, exposing the leg or knee, while longer skirts hang down in the back, sometimes dragging on the floor. Hence, skirts for wheelchair users should be cut with the front

section proportionately longer, so that when seated, the skirt forms a neat circle around the bottom hem.

3. Longer-length trousers: Trousers also ride up on the leg when seated. To maintain a neat line without exposing too much sock, the length of trousers should be slightly longer than what could be worn when standing.

4. Loose fit around hips and thighs: For both men and women, pants with a loose cut around the hips and thighs are more comfortable than tight-fitting trousers. Relaxed-fit pants can also accommodate medical devices such as catheter bags and tubes, hiding them neatly under trousers.

5. Loose fit across the shoulders and arms: A loose fit in tops, shirts, jackets and blazers enables wheelchair users to move their arms freely to smoothly move their wheelchairs wherever they wish.

6. Flat seams: Nothing hurts more than seams that rub and chafe. Seams especially those inside should be soft and sit flat against the leg. Pinching, bunching or rubbing hurts a lot, and for those with sensitive skin due to medications or illness, can also spell disaster in the form of painful sores.

7. Avoid tight belts or fitted waists: Belts can be uncomfortable, especially if too tight. Ladies may wish to avoid dresses with belts. Fitted waists with elastic provide fashionable yet comfortable options for most garments.

8. Select colours that that enhance the individualsô desirable features, flatter the figure or hide undesirable features. Dark trousers or skirts blend in with the wheelchair, while pretty patterns or attractive tops and jewellery focus attention on the face. Vertical stripes make a person appear taller and slimmer. Large patterns may overwhelm petite figures.

9. Fasteners; Buttons, clips, neckties, and fasteners pose special challenges. Arthritis and other ailments can make buttoning shirts quite painful. Newer fasteners for use by

manufactures of clothing for wheelchair users include magnets or Velcro behind the button, plackets that create smooth, seamless look.

The use of large pockets, pockets placed just below the knees of trousers, pants opened the entire length of a side, built-in-slings for support (for paralyzed or weakened arms), underwear with alternative seam openings are functional design features suggested by Chase and Quinn (2003). The use of separates; garments that are composed of skirts, pants or trousers, wrappers and blouses was recommended for the wheelchair person. Chase and Quinn (2003) insisted that separates are excellent when the top is different in size from the bottom. Johnson (2009), however added that coats, blouses, jackets should be without long edges which may entangle on the wheels during movement. Johnson (2009) asserted that when the physically challenged wheelchair person wears separates, the following styles could be advantageous:

- Fold out extra fabric across lap of pants, skirts or dress.
- Extended back crotch length at the waist of slacks/pants
- Shorten tops or jackets and cut back seat area of skirts
- Make points legs wide enough to slip on easily. An alternative is to attach overalls closures (Zippers, nylon hooks or loops fasteners)inside seam area.

The following features according to Johnson (2009) may promote independence in dressing and undressing (donning and doffing) for the physically challenged wheelchair person.

i) Simple styles, with minimal details.

ii) Front or side closures.

iii) Full length zippers.

iv) Attached zipper pulls (small loops, rings, yarn tassels, braided ribbon or cording) for grasping zippers, hook and loop fasteners such as Vero large buttons, buttons sewn with elastic thread, mock buttons

v) Raglan and dolman sleeves, large arm openings

vi) Large neck openings, drawstring necklaces

vii) Extra fullness at knees and elbows.

viii) Elastic waist bands, waist closures

ix) Parts with a long back rise (for better fit wraparound skirt styles)

The utilization of design principles is a must in clothing design for Physically Challenged individuals. Chase and Quinn (2003) quoted Andre Courreges, a well-known French designer; ñLuxury in clothes to me has no meaning. It belongs to the past. My problem is not rich embroidery, useless business ï it is to harmoniously resolve function problems ï just like the engineer who designs a plane ï like the man who conceives a car. The design should combine function and aesthetics.ò Functionality has to do with the physical requirements in dressing that are the result of a particular disability/challenge. Aesthetics is realizable by accepting as a fact that beauty is one of the special needs emotionally necessary for survival. Grunnert (2009) averred that good looks give rise to a feeling of wellness. This beauty is achievable by combining the elements of design namely: line, space, form, texture and colour. The application and good combination of the above elements is reflected in the visual design of the garment.

i) Line

Line as an element of design includes direction that the outside edges follow as well as the entire horizontal, vertical and diagonals on the garment. The structural line such as yokes, panels, pockets, collars also contribute to the design of the garment. In designing clothing for the physically challenged, Chase and Quinn (2003) recommended that line in relation to the line of the body that will wear it should be considered. Chase and Quinn (2003) stressed that since a seated figure appears to be visually compressed, the emphasis of a vertical line will provide an illusion of extra height.

ii) Space & shapes

Shape is defined as a flat area or space enclosed by lines. Selecting and combing shape correctly give a successful garment design. Basically horizontal shapes add width and diagonal shape take on the characteristics of either horizontal or vertical shapes. The shapes frequently camouflage figure irregularities. Colour may interplay with shapes. For example, horizontal shapes or line may not add width if the colour contrast is close, the stripes are fine or if the total effect is one of ñstackedò horizontals resulting in a vertical effect much like a tall ladder with short horizontal steps (Chase and Quinn, 2003). The following guidelines for application of shapes and line for designing garments for persons on wheelchair were recommended by Chase and Quinn (2003):

1) Use vertical design lines rather than horizontal so that as much body lengthening as possible is achieved. This process emphasizes the silhouette.
2) Horizontal yoke or pocket lines should be avoided.
3) Vertical seaming or decorative trim edging the garment vertically is preferable.
4) Avoid use of shapes extending far away from the body, such as garments and garments parts like skirts, puffed sleeves since they add apparent bulk and weight.
5) Loose fitting clothes that camouflage figure extremes of thinness and heaviness could be applied.
6) Close fitting garments emphasize actual body contours and usually increase apparent size. Hence, use close fitting garments with discretion.
7) Curved shapes counter angularity; straightness counter rotundity. The use of Soft, rounded lines help very thin angular figures look fuller. Straight geometric design lines help plump person to appear slim.
8) A- shape tends to emphasize the part of the body where it ends. For instance, if the hemline of a jacket ends at the widest part of pelvis, the hips are emphasized.

Therefore the level where the edge of the garments ends should be carefully considered.

iii) Colour

Chase and Quinn (2003) reiterated that the designer of garments for persons on the on the wheelchair should decide whether smooth harmony, strong variation or multi-colour intensity is desired. The dominant colour in a garment draws the most attention, sets the mood for the wearers overall appearance. Colour can be used to draw attention to positive features or draw attention away from negative portion of the figure. Chase and Quinn (2003) noted that a taller look is achieved by wearing same colour of separates from head to toe in a long unbroken line. Dark, dull colours give illusion of thinness and will not attract so much attention. This characteristic can be used to great advantage in designing lower body garment such as trousers, skirts for wheelchair persons. Garments with dark dull colours draw attention away from the afflicted parts of the body.

Chase and Quinn (2003) noted that the psychological impact of colour should also be considered while designing garments for the physically challenged persons sitting on the wheelchair. Some colours termed happy colours such as red, sunflower yellow or orange according to (Chase & Quinn, 2003) lift the spirits of both the wearer and the observer. Hence, it is necessary sometimes to include accent colours to liven up an outfit. Such accent colours may be included on neck lines as ties and use of lively beads thereby drawing attention from the lower parts of the body that are afflicted.

iv) Texture

Texture plays important roles in the design of garments since it is one of the elements of design. Texture is the element of design that appeals to the sense of touch, sight, and even sounds (Chase & Quinn, 2003). Clothing textures interact with each other and with body shape to create illusions of bulk, filminess, smoothness, clinginess, etc. Chase and Quinn (2003) therefore suggested that fabric texture should provide physical comfort

for the wheelchair persons, avoiding friction between the garment and the body to prevent disastrous problem of pressure sores. Chase and Quinn (2003) documented that fabric texture can be used to camouflage figure irregularity, for example, the use of deep pile fabric such as fleece or bouclé to ñeven outò body asymmetry of a woman with scoliosis. Similarly the psychological effect of wearing a plush or luxurious cloth is the heightening of the mood and self-concept of the wearer and her audience. Hence texture of the fabric used in designing garments for the physically challenged person can influence his or her healing.

The wheelchair bound people, whether female or male have peculiar garment needs that require special design features. Different types of garments have been designed for the physically challenged wheelchair persons by different clothing companies especially in the US. The list include short skirts, cuffed pants, jackets, boleros, vests, blouse and lower garments such as long pants, fitted short/ knickers, overall and dungarees. Chase and Quinn (2003) listed a variety of garment styles the wheelchair female could wear to accent physical features, to distract from the negative and to make the imperfect look perfect. Chase and Quinn (2003) recorded, that overall height can be influenced by use of different sizes of hats. Large hats and full or ñpermedôô hair make the wearer appear shorter, while short, close hairstyles and small hat make the wearer appear taller. Short skirts, cuffed pants reduce overall height while narrow, slim or slightly flared pants or skirts create illusions of tallness for persons sitting on wheelchair. Shoulder, midriff and hip yokes according to Chase and Quinn (2003) are recommended where there is need to make the physically challenged person on wheelchair appear shorter. However, sheath, shift, princess style dresses add height to the wearer. The application of strong horizontal lines, ruffles, flounces, shirring add width while small-scale, all-over or vertical pattern and neat, small details at the top such as stand ï up collars or shoulder yoke seaming increase apparent height of people on wheelchair, (Chase and Quinn,2003). Recommended styles of garments that can create illusions of slimness for wheelchair bound females include use of narrow,

long set-in or raglan sleeves, single-breasted closings and fabrics with cooler hues, darker values. The authors recommended garment with smocks or bloused bodices, double-breasted jackets, waist-length vest, and fabrics with warmer hues and bright intensities, where the designer desires to make the wearer appear larger. Chase and Quinn (2003) reiterated that skeletal curves could be minimized or accentuated by use of specific design of garments for wheelchair users. For instance, high necks with front closings, interesting shaped shoulder yokes, dark values in shoulder area and small-scale, all-over or vertical pattern minimize spinal curvature. On the contrary, back neck accent, low back necks or closings, sailor or other collars flat in back, straight lines or tucks at back shoulder and tightly fitted bodices call attention to spinal curvature, (Chase and Quinn, 2003). Where there is need to minimize the bust line, garment design for wheelchair bound females should include straight-edge shoulder lines or collars, high cowl necklines, single-breasted openings, vertical bodice stripes or tucks and bodices gently bloused at bust (Chase and Quinn, 2003). Garment designs with Jabot or long tie- collar, horizontal shoulder ruffles or pleats, shoulder yoke with gathered bodice below, bodice smocking, shirring, pleating, draping or gathering at bust and thick or fuzzy bodice textures enhance a small bust line (Chase and Quinn, 2003).

Comfort in Garment Usage

Comfort is defined as the ñabsence of unpleasantness or discomfort or a neutral state compared to the more active state of pleasureò (Dhinakaran, Sundarasan and Dasaradan, 2011, P.1). The authors averred that the movement of heat and water vapour through a garment is probably the most important factor in clothing comfort. The state of comfort can only be achieved when most complex interactions between ranges of physiological, psychological, neuro physiological and physical factors have taken place satisfactorily (Dhinakaran et al, 2011). Goldman and Kampmann (2007) documented that comfort is a

state of the mind. They added that comfort is not a factor but a subjective weighing of all different properties of clothing. According to Dhinakaran et al (2011) comfort is perceived by integration of impulses passed through the nerves from a variety of peripheral receptors like visual, auditory, smell, taste and thought in the brain. However, clothing comfort is basically associated with skin sensory systems (Dhinakaran et al, 2011). Comfort forms one of the five factors that contribute to clothing practices for weight conscious women. The other factors enumerated by Kwon and Parham (1994) are fashion, camouflage, assurance and individuality.

Clothing comfort can be divided in three groups namely; psychological, tactile and thermal comfort. Psychological comfort is related to aesthetic appeal, which include size, fit, colour, lustre, style, fashion compatibility. Tactile comfort is related to fabric surface and mechanical properties which emanate from raw materials used for producing the fabric; the interaction between the physical demands imposed on the individual and many other social customs, tactile perceptions, environment especially temperature variations (Goldman & Kampmann, 2007). Thermal comfort relates to the ability of the fabric to maintain the temperature of the skin through heat transfer and perspiration generated with the human body. Goldman and Kampmann (2007) asserted that thermal comfort depends on the interaction between environment factors, clothing factors and physiological factors.

Saville (1999) documented two aspects of wear comfort of clothing namely; thermo physiological wear comfort and skin sensational wear comfort. Thermo physiological wear comfort is related to heat and moisture transport properties of clothing and the way clothing helps to maintain heat balance of the body during various levels of activity (Saville, 1999). Skin sensational wear comfort explains the mechanical contact of the fabric with the skin and this relates to its softness, pliability in movement and its lack of prickle, irritation and cling when damp. Wearing comfort as described by Saville (1999) is a measure of how well the clothing assists the functioning of the body or at least impairs it to a minimum degree.

Thompson (2010) documented the relationship between protective clothing and comfort of the wearer. Increased level of protection with several layers of clothing results in higher thickness and insulation value. This in turn reduces the permeability of the fabric to liquid, air and moisture due to decreased number of opening and ventilation on the garment thereby causing discomfort for the wearer (Thompson, 2010).

Basically clothing comfort can be categorized into two broad sections namely, sensorial comfort and non-sensorial comfort (Dhinakaran et al., 2011). Sensorial comfort is the sensory responses of nerve ending to external stimuli such as thermal, pressure, pain etc. producing neuro-physiological impulses which are sent to the brain and interpreted as perception of comfort/discomfort. According to Dhinakaran et al (2011), the sensory signals processed by the brain formulate subjective perceptions of sensation clustered as follows:

i. Tactile sensation: prickly, tickling, rough, razzy, scratchy, itchy, prickly, sticky.
ii. Moisture sensation: Clampy, damp, wet, sticky, sultry, non-absorbent, clingy
iii. Pressure (body fit) sensation: sung, loose, light weight, heavy, soft, stiff.
iv. Thermal sensational: cold, chill, cool, warm, hot.

Sensorial properties describe the performance of a fabric on skin contact and depend on fibre material, fabric construction (surface structure) and the fabric finishing treatments.
Non sensorial comfort according to Dhinakaran et al (2011) comprise physical processes which generate the stimuli like heat transfer by conduction, connection, radiation, moisture transfer by diffusion, sorption, wicking and evaporation. It also includes mechanical interactions like pressure, friction and dynamic irregular contact, air permeability, water repellence and water resistance properties that contribute clothing comfort. The properties that contribute to clothing comfort are summarized as: fabric handle comprising of fabric texture, thermal comfort, air permeability, water vapour transmission and water repellency and absorption. Texture according to Dhinakaran et al (2011) is a sensory perception that covers various aspects of surface features of the fabric including visual, auditory and tactile

perceptions which can be subscribed as smooth, rough, shiny or dull. There is a difference between perception arising from touch with finger touch and feeling by the skin during wear (Dhinakaran et al., 2011). Thermal comfort explains the characteristics of clothing in maintaining heat balance on the skin surface. Clothing provide a heat balance as it modifies the heat loss from the skin surface and provides a secondary effect of altering the moisture loss from the skin. The heat transfer through a fabric is a complex phenomenon affected by many factors and the resistance that a fabric offers to the movement of heat through it is of critical importance to its thermal comfort (Dhinakaran et al., 2011). Thompson (2010) suggested that ventilation features should be provided in clothing (garments) to allow passage of excess heat into the environment to avoid sweating.

Air permeability describes the property of fabric to let through air. The air permeability of a fabric can influence its comfort behaviour in several ways. There is a direct relationship between air permeability, water permeability (liquid and vapour phase). The water vapour permeability of fabrics is an important property for fabrics used for clothing system intended for vigorous activity. Dhinakaran et al (2011) noted that the fabric must be able to remove moisture in order to maintain comfort and reduce the degradation of thermal insulation caused by moisture build-up in cold environment. A breathable textile allows extra heat loss by evaporation through the clothing layers. Thompson (2010) suggested the use of thin- layer- fabric-garment that provide fewer insulation air spaces for enhanced evaporation cooling. Thompson (2010) added that, in the tropics where cooling is difficult to achieve due to high humidity, thin garments made from open weave fabrics to allow the limited amount of evaporation to take place could be used. Impermeable clothing surface capture moisture between skin and clothing, leading to heat accumulation in the body (Dhinakaran et al., 2011).

Clothing comfort may be assessed in different ways. Comfort is purely a subjective criterion; however it can be qualified in an objective manner in terms of the properties of

none-sensorial comfort characteristics. Dhinakaran et al (2011) documented that satisfactory thermal equilibrium and efficient moisture management are the most important comfort criteria in the apparel of 21st century. One of the processes of assessing clothing comfort is use of psychological methods (Sweeney and Branson 1990).Physiological models have also been used to assess the temperature. Examples include the use of vasomotor or sudomotor system, the most popular model being an NASA model produced by Stolwijk (Goldman and Hampmann, 2007). In this model, the sweat rate, vasoconstriction, vasodilatation and drilling are controllable.

Theoretical Framework

This research is based particularly on two theories of clothing namely: the protection and adornment theories. The theories of clothing like many other theories have been highly researched into to prove them. The various reasons why people wear clothes propounded by renowned authors are termed the theories of clothing. Early classification of the theories of clothes and body decoration are: Protection, self-expression, group identity, status, modesty and adornment. The diversity of roles played by use of clothing and body adornment have given rise to more theories such as body image theory, conformity and individuality theory, social leadership or adornment theory, Status theory, role theory and symbolism theory. The theories are interwoven. For instance, the psychological desire for adornment is to satisfy status, ceremonial use, group identity, sex attraction or self-expression.

Horn and Gurel, (1981) in considering the importance of clothing asserted that clothes worn by individuals serve as the ñsilent languageò that communicates what the person is. Faux and Davies (1988) added that Clothes transmit signals from other people in social encounters. Hence clothing is as much a part of human language as gesture, facial expression and postures (Faux & Davies, 1988). Clothes are indispensable to human beings because of the numerous roles clothes play in the lives of different people of the world.

Jones (1990) summarized the roles as follows: Protection, modesty, attraction, occupational identity, social status symbol and traditional identity. Early clothing no doubt was functional as depicted in the discovery of 1991 documented by Steele (2008). Steele (2008) asserted that proof of the claim was substantiated by discovery of a 5,000 year- old- male body on glacier near the Austrian Italian border. According to Steele (2008) ñit was clothed in a fur cap, a crudely tanned leather shoes. A grass cloak covered the fur and leather clothingò. The roles of clothing may be complete in one set of clothes worn by an individual; however, some roles may be deemphasized or non-existent.

The current research is particularly guided by theories of clothing that are concerned with functionality of the garment as protective covering and a mode of adornment in various forms.

Protection Theory

The protection theory otherwise known as the defence theory is one of the reasons for wearing clothes. By the assertions of Kaiser, Freeman and Wingate (1985) protection is the underlying reason for clothing though expressed in various ways. Priest and Pullen (1990) noted that clothes are worn by humans to protect them from extreme cold and from injury during accidents. Deflection to another body attribute less discrediting than their disability protects the physically challenged from assumed public glare that otherwise have embarrassed the individual. Similarly, compensation (expressing mastery in an area usually closed to disabled persons) enhances the physically challenged participation in areas that otherwise have been unattainable. The inclusion of easy to operate opening such as Velcro, press tabs have helped the physically challenged in donning and doffing garments. This special enablement protects the user from hazard such as cold, heat and neglect by caregivers. Emphasis of the social uniqueness of the subjectôs situation or uniqueness of disability have also been achieved in clothes worn by the physically challenge in the society

(Carroll, 2001). Inclusion of special design features in the clothing of the physically challenged distinguishes and protects them from lack of social interaction in the society.

Concealment, another finding by Kaiser et al (1985) as reason for wearing clothes by people with physical challenges could also be seen to have protective implication. Webb-lupo (1987) noted that protective clothing not only protect the wearer but also protect others. For instance, doctors and nurses wear gloves, over coats to protect patients from infection. The concealment not only protects the wearer from social embarrassment but also saves the onlooker from trauma of gazing at a deformation of portion of a body. In some cases concealment may also have health protection implication for both the physically challenged and people around him or her.

Despite the protection derived from use of clothes, Langner (2001) argues that the invention of clothes did not necessarily arise from the need for protection against cold since the earliest evolution of clothes originated in the areas with warm climate. Scholars still argue that the need for protection for humans from environmental hazard may not be foremost reason for the discovery of clothes by man. However, the use of clothing for physical protection is universal. The use of clothing for protection has greatly advanced as a result of many researches.

Protective clothing goes beyond physical protection from climatic and human hazards. Great advances in protective clothing have continued in recent times. A ñno-contact jacketò that stuns attackers with an 80,000V, operating on 9V battery and high voltage charge has been developed, (Technology Review, 2003).The wearer activates it by pressing a button on the inside of sleeves. The garment includes a layer of special conductive fabric which delivers crackling but non-lethal stun-gun-like shocks if assailants touch the jacket. The wearer is protected by an inner layer of rubber (Technology Review, 2003). In designing clothes for wheelchair patients, Chase and Quinn (2003), in line with the protection theory recommended the use of soft knitted fabrics rather than stiffer woven

fabric in constructing lower garment for people sitting on wheelchair to protect their soft skin from developing pressure sores. In some cultures of the world, ornaments, jewelries worn by people are believed to protect them against invisible spiritual forces (Kaka, 2007).

Adornment or Decoration Theory

Self-adornment is undertaken by peoples of the world for the purpose of expressing themselves, (1990). The adornment theory is generally accepted as the primary reason why people of most cultures first wore clothing (Tortora and Eubank, 1998). Self-adornment goes beyond tattooing of the skin. Skin scarring, piercing of nose, lips and ears to attach or suspend metal or non-metal objects, are also practiced by different cultures (Craig, 1973). Craig (1973) averted that the factors that determine the means by which people adorn themselves are: traditions of culture, raw materials available and the advancement of technology and communication. The fundamental reasons for adornment by people according to Webb-lupo and Lester (1987) go beyond the physical need for protection and modesty. Adornment is also done for these other reasons: to express status and superiority, ceremonial display, group identity, sex attraction, self-expression and creativity. In explaining the Social Psychology of clothing Kaiser (1990) documented the role of adornment in personal clothing to be ñAppearance modification for purposes of display, attraction, or aesthetic expressionò. Kaiser (1990) also asserted that clothing as adornment can be used as mechanism to lessen the effects of visible differences in the body and to emphasize other aspects of the self. For instance, technological advancement enables integral lighting that sparkled and flashed inside haute couture evening garments worn by well- to-do women to enhance their level of adornment, (Chung, 2004). Different design components to be included in clothing for the Persons with disabilities for the purpose of adornment have been documented by Johnson (2009) and Grunnert (2009).

Review of Related Empirical Studies

This section contains a brief review of existing research on designing, development and testing of block patterns for special garment needs. Researches relating to Social and Psychological aspects of clothing for Physically Challenged people were also reviewed. Designing functional garments is a relatively new area in clothing manufacture that is receiving great attention due to the need to produce garments that meet consumer requirements (Chase & Quinn, 2003).

Pioneer work in designing special clothing for rehabilitation of elderly patients in Ohio during the 1960s was carried out by Behrens in 1960. The researcher at the request of nursing home administrators produced special back open dresses for the elderly patients who would not always have to wear hospital type gown. Carroll (2001) noted that Behrensô designs could be as the first universally designed garments since it had several special design features incorporated in one basic garment to serve more than one type of physical disability. In Behrensô design, a dress originally designed for older incontinent women was found to be equally suitable for people confined to a wheelchair because of its full cut and overlapping Skirt panel. The problem of difficulty in managing fastenings such as (hooks and eyes, zippers, and buttons) due to restricted use of hands and lack of mobility was attended to by Behrenôs design. The challenge of donning and doffing of garments were addressed in the current design using Velcro and other notions appropriate for opening and closing of garments both by the physically challenged and their care givers.

Thorén (1990) researched on clothing for the disabled. The purpose of the research was to find out why it was difficult for disabled users to find suitable clothing. User oriented product development in combination with soft system methodology was used by the researches. Questionnaire formed part of the instrument for data collection. Data was analysed by percentages. The results of the research showed among other things that the clothing market was not adapted for people with unusual body dimensions and or different

kinds of functional impairments. The requirement of the disabled clothing users, depending on their types of impairments are fit and functionality. Shopping and service in the stores pose challenges to the disabled clothing user (Thorén, 1990). A new method of taking three dimensional measurements was developed by the researcher. It was discovered that the symbolic values of clothing are as important as the functional values. The researcher recommended that it is essential to focus on both the end product and other problems such as manufacturing, marketing and end use when considering clothing for the disabled (physically challenges) user. Both the current research and fore mentioned were user oriented, involving needs assessment. The use of questionnaires for data collection is common to both researches. Analyses of data included the use of percentages in both of the researches. The research conducted by Thorén (1990) also exploited the shopping and service needs of the users, the current research however did not extend to studying this aspect of the needs of the users.

Iloeje and Lemchi (1995) carried out a research to establish average body measurements of school age of (6-11 years) girls in Nigeria for development of basic garment patterns. The purpose of the research was to establish average body measurements for school age female (6-11yers) children and to utilize the measurements to draft block patterns for construction of uniform garments for school age females. Another objective of the study was to find the relationship between average body measurements of school age females in Nigeria and European countries. Data was analysed using mean and standard deviation to determine the average body measurements of the subjects. Some of the findings include: At 0.05 level of significance, there was significant difference at the chest, waist, hip, length of dress and height areas. European children were slightly bigger in size than the Nigerian children used as sample for the research. This research is similar to that of Iloeje and Lemchi (1995) since both took anthropometric measurements of the users. Both

researches used the mean measurements of the users to develop the patterns for the garments. Methods of data analyses for both researches were similar.

Bergen, Capjack, McConnan and Richards (1996) designed and evaluated clothing for the Neonate. The purpose of the research was to design and evaluate functional clothing for neonates in intensive care units. The research used the functional design process as the conceptual framework to design and evaluate clothing for the premature infants in intensive care setting. The researchers identified six research design criteria (Comfort, Safety, Adjustability, Accessibility, Aesthetics and Production) from which specifications were developed and their interrelationships through interaction matrix. Interviews and observations were used to assess the needs for clothing for neonates. Twenty two prototype garments were developed based on anthropometric measurements of the neonates and evaluated on twenty one babies of different weights. Evaluation of the prototype garments were conducted based on comfort, safety, adjustability, accessibility, aesthetics and production using a five- point Likert scale questionnaire. Caregivers (nurses) responded to the questionnaire after fitting the garments on the neonates in the intensive care units. Data was analysed using percentages and means. The findings indicated a definite need for clothing in various size ranges with special adaptations for the premature infants in the intensive care setting. The current research is similar to the research by Bergen et al (1996) since it entailed developing a functional garment for a special group of people with medical care. The identification of design criteria is common to both researches; however, whereas the past research included production aspect, the current research does not. Development and evaluation of prototype garments is common to both researches. In the current research, like in the foregone, development of the prototype garments was based on anthropometric measurements of the users. While Bergen et al developed the prototype garments based on the different weights of the neonates; the current research developed the prototype garments based on three sizes (small, medium and large) of the physically

challenged wheelchair and bedridden females. The involvement of caregivers and use of 5-point Likert scale to evaluate the performance or otherwise of the prototype garments are also common to both researches. However, in addition to caregivers, clothing and textile lecturers, garment constructors and the users participated in evaluating the prototype garments. The use of percentages and means for data analyses is common to both researches.

Haar (1998) used a design process developed by Joann Boles to develop a therapy garment for three four-year old boys to assess their sensory integrative dysfunction. Haar (1998) used sensory integrative methods. The design process framework comprised four stages:

(a) problem development

(b) needs assessment

(c) prototype development

(d) evaluation

The problem was developed by observing children with sensory impairment; interviewing parents and professionals experiencing sensory integrative methods and reviewing literature.

The needs were assessed for wearers through four weeks of observations of the activity and the environment, interview with the child and significant others and document reviews. The research design was multiple case studies. The data collection and analyses followed grounded theory procedures of open and axial coding outlined by Strauss and Corbin (1990). Haar (1998) used four garment specification categories:

(a) Movement.

(b) Sensory integration.

(c) Motor development.

(d) Play.

The process of prototype generation to meet garment specification in terms of structure, materials and assembly included writing ideas, coding and combining ideas, sketching ideas, constructing samples and constructing prototype solution. The prototype consisted of a sleeveless pullover top, cape and weights. It featured a boy superhero theme.

The prototype was evaluated against garment specification criteria through observations, interviews and evaluation form. Haar (1998) found the following:

- The prototype allowed full body movement and provided safety features for full interaction in movement.
- The prototype provided proprioceptive input and gross motor opportunities through elastic band loops and big weights, and promoted the use of vestibular integrating equipment with the cape.
- Textile opportunities were provided through the variety of materials used.
- Fine and perceptual motor skills were promoted by manipulative on the cape and the opportunity to see fine motor activities in cape pockets.
- Storing activities in the cape promoted smooth transitions, motor planning, organization, follow through and self-discipline.
- The boy theme appealed to the wearers play interests and promoted imaginative scenario during therapy, thus aiding in self-organization and task.

The current research, like the research by Haar (1998) comprises four stages of design processes. The process of carrying out need assessment for the wearers viz; observation, interviews of the users and significant others and review of documented literature is common to both researches. Evaluation of the prototype garments developed using forms/questionnaire is also common to both researches. However, the method of data collection and analyses following grounded theory procedures of open and axial coding outlined by Strauss and Corbin (1990) was not used in the current research. The four

garment specification categories adapted by Haar (1998) was also omitted in the current research.

Carroll (2001) reported on innovations and improvisations of functional clothes for the disabled. The purpose of the study was to develop specialized business clothing products for women with physical disabilities. This study based the conceptual framework to the design on Universal Design, employing qualitative research process. Carroll (2001) employed multiple data collection and analysis strategies. Datum was collected using interviews. Datum was analysed through coding and by descriptive statistics (frequencies and means). The research revealed that consumers with physical disabilities do not want to be treated as a specialized group, but same as any other consumers group. Carroll (2001) developed upper torso garments for physically challenged females. Other major findings from the study include the following:

- A categorization of disabilityôs effect on the body can be used to design and develop their clothing. A clinical definition of disability is not needed.
- Working women with a variety of disabilities can have similar clothing needs and preferences.
- Universal Design can be a successful strategy for product development.
- Constricting styles and fastenings present the greatest clothing problems regardless of subject disabilities.
- A universally designed clothing product can be visually appealing, functionally and easily manufactured within the existing clothing system.
- Marketing the product will prove to be the most challenging aspect of putting the products into the ready- to- wear system.

Carroll (2001) reported that if a universally designed clothing product can be successfully produced and marketed to many types of consumers, potential benefits could exist for manufacturers, distributors and consumers. The researcher observed that most researchers

on product development did not extend the research to include opinion of manufacturers and distributors of end use products.

The present research and that of Carroll (2001) focused on developing functional garments for female with physical disabilities. Both researches employed multiple data collection and analysis strategies. The current research based its conceptual framework to the FEA design and Universal design, employing quantitative research process unlike in the past research by Carroll (2001) that used only Universal design and qualitative approach. In contrast to the present research that used large sample size (n=368), Carroll (2001) used a small sample size (n=9) to obtain user needs for development of prototype functional garments for people with physical disabilities.

The research by Carroll (2001) was a qualitative research while the present research is a quantitative research. Though both researches entailed development of prototype functional garments for the physically challenged, Carroll (2001) concentrated on upper torso challenges, while the present research embraced those with both lower and upper torso challenges and those who may be totally incapacitated (bedridden). In the current research, 3 sizes of prototype garments from three different silhouettes (gown, skirt and blouses, trouser and tops) were fit- tested on three sizes (small, medium and large) users instead of 2 sizes utilized by the Carroll (2001). In contrast to the research by (Carroll, 2001) who included 6 women without physical disabilities in fit-testing of the garment, fit-testing of garments in the current research is restricted to the PCWBF only who are the final users of the prototype functional garments following the FEA Model.

Meinander and Varheennaa (2002) researched into the role of functional clothing and textile products in the improvement of life for the disabled and elderly. The purpose of the research was to find out how the functionality and aesthetics of clothing and textiles could improve life of the elderly and disabled. Meinander and Varheennaa (2002) also

identified problems that occur concerning clothing and textiles for disabled and the elderly people. The research results provided:

1. Built up data base in order to improve the availability of the information of clothing and textile for disabled and elderly.

2. Developed systems that enabled the industrial production of individually modified clothing by using automated body scanning technique.

3. Alter of the standard patterns according to individual dimensions.

The researchers concluded, based on their research findings that: Disabilities often lead to special functional requirements of clothing and other textile products in living environment and that the quality of life for disabled and elderly people can in many cases be substantially improved by a better choice of good looking and functional clothing and textile products. The overall purposes of the former research and the current research are similar: improvement of life for persons with disabilities, elderly and their caregivers. Provision of specific patterns that could be applicable to persons with different body dimensions/ individual body dimensions is also common to both past and the present researches.

Another study by Anikweze (2003) was reported. The purpose of the study was to develop dress patterns for women with figure problems in Enugu State. Survey and experimental design was used. The researcher utilized multiple design method to collate data. Sample of women with figure flaws were selected by observation of women and subsequent measurements. The researcher used average measurements of sample women to draft patterns which were used for cutting the garments. The prototype garments sewn were worn by samples of women and these were assessed for comfort using Fitting Standards Guides for women. Data was analysed by percentages and Means. The research showed that the widest distributions of values indicative of figure problems are found in the bust, waist and hips. The research revealed that the widest alterations to the drafted patterns were

related to the hips, waist and bust especially for women in the large size. The average rating of the clothing fit by the judges was 76.8%. The mean score for acceptability of the tested garments based on comfort was 77.8% although the range of variation was 16.7%. Similar to the research by Anikweze (2003), the current purposed to develop pattern and functional garments for special group of females. Both researches utilized the average measurements of sample respondents to draft patterns and adapted the patterns to selected styles by the users. In both researches, prototype garments for wear testing on the sample were constructed. The present research is similar to that of Anikweze (2003) as both utilized questionnaires and observation as instruments for collecting data on the garment needs of the users. Both researches utilized percentages and Means for data analyses. However, unlike in the study by Anikweze (2003), this study involved relevant stake holders such as nurses, clothing and textile lecturers and garment constructors while assessing the garment needs of the users. In this study unlike in the fore mentioned, the stake holders were also involved in determination of appropriateness of the prototype functional garments.

Coates (2005) researched on a method for user-oriented product development. The purpose of the research was to develop clothing products that were user- oriented. After a theoretical introduction, the method was applied to the development of functional clothing. The characteristic of the method is its starting-point with the user in the use-situation. Three case-studies were described where this method has been applied. They concern working clothes, clothes for the elderly and military clothing. The quality of this method as an instrument for product development in the clothing area was evaluated by comparing, on the one hand, the method with those usually used in the clothing industry, and on the other hand the new products with those formerly used. As parts of the findings, important product demands were derived from use-analyses. The method for user-oriented product development has proved to be complementary to conventional methods. Coates (2005) recommended that it should be applied to products whose functional properties are of great

importance. It was also suggested that the method can be generalized to all users and to products with close connection to human beings. The current research is a product development research that is user oriented, assessment of the success of the product also focused on the use of the products (fit- testing of the functional garments)

In another study reported by Cho, Homastu, Invi, Tahatera, Shimizu and Park (2006), the purpose of the study was to develop individualized pattern making using computerized draping method for clothing. The researchers developed a method of individual pattern making by modifying a traditional draping system so that it can be used in conjunction with modern three-dimensional modelling techniques. The fitting process prevents or controls bulking when the limit angle of a fabricôs ability to conform to a surface is exceeded. Computed geometrical models were used to control bulkiness rather than physically controlling the bulk. Data analyses included us of percentages. The research showed that patterns made from this method achieved greater success in creating complex curved lines for the sample dummies used for fitting the garments. Approximately 80% of the subjects indicated a preference for skirts made using this method over traditionally designed skirts. Use of percentages for data analyses is common to both researches. The current research similarly adopted the method of preliminary fitting of prototype garments on users to obtain feedback prior to final product development. The control of bulkiness is similar to both researches. Although, while control of bulkiness was achieved through folding or slashing portions of the patterns in the present study, control of bulkiness was achieved using computed geometric models in the past research. Unlike in the research by Cho et al (2006), the current research utilized developed designs that created differences between overall lengths of garment hems to reduce bulk for the wearer.

Hsu (2007) researched into developing body measurement charts for improving female clothing manufacture applying a bust-waist-girt ratio approach in China. The study purposed to classify body shapes for developing body measurement charts for women. The

researcher conducted factor analysis to identify the most critical factors which can form the foundation for classifying the population. Data was collected by building anthropometric database using direct anthropometric measurement of the sample female with 44 anthropometric variables. Hsu (2007) found that body measurement charts are necessary for designing and sizing clothing. The study identified 12 anthropometric variables made up of six (6) linear measurements and six (6) girth measurements commonly used for upper body clothing manufacture. The study also showed that the waist and height factors were the most anthropometric variables in clothing making and so the population was classified on the bases of stature (Height factor) and the girth factor. The researcher concluded that well-fitting clothing is important for quality life. Size based on regular ratios of different body shapes to one another makes sense to the clothing manufacturers as well as pattern making, pattern grading, marker making, cutting and sewing during production, (Hsu, 2007). The current research similarly utilizes direct anthropometric measurements of the PCWBF to establish the required body measurements for creating the patterns for the prototype functional garments. Like in the past research, the present research established three groups of body sizes of PCWBF based on the measurements taken. However, while the past utilized a relatively small sample size (n=44) to establish the different groups of body sizes, in the current research, a relatively larger sample size (n=368) to establish the three groups of sizes for average sizing for pattern development. Fit is also considered very important in the current research like in the past research.

A recent study by Thompson (2010) developed functional apparel for cosmetologists for use in their occupation in Lagos, Nigeria. The study adopted Research and Development (R and D) design and Functional Apparel Design Process framework. The sample comprised 195 respondents (22 judges and 24 cosmetology models) who assessed the movement/mobility, fit, comfort, safety /protection, expressive, aesthetics and general utilitarian variables of the developed prototype functional garments. Data was obtained

using three different needs assessment questionnaires. Data was analyzed using descriptive statistics, means and standard deviation. Hypotheses were analyzed using t-test and one-way ANOVA. Major findings included: 6 general functional apparel needs for cosmetologists, 11 design criteria clustered into 7 broad variables were needed to produce functional apparels for cosmetologists. Seven creative design ideas were selected, mean body measurements were determined for three size categories, a 20 piece pattern set were developed for each size category of consumers and 24 functional apparel sets were produced. The study recommended among others that, the findings of the study be made available to beauty academia and cosmetology organizations to create awareness about current research in cosmetology workforce.

The research by Thompson (2010) is similar to the present research since both developed functional garments/apparels for special groups of persons. The use of needs assessment questionnaire to obtain garment needs of the various users is common to both studies. The involvement of judges in deciding the appropriateness or otherwise of the developed functional garments on the users is also common to both researches. Both researches also analysed data collected using descriptive statistics, means and standard deviations. However, while the former research utilized existing standard measurement chart of females, the current research took anthropometric measurements of the users and established three average sizes (small, medium and large) of the users for development of basic patterns which were adapted to the selected designs. The former research utilized a relatively higher sample (n=22) than the present research (n=3 one each from small, medium and large size categories of users) for fit ï testing of the functional garments developed.

Summary of literature Reviewed

The reviewed literature showed that the development of functional garments is guided by different factors among which are specific models chosen by the garment developer. In all, the garment needs of the user are paramount. These needs may be functional, expressive and aesthetic demands for functional garments. The functional needs could be for physical protection from harsh environmental conditions or social-psychological demand for identity, security, comfort and enablement to carry on daily activities. The review of literature exposed the different physical disabilities that place demands on garment designersô specificity in design. Garment designs, development and evaluation also formed part of the reviewed literature. The three are indispensable in functional garment production. Design is the first step followed by pattern drafting in functional garment development. Other considerations in the review of related literature included needs assessment by various methods, garment designing for the PCWBF. Clothing comfort and comfort assessment were reviewed. Several design specifications for persons with disabilities formed part of the reviewed literature. Theoretical frame work for the research was reviewed. The research based particularly on two theories of clothing: protection and adornment/decoration theories.

The review of related empirical studies established the fact that the development of functional garments for special needs is an important aspect of clothing studies. Different researches reviewed, revealed that functional garment designs focused on meeting physical needs for protection from harsh environmental conditions, task-related needs as well as social-psychological needs of clothing for persons with disabilities, the elderly and persons with abnormal body dimensions. Task-related needs for garments refer to functions performed by the garments in providing covering, ease of attending to specific functions for the user. Social-psychological needs of the wearer are met when such garments are used to create identity, enhance social status and provide emotional stability for the wearer. The

variability of physical disabilities and difference among the needs for various task-related garments needs place demands on clothing specialists for more garment designs to meet the myriad of needs. Although numerous researches in functional clothing development have been undertaken abroad and in Nigeria, no research has addressed particularly the functional garment needs of persons with disabilities. It is also evident from the review of empirical related studies that no study has been conducted to address particular functional garment needs of the physically challenged wheelchair and bedridden females in Benue State of Nigeria. It is this gap that the present research aimed to bridge.

CHAPTER THREE

METHODOLOGY

This chapter outlines the design of the study, the plan and phases of the study, area of study, population for the study, sample and sampling. Method of data collection, validation of the instrument, reliability of the instruments and methods of analysis are included.

Design of the Study

The research design was Research and Development (R and D). According to Gall, Gall and Borg (2007), Research and Development is a component of evaluation research. Evaluation research is particularly important to policy makers, programme managers and curriculum developers. Research and Development is a research-based approach to developing new programmes and materials to improve education, (Gall, Gall & Borg, 2007).The R and D systems approach model of educational research and development comprise ten steps called the R and D cycle (Gall, Gall & Borg, 2007). The ten steps of systems approach model of educational research development shown as appendix A comprised: Identification of instructional goals, conduct of instructional analysis, analysis of learners and context, writing of performance objective, development of instruments, development of instructional strategy, development and selection of instructional materials, design and conduction of formative evaluation of instruction, revision of instruction, design and conduct of summative evaluation. The current research adapted the R and D cycle using six steps illustrated in figure 3.

Step 1: Identification of Goals for Development of Functional Garments. This involved identifying the Physically Challenged Wheelchair and Bedridden Females (PCWBF) in Benue State.

Step 2: Identification of Procedures and Tasks that Dictated Garments Needs by PCWBF.

This step involved studying the setting in which the people live and the activities they are usually involved in so as to establish their garment needs and identify necessary design features needed for inclusion in the functional garments.

Step 3: Size Categorization of PCWBF and Development of Basic Patterns (Analysis of Users' Size). Measurements of PCWBF were taken and categorized into three sizes: small, medium and large. Basic patterns of gowns, skirt and blouses, trousers and tops were drafted based on the three sizes.

Step 4: D**evelopment of assessment charts: Validation Instruments for Fit-Testing Prototype Functional Garments (Development of Instruments)**

Step 5: Development of Prototype Functional Garments (Instructional materials). The prototype functional garments were constructed in the three sizes each and fit-tested first by the users to obtain feedback on the suitability/ appropriateness of prototype functional garments. Appropriateness culminated in fit, comfort, functionality, aesthetics and expressive attributes. Feedback obtained from the users (PCWBF) was utilized to effect corrections on the prototype functional garments.

Step 6: Summative Evaluation of Prototype Functional Garments Produced. This step consisted fit-testing of prototype functional garments to assess appropriateness based on standard criteria such as fit, ease of mobility, comfort, acceptability, functionality, aesthetics and expressive attributes by the users (PCWBF) and judges (nurses, Clothing and Textile, garment constructors).

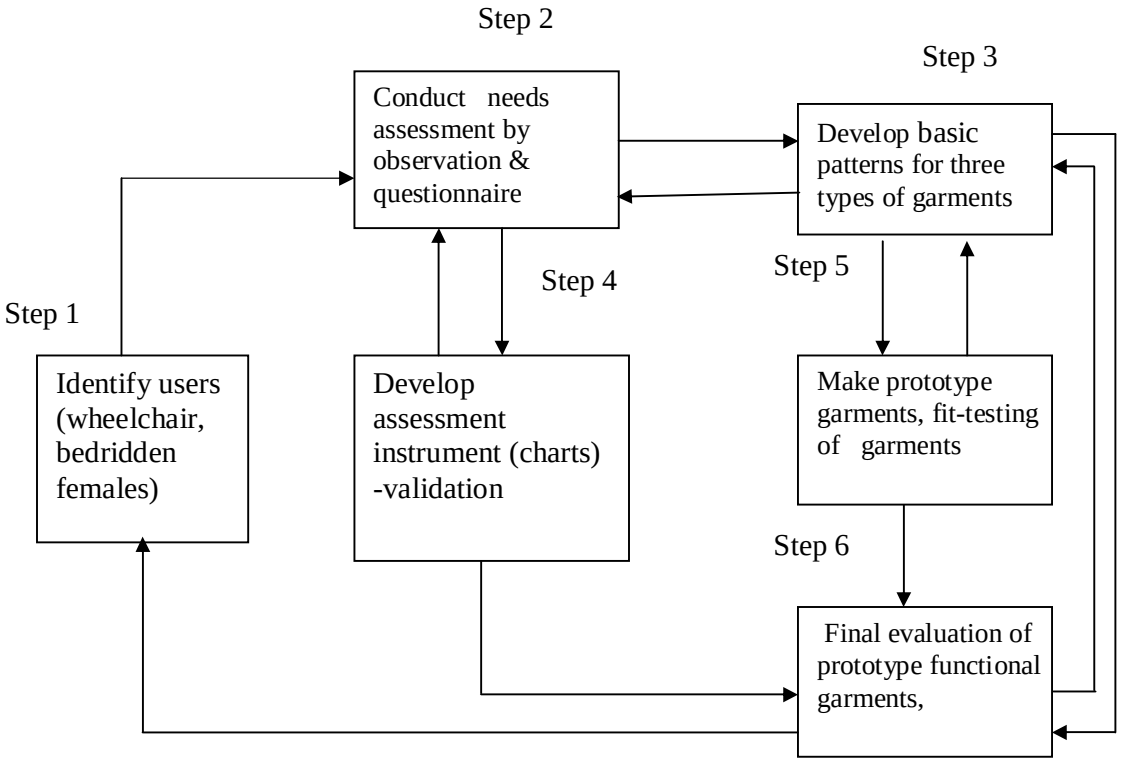


Figure 3: Adapted R and D Cycle Model for the Development of Functional Garments for Wheelchair and Bedridden Females in Benue State.

Source: Adapted from Gall, Gall and Borg (2007) Appendix A.

Area of the Study

The area of study was Benue State of Nigeria. The State comprises twenty three (23) local government areas (LGAs) divided into three senatorial zones namely; A, B,C. Zone A has Ukum, Katsina Ala, Logo, Kwande, Vandekya, Ushongo and Konshisha. Zone B comprises Gboko, Buruku, Guma, Makurdi, Gwer, Gwer West and Tarka. Zone C has Otukpo, Apa, Ohimini, Okpokwu, Ogbadibo, Oju, Obi, Agatu and Ado. Zones A and B are Tiv speaking while Zone C is made up of predominantly Idoma. Appendix Q shows the Zones and the Local Government Areas (LGAs) in each of the zones. There is a tertiary health care delivery centre, Federal Medical Centre (FMC) situated in Makurdi the State capital. There is a rehabilitation hospital: Mkar rehabilitation hospital (MRH). The MRH has a Christian Blind Mission Centre which hosts the training of Women with Disabilities

including those on wheelchair and crutches monthly. Their activities are coordinated by an NGO, Advocacy for Women with Disabilities Initiative.

Population for the Study

The population for the study was 9,940 persons comprising four groups:

a. Physically challenged wheelchair and bedridden females (PCWBF) referred to as users were 8,944. The total number of females with mobility Disabilities in Benue State was 8,944 (NPC, 2006).

b. Nurses /caregivers were 769.This figure was obtained from Benue State Health management Board (2011).

c. Clothing and Textiles lecturers were 10. This figure represented the total number of lecturers of Clothing and Textiles in the three tertiary institutions in Benue State that offer the course.

d. Garment constructors. The population was obtained from Garment and Textile Workers Union in Benue State. The number of garment constructors /tailors who were members of the Union was 217.

Nurses, Clothing and Textile lecturers and garment constructors were included in the study because it is assumed that they are stakeholders in the welfare and clothing of PCWBF. Information about the physically challenged wheelchair and bedridden females in Benue State was obtained from different sources including; oral interviews with the chairman of association of Persons with Disabilities (PWDs) in Benue State, Women with Disabilities Initiative, an NGO that collaborates with Mkar Rehabilitation Hospital (MRH) in Gboko for the training of women with disabilities and literature. The number of Clothing and Textile lecturers in the tertiary institutions was obtained from the Personnel departments of the various institutions namely: University of Agriculture Makurdi, College of Education Katsina Ala, College of Education Oju, Akpera Orshi College of Agriculture

Yandev, where Home Economics Courses are taught. The two Colleges of Education and Agriculture selected are the oldest tertiary institutions; each belonging to a different geographical zone of the State. Information about garment constructors/tailors was obtained from registered tailors in the State.

Sample for the Study

The sample for this study was 653 persons. The sample comprised four groups; PCWBF, nurses and garment constructors and Clothing and Textile lectures who participated in the study at different phases. A standard statistical table by Emaikwu (2008) in Appendix R was used to obtain the sample size of the PCWBF, nurses and garment constructors from the populations. No sampling was done for Clothing and Textile lecturers since the population was small. The sample for each group was: PCWBF (368), nurses (260), garment constructors (15) and Clothing and Textile lecturers (10). Details are summarized in Appendix H. In each of the senatorial zones A and B comprising seven local governments each, the three largest and oldest local governments were selected, while in Zone C comprising nine local governments, four largest and oldest local governments were selected. Each of the local government area were proportionately allocated sample sizes of PCWBF based on the population of the local government. The populations of the various local governments are shown in Appendix Q.

Convenience or accidental sampling technique was utilized in selecting judges (Clothing and Textile lecturers, caregivers /nurses and garment constructors) who participated in final evaluation of the functional garments. Sample for determination of aesthetic and expressive attributes of the prototype functional garments comprised: five nurses, five garment constructors and ten Clothing and Textile lecturers and three users selected from the existing samples by purposive sampling.

Instrument for Data Collection

Data for the study were collected using the following instruments:

1. Garment Needs Assessment Questionnaire (GNAQ) for assessing the garment needs of PCWBF (Appendix B and C).
2. Observation Checklist (OCL) to identify the activities of Physically Challenged Wheelchair, bedridden females (Appendix D)
3. Body Measurement Chart (BMC) for obtaining measurements for large, medium and small sizes PCWBF (Appendix I, J and K)
4. five-point-Likert scale Garment Fit Assessment Questionnaire (GFAQ) for fit-testing prototype garments by users (Appendix M)
5. five-point-Likert scale Garment Fit Assessment Questionnaire (GFAQ) for assessing fit of prototype functional garments by judges (Appendix N).

Garment Needs Assessment Questionnaire (GNAQ) is an instrument constructed by the researcher to solicit information on the garment requirements of the PCWBF. DeJonge (1984) and LaBat (1992) averred that obtaining information about user needs is an essential part of the design process. The FEA model of garment design which is being utilized in this research also recommends the need for adequate information on user needs prior to design since the user is the center of the design. The GNAQ (Appendix B and C) comprised four sections; A, B, C and D. Section A contained four questions on the need for functional garments. Each question had four or five options on garment requirements and type of garment preferred. Section B made up of seven questions solicited information on garment design features preferred by PCWBF/ users and those recommended by the judges (nurses, Clothing and Textile lectures and garment constructors) that needed to be incorporated into the prototype functional garments. Each attribute of a design was followed by several options. Sections C and D had five point Likert Scale of measuring the response of the PCWBF and the judges on preferred aesthetic and expressive design features. Section C has

fourteen questions while section D has seven questions. The scale comprised: Strongly Agree (SA) =5, Agree (A) =4, Undecided (U) =3, Disagree (D) =2 and Strongly Disagree (SA) =1. Section C solicited information on garment design specifications for gowns, trousers/pants and skirts that are functional and aesthetic; can enhance mobility, fit, comfort, safety and easy donning and doffing, beautiful to see based on individual preferences and acceptability. Section D contained information on functional, aesthetic and expressive attributes preferred by both users and the judges.

The Observation Checklist Appendix D as an instrument for data collection was necessary for assessing the functional requirements of the garment. According to Carroll (2001), functional requirements of a clothing design are influenced by the userôs cultural environment, physical characteristics and the activities he or she is capable and permitted to carry out. Hence an understanding of the limitations of the culture and the user of the end product is important. The Observation Checklist for Wheelchair bound females (OCL) had eleven items that the respondents selected from to indicate their participation or otherwise in the various activities list appendix D.

The Standard Body Measurement Chart (SBMC), Appendix G is a compilation of the different body parts needed to be measured for effective pattern drafting and garment construction. This guided the taking of measurements of PCWBF from the field in phase 1 of the research. Basic measurements of parts of the body required for drafting blouse bodices, skirt blocks and trousers were taken. The body measurement was grouped based on a Standard Body Measurement Chart, African Women Size Chart obtained from reviewed literature. The measurement of the body parts required for drafting the basic bodice blocks/ patterns of garments are included in body measurements charts (BMC) for each size category in Appendices I, J and K. These include for: (a) blouses/tops, gowns; bust, waist, hip, nape to back waist, shoulder, front length, length of sleeve, round sleeve, round arm

hole, (b) skirts, trousers/pants; round waist, round hip, length of skirt/ trouser, round ankle, length of crotch, length from waist to knee.

Garment Fit Assessment Questionnaire (GFAQ) in Appendices M and N are assessment instruments for both the PCWBF and the judges for rating the fit, overall performance, aesthetic and expressive attributes based on given criteria obtained from literature. The GFAQ had five sections (1,2,3,4 and 5). Sections 1 and 2 each had at least ten different variables on fit of the prototype functional garments on the users while sitting and in slight motion. Sections 3 had nine variables on comfort and overall performance of the garments, Sections 4 had eleven variables on aesthetic variables while Sections 5 had six variables on expressive characteristics of the prototype functional garments. Each of the variables to be assessed was followed by a five-point- Likert Scale: Excellent fit (5), Good fit (4), satisfactory fit (3), Poor fit (2) and Extremely Poor fit (1).

Methods of Data Collection

Prior to data collection, three research assistants were selected from among post graduate students of Home Science and Management department of the University of Agriculture, Makurdi. The research assistants were trained to assist the researcher in recording measurements taken, pattern drafting and alterations, proficiency in interpreting the content of the questionnaire to respondents and assisting respondents where necessary. Data for this study were collected in three phases (1, 11,111) involving two groups of sample of respondents: users and judges (nurses, Clothing and Textile lecturers and garment constructors.) Multimethods were used in selecting the respondents.

The entire sample comprising 368 PCWBF, 260 nurses, 10 Clothing and Textile lectures and 15 garment constructors provided responses for obtaining data for phase 1 of the study. Data obtained included, physical characteristic of PCWBF, activities of the PCWBF in their environment, garment needs and types of garments required by the

PCWBF. The study utilized only nurses that were on duty on the days that the visits were scheduled to hold in their places of work, those who were knowledgeable about the subject and were willing to participate in the study. The nurses on duty on the days of researchersô visit were chosen as the sample of interest for two reasons. First, because nurses on duty are cross- section of all ages, gender and fields of specialization. Second, the study was designed for all nurses who are involved in caring for all patients irrespective of the nature of illness, this include physically challenge wheelchair and bedridden females. Eligibility for participation by garment constructors was also based on availability, knowledge of the research requirements and consent to participate.

In phase 11, the entire sample of the PCWBF totalling 368 participated in the study. The exercise involved taking measurement of each person and categorizing them into three sizes (small, medium and large) and utilizing the data analysed to draft basic patterns for functional garments.

In phase 111, 3 PCWBF /users and 20 judges comprising 5nurses, 5 garment constructors and 10 Clothing and Textile lecturers made up the sample size. Non-probability sampling technique was used to purposively select 3 PCWBF from the sample for fit-testing constructed prototype functional garments for the research. The selected nurses, garment constructors and Clothing and Textile lecturers participated in assessing the aesthetics and expressive attributes of the prototype functional garments. The three PCWBF were made up of one each belonging to small, medium, and large size categories. Those selected to fit-test prototype functional garments were those whose body sizes coincided with the mean body measurements chart computed from data obtained for the study. Other criteria for choosing fit-testers from among the PCWBF were ability to understand the requirements of the research and consent to participate in the exercise. Use was made of consent forms (Appendix U) to seek consent of participants prior to the study.

Data for this research were collected in three phases (1, 11,111) using multiple methods summarised are as follows.

Phase1

i. Identification and selection of the physically challenged wheelchair and bedridden females, selection of nurses, Clothing and Textile lecturers and garment constructors in Benue State.

ii. Development of Instrument 1; Garment Needs Assessment Questionnaire (GNAQ) for PCWBF and judges, Appendix B and C

iii. Development of Instrument 11; Observation Checklist (OCL) of activities of PCWBF Appendix D.

iv. Development of Instrument 111; Garment Fit Assessment Questionnaire (GFAQ) for users and judges, Appendices M and N respectively.

v. Development of instrument 1V; Body Measurement Chart (BMC) for small, medium and large sizes. See Appendices I, J and K.

vi. Development of evaluation forms for instrument 1: Validation forms for Garment Needs Assessment Questionnaire by users and judges respectively. See Appendices E and F.

vii. Development of evaluation form for instrument 111: Validation Chart for validating the Garment Fit Assessment Questionnaire for test- fitting prototype functional garments by users. See Appendix O.

viii. Development of evaluation chart for instrument 111: Validation Chart for evaluating the Garment Fit Assessment Questionnaire for test-fitting the functional garments by judges Appendix P.

ix. Training of research assistants for phase 1 of the study.

x. Data collection for phase 1.

Collection of data on the type of activities involved in by the PCWBF using Observation Checklist Appendix D was undertaken. The PCWBF were visited in the hospitals and their residence severally to observe and record their activities. Their physical characteristics were also observed and recorded. This was necessary to establish the characteristics that determined their garment needs and to develop design features for inclusion in the functional garments. Garment Needs Assessment Questionnaires (GNAQ) were used to ascertain the garment requirements, types of garments, aesthetic and expressive design preferences of the PCWBF for the functional garments from the PCWBF and judges. GNAQ were served to the PCWBF on scheduled visits to organized groups in the different local government areas of Benue state. GNAQ distribution was carried out for the various groups of judges in their places of work on scheduled days. Other activities comprised determination of the mean body measurements of the PCWBF. Some of such organized meetings are shown in appendix W (d-h). Measurements of the physically challenged wheelchair females were taken during scheduled visits to their groups and categorized into large, medium and small size based on standard body measurements charts the means were used for drafting basic blocks for female dresses documented by Beazley and Bond (2003) and Decker (2007). The measurements are in appendices I, J and K. The body measurements taken include: Round bust (RB), round waist (RW), round hip (RH), back waist length, neck circumference (NC), round hip (RH) for trouser or skirt, round thigh (RT) for trousers and waist to ankle length for trouser and skirts. Average body sizes categorized from the measurements are shown in Appendix L. Measurements were taken in the morning hours to avoid interference of emotional and physical imbalances. Uniform plastic tapes were used and each measurement taken personally by the researcher to avoid discrepancies in computation of the correct measurements. Measuring callipers were used to take measurements of difficult-to-reach parts of the body like round the thigh to obtain relevant data.

xi. Determination of design features to be incorporated into the design of the functional garments.

Ideas generation for creative designs for the prototype garments were based on review of literature and information from GNAQ and OCL.

Initial ideas about the designs of the prototype functional garments were drawn, sown into styles which were shown to the PCWBF, nurses, Clothing and Textile lecturers, and garment constructors during scheduled visits to enhance good understanding of the concepts. Shapes of necklines; overall shapes of garments were also shown as diagrams to explain salient points to participants in the research. Some of the sketches of conceived designs are shown in the Appendix V. Initial interest in the research developed from personal experience in the hospital while on admission with multiple detached fractures of the right leg in an orthopaedic specialist hospital. It was observed that people with similar or more complicated health challenges on admission in the same hospital had difficulty in attending to their garment needs and usage while in bed and after recuperation and on visit for medical check. It became necessary to attempt to solve the problems of such patients associated with their use of garments while attending to their daily activities more conveniently.

Of particular note and interest was a case of a woman who had been bedridden for thirty-one year due to spinal cord injury left in the care of 5ï 6 year old little girl most of the time. Her problems were (a) need for protective clothing in cold weather, (b) need for lighter garments in hot weather, (c) mobility ï reaching out to pick items of need, (d) toiletry (donning and doffing for toileting), (e) cleaning up sored parts of body occasionally and (e) excessive weight which created difficulty in lifting her. See Appendix W (d)

Subsequently, when the research took off, to further develop the problems or assess the garment needs of the physically challenged wheelchair and bedridden females, several visits to the rehabilitation centre, Mkar were undertaken. This revealed some physical

characteristics and activities of females restricted to wheelchair, bedridden or highly incapacitated in the use of their lower limbs. The female surgical and orthopaedic ward of the federal medical centre, Makurdi was also visited severally within the early stage of the research. Different wheelchair and bedridden females introduced to the researcher by ñSnow ballingò method were also visited and observed in their natural environment of their homes. The GNAQ were served to nurses, Clothing and Textile lecturers and garment constructors on scheduled visits to obtain information on the garment needs and design preferences for PCWBF. Finally, the associations for people with disabilities in the three Senatorial zones were identified and visited at various scheduled times. At such visits, organized distribution and collection of questionnaire were carried out and relevant information on the garment needs of the physically challenged wheelchair and bed ridden females were obtained, these aided in generating creative ideas for the final designs of the prototype garments. Different samples of functional garment designs were drawn by the researcher and choices made from the several designs were developed into three sizes of prototype functional garments and pilot tested on the users. The designs featured gowns, blouses/tops, Trousers/pants and skirts and Dungarees. Basic patterns to be adapted for constructing the desired garment designs were drafted and altered to the desired styles by the researcher.

xii) Data analysis for phase 1 of the research involved calculation of frequencies and percentages of responses on observation checklist of activities, garment needs, characteristics of garments required. Calculation of means and standard deviations of the measurements of the PCWBF were carried out. Test of reliability of the instruments for data collection were also carried out in phase 1.

Phase 11: Construction of blocks and prototype garments for PCWBF in small, medium and large sizes.

The activities were carried out as follows:

i Development of blocks and adaptation of pattern pieces for the designs in three sizes: small, medium and large, figure 4, 5, 6, 7 and 8.

This entailed development of patterns using the mean measurements of the PCWBF from each of the size categories for functional garments. Appendix W (k) shows pictures of drafting exercise by the researcher assisted by a research assistant. Three forms of garments were selected for construction based on the analysis of GNAQ. The garment types selected were skirt and top, gown and trouser and top. Pattern development for the research adopted the methods of flat pattern drafting by Igbo and Iloeje (2003) in collaboration with the method by Beazley and Bond (2003). The basic patterns drafted include:

a) Basic Blouse bodices front and Back (fig 4 a and 4 b)

b) The sleeve block piece (fig. 5)

c) Basic skirt blocks front and back (fig.6 a and 6 b)

d) Simple Sloper (gown) front and back (fig 7 a and 7 b)

e) Basic Trouser block front and back and belt (fig8a, 8b and8c)

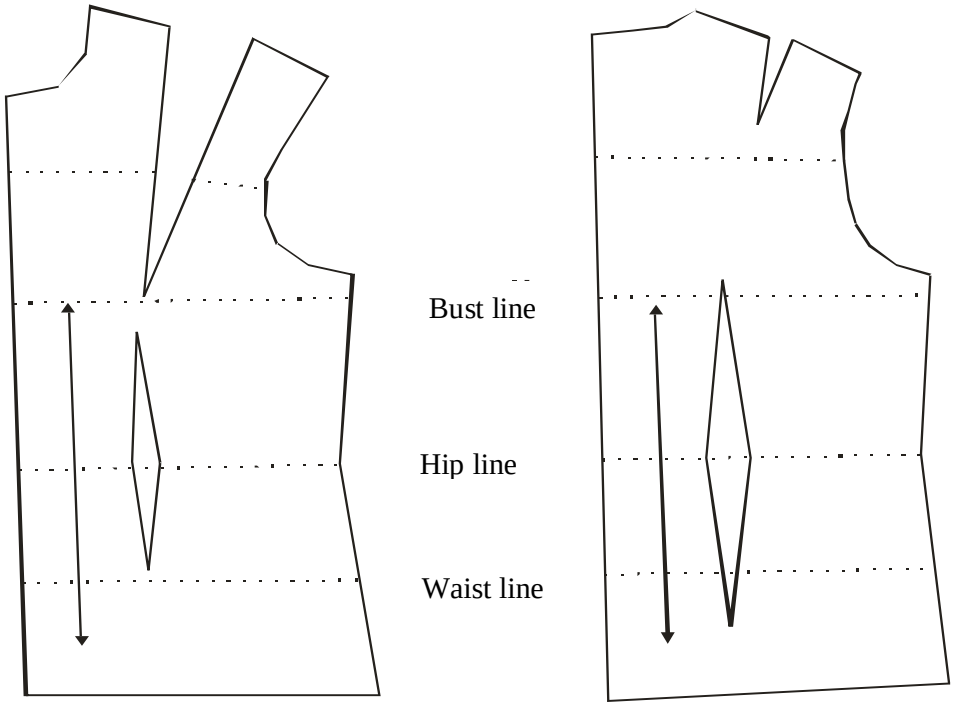


Fig 4. Basic Blouse Bodices front (a) and back (b)

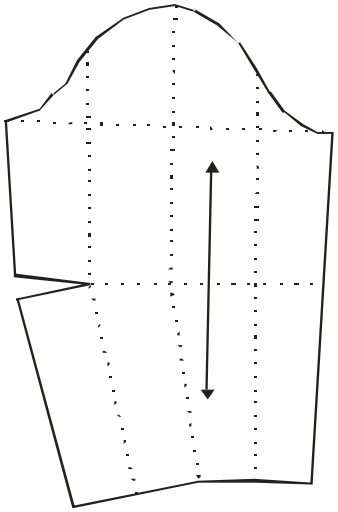


Fig 5. Sleeve block piece

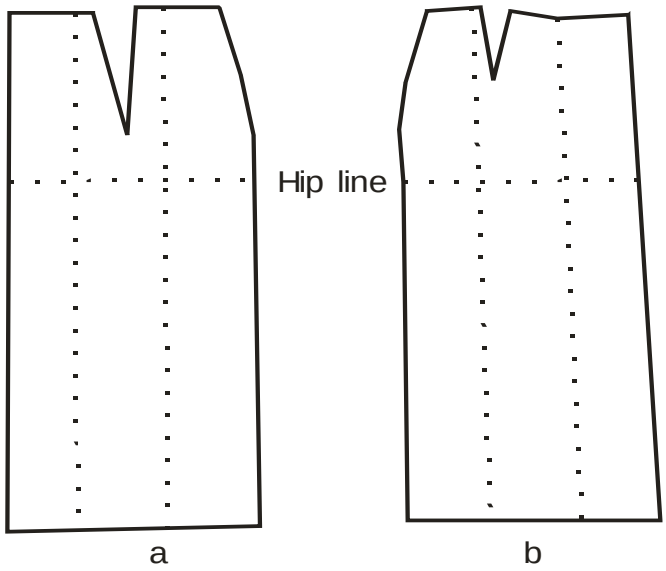


Fig 6. Skirt Block back (a) and front (b)

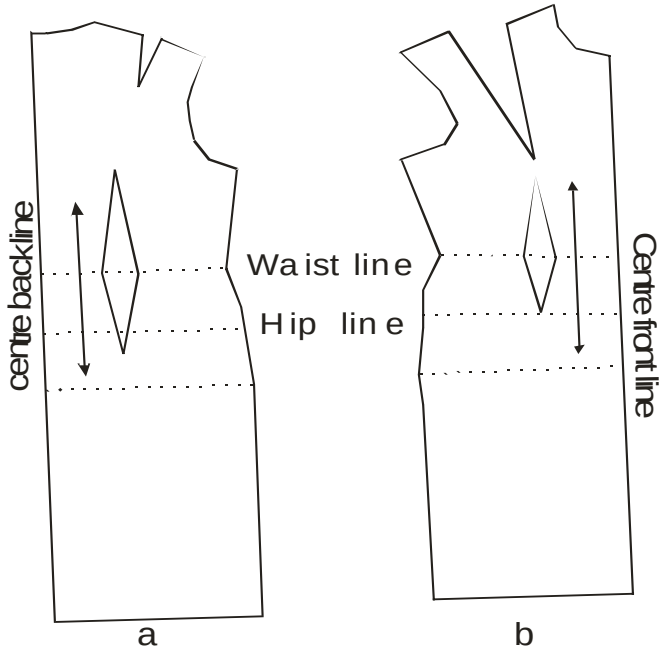


Fig 7 Simple Sloper/Gown front (b) and back (a)

ii. Adaptation of basic blocks to selected garment styles/designs

The basic design features for the prototype functional garments included for:

a. Blouse: raglan sleeve or kimono sleeve, short sleeve lengths, short length of blouse, multiple opening/closures. See figures 9, 10 and 11.

b. Skirt: elasticized waist, uneven length at hem line, multiple opening/ closures along side seams, detachable back-inset for toileting, inset-pocket for carrying medical devices and personal effects. See figures 12 and 14.

c. Trouser/ Pant: multiple full length side opening/closures for ease of donning and doffing, pleats / gathers at lower leg, in-set pocket for carrying medical devices or personal effects, elasticized waist, detachable back. See figure 13 and 15.

d. Gown: raglan and kimono sleeves that are short, full or three quarter length, multiple side and shoulder opening/closures for separating front and back, free gown (back and front fullness, flared silhouette), low or high round neck lines, concealed large pockets, detachable back in-set for toileting. See figure 16.

e. Fabric type: cotton, dull floral, dull plaids.

f. Design Characteristics similar to contemporary garments worn by none physically challenged females.

iii. Selection of appropriate fabrics. Respondents selected different types of fabrics from list included in the GNAQ. Different fabrics were shown to respondents who had difficulty in identifying fabrics to assist them in their selection

iv. Construction of the prototype functional garments.

v. Pilot testing of prototype functional garments to assess the fit of the garments. Pilot fit-testing of prototype functional garments on PCWBF, at BIMMA Orthopaedic Specialist Hospital Jos, Plateau State.

vi Final modifications on the prototype functional garments. Alterations on the prototype functional garments were based on feedback from users. The major parts corrected were necklines, length of gown and trouser, crotch length of trousers, re-enforcement of openings and closures.

Fig. 8 Raglan sleeve blouse with multiple Velcro openings detachable front and back.

Fig 9. Simple blouse with multiple Velcro opening/closures

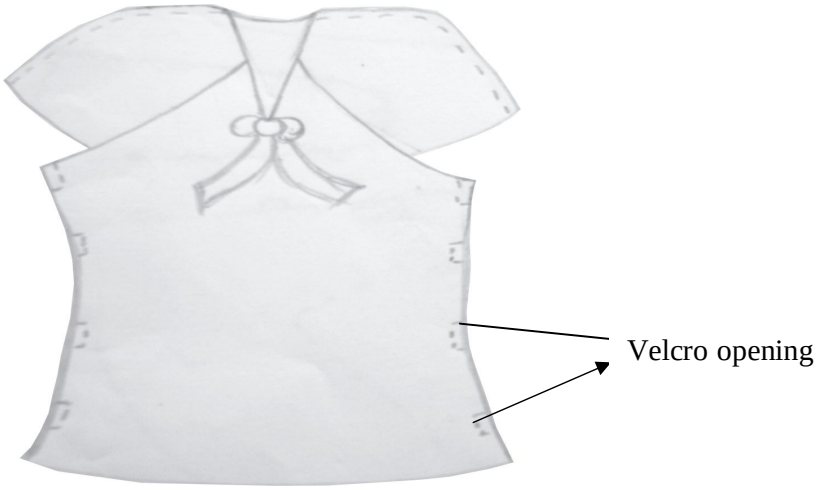


Fig. 10. Short blouse with multiple Velcro opening/closures and a neck tie

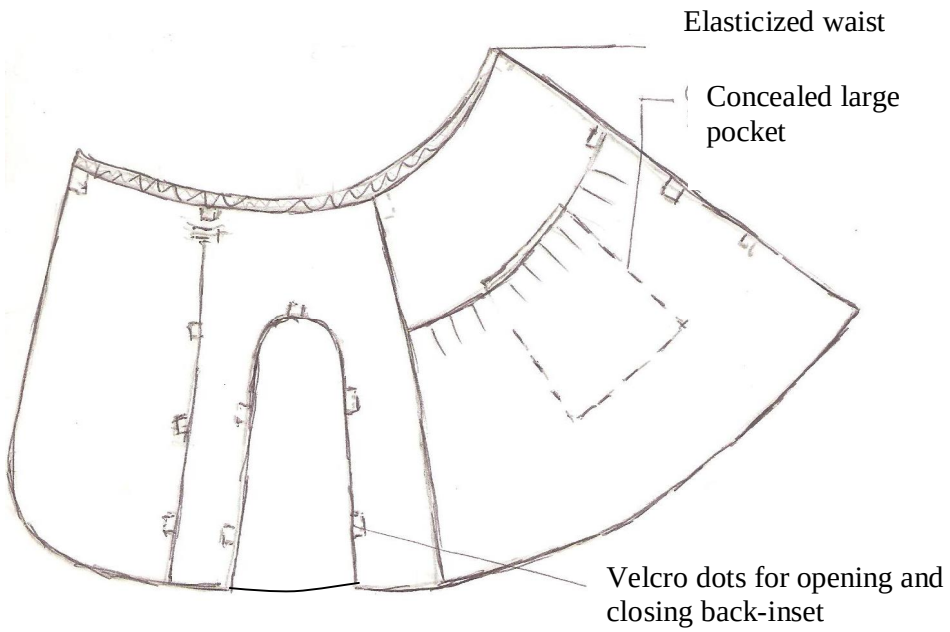


Fig. 11 Elasticized waist wrap round with multiple Velcro openings and in-set front pocket

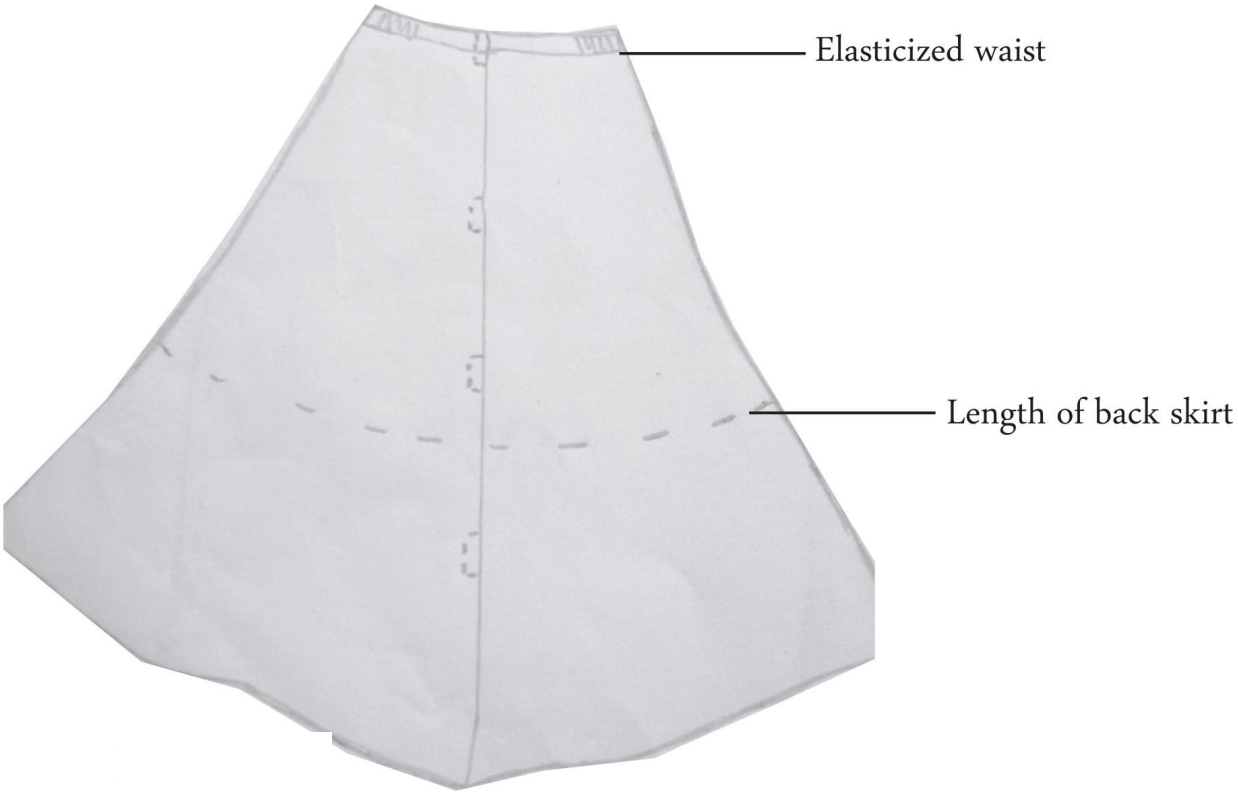


Fig. 12 Short flare skirt with longer front than back length

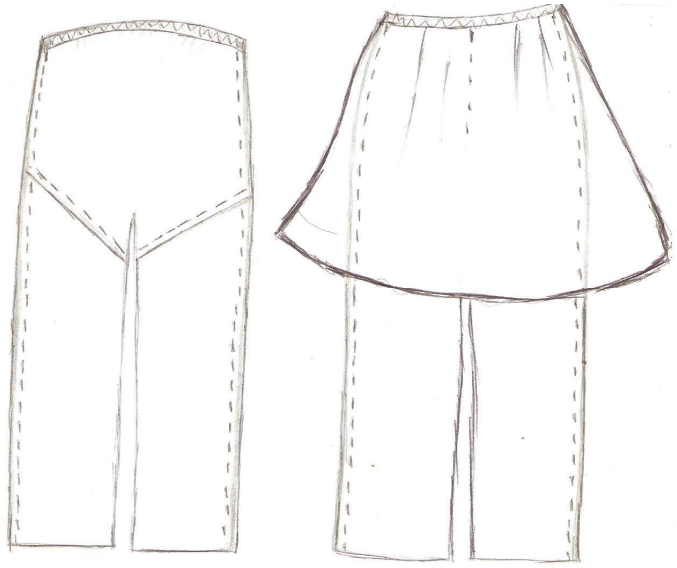


Fig 13. Functional trousers with detachable pack-pieces and elasticized waist and multiple Velcro opening and closures.

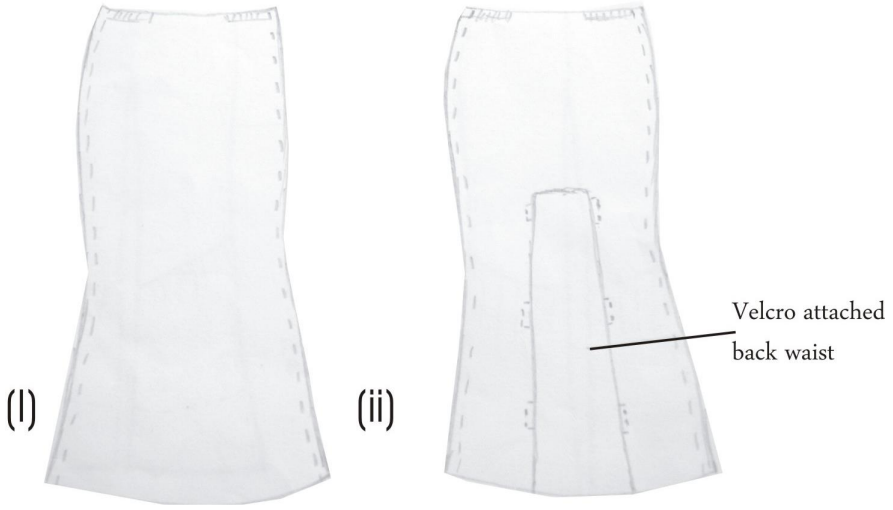
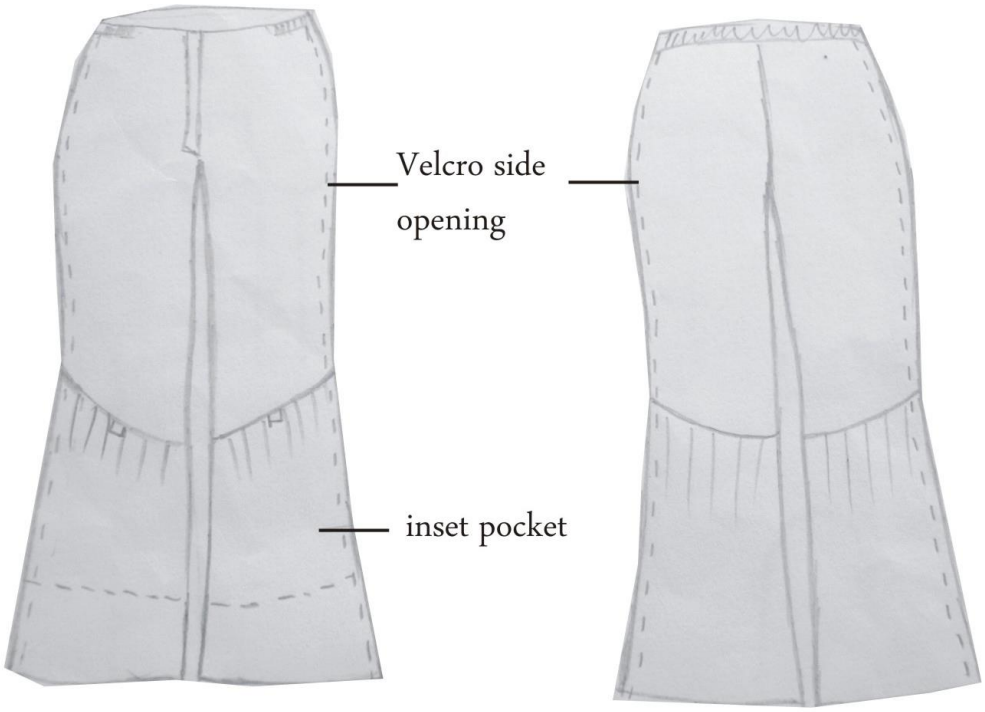


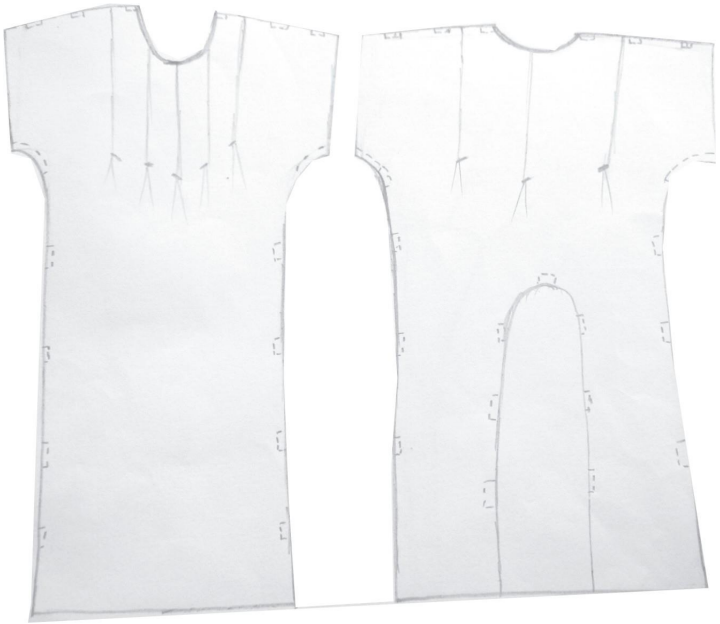
Fig.14 Long skirt with elasticized waist multiple side opening/closures, detatchable back in-set.



(a) Front view (b) Back view

Fig. 15 Trouser/pant with lower leg gather and in-set pockets.

Front



Back

Fig. 16 Long tubular free gown with multiple side and shoulder opening and closures. Margyan/ kimono sleeves, detachable back in-set. Front and Back views

Adaptation of Basic Pattern to Prototype Functional Garment Styles

Pattern Development Plan for Basic Blouse with Raglan Sleeves, Multiple Side and Shoulder Velcro Openings and Closures.

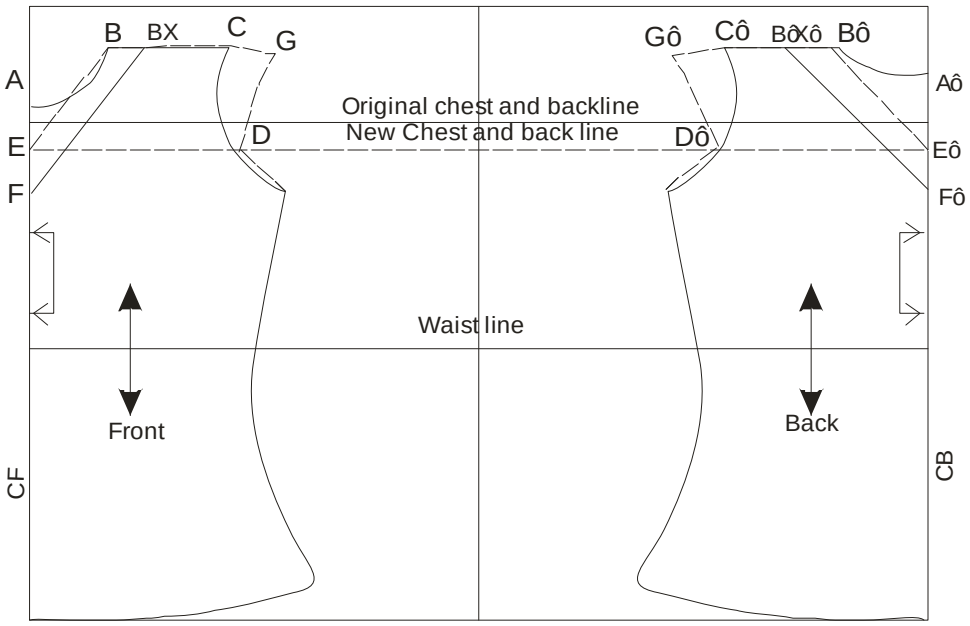


Fig 17: Basic Blouse with Raglan sleeve

i. Move chest and back line downwards by 2.5cm to get line EEô

ii. Connect armholes to line EEô at D and Dô for front and back bodices respectively with straight lines.

iii. Neck line: alter neckline to V by connecting point B to E and Bô to Eô. draw straight lines 4cm away and parallel to line BE and BEô to obtain width of neck

iv. Sleeve: extend shoulder line BXC to G and BôXôCô to Gô slightly slanted to accommodate length of sleeve measured.

v. Cut along broken lines to obtain draft pieces for neck, sleeves and bodices (front and back)[Pattern may be traced along line FBX, BXG, GDH, HI, IJ to obtain styles that do not require several joining at armhole and side seams].

vi. Include seam allowances of 2cm along seams of necks and three sides of sleeves except along shoulder line where 4cm seam allowance should be included to create overlap. Cut double pairs for neck and sleeves respectively.

vii. Include seam allowance of 4cm on side seams of blouse bodices to provide overlap for inclusion of Velcro openings and closures.

viii. Pattern for yoke may be cut along broken lines DE, D`E` front and back bodice respectively.

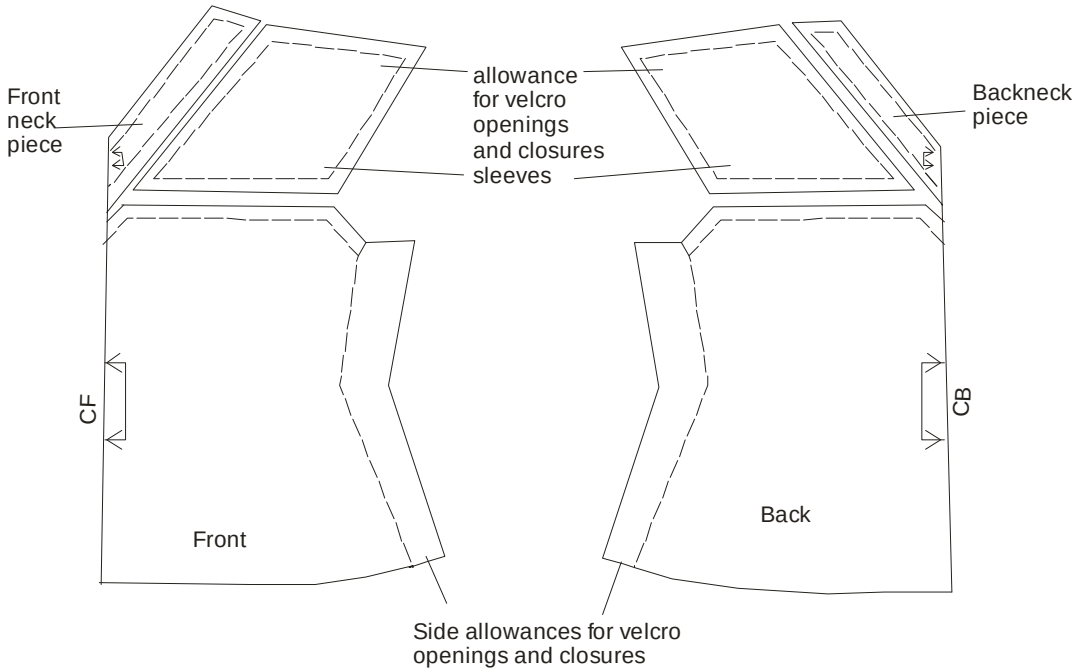


Fig. 18: Basic Blouse with Raglan sleeve and allowances for velcro

Pattern Development Plan for Elasticized Wrap-Round Skirt with Multiple Velcro Openings and Closures, In-Set Front Pocket and Detachable Back In-Set

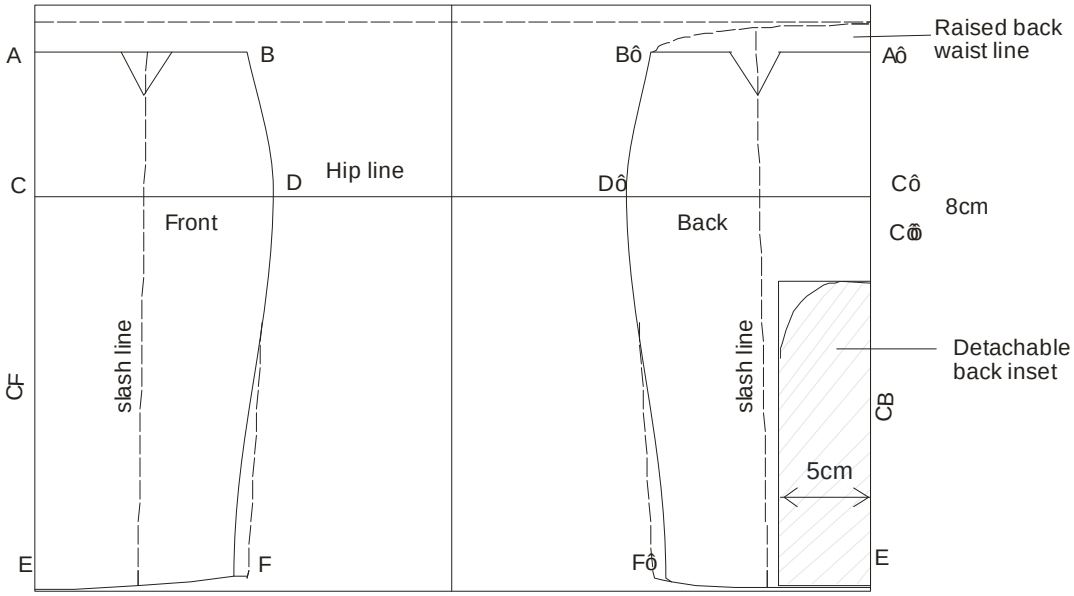


Fig. 19: Basic skirt front and back with back inset.

i. Introduce vertical lines along the waist dart positions

ii. Separate front skirt piece along hip line to introduce yoke. Slash and spread lower piece to accommodate pleats and in-set pocket along yoke panel.

iii. Include extra allowance of 10cm at edge (outer sides) of skirt to produce over-lap and position for Velcro

iv. Increase height of waist line of front and back skirt piece by 4cm for and higher upwards from points A and Aô to accommodate waist elastics fold.

v. Locate a point Cò 8cm ï 10cm below the hip line alone centre back line and square in 5cm. Create a gentle curve and extend line to the skirt hem. Dethatch shaded portion as back ï in-set. Place cut portion on paper to cut out facing at least 4cm wide for the opening created at back of skirt. This also forms the surface for Velcro attachments.

vi. Slash and spread along slash line to required fullness (pleats).

vii. Place dethatched back-in-set piece on drafting paper laid on bias. Using the curved edge to obtain required shape. Create a wider pattern with seam allowances include as shown in fig 20

viii. Extend left side of back skirt piece 10cm or to provide overlap as wrap-round.

ix. Introduce all seam allowances.

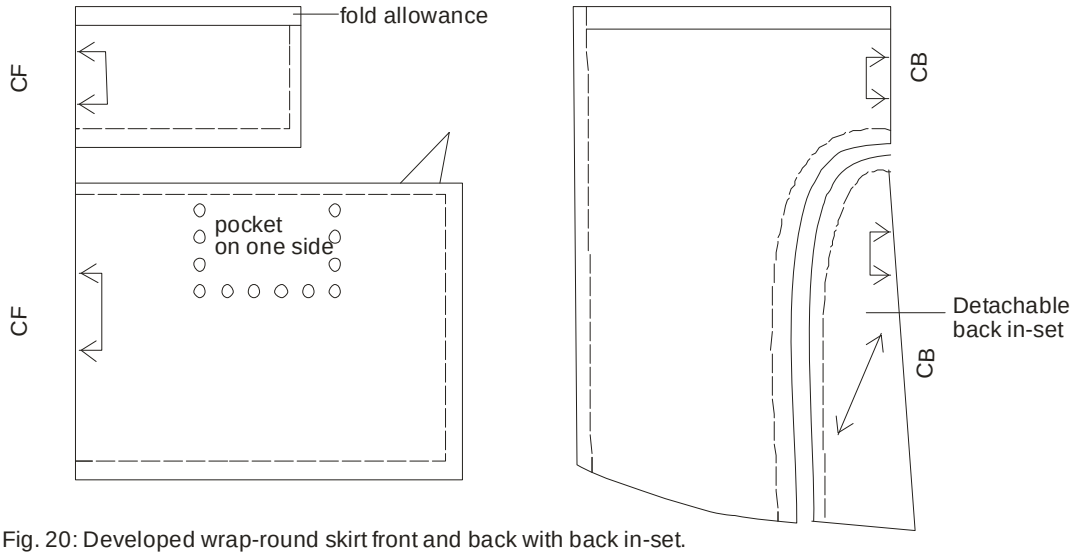


Fig. 20: Developed wrap-round skirt front and back with back in-set.

Pattern Development for Trouser/Pant with Lower Leg Pleats and In-Set Pockets

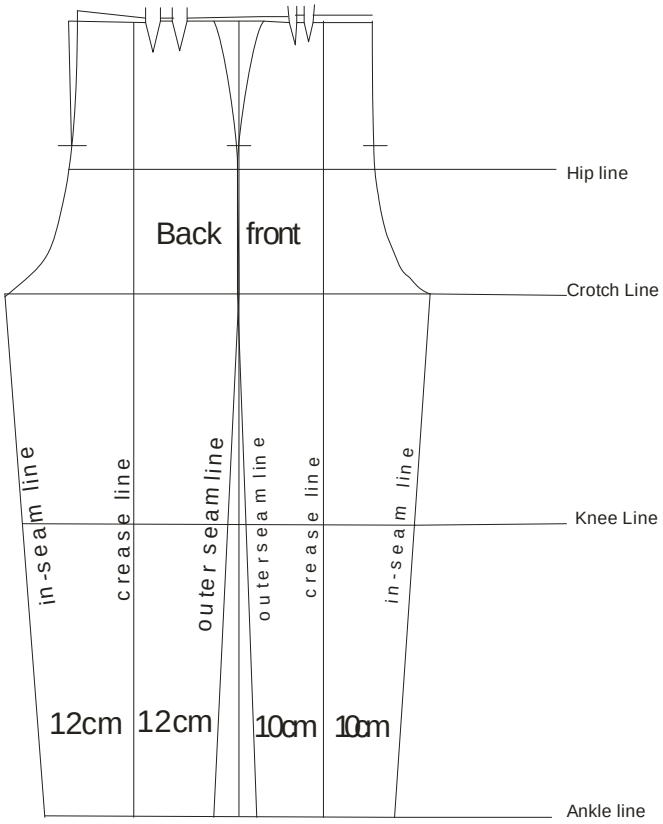


Fig. 21: Basic Trouser front and back

The basic trouser/pant patterns were altered to the selected styles by:

i. Adjust waist line of back trouser piece upwards by 5cm to accommodate sitting position.

ii. Slash along back dart lines from waist line to ankle. Spread the slashes wider to introduce fullness along buttocks and thigh but slightly at knee and below the knee.

iii. Include seam allowance of 4cm on outer seam line to accommodate overlap for inclusion of Velcro seam allowance

iv. Slash along dart lines to spread slightly to required size of wearer with slight fullness added on upper body on front part of the trouser.

v. Move original knee line downwards by 4cm to locate position of in-set pocket and introduce pleats for fullness.

vi. Slash and spread to $2^{1/2}$ times the original width of trouser lower leg to form pleats on lower leg of front trouser legs

vii. Draft inset pocket estimating size (square or rectangle) and cut two pieces.

viii. Take final length of waist lines (front and back) and draft waist band equal to the new waist length and 4cm wide cut two pieces.

ix. Introduce seam allowances around waist band and pocket

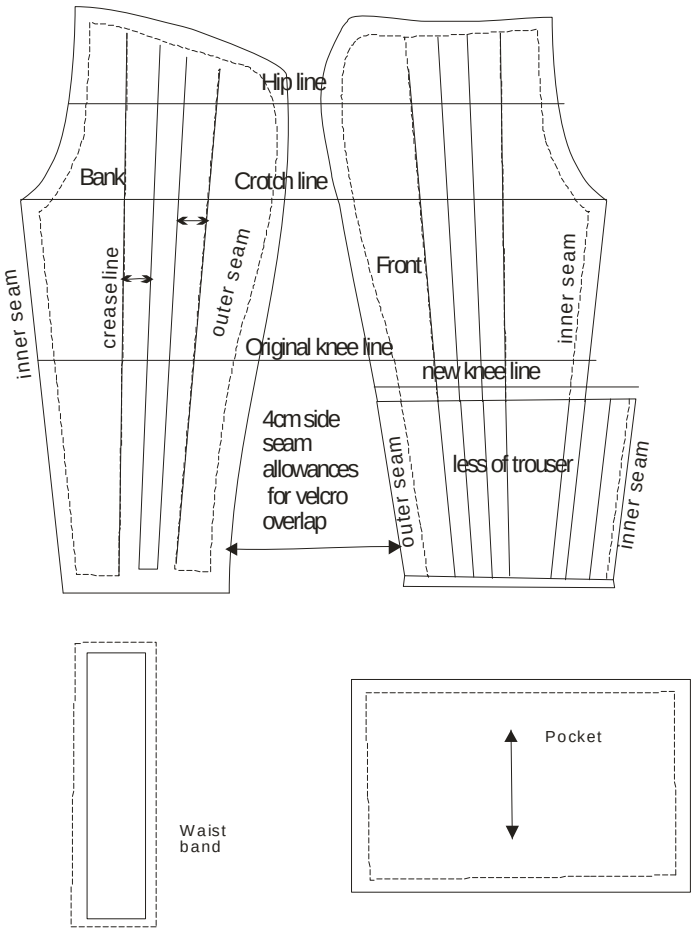


fig 22: Developed Trouser pattern with lower leg pleates in front

Phase 111: Final evaluation of the prototype functional garments by users and judges.

i. Training of users for correct assessment of fit of the prototype functional garments.

ii. Training of the judges for correct assessment of fit, aesthetics and expressive variables of the prototype functional garments. The photographs of some training sessions with judges in included in appendix W (i)

iii Construction of new sets of functional garments using the corrections from first fit.

iv Fit- testing prototype functional garments by users. This entailed one user in each size category of small, medium, large, fitting three different garments (gown, skirt and blouse and trouser and top). Photographs of fit ï testing exercise are included in appendix W (m-r)

v. Data collection on assessment on fit of garments from users and judges.

vi. Data analysis

Validation of the Instruments

The instruments for data collection namely: Garment Needs Assessment Questionnaire (GNAQ) Appendix B and C by users and judges respectively, Garment Fit Assessment Questionnaire by users and judges respectively were face and content validated by two Clothing experts, one each from the University of Nigeria, Nsukka (UNN) and University of Agriculture, Makurdi, two nurses in Government Hospital in Benue State and one expert of research methods from the department of Educational Foundation of the University of Agriculture, Makurdi. Each of the validators was given the purpose of the research, the research objectives and research questions to be well informed about the research. This was to assess the appropriateness of the instruments for data collection for the research. Copies of the validation charts are included in Appendix E, F,O and P. Based on the corrections and comments of the validators, appropriate modifications were affected on the instruments.

Reliability of the Instruments

The test for reliability was conducted in a different environment that has some similar characteristics with the study area. Hence the trial test of the research was carried out in BIMMA in Jos, Plateau State to establish reliability of the instruments for data

collection. Plateau State is also a Middle Belt State with high incidence of Motorcycle accidents, presence of females with mobility disabilities like Benue State. The garment choice among females are similar since the two States were once one State; Benue Plateau State. Prototype functional garments each produced in three sizes; large, medium and small were fit ï tested on six purposively selected PCWBF. Assessment of the garment was done by the users first, then by the judges. According to Ring (2001), users have the best judgments of garments worn by them. Involvement of expert judges (lecturers, nurses and tailors) also helped to ensure reliability by reducing research bias as recommended by Babbie (1992). Involvement of users at the stage of styling ensures that prototype meet the needs of the users thereby increasing the reliability of the instruments.

The reliability of the instruments for data collection was tested using Garment Needs Assessment Questionnaire (GNAQ) Appendix B and Garment Fit Assessment Questionnaire (GFAQ) Appendix M. Six PCWBF; two each belonging to large, medium and small sizes were selected to fitï test one set of prototype functional garment. Six judges comprising two Clothing lecturers, two nurses and two tailors responded to some variables such as type, functional, aesthetics and expressive design attributes for GNAQ and fit, comfort, aesthetics and expressive attributes for GFAQ of the prototype functional garments. Reliability Coefficient for section B of GNAQ was determined using inter-rater reliability Coefficient. To obtain the Coefficient, Kendell W formula was used to obtain the Coefficient of Concordance and the value is 0.773. See Appendix O. The internal consistency reliability for sections C and D of GNAQ are 0.643 and 0.764 respectively, see Appendix O. The reliability of GFAQ was tested using Cronbach Alpha Coefficient. The Cronbach Alpha are as follows for the variables tested fit (0.774), comfort (0.688), Aesthetics (0.854) and Expressive (0.725). See Appendix P. The instruments were found reliable.

Method of Data Analysis

Different methods were used to analyse the different data collected. Section A and B of the Garment Needs Assessment Questionnaire (GNAQ) were analysed using percentages. Sections C and D were analysed using the mean. A five-point likert scale was used to decide the mean. A mean of 3.0 was considered satisfactory response while means below 3.0 were considered not satisfactory enough for choice of design variables needed for inclusion in patterns and the fit of a garment.

The Observation Checklist of activities for the PCWBF was analysed using simple percentages and observation of the physical characteristics of the PCWBF were recorded. Datum obtained using the Garment Needs Assessment Questionnaire (GNAQ) was analysed using percentages and means. A mean of 3.0 was utilized to determine a satisfactory fit and all characteristics assessed by the PCWBF and the judges since a five point Likert scale was used. Datum on body measurements was analysed using means. Analysis of variance (ANOVA) was used to test two null hypotheses at a 0.05 level of significance. All data obtained for the research were analysed using Statistical Package of Social Science (SPSS) version 16.0

CHAPTER FOUR

RESULTS

This chapter contains the analysis of results obtained from the research in attending to the specific objectives of the research.

Research Question 1:

What are the activities of physically challenged wheelchair and bed ridden females (PCWBF) that characterise their garment needs? Answer to this research question is summarised below while the category of needs are contained in table 1.

The study revealed various daily activities of the PCWBF in Benue State. The predominant posture of the PCWBF was the seated position from where most of the daily activities were carried out. Typical daily activities of the 368 PCWBFs included: donning and doffing garments for toileting and to clean up, mouth brushing, bathing indicated by all representing 100% for each activity, washing of clothes and dishes indicated by 40%, meal preparation/cooking (58%), child care (28%), movement within and outside the house by crawling (39%), pedalling wheelchair with arm (69%), climbing into the wheelchair, crawling out of the wheelchair (78%), operating electronic gadgets like TV and radio (42%), bending to lift objects from floor (52), arm stretching to lift objects from moderate heights (58%), sitting over a long period of time (92%), lying in bed on one position over a long period of time not capable of turning by themselves (18%). Very few (3%) of the PCWBF were actively involved in the civil / circular jobs such as teaching, secretarial services and businesses such as hair weaving or braiding and garment construction (knitting, crocheting and sewing). Information on daily activities was obtained by careful interaction and observation of the PCWBF and guided by the use of observation checklist of activities in appendix D.

The study revealed the following physical characteristics possessed by the PCWBF through careful observation in their natural environment: Curved spine, arched back, disproportionate sizes of lower upper torsos, enlarged upper torsos, deformed lower limbs that were disproportionate in size, widened hips and buttocks due to long sitting, stiff knee

and some other body joints that do not flex easily. Other physical characteristics observed were shrivelled hands and feet, muscular large upper arms and neck muscles, weak upper limbs. Some of the PCWBF apart from been wheelchair bound or bedridden had other physical disabilities like partial or total blindness, deafness and down syndrome. Individuals may possess one or more of the physical characteristics observed but not all.

Table 1: Category of Needs that Characterise the Garment Needs of Physically Challenged Wheelchair and Bedridden Females.

Category of Needs	RESPONSES N=368	
	Freq	**%**
1. Physical need for:		
a. Ease of wearing and taking off	204	55.4
b. Comfort in wear	30	8.2
c. Protection/safety	10	2.7
d. Adornment of self	4	1.1
e. Concealment of place of deformity	120	32.6
2. Social/Psychological need for:		
a. Self esteem	83	22.6
b. Emotional, psychological and physical independence	254	69.0
c. Group identity	2	0.5
d. Enhanced participation in social and physical activities	29	7.9

Table 1 reveals category of needs of the physically challenged wheelchair and bedridden females in Benue State that characterise their need for garments. The physical need for easy donning and doffing (wearing and taking off) garments indicated by 204

PCWBF representing 55.4% and the social/psychological need to satisfy emotional, psychological and physical independence (69.0%) ranked highest in the category of needs that characterised need for garments by the PCWBF.

Research Question 2: What are the types of garments preferred by the users and the judges for the physically challenged wheelchair and bedridden females? Answer to the research question is in table 2.

Table 2: Types of Garment Preferred by the Users and Judges.

S/No	Description of Garments Silhouette	Users Freq N=368	%	Nurses Freq N=260	%	C &T Lecturers Freq N=10	%	Garment Constructors Freq N=15	%	Overall Freq N=653	%
1	long skirts and blouses	158	42.9	153	58.8	5	50	5	33.3	321	49.2
2	Short gowns	45	12.2	1	0.4	0	0	0	0	46	7.0
3	Full-length gowns	153	41.6	104	40	4	40	1	6.7	262	40.1
4	Trousers and tops	12	3.3	2	8	1	10	9	60.0	24	3.7
5	Dungarees	0	0	0	0	0	0	0	0	0	0

Key: C & T =Clothing and Textile lecturers, Freq= Frequency

Table 2 reveals the types of garment preferences by the PCWBF, nurses, Clothing and Textile lecturers and the garment constructors for the PCWBF. Out of the five major types of garments namely; skirt and blouses, short gowns, full length gowns, trouser and tops and dungarees presented for selection, skirt and blouses were the most preferred, selected by 42.9%, followed by full length gowns 41.6% by PCWBF. Dungarees were not acceptable to the PCWBF.

Research Question 3: What garment characteristics are needed by physically challenged wheelchair and bedridden females in Benue State? Table 3 contains answer to this question.

Tables 3: Garment Characteristics Needed by Physically Challenged Wheelchair and Bedridden Females.

Style Variables	Users	
	Freq	%
Overall shape/silhouette		
Straight skirt/gowns that are free	126	34.2
Skirt/gowns that are tight fitting	60	16.3
Flared skirts/flared gown	130	35.3
Skirt/gown with full gather/pleat	52	14.1
Garment Length		
Ankle length (full length)	98	26.6
Three quarters (B/w knee and ankle)	239	64.9
Knee length	8	2.2
Above knee	23	6.3
Sleeve Length		
Short length	245	66.6
Elbow length	117	31.8
Three quarters	6	1.6
Long sleeve	0	0
Neck Line		
Low neckline (scoop)	33	9.0
Low neckline (round)	276	75.0
Low neckline (square)	53	15.8
Low neckline (v-neck)	1	0.3
Low neck line (scallop)	0	0
High Necklines		
High neckline (scoop)	70	19.0
High neckline (round)	239	64.0
High neckline (square)	51	3.9
Neckline with collar		
Neckline with shirt collar	162	44.0
Neckline with other collars (convertible, peter pan)	206	56.0
Fabric Type		
Cotton	278	75.5
Wool	12	3.3
Nylon	73	19.8
Linen	4	1.1
Synthetic/blends with other fibres	0	0
Colour of fabric		
Bright solid colours (red, yellow, blue)	19	5.2

Dull solid colours (brown, green, purple)	169	45.9
Bright floral colours (red, yellow, blue)	12	3.3
Dull floral colours (brown, green, purple)	168	45.7
Fabric surface design		
Bright colour plaids/check (red, yellow, blue)	22	6.0
Dull colour plaids/checks (brown, green, purple)	232	63.0
Poker dots (two colours)	25	6.8
Poker dots (with more than two colours)	89	24.2

*multiple choice questions addressing various garment characteristics of garments recommended for selected for drafting patterns for prototype functional garments for PCWBF.

Key: Freq= Frequency. PCWBF (Users) =368.

Table 3 reveals some of the characteristics of garments needed by physically challenged wheelchair and bedridden females**.** In each case, the characteristics with the highest frequency and percentage were selected to guide in the design of the prototype functional garments. The characteristics of garments presented to the PCWBF include overall shape (silhouette), length of garment, length of sleeve, shape of neckline, type of fabric (Texture, colour, surface design). The overall results indicate the most preferred garment characteristics by the PCWBF are: skirts/flared gowns (35.3%), straight skirts/gowns that are free (34.2%), three quarter length garments (60.6%) and short length sleeves (72.6%). Other design features selected by the PCWBF are round low necklines (75.0%), round high necklines (74.1 %) and necklines with other collars (72.0%). Cotton fabric was the most selected fabric type (83.3%). The PCWBF preferred dull floral colours most; this was endorsed by55.7% PCWBF.

Research Question 4: What design features (functional, aesthetic and expressive) that are needed for the drafting of patterns of functional garments for PCWBF? Answer to this research question is in table 4 and 5.

Table 4: Functional and Aesthetic Design Features Needed for Drafting Patterns of Functional Garments for the Physically Challenged Wheelchair and Bedridden Females.

S/No	Functional and aesthetic design features	Users/PCWBF $\bar{X}$	SD
1	Garments with longer neck- to- waist lengths than shorter neck- to-waist lengths to make me appear taller.	3.85	1.78
2	Gown that are proportionately longer in front than at the back to reduce bulk	4.26	0.4
3	Gowns and blouses with front side closures/and openings to avoid hurting me while sitting and for ease of opening and closing	4.72	0.47
4	Garments with large neck openings for ease of wearing and taking off	4.47	0.5
5	Garments that fit loosely around the hip and thighs for comfort and to accommodate medical devices like catheter bags and tubes.	4.43	0.54
6	Garments with special closures/openings devices such as Velcro, Magnets and smooth openings with plackets for easy handling.	3.71	1.85
7	Garments that is loose across the shoulder and arms for easy movement (raglan, kimono and dolman sleeves).	3.79	1.04
8	Garments with large arm openings for ease of wearing and freedom of movement.	4.61	0.54
9	Garments made from special fabrics to cushion my sitting and movement on the wheelchair or lying in bed.	4.39	0.59
10	Trousers and Skirts with loose fitting adjustable waists for ease of wearing and taking-off.	4.28	0.96
11	Skirts, Trousers and gowns with large pockets to store away some personal items and medical gadgets like catheter.	4.02	0.92
12	Garments with zip-off (detachable) parts to ease wearing and taking-off, with access to parts of the body for some activities such as medications.	3.17	1.34
13	Athletic Trousers/pants designs without back middle and seat seams for comfort while sitting.	3.74	0.58
14	Garments that have flat, smooth seams especially on the inside, sits to avoid sores, pinching sensitive skin.	4.50	0.98

*Clothing and Textiles lecturers.

Table 4 reveals responses by the users on the various functional and aesthetic design features that need to be incorporated in the drafting of patterns of functional garments for the PCWBF. All the fourteen functional and aesthetic design features listed were rated above good or very good (between 3.17 and 4.72) by the users indicating that the users are satisfied with incorporating such designs. Each of the Standard deviation is < 1, showing that there are relatively low variations among users in their responses

Table 5: Expressive Design Features Needed for Drafting Patterns of Functional Garments for the Physically Challenged Wheelchair and Bedridden Females.

		Users	
S/No	**Expressive design features**	$\bar{X}$	**SD**
1	Gown, blouses/top that have contrasting colour to appear shorter in the wheelchair.	3.40	1.16
2	Garments/colours that help me attend to specific function such as games, cooking, shopping.	4.04	0.74
3	Garment styles that are similar to or same as those worn by people without physical challenges for psychological reasons.	3.47	1.23
4	Stylish garments with good and visual designs to satisfy emotional, psychological feelings of wellness.	4.11	0.36
5	Skirts and Trousers with multiple closures/openings for ease of wearing and taking off and to easily attend to physical activities.	3.58	1.44
6	Skirts and Trousers with Blouses/Tops that are same colour to make me appear slim and tall.	3.02	1.04
7	Skirts and Trousers with Blouses/Tops that have contrasting colours to make me appear shorter and larger.	2.67	1.84

Table 5 is a summary of responses from users on the expressive design features recommended for inclusion in functional garments for the PCWBF. Six of the seven expressive designs features listed were rated above 3 (satisfactory) by the users. The use of contrasting colours to create illusion of shortness and largeness was unacceptable to both

PCWBF since the mean is less than 3. The highest standard deviation (1.84) occurred in the responses of users on use of contrasting colours.

Research Question 5: What are the average body measurements of the three sizes (small, medium, large) of physically challenged wheelchair and bedridden females needed for drafting patterns for functional garments? Answer to this research question is in table 6.

Table 6: Mean Body Measurements (cm) of Small, Medium and Large Physically Challenged Wheelchair and Bedridden Females needed for drafting Patterns of Functional Garments.

S/N	Variable	X_1	X_2	X_3	Std	M_1	M_2	M_3	Std	L_1	L_2	L_3	SD
1	Bust	78	94	87.5	4.3	95	104	97.5	2.4	106	150	128	13.9
2	Waist	62	88	77.8	8.8	88.5	98	90.7	2.6	98.5	150	113	15.8
3	Hip	79	95	86.8	5.5	96	114	107	5.8	115	150	132	10
4	Back to Waist L*	35	39	38.4	0.8	40	43	40.4	0.7	38	45	41.3	1.9
5	Shoulder	12	15	12.9	0.6	14	16.5	15.5	0.6	15	18	16	0.5
6	Round Neck	34	36	35.5	0.69	38	45	38.8	1.4	46	48	46.6	0.8
7	Full L*	92	120	117	6.5	121	123	119.7	5.8	124	130	128	2.4
8	Sleeve L*	46	55	51.7	2.43	58	60	59.7	0.59	58	66	60.9	1.6
9	Upper arm	32	35	33.7	0.9	40	46	42.4	1.9	30	46	40	2.7
10	Bicep	38	42	40.6	1.49	43	45	43.5	0.6	46	52	47.6	1.9
11	Waist S/T*	70	88	76.9	6.9	89	116	92.9	5.6	96	150	112	14.9
12	Hip S/T*	85	108	92.8	7.4	100	120	110.4	7.2	106	160	134	11.9
13	Full L S/T*	87	115	111	3.7	92	113	101.8	4.7	90	115	108	5.8
14	Thigh	37	58	41.1	3.4	52	65	59.5	3.0	67	98	84	8.1
15	Crotch**	24	30	26.7	0.8	26	36	27.9	1.7	22	38	31	2.1
16	Ankle**	38	40	38.6	0.86	40	42	40.3	0.8	40	46	41.9	1.75

Key:

SD= Standard Deviation

*L= Length of skirt/ trouser

Crotch **, Ankle ** are applicable for trousers only.

T= Trouser, S=Skirt,

X_1, X_2, X_3 stand for minimum, maximum and averages respectively of small sizes of the Physically Challenged Wheelchair Bedridden Females.

M_1, M_2, M_3 stand for minimum, maximum and averages respectively of medium sizes of the Physically Challenged Wheelchair Bedridden Females.

L_1, L_2, L_3 stand for minimum, maximum and averages respectively of large sizes of the Physically Challenged Wheelchair Bedridden Females.

Table 6 is a summary of the minimum, maximum, means and standard deviation (Std D) of measurements (in cm) of the three sizes of PCWBF. The measurement charts for large, medium and small sizes are in appendices I , J and K. Out of 368 samples of PCWBF, 215 were categorized as large, 99 as medium and 54 as small representing 58.4%, 26.9%, and 14.7% respectively. The highest variation in measurement of body parts for small size are in the round waist of blouse, round waist of skirts/Trousers, hip of Trousers and length of skirts / Trousers (SD=8.8, 6.9, 7.4, 6.5), respectively. The high SD of small size is an indication of wide difference in the shape and figure of the PCWBF within this size. The lowest variation in measurement of small is found in shoulder line with SD of 0.6. The highest variation in measurement of body parts for medium size (SD=5.8, 7.2, 5.8) are in the round hip of blouse, round hip of skirts/Trousers and length of skirts/Trousers respectively. The high SD of round hip for blouse, hip of skirt/trouser and length of medium size is an indication of wide difference in the shape and figure of the PCWBF within this size. The lowest variation in measurement of medium size is also on the length of shoulder with Std D of 0.6. The highest variance in measurement of body parts for large size are SD =13.9 (round bust), SD=15.8 (round waist of blouse) and SD =10 round hip of blouse. Others are SD=14.9 (round waist of skirt/trouser and SD= 11.9 for round hip of skirt/ trouser. The lowest variation in measurement of medium size is on the length of shoulder with SD of 0.5. The high SD in measurements in the large size category indicates wide difference in the shape and figure of the PCWBF within the sizes.

Research Question 6: What is the mean responses of the PCWBF on fit, comfort and overall performance, ease of mobility, aesthetics and expressive variables for the three sizes (small, medium, large) each of gowns, skirt and blouses trouser and tops?

This research question was answered by the data in tables 7, 8, 9, 10 and 11.

Table 7: Mean Responses of Physically Challenged Wheelchair Bedridden Females on Fit Variables for Small, Medium, Large Sizes of Gowns, Skirt and Blouses, Trousers and tops.

Style	Variable	Neck line	Bust line	Ease across shoulder	Waist line	Ease at biceps	Fit over the hip	Safety	Overall fit	Func*	Ease of mobility
Gown	**Total**	9	9	9	9	9	9	9	9	9	9
	Mean	4.11	4.11	4.00	4.22	4.00	4.11	4.33	4.00	4.11	4.22
	Standard Deviation	.928	.601	.500	.441	.500	.333	.500	.000	.333	.441
Skirt & Blouse	**Total**	9	9	9	9	9	9	9	9	9	9
	Mean	4.11	4.11	4.00	4.22	4.00	4.11	4.33	4.00	4.11	4.22
	Standard Deviation	.928	.601	.500	.441	.500	.333	.500	.000	.333	.441
Trouser and Top	**Total**	9	9	9	9	9	9	9	9	9	9
	Mean	4.11	4.11	4.00	4.22	4.00	4.11	4.33	4.00	4.11	4.22
	Standard Deviation	.928	.601	.500	.441	.500	.333	.500	.000	.333	.441

***Func = Functionality**

Data in table 7 is a summary of the mean responses of the PCWBF (users) on the fit variables for the three sizes (small, medium, large) of the garments; gowns, skirt and blouses and trousers and tops. The fit variables tested were ease at the bust line, across shoulder, waist line and biceps. Other fit variables included fit over the hip, safety in use, overall fit, functionality and ease of mobility while wearing each of the prototype functional garments.

The total means for fit variables for all the sizes of gowns were rated as very good (above 4) indicating usersô high satisfaction with the fit variables tested. The totals for each of the standard deviations were between 0.33 and 0.93 indicating low variations between the responses of the users. Users expressed satisfaction with the fit of all sizes of skirts and blouses since the values mean were between 4 and 4.33, each total standard deviation was less than 1 indicating that there were low variations between the responses of the users on the fit of the prototype functional skirts and blouses. The fit mean variables of all the sizes of trouser and tops of mean values were between 4 and 4.22 indicating satisfactory rating of the fit mean variables by the users. The total standard deviation for each fit variables of trouser and tops ranged between 0 and 0.93 indicating relative uniformity in responses by the users on the fit. Details on fit of specific sizes are summarised in appendices.

Table 8: Mean responses of PCWBF on Comfort and Overall Performance Variables for Small, Medium, Large Sizes of Gowns, Skirt and Blouses, Trousers and Tops.

Style	Variable	O C	F B M	FTB	NI B	A P	FIU	S	F	EWTO
Gown	**Total**	9	9	9	9	9	9	9	9	9
	Mean	4.44	4.67	4.33	4.22	4.44	4.44	4.33	4.33	4.22
	Standard Deviation	.527	.500	.500	.441	.527	.527	.500	.500	.441
Skirt & Blouse	**Total**	9	9	9	9	9	9	9	9	9
	Mean	4.44	4.67	4.33	4.22	4.44	4.44	4.33	4.33	4.22
	Standard Deviation	.527	.500	.500	.441	.527	.527	.500	.500	.441
Trouser and Top	**Total**	9	9	9	9	9	9	9	9	9
	Mean	4.44	4.67	4.33	4.22	4.44	4.44	4.33	4.33	4.22
	Standard Deviation	.527	.500	.500	.441	.527	.527	.500	.500	.441

Key:

OC = overall comfort, FBM = full body movement

FTB = feel on the body, NIB = none- irritability to body

AP = air permeability, FIU = flexibility in use

S = safety, F = functionality

EWTO = ease of wearing and taking off

Table 8 is a summary of the responses of the PCWBF (users) on the comfort and overall performance of the three sizes each of gowns, skirt and blouses and trouser and tops. The variables of comfort tested by the users were overall comfort, full body movement, feel on the body, non-irritability, air permeability, safety, functionality and ease of wearing and taking off (donning and doffing). The five-point likert scale of rating used had 5 as excellent performance, 4 as very good, 3 as satisfactory, 2 as poor and 1 as extremely poor. Each of the comfort variable tested for large size gowns, long skirts and blouses and trousers and tops fell between very good and excellent (4 and 5) indicating high satisfaction by the users. Each of the standard deviation for the variables was between 0.441 and 0.527; indicating low variation between the responses of the users.

Table 9: Mean Responses of Users on Fit Variables for the Three Sizes of Gown, Skirt and Blouses, Trousers and Tops while in Motion

Style	Variable	Neck line	Bust line	Ease across shoulder	Waist line	Ease at biceps	Fit over the hip	Safety	Overall fit	Func*	Ease of mobility
Gown	**Total**	9	9	9	9	9	9	9	9	9	9
	Mean	4.22	4.00	4.00	4.33	4.33	4.33	4.33	4.22	4.22	4.22
	Standard Deviation	.441	.000	.500	.500	.500	.500	.500	.441	.441	.441
Skirt & Blouse	**Total**	9	9	9	9	9	9	9	9	9	9
	Mean	4.22	4.00	4.00	4.33	4.33	4.33	4.33	4.22	4.22	4.22
	Standard Deviation	.441	.000	.500	.500	.500	.500	.500	.441	.441	.441
Trouser and Top	**Total**	9	9	9	9	9	9	9	9	9	9
	Mean	4.22	4.00	4.00	4.33	4.33	4.33	4.33	4.22	4.22	4.22
	Standard Deviation	.441	.000	.500	.500	.500	.500	.500	.441	.441	.441

Table 9 contains a summary of the responses of the PCWBF (users) on the fit variables for the three sizes of gown, skirt and blouses, trousers and tops while in slight motion. Slight motion culminated in bending low to lift objects from floor, turning sideways and lifting arm up and down; illustrated in appendix W (p). The variables of fit tested by the users were neck line, bust line, ease across shoulder, waist line, ease at biceps, fit over the hip, safety, overall fit, functionality and ease of mobility, The five-point likert scale of rating used had 5 as excellent performance, 4 as very good, 3 as satisfactory, 2 as poor and 1 as extremely poor. Each the fit variable tested for large size gowns, long skirts and blouses and trousers and tops were between very good and excellent (4 and 4.33) indicating high satisfaction by the users. Each of the standard deviation for the variables was between 0.441 and 0.5; indicating low variation between the responses of the users.

Table 10: Mean Responses of Users on Aesthetics Variables for the Three Sizes (Small, Medium, Large) Gowns, Skirt and Blouses, Trousers and Tops.

Style	Variable	BE	C	TOF	FS A	V A	S	S A	CT	F	AC
Gown	Total	9	9	9	9	9	9	9	9	9	9
	Mean	4.33	4.33	4.44	4.33	4.44	4.11	4.22	4.44	4.11	4.89
	Standard Deviation	.500	.500	.527	.500	.527	.601	.441	.527	.333	.333
Skirt & Blouse	Total	9	9	9	9	9	9	9	9	9	9
	Mean	4.33	4.33	4.44	4.33	4.44	4.11	4.22	4.44	4.11	4.89
	Standard Deviation	.500	.500	.527	.500	.527	.601	.441	.527	.333	.333
Trouser and Top	Total	9	9	9	9	9	9	9	9	9	9
	Mean	4.33	4.00	4.67	4.33	4.67	3.67	4.00	4.67	4.33	5.00
	Standard Deviation	.577	.000	.577	.577	.577	.577	.000	.577	.577	.000

Key

BE= beauty, C= colour, TOF= texture of fabric, FS A= fashion ability, VA= visual appeal, S= shape/silhouette, SA = style attribute, CT= construction technique, F= fastening, AC= acceptability.

Table 10 is a summary of the responses of the PCWBF (Users) on the aesthetic variable of the three sizes each of gowns, skirt and blouses and trouser and tops. The variables of aesthetic tested by the users were beauty, colour, and texture of fabric. Others were fashion ability, visual appeal, shape/silhouette, style attribute, construction technique, fastening and acceptability. The five-point likert scale of rating each of the variables had 5 as the excellent performance, 4 as very good, and 3 as satisfactory, 2 as poor and 1 was extremely poor. The entire aesthetic variable tested for the three sizes of gowns, were between very good and excellent (4.11 and 4.89). Each of the standard deviation for the aesthetic variables were between 0.333 and 0.601; indicating low variation between the responses of the users. Each of the total aesthetic variables tested for the three sizes of long skirts and blouses, fell between 4.11and 4.89. Each of the total standard deviation aesthetic variables were between 0.333 and 0.601; indicating that the variation between the responses of the users was low. The mean responses of users for the three sizes of trousers and tops ranged from 3.67 to 5.00, while the standard deviation ranged between 0 and 0.577. The result indicated usersô satisfaction with the aesthetic variables and low variation among the respondents.

Table 11: Mean Responses of Users on Expressive Variables for the Three Sizes (Small, Medium, Large) Gowns, Skirt and Blouses, Trousers and Tops.

Style	Variable	promotes self image	promotes self esteem	promotion of confidence	promotion of social security	promotion of physical independence
Gown	**Total**	9	9	9	9	9
	Mean	4.00	3.67	3.78	3.89	4.11
	Standard Deviation	.500	.500	.441	.333	.333
Skirt & Blouse	**Total**	9	9	9	9	9
	Mean	4.00	3.67	3.78	3.89	4.11
	Standard Deviation	.500	.500	.441	.333	.333
Trouser and Top	**Total**	9	9	9	9	9
	Mean	4.00	3.67	3.78	3.89	4.11
	Standard Deviation	.500	.500	.441	.333	.333

Table 11 summarizes the total responses of the PCWBF (Users) on the five expressive variables of the three sizes each of gowns, skirt and blouses and trouser and tops. The expressive variable tested by the users were promotion of self image, promotion of self-esteem, promotion of confidence, promotion of social security, and promotion of physical independence. The five Likert scale of rating had 5 as excellent performance, 4 as very good and 3 as satisfactory, 2 as poor and 1 was extremely poor. The expressive variables: promotion of self-image and physical independence tested for the three sizes of gowns, long skirts and blouses were rated very good (between mean of 4 and 4.11) respectively. Their corresponding standard deviations were between 0.33 and 0.50. This indicates low variation between the responses of the users. The ratings for promotion of self-esteem, confidence,

and social security were lower; between SD of 3.67 and 3.89. The however indicated usersô approval of these as variables as factors influencing their use of functional garments. The standard deviation for each of the expressive variables ranged between 0.33 and 0.50, showing low variation among the responses of the users. Two of the expressive variables; promotion of self-image and physical independence for all sizes of trousers and tops were rated very low (between 1 and 2) while promotion of self-esteem, confidence and social security for trousers and tops were rated satisfactory (3). Detail assessment of expressive variable of the three sizes each of gowns, skirt and blouses and trouser and tops are in appendix ZB

Research Question 7: what are the mean responses of the judges on aesthetics and expressive variables of the prototype functional garment? The answer to this research question is in table 12.

Table 12: Mean Responses of Judges on Aesthetics Variables for the Three Sizes (Small, Medium, Large) Gowns, Skirt and Blouses, Trousers and Tops.

Category	Style	Variable	BE	C	TOF	FSA	VA	S	SA	CT	F	AC
Nurse	**Gown**	**Total**	15	15	15	15	15	15	15	15	15	15
		Mean	4.60	4.60	4.07	4.40	4.20	3.93	4.40	4.67	4.33	4.53
		Standard Deviation	.507	.507	.961	.737	.862	.258	.507	.488	.816	.516
	Skirt & Blouse	**Total**	15	15	15	15	15	15	15	15	15	15
		Mean	4.47	4.40	3.93	4.40	4.33	4.53	4.53	4.27	4.60	4.33
		Standard Deviation	.834	.828	.594	.632	.617	.516	.516	.458	.507	.488
	Trouser and Top	**Total**	15	15	15	15	15	15	15	15	15	15
		Mean	3.87	3.33	3.67	3.73	4.27	3.80	3.67	4.33	4.33	4.07
		Standard Deviation	.516	.488	.488	.704	.799	1.014	1.11	.488	.816	.704
Clothing & Textile Lecturer	**Gown**	**Total**	30	30	30	30	30	30	30	30	30	30
		Mean	4.60	4.50	4.33	4.07	4.40	4.00	4.30	4.27	4.57	4.60
		Standard Deviation	.621	.509	.547	.450	.563	.643	.702	.907	.568	.563
	Skirt & Blouse	**Total**	30	30	30	30	30	30	30	30	30	30
		Mean	4.33	4.40	4.00	4.24	4.33	4.13	4.42	4.71	4.56	4.51
		Standard Deviation	.707	.688	.603	.679	.739	.842	.657	.506	.546	.626
	Trouser and Top	**Total**	30	30	30	30	30	30	30	30	30	30
		Mean	4.30	4.17	4.03	4.23	4.33	4.17	4.37	4.60	4.57	4.33
		Standard Deviation	.596	.592	.669	.626	.606	.648	.669	.675	.504	.661
Garment Constructors	**Gown**	**Total**	15	15	15	15	15	15	15	15	15	15
		Mean	4.67	4.53	4.33	4.87	4.80	4.60	4.87	4.87	4.87	4.87
		Standard Deviation	.488	.516	.816	.352	.414	.507	.352	.352	.352	.352
	Skirt & Blouse	**Total**	15	15	15	15	15	15	15	15	15	15
		Mean	4.13	4.13	4.27	4.13	4.33	4.20	4.33	4.87	4.80	4.73
		Standard Deviation	.640	.743	.594	.640	.617	.561	.488	.352	.414	.458
	Trouser and Top	**Total**	15	15	15	15	15	15	15	15	15	15
		Mean	3.60	3.60	3.93	4.07	3.73	3.47	3.80	4.20	4.27	4.00
		Standard Deviation	.828	.507	.458	.799	.704	.834	1.014	1.014	.799	.845

Key: BE= beauty, C= colour, TOF= texture of fabric, FSA= fashion ability/style attribute VA= visual appeal, S= shape/silhouette, SA=style attributes, CT= construction technique F= fastening, AC= acceptability

Table 12 contains summary of total responses of the judges (nurses, Clothing and Textile lecturers and garment constructors) on the aesthetics variables of the three sizes each of gowns, skirt and blouses and trouser and tops. The aesthetics variables tested were beauty, colour, and texture of fabric, fashion ability/style attribute, visual appeal, shape/silhouette, style attributes, construction technique, fastening and acceptability. The five-point likert scale of rating had 5 as excellent, 4 as very good, 3 as satisfactory, 2 as poor and 1 as extremely poor performance.

The mean ratings of the aesthetics variable by nurses for the three sizes of gowns were between 3.93 and 4.67, rating for the three sizes of skirt and blouses were between 4.00 and 4. 71 while the three sizes of trousers and tops were rated with means between 3.33 and 4.33. The results indicated satisfaction of the nurses with the aesthetic variables tested. Each of the standard deviations for the responses was between 0.258 and 1.11.

Clothing and Textiles lecturers rated all aesthetics variable for the three sizes of gowns, , long skirt and blouses, trousers and tops very good, (between 4.0 and 4.71 mean). The total for each of the standard deviations for the aesthetics variables for the prototype functional garments gown, skirt and blouses, trousers and tops was between 0.504 and 0.907; indicating low variation in the responses of the Clothing and Textiles lecturers. Garment constructorsô ratings of the aesthetics variable for the three sizes of gowns and skirt and blouses were between very good and excellent (4.13 and 4.87) while the standard deviations for each of the aesthetics variables were between 0.352 and 0.743. The result showed that garment constructors were highly satisfied with aesthetics variables of the different sizes of gowns and skirts and blouses and there was low variation in the responses of the garment constructors. Results indicated lower ratings for aesthetics variables for trousers and tops by garment constructors: total ratings for trousers and tops were between 3.47 and 4.27. The total standard deviations for each of the variables tested were also higher for trousers and tops: between 0.458 and 1.014.

Table 13: One Way ANOVA for Hypothesis One

Ho_1: There is no significant difference in the mean responses of users and judges on the category of requirements that characterised garment needs and type of garments required by physically challenged wheelchair and bedridden females.

ANOVA

Category of Requirements for garment needs		Sum of Squares	df	Mean Square	F	Sig.
Physical Requirements (ease of donning and doffing)	Between Groups	77.958	2	38.979	27.105	.000
	Within Groups	405.537	282	1.438		
	Total	483.495	284			
Physical Requirement (Concealment of points of deformity)	Between Groups	7.174	2	3.587	3.498	.032
	Within Groups	289.212	282	1.026		
	Total	296.386	284			
Social/psychological requirement l garments needs	Between Groups	8.983	2	4.491	5.027	.007
	Within Groups	251.929	282	.893		
	Total	260.912	284			
Type of garment designs you prefer most	Between Groups	3.341	2	1.671	1.664	.191
	Within Groups	283.045	282	1.004		
	Total	286.386	284			
Overall	Between Groups	7.105	2	3.552	14.496	.000
	Within Groups	68.862	281	.245		
	Total	75.967	283			

Multiple Comparisons
Scheffe

Dependent Variable	(I) Status	(J) Status	Mean Difference (I-J)	Std. Error	Sig.	95%Confidence Interval Lower Bound	Upper Bound
Physical requirements (ease of donning and doffing)	Nurse	Lectures	1.619*	.386	.000	.67	2.57
		Constructors	1.986*	.318	.000	1.20	2.77
	Lectures	Nurse	-1.619*	.386	.000	-2.57	-.67
		Constructors	.367	.490	.756	-.84	1.57
	Constructors	Nurse	-1.986*	.318	.000	-2.77	-1.20
		Lectures	-.367	.490	.756	-1.57	.84
	Nurse	Lectures	.827*	.326	.042	.02	1.63
		Constructors	-.173	.269	.813	-.83	.49
	Lectures	Nurse	-.827*	.326	.042	-1.63	-.02
		Constructors	-1.000	.413	.055	-2.02	.02
	Constructors	Nurse	.173	.269	.813	-.49	.83
		Lectures	1.000	.413	.055	-.02	2.02
Social/psychological require reasons for need for functional garments	Nurse	Lectures	.704	.305	.071	-.05	1.45
		Constructors	.571	.251	.077	-.05	1.19
	Lectures	Nurse	-.704	.305	.071	-1.45	.05
		Constructors	-.133	.386	.942	-1.08	.82
	Constructors	Nurse	-.571	.251	.077	-1.19	.05
		Lectures	.133	.386	.942	-.82	1.08
Type of garment designs you prefer most	Nurse	Lectures	-.273	.323	.700	-1.07	.52
		Constructors	-.440	.266	.257	-1.09	.21
	Lectures	Nurse	.273	.323	.700	-.52	1.07
		Constructors	-.167	.409	.920	-1.17	.84
	Constructors	Nurse	.440	.266	.257	-.21	1.09
		Lectures	.167	.409	.920	-.84	1.17
Overall	Nurse	Lectures	.66873*	.15954	.000	.2761	1.0613
		Constructors	.46873*	.13147	.002	.1452	.7922
	Lectures	Nurse	-.66873*	.15954	.000	-1.0613	-.2761
		Constructors	-.20000	.20210	.613	-.6973	.2973
	Constructors	Nurse	-.46873*	.13147	.002	-.7922	-.1452
		Lectures	.20000	.20210	.613	-.2973	.6973

* The mean difference is significant at the 0.05 level.

Table 13 is an ANOVA summarizing the results of null hypothesis one: There is no significant difference in the mean responses of users and judges (nurses, Clothing and Textile lecturers, garment constructors) on the category of requirements that characterised garment needs and type of garments required by physically challenged wheelchair and

bedridden females. The result revealed the following: The values for (F=27.105) is significant @ 0.000 for physical requirements for ease of donning and doffing that characterised garments needs of the PCWBF, F= 3.498 were significant @ 0.032 physical requirement for concealment of place of deformity, F= 5.027 were significant @ 0.007 for social and psychological requirement to satisfy emotional, social /psychological and physical independence. This meant that at each of the above F values, the P values were < 0.05. Therefore the null hypothesis was not accepted; hence there is significant difference in the mean responses of users and judges on the garment needs and type of garments required by physically challenged wheelchair and bedridden females in Benue State. A further multiple comparison tests by Scheffe method indicated that the differences in responses occurred between nurses and Clothing and Textile lecturers, nurses and garment constructors.

Table 14: One Way ANOVA for the Ho_2: There is no Significant Difference in the Mean Responses of Clothing and Textile Lecturers and the Nurses on the Aesthetics Attributes of the Prototype Functional Garments.

		Sum of Squares	Df	Mean Square	F	Sig.
BEAUTY		2.243	2	1.121	2.289	.104
	Within Groups	94.044	192	.490		
	Total	96.287	194			
COLOUR	Between Groups	3.335	2	1.668	3.468	.033
	Within Groups	92.337	192	.481		
	Total	95.672	194			
TEXTURE OF FABIRC	Between Groups	2.125	2	1.063	2.523	.083
	Within Groups	80.870	192	.421		
	Total	82.995	194			
FASHION ABILITY/STYLE ATTRIBUTE	Between Groups	.992	2	.496	1.120	.328
	Within Groups	85.079	192	.443		
	Total	86.072	194			
VISUAL APPENDIXEAL	Between Groups	.281	2	.140	.293	.746
	Within Groups	92.006	192	.479		
	Total	92.287	194			
SHAPE/ SHILHOUETTE	Between Groups	.012	2	.006	.011	.989
	Within Groups	107.137	192	.558		
	Total	107.149	194			
STYLE ATTRIBUTES	Between Groups	.932	2	.466	.846	.431
	Within Groups	105.714	192	.551		
	Total	106.646	194			
CONSTRUCTION TECH	Between Groups	1.129	2	.564	1.271	.283
	Within Groups	85.251	192	.444		
	Total	86.379	194			
FASTENING	Between Groups	1.151	2	.575	1.598	.205
	Within Groups	69.137	192	.360		
	Total	70.287	194			
ACCEPTABILITY	Between Groups	1.306	2	.653	1.627	.199
	Within Groups	77.073	192	.401		
	Total	78.379	194			
Overall	Between Groups	.533	2	.267	1.361	.259
	Within Groups	37.587	192	.196		
	Total	38.120	194			

Table 14 is an ANOVA summarizing the results of null hypothesis two: There is no significant difference in the mean responses of Clothing and Textile lecturers and nurses on aesthetics variables of prototype functional garments. The result revealed the following: The

value for (F=3.468) is significant @ 0.033 for colour. Therefore the null hypothesis was not accepted; hence there is significant difference in the mean responses of Clothing and Textile lecturers and nurses on aesthetics variables of prototype functional garments. This means that there is varied opinion between the Clothing and Textile lecturers and nurses on choice of the colour for the functional garments needed by the physically challenged wheelchair and bedridden females.

Findings of the Study

The following findings were made based on the data collected and analysed.

- This study revealed that even though, Physically Challenged Wheelchair and Bedridden Females (PCWBF) have peculiar seated posture, they participate in a wide range of daily activities similar to those undertaken by those without physical disabilities.
- The daily activities of PCWBF revealed in the study were donning and doffing garments for toileting and to clean up, mouth brushing, bathing, washing of clothes and dishes, meal preparation/cooking, child care, movement within and outside the house by crawling, pedalling wheelchair with arm, climbing into the wheelchair, crawling out of the wheelchair, operating electronic gadgets like TV and radio, bending to lift objects from floor, arm stretching to lift objects from moderate heights, sitting over a long period of time, lying in bed on one position over a long period of time.
- The study showed that a very small percentage of the PCWBF (3%) were civil servants or were in circular jobs of teaching, secretarial service and businesses such as hair weaving or braiding and garment construction.
- The study revealed some physical characteristics of the PCWBF: Curved spine, arched back, disproportionate sizes of lower upper torsos, enlarged upper torsos,

deformed lower limbs that were disproportionate in size, widened hips and buttocks due to long sitting, stiff knee and some other body joints that do not flex easily. Other physical characteristics were shrivelled hands and feet, muscular large upper arms and neck muscles, weak upper limbs, partial or total blindness, deafness and Down syndrome. Individuals may possess one or more of the physical characteristics observed but not all.

- The study revealed the category of needs of the physically challenged wheelchair and bedridden females that characterised their garment needs.
- Datum in table 1 shows category of needs that characterised garment needs of the PCWBF are emotional, psychological and physical need for independence 69.0%, need for ease of wearing and taking off indicated by 55.4 % PCWBF and social/psychological, physical independence 32.6 % and need for concealment of place of deformity and self esteem 22.6% .
- The garments need of the PCWBF included satisfying functions of survival (comfort in wear) safety and security (protection), modesty, status symbol, and decoration except identity.
- The study revealed as shown in table 2 that the most preferred type of garments by PCWBF are long skirt and blouses, selected by 42.9% PCWBF, followed by full length gowns selected by 41.6% PCWBF. This is very close to the traditional dress of the people in Benue State which is wrapper and blouses.
- The PCWBF selected the following characteristics of garments: skirts/ gowns that flared (35.3%), straight skirts/gowns that are free (34.2%), three quarter length garments (60.6%) and short length sleeves (72.6%). Other design features selected by the PCWBF were round low necklines (75.0%), round high necklines (74.1 %) and necklines with other collars (72.0%). Cotton fabric was the most preferred

selected by 83.3% PCWBF. The most preferred colour of fabrics was dull floral colours (55.7%). The results are in table 3.

- An overall difference exists between groups of users and judges on clothing needs and types of garments required for the PCWBF as indicated in table 2.
- All fourteen functional and aesthetic design features listed were each rated with mean of above good or very good (between 3.17 and 4.72) by the users as summarized in table 4. This indicated that the users were satisfied with incorporating such designs in their functional garments. There were relatively low variations among users in their responses on choice of functional and aesthetics designs to be included in the functional garments since each of the standard deviation (SD) was < 1.
- The PCWBF selected six out of the seven expressive designs features listed and each was rated with mean above 3 as shown in table 5.
- There is relatively high variation in the responses of users on some functional and aesthetic design features ; garments with longer neck- to- waist lengths than shorter neck- to- waist lengths to make the users appear taller (SD=1.78, Table 4). Similarly, garments with special closures/openings devices such as Velcro, Magnets and smooth openings with plackets for easy handling have relatively high variation (SD=1.85, Table 4).
- The use of contrasting colours to create illusion of shortness and largeness was unacceptable to PCWBF since the mean was less than 3 with standard deviation of 1.84. The relatively high standard deviation indicated variations between the responses of users. The results are documented in table 4.
- The study in table 5 showed that garments that enabled PCWBF to attend to some activities were highly preferred. This fact was buttressed by the high mean value of 4.04 and low standard deviation of 0.74.

- The study revealed that PCWBF liked stylish garments with good and visual designs to satisfy emotional, psychological feelings of wellness. This choice was evidenced by the high mean value of 4.11 and very low standard deviation of 0.36 indicated in table 5.
- Most (59%) of physically challenged wheelchair and bedridden females in Benue State fall within the Large size. Other size proportions are: 26.90% and 14.67 % in the medium and small size categories respectively (Table 6, Appendix I, J and K).
- There is high variation in the size (measurements) of the different parts of body of the PCWBF within size categories (Table 6, Appendix. I, J and K)
- The highest variations in size of the different parts of body of the PCWBF are within the large size. The SDs are 13.9, 15.8, 10, and 8.1 on the bust, waist, hip and round thigh respectively (Table 6, Appendix. I).
- The highest variations in size of the different parts of body for medium size PCWBF are on the hip, full length of gown, waist, and hip of trouser, length of trouser / skirt and round thigh with STDs 5.8, 5.8, 5.6, 7.2, 4.7and 3.0 respectively (Table 6, Appendix.)
- The highest variations in size of the different parts of body for small size PCWBF are on the bust, waist, hip, full length of gown, waist, and hip of trouser/skirt and round thigh with SDs 4.3, 8.8, 5.5, 6.5, 6.8,7.4 and 3.4 respectively (Table 6, Appendix K)
- Due to deformity nearly each PCWBF has peculiar silhouette. This is evidenced by the differences in size of various parts of their bodies. This made it extremely difficult to identify and group the silhouettes/shapes to standard sizes.
- There were small variations in the size of shoulder within each category of size, since the standard deviations are low 0.6 for small, 0.6 for medium and 0.5 for large sizes respectively (Appendix. I, J and K)

- There was overlap in size of shoulder between small and medium size, and between medium and large size categorization (Table 6).
- The bust girt factor is the most the most workable or ideal method of categorizing size of females on wheelchair, table 6.
- Based on the categorization of the different sizes of the PCWBF, three basic patterns were developed one each for gown, skirt and blouse and trouser and top for the three different sizes (small, medium and large).
- A total of fifteen basic units of garment patterns were drafted (3 gowns, 3skirts, 3 blouses, 3trousers and 3 tops)
- Based on the garment types, characteristics, functional, aesthetic and expressive designs selected by the PCWBF thirteen styles of functional garments were developed from adaptation of the basic patterns drafted.
- A total of 72 pattern pieces were drafted for the prototype functional garments.
- The total fit variables for each of the three sizes of prototype functional gowns, skirts and blouses and trouser and tops assessed by PCWBF had means above 4.0, representing very good and the corresponding standard deviations were between 0 and 0.98 indicating uniformity among responses of users since the standard deviations were each less than 1, see table7 and appendix X.
- The responses of users on fit variables of small, medium, large prototype functional garments varied for necklines and ease across shoulder. The difference occurred between the small and large sizes users (table 7).
- Responses of users on some fit variables of some of the functional prototype garments showed high satisfaction: overall fit for all sizes of gown (X=4, SD=0), overall fit for all sizes of skirts and blouses (X=4, SD=0), overall fit for all sizes of trousers and tops (X=4, SD=0), see table 7 and appendix X.

- The comfort and overall performance variables for each of the three sizes of prototype functional gowns, skirts and blouses and trouser and tops rated by PCWBF had means between 4.22 and 4.67. These represented very good fit. The corresponding total standard deviation for each comfort and overall performance variable was between 0.441 and 0.527 indicating uniformity among responses of users. The details are in table 8 and appendix Y.
- Motion was not hampered by any of the fit variables of the three sizes of prototype functional garments. Each of the fit variables assessed by the PCWBF namely: neck line, bust line, ease across shoulder, waist line, ease at biceps, fit over the hip, safety, overall fit, functionality and ease of mobility had mean above 3 which meant that the users were satisfied with the fits while in slight motion. The details are documented in table 9.
- All aesthetic design features assessed by the users were rated with mean between 3.67 and 5.0 indicating that the PCWBF were highly satisfied with the aesthetic variables of the prototype functional garments. Each of the total standard deviation for the aesthetic design variables was less than 0.601 indicating that the responses were relatively uniform. Details are in table 10 and appendix ZA.
- Users rated promotion of self-image and promotion of physical independence 4 and 4.11 respectively for all sizes of the three prototype functional garments. The responses were relatively uniform since each of the standard deviations were less than or equal to 0.5 as shown in table 11 and appendix ZB.
- Users rated promotion of self-esteem, confidence and social security (between 3.67 and 3.89 mean) lower than promotion of self-image and physical independence (between 4 and 4.11mean) respectively for all sizes of the three prototype functional garments. However, the responses were relatively uniform since each of the standard deviations were less than or equal to 0.5. See table 11 and appendix ZB.

- The total mean responses of nurses for each of the aesthetic variables: beauty, colour, texture of fabric, fashion ability/style attribute, visual appeal, style attributes, construction technique was rated above 4 except shape which was rated 3.93 for gowns and 3.80 for trousers indicated in table 12.
- All aesthetic variables for all sizes of prototype functional skirts and blouses except texture of fabric (3.93) were rated above 4 by nurses as shown in table 12 and appendix ZC.
- All aesthetic variables for all sizes of prototype functional trousers and tops were rated with mean of above 3 indicating nurses satisfaction with the all the aesthetic variables.
- Clothing and Textile lecturers were highly satisfied with the aesthetic variables of the prototype functional garments since each total mean for each of the variables was rated above 4. Total standard deviation for each aesthetic was between 0.450 and 0.907. The data are shown in table 12 and appendix ZC.
- Garment constructors were highly satisfied with the aesthetic variables of the prototype functional gowns and skirts and blouses since each total mean for each of the variables was rated above 4. Total standard deviation for each aesthetic variable was between 0.352 and 0.743 showing relative uniformity among respondents. The data are shown in table 12 and appendix ZC.
- Garment constructors rated only four (texture of fabric, construction technique, fastening and acceptability) aesthetics variables above 4. The results however, indicated that garment constructors were satisfied with all the aesthetic variables of the trousers and tops since each of the mean for each of the remaining aesthetic variables were rated above the satisfactory mean, 3. The data are shown in table 12 and appendix ZC.

- The differences between the responses of users and judges on the category of requirements that characterised garment needs of physically challenged wheelchair and bedridden females were significant: for physical requirements for ease of donning and doffing , ($F=27.105; 0.0<p< 0.05$). Physical requirement for concealment of place of deformity, ($F=3.498; 0.032< p< 0.05$) , for social and psychological requirement to satisfy emotional, social/psychological and physical independence,($F= 5.027; 0.007<p<0.05$). The details are contained in table 13, appendix AC.
- Results in ANOVA table 13 indicated that there is significant difference in the mean responses of users and judges (nurses, Clothing and Textile lecturers, garment constructors) on the category of requirements that characterised garment needs for physically challenged wheelchair and bedridden females.
- The study revealed that a significant difference exists between the responses of Clothing and Textile lecturers and nurses on aesthetics variables (colour) of prototype functional garments needed by physically challenged wheelchair and bedridden females. This means that there is varied opinion between the Clothing and Textile lecturers and nurses on choice of the colour for the functional garments. The value for ($F=3.468; 0.033< p< 0.05$) for colour as shown in table 14.

Discussion of Findings

The study revealed various daily activities of the PCWBF in Benue State. The daily activities of PCWBF were carried out in seated position for those capable of sitting in the wheelchair while some were carried out while lying in bed for those that were bedridden. Sitting down or lying down pose challenge to individuals with the garments they wear. These challenges according to Chase and Quinn (2003) include bulkiness in front of the garment due to reduced length of the wearer in front while seated and reduced length of

ankle length of trousers resulting from bent knees and expanded buttocks and hip. Such challenges justify the need for special designs in their garments. Daily activities of the 368 PCWBFs revealed in the study included: donning and doffing garments for toileting and to clean up (100%), mouth brushing (100%), bathing (100%), washing of clothes and dishes (40%), meal preparation/cooking (58%), child care (28%), movement within and outside the house by crawling (39%), pedalling wheelchair with arm (69%), climbing into the wheelchair crawling out of the wheelchair(78%), operating electronic gadgets like TV and radio (42%), bending to lift objects from floor (52%), arm stretching to lift objects from moderate heights (58%), lying in bed over a long period not capable of changing position by themselves (18%).

These finding of this study have various implications. All of the activities required usage of functional garments for the convenience and effectiveness of the users. Doffing to attend to particular duties conveniently is also necessary. In the seated position it becomes most pertinent to put on the right garments for effective functioning. For instance, Chase and Quinn (2003) and Carroll 2001 noted that garments with sleeves that have extensions would entangle on the wheel of wheelchair. Superfluous garments may catch flame during cooking, especially in the seated position. The study showed that wheelchair bound females were involved in vigorous movements in climbing in and out of the wheelchair, indicated by 69% and pedalling the wheelchair manually. The study also showed that very few (3%) of the PCWBF were civil servants who were involved in teaching, secretarial services and some were business women requiring movement from place to place. These require functional garments that could enable them attend to the various activities effectively. There was evidence of bedridden females totally incapacitated (18%) who depended on care givers. Functional garments are a must to this group to reduce the burden on their care givers or relatives.

This research revealed the category of requirements that characterised garment needs of physically challenged wheelchair and bedridden females (PCWBF). These comprised physical: Ease of wearing and taking off (55.4%), concealment of place of deformity (32.6%), comfort in wear, protection/safety (8.2%), protection/safety (2.7%) and adornment of self (1.1%). The social/ psychological considerations were: Emotional, psychological and physical independence (69.0%), Self-esteem (22.6%), enhanced participation in social and physical activities (7.9%). The category of needs reflected the requirement of the physical characteristics possessed by some of the PCWBF observed and documented earlier in the study. For instance, weak hands and fingers as well as seated position would hamper easy donning and doffing, therefore there was need for use of garments that could be easily donned or doffed. The presence of shrivelled lower limbs, deformed body shapes or figure flaws informed the need to conceal places of deformity selected by the PCWBF.

The findings agree with the documentations by Weber (1990) that garment should satisfy the functions of survival, safety and security (protection), identity, modesty, status symbol, and decoration. The need to satisfy emotional, psychological and physical independence agrees with Weber (1990) who noted that such satisfaction give room for survival despite the odds against the wearer. The most selected physical requirement for garment needs by PCWBF was ease of donning and doffing (wearing and taking off) garments. All PCWBF require this as indicated by (100%). This finding agrees with the finding by Carroll (2001) that wearing and taking off garments pose great challenge to people with disabilities. Difficulty in donning and doffing garments bring about restriction in basic activities of daily living including dressing and undressing for work, toileting and receiving medical treatments where necessary. Carroll (2001) added that difficulty to manage fastenings caused the most consistent problems with People with Disabilities (PWD). The finding is also inconsonance with the assertion by Chase and Quinn (2003),

that people with physical disabilities require garments that are easy to wear and take off in order to enhance their physical independence on people around them. Chase and Quinn (2003) similarly noted that the basic requirements for garments for PWD are that the garments should be easily worn and taken off as well as provide comfort for the wearer. In the seated position, it becomes cumbersome to don/ wear certain garments that require slipping in and out of the body except there are special closures and openings. Johnson (2009) had recommended that special closures such as Velcro, double end zippers with extensions for handling be used on functional garments for people with disabilities to ease the use of such garments.

Other physical requirements selected by the PCWBF were concealment of place of deformity, comfort and protection/safety. The overall rating for need to conceal place of deformity was 32.6%. This finding is in consonance with the reason why people with disabilities wear cloths found by Kaiser, Freeman and Wingate (1985). These include concealment, deflection (to another body attribute less discerning than their disability) and compensation (expressing mastery in an area usually closed to disabled persons and emphasis of the social uniqueness of the subjectsô situation; uniqueness of disability Concealment of place of deformity provides psychological satisfaction and physical protection for the wearer as well as those that come in contact with the wearer. This is because some deformities may cause a traumatic experience for the onlooker if not properly covered.

Comfort in wear was selected as one of the requirements for garment needs for PCWBF. This finding agrees with assertions by Sweeney and Branson (1990); Sproles and Burns (1994) that comfort form a major factor in the choice of clothing by people. This finding supports the assertion by Merenstein and Gardner (2002) who stressed the effects of swaddling neonates in the intensive care unit for maximum comfort and survival. Breza

(2007) equally maintained that comfort in clothing program is a great source of relief for patients in helping them maintain their dignity.

Specifically, the research also sought to identify the types of garment designs preferred most by the users or PCWBF. Data in table 2 showed that the most preferred garment design for both users and the judges is long skirts and blouses (separates) selected by 42.7% users. The second most preferred form of dress revealed in the research is long or full length gowns select by users 41.6%. The choice of skirts and blouses could be associated with the need to conceal deformed lower limbs. This choice is also in close association with the traditional garments of the people in the area of study which is blouse and wrapper used irrespective of physical disability as shown in appendix AD. This finding is in parallel with earlier findings by Hurlock in Sproles and Burns (1994) who found that one of the factors which influence women of all ages to choose their dress is conformity to existing dress forms. Conformity in dress according to Sproles and Burns (1994) is a method for seeking group membership or attaining friendship and companionship of others. In the case of the PCWBF, conformity to existing dress design is a proof of desire to belong to the larger society without disabilities. Apart from physical disabilities, the non-choice of short gowns, trouser and tops, dungarees reflected in Table 2 is an indication that such garments are not popular choice in Benue State especially among those without physical disabilities.

The most preferred length of sleeve indicated by 66.6 % users in table 3 was short length. The finding supports earlier findings by Carroll (2001) who purported that some of her respondents detested the use of elastics, frills or extensions on the edge of sleeve of their functional garments. The results are in consonance with the recommendations by Chase and Quinn (2003) for designing garments for people on the wheelchair. Shorter sleeves without much extension and hangings, according to Chase and Quinn (2003), Johnson (2009) and Grunnert (2009) are necessary to avoid the extended sleeve length from entangling on the wheels while the wearer is in motion. Short sleeves without extensions will also save

wearers from fire accidents while cooking especially while seated. Results from this study showed that as much as 58% of PCWBF prepared meals, 69% pedal their wheelchair and are involved in other activities that require garments with short sleeves. The data obtained confirmed their need to fulfil their daily activities effectively.

Various necklines namely: low, high necklines, necklines with collar, without collars were presented to the users for selection. Design of necklines were displayed or shown to individual respondents to clarify points while carrying out the study. The characteristics of neck line most preferred and indicated by users in table 3 were: low neck lines (round) 75%, high neck lines (round) 82.3% and neckline with other collars such as convertibles, Peterman 56.0%. The choice of round necklines could be as a result of desire by users for simplicity in the design of the functional garments as well as conformity to predominant styles available to the users in the study area. A few variations attended to the choice of necklines due to specific individual preferences. This contradicts the assertion by Caldwell (1999), Thorén (1997) and Chase and Quinn (2003); that people with disabilities place value on the stylishness and fashion ability of their garments. However, similar to the findings of Carroll (2001), this finding shows that the disparity in choice of neckline may be attributed to desire by users to express their individuality in garment choice. While certain necklines conceal deformities such as dowagers, hump and other unwanted structural or figure problems, others emphasize them. Clothing style can enhance desired figures or create illusions of perfection on otherwise disadvantaged parts of the body (Chase and Quinn, 2003; Johnson, 2009). Clothing for the physically challenged often deviated from the usual shapes in order to be more functional and minimize figure flaws (Johnson, 2009).

In addition to the list of fabric types (texture) and colour, surface design, different samples of fabrics were shown to the respondents who were not Clothing and Textile specialist to clarify points that were difficult to be understood. The analysis of rating by respondents in table 1 showed that 75.8% users selected cotton as the most preferred fabric.

The characteristics of cotton fabric such as softness, breath ability, non-irritational, malleability provide comfort for wearers. This finding buttress the assertions by Weber (1990), Stratton (2007) and Dhinakaran et al (2011) that people place comfort foremost in the choice of their clothing. The high percentage of choice for cotton fabrics recorded by respondents can be attributive to the hot and humid weather condition in Benue State. The finding also suggests that respondents were aware of the inherent characteristics of cotton fabric; capable of absorbing moisture from the body resulting from sweat.

The overall choice of colour by users was divided between dull solid colours (brown, green, blue) (45.9%) and dull floral colours (brown, green and purple) (45.7%) as shown in table 3. However, the overall analysis shows that the most preferred fabric colour is dull floral colours attested to by 55.7 % respondents. The disparity in choice of colour and motifs is at pals with the findings of Carroll (2001) who reported similar disparity of choice of fabric among women with disabilities. The finding also agrees with the assertion by Brock, Ulrich and Connell (2010) that colour choice among people depend on several factors such as individual or personal colouring, mood, culture age and sex. The choice of dull solid or floral colours is likely to be due to the need to guard against stains which is one of the problems highlighted by Carroll (2001) on the use of solid coloured fabrics.

Several design features indicated in table 4 guided the design of functional garments and subsequent drafting of the patterns for the functional garments. The choice of garments with fullness indicated the desire of the users for freedom of movement of mobility. Watkins (1984) had noted that if clothing impedes the normal range of body movement, physical and mental fatigue can result. The finding the study re-echoed the documentation by Carroll (2001) that overall styling preferences by people with disabilities tended to be for loose and unfitted style of garments. Mobility is a significant issue for clothing product development for people with disabilities, it is therefore recommended that a certain amount of ease be included in garments especially for people with disability for easy donning and

doffing, manipulating fasteners, comfortable movement and adjusting clothing once it is on the body (Carroll,2001). These help wearers not to have to work against their garments. The choice of ¾ uarter length, ankle length garments rather than short and knee length garments support the earlier findings that the PCWBF select garments that conceal their deformities. The finding is in consonance with the assertion by Sproles and Burns (1994) that the selection and wearing of a particular garment serve partially to satisfy needs of the personôs physiological and safety needs (comfort and protection). This finding confirmed the assertion by Chase and Quinn (2003) that people with disabilities especially, those sitting on the wheelchair desire long garments to cover their areas of deformity.

All the fourteen functional and aesthetic design features listed in table 4 were satisfactory to the users, since each of the mean values were higher than 3. The finding confirmed the assertion by Chase and Quinn (2003) that the physically challenged people desire to wear clothes with aesthetic finishes like people without disabilities. The PCWBF (users) rated nine out of the fourteen aesthetics variables > 4 meaning very good, the remaining five were rated between 3 and 3.79 meaning good or satisfactory. The corresponding standard deviation for each of the design features approved of by the users is Ò1 showing relative high level of uniformity among the responses of the users.

All but one out of the seven expressive design features listed in table 5 for inclusion in the patterns for the prototype functional garments were satisfactory to the users. Two of the expressive design features (Garments/colours that help PCWBF attend to specific function such as games, cooking, shopping and stylish garments with good and visual designs to satisfy emotional, psychological feelings of wellness were rated with mean above 4. Four of the expressive variables were rated good, mean (between 3 to 3.59) while only one expressive variable was rated with mean of 2.59 (below satisfactory). One of the expressive design features: Stylish garments with good and visual designs to satisfy emotional, psychological feelings of wellness have very low standard deviation (0.33). This

indicates that all the users had high agreement on the need for the stated design feature on the prototype functional garments. This finding supported the claim by of Chase and Quinn (2003) that people with disabilities desire to wear fashionable clothes in order to enjoy a state of wellness. The finding also reaffirms the need recommended by Meinander and Varheennaa (2002) that while designing garments for people with disabilities, both aesthetical and functional aspects should be fulfilled. Meinander and Varheennaa (2002) added that such garments should have characteristics that will meet both the physical and psychological limitations of the individual. The choice of different types, design characteristics of functional garments made by the PCWBF, namely: ankle length garments, free, short sleeves indicated in table 3 reflected usersô desires to satisfy emotional, psychological and physical independence in their use of the functional garments.

In establishing size categorization for the PCWBF, the study revealed that 59% of the physically challenged wheelchair and bedridden females fall within the large size category, 26.9% were medium sized, 14.7% were small sized as shown in table 6 and appendices I, J and K. Sizing was based on size categorization in women size chart (African styles measurement chart, (2011); Standard Metric Measurement Chart (2007). This finding agreed with the assertion by Craig (1990), Chase and Quinn (2003), that sitting on the wheelchair leads to fat deposition in different parts of the body due to inactivity. Fat deposition among women increases with increase in age and less activity (Kwon and Parham, 1994). Fat deposition could occur at different positions on the body particularly on the stomach hip, waist, thigh and upper arms. The variations in size observed in this study augmented the suggestion of Broorady et al (2009) that due to variations in size and shape of people, sizing should be on the most recent anthropometric data available for the population.

The following fit variables were tested by users: neck line, bust line, ease across shoulder, waist line, and ease at biceps. Others include: fit over the hip, safety, overall fit,

functionality and ease of mobility. The total mean rating of each fit variables for the three sizes of gowns by the users was very good Ó 4, as recorded in table 7. The total standard deviation of each of the fit variables ranged from 0.0 to 0.928 for all sizes of gown. The total mean rating of each fit variables for skirts and blouses by the users is very good Ó 4. The total standard deviation of each of the fit variables also ranged from 0.0 to 0.928 for all sizes of skirts and blouses. Similarly, the total mean rating of each fit variables for trousers and tops by the users is very good (Ó 4). The total standard deviation of each of the fit variables ranged from 0.0 to 0.928 for all sizes of trousers and tops. Each of the overall total mean for each of the fit variables in the large, medium and small size categories is Ó 4, and their corresponding standard deviations are all <1. This implies that the users have rated the prototype functional garments to be very good even though their judgments differed. There is relative uniformity in their responses. This result is consistent with the assertions of Varney 1980; Watkins (1995) that the fit of a garment is a critical element and opinions about fit of a garment vary from one individual to another. Lawson and Lorentzen (1990) and Ring (2001) had noted that the wearer of a garment has the best judgment of the fit of any garment. Hence if the wearer is satisfied with the fit of the garment it is perceived to fit well.

Ease of mobility which forms major requirement in design of functional garments for people with disabilities recommended by Grunnert (2009) and Broorady, Haise, Rucker and Ashdown (2009) was accomplished in this study. The users were subjected to slight movement test such as lifting objects from tables behind them, lifting objects from the floor and moving their respective wheelchairs by rolling the wheelchairs back and forth. Each of the fit variables : neck line, bust line, ease across shoulder, waist line, ease at biceps, fit over the hip, safety, overall fit, functionality and ease of mobility assessed by both users were satisfactory or above satisfactory (table 9, appendix Y). The results showed that mobility of users was not hampered by any of the designs of the prototype functional garments. This

result implies that the prototype functional garments do not prevent the wearers from carrying out activities such as moving, lifting, bending, riding the wheelchair which characterized their daily activities documented in the study.

The aesthetic attributes of the prototype functional garments tested were beauty, colour, and texture of fabric. Others were fashion ability, visual appeal, shape/silhouette, style attributes, construction technique, fastenings and acceptability given in table 10. Each of the aesthetic attributes were rated with mean of 4 or above by users. Each total standard deviation was between 0.33 and 0.60. The result implied that users were highly satisfied with all the aesthetic design attributes included in the prototype functional garments for the Physically Challenged Wheelchair and Bedridden Female. There was close association between the responses of the users since the standard deviations were all below 0.60 for each of the aesthetic attributes.

Nurses rated all the aesthetic attributes for gowns, skirt and blouses very good (>4). All aesthetic attributes assessed for the prototype functional garments were acceptable to the Clothing and Textile lecturers and the garment constructors. The total for each of the standard deviations for aesthetic design attributes was <1: indicating little or no variation among the respondents as shown in table 10. An ANOVA test (table 14) to ascertain the level of differences between the response of judges revealed that the significant difference ($F= 3.468; 0.033<p < 0.05$) occurred between Clothing and Textile lecturers and nurses in the assessment of colour. Therefore, the null hypothesis Ho_2: There is no significant difference in the mean responses of judges (Clothing and Textile lecturers and nurses) on the aesthetics attributes of prototype functional garments was not accepted. The research showed that although both the users and the judges desired the inclusion of aesthetics in the design of functional garments for the PCWBF, a significant difference occurred between the responses of Clothing and Textile lecturers and nurses on choice of colour. The finding complimented the findings of Carroll (2001) who noted disparity among people with

disabilities on colour selection. Carroll (2001) found that while some of the respondents preferred solid colour fabrics for some tailored functional garments, others rejected same arguing that such fabric colours would show stains easily. This finding also confirmed that people have different dispositions to colour choice because of the various illusions colour creates on the wearer and the person observing the wearer. Chase and Quinn (2003) documented that dull colours give illusions of thinness; attracting less attention to the wearer, while happy colours like sun flower yellow or orange lift the spirit and draw attention to the wearer. Hence, colour can be used to create desirable effects on clothing for people with disabilities (Chase and Quinn, 2003).

Five expressive variables namely: promotion of self-image, self-esteem, confidence, social security and physical independence were assessed by both users and documented in table 11 and appendix AA. The total means ratings for promotion of self-image and physical independence were 4 and 4.11 respectively, while the total standard deviations for each of them was between 0.500 and 0.333 respectively for all the gowns, skirt and blouses and trousers and tops. This implied that the users were very satisfied with the two expressive variables inherent in the prototype functional garments. There were only slight variations in the response of the users since the standard deviations were very low. Users rated promotion of self-esteem, confidence and social security with lower total means (3.67, 3.78 and 3.89) respectively, relative to promotion of self-image and physical independence with 0 .500, 0.441 and 0.333 SD respectively. Users were satisfied with all the five expressive attributes of the three types of prototype functional garments fitted. Expressive design feature has to do with the inner (emotional objective interpretation) of the design concepts in the garment which are best expressed by the wearers of the garments. The findings buttressed the findings of Kaiser et al (1985); Kaiser (1990); Carroll (2001) and Chase and Quinn (2003) who found that physical disability does not deter the use of stylish, visually appealing garments and emotionally satisfying clothing. Carroll (2001) also noted that

wearing beautiful and satisfying garments helps people with physical disabilities to be happy.

The results in table 13 revealed that there was significant difference between Clothing and Textile lecturers and nurses on the category of requirements that characterised garment needs of PCWBF. Data in table 14 also showed significant differences between the mean responses of Clothing and Textile lecturers and nurses on colour. According to Craig (1980), individual differences in colour choice always exist due to differences in temperaments, emotions. Colour plays many roles in the design of functional garments for the physically challenged. For instance, colour interplays with lines and shapes resulting in beauty. Chase and Quinn (2003) and Grunnert (2009) asserted that expression of inner feelings of joy, sadness and conveyance of message through clothing usage are achieved by use of colour. The finding about differences in choice of aesthetics (colour) is in line with the findings of Carroll (2001) who found that although some functional clothing styles preferences of people with disabilities were similar, specific styling needs and preferences varied. This was attributed to variation in size, shape, need to cover figure problems like dowagerôs hump, need for ease along necklines, and inability to perform some daily activities such as carrying bags. Carroll (2001) noted that while some physically challenged indicated need for large outer pockets on their garments to carry items, others preferred that such pockets be concealed.

CHAPTER FIVE

SUMMARY, CONCLUSION AND RECOMMENDATIONS

Restatement of the Problem

This chapter deals with the summary, conclusion and recommendations of the research. The summary of the procedures used in the study and summary of major findings are included in this chapter. The physically challenged or people with disabilities are people who are disadvantaged in different ways and need to be encouraged to fully participate in various activities in order to attain some level of fulfilment in life despite their physical constraints. In Nigeria, like in many other countries of the world, people with disabilities are receiving attention to enhance their full participation or integration in the larger society. Women with disabilities comprise a sizeable group and are frequently subjected to multiple discrimination; both disability and gender based. These groups of people have some peculiar body characteristics such as inability to move lower limbs and use them effectively, body deformations and disproportionate sizes of different parts of the body. Their garment needs are dictated by their peculiar body characteristics and the various activities that they participate in and therefore require urgent attention. Persons with physical disabilities require full recognition in fashion changes that indicate the growth of a society. Females are among the vast number of physically challenged persons seeking recognition and integration into work force in Nigeria.

Recognizing that garments are the second skin and the next closest environment to human body, if the individual is deprived of the opportunity to wear choice garments as well as elaborate desired styles due to inability to move the limbs appropriately the woman with disability is disadvantaged. This aspect of the needs of women with disabilities is often neglected by garment producers and educational institutions that should propagate this knowledge. The knowledge of the role functional garments play in the lives of people with

disabilities seems to be inadequately disseminated by stake holders like nurses, Clothing and Textile lecturers.

The clothing market is not stocked for people with unusual body dimensions and or different kinds of functional impairments. Currently, demands or orders have to be placed for specific garment and other clothing needs such as foot wears for people with unusual body dimensions. This poses challenge to the Clothing and Textile instructors, who should encourage creativities, propagate the knowledge of clothing design and production garment designers and garment manufacturers.

None availability of ready-made commercial patterns specially designed to fulfil functional roles in garments for people with disabilities has added to the problem. Commercial patterns imported to Nigeria are devoid of essential features for direct translation into functional garments for persons with physical disabilities. Such patterns will require major alterations which can only be carried out by well-trained garment constructors. This poses a problem to garment constructors who are not conversant with pattern drafting prior to garment construction and the wearers.

The disparity between the body size, shape and figure type of the white and black females makes it imperative for patterns of garments for the PCWBF in Nigeria to be designed and drafted specifically for its users in Nigeria and not to depend on existing patterns that are produced for white females with disabilities. For instance, size charts developed for white females are made to fit on the body silhouettes while size charts for African females is characterized by extra allowances for freeness.

Physically challenged wheelchair and bedridden females require comfortable and aesthetic garments to attend to their daily activities. In garment design, there is constant need for developing designs that are in consonance with current fashion since fashion is dynamic. Hence, fashion designers are shifting emphasis from just aesthetics to both aesthetics and function. Garments that provide accessibility for caregivers, relatives of

persons with physical disabilities are achievable by including functional components such as detachable portions that allow access to parts of the body, easy-to-handle fasteners, and pockets for housing medical care aids like catheters. Functional garments that reduce inconveniences experienced by the PCWBF in hospitals and at home due to unavailability of adequate medical facilities in hospitals and limited number of care givers and relatives should be the focus of garment producers.

Although, researches on designs and developments of functional/special garments for people in different professions have been carried out in Nigeria, none has particularly addressed the functional garment needs of physically challenged wheelchair and bedridden females in Benue State.

Summary of Procedures Used in the Study

The study was conducted in Benue State, Nigeria. The research design was Research and Development (R and D). The study focused on product development for a special group of people; the physically challenged wheelchair and bedridden females. Two models: Lamb and Kalla (1982) known as Function, Expressive and Aesthetic (FEA) and the Universal Design Principles (UDP) guided the process of the research. The prototype functional garments developed needed to be aesthetically and expressively acceptable in the cultural setting of the users, universally applicable by other groups of women and relevant to the users in attending to their daily activities. These were articulated at the various phases of the study. The study comprised three major phases as follows:

1. Identification of PCWBF and category of requirements that characterised their garment needs.

2. Development of three sizes each of three types of prototype functional garments based on selected garment designs and pre-testing of the garments.

3. Summative evaluation of the prototype functional garments produced by test-fitting of PCWBF.

The population for the study was 9,940 persons comprising four groups namely; 8,944 physically challenged wheelchair and bedridden females (PCWBF) also called users, 769 nurses /caregivers, 10 Clothing and Textiles lecturers and 217 garment constructors /tailors.

The sample for the study was 653 respondents drawn by multiple techniques from the populations. The sample comprised 368 PCWBF, 260 nurses and 15 garment constructors and 10 Clothing and Textile lecturers in phase 1 of the research. The sample of respondents that participated in summative evaluation of the prototype functional garments was 23 persons made up of 3 PCWBF /users and 20 judges (5 nurses,10 Clothing and Textile lecturers and 5 garment constructors). Data obtained were analysed using, frequencies, percentages, Means and standard deviations. The two hypotheses were tested using ANOVA.

Summary of Major Finding

The major findings were made based on the set research objectives. Data collection was achieved by use of the four instruments for data collection: Observation checklist (OCL), garment needs assessment questionnaire (GNAQ), body measurement chart (BMC) and garment fit assessment questionnaire (GFAQ).

- The study revealed that the PCWBF undertake many activities in the seated position or lying in bed and this presented challenges on the need for correct functional garments.
- The study revealed physical and social and psychological category of requirements that characterised their garment needs. Ease of donning and doffing (wearing and taking-off) garments presented the highest physical requirement (55.5%) while satisfaction of emotional, psychological and physical independence represented the greatest social and psychological requirements (59%) for garment needs of the PCWBF shown in table 1.

- The study revealed some physical characteristics of the PCWBF: Curved spine, arched back, disproportionate sizes of lower upper torsos, enlarged upper torsos, deformed lower limbs that were disproportionate in size, widened hips and buttocks due to long sitting, stiff knee and some other body joints that do not flex easily. Other physical characteristics were shrivelled hands and feet, muscular large upper arms and neck muscles, weak upper limbs, partial or total blindness, deafness and Down syndrome. Individuals may possess one or more of the physical characteristics observed but not all.
- The characteristics of garments selected included: ¾ length garments (gowns, skirts and blouses), garments that are free, short sleeve lengths, round necklines, collars other than the regular shirt collars, cotton fabric with dull floral patterns and colour. See table 2.
- All the fourteen functional and aesthetics designs variables presented were acceptable to the PCWBF while five out of the seven expressive design variable presented were rate above satisfactory by PCWBF.
- The PCWBF were categorized into three basic sizes (large, medium and small). The distribution of PCWBF in each size category was 58.4% (large), 26.9% (medium) and 14.7% (small) sizes. This summarized in table appendix I, J and K.
- Functional components included in the design of prototype functional garments for this study were enlargement of bodices for freeness, easy wearing and taking off using Velcro openings and closures, fabric strings for fastening, elasticized waists on trousers and skirts, back inset that are detachable, concealed pockets, extended front lengths and altered neck lines and short length kimono/ margyan sleeves.
- A total of 72 pattern pieces were drafted.
- Thirteen styles of functional garments were adapted from the basic patterns.

- The appropriateness of the prototype functional garment were determined by test-fitting for fit, comfort, ease of mobility, acceptability, aesthetic, expressive attribute by users. All the fit, comfort, ease of mobility, acceptability, aesthetic and expressive attributes were rated above satisfactory by the users (PCWBF).
- The judgesô assessment of aesthetics and expressive variables shown in table 12 indicated that the aesthetics and expressive performance of the prototype functional garments were very good.
- A significant difference occurred between the responses of Clothing and Textile lecturers and nurses only on preferred colour (aesthetics) of fabric to use for construction of the prototype functional garments.

Conclusion

This study was guided by the two models: Function, Expressive and Aesthetics (FEA) and Universal Design (UD) established the need for involvement of the users, consideration of existing cultural setting and coverage of a wider range of users that could enjoy the usage of the product developed. It was also concluded that the (UD) approach to designing garments for Physically Challenged Wheelchair and Bedridden Females yielded excellent results in meeting their garment needs due to variations in levels of incapacitation. The universally designed garment could also have a wider scope in usage, for instance, the prototype functional garments produced in this research are equally useful to the incontinent and the aged females.

It was established that individual differences existed over choice of garments. Therefore, obtaining feedback from end users while developing new products like garments is important since it helps the developer/ designer to eliminate erroneous assumptions about their needs and choices. The application of R and D method for this study was therefore appropriate. It is equally important to consider the cultural setting of the users especially

when considering what is to be worn by the targeted people. The fashion that may be acceptable in culture may be unacceptable in another.

This study revealed that even though Physically Challenged Wheelchair and Bedridden Females (PCWBF) have peculiar seated postures, diverse physical characteristics of body; they participate in a wide range of daily activities similar to those undertaken by those without physical disabilities. Therefore, they needed functional garments that would facilitate or enhance effective performance in those activities. This study has shown that the garment needs of the Physically Challenged Wheelchair and Bedridden Females in Benue State were governed by physical, social and psychological characteristics. The two most predominant requirements for their garments were easy donning and doffing and psychological and emotional satisfaction of physical independence. The category of characteristics that governed the garment needs of the PCWBF was reflected in the choice of types of garments, functional, aesthetics and expressive designs preferred by PCWBF and the judges. The need for taking anthropometric measurement of individuals while developing new garment products was confirmed in the research especially due to disparity between the sizes of the users in this study. Based on the findings of this study, it could be assumed that large sizes predominate size of PCWBF in Benue State, hence in producing functional garments for the this group of people, large sizes should be more in number than medium and small sizes.

It was concluded that the study was successful since the prototype functional garments designed, constructed and fit-tested satisfied both the users and the judges.

Implications of the Study

The findings of the research placed wide consequences on the physically challenge and bedridden females (PCWBF), their caregivers and relatives, Clothing and Textile lecturers, garment constructors, garment entrepreneurs, and the aged females and their

caregivers. The products of this study will enable the PCWBF to enjoy effective use of their garments: easy donning and doffing (wearing and taking off) and enhance functionality of the garments they wear. It will help the users to have comfort in wear, enjoy attending to their daily activities with much ease and without depending solely on their relatives, care givers who may not be readily available. The presence of persons with disabilities places extra demands on the members of the family. Comfort in wear, according to Breza (2006) provides emotional stability for people recuperating from illness. The availability and use of the functional garments will cut down on spending to maintain a care giver for the PCWBF since the person with disability could attend at least to her garment needs with little or no assistance. For instance, the nurses on duty would have less demand in attending the PCWBF if on admission due to the functional components of the garments. The products of the research provide social, psychological, emotional satisfaction for the users thereby enhancing their integration into the productive society. The expressive properties; promotion of self-image, confidence, social security and physical independence experienced by the users add to assimilation into the world of work regularly been looked forward to by people with disabilities.

Caregivers, both medical and relatives will find it easier to administer medical treatments such as cleaning, wound dressing, injection, change of catheter on the PCWBF while wearing such garments. Nurse and relatives will be less encumbered by the attention of their physically incapacitated relative since such relatives can attend to some basic needs of garment usage.

The incontinent, the aged females will also benefit from the use of the functional garment. Its usage will reduce their dependence on their caregivers. This results from the availability of special closures and openings and provision for detachable insets on the functional garments.

The finding of the study provides better knowledge for garment constructors who are better equipped to construct the right silhouettes, designs, fabrics and colours that best suit the PCWBF. The product of this research will provide readyï made patterns for use by garment constructors and this will enhance their performance in garment construction. Their rate of production will be faster, precision in cutting and joining will be enhanced since the patterns for the garments are already available. This knowledge can be disseminated in form of charts and given to the association of Textile and garment producers and distributed to their members.

The findings of this study have implications for entrepreneurs. Entrepreneurs can generate income from sale of ready-made patterns of functional garments to interested large scale garment constructors as well as individuals. Functional garments could be mass produced and sold to increase source of income for existing entrepreneurs and would-be entrepreneurs especially Home Economic graduates seeking employment. The benefit to be derived by Home Economics graduates makes it incumbent on curriculum planners to include courses on creativity and entrepreneurial education to equip the graduates for self-employment.

Recommendations

Based on the findings of the research the following recommendations were made:

1. Information gathered from this research, especially on garment choices by the PCWBF should be produced in form of charts and given to garment constructors in order to correctly produce the right garments for the PCWBF. The functional garment usage should form part of the healing therapy given to patients whose illnesses have led to physical incapacitation culminating in sitting on wheelchair or confinement to bed. This teaching can be down by nurses while the patients are still in hospital, by Home Economics Extension workers on visit to the homes of the PCWBF.

2. The summary of the method of pattern drafting adopted in this research should be extracted and published to provide knowledge for garment design students to aid in equipping them for creativity in garment designs with functionality in focus.
3. The research showed that the users were satisfied with the prototype functional garments even though the garments were entirely new concepts to the existing fashion of the people. This is an indication that if such garments are available in the market they will be purchased by those who need them. Hence, it is recommended that garment producers could use the patterns to produce the garments for sale.
4. Ready- to- wear functional garments should form parts of the discharge kit for people with disabilities especially those with mobility challenges on discharge from hospital. The cost may be built into the cost of treatment.

Limitations

The study was limited by some factor. Obtaining the sample for the study placed some limitations on the study since in some cases convenience sampling was undertaken to ensure that those who responded to the questionnaire had adequate understanding of the study. For instance, in judging the fit of the functional garments, purposive sampling was used to select sample of users from among the PCWBF and sample of judges from nurses, Clothing and Textile lecturers and garment constructors. In most cases, use was made of only registered members of organizations of PCWBF, garment constructors and participants who were available and willing to participate to participate in the research. This may have introduced some biases in the results of the study. This implied that the results of this study may be generalized only for Benue State. Soliciting information on garment needs of the PCWBF entailed the use of questionnaire. Information given by the PCWBF (users) and the judges (nurses, Clothing and Textile lectures and garment constructors may be subjective.

While filling the questionnaire, respondents may have influenced each otherôsô judgment since the exercise was usually done in interactive forum to discourage loss of questionnaire. Another limitation placed on the study was the difficulty in obtaining accurate body measurements. Accurate body measurements, especially the circular measurements of the PCWBF were difficult to obtain due to the sitting or lying position of the PCWBF. As much as possible, near accurate measurements were obtained and the Means calculated.

Another limitation placed on this research was the fact that opinions about the fit of a garment are quite controversial. Hence in the use of garment fit assessment questionnaire (GFAQ) judgement opinion about the fit may be subjective. What may be judged as accurate by one respondent may not be so for another.

Suggestions for further Studies

1. This research can be repeated but using case study method to harness qualitative data on females with specific physical disabilities on their garment needs or other aspects of clothing needs.
2. A similar research may be conducted to determine garment needs of men on with various forms of disabilities. A comparative research may be carried out to assess the garment needs of youth versus older females with physical disabilities

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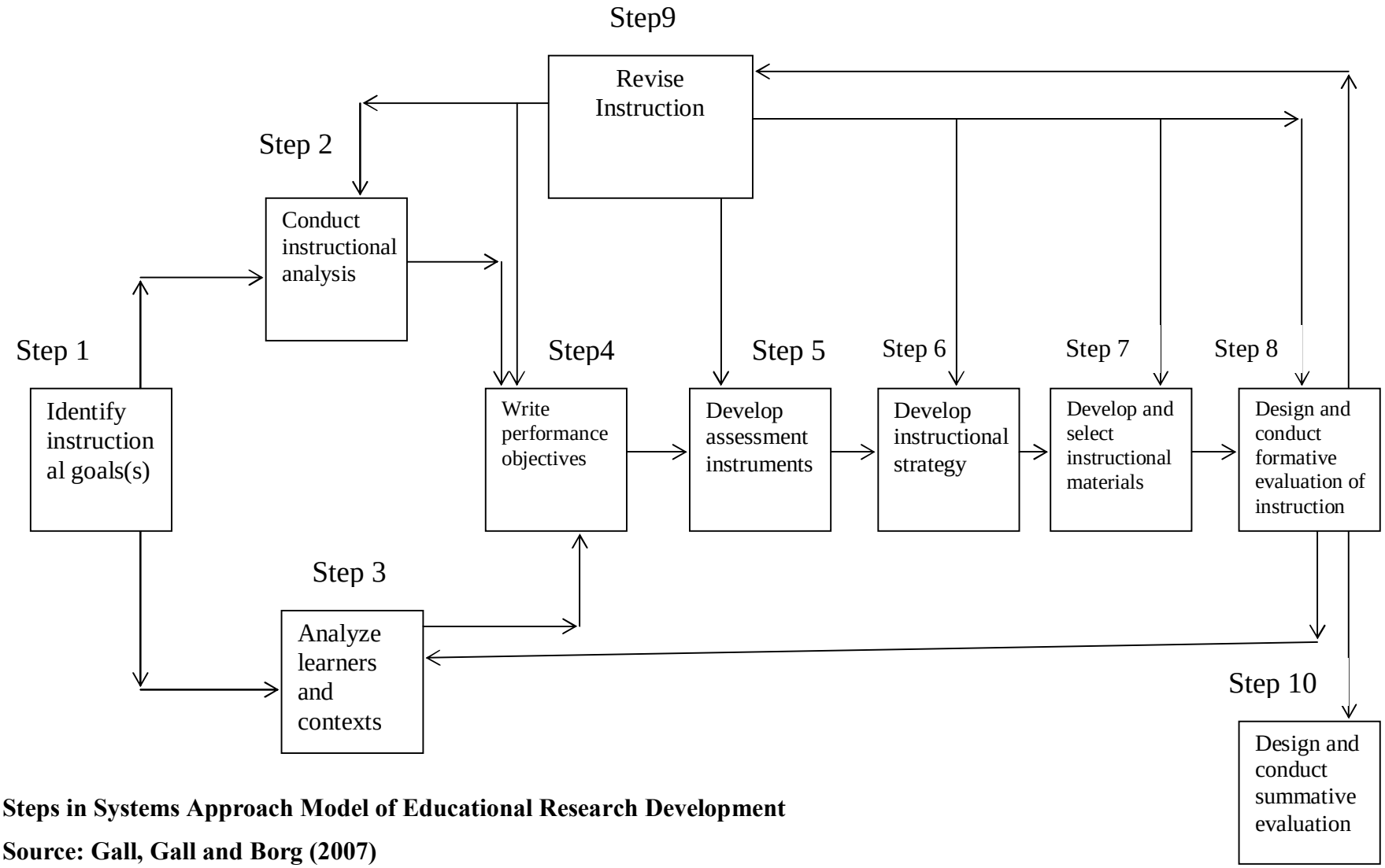
APPENDIX A



Steps in Systems Approach Model of Educational Research Development

Source: Gall, Gall and Borg (2007)

APPENDIX B

Garment Needs Assessment Questionnaire for Development of Functional Garments for Physically Challenged Wheelchair and Bedridden Females in Benue State

(For Users)

Please, kindly complete this form by checking (ã) in the boxes provided to indicate your choice or otherwise of the attributes of garments required to function better.

Section A:

1. Indicate your greatest challenge in use of garments.

(a) Wearing and Taking-off ( )

(b) Choice of style ( )

(c) Choice of fabric colour and texture ( )

(d) Comfort in wear ( )

2. Indicate the reason that best explains the need for functional garments.

(a) Comfort in wear ( )

(b) Protection/safety ( )

(c) Adornment of self ( )

(d) Concealment of place of deformity ( )

3. Indicate social/psychological reasons for need for functional garments.

(a) Self-esteem ( )

(b) Emotional, psychological and physical independence ( )

(c) Group identity ( )

(d) Enhance participation in social and physical activities ( )

4. Indicate by checking (ã) the types of garment designs you prefer most.

Clothing Item (Garment components)

(a) Skirt & blouses ( )

(b) Short gowns ( )

(c) Full length gowns ( )

(d) Trousers & Tops ( )

(e) Overalls (Dungarees) ( )

Section B

Indicate by checking (ã) the characteristics of garment designs you prefer most.

1. Overall Shape or Silhouette

Straight skirt/ straight gown that are free ( )

Skirt/ gown that are tight fitting ( )

Flared skirt/ flared gown ( )

Skirt/gown with full gathers/pleats ( )

2. Garment length

Ankle length (long) ( )

Three quarters (Between knee and ankle) ( )

Knee length ( )

Above the knee ( )

3. Sleeve Length

Short length ( )

Elbow length ( )

Three quarters ( )

Long sleeve ( )

4. Necklines

i Low neckline

Low neckline (Scoop) ( )

Low neckline (Round) ( )

Low neckline (Square) ( )

Low neckline (V-neck) ( )

Low neckline (Scallop) ( )

ii High necklines

High neckline (Scoop) ( )

High neckline Round ( )

High neckline Square ( )

High neckline (V-neck) ( )

High neckline (Scallop) ( )

iii Necklines with Collar

Neckline with Shirt collar ( )

Neckline with other collars (Convertible, Peter pan) ( )

5. Fabric Type

Cotton ( )

Wool ( )

Nylon ( )

Linen ( )

Synthetic blends (Silk, Polyester, Lycra etc) ( )

6. Colour of fabric

Bright Solid colours (red, yellow, blue) ( )

Dull Solid colours.(brown, green, purple) ( )

Bright floral colours (red, yellow, blue) ( )

Dull floral colours (brown, green, purple) ( )

7. Fabric surface design

Bright colour Plaids/Checks (red, yellow, blue) ( )

Dull colour Plaids/Checks (brown, green, purple) ( )

Poker dots (two colours) ( )

Poker dots (with more than two colours ( )

Section C. Garment Design features for Functionality, Mobility, Fit, Comfort, Aesthetics, Safety, Ease of Donning and Doffing.

1	Garments with longer neck- to- waist lengths than shorter neck- to- waist lengths to make me appear taller.	SA	A	U	D	SD
2	Gown that are proportionately longer in front than at the back to reduce bulk	SA	A	U	D	SD
3	Gowns and blouses with front side closures/ and openings to avoid hurting me while sitting and for ease of opening and closing.	SA	A	U	D	SD
4	Garments with large neck openings for ease of wearing and taking off.	SA	A	U	D	SD
5	Garments that fit loosely around the hip and thighs for comfort and to accommodate medical devices like catheter bags and tubes.	SA	A	U	D	SD
6	Garments with special closures/openings devices such as Velcro, Magnets and smooth openings with plackets for easy handling.	SA	A	U	D	SD
7	Garments that are loose across the shoulder and arms for easy movement (raglan, kimono and dolman sleeves).	SA	A	U	D	SD
8	Garments with large arm openings for ease of wearing and freedom of movement.	SA	A	U	D	SD
9	Garments made from special fabrics to cushion my sitting and movement on the wheelchair or lying in bed.	SA	A	U	D	SD
10	Trousers and Skirts with loose fitting adjustable waists for ease of wearing and taking-off.	SA	A	U	D	SD
11	Skirts, trousers and gowns with large pockets to store away some personal items and medical gadgets like catheter.	SA	A	U	D	SD
12	Garments with zip-off (detachable) parts to ease wearing and taking-off, with access to parts of the body for some activities such as medications.	SA	A	U	D	SD
13	Athletic trousers/pants designs without back middle and seat seams for comfort while sitting.	SA	A	U	D	SD
14	Garments that have flat, smooth seams especially on the inside, sits to avoid sores, pinching sensitive skin.	SA	A	U	D	SD

Section D

Garment Design specifications for gowns trousers/pants and skirts based on individual preferences and acceptability.

1	Gown, blouses/top that have contrasting colour to appear shorter in the wheelchair.	SA	A	U	D	SD
2	Garments/colours that help me attend to specific function such as games, cooking, shopping.	SA	A	U	D	SD
3	Garment styles that are similar to or same as those worn by people without physical challenges for psychological reasons.	SA	A	U	D	SD
4	Stylish garments with good and visual designs to satisfy emotional, psychological feelings of wellness.	SA	A	U	D	SD
5	Skirts and trousers with multiple closures/openings for ease of wearing and taking off and to easily attend to physical activities.	SA	A	U	D	SD
6	Skirts and trousers with Blouses/Tops that are same colour to make me appear slim and tall.	SA	A	U	D	SD
7	Skirts and trousers with Blouses/Tops that have contrasting colours to make me appear shorter and larger.	SA	A	U	D	SD

KEY**:** PCWBF = Physically Challenged wheelchair

SA	=	Strongly Agree	= 5
A	=	Agree	=4
U	=	Undecided	=3
DA	=	Disagree	=2
SD	=	Strongly disagree	=1

Comments/Suggestions:.....

.....

.....

.....

APPENDIX C

Garment Needs Assessment Questionnaire for Development of Functional Garments for Physically Challenged Wheelchair and Bedridden Females in Benue State

(for nurses, Clothing &Textile lecturers, garment constructors,)

Please, kindly complete this form by checking (ã) in the boxes provided to indicate your choice or otherwise of the attributes of garments required by PCWBF to function better.

Section A:

1. Indicate the greatest challenge in use of garments by the PCWBF.

(a) Wearing and Taking-off ( )

(b) Choice of style ( )

(c)Choice of fabric colour and texture ( )

(d) Comfort in wear ( )

2. Indicate the reason that best explains the need for functional garments for the PCWBF

(a) Comfort in wear ( )

(b) Protection/safety ( )

(c) Adornment of self ( )

(d) Concealment of place of deformity ( )

3. Indicate social/psychological reasons for need for functional garments for the PCWBF

(a) Self esteem ( )

(b) Emotional, psychological and physical independence ( )

(c) Group identity ( )

(d) Enhance participation in social and physical activities ( )

4. Indicate by checking (ã) the types of garment designs you prefer most for the PCWBF

Clothing Item (Garment components)

(a) Skirt & blouses ( )

(b) Short gowns ( )

(c) Full length gowns ( )

(d) Trousers & Tops ( )

(e) Overalls (Dungarees) ( )

Section B

Indicate by checking (ã) the characteristics of garment designs you prefer most for the PCWBF.

1. Overall Shape or Silhouette

Straight skirt/ straight gown that are free ( )

Skirt/ gown that are tight fitting ( )

Flared skirt/ flared gown ( )

Skirt/gown with full gathers/pleats ( )

2. Garment length

Ankle length (long) ( )

Three quarters (Between knee and ankle) ( )

Knee length ( )

Above the knee ( )

3. Sleeve Length

Short length ( )

Elbow length ( )

Three quarters ( )

Long sleeve ( )

4. Necklines

i Low neckline

Low neckline (Scoop) ( )

Low neckline (Round) ( )

Low neckline (Square) ( )

Low neckline (V-neck) ( )

Low neckline (Scallop) ( )

ii High necklines

High neckline (Scoop) ( )

High neckline Round ( )

High neckline Square ( )

High neckline (V-neck) ( )

High neckline (Scallop) ( )

iii Necklines with Collar

Neckline with Shirt collar ( )

Neckline with other collars (Convertible, Peter pan) ( )

5. Fabric Type

Cotton ( )

Wool ( )

Nylon ( )

Linen ( )

Synthetic/ blends with other fibers ( )

6. Colour of fabric

Bright Solid colours (red, yellow, blue) ( )

Dull Solid colours.(brown, green, purple) ( )

Bright floral colours (red, yellow, blue) ( )

Dull floral colours (brown, green, purple) ( )

7. Fabric surface design

Bright colour Plaids/Checks(red, yellow, blue) ( )

Dull colour Plaids/Checks(brown, green, purple) ( )

Poker dots (two colours) ( )

Poker dots (with more than two colours ( )

Section C.

Garment Design features for Functionality, Mobility, Fit, Comfort, Aesthetics, Safety, Ease of Donning and Doffing.

1	Garments with longer neck- to- waist lengths than shorter neck- to- waist lengths to make them appear taller.	SA	A	U	D	SD
2	Gown that are proportionately longer in front than at the back to reduce bulk	SA	A	U	D	SD
3	Gowns and blouses with front side closures/ and openings to avoid hurting them while sitting and for ease of opening and closing.	SA	A	U	D	SD
4	Garments with large neck openings for ease of wearing and taking off.	SA	A	U	D	SD
5	Garments that fit loosely around the hip and thighs for comfort and to accommodate medical devices like catheter bags and tubes.	SA	A	U	D	SD
6	Garments with special closures/openings devices such as Velcro, Magnets and smooth openings with plackets for easy handling.	SA	A	U	D	SD
7	Garments that are loose across the shoulder and arms for easy movement (raglan, kimono and dolman sleeves).	SA	A	U	D	SD
8	Garments with large arm openings for ease of wearing and freedom of movement.	SA	A	U	D	SD
9	Garments made from special fabrics to cushion sitting and movement on the wheelchair or lying in bed.	SA	A	U	D	SD
10	Trousers and Skirts with loose fitting adjustable waists for ease of wearing and taking-off.	SA	A	U	D	SD
11	Skirts, trousers and gowns with large pockets to store away some personal items and medical gadgets like catheter.	SA	A	U	D	SD
12	Garments with zip-off (detachable) parts to ease wearing and taking-off, with access to parts of the body for some activities such as medications.	SA	A	U	D	SD
13	Athletic trousers/pants designs without back middle and seat seams for comfort while sitting.	SA	A	U	D	SD
14	Garments that have flat, smooth seams especially on the inside, sits to avoid sores, pinching sensitive skin.	SA	A	U	D	SD

Section D

Garment Design specifications for gowns trousers/pants and skirts based on individual preferences and acceptability.

1	Gown, blouses/top that have contrasting colour to appear shorter in the wheelchair.	SA	A	U	D	SD
2	Garments/colours that help them attend to specific function such as games, cooking, shopping.	SA	A	U	D	SD
3	Garment styles that are similar to or same as those worn by people without physical challenges for psychological reasons.	SA	A	U	D	SD
4	Stylish garments with good and visual designs to satisfy emotional, psychological feelings of wellness.	SA	A	U	D	SD
5	Skirts and trousers with multiple closures/openings for ease of wearing and taking off and to easily attend to physical activities.	SA	A	U	D	SD
6	Skirts and trousers with Blouses/Tops that are same colour to make them appear slim and tall.	SA	A	U	D	SD
7	Skirts and trousers with Blouses/Tops that have contrasting colours to make them appear shorter and larger.	SA	A	U	D	SD

KEY**:** PCWBF = Physically Challenged wheelchair

SA = Strongly Agree =5

A = Agree =4

U = Undecided =3

DA = Disagree =2

SD = Strongly disagree =1

Comments/Suggestions**:**.....

.....

.....

.....

APPENDIX D

Observation Checklist of Activities Involved in by Physically Challenged Wheelchair and Bedridden Females in Benue State

Nature of Physical Challenge Responses

*Bedridden	Activities	Yes	No
	1. donning, doffing garments	☐	☐
	2. toileting	☐	☐
	3. mouth brushing	☐	☐
	4. bathing	☐	☐
	5. washing of clothes	☐	☐
	6. meal preparation/cooking	☐	☐
	7. breaking egusi	☐	☐
	8. peeling oranges	☐	☐
	9. movement within and outside the house involving crawling	☐	☐
	10. pedaling wheelchair with arm	☐	☐
	11. Operating electronics (TV and Radio)	☐	☐
	12. climbing into the wheelchair and crawling out of the wheelchair	☐	☐
	13. bending to lift objects from floor	☐	☐
	14. arm stretching lift objects from moderate heights	☐	☐

15. sitting over a long period of time	☐	☐
16. lying in bed on one position over a long period of time	☐	☐
17. child care	☐	☐
Total		

APPENDIX E

RESEARCH GARMENT DESIGN AND DEVELOPMENT FOR WHEELCHAIR FEMALES IN BENUE STATE

Department of Vocational Teacher Education (Home Economics)
University of Nigeria,
Nsukka.
20th February, 2010

Dear Sir/Madam

VALIDATION OF NEEDS ASSESSMENT CRITERIA CHART BY USERS

A Needs Assessment Questionnaire has been designed for collecting data on the garment needs of physically challenged wheelchair and bedridden females in Benue State. Please you are kindly requested to validate this assessment instrument for its appropriateness for the stated purpose above. You may use the following three scales for rating the items:

3 = very relevant

2 = relevant

1 = irrelevant

Further suggestions for improving the instrument will be highly accepted. You may include suggestions overleaf.

Please indicate your profession by checking the space provided appropriately

Lecturer ( ) Care giver ( ) User ( )

Name Date Signature

APPENDIX F

RESEARCH IN CLOTHING DESIGN AND DEVELOPMENT FOR WHEELCHAIR FEMALES IN BENUE STATE

Department of Vocational Teacher,
Education (Home Economics),
University of Nigeria,
Nsukka.
20th February, 2010

Dear Sir/Madam

VALIDATION OF NEEDS ASSESSMENT CRITERIA CHART BY JUDGES

A Needs Assessment Questionnaire has been designed for collecting data on the garment needs of physically challenged wheelchair and bedridden females in Benue State. Please you are kindly requested to validate this assessment instrument for its appropriateness for the stated purpose above. You may use the following three scales for rating the items:

3 = very relevant

2 = relevant

1 = irrelevant

Further suggestions for improving the instrument will be highly accepted. You may include suggestions overleaf.

Please indicate your profession by checking the space provided appropriately

Lecturer ( ) Care giver ( ) User ( )

Name Date Signature

APPENDIX G

STANDARD BODY MEASUREMENT CHART (SBMC)

1. NAME OF MODEL
2. SIZE CATEGORY
3. SENATORIAL ZONE ( )

Body Part

1. BUST
2. WAIST
3. HIPS
4. NAPE/BACK WAIST LENGTH (HL)
5. SHOULDER (SH)
6. FRONT FULL LENGTH
7. OVER ARM/SLEEVE LENGTH (SL)
8. BICEPS (BS)
9. ARMHOLE CIRCUMFERENCE (SC)
10. NECK CIRCUMFERENCE (NC)
11. TROUSER LENGTH
12. THIGH

13 CROTCH

APPENDIX H

Summary of Population and Sample of Respondents for the Study

S/No	Respondents	Population	Sample
1.	Nurses	769	260
2.	Clothing & Textiles Lecturers	10	10*
3.	Tailors	217	15
4.	People with mobility disabilities Physically Challenged Wheelchair and bedridden Females (PCWBF)	8944	368
5.	PCWBF (for wear-testing Prototype garments)	-	3*
6.	Nurses (for judging fit of Prototype garments)		5*
7.	Tailors (for judging fit of Prototype garments)		5*
Total		9940	672

10* = Clothing and Textile Lecturers, 3* = PCWBF, 5*= Nurses, 5*= Tailors, were selected from existing sample sizes of the population to serve as judges.

APPENDIX I

MEASUREMENTS (IN CM) OF PHYSICALLY CHALLENGED WHEELCHAIR OR BEDRIDDEN FEMALES (LARGE SIZE)

		BLOUSE						SLEEVE		SKIRT/TROUSER/PAINTS					
S/NO	**BUST**	**WAIST**	**HIP**	**BWL**	**SH**	**NC**	**FL**	**SL**	**UPPER ARM**	**BS**	**WAIST**	**HIP**	**FL W-A**	**THIGH**	**CROTCH**	**ANKLE**
1	106	90	124	39	16	40	52	59	36	40	90	120	113	67	28	39
2	128	122	138	36	16	40	61	61	36	45	124	140	99	98	30	50
3	140	134	138	36	16.5	44	60	60	41	49	128	160	98	94	34	44
4	150	140	140	34	17.5	46	54	62.5	44	52	140	150	99	89	35	44
5	142	140	138	32	17.5	46	54	62.5	44	52	140	150	99	89	35	44
6	152	150	149	39	18	46	54	63	43	52	142	147	111	85	38	39
7	144	147	140	36	16.5	40	60	63	43	52	142	147	111	85	38	39
8	124	124	122	34	16	40	50	60	36	43	120	152	98	89	30	40
9	150	146	139	36	17	42	52	60	46	50	144	148	98	94	36	38
10	124	118	120	34	16	40	51	55	30	44	114	140	97	92	30	38
11	110	90	115	40	16	38	54	62	40	40	98	111.5	102	84	30	39
12	128	102	132	38	16	38	52	52.5	40	40	100	134	111.5	84	30	39
13	130	102	135	40	16	40	52	60	38	44	100	134	111.5	84	32	44
14	140	110	146	41	15.5	43	52	60	40	44	100	148	112.5	75	34	44
15	148	120	150	42	16	40	52	60	41	49	118	150	111.5	89	34	44
16	150	130	148	41	17	44	52	60	46	50	125	150	112	96	34	44
17	151	128	146	42	18	43	52	60	46	50	125	148	110	94	30	44
18	133	102	145	38.5	16	40	52	59	40	40	100	137	110	90	30	44
19	118	98	120	39	16	38	52	64	38	40	96	124	108	85	30	42
20	125	102	132	40	16	40	52	60	46	50	125	148	110	94	30	44
21	133	106	136	41	16	40	52	60	42	39	101	138	111.5	90	30	44
22	134	116	138	40	16	40	52	60	42	40	112	140	110	92	32	40
23	136	108	140	44	16	40	52	60	40	40	104	142	111	92	34	40
24	128	100	138	40	15.5	40	50	55	40	39	100	144	110	85	30	40
25	114	94	119	43	15.5	40	50	60	39	40	92	118	110	80	32	40
26	124	104	129	44	15	40	52	60	40	42	100	128	111	80	32	42
27	116	106	122	42	16	40	52	60	38	40	102	122	115	74	30	40

28	134	114	139	44.5	16	40	54	60	40	42	111	138	112	76	30	40
29	110	100	124	39	16	40	50	60	39	40	98	126	111	70	30	42
30	124	102	129	43	16	40	52	61	40	41	100	135	110	70	30	42
31	134	116	138	40	16	42	50	60	40	42	113	141	111	72	30	42
32	144	124	149	45	16	40	50	60	42	44	121	147	112.5	84	30	40
33	106	95	126	40	16	40	52	60	38	40	93	132	110	80	30	40
34	140	133	138	40	16.5	44	52	61	42	40	131	138	110.5	82	34	40
35	128	104	129	43	16	40	52	60	40	40	102	132	111	80	30	40
36	114	96	119	44	16	40	52	60	40	38	94	106	112	80	30	40
37	124	104	128	44	16	40	50	59	40	40	102	108	112	82	30	42
38	116	106	120	40	16	40	50	60	38	39	103	131	111.5	70	31	42
39	109	96	126	42	15.5	38.5	50	60	38	40	94	128	111.5	70	30	40
40	144	124	146	44	16	44	50	62	44	42	121	134	111	80	32	40
41	106	92	123	39	16	40	53	60	38	40	90	127	110	74	30	40
42	112	90	118	40	16	40	52	59	40	40	88	124	111	76	30	44
43	144	124	148	44	17	40	53	58	40	42	122	130	111	78	30	42
44	124	106	129	44	16	40	53	60	40	40	104	109	112	80	32	42
45	124	106	127	43	16	40	50	60	40	40	104	126	98	80	32	40
46	115	94	120	44	16	40	50	60	40	40	92	128	111	80	30	40
47	112	90	116	40	16	40	50	60	40	40	88	126	111.5	80	30	40
48	109	94	124	43	16	40	50	60	40	40	92	137	100	80	30	40
49	128	100	138	40	15.5	40	50	50	40	39	100	144	110	85	30	40
50	136	108	140	44	16	40	52	60	40	40	104	142	111	92	34	40
51	134	116	138	40	16	40	52	60	42	40	112	140	110	92	32	40
52	133	106	136	41	16	40	52	50	42	39	101	138	111.5	90	34	42
53	125	102	132	40	16	40	52	60	38	40	98	136	111	85	32	40
54	118	98	120	39	16	38	52	64	38	40	96	124	108	85	30	42
55	133	102	135	38.5	16	40	52	59	40	40	100	137	110	90	30	44
56	151	128	146	42	18	43	52	60	46	50	125	148	110	94	30	44
57	150	130	148	42	17	44	52	60	46	50	125	150	112	96	34	44
58	148	120	150	42	16	40	52	60	42	49	118	150	111.5	98	34	44
59	140	110	146	41	15.5	43	52	60	40	44	100	148	112.5	75	34	44

60	130	102	135	40	16	40	52	60	38	44	100	136	113	90	32	44
61	128	102	132	38	16	38	52	62.5	40	40	100	134	111.5	94	32	44
62	110	90	115	40	16	38	54	62	40	40	100	134	111.5	94	32	44
63	124	118	120	34	16	40	51	55	30	44	144	140	97	92	30	38
64	150	146	139	36	17	42	52	60	46	50	144	148	98	94	36	38
65	124	124	122	34	15	40	50	60	35	43	120	152	98	89	30	40
66	144	147	140	36	16.5	40	60	63	40	50	144	146	98	98	32	40
67	152	150	149	39	18	46	54	63	43	52	142	147	111	85	38	39
68	142	140	138	43	16.5	40	60	63	44	50	138	140	97	98	32	38
69	150	146	140	34	17.5	40	60	63	44	50	128	140	97	98	32	38
70	140	134	138	36	165	44	60	60	42	49	128	160	90	94	34	44
71	128	122	138	36	16	40	61	61	36	45	124	140	99	98	30	50
72	106	90	124	39	16	40	52	59	36	40	92	120	113	76	28	39
73	109	94	124	43	16	40	50	60	40	40	92	137	100	80	30	40
74	112	90	116	40	16	40	50	60	40	40	88	126	111.5	80	30	40
75	115	94	120	44	16	40	50	60	40	40	92	128	111	80	30	40
76	124	106	129	43	16	40	50	60	40	40	102	126	98	80	32	40
77	124	106	129	44	16	40	53	60	40	40	104	109	112	80	32	42
78	144	124	148	44	17	40	53	58	40	42	122	130	111	78	30	42
79	112	90	118	40	16	40	52	59	40	40	88	124	111	76	30	42
80	106	92	123	39	16	40	53	60	38	40	90	127	110	74	30	40
81	144	124	146	44	16	44	50	62	44	42	121	134	111	80	32	40
82	109	96	126	42	15.5	38	50	60	38	40	94	128	110	78	30	40
83	116	106	120	40	16	40	50	60	38	39	103	131	111.5	70	31	41
84	124	104	128	44	16	40	50	59	40	40	102	108	112	82	30	42
85	114	96	119	44	16	40	52	60	40	38	94	106	112	80	30	40
86	128	104	129	43	16	40	52	60	40	40	102	132	111	80	32	40
87	140	133	138	40	16.5	44	52	60	40	40	131	138	110.5	82	32	40
88	106	95	126	40	16	40	52	60	38	40	93	132	110	80	30	40
89	144	124	149	45	16	40	50	60	42	44	121	147	112.5	84	30	40
90	134	116	138	40	16	42	50	60	40	42	113	141	111	72	30	42
91	124	102	129	43	16	40	52	61	40	41	100	135	110	70	30	42

92	110	100	124	39	16	40	50	60	39	40	98	126	111	70	30	42
93	134	114	129	44.5	16	40	54	60	40	41	111	138	112	76	30	40
94	116	106	122	42	16	40	52	60	38	40	102	122	110.5	74	30	40
95	124	104	129	44	16	40	52	60	40	42	100	128	111	80	32	42
96	114	94	119	43	15.5	40	50	50	39	40	92	118	110	80	32	40
97	128	102	132	38	15	38	53	62.5	40	40	100	132	111.5	84	32	44
98	110	90	115	40	16	38	54	62	40	40	98	122	102	94	30	39
99	124	118	120	34	16	40	51	55	30	44	114	140	97	92	30	38
100	150	146	139	36	17	42	52	60	46	50	144	148	98	94	36	38
101	124	124	122	34	16	40	50	60	36	43	120	152	98	89	30	40
102	144	147	140	36	16.5	40	60	63	40	50	144	146	98	98	32	40
103	152	150	149	39	18	46	54	63	43	52	144	147	111	85	38	39
104	142	140	138	32	15.4	40	60	63	44	50	138	140	97	96	32	38
105	150	146	140	34	17.5	46	54	62.5	44	52	140	150	99	89	35	44
106	140	134	138	36	16.5	44	60	60	42	49	128	160	98	94	34	44
107	128	122	138	36	16	40	61	61	36	45	124	140	99	98	30	50
108	106	90	124	39	16	40	52	59	36	40	90	120	113	67	28	39
109	128	100	138	40	15.5	40	50	55	40	39	100	144	110	85	30	40
110	136	108	140	44	16	40	52	60	40	40	104	142	111	90	34	40
111	134	116	138	40	16	40	52	60	42	40	112	140	110	92	32	40
112	133	106	136	41	16	40	52	60	41	39	101	138	111.5	90	34	42
113	125	102	132	40	16	40	52	60	38	40	98	136	111	85	32	40
114	118	98	120	39	16	38	52	64	38	40	96	134	108	85	30	42
115	133	102	135	38.5	16	40	52	59	40	40	100	137	110	90	30	44
116	151	128	146	42	18	43	52	60	46	50	125	148	110	94	30	44
117	150	130	148	42	17	44	52	60	46	50	125	150	112	96	34	44
118	148	120	150	42	16	40	52	60	42	49	118	150	111.5	98	34	44
119	140	110	146	41	195	43	52	60	40	44	100	148	112.5	75	34	44
120	130	102	135	40	16	40	52	60	38	44	100	136	113	90	32	44
121	114	96	119	44	16	40	52	60	40	38	94	106	112	80	30	40
122	128	104	129	43	16	40	52	60	40	40	102	131	111	80	32	40
123	140	133	138	40	16.5	44	52	61	42	40	131	138	110.5	82	34	40

124	106	95	126	40	16	40	52	60	38	40	93	132	110	80	30	40
125	144	124	149	45	16	40	50	60	42	44	121	147	112.5	84	30	40
126	134	116	138	40	16	42	50	60	42	44	121	147	112.5	84	30	40
127	124	102	129	43	16	40	52	61	40	41	100	135	110	70	30	42
128	110	100	124	39	16	40	50	60	39	40	98	126	111	70	30	42
129	134	114	139	44.5	16	40	54	60	40	42	111	138	112	76	30	40
130	116	106	122	42	16	40	52	60	38	40	102	122	110.5	74	30	40
131	124	104	129	44	16	40	52	60	38	40	102	122	110	74	30	40
132	114	94	119	43	15.5	40	50	50	39	40	92	118	110	80	32	40
133	109	94	124	43	16	40	50	60	40	40	92	118	110	80	32	40
134	112	90	116	40	16	40	50	60	40	40	88	126	111.5	80	30	40
135	115	94	120	44	16	40	50	60	40	40	92	128	111	80	30	40
136	124	106	129	43	16	40	50	60	40	40	102	126	98	80	31	40
137	124	106	129	44	16	40	53	60	40	40	104	109	112	70	32	42
138	144	124	148	44	17	40	53	58	40	42	122	130	111	78	30	42
139	112	90	118	40	16	40	52	59	40	40	88	124	111	76	30	44
140	106	92	123	39	16	40	53	60	38	40	90	127	110	74	30	40
141	144	124	146	44	16	44	50	62	44	42	121	134	111	80	32	40
142	109	96	126	42	15.5	38.5	50	60	38	40	94	128	110	78	30	40
143	116	106	120	40	16	40	50	60	38	39	103	131	111.5	70	31	42
144	124	104	128	44	16	40	50	59	40	40	102	108	112	82	30	42
145	124	104	128	44	16	40	50	59	40	40	102	108	112	82	30	42
146	116	106	120	40	16	40	50	60	38	39	102	131	111.5	70	31	43
147	109	96	126	41	15.5	38.5	50	60	38	40	94	128	110	78	30	40
148	144	124	146	44	16	44	50	62	44	42	121	134	111	80	32	40
149	106	92	123	39	15	40	53	60	38	40	90	127	110	74	30	40
150	112	90	118	40	16	40	52	59	40	40	88	124	111	76	30	44
151	144	124	148	44	17	40	53	58	40	42	122	130	111	78	30	42
152	124	106	129	44	16	40	53	60	40	40	104	109	112	80	32	42
153	124	106	129	43	16	40	50	60	40	40	102	126	98	80	32	40
154	115	94	120	44	16	40	50	60	40	40	92	128	111	80	30	40
155	112	90	116	40	16	40	50	60	40	40	92	128	111	80	30	40

156	109	94	124	43	16	40	50	60	40	40	102	126	94	80	32	40
157	114	94	119	43	15.5	40	50	50	39	40	92	118	110	80	32	40
158	124	104	129	44	16	40	52	60	40	42	100	128	111	80	32	42
159	116	106	122	42	16	40	52	60	38	40	102	122	110.5	74	30	40
160	134	114	139	44.5	16	40	54	60	40	42	111	138	112	76	30	40
161	110	100	124	39	16	40	50	60	39	40	98	126	111	70	30	42
162	124	102	129	43	16	40	52	61	40	41	100	135	110	70	30	42
163	134	116	138	40	16	40	52	60	40	41	100	135	110	70	30	42
164	144	124	149	45	16	40	50	60	42	44	121	147	112.5	84	30	40
165	106	95	126	40	16	40	52	60	38	40	93	132	110	80	30	40
166	140	133	138	40	16.5	44	52	61	42	40	131	138	110.5	82	34	40
167	128	104	129	43	16	40	52	60	40	40	102	132	111	80	32	40
168	114	96	119	44	16	40	52	60	40	38	94	106	112	80	30	40
169	130	102	135	40	16	40	52	60	38	44	100	136	113	90	32	44
170	140	110	146	41	19.5	43	52	60	40	44	100	148	112.5	75	34	44
171	148	120	150	42	16	40	52	60	42	49	118	150	111.5	89	34	44
172	150	130	148	42	17	44	52	60	46	50	125	150	112	96	34	44
173	151	128	146	42	18	43	52	60	46	50	125	150	112	96	34	44
174	133	102	135	38.5	16	40	52	59	40	40	100	137	110	90	30	44
175	118	98	120	39	16	39	52	64	38	40	96	124	108	85	30	42
176	125	102	132	40	16	40	52	60	38	40	98	136	111	85	32	40
177	133	106	136	41	16	40	52	60	42	39	101	138	111.5	90	34	42
178	134	116	138	40	16	40	52	60	40	40	104	142	111	92	34	40
179	136	108	140	44	16	40	52	60	40	40	104	142	111	92	34	40
180	128	100	138	40	15.5	40	50	55	40	39	100	144	110	85	30	40
181	106	90	124	39	16	40	52	59	36	40	90	120	112	76	28	39
182	128	122	138	36	16	40	61	61	36	45	124	140	99	98	30	50
183	150	146	140	34	17.5	46	54	62.5	44.52	40	150	140	98	94	32	39
184	150	146	140	34	17.5	46	54	62.5	44	52	140	150	99	98	30	50
185	142	140	138	32	16.5	40	60	63	44	50	138	140	97	96	32	38
186	152	150	149	39	18	46	54	63	43	52	144	147	111	85	38	39
187	144	147	140	36	16.5	40	60	63	40	50	144	146	98	98	32	40

188	124	124	122	34	16	40	50	60	36	43	120	152	98	89	30	40
189	150	146	139	36	17	42	52	60	46	50	144	148	98	92	36	38
190	124	118	120	34	16	40	51	55	40	44	114	140	97	92	30	38
191	110	90	115	40	16	38	54	62	40	40	98	122	102	84	30	39
192	128	102	132	38	16	38	52	62.5	40	40	100	134	111.5	84	32	44
193	114	96	119	44	16	40	52	60	40	38	94	106	112	80	30	40
194	128	104	129	43	16	40	52	60	40	40	102	132	111	80	32	40
195	140	133	138	40	16.5	44	52	61	42	40	131	138	110.5	82	34	40
196	128	102	132	38	16	38	52	62.5	40	40	100	134	111.5	94	32	44
197	110	90	115	40	16	38	54	62	40	40	100	134	111.5	94	32	44
198	124	118	120	34	16	40	51	55	30	44	144	140	97	92	30	38
199	150	146	139	36	17	42	52	60	46	50	144	148	98	94	36	38
200	124	124	122	34	15	40	50	60	35	43	120	152	98	89	30	40
201	144	147	140	36	16.5	40	60	63	40	50	144	146	98	98	32	40
202	152	150	149	39	18	46	54	63	43	52	142	147	111	85	38	39
203	142	140	138	43	16.5	40	60	63	44	50	138	140	97	98	32	38
204	150	146	140	34	17.5	40	60	63	44	50	128	140	97	98	32	38
205	140	134	138	36	165	44	60	60	42	49	128	160	90	94	34	44
206	128	122	138	36	16	40	61	61	36	45	124	140	99	98	30	50
207	106	90	124	39	16	40	52	59	36	40	92	120	113	76	28	39
208	109	94	124	43	16	40	50	60	40	40	92	137	100	80	30	40
209	112	90	116	40	16	40	50	60	40	40	88	126	111.5	80	30	40
210	115	94	120	44	16	40	50	60	40	40	92	128	111	80	30	40
211	124	106	129	43	16	40	50	60	40	40	102	126	98	80	32	40
212	124	106	129	44	16	40	53	60	40	40	104	109	112	80	32	42
213	144	124	148	44	17	40	53	58	40	42	122	130	111	78	30	42
214	112	90	118	40	16	40	52	59	40	40	88	124	111	76	30	42
215	128	120	134	45	18	38	52	55	44	44	120	134	94	82	22	46
TOTAL	**27562**	**24052**	**28387**	**8674**	**3959.9**	**8732.5**	**11273**	**12887**	**8637.52**	**9166**	**23582**	**28912.5**	**23196**	**18037**	**6754**	**8868**
MAX	**152**	**150**	**150**	**45**	**195**	**46**	**61**	**64**	**46**	**52**	**150**	**160**	**115**	**98**	**38**	**50**
MIN	**106**	**90**	**115**	**32**	**15**	**38**	**50**	**50**	**30**	**38**	**88**	**106**	**90**	**67**	**22**	**38**
MEAN	**128.1953**	**111.8698**	**132.0326**	**40.34418605**	**18.41814**	**40.61628**	**52.43256**	**59.93953**	**40.17451163**	**42.63256**	**109.6837**	**134.4767**	**107.8884**	**83.89302**	**31.41395**	**41.24651**

STD	**13.99896**	**17.40372**	**10.10292**	**3.196471647**	**18.75574**	**1.836918**	**2.785788**	**2.299648**	**2.812590787**	**4.088948**	**16.82934**	**11.93213**	**5.850082**	**8.198056**	**2.137951**	**2.387599**

KEY: MN=MEAN, STD = STANDARD DEVIATION, HST = HEIGHEST, LWST = LOWEST HL=Half Length of blouse bodice, SH= Length of Shoulder, FL= Full length of Blouse/Gown/Trouser, SL= Length of Sleeve BS= Bicep

APPENDIX J

MEASUREMENTS (IN CM) OF PHYSICALLY CHALLENGED WHEELCHAIR OR BEDRIDDEN FEMALES (MEDIUM SIZE)

	BLOUSE			SLEEVE					SKIRT/TROUSER/PAINTS							
S/NO	**BUST**	**WAIST**	**HIP**	**BWL**	**SH**	**NC**	**FL**	**SL**	**UPPER ARM**	**BS**	**WAIST**	**HIP**	**FL W-A**	**THIGH**	**CROTCH**	**ANKLE**
1	87	80	98	39	14.5	36	48	55.8	44	39	78	100	102	52	28	39
2	94	86	100	38	14.8	38	48	61	42	40	82	102	101	60	27	40
3	97	88	104	40	16	36	46	62	44	40	86	106	97	62	28	40
4	98	86	106	38	15	38	48	63	44	41	84	108	101	58	26	41
5	98	86	117	37	15	36	39	59	43	42	84	119	97	52	28	40
6	104	90	116	36	15	38	48	62	46	42	88	118	101	61	27	40
7	88	84	114	41	16	36	44	60	40	40	82	116	102	60	26	38
8	99	87	116	38	15	34	43	62	40	42	84	118	97	60	28	40
9	92	88	117	38	16.5	38	61	41	40	40	84	119	101	58	26	40
10	99	92	118	40	16	36	50	59	44	42	90	120	113	62	28	40
11	90	74	96	38	16	38	50	60	40	40	70	105	97	58	30	38
12	93	78	97	40	16	38	50	58	42	41	76	111	92	60	28	40
13	95	77	98	39	16	39	50	60	42	41	75	112	105	60	28	40
14	99	79	105	40	16	40	50	60	43	41	77	109	105	60	30	40
15	98	74	103	40	16	40	50	60	42	40	70	109	100	61	30	40
16	95	77	98	40	15.5	39	50	61	42	40	73	107	104	61	30	40
17	96	75	98	40	15.5	39	50	61	42	40	73	107	104	61	36	39
18	100	70	105	40	16	39	48	60	43	42	76	107	100	62	30	40
19	100	72	104	40	16	39	50	60	43	42	78	106	106	62	30	40
20	97	75	99	40	16	39	50	60	40	40	73	102	102	60	30	40
21	98	77	104	41	15.4	39	48	61	42	40	75	102	105	60	30	40
22	99	78	102	40	15.6	40	50	60	43	41	75	104	105	61	30	40
23	98	77	104	39	15	39	50	61	42	40	74	110	102	61	30	40
24	97	74	102	40	16	40	48	60	40	40	72	104	98	61	30	40

25	88	84	114	41	16	36	44	60	40	42	116	102	108	60	28	40
26	94	86	117	37	15	36	39	59	43	40	78	108	101	52	28	39
27	97	88	104	40	16	36	46	62	44	40	86	104	97	63	28	40
28	99	86	106	38	15	38	48	63	43	41	84	108	101	58	26	41
29	94	86	100	38	14.9	37	48	55.8	45	40	78	102	101	60	27	39
30	99	92	118	40	16	36	50	59	44	40	90	120	113	62	28	40
31	99	88	117	38	16.5	38	40	61	41	41	84	119	101	58	26	40
32	88	84	114	41.5	16	38	40	60	40	39	118	101	96	58	26	38
33	94	86	100	38	14.8	38	48	60	41	40	78	100	101	52	28	39
34	104	90	117	37	15	38	46	62	44	41	84	108	101	58	26	40
35	99	97	114	42	16	36	44	60	40	41	82	116	102	60	26	38
36	97	96	106	40	14.8	38	48	61	42	40	84	106	97	60	28	41
37	87	90	116	37	15	38	46	62	46	39	88	118	101	61	27	40
38	92	88	117	38	16	34	43	60	41	39	84	120	97	60	28	40
39	87	80	98	39	14.5	36	48	55.8	44	38	78	100	102	52	28	39
40	94	86	100	38	14.8	38	48	61	42	39	82	102	101	60	27	40
41	97	88	104	40	16	36	46	62	44	40	86	106	97	62	28	40
42	99	86	106	38	15	39	48	63	44	42	84	108	101	58	26	41
43	98	86	117	37	15	36	39	59	43	41	84	119	97	52	28	40
44	99	92	118	40	16	36	50	59	44	40	90	120	113	62	28	40
45	88	84	114	41	16	36	44	60	40	40	82	116	102	60	26	38
46	92	88	118	40	16	36	50	60	40	40	90	120	113	65	26	40
47	88	90	117	38	14.5	38	48	60	41	40	78	100	101	61	27	40
48	99	92	118	40	16	36	50	59	44	40	90	120	113	62	28	40
49	88	84	114	38	16	36	44	60	40	40	82	116	102	60	26	38
50	92	88	118	40	16	36	50	60	40	40	90	120	113	65	26	40
51	88	90	117	40	14.5	38	48	60	41	40	78	100	101	61	27	40
52	99	92	118	40	16	36	50	59	44	40	90	120	113	62	28	40
53	104	90	116	36	15	38	48	62	46	42	88	118	102	60	26	38

54	97	88	106	38	16	36	44	60	46	40	82	116	102	61	27	40
55	88	84	114	41	16	36	44	60	40	39	82	118	97	60	28	40
56	92	88	118	40	16	36	50	59	44	39	84	119	101	58	26	40
57	99	87	117	38	15	34	43	62	40	41	84	118	97	62	27	39
58	94	86	100	38	14.8	48	62	62	40	40	86	106	97	62	27	39
59	88	84	114	34	16	36	44	60	40	40	82	116	102	60	26	38
60	87	86	104	40	15	36	44	61	46	40	88	120	97	60	28	40
61	94	84	100	38	15	38	43	62	44	40	84	118	101	62	27	41
62	99	87	114	40	16	36	44	60	40	41	90	120	113	53	28	40
63	87	90	116	37	15	38	46	62	46	40	82	116	102	60	26	38
64	94	86	100	38	14.8	37	48	61	42	40	84	119	97	52	29	40
65	99	92	118	40	16	36	50	59	44	41	84	108	97	53	28	40
66	99	94	114	43	15	36	44	60	40	40	86	106	97	60	28	41
67	104	90	114	36	16.5	38	40	61	41	41	84	120	97	60	27	41
68	97	88	104	40	16	35	46	63	44	40	82	118	102	60	26	38
69	99	90	114	41.5	16	36	44	60	40	40	94	106	101	62	28	40
70	92	94	116	36	15	38	48	62	46	40	88	119	101	62	28	40
71	87	88	117	38	14	35	38	61	41	40	82	116	102	60	28	40
72	97	76	106	38	15	38	48	63	46	40	86	104	101	52	27	40
73	97	88	116	36	14	35	38	61	41	40	86	119	101	62	28	40
74	92	84	116	38	14	35	38	63	46	40	84	101	97	60	28	38
75	104	88	104	40	16	37	48	61	44	41	86	118	102	60	27	40
76	99	84	116	36	15	38	44	60	46	40	84	119	97	60	28	40
77	94	90	116	38	14.8	37	48	61	42	40	84	119	97	60	28	40
78	100	90	102	40	16.5	36	50	60	43	42	70	101	101	62	27	40
79	96	75	98	40	15.5	39	50	61	42	40	73	107	104	61	36	39
80	100	70	105	40	16	39	48	60	43	42	76	107	100	62	30	40
81	100	72	104	40	16	39	50	60	43	42	78	106	106	62	30	40
82	97	75	99	40	16	39	50	60	40	40	73	102	102	60	30	40

83	98	77	104	40	15.4	39	48	61	42	40	75	102	105	60	30	40
84	99	78	102	40	15.6	40	50	60	43	41	75	104	105	61	30	40
85	98	77	104	39	15	39	50	61	42	40	74	110	102	61	30	40
86	97	74	102	40	16	40	48	60	40	40	72	104	98	61	30	40
87	88	84	114	40	16	36	44	60	40	42	116	102	108	60	28	40
88	94	86	117	41.5	15	36	39	59	43	40	78	108	101	52	28	39
89	97	88	104	40	16	36	46	62	44	40	86	104	97	63	28	40
90	99	86	106	38	15	38	48	63	43	41	84	108	101	58	26	41
91	94	86	100	38	14.9	37	48	55.8	45	40	78	102	101	60	27	39
92	99	92	118	42	16	36	50	59	44	40	90	120	113	62	28	40
93	99	88	117	38	16.5	38	40	61	41	41	84	119	101	58	26	40
94	88	84	114	40	16	38	40	60	40	39	118	101	96	58	26	38
95	94	86	100	38	14.8	38	48	60	41	40	78	100	101	52	28	39
96	104	90	117	37	15	38	46	62	44	41	84	108	101	58	26	40
97	99	97	114	41	16	36	44	60	40	41	82	116	102	60	26	38
98	97	96	106	40	14.8	38	48	61	42	40	84	106	97	60	28	41
99	97	75	104	39	16	37	37	46	42	40	90	100	113	61	27	42
TOTAL	**9467**	**8403**	**10799**	**3866.5**	**1534**	**3699**	**4618**	**5947.2**	**4200**	**3996**	**8241**	**10934**	**10078**	**5890**	**2762**	**3933**
MEAN	**95.62626**	**84.8787**	**109.0808**	**39.05556**	**15.494**	**37.363**	**46.646**	**60.072**	**42.42424242**	**40.364**	**83.24242**	**110.44**	**101.798**	**59.49495**	**27.89899**	**39.72727**
MAX	**104**	**97**	**118**	**43**	**16.5**	**48**	**62**	**63**	**46**	**42**	**118**	**120**	**113**	**65**	**36**	**42**
MIN	**87**	**70**	**96**	**34**	**14**	**34**	**37**	**41**	**40**	**38**	**70**	**100**	**92**	**52**	**26**	**38**
STD	**4.630392**	**6.379612**	**7.346632**	**1.598611**	**0.624071**	**1.831898**	**4.204743**	**2.832098**	**1.938287215**	**0.850625**	**8.8584**	**7.2452**	**4.705576**	**3.07184**	**1.775657**	**0.842956**

KEY: MN=MEAN, STD = STANDARD DEVIATION, HST = HEIGHEST, LWST = LOWEST, HL=Half Length of blouse bodice, SH= Length of Shoulder, FL= Full length of Blouse/Gown/Trouser, SL= Length of Sleeve, BS= Bicep

APPENDIX K

MEASUREMENTS (IN CM) OF PHYSICALLY CHALLENGED WHEELCHAIR OR BEDRIDDEN FEMALES (SMALL SIZE)

	BLOUSE								SLEEVE	SKIRT/TROUSER/PAINTS						
	BUST	WAIST				SH		SL	UPPER	BS	WAIS		FL W-A			
S/NO			HIP	BWL		NC	FL		ARM		T	HIP		THIGH	CROTCH	ANKLE
1	78	76	85	40	12.5	36	52	50	34	44	68	89	113	40	27	38
2	86	84	85	43	13	39	49	51	32	39	64	88	112	38	26.5	38
3	85	80	79	44	13	39	51	50.5	33	43	76	85	114	40	25.5	36
4	79	76	80	42	13	37	54	52	32.5	43	74	89	112	41	27.4	38.9
5	90	88	85	43	13.5	39	51	53	34	48	85	88	113	39.5	26.5	37.5
6	87	85	84	44	13	39	48	52	35	38	82	86	111	37.8	27	37.5
7	90	87	83	43	13.5	39	50	52	34	43	86	88	112	39	27	37.8
8	90	85	85	42	13	39	52	52.5	35	48	88	89	113	44	27	40
9	88	84	85	42	12	38	54	53.2	35	46	83	88	111	40	25.5	38
10	82	80	86	44	13	38	51	52	34	39	77	89	112	41	27	36
11	78	76	85	43	12.5	37	52	50	34	44	68	89	111	44	27	37.5
12	85	80	79	43	13	39	51	50.5	34	43	76	85	110	40	25.5	37.5
13	90	88	85	43	13.5	39	51	53	33	48	85	88	110	41	26.5	38
14	90	87	83	43	13.5	39	50	52	34	43	86	88	114	39.5	27	38
15	88	84	83	42	12	38	54	52	34	46	83	88	111	39	25.5	38.9
16	86	84	85	43	13	39	49	52	35	39	64	89	114	40	26.5	37.5
17	79	76	80	42	13	37	54	55	32	43	74	86	112	41	27.4	40
18	87	85	84	42	13	39	48	52	32.5	38	82	89	111	38	27	42
19	90	85	85	44	13	39	52	50.5	35	48	88	89	114	41	27	36
20	82	80	86	44	13	38	51	53	35	39	77	85	115	38	27	37.5
21	85	80	79	41	13	39	51	52	34	43	76	88	114	41	25.5	37.8
22	90	88	85	42	13.5	39	56	56	33	38	85	88	111	37.8	26.5	38
23	90	87	83	40	13.5	39	50	52	34	43	86	96	112.5	44	27	38
24	90	65	98	43	12.5	37.5	51	56	34	42	63	105	112	41	27	38

25	91	66	97	43	12	37	51	60	33	42	64	99	109	40	27.5	38
26	90	63	97	41	12	37	51	60	33	42	61	105	111	39.5	26.5	38
27	90	62.5	102	41	12	37	52	54	33	42	60	105	112	39	27	39
28	92	66	98	40	12	37	50	56	33	44	64	99	111	44	27	40
29	90	63	97	43	12	36.5	48	56	34.5	42	61	103	108	42	27	40
30	93	67	99	43.5	12.5	48	51.5	60	33	44	65	99	111	44	26.5	39
31	94	62	98	43	13	39	50	60	34.5	48	62	98	112	43	27	39
32	94	71	102	43.5	12.5	39	51	60	35	48	70	104	112	41	27	40
33	91	68	96	41.5	13	38.5	51	60	33	44	64	99	112	43	26.5	39
34	92	69	104	42	13	39	51	60	35	45	67	105	113	41	27	40
35	88	71	93	43	15	37	50	63	32	38	70	108	110	58	30	39
36	93	88	97	42	15	38	50	60	32	42	88	106	87	52	24	40
37	82	80	86	44	13	38	51	52	34	39	77	89	112	41	27	36
38	78	76	85	43	12.5	37	52	50	34	44	68	89	111	44	27	37.5
39	85	80	79	43	13	39	51	50.5	34	43	76	85	110	40	25.5	37.5
40	90	88	85	43	13.5	39	51	53	33	48	85	88	110	41	26.5	38
41	90	87	83	43	13.5	39	50	52	34	43	86	88	114	39.5	27	38
42	88	84	83	42	12	38	54	52	34	46	83	88	111	39	25.5	38.9
43	86	84	85	46	13	39	49	52	35	39	64	89	114	40	26.5	37.5
44	79	76	80	42	13	37	54	55	32	43	74	86	112	41	27.4	40
45	87	85	84	42	13	39	48	52	32.5	38	82	89	111	38	27	42
46	90	85	85	44	13	39	52	50.5	35	48	88	89	114	41	27	36
47	82	80	86	44	13	38	51	53	35	39	77	85	115	38	27	37.5
48	85	80	79	41	13	39	51	52	34	43	76	88	114	41	25.5	37.8
49	90	88	85	42	13.5	39	56	56	33	38	85	88	111	37.8	26.5	38
50	90	87	83	41	13.5	39	50	52	34	43	86	96	112.5	44	27	38
51	90	65	98	43	12.5	37.5	51	56	34	42	63	105	112	41	27	38
52	91	66	97	43	12	37	51	60	33	42	64	99	109	40	27.5	38
53	90	63	97	41	12	37	51	60	33	42	61	105	111	39.5	26.5	38
54	90	62.5	102	41	12	37	52	54	33	42	60	105	112	39	27	39

TOTAL	**4726**	**4203**	**4759**	**2296.5**	**696.5**	**2072**	**2763.5**	**2925.2**	**1819.5**	**2311**	**4027**	**5013**	**6018**	**2216.9**	**1442.2**	**2069.1**
MAX	**94**	**88**	**104**	**46**	**15**	**48**	**56**	**63**	**35**	**48**	**88**	**108**	**115**	**58**	**30**	**42**
MIN	**78**	**62**	**79**	**40**	**12**	**36**	**48**	**50**	**32**	**38**	**60**	**85**	**87**	**37.8**	**24**	**36**
MEAN	**87.51852**	**77.8333 3**	**88.129 63**	**42.52778**	**12.8981 5**	**38.3703 7**	**51.1759 3**	**54.1 7037**	**33.69444444**	**42.796 3**	**74.574 07**	**92.833 33**	**111.4444**	**41.0537**	**26.70741**	**38.3166 7**
STD	**4.333898**	**8.85416 4**	**7.4099 53**	**1.195182**	**0.65430 1**	**1.62290 6**	**1.77816 3**	**3.52 7714**	**0.943781368**	**3.0921 67**	**9.5534 28**	**7.3580 91**	**3.723544**	**3.358499**	**0.81677**	**1.30047 2**

KEY: MN=MEAN, STD = STANDARD DEVIATION, HL=Half Length of blouse bodice, SH= Length of Shoulder, FL= Full length of Blouse/Gown/Trouser, SL= Length of Sleeve, BS= Bicep

APPENDIX L

Mean Body Measurement for Large, Medium and Small Size Physically Challenged Wheelchair Females

Variables	**Large (CM)**	**Medium(CM)**	**Small (CM)**
Bust	135	95.7	81
Waist	132	86.7	73
Hip	135	112.6	88.4
Nape/back waist length	42.5	45	34
Shoulder (SH)	18.2	14	12.5
Front full length	58.5	60.3	50
Neck circumference	40	36	34
Sleeve length	56	56	55.8
Arm hole	48	44.5	34
Round sleeve	46	40	33
Skirt waist	132	84.5	70.8
Skirt hip	135	112.6	84
Skirt length	89	89	82.3
Trouser waist	127	100.6	70.8
Round thigh	84.3	65	40
Trouser length	114	110.6	113.7
Round ankle	71.7	54.8	52
Trouser Crotch	32.7	27.6	26.6
Knee Length	47.5	54	54

APPENDIX M

Garment Fit Assessment Questionnaire for Fit-Testing of Prototype Garments by Users

Please rate the fit of the prototype functional garment for various conditions indicated by checking

(ã) in the appropriate values. Each of the values 1-5 indicates the level of ratings for the fit variables.

1. Sitting

	Excellent Fit	**Good Fit**	**Satisfactory Fit**	**Poor Fit**	**Extremely poor Fit**
Neck line	(5)	(4)	(3)	(2)	(1)
Bust line	(5)	(4)	(3)	(2)	(1)
Ease across shoulder	(5)	(4)	(3)	(2)	(1)
Waist line	(5)	(4)	(3)	(2)	(1)
Ease at biceps	(5)	(4)	(3)	(2)	(1)
Fit over the Hip	(5)	(4)	(3)	(2)	(1)
Safety	(5)	(4)	(3)	(2)	(1)
Overall fit	(5)	(4)	(3)	(2)	(1)
Functionality	(5)	(4)	(3)	(2)	(1)
Ease of mobility	(5)	(4)	(3)	(2)	(1)
Ease of thigh*	(5)	(4)	(3)	(2)	(1)
Ease of crotch**	(5)	(4)	(3)	(2)	(1)

2. In motion (bending, turning from side to side/twisting)

	Excellent Fit	**Good Fit**	**Satisfactory Fit**	**Poor Fit**	**Extremely poor Fit**
Neck line	(5)	(4)	(3)	(2)	(1)
Bust line	(5)	(4)	(3)	(2)	(1)
Ease across shoulder	(5)	(4)	(3)	(2)	(1)
Waist line	(5)	(4)	(3)	(2)	(1)
Ease at biceps	(5)	(4)	(3)	(2)	(1)
Fit over the Hip	(5)	(4)	(3)	(2)	(1)
Safety	(5)	(4)	(3)	(2)	(1)
Overall fit	(5)	(4)	(3)	(2)	(1)
Functionality	(5)	(4)	(3)	(2)	(1)
Ease of mobility	(5)	(4)	(3)	(2)	(1)
Ease of thigh*	(5)	(4)	(3)	(2)	(1)
Ease of crotch**	(5)	(4)	(3)	(2)	(1)

3. Please rate the comfort and overall performance of the prototype functional garment.

	Excellent Fit	**Good Fit**	**Satisfactory Fit**	**Poor Fit**	**Extremely poor Fit**
Overall fit	(5)	(4)	(3)	(2)	(1)
Full body movement	(5)	(4)	(3)	(2)	(1)
Feel on the body	(5)	(4)	(3)	(2)	(1)
Non-irritability of body	(5)	(4)	(3)	(2)	(1)
Air permeability	(5)	(4)	(3)	(2)	(1)
Flexibility in use	(5)	(4)	(3)	(2)	(1)
Safety	(5)	(4)	(3)	(2)	(1)
Functionality	(5)	(4)	(3)	(2)	(1)
Ease of wearing & taking off	(5)	(4)	(3)	(2)	(1)

4. Please rate the Aesthetic attributes of the prototype functional garment.

Fit Variables	**Excellent Fit**	**Good Fit**	**Satisfactory Fit**	**Poor Fit**	**Extremely poor Fit**
Beauty	(5)	(4)	(3)	(2)	(1)
Colour	(5)	(4)	(3)	(2)	(1)
Texture of fabric	(5)	(4)	(3)	(2)	(1)
Fashion ability/ style attribute	(5)	(4)	(3)	(2)	(1)
visual Appendixeal	(5)	(4)	(3)	(2)	(1)
shape/Shilhouette	(5)	(4)	(3)	(2)	(1)
Style attributes	(5)	(4)	(3)	(2)	(1)
Construction Techniques	(5)	(4)	(3)	(2)	(1)
Fastenings	(5)	(4)	(3)	(2)	(1)
Acceptability	(5)	(4)	(3)	(2)	(1)

5. Please rate the Expressive attributes of the prototype functional garment.

	Excellent Fit	**Good Fit**	**Satisfactory Fit**	**Poor Fit**	**Extremely poor Fit**
Promotes self image	(5)	(4)	(3)	(2)	(1)
Promotes self Esteem	(5)	(4)	(3)	(2)	(1)
Promotion of confidence	(5)	(4)	(3)	(2)	(1)
Promotion of social security	(5)	(4)	(3)	(2)	(1)
Promotion of physical Independence	(5)	(4)	(3)	(2)	(1)

Key: EF = Excellent Fit = 5

GF = Good fit = 4

SF = Satisfactory fit = 3

PF = Poor Fit = 2

*** Applicable for fit of trousers and skirt only**

*** Applicable for fit of trousers only**

APPENDIX N

Garment Fit Assessment Questionnaire for Fit-Testing Of Prototype Garments by Judges

Please rate the fit of the prototype functional garment for various conditions indicated by checking (ã) in the appropriate values. Each of the values 1-5 indicates the level of ratings for the fit variables.

2. Sitting

	Excellent Fit	**Good Fit**	**Satisfactory Fit**	**Poor Fit**	**Extremely poor Fit**
Neck line	(5)	(4)	(3)	(2)	(1)
Bust line	(5)	(4)	(3)	(2)	(1)
Ease across shoulder	(5)	(4)	(3)	(2)	(1)
Waist line	(5)	(4)	(3)	(2)	(1)
Ease at biceps	(5)	(4)	(3)	(2)	(1)
Fit over the Hip	(5)	(4)	(3)	(2)	(1)
Safety	(5)	(4)	(3)	(2)	(1)
Overall fit	(5)	(4)	(3)	(2)	(1)
Functionality	(5)	(4)	(3)	(2)	(1)
Ease of mobility	(5)	(4)	(3)	(2)	(1)
Ease of thigh*	(5)	(4)	(3)	(2)	(1)
Ease of crotch**	(5)	(4)	(3)	(2)	(1)

2. In motion (bending, turning from side to side/twisting)

	Excellent Fit	Good Fit	Satisfactory Fit	Poor Fit	Extremely poor Fit
Neck line	(5)	(4)	(3)	(2)	(1)
Bust line	(5)	(4)	(3)	(2)	(1)
Ease across shoulder	(5)	(4)	(3)	(2)	(1)
Waist line	(5)	(4)	(3)	(2)	(1)
Ease at biceps	(5)	(4)	(3)	(2)	(1)
Fit over the Hip	(5)	(4)	(3)	(2)	(1)
Safety	(5)	(4)	(3)	(2)	(1)
Overall fit	(5)	(4)	(3)	(2)	(1)
Functionality	(5)	(4)	(3)	(2)	(1)
Ease of mobility	(5)	(4)	(3)	(2)	(1)
Ease of thigh*	(5)	(4)	(3)	(2)	(1)
Ease of crotch**	(5)	(4)	(3)	(2)	(1)

3. Please rate the comfort and overall performance of the prototype functional garment.

	Excellent Fit	Good Fit	Satisfactory Fit	Poor Fit	Extremely poor Fit
Overall fit	(5)	(4)	(3)	(2)	(1)
Full body movement	(5)	(4)	(3)	(2)	(1)
Feel on the body	(5)	(4)	(3)	(2)	(1)
Non-irritability of body	(5)	(4)	(3)	(2)	(1)
Air permeability	(5)	(4)	(3)	(2)	(1)
Flexibility in use	(5)	(4)	(3)	(2)	(1)
Safety	(5)	(4)	(3)	(2)	(1)
Functionality	(5)	(4)	(3)	(2)	(1)
Ease of wearing & taking off	(5)	(4)	(3)	(2)	(1)

4. Please rate the Aesthetic attributes of the prototype functional garment.

Fit Variables	**Excellent Fit**	**Good Fit**	**Satisfactory Fit**	**Poor Fit**	**Extremely poor Fit**
Beauty	(5)	(4)	(3)	(2)	(1)
Colour	(5)	(4)	(3)	(2)	(1)
Texture of fabric	(5)	(4)	(3)	(2)	(1)
Fashion ability/ style attribute	(5)	(4)	(3)	(2)	(1)
visual appeal	(5)	(4)	(3)	(2)	(1)
shape/Shilhouette	(5)	(4)	(3)	(2)	(1)
Style attributes	(5)	(4)	(3)	(2)	(1)
Construction Techniques	(5)	(4)	(3)	(2)	(1)
Fastenings	(5)	(4)	(3)	(2)	(1)
Acceptability	(5)	(4)	(3)	(2)	(1)

5. Please rate the Expressive attributes of the prototype functional garment.

	Excellent Fit	**Good Fit**	**Satisfactory Fit**	**Poor Fit**	**Extremely poor Fit**
Promotes self image	(5)	(4)	(3)	(2)	(1)
Promotes self Esteem	(5)	(4)	(3)	(2)	(1)
Promotion of confidence	(5)	(4)	(3)	(2)	(1)
Promotion of social security	(5)	(4)	(3)	(2)	(1)
Promotion of physical Independence	(5)	(4)	(3)	(2)	(1)

Key: EF = Excellent Fit = 5

GF = Good fit = 4

SF = Satisfactory fit = 3

PF = Poor Fit = 2

*** Applicable for fit of trousers and skirt only**

*** Applicable for fit of trousers only**

APPENDIX O

Development of Functional Garments for Physically Challenged Wheelchair and Bedridden Females in Benue State

Department of Vocational Teacher,
Education (Home Economics),
University of Nigeria,
Nsukka.
20th February, 2010

Dear Sir/Madam

VALIDATION CHART FOR VALIDATING THE FIT- TESTING ASSESMENT QUESTIONNAIRE BY USERS

The following Assessment Questionnaire has been designed for collecting data on the fit of prototype functional garments for physically challenged wheelchair and bedridden females in Benue State. Please, you are kindly requested to validate this assessment instrument for its appropriateness for the stated purpose above. You may use the following three scales for rating the items:

3 = very relevant
2 = relevant
1 = irrelevant

Further suggestions for improving the instrument will be highly accepted. You may include suggestions overleaf.

Please indicate your profession by checking the spaces provided appropriately

Lecturer( ) Care giver (Nurse) ( ) User ( )

Name Date Signature

APPENDIX P

Designing Functional Garments for Physically Challenged Wheelchair and Bedridden Females in Benue State

Department of Vocational Teacher,
Education (Home Economics),
University of Nigeria,
Nsukka.
20th February, 2010

Dear Sir/Madam

VALIDATION CHART FOR VALIDATING THE FIT- TESTING ASSESMENT QUESTIONNAIRE BY JUDGES

The following Assessment Questionnaire has been designed for collecting data on the fit of prototype functional garments for physically challenged wheelchair and bedridden in females in Benue State. Please, you are kindly requested to validate this assessment instrument for its appropriateness for the stated purpose above. You may use the following three scales for rating the items:

3 = very relevant
2 = relevant
1 = irrelevant

Further suggestions for improving the instrument will be highly accepted. You may include suggestions overleaf.

Please indicate your profession by checking the spaces provided appropriately

Lecturer ( ) Care giver (Nurse) ( ) User ( )

Name Date Signature

APPENDIX Q

Senatorial Zones, Local Government Areas (LGAs), and Population of Nurses in Benue State

Zone A	**Population**	**No. of Nurses**	**Zone B**	**Population**	**No. of Nurses**	**Zone C**	**Population**	**No. of Nurses**
V/Kya	234,567	24	Makurdi	300,377	121	Otukpo	266,411	57
K/Ala	225,471	36	Gboko	361,325	111	Oju	168,491	26
Kwande	248,642	30	Buruku	206,215	4	Obi	98,707	13
Guma	194,164	8	Gwer West	122,313	30	Okpokwu	175,596	14
Konshisha	226,492	13	Tarka	79,280	18	Ado	184,389	9
Ukum	216,983	15	Gwer East	168,660	4	Apa	96,780	12
Ushongo	234,567	4	Logo	169,570	4	Ogbadigbo	130,988	3
						Ohimini	70,688	3
						Agatu	115,597	3
Total	**1,580,886**	**130**		**1,407,740**	**292**		**1,307,647**	**140**

(Curled from Federal Republic of Nigeria Official Gazette)

Note: The distribution of PCWBF respondents in each of the selected local government areas is as follows: Zone A: Katsina Ala =30, Kwande=30, Vandekya=30, total = 90

Zone B: Makurdi=60, Gboko=49, Buruku=30, (total = 139)

Zone C: Otukpo=49, Ogbadibo=30, Oju= 30, Apa =30, (Total = 90)

APPENDIX R

Sample Size Determination from known Population

The sample size (n) required for a given population sizes (N)

N	S	N	S	N	S	N	S	N	S
10	10	100	80	280	162	800	260	2800	338
15	14	110	86	290	165	850	265	3000	341
20	19	120	92	300	169	900	269	3500	346
25	24	130	97	320	175	950	274	4000	351
30	28	140	103	340	181	1000	278	4500	354
35	32	150	108	360	186	1100	285	5000	357
40	36	160	113	380	191	1200	291	6000	361
45	40	170	118	400	196	1300	297	7000	364
50	44	180	123	420	201	1400	302	8000	367
55	48	190	127	440	205	1500	306	9000	368
60	52	200	132	460	210	1600	310	10000	370
65	56	210	136	480	214	1700	213	15000	375
70	59	220	140	500	217	1800	317	20000	377
75	63	230	144	550	226	1900	320	30000	379
80	66	240	148	600	234	2000	322	40000	380
85	70	250	152	650	242	2200	327	50000	381
90	73	260	155	700	248	2400	331	75000	382
95	76	270	159	750	254	2600	335	100000	384

Adapted from R.V. Krejele and D.W. Morgan on the title "determining sample size for research activities". Journal of Educational and Psychological measurement, 30, 608.

Source: Emaikwu (2006).

APPENDIX S

Reliability of Garment Needs Assessment Questionnaire (GNAQ)

(Kendall's W[a] Coefficient of Concordance)

Section B

Ranks

	Mean Rank
Overall shape	4.75
Germent length	4.25
Sleev Length	3.95
Low lines	4.95
High Necklines	5.25
High Neckline with Collar	5.45
Farbric Type	3.90
Colour of fabric	8.50
Fabric Surface Design	4.00

Test Statistics

N	10
Kendall's W[a]	.773
Chi-Square	26.702
df	8
Asymp. Sig.	.001

a. Kendall's Coefficient of Concordance

Section C

Case Processing Summary

		N	%
Cases	Valid	15	93.8
	Excluded[a]	1	6.3
	Total	16	100.0

a. Listwise deletion based on all variables in the procedure.

Reliability Statistics

Cronbach's Alpha	N of Items
.643	14

Section D

Case Processing Summary

		N	%
Cases	Valid	15	100.0
	Excluded[a]	0	.0
	Total	15	100.0

a. Listwise deletion based on all variables in the procedure.

Reliability Statistics

Cronbach's Alpha	N of Items
.764	14

APPENDIX T

Reliability of Garment Fit Assessment Questionnaire (GFAQ)

(Cronbach Alpha Coefficient)

Fit

Case Processing Summary

		N	%
Cases	Valid	10	100.0
	Excluded[a]	0	.0
	Total	10	100.0

a. Listwise deletion based on all variables in the procedure.

Reliability Statistics

Cronbach's Alpha	N of Items
.774	10

Comfort

Case Processing Summary

		N	%
Cases	Valid	10	100.0
	Excluded[a]	0	.0
	Total	10	100.0

a. Listwise deletion based on all variables in the procedure.

Reliability Statistics

Cronbach's Alpha	N of Items
.688	9

Aesthetics

Case Processing Summary

		N	%
Cases	Valid	10	100.0
	Excluded[a]	0	.0
	Total	10	100.0

Case Processing Summary

		N	%
Cases	Valid	10	100.0
	Excluded[a]	0	.0
	Total	10	100.0

a. Listwise deletion based on all variables in the procedure.

Reliability Statistics

Cronbach's Alpha	N of Items
.854	10

Expressive

Case Processing Summary

		N	%
Cases	Valid	10	100.0
	Excluded[a]	0	.0
	Total	10	100.0

Case Processing Summary

		N	%
Cases	Valid	10	100.0
	Excluded[a]	0	.0
	Total	10	100.0

a. Listwise deletion based on all variables in the procedure.

Reliability Statistics

Cronbach's Alpha	N of Items
.725	5

APPENDIX U

INFORMED CONSENT FORM

Department of Vocational and
Teacher Education
Faculty of Education
University of Nigeria, Nsukka
23rd March 2011

TO WHOM IT MAY CONCERN

I am a PhD student with registration number PGD/PhD/33739/04 with the department of Vocational Teacher Education, Faculty of Education, University of Nigeria, Nsukka. I am currently carrying out a research on the development of functional garments for the Physically Challenged Wheelchair and Bedridden Females (PCWBF) in Benue State.

Your consent to participate in this research: Development of Functional Garments for Physically Challenged Wheelchair and Bedridden Females is hereby sought. Your participation will involve judging the fit of constructed functional garments on the physically challenged wheelchair females using a set of questions and guided by the researcher and her assistants. You may be requested to carry out the exercise 2-3 hours each for a maximum 3 days. Permission is also sought for the exercise to be videotaped and photographed. This is necessary to assist the researcher in presenting data on findings and analysis of data. The researcher promises to keep you anonymous throughout the presentation and compilation of copies of the research for academic records and wherever the video may be shown.

Further inquiries and responses may be directed to the researcher through the above address. Please endorse and dethatch this attached portion for the researcher if you have consented to the request.

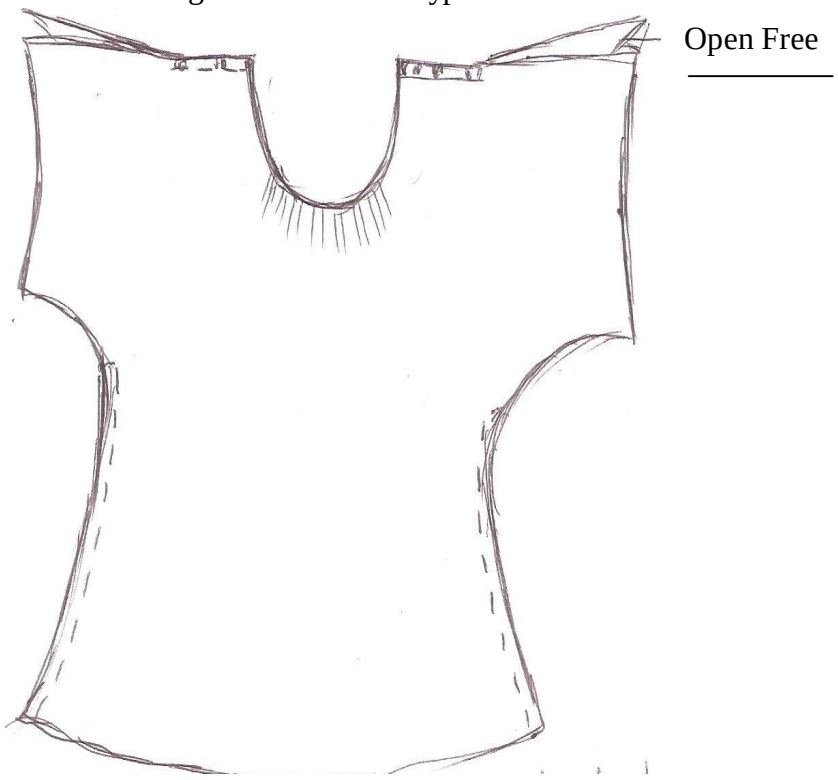
é é
é é é é é é é é é é é é é é ..

I have understood and consented to participate in the ongoing research on Development of Functional Garments for Physically Challenged Wheelchair and Bedridden Females in Benue State.

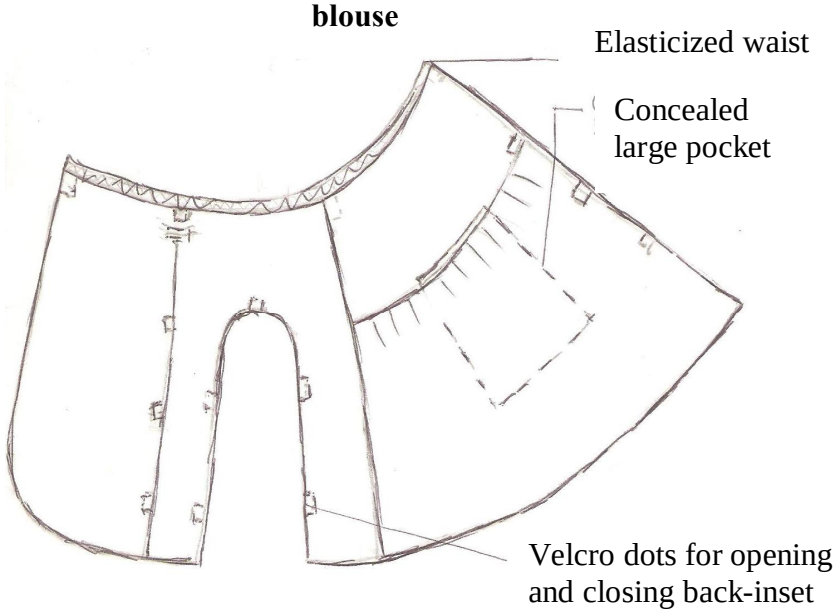
Signature Occupation Date

APPENDIX V

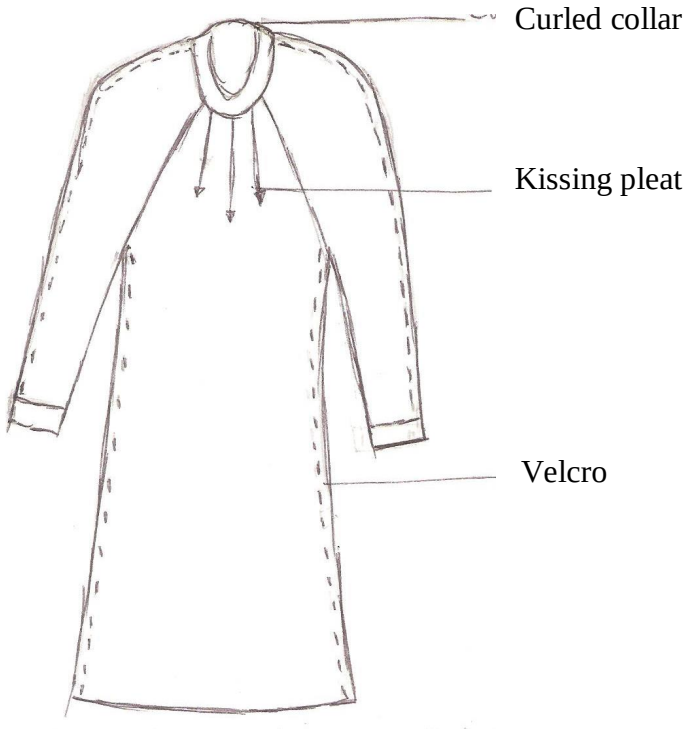
Generation of Design Ideas for Prototype Functional Garments



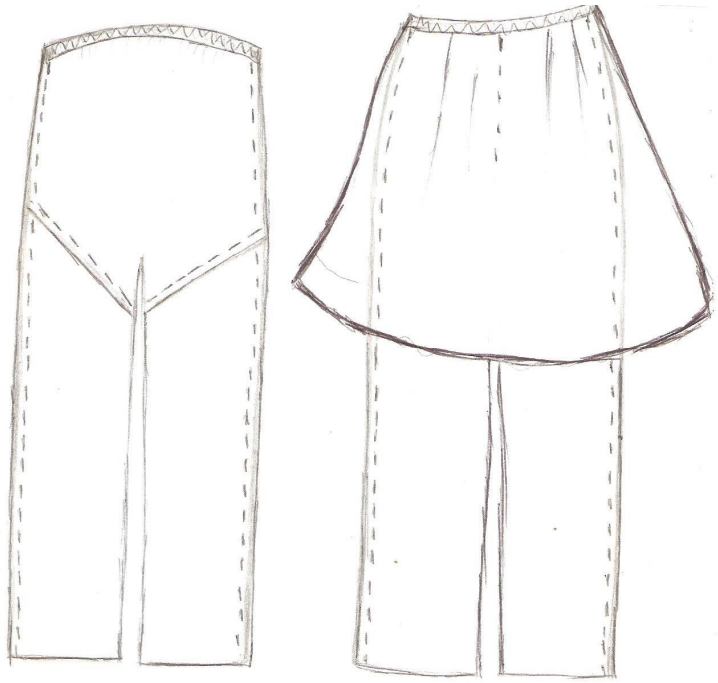
a) Detachable front and back short flare blouse



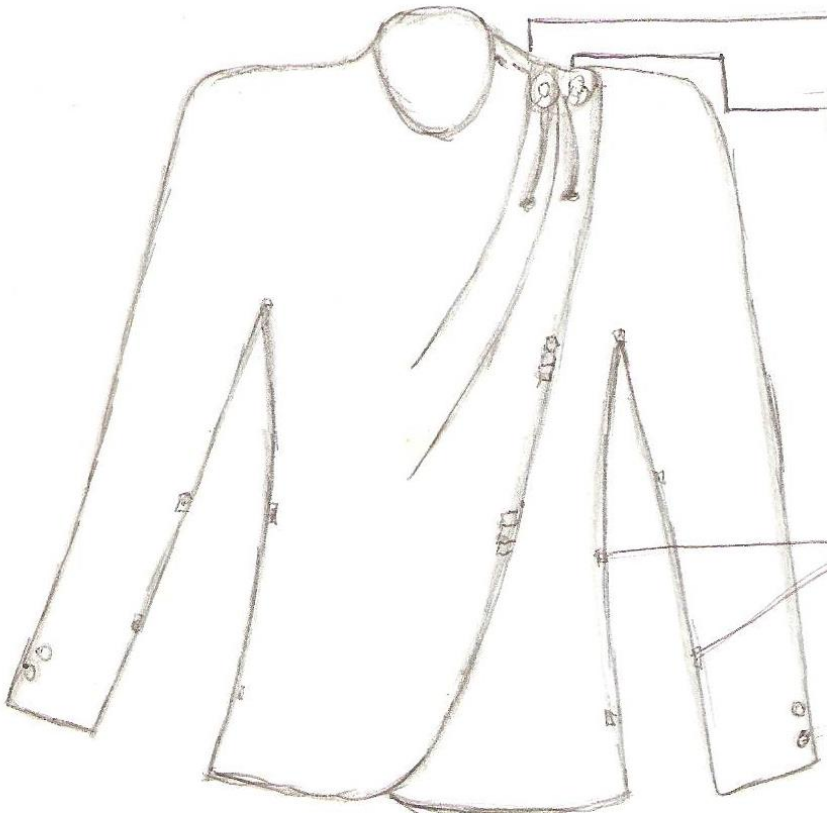
b) Wrap-round skirt with multiple openings and closures.



c) Semi-Fitted short gown with long sleeves, curled collar, pleats front and back and multiple openings and closures.



d) Functional trousers with detachable pack-pieces and elasticized waist and multiple Velcro opening and closures.



d) Long-sleeved blouse with Bishop Collar neckline and multiple Velcro openings and closures.

APPENDIX W

Research Activities in Pictures

(a) Physically Challenged Wheelchair Female in their traditional Attires

(b) Physically Challenged Wheelchair woman without a dress

(c) Researcher Fit-testing functional prototype functional garment on bedridden female

(d) A Physically Challenged Bedridden Females

(e)Researcher interacting with physically challenged wheelchair bound females

(f) Researcher interacting with physically challenge wheel chair bound females

(g)Researcher showing her accidental leg to physically challenged wheel chair bound females

(h)Researcher interacting with physically challenged wheel chair bound females to obtain clothing needs.

(i) Nurses filling garment needs assessment questionnaire

(j) Researcher taking measurement of a user female without Dress

(k) Pattern Drafting for Prototype Functional Garment for Physically Challenged Wheelchair and Bedridden Females

(l)Researcher training judges for garment fit- assessment

(m)Physically Challenge Wheelchair Bound Females donning garments by themselves

(n)Fit-testing of functional skirt and blouse by physically challenged wheel chair bound females

(o) Judges assessing comfort of the garment while users are in slight motions

(p)Users demonstrating slight motions to asses fit of garment

(q)Research assistant and researcher fit-testing gowns on users

(r) User fit- testing a garment

APPENDIX X

Mean Responses of Physically Challenged Wheelchair Bedridden Females on Fit Variables for Small, Medium, Large Sizes of Gowns, Skirt and Blouses, Trousers and tops.

Category	Style	Size		neck line	bust line	ease across shoulder	waist line	ease at biceps	fit over the hip	safety	overall fit	Func*	ease of mobility
Users	**Gowns**	Large	N	3	3	3	3	3	3	3	3	3	3
			Mean	4.00	4.00	4.00	4.33	3.67	4.00	4.33	4.00	4.33	4.33
			Std. Deviation	1.000	.000	.000	.577	.577	.000	.577	.000	.577	.577
		Medium	N	3	3	3	3	3	3	3	3	3	3
			Mean	4.00	4.33	4.33	4.00	4.00	4.33	4.33	4.00	4.00	4.33
			Std. Deviation	1.000	.577	.577	.000	.000	.577	.577	.000	.000	.577
		Small	N	3	3	3	3	3	3	3	3	3	3
			Mean	4.33	4.00	3.67	4.33	4.33	4.00	4.33	4.00	4.00	4.00
			Std. Deviation	1.155	1.000	.577	.577	.577	.000	.577	.000	.000	.000
		Total	N	9	9	9	9	9	9	9	9	9	9
			Mean	4.11	4.11	4.00	4.22	4.00	4.11	4.33	4.00	4.11	4.22
			Std. Deviation	.928	.601	.500	.441	.500	.333	.500	.000	.333	.441
	Skirt and Blouse	Large	N	3	3	3	3	3	3	3	3	3	3
			Mean	4.00	4.00	4.00	4.33	3.67	4.00	4.33	4.00	4.33	4.33
			Std. Deviation	1.000	.000	.000	.577	.577	.000	.577	.000	.577	.577
		Medium	N	3	3	3	3	3	3	3	3	3	3

		Mean	4.00	4.33	4.33	4.00	4.00	4.33	4.33	4.00	4.00	4.33
		Std. Deviation	1.000	.577	.577	.000	.000	.577	.577	.000	.000	.577
	Small	N	3	3	3	3	3	3	3	3	3	3
		Mean	4.33	4.00	3.67	4.33	4.33	4.00	4.33	4.00	4.00	4.00
		Std. Deviation	1.155	1.000	.577	.577	.577	.000	.577	.000	.000	.000
	Total	N	9	9	9	9	9	9	9	9	9	9
		Mean	4.11	4.11	4.00	4.22	4.00	4.11	4.33	4.00	4.11	4.22
		Std. Deviation	.928	.601	.500	.441	.500	.333	.500	.000	.333	.441
Trouser	Large	N	3	3	3	3	3	3	3	3	3	3
and Top		Mean	4.00	4.00	4.00	4.33	3.67	4.00	4.33	4.00	4.33	4.33
		Std. Deviation	1.000	.000	.000	.577	.577	.000	.577	.000	.577	.577
	Medium	N	3	3	3	3	3	3	3	3	3	3
		Mean	4.00	4.33	4.33	4.00	4.00	4.33	4.33	4.00	4.00	4.33
		Std. Deviation	1.000	.577	.577	.000	.000	.577	.577	.000	.000	.577
	Small	N	3	3	3	3	3	3	3	3	3	3
		Mean	4.33	4.00	3.67	4.33	4.33	4.00	4.33	4.00	4.00	4.00
		Std. Deviation	1.155	1.000	.577	.577	.577	.000	.577	.000	.000	.000
	Total	N	9	9	9	9	9	9	9	9	9	9
		Mean	4.11	4.11	4.00	4.22	4.00	4.11	4.33	4.00	4.11	4.22
		Std. Deviation	.928	.601	.500	.441	.500	.333	.500	.000	.333	.441

APPENDIX Y

Mean Responses of PCWBF on Comfort and Overall Performance Variables for Small, Medium, Large Sizes of Gowns, Skirt and Blouses, Trousers and Tops.

Category	Style	Size		O C	F B M	FTB	NI B	A P	FIU	S	F	EWTO
Users	**Gowns**	Large	N	3	3	3	3	3	3	3	3	3
			Mean	4.33	4.67	4.67	4.00	4.67	4.33	4.33	4.33	4.33
			Std. Dev	.577	.577	.577	.000	.577	.577	.577	.577	.577
		Medium	N	3	3	3	3	3	3	3	3	3
			Mean	4.33	4.67	4.33	4.33	4.33	4.33	4.33	4.33	4.00
			Std. Deviation	.577	.577	.577	.577	.577	.577	.577	.577	.000
		Small	N	3	3	3	3	3	3	3	3	3
			Mean	4.67	4.67	4.00	4.33	4.33	4.67	4.33	4.33	4.33
			Std. Deviation	.577	.577	.000	.577	.577	.577	.577	.577	.577

	Total	N	9	9	9	9	9	9	9	9	9
		Mean	4.44	4.67	4.33	4.22	4.44	4.44	4.33	4.33	4.22
		Std. Dev	.527	.500	.500	.441	.527	.527	.500	.500	.441
Skirt and Blouse	Large	N	3	3	3	3	3	3	3	3	3
		Mean	4.33	4.67	4.67	4.00	4.67	4.33	4.33	4.33	4.33
		Std. Dev	.577	.577	.577	.000	.577	.577	.577	.577	.577
	Medium	N	3	3	3	3	3	3	3	3	3
		Mean	4.33	4.67	4.33	4.33	4.33	4.33	4.33	4.33	4.00
		Std. Dev	.577	.577	.577	.577	.577	.577	.577	.577	.000
	Small	N	3	3	3	3	3	3	3	3	3
		Mean	4.67	4.67	4.00	4.33	4.33	4.67	4.33	4.33	4.33
		Std. Dev	.577	.577	.000	.577	.577	.577	.577	.577	.577
	Total	N	9	9	9	9	9	9	9	9	9
		Mean	4.44	4.67	4.33	4.22	4.44	4.44	4.33	4.33	4.22
		Std. Dev	.527	.500	.500	.441	.527	.527	.500	.500	.441
Trouser and Top	Large	N	3	3	3	3	3	3	3	3	3
		Mean	4.33	4.67	4.67	4.00	4.67	4.33	4.33	4.33	4.33
		Std. Dev	.577	.577	.577	.000	.577	.577	.577	.577	.577

	Medium	N	3	3	3	3	3	3	3	3	3
		Mean	4.33	4.67	4.33	4.33	4.33	4.33	4.33	4.33	4.00
		Std. Dev	.577	.577	.577	.577	.577	.577	.577	.577	.000
	Small	N	3	3	3	3	3	3	3	3	3
		Mean	4.67	4.67	4.00	4.33	4.33	4.67	4.33	4.33	4.33
		Std. Dev	.577	.577	.000	.577	.577	.577	.577	.577	.577
	Total	N	9	9	9	9	9	9	9	9	9
		Mean	4.44	4.67	4.33	4.22	4.44	4.44	4.33	4.33	4.22
		Std. Dev	.527	.500	.500	.441	.527	.527	.500	.500	.441
Total	Large	N	9	9	9	9	9	9	9	9	9
		Mean	4.33	4.67	4.67	4.00	4.67	4.33	4.33	4.33	4.33
		Std. Dev	.500	.500	.500	.000	.500	.500	.500	.500	.500
	Medium	N	9	9	9	9	9	9	9	9	9
		Mean	4.33	4.67	4.33	4.33	4.33	4.33	4.33	4.33	4.00
		Std. Dev	.500	.500	.500	.500	.500	.500	.500	.500	.000
	Small	N	9	9	9	9	9	9	9	9	9
		Mean	4.67	4.67	4.00	4.33	4.33	4.67	4.33	4.33	4.33
		Std. Dev	.500	.500	.000	.500	.500	.500	.500	.500	.500

Key:

OC = overall comfort, FBM = full body movement

FTB = feel on the body, NIB = non- irritability to body

AP = air permeability, FIU = flexibility in use

S = safety, F = functionality

EWTO = ease of wearing and taking off

APPENDIX Z

Mean Responses of Users on Fit Variables for the Three Sizes of Gown, Skirt and Blouses, Trousers and Tops while in Motion

Size	Style		neck line	bust line	ease across shoulder	waist line	ease at biceps	fit over the hip	safety	overall fit	*Func	ease of mobility
Large	Gowns	N	3	3	3	3	3	3	3	3	3	3
		Mean	4.00	4.00	3.67	4.00	4.67	4.67	4.33	4.33	4.33	4.33
		Std. Deviation	.000	.000	.577	.000	.577	.577	.577	.577	.577	.577
	Skirt and Blouse	N	3	3	3	3	3	3	3	3	3	3
		Mean	4.00	4.00	3.67	4.00	4.67	4.67	4.33	4.33	4.33	4.33
		Std. Deviation	.000	.000	.577	.000	.577	.577	.577	.577	.577	.577
	Trouser and Top	N	3	3	3	3	3	3	3	3	3	3
		Mean	4.00	4.00	3.67	4.00	4.67	4.67	4.33	4.33	4.33	4.33
		Std. Deviation	.000	.000	.577	.000	.577	.577	.577	.577	.577	.577
	Total	N	9	9	9	9	9	9	9	9	9	9
		Mean	4.00	4.00	3.67	4.00	4.67	4.67	4.33	4.33	4.33	4.33
		Std. Deviation	.000	.000	.500	.000	.500	.500	.500	.500	.500	.500
Medium	Gowns	N	3	3	3	3	3	3	3	3	3	3
		Mean	4.33	4.00	4.33	4.33	4.33	4.00	4.00	4.33	4.33	4.00
		Std. Deviation	.577	.000	.577	.577	.577	.000	.000	.577	.577	.000
	Skirt and Blouse	N	3	3	3	3	3	3	3	3	3	3
		Mean	4.33	4.00	4.33	4.33	4.33	4.00	4.00	4.33	4.33	4.00
		Std. Deviation	.577	.000	.577	.577	.577	.000	.000	.577	.577	.000

	Trouser	N	3	3	3	3	3	3	3	3	3	3
	and Top	Mean	4.33	4.00	4.33	4.33	4.33	4.00	4.00	4.33	4.33	4.00
		Std. Deviation	.577	.000	.577	.577	.577	.000	.000	.577	.577	.000
	Total	N	9	9	9	9	9	9	9	9	9	9
		Mean	4.33	4.00	4.33	4.33	4.33	4.00	4.00	4.33	4.33	4.00
		Std. Deviation	.500	.000	.500	.500	.500	.000	.000	.500	.500	.000
Small	Gowns	N	3	3	3	3	3	3	3	3	3	3
		Mean	4.33	4.00	4.00	4.67	4.00	4.33	4.67	4.00	4.00	4.33
		Std. Deviation	.577	.000	.000	.577	.000	.577	.577	.000	.000	.577
	Skirt and	N	3	3	3	3	3	3	3	3	3	3
	Blouse	Mean	4.33	4.00	4.00	4.67	4.00	4.33	4.67	4.00	4.00	4.33
		Std. Deviation	.577	.000	.000	.577	.000	.577	.577	.000	.000	.577
	Trouser	N	3	3	3	3	3	3	3	3	3	3
	and Top	Mean	4.33	4.00	4.00	4.67	4.00	4.33	4.67	4.00	4.00	4.33
		Std. Deviation	.577	.000	.000	.577	.000	.577	.577	.000	.000	.577
	Total	N	9	9	9	9	9	9	9	9	9	9
		Mean	4.33	4.00	4.00	4.67	4.00	4.33	4.67	4.00	4.00	4.33
		Std. Deviation	.500	.000	.000	.500	.000	.500	.500	.000	.000	.500
Total	Gowns	N	9	9	9	9	9	9	9	9	9	9
		Mean	4.22	4.00	4.00	4.33	4.33	4.33	4.33	4.22	4.22	4.22
		Std. Deviation	.441	.000	.500	.500	.500	.500	.500	.441	.441	.441
	Skirt and	N	9	9	9	9	9	9	9	9	9	9
	Blouse	Mean	4.22	4.00	4.00	4.33	4.33	4.33	4.33	4.22	4.22	4.22
		Std. Deviation	.441	.000	.500	.500	.500	.500	.500	.441	.441	.441
	Trouser	N	9	9	9	9	9	9	9	9	9	9
	and Top	Mean	4.22	4.00	4.00	4.33	4.33	4.33	4.33	4.22	4.22	4.22
		Std. Deviation	.441	.000	.500	.500	.500	.500	.500	.441	.441	.441
	Total	N	27	27	27	27	27	27	27	27	27	27
		Mean	4.22	4.00	4.00	4.33	4.33	4.33	4.33	4.22	4.22	4.22
		Std. Deviation	.424	.000	.480	.480	.480	.480	.480	.424	.424	.424

APPENDIX ZA

Mean Responses of Users on Aesthetics Variables for the Three Sizes (Small, Medium, Large) Gowns, Skirt and Blouses, Trousers and Tops.

Category	Style	Size		BE	C	TOF	FS A	V A	S	S A	CT	F	AC
Users	**Gowns**	Large	N	3	3	3	3	3	3	3	3	3	3
			Mean	4.33	4.33	4.33	4.33	4.33	4.33	4.33	4.33	4.00	4.67
			Std. Dev	.577	.577	.577	.577	.577	.577	.577	.577	.000	.577
		Medium	N	3	3	3	3	3	3	3	3	3	3
			Mean	4.33	4.67	4.33	4.33	4.33	4.33	4.33	4.33	4.00	5.00
			Std. Dev	.577	.577	.577	.577	.577	.577	.577	.577	.000	.000
		Small	N	3	3	3	3	3	3	3	3	3	3
			Mean	4.33	4.00	4.67	4.33	4.67	3.67	4.00	4.67	4.33	5.00
			Std. Dev	.577	.000	.577	.577	.577	.577	.000	.577	.577	.000
		Total	N	9	9	9	9	9	9	9	9	9	9
			Mean	4.33	4.33	4.44	4.33	4.44	4.11	4.22	4.44	4.11	4.89
			Std. Dev	.500	.500	.527	.500	.527	.601	.441	.527	.333	.333
	Skirt and Blouse	Large	N	3	3	3	3	3	3	3	3	3	3
			Mean	4.33	4.33	4.33	4.33	4.33	4.33	4.33	4.33	4.00	4.67
			Std. Dev	.577	.577	.577	.577	.577	.577	.577	.577	.000	.577
		Medium	N	3	3	3	3	3	3	3	3	3	3
			Mean	4.33	4.67	4.33	4.33	4.33	4.33	4.33	4.33	4.00	5.00
			Std. Dev	.577	.577	.577	.577	.577	.577	.577	.577	.000	.000
		Small	N	3	3	3	3	3	3	3	3	3	3
			Mean	4.33	4.00	4.67	4.33	4.67	3.67	4.00	4.67	4.33	5.00

		Std. Dev	.577	.000	.577	.577	.577	.577	.000	.577	.577	.000
	Total	N	9	9	9	9	9	9	9	9	9	9
		Mean	4.33	4.33	4.44	4.33	4.44	4.11	4.22	4.44	4.11	4.89
		Std. Dev	.500	.500	.527	.500	.527	.601	.441	.527	.333	.333
Trouser	Large	N	3	3	3	3	3	3	3	3	3	3
and Top		Mean	4.33	4.33	4.33	4.33	4.33	4.33	4.33	4.33	4.00	4.67
		Std. Dev	.577	.577	.577	.577	.577	.577	.577	.577	.000	.577
	Medium	N	3	3	3	3	3	3	3	3	3	3
		Mean	4.33	4.67	4.33	4.33	4.33	4.33	4.33	4.33	4.00	5.00
		Std. Dev	.577	.577	.577	.577	.577	.577	.577	.577	.000	.000
	Small	N	3	3	3	3	3	3	3	3	3	3
		Mean	4.33	4.00	4.67	4.33	4.67	3.67	4.00	4.67	4.33	5.00
		Std. Dev	.577	.000	.577	.577	.577	.577	.000	.577	.577	.000

Key:

BE= beauty, C= colour, TOF= texture of fabric, FS A= fashion ability/style attribute, VA= visual appeal, S= shape/silhouette, SA = style attribute, CT= construction technique, F= fastening

AC= acceptability

APPENDIX ZB

Mean Responses of Users on Expressive Variables for the Three Sizes (Small, Medium, Large) Gowns, Skirt and Blouses, Trousers and Tops.

Style	size		promotes self image	promotes self esteem	promotion of confidence	promotion of social security	promotion of physical independence
Gowns	Large	N	2	2	2	2	2
		Mean	4.00	3.50	3.50	3.50	4.50
		Std. Deviation	.000	.707	.707	.707	.707
	Medium	N	4	4	4	4	4
		Mean	4.00	3.75	4.00	4.00	4.00
		Std. Deviation	.816	.500	.000	.000	.000
	Small	N	3	3	3	3	3
		Mean	4.00	3.67	3.67	4.00	4.00
		Std. Deviation	.000	.577	.577	.000	.000
	Total	N	9	9	9	9	9
		Mean	4.00	3.67	3.78	3.89	4.11
		Std. Deviation	.500	.500	.441	.333	.333
Skirt and Blouse	Large	N	3	3	3	3	3
		Mean	3.67	3.33	3.67	3.67	4.33
		Std. Deviation	.577	.577	.577	.577	.577
	Medium	N	3	3	3	3	3

		Mean	4.33	4.00	4.00	4.00	4.00
		Std. Deviation	.577	.000	.000	.000	.000
	Small	N	3	3	3	3	3
		Mean	4.00	3.67	3.67	4.00	4.00
		Std. Deviation	.000	.577	.577	.000	.000
	Total	N	9	9	9	9	9
		Mean	4.00	3.67	3.78	3.89	4.11
		Std. Deviation	.500	.500	.441	.333	.333
Trousers and Top	Large	N	3	3	3	3	3
		Mean	3.67	3.33	3.67	3.67	4.33
		Std. Deviation	.577	.577	.577	.577	.577
	Medium	N	3	3	3	3	3
		Mean	4.33	4.00	4.00	4.00	4.00
		Std. Deviation	.577	.000	.000	.000	.000
	Small	N	3	3	3	3	3
		Mean	4.00	3.67	3.67	4.00	4.00
		Std. Deviation	.000	.577	.577	.000	.000
	Total	N	9	9	9	9	9
		Mean	4.00	3.67	3.78	3.89	4.11
		Std. Deviation	.500	.500	.441	.333	.333

APPENDIX ZC

Mean Responses of Judges on Aesthetics Variables for the Three Sizes (Small, Medium, Large) Gowns, Skirt and Blouses, Trousers and Tops.

Category	Style	Size		BE	C	TOF	FSA	VA	S	SA	CT	F	AC
Nurse	**Gowns**	Large	N	5	5	5	5	5	5	5	5	5	5
			Mean	4.60	4.60	4.20	4.20	4.20	3.80	4.60	4.80	4.40	4.60
			Std. Deviation	.548	.548	1.095	.837	.837	.447	.548	.447	.894	.548
		Medium	N	5	5	5	5	5	5	5	5	5	5
			Mean	4.60	4.60	4.00	4.40	4.20	4.00	4.20	4.40	4.40	4.60
			Std. Deviation	.548	.548	1.000	.894	1.095	.000	.447	.548	.894	.548
		Small	N	5	5	5	5	5	5	5	5	5	5
			Mean	4.60	4.60	4.00	4.60	4.20	4.00	4.40	4.80	4.20	4.40
			Std. Deviation	.548	.548	1.000	.548	.837	.000	.548	.447	.837	.548
		Total	N	15	15	15	15	15	15	15	15	15	15
			Mean	4.60	4.60	4.07	4.40	4.20	3.93	4.40	4.67	4.33	4.53
			Std. Deviation	.507	.507	.961	.737	.862	.258	.507	.488	.816	.516
		Large	N	5	5	5	5	5	5	5	5	5	5
			Mean	4.40	4.40	4.00	4.20	4.20	4.40	4.40	4.00	4.40	4.40
			Std. Deviation	.894	.894	.707	.837	.837	.548	.548	.000	.548	.548
		Medium	N	5	5	5	5	5	5	5	5	5	5
			Mean	4.80	4.60	4.20	4.40	4.60	4.60	4.60	4.40	4.60	4.20
			Std. Deviation	.447	.548	.447	.548	.548	.548	.548	.548	.548	.447
		Small	N	5	5	5	5	5	5	5	5	5	5

			Mean	4.20	4.20	3.60	4.60	4.20	4.60	4.60	4.40	4.80	4.40
			Std. Deviation	1.095	1.095	.548	.548	.447	.548	.548	.548	.447	.548
		Total	N	15	15	15	15	15	15	15	15	15	15
			Mean	4.47	4.40	3.93	4.40	4.33	4.53	4.53	4.27	4.60	4.33
			Std. Deviation	.834	.828	.594	.632	.617	.516	.516	.458	.507	.488
	Trouser and Top	Large	N	5	5	5	5	5	5	5	5	5	5
			Mean	3.80	3.60	3.80	4.00	4.40	3.60	4.20	4.20	4.80	4.00
			Std. Deviation	.837	.548	.447	.707	.894	.894	1.304	.447	.447	.707
		Medium	N	5	5	5	5	5	5	5	5	5	5
			Mean	3.80	3.40	3.40	4.00	4.40	4.20	3.80	4.60	4.40	4.20
			Std. Deviation	.447	.548	.548	.707	.894	1.304	1.095	.548	.548	.837
		Small	N	5	5	5	5	5	5	5	5	5	5
			Mean	4.00	3.00	3.80	3.20	4.00	3.60	3.00	4.20	3.80	4.00
			Std. Deviation	.000	.000	.447	.447	.707	.894	.707	.447	1.095	.707
		Total	N	15	15	15	15	15	15	15	15	15	15
			Mean	3.87	3.33	3.67	3.73	4.27	3.80	3.67	4.33	4.33	4.07
			Std. Deviation	.516	.488	.488	.704	.799	1.014	1.11	.488	.816	.704
Clothing & Textile Lecturer	**Gowns**	Large	N	10	10	10	10	10	10	10	10	10	10
			Mean	4.70	4.50	4.20	4.10	4.50	3.80	4.20	4.30	4.70	4.70
			Std. Deviation	.483	.527	.632	.316	.527	.789	.632	.823	.483	.483
		Medium	N	10	10	10	10	10	10	10	10	10	10
			Mean	4.60	4.60	4.50	4.20	4.40	4.20	4.40	4.10	4.40	4.50

		Std. Deviation	.699	.516	.527	.422	.516	.632	.699	.994	.699	.707
	Small	N	10	10	10	10	10	10	10	10	10	10
		Mean	4.50	4.40	4.30	3.90	4.30	4.00	4.30	4.40	4.60	4.60
		Std. Deviation	.707	.516	.483	.568	.675	.471	.823	.966	.516	.516
	Medium	N	10	10	10	10	10	10	10	10	10	10
		Mean	4.10	3.90	4.00	4.20	4.40	4.00	4.40	4.40	4.60	4.20
		Std. Deviation	.738	.568	.667	.632	.516	.667	.699	.843	.516	.789
	Small	N	10	10	10	10	10	10	10	10	10	10
		Mean	4.30	4.30	4.10	4.10	4.10	4.00	3.90	4.60	4.50	4.20
		Std. Deviation	.483	.483	.738	.738	.738	.667	.568	.699	.527	.632
	Total	N	30	30	30	30	30	30	30	30	30	30
		Mean	4.30	4.17	4.03	4.23	4.33	4.17	4.37	4.60	4.57	4.33
		Std. Deviation	.596	.592	.669	.626	.606	.648	.669	.675	.504	.661
Total	Large	N	35	35	35	35	35	35	35	35	35	35
		Mean	4.51	4.40	4.03	4.29	4.46	4.17	4.46	4.63	4.63	4.57
		Std. Deviation	.658	.651	.618	.519	.611	.822	.611	.598	.490	.558
	Medium	N	35	35	35	35	35	35	35	35	35	35
		Mean	4.31	4.34	4.11	4.20	4.34	4.06	4.40	4.43	4.51	4.40
		Std. Deviation	.718	.639	.583	.632	.639	.765	.651	.778	.562	.695
	Small	N	35	35	35	35	35	35	35	35	35	35
		Mean	4.37	4.34	4.17	4.09	4.26	4.09	4.26	4.60	4.54	4.49
		Std. Deviation	.598	.591	.664	.658	.701	.612	.741	.736	.561	.612
	Total	N	105	105	105	105	105	105	105	105	105	105

			Mean	4.40	4.36	4.10	4.19	4.35	4.10	4.37	4.55	4.56	4.49
			Std. Deviation	.659	.622	.619	.606	.650	.733	.669	.707	.536	.622
Garment Constructors	**Gowns**	Large	N	5	5	5	5	5	5	5	5	5	5
			Mean	4.80	4.60	4.40	4.80	4.80	4.60	4.80	4.80	4.80	4.80
			Std. Deviation	.447	.548	.894	.447	.447	.548	.447	.447	.447	.447
		Medium	N	5	5	5	5	5	5	5	5	5	5
			Mean	4.40	4.40	4.20	5.00	4.80	4.60	5.00	5.00	5.00	5.00
			Std. Deviation	.548	.548	.837	.000	.447	.548	.000	.000	.000	.000
		Small	N	5	5	5	5	5	5	5	5	5	5
			Mean	4.80	4.60	4.40	4.80	4.80	4.60	4.80	4.80	4.80	4.80
			Std. Deviation	.447	.548	.894	.447	.447	.548	.447	.447	.447	.447
		Total	N	15	15	15	15	15	15	15	15	15	15
			Mean	4.67	4.53	4.33	4.87	4.80	4.60	4.87	4.87	4.87	4.87
			Std. Deviation	.488	.516	.816	.352	.414	.507	.352	.352	.352	.352
	Skirt and Blouse	Large	N	5	5	5	5	5	5	5	5	5	5
			Mean	4.00	4.20	4.20	4.40	4.60	4.40	4.20	5.00	4.80	4.80
			Std. Deviation	1.000	.837	.447	.548	.548	.548	.447	.000	.447	.447
		Medium	N	5	5	5	5	5	5	5	5	5	5
			Mean	4.20	4.20	4.20	3.80	4.00	4.00	4.20	4.60	4.80	4.60
			Std. Deviation	.447	.837	.447	.837	.707	.707	.447	.548	.447	.548
		Small	N	5	5	5	5	5	5	5	5	5	5
			Mean	4.20	4.00	4.40	4.20	4.40	4.20	4.60	5.00	4.80	4.80

		Std. Deviation	.447	.707	.894	.447	.548	.447	.548	.000	.447	.447
	Total	N	15	15	15	15	15	15	15	15	15	15
		Mean	4.13	4.13	4.27	4.13	4.33	4.20	4.33	4.87	4.80	4.73
		Std. Deviation	.640	.743	.594	.640	.617	.561	.488	.352	.414	.458
Trouser and Top	Large	N	4	4	4	4	4	4	4	4	4	4
		Mean	3.50	3.50	4.00	3.75	3.50	3.25	3.25	4.00	4.00	4.25
		Std. Deviation	.577	.577	.000	.957	1.000	1.258	.500	.816	.816	.957
	Medium	N	6	6	6	6	6	6	6	6	6	6
		Mean	3.50	3.50	4.00	4.33	3.67	3.50	4.17	4.33	4.00	3.67
		Std. Deviation	.548	.548	.632	.516	.516	.837	.983	1.033	.894	.816
	Small	N	5	5	5	5	5	5	5	5	5	5
		Mean	3.80	3.80	3.80	4.00	4.00	3.60	3.80	4.20	4.80	4.20
		Std. Deviation	1.304	.447	.447	1.000	.707	.548	1.304	1.304	.447	.837
	Total	N	15	15	15	15	15	15	15	15	15	15
		Mean	3.60	3.60	3.93	4.07	3.73	3.47	3.80	4.20	4.27	4.00
		Std. Deviation	.828	.507	.458	.799	.704	.834	1.014	1.014	.799	.845

Key: BE= beauty, C= colour, TOF= texture of fabric, FSA= fashion ability/style attribute VA= visual appeal, S= shape/silhouette, SA = style attributes, CT = construction technique F= fastening, CA= acceptability

APPENDIX ZD

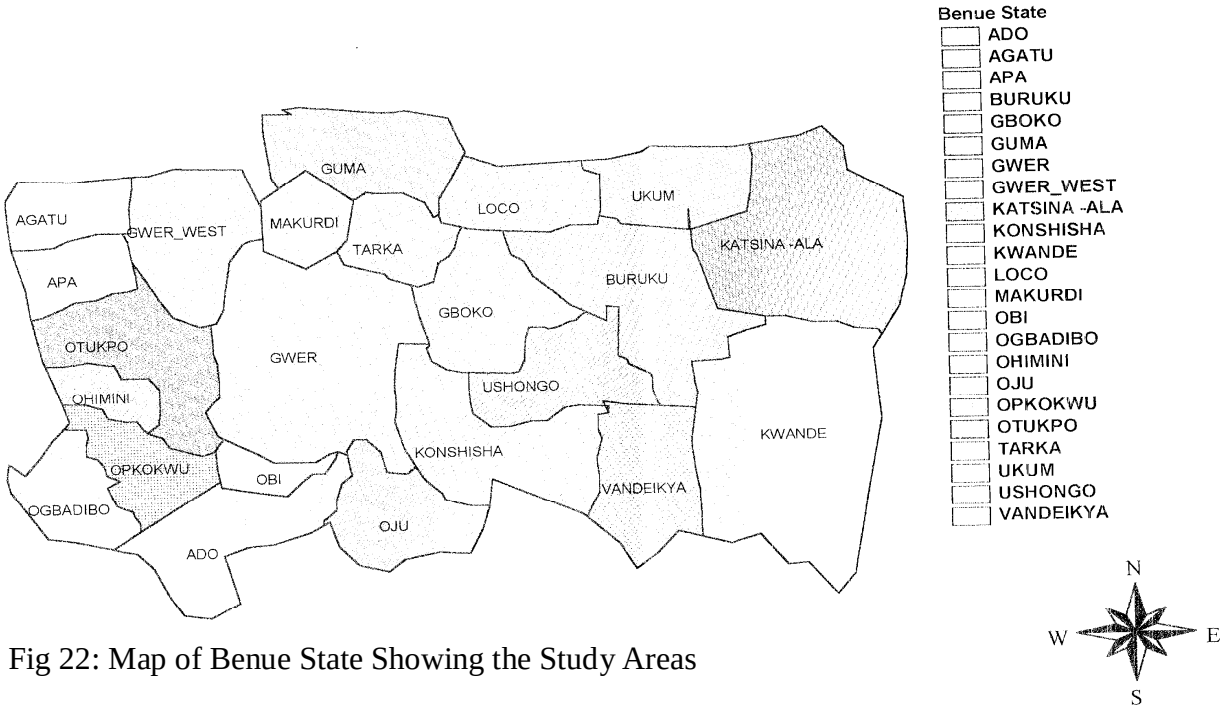


Fig 22: Map of Benue State Showing the Study Areas