

## FUNCTIONAL GARMENT DESIGNING AND DEVELOPMENT IN RELATION TO ACTIVITIES OF BEDRIDDEN FEMALES IN BENUE STATE, NIGERIA.

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### ABSTRACT

*The study assessed activities of bedridden females (BF) in Benue State, Nigeria towards designing and developing functional garments for them. Specifically, the study determined activities of BF, undertook needs assessment of BF, designed functional garments for BF, established average body measurements of BF in (small, medium and large sizes), developed patterns for the functional garments, developed prototype functional garments for BF. Two research questions and two null hypotheses guided the study. Research design was Research and Development (R & D). Two models: Function, Expressive and Aesthetic (FEA) model and the Universal Design Principles (UDP) provided the theoretical framework for the study. Population and sample for the study were 368 and 368 respondents respectively. Instruments for data collection were Garment Needs Assessment Questionnaire (GNAQ), Body Measurement Chart (BMC), Observation Checklist (OCL). Reliability of GNAQ was tested: Inter-rater reliability Coefficient for section A of GNAQ tested using Kendall's 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. Results showed that activities of BF include: donning and doffing garments (100%), mouth brushing, bathing, meal preparation/cooking (58%), child care (28%), operating electronics like TV, handsets (42%), reading, writing, meal preparation. A total of 72 basic block patterns were drafted for small, medium and large sizes each for trouser, skirts, blouses, gowns. Twelve prototype functional garments were developed by adapting the basic blocks. Data collected were analyzed using percentages and means. All fourteen functional attributes were rated above satisfactory ( $4 \pm 0.33$ ). Recommendations included: Ready-to-wear functional garments should form parts of the discharge kit for BF.*

Keywords: Bedridden Females, Functional Garment, Garment Designing, Garment Development.

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### Introduction

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. Functional performance includes performance aspects other than appearance, namely the garments utility and durability (Dehhia, 2015). 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 and those bedridden. Social-psychological functions of clothes, termed the functionality of clothes attend to the following needs: Need to be up-to-date, adjust to a changing society, for symbolic differentiation, social affiliation and desire to escape boredom.

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 'who they are' based on what they can do on a physical level. A person's self-perception is strongly affected by how the society views him or her. The two combined perceptions, physical and social, result in an individual's 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 grief 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. Clothing provides this opportunity for people with disabilities. Consciousness and concern of a patient about clothing and appearance is an indication of psychological recovery (Chase and Quinn, 2003).

Designing aims 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. 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 applied artistically.

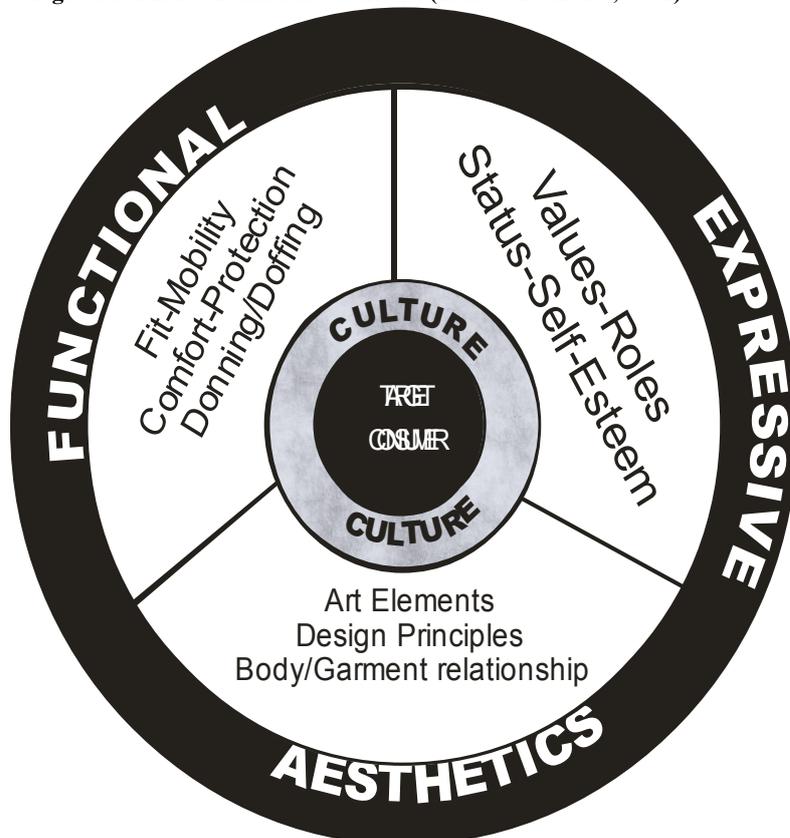
Functional criteria or requirements are very essential in designing garments for the physically challenged. It is concerned with the product's ability to perform functions needed by the user as incorporated in the design. Dehhia (2015) documented that apparels possess two major functions, namely: "Physical aspects or what the garment is; and Performance aspects or what the garment does. The physical aspects of a garment determine its performance." The functional requirements of the design include variables such as fit, mobility and ease of donning and doffing, utility and durability, (Carroll,2001; Dehhia 2015). 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 user's cultural environment and the activities he or she is capable and permitted to carry out. 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.

Garment development process consist several steps: identification of the needs of the wearers, patterns drafting, Fit sample, making, and construction of the garments ( Kaiser, 1997, Apparel Mechandiser, 2015). A prototype garment produced from cheaper fabric, tested and corrected to meet the desired specifications of a design is needful to confirm fit. 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. It provides opportunity for every correction to be effected after series of fitting using prototype garments on the figure before the final garment construction (Weber, 1990; Igbo and Iloeje, 2003). Size and shape of individuals 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.

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.

Fig1: The FEA consumer needs model (Lamb and Kallal, 1992)



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

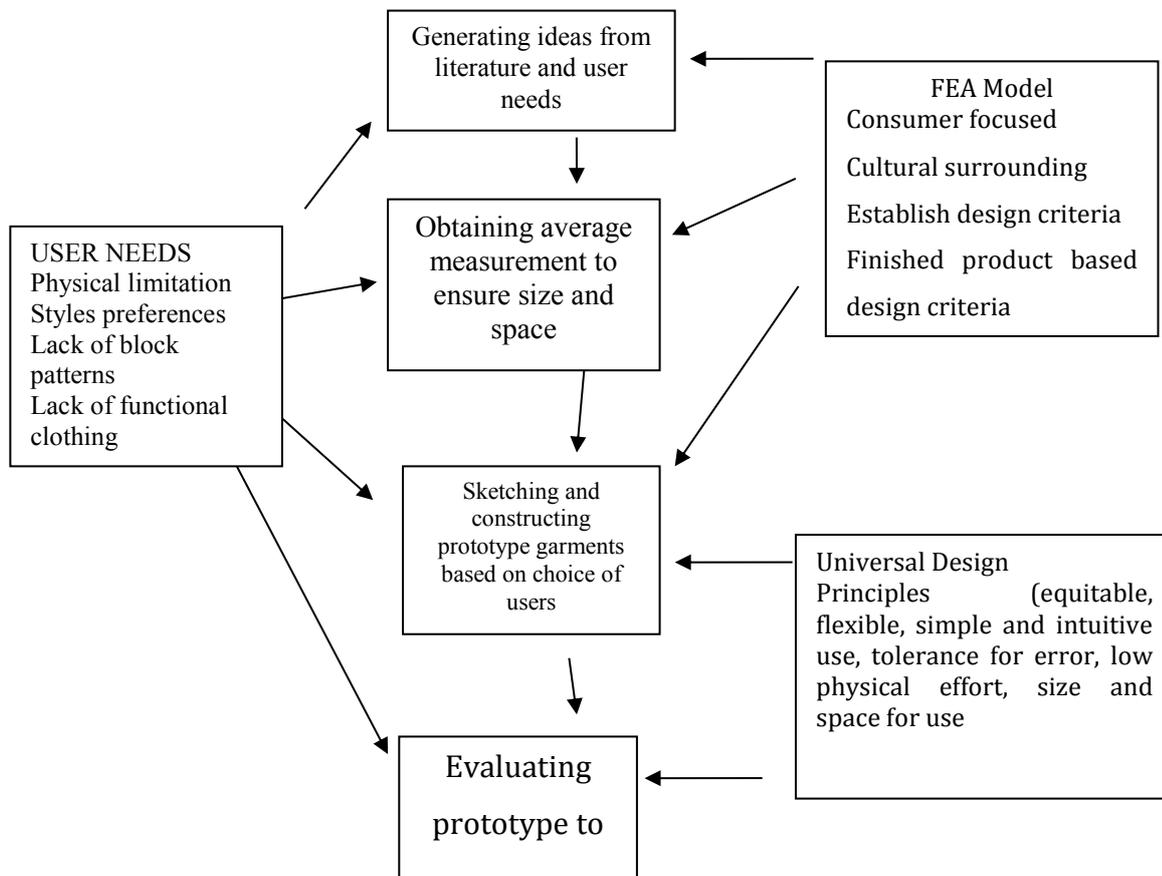
- i) The consumer is the central focus
- ii) The cultural surrounding of the consumer (user) is considered in the design
- iii) The design researcher establishes the design criteria in the initial steps.
- iv) The finished product must meet the design criteria.

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 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 bedridden females include variables such as role or status in the society. 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). Opinions of what is appropriate clothing differs based on need for usage, background of the users 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: Equitable/reasonable in use, flexible in use, simple, intuitive, tolerant of error, low in physical effort, possess size and space for use.

This research 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. 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. Fig 2 is an illustration of the model for functional garments for the BF.

**Fig 2: Model for Functional Garments for the bedridden Females in Benue State.**



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. The cultural practices that negates freedom of dressing and appearance can therefore be modified to enhance comfort of the bedridden. What people wear and the feelings they derive from what they wear can improve on their wellbeing. Breza (2007) noted that during times of illness, a patient's emotional well-being can be vital to their recovery.

The garments needs of bedridden females differ at various times. These differences pose problems to garment designers, garment constructors, the bedridden and those who assist them to curtail the problem. Professional-patient relationship is highly important, since this is the human context in which decision-making occurs (Merenstein and Gardner, 2002). Some problems that could be encountered by inadequate clothing, inappropriate clothing or use of non functional clothing for bedridden persons include: painful process for patients, bedsores, lack of blood circulation, incontinent issues, caregiver fatigue, exposure of extremities, improper flexor of muscles (Miloma Investments 2016). Other problems likely to be faced by bedridden persons include: Ulcers, edema, itching/ rashes, dryness of skin.

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 "donning and doffing" 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.

Chunyan & Yue (2014) documented that " Fashion design which is integrating the design concept of multi-angle, multi-paradigm and multi-aspect should be on the stand of severing people so as to meet people's physiological and mental needs and to enrich people's spiritual and material life for the purpose" Chunyan & Yue (2014) added that designers should be free from the limitation in the clothing art itself, broaden their horizon, grasp the pulse of the development of the clothing art and expand the dimensions of fashion design, so as to make the clothing art become more stereo and full. Multi-level needs in contemporary society and diversification of consumer demand should also be met in clothing designs(Chunyan & Yue, 2014) .

Challenges facings garment producers in Ghana was researched by Quarcoo, Gavor & Tetteh-Coffie (2013). The garment industry is one of the largest and fast growing industries. Textiles and clothing are among the sectors where developing countries have the most to gain from multilateral trade liberalization Quarcoo et al (2013). The clothing industry is labor-intensive but offers entry-level jobs for unskilled labor in developed as well as developing countries and job creation in the sector has been particularly strong for women in poor countries, who previously had no income opportunities other than the household or the informal sector (Quarcoo et al 2013). The major challenges confronting the garment industry are lack of motivation, inadequate facilities and amenities, lack of funding, and insufficient managerial ability (Quarcoo et al 2013). Close monitoring of garment industries, garment industries by government, provision of loans and subsidy, prompt payment to industry workers were suggested among others by the authors.

The motivation for this paper stemmed from personal experience of one of the authors and interactions with some bedridden female patients introduced to the researchers by snowballing. She had a multiple dethatched fracture of the right leg and was bedridden for one year in an orthopaedic hospital. It was a horrifying experience particularly due to unavailability of garments that could conveniently be used by the bedridden. Many on same hospital ward could not be shifted because of multiple broken bones. Toileting facilities providers took no particular notice of such disabilities. Caregivers were grossly inadequate especially given the nature of the special needs of the bedridden. Some of the care givers were young relatives of the bedridden females who could not lift the patients, could not easily don or doff tight fitted garments for the bedridden. Bains and Minhas (2011) documented that a majority of the caregivers (82%) for bedridden patients in Northern India were untrained family members. In bedridden conditions, the individual is at her lowest ebbs and requires all attention in care to recover emotionally and settle down to the realities of physical incapacitation or otherwise. After having conceived different styles of garments that may benefit bedridden females, the researches noticed with dismay that ready-made patterns for producing such styles were not available in the market. This research is therefore poised to attend to these crucial needs of bedridden females guided by the following research objectives:

### **Objectives Of The Study**

Specifically, the study:

1. Determined activities of BF; undertook needs assessment of BF,
2. Designed functional garments for BF
3. Established average body measurements of BF in (small, medium and large sizes)
4. Developed patterns for the functional garments,

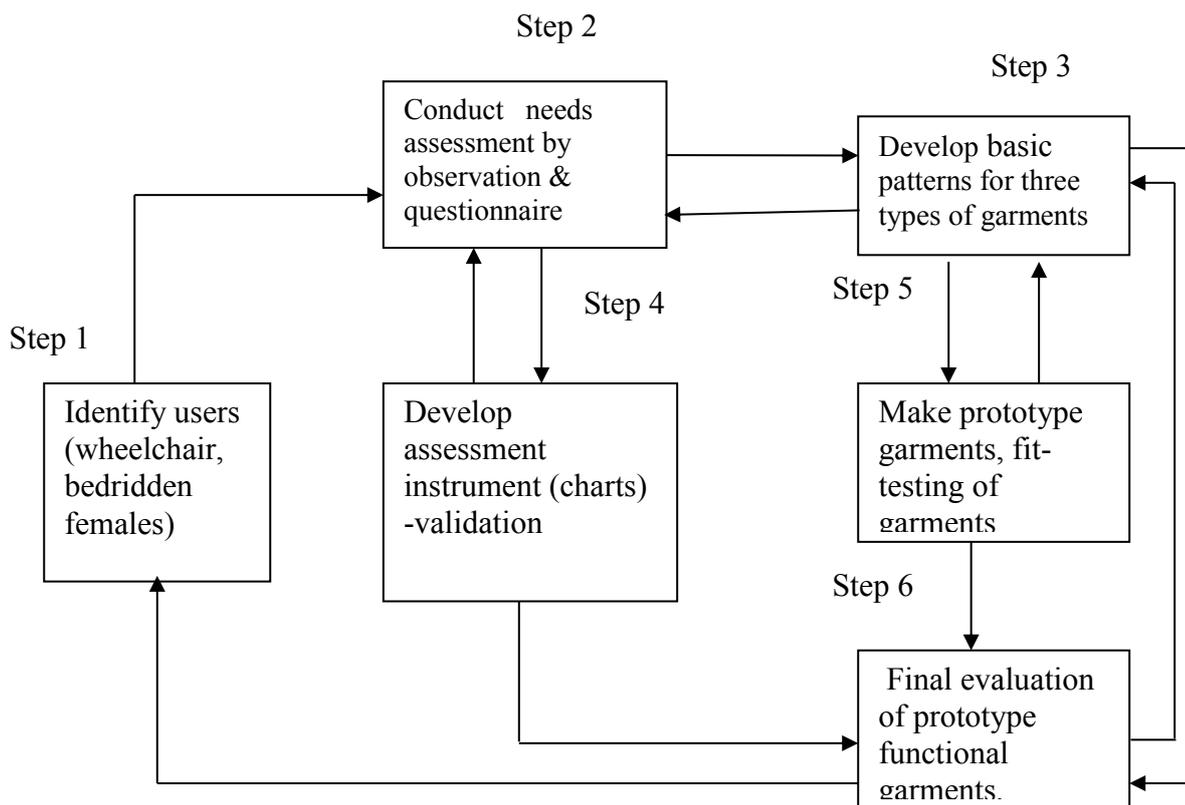
5. Developed prototype functional garments for BF.

The introduction is followed by the methodology of the study which includes the design of the study, area, population, sample size and instrument for data collection. Findings of the research are shown tables and discussed in line with the set objectives. This is followed by conclusions based on the findings and suggestions or recommendations.

**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. The R and D systems approach model of educational research and development comprise ten steps called the R and D cycle. This current research adapted the R and D cycle using six steps illustrated in fig 3

**Fig 3: Adapted R and D Cycle Model for the Development of Functional Garments for Bedridden Females in Benue State. Adapted from Gall, Gall and Borg (2007).**



**Area Of The Study**

The area of study was Benue State of Nigeria; from three selected local government areas each from the three Senatorial Zones namely: A, B,C. Katsina Ala, Kwande, Vandekya, in Zone A, Gboko, Buruku, Makurdi in Zone B and Otukpo, Apa, Oju in Zone C. These area were purposefully selected because they are the most developed local government establishments such as hospitals and offices. The respondents were randomly selected from among in-patients within Federal Medical Centres and General Hospitals in each of the local Government Areas selected.

**Population For The Study**

The population for the study was 368 Bedridden Females. This comprise female patients with chronic ailments paralysis, multiple fractures, spinal cord injuries, amputees that has rendered them bedridden for the rest of their lives.

**Sample For The Study**

The sample for this study was 368 Bedridden Females. The entire population served as sample for the study since the population was small. According to (Emaikwu), 2013, representativeness is directly related to precision; since it is a quantitative research, and most of the respondents have unique features, the larger the representation the safer it is to generalize the result on bedridden females in the state and beyond.

**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 Bedridden females (types of garments that will enhance their carrying out various activities conveniently and effectively).
2. Observation Checklist (OCL) to identify the activities of bedridden females. Information on daily activities was obtained by careful interaction and observation of Bedridden Females.
3. Body Measurement Chart (BMC) for obtaining measurements for large, medium and small sizes BF.
4. Measurement tape for garment pattern development and garment construction.
5. Pattern drafting tools for garment pattern development.
6. Garment construction tools (pairs of scissors, sewing machine).

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 BF/ users. Sections C and D had five point Likert Scale of measuring the response of the Bedridden Females. 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 (SD) =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 for Bedridden females had eleven items indicating their participation or otherwise in the various activities list. The Standard Body Measurement Chart (SBMC) 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 BF 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. 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.

## Results And Discussion

**Table 1: Needs Assessment of Physical Activities of Bedridden Females in Benue State**

S/No	Type of Physical Activity	% (N=368)
1	donning and doffing garments	100
2	mouth brushing,	100
3	bathing indicated by all representing	100
4	washing of clothes and dishes	40
5	meal preparation/cooking	28
6	child care	28
7	Crawling within and outside the house	39
8	pedalling wheelchair with arm	69
9	climbing in and out of wheelchair,	78
10	operating electronic gadgets like TV and radio	42
11	bending to lift objects from floor	52
12	sitting over a long period of time	92
13	lying in bed on one position over a long period	18
14	Involvement in circular jobs such as teaching, secretarial services and knitting, crocheting and sewing.	3

**Source: Field data 2013.**

Table 1 shows typical daily activities of BFs in Benue State. These include: donning and doffing garments for toileting and to clean up, mouth brushing, bathing indicated by all representing 100% for each activity. Predominant posture of the BF is the seated position. Very few (3%) still attended to demands of paid jobs since they had not been laid off. The result does not show evidence of deliberate conscious efforts made by bedridden females' participation in exercises. This negates recommendations by Centres for Disease Control and Prevention Vital Signs (2016), people with disabilities should participate in recommended exercises to prevent heart diseases resulting from lack of exercise.

### Designs of functional garment styles for bedridden females in Benue State

The major components of design of Functional Garment Styles were as follows:

- a. Blouse: short sleeve lengths raglan sleeve or kimono sleeve, short length of blouse, multiple opening/closures. See figures 4 and 5.
- b. Skirt: elasticized waist, uneven length at hem line (front longer than back), multiple opening/ closures along side seams, detachable back-inset for toileting, concealed pockets for carrying medical devices and personal effects. See figure 6.
- c. Trouser/ Pant: multiple full length side opening/closures for ease of donning and doffing even in lying position, elasticized waist, pleats / gathers at lower leg (between knee and ankle) to create illusion of large or normal size of feet, concealed pocket for carrying medical devices or personal effects, detachable back for ease of toileting. See figure 7.

- 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 size gown(multiple sizes in one), back and front fullness with flared/ A-line silhouette), low or high round neck lines, concealed large pockets, detachable back in-set for toileting. See figure 8.
- e. Fabric type: cotton, dull floral patterns, dull plaids.
- f. Design Characteristics similar to contemporary garments worn by none physically challenged females. Incorporated are aesthetics elements in fabric colour, use of bias, trims.

Fig. 4 Raglan sleeve blouse with multiple Velcro openings detachable front and back



Fig. 5. Short blouse with multiple Velcro opening/closures and a neck tie



Fig. 6. Elasticized waist wrap round with multiple Velcro openings and in-set front pocket and detachable back in-set

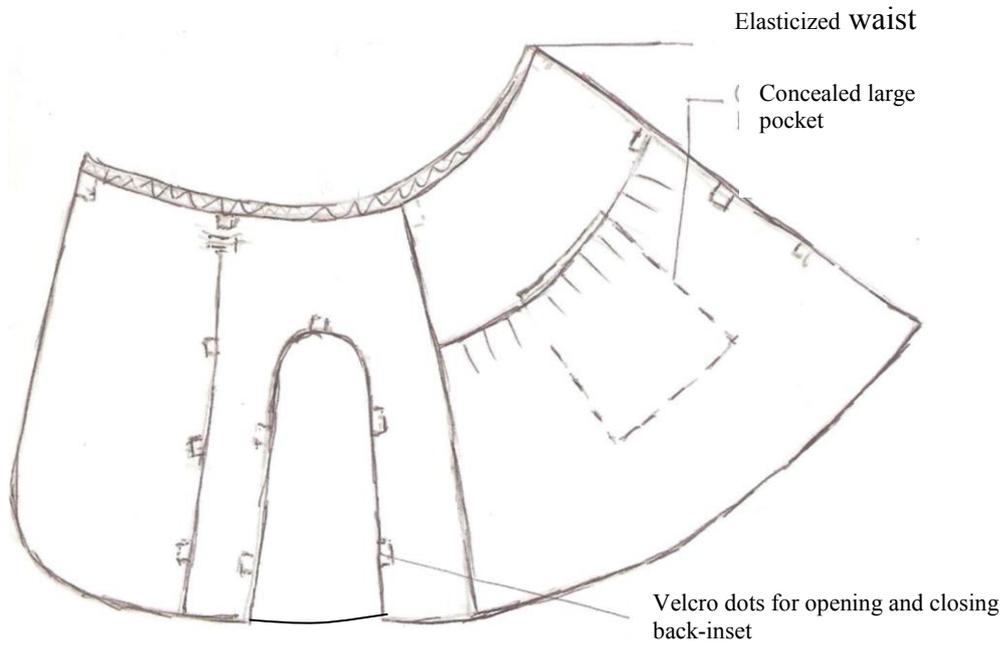


Fig. 7 Trousers/pant with lower leg gather and in-set pockets.

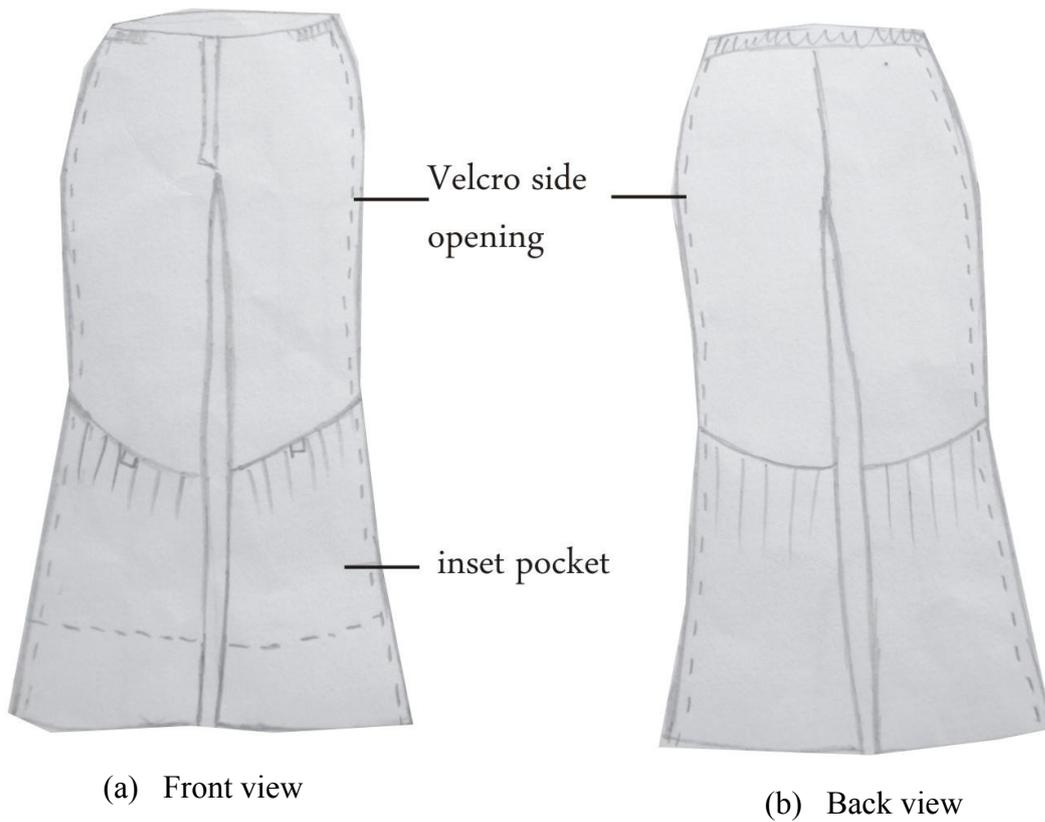
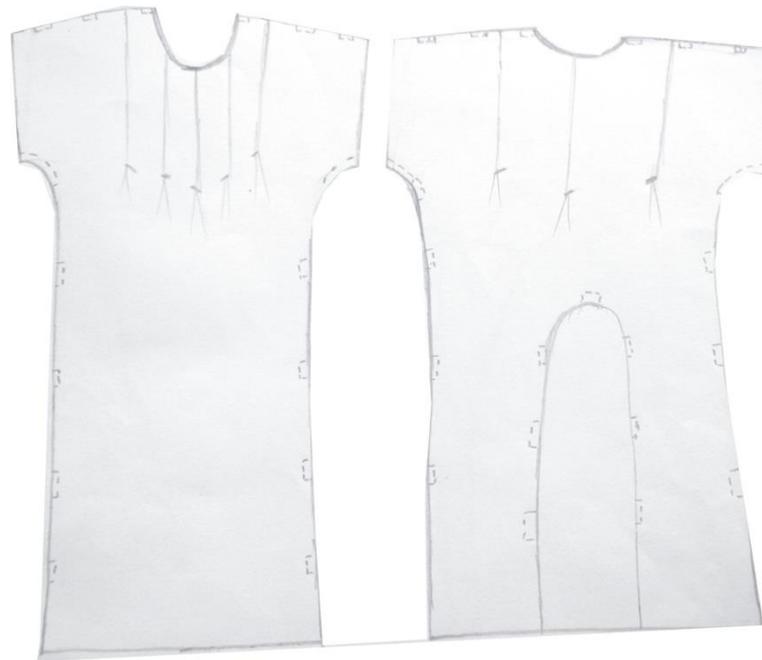


Fig. 8 Long tubular free gown with multiple side and shoulder opening and closures. Margyan/ kimono sleeves, detachable back in-set. Front and Back views



**Table 3: Average body measurements of Bedridden Females (small, medium, large sizes)**

Key: SD= Standard Deviation, \*L= Length of skirt/ trouser, Crotch \*\*, Ankle \*\* are applicable for trousers only. T= Trouser,

S/ N	Variable	X <sub>1</sub>	X <sub>2</sub>	X <sub>3</sub>	Std	M <sub>1</sub>	M <sub>2</sub>	M <sub>3</sub>	Std	L <sub>1</sub>	L <sub>2</sub>	L <sub>3</sub>	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*	46	55	51.7	2.43	58	60	59.7	0.6	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

S=Skirt, X=small, M= medium, L= large

In establishing size categorization for the BF, the study revealed that 59% of the bedridden females fall within the large size category, 26.9% were medium sized, 14.7% were small sized. Sizing was based on size categorization in women size chart (African styles measurement chart, (2011); Standard Metric Measurement Chart (2007). This research has shown that sizing of

people with disabilities and especially those bedridden exhibit a lot of variations in shape and size among and within same groups as shown in Table 3. This finding agreed with the assertion by Craig (1990), Chase and Quinn (2003), that people with disabilities have peculiar features; sitting on the wheelchair or lying still in bed 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 size categorization reveals very great variation in size of body parts. The variations in size observed in this study is augmented by the suggestion of Broorady, Haise, Rucker, & Ashdown, (2009 ) that due to variations in size and shape of people, sizing should be on the most recent anthropometric data available for any population. Bedridden females have irregular body shapes and sizes.

**Pattern development for functional garments for Bedridden Females in Benue State**

Pattern development for functional garments for Bedridden Females hinged on adaptation of basic original patterns created based on average measurements of the bedridden females. A total of 72 pattern pieces were developed to accommodate the various styles. An example of summary of major steps for adapting blouse/ gown pattern is as follows:

- i. Move chest and back line downwards by 2.5cm to get line EE'.
- ii. Connect armholes to line EE' at D and D' for front and back bodices respectively.
- iii. Neck line: alter neckline to V by connecting point B to E and B' to E'. draw straight lines 4cm away and parallel to line BE and BE' to obtain width of neck.
- iv. Sleeve: extend shoulder line BXC to G and B'X'C' to G' 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.

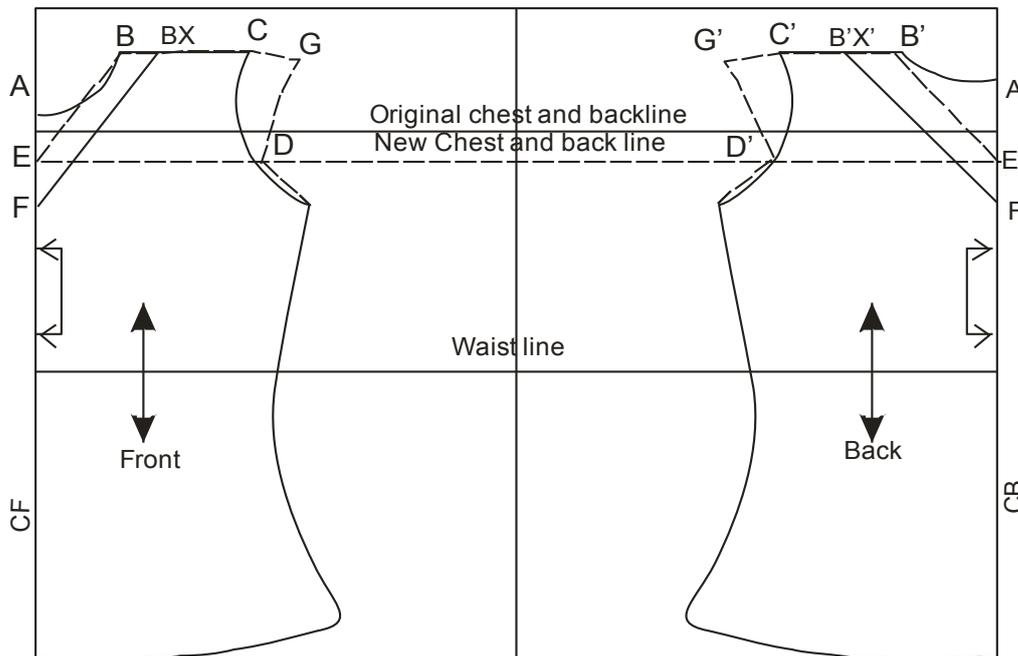


Fig 17: Basic Blouse with Raglan sleeve

Adaptation of Basic Pattern to Prototype Functional Garment Styles(Basic Blouse with Raglan Sleeves, Multiple Side and Shoulder Velcro Openings and Closures.

**Table 4: Mean responses of Bedridden Females on Functional Attributes Required in functional garments for Bedridden Females in Benue State.**

S/No	Functional and aesthetic design features	Responses	
		$\bar{x}$	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

Source: Field data 2013

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 BF. All the fourteen functional and aesthetic design features listed were rated above good or very good (Mean between 3.17 and 4.72) all above cut- off mean of 2.5; indicating that the users are satisfied with incorporating such designs. The findings are in consonance with the assertion by Guptaa 2011 that functional clothing by definition is user-requirement specific and designed or engineered to meet the performance requirements of the user under extreme conditions. The different attributes of the designed garments possess attributes specified in Disabled towards tomorrow, (2016): clothing for people with disabilities or bedridden persons is that such clothing should look and feel like normal clothing. Such clothing with special features make dressing and undressing patients easier for caregivers, nurses, and hospice staff, and provide non restrictive comfort to the wearer (Disabled towards tomorrow, 2016).

### Conclusion

This study 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 wider range of users in developing a new product functional garment. The application of UD approach to designing garments for Bedridden Females yielded excellent results in meeting their garment needs due to variations in levels of incapacitation and size variation.

Bedridden females do not participate in physical activities for exercise but only to fulfil the demands of some daily chores. However, there is evidence of bedridden females' participation in different activities that require design of their garments to accomplish such tasks with higher ease and comfort. Designed garments were based on preferred designs by the bedridden females. The designs have special openings and closures, special sleeves and the garments have features that make them look and feel like normal clothing. The two most predominant requirements for their garments were easy donning and doffing and psychological and emotional satisfaction of physical independence.

In establishing size categorization for the BF, the study revealed that 59% of the bedridden females fall within the large size category. The study therefore concludes that in designing garments for bedridden females especially in Benue State, large sizes should be more predominant. Designs with adjustable universal sizes should be undertaken in order to cover a wider range sizes due to variations in shape and size of bedridden females recorded in the results, they needed functional garments that would facilitate or enhance effective performance in those activities. The two most predominant requirements for their garments were easy donning and doffing and psychological and emotional satisfaction of physical independence. 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. The design of the functional garments met these needs.

Developed patterns for the garments can be used to make variety of garments to meet different needs of people; with or without disabilities. The study was successful since the prototype functional garments designed, constructed satisfied the users.

## Recommendations

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

1. Bedridden females should be taught and encouraged to undertake some physical exercises to improve longevity.
2. Information gathered from this research, especially on garment choices by the BF should be produced in form of charts and given to garment constructors in order to correctly produce the right garments for the BF.
3. Home Economics Extension workers should visit BFs and teach them how to use functional garment to enhance healing through clothing therapy.
4. Garment producers could use the patterns to produce the garments for sale. This reduce challenges encountered in the garment industry.
5. Ready- to- wear functional garments should form parts of the discharge kit for BF on discharge from hospital. The cost may be built into the cost of treatment.

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