Design and Pragmatic studies of bathroom for Elderly people in India

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Abstract: - A very high morbidity and mortality due to fractures as a result of fall is reported world over. Most of the falls are during toileting or bathing, which are quite often cardiovascular syndrome (CVS) and myocardial infarction (MI) leads to an emergency medical condition, are common in vulnerable groups such as elderly or handicapped or pregnant mothers. Most people who find bathroom as a quite retreat, never for a second consider this room as a dangerous place. A recent study shows that one of the single biggest gaps in most of the home safety plans is the bathroom; it is surrounded by water, slippery tiles and hard ceramic surfaces. The conditions of toilet and bathroom need to assess with a systematic design for the comfortable utility as well as to minimize the accidental falls and other mishaps. This paper is based on a pragmatic study on the toilet - bathroom design based on the responses from elderly people with or without disability. Results of the study will help to raise the awareness level among general population, health care professionals and engineers who design the bathroom for the elderly people. The study demonstrates the efficacy of new architectural design approaches with pragmatic studies in reducing the accidents and enhancing the comforts to the elderly people in India while bathing.

Key words: Growth of elderly population, health issues, bathroom design, bathing accidents.

1. Introduction:

Socioeconomic and medical progress in 20th century has yielded an elderly population growth in India considerably. For instance, people of age 65 and above constitute 4% to 10% of the total population, ranging from 3% to 17% in different regions (Irudaya Rajan, 2003) [1]. It is estimated that by the year 2050, 20% of the Indian population will be 65 years and above. Although the prospect of a longer life could be rejoice for many of us, but the absolute and proportional increase of the older population entails medical and economical consequences for the society with menopausal illnesses, Alzheimer's, fractures, and cognitive disorders (Sengupta A, 2003) [2,3]. In general, the risk of disability for Activities of Daily Life (ADL) includes bathing, dressing, toileting, transfer and feeding, these risks will increases with increasing age. In most cases disability is a chronic condition raising health care costs for society and reducing the quality of life in elder individuals. Furthermore, physically disabled elderly have a higher risk of dying or being institutionalized. Accident rates in the literature for ADL disability with different lengths of follow-up and within different age groups range from 5.6% to 47%. Furthermore, several studies show different levels of statistical significance for the associative determinants such as gender, body mass index, and cognitive functioning (M M B Breteler, 1994) [4]. Bathing dispels sleep, burning and tiredness; rids sweat, itching and thirst; enhances pleasure and stimulates all sense organs; cleanses the body; removes drowsiness and indolence; gives satisfaction; and kindles the digestive fire. Accumulated foreign matter and skin cleansing will be achieved physiologically from bathing.

Bathing prevents dead skin, displaces irritations and rashes that transform into to infections. It allows the people for social standard of cleanliness, appearance and olfactory requirement. It also refreshes, revive, and relax them. Bathing process is subjective and personalized with specific place or technique from different studies [5-8]. Familiar products or items to the individual, frequency of changing while bathing, preferences with references to the time of day for bathing (Sloane PD, Hoeffer B, et al., 2004) [7]. Modifications in the environment like decoration of wall with colored paint, colored towels, pictures, plants, home like settings, curtains, warm water, comfortable temperature, gentle spray shower, softening lighting with minimum glare, relaxing music, bath blankets or heated towels, privacy during bathing, installation of natural phenomena like bird songs and pictures have been suggested. Soothing music before and during bathing had significant effect in aggressive behaviours and verbally agitated behaviours (Thomas D, Heitman et al., 1997) [8]. Bathing is not at all a problem for young, able-bodied people, but it is more time consuming, difficult and sometimes it is dangerous for elderly person. When considering designing a bathroom for them, we need to examine the above mentioned problems, with a view of reducing such mishaps while at the same time make it comfortable, user friendly for the vulnerable groups. It is evident about the dangerous aspect of bathing from the injury data reported by the Consumer product safety commission. 1,17,230 bathtub or shower injuries are reported in 1989, 1,36,616 in 1990 and 1,39,434 in 1991 between the ages of 25-64. More vulnerable injuries are reported in upper age limit. 17 % bathtub injuries are reported in 1989, 22 % in 1990, and 20 % in 1991. Mostly they are injured from bathtub, shower exercise equipment or cooking appliances. Tokyo metropolitan fire department investigated bathing accident research from 1999 to March 2000, 14,000 sudden deaths are reported in 1999, which are larger than traffic accidents, in 23 districts within Tokyo, 628 accidents and 866 deaths are reported. More female deaths are reported but specific reasons are not clear, few deaths are reported in early evening and in late afternoon, from this it is observed that mortality rate is related to biological rhythm (Kurosaki Kunihiko, 2002, Takahito Hayashi, 2004) [9, 10]. National safety council reported that one person dies everyday by bathtub or shower in United States. Psychological trauma for the families is observed due to bathtub related accidents that too in supposedly protective environment. The search included all relevant resources without a limitation to the age and place (up to September 2010). As elderly persons with health problems are living in a continuum of housing, including institutional types of housing, such as nursing homes, small-scale group settings, and special care units, the literature covers the whole range of living environments. Although the main focus of the work is on elderly friendly bathroom, literature concerning to institutional settings provide important information that are relevant for personalized home settings, are therefore included in this study. Quotes appearing in qualitative studies, which summarize the essence of a person's subjective experience, are included in the literature review only for further illustration of certain topics. The literature search is complex due to the large differences in the way the problems are conceptualized between nursing or occupational therapy, and the technological sciences. There are also relevant differences in the way professionals related health issues and limitations in home settings, as well as in the level of conceptual thinking when dealing with these challenges (Miller, RI, 1994) [11]. In the beginning of the study, we conducted a complete literature survey that included both peer-reviewed articles and books on (i) ageing senses and perception of bathroom parameters by elderly people, (ii) bathroom for older people with various health problems, (iii) behavioural problems among elderly people in relation to bathroom parameters, (iv) design guidelines with technology support, and (v) anthropometric data of elderly people in India. Mean height, weight, circumferences of waist,

hip and Waist Hip Ratio (WHR) are tabulated (table 3, Appendix-2) and it is observed that, all parameters are higher in males than females with no difference in body mass index (BMI). However, none of the anthropometric variables showed significant association with age (K.K. Reddy and A. Papa Rao, 2010) [12].

We tried the best of our ability to meticulously brainstorm upon the existing problems faced by the elderly people during bathing or toileting with keen observations, imaginations and experience with or during the care of the elderly people. Typical bathroom sizes with reference to public places like hotels, hospitals, hostels, and houses with single room, double room, and triple room's values are tabulated in table 1 (Appendix-2). The two main issues, that brings out health problems due to aging, which provides the demands and requirements for the elderly friendly bathroom. Health problem describes the limitations or restrictions that result from diseases and disorders emerging out of aging. It has two parts, each with two components: Part I: Functioning and Disability: (i) Body functions and structures (ii) Activities and participation Part II: Contextual Factors: (i) Environmental factors (ii) Personal factors. Each component can be expressed in both positive and negative terms. Impairments are problems in body function (physiological functions of body systems) or structure (anatomical parts of the body) such as a significant deviation or loss. The purpose of this work is to (i) comprehensive literature review to enlist various kinds of bathing facilities, (ii) enlist problems and limitations while bathing from different sections of society and elderly people while bathing-toileting, and (iii) ultimately to design effective bathing-toiling facilities to everyone.

2. Materials and methods:

- Study Design: The present study is descriptive in nature.
- Sample size: The sample of the study is 97, both men (30) and women (67). Informed consent is obtained from the participants.
- Inclusion criteria: older than age of 55 – 90 Years.

Elderly persons from different regions of India are invited for study and are enrolled when they are consented. Elderly people are excluded for study when they are severely disabled, bedridden, comatose, unable to understand others, and hard to make them to understood. Structured questionnaire from literature review is given to elderly persons. The variables include self-rated health status, difficulties or limitations and safety issues while bathing. In-depth interview with group of thirty subjects in the age range of 70 to 90 years reveal useful information to formulate the design criteria for toilet and bathroom layout.

3. Results:

Socio-Demographic profile, Health profile, and Bathroom profile are important determinants in designing the elderly friendly bathroom. So the data is collected and analyzed. Descriptive characteristics of elderly people profile, health profile and bathroom profiles are shown in figure 7 to 9 (Appendix-1), abbreviations, structured questionnaire, background characteristics of elderly data and cross table (Age & Gender) are tabulated in table 2, 4, 5 and 6 respectively (Appendix-2).

3.1. Socio-demographic profile:

The results in brief shows, study includes female (69.1%) more than man (30.9%), major respondents are in the age range of 65 to 79 (53.6%) followed by 55 to 64 (26.8%) and 80 to 90 (19.6%) the majority of them are from city i.e. 68% (urban). 19.6% are graduates and above, 29.9% secondary and high schooling, 50.6% are illiterate and primary schooling combined. It shows that study includes older persons from all social class. Only 5.2% are unmarried. The percent of widow is high (30.9%). One third of elderly (28.9%) are dependent financially. 11.3% are fully dependent on others 38.1% are partially dependent.

User demands:

- Design should be simple and affordable (due to financial dependency and more number of widows).
- Not able to adopt for new architectural bathroom design (due to illiteracy, more number of older then old i.e. age is more than 65 years).

3.2. Health profile:

54.6% suffer with blood pressure, 68.1% suffer with eye sight. On mind-body coordination only 51.5% are normal, but reduced body grip and stability is normal only in case of 47.4%. The muscular strength is normal in case of 47.4%. Body posture change is normal in 74.2%. Multiple disorders are normal in case of 51.5% rest of them suffer with diabetics (22.7%), arthritis (9.3%), depression (5.2%), insomnia (3.1%), cardiac problems (3.1%), and cancer (2.1%).

Cross table shows that, as age progresses, diseases like blood pressure, diabetic, arthritis, mind body coordination, muscular strength, stability, grip and dependencies on other increases. From the interactions it is observed that (i) lack of safety feature is common in toilet and bathroom design, (ii) the support and other measures are lacking and (iii) maintenance in terms of cleanliness and hygiene is missing. Women are more vulnerable to arthritis and bony weakness due to lack of calcium and vegetarian diet.

User demands:

Proper support system: grab bars, portable type (due to blood pressure and multiple disorders)

3.3. Bathroom profile:

37.1% reported slippery floor of bathroom, 15.5% reported sharp edge, and the obstacles 14.4%. The problem of lighting in the bathroom is reported by 70.1%. The problem of availability of water is reported by 58.8%. Poor ventilation is reported by 53.6%. 40.2% reported fall in the bath room in the range of once (20.6%), 15.5% twice and 4.1% thrice. 32% has to come out of the fall or injury by their own strength.

User demands:

- Bathroom must be free from slippery, sharp edges, and obstacles.
- Good lighting facility (natural or artificial).
- Good ventilation and good slope to eliminate water logging.
- Impact less floor will reduce the probable injury from the fall or slippery.

4. Design part:

Design part is to address the diverse relationship speculates about the cost effectiveness and usability. It could be applicable to wide variety of subjects with reference to age, class, and gender. Ultimately we wish to design a bathroom to everyone. While designing, our research focus is to address differential level of comforts for different types of disabilities varying from mild to severe. In Indian family, it is very difficult to construct separate toilet and bathroom for male and female. An intermediate value from Indian anthropometric data (table 3, Appendix–2) is taken for the design, which suits to both the gender. Little compromise will ensure the safe and comfortable bathing and toileting for both the gender. Design of bathroom and toilet are based on both quantitative and qualitative parameter from results. This is carried out by architects from Instrumentation Design and Development Centre (IDDC), IITD, New Delhi. Different bathroom and toilet design models are discussed below.

4.1. Extracted information from results:

Bathroom – toilet design should be as per specific requirements of elderly persons, it could be spacious with good ventilation, non slippery floors.

- Grip support or grab bars to entire bathing toileting room.
- Permanent sitting facility for relaxing purpose.
- Bidirectional door access (emergency situations).

- Wind movement study for proper ventilation
- Shelf to keep hand towel, napkin, and other accessories.
- Hand shower to avoid excessive movements.
- Night lamps to ease night walking to the bathroom.
- Bigger size electrical switches at a comfortable height.
- Exit and ordinary fans must be provided to maintain temperature and to dry the bathroom.
- Alarm switch with falling sensor and telephone with single digit emergency dialling.
- Bathroom should be nearby to elderly room, preferably attached bathroom.
- Good slopes to eliminate water logging.

4.2. Process while bathing:

Bathing without assistance and with assistance is analyzed for the design purpose. Approach to bathroom with following actions (Walking with stick, removing cloths, cleaning the body with water, soap (or paper soap) under shower and drying the body after bath without assistance) and with assistance, to wash, clean, dress and get ready is shown in figure 10 (Appendix-1). Mapping activity in bathroom like collecting required accessories, undressing, bathing, urinating, washing, and dressing is shown in figure 1. Approximate time estimation of bathing activity from subjective interactions is shown in figure 2.

5. Different design models:

5.1 Design I:

Elderly specific bathroom layout is shown in figure 3. It has grab bars around the bathroom, exit fan, alarm switch, shower, tap, bidirectional accessible door, permanent sitting facility, mat furnished floor for anti-slippery, ventilation provision, and podium for the mobile chair (toileting cum bathing). Toilet cum bathing facility is designed with simple easy mobile chair with push buttons as shown in figure 4. Mobile chair has stepper motor for mobility and control, motor is completely covered and isolated from water for safety purpose (to eliminate electric shock). Mobile chair with bathing-toilet facility can be accommodated in bathroom or separately housed for toileting purpose, toileting and bathing will be very easy using push buttons. Design I prototypes are shown in figure 3 & 4.

Advantages:

- Elderly specific design, suitable for all members of the family, safe and user friendly design.
- For severely disabled persons, the mobile chair with bathing cum toileting chair could be used.
- Bathroom has a provision to accommodate in mobile chair with bathing-toilet facility.

Limitations:

- Expensive in case of renovation/new construction.
- Grab bars and podium for mobile chair in bathroom could be obstacle for other members of the family.

Applications:

- Suitable for all family members.

5.2. Design II:

The trust of design II is for elderly suffering with relatively moderate level of disabilities, the unique feature of this design is, its portability, fold-ability and affordability. Because the houses are already built, the scope for reconstruction is minimal due to problem of cost and conveniences. Such type of portable bathing mechanism could be of great use for elderly. The purpose is to develop a portable device that can help elderly people to bath safely, to assist them to use it in an ordinary bathroom. It is likely to provide an aid and stabilize the user giving ample support and improve over the fixed grab bars of design I. It will increase the mobility in the bathroom. The design is conceptualized with a cross between walker and a seat to enable an elderly for walking in the bathroom layout, sit down on it, bathe, get up and go out easily. Design II prototypes are shown in figure 5.

Advantages:

- Affordable, portable and foldable product.
- No construction or modifications in bathroom.
- Adjustable height, more freedom of movement.

Limitations:

- Mechanical type.
- Space requirement to accommodate.
- Could be obstacle to other members of family.

Applications:

• Suitable for elderly persons with relatively moderate level of disabilities.

5.3. Design III:

In any society there is alit class who don't bather about cost, remain more concern to the comforts and attraction, this design is keeping alit class view. The objective is to conceptualize and develop a modern device that can help elderly people for toileting, bathing safely and comfortably. Both bathing and toileting is mounted on single piece of model. Design III prototypes are shown in figure 6.

Advantages:

- Occupies less space, good looking, safe, comfort and user friendly.

Limitations:

- Expensive

Applications:

- Suitable for all family members including elderly persons.

5.4. Implementation of design ideas:

- Simple, safe with all essential requirements as per the user need with bathroom layout and for severely disable older people toilet cum bathing facility with mobile chair is addressed in design I.
- Felt need of the user and cost effective is addressed in design II.
- Attractive with more comforts with less space is addressed in design III.

6. Conclusions:

Elderly disability is very common and natural due to aging. Deterioration of intellectual function and cognitive skills due to aging makes elderly people dependent more and more on others in their daily living activities like bathing, dressing, feeding self, locomotion, etc. Physiological makeup in Indian women calls for special nutritional requirements. Menstruation and childbirth are iron depleting physiological processes. Calcium needs to be frequently supplemented during a woman's life cycle to safeguard against osteoporosis in menopause period. Principally vegetarian diet of Indians does not complete many of the women's nutritional requirements. Further, cultural practices sometimes could be a drawback for women in many ways and add to their reduced nutritional status. It is habitual in many households across the country that the women should eat last and eat the leftovers after the men folk have had their food. This leads to many health complications and problem with locomotion, muscle and bony weaknesses. Other accidents like heart attack or some vital organ failures could occur in bathroom, in such situations, it is considered as bathroom accident. Bathroom and toilet design must be as per specific requirements of elderly persons with back rest, hand grip, and water hose (jet). It must be spacious with good ventilation, non slippery floors with matt furnished tiles, grip or grab bars to the entire bathroom, permanent sitting facility, bidirectional door access, and hand shower to avoid excessive movements. Master bedroom must be with night lamps to ease night walking to the bathroom. Bigger size electrical switches at a comfortable height. Exit and ordinary fans are useful to maintain temperature and to dry the bathroom. Alarm switch with falling sensor, telephone with single digit emergency dialing, customized timers, if time of bathing exceeds the time set, surveillance camera needs to automate for alerting other family members

or neighbors for immediate action to rescue the elders from probable bathing accident.

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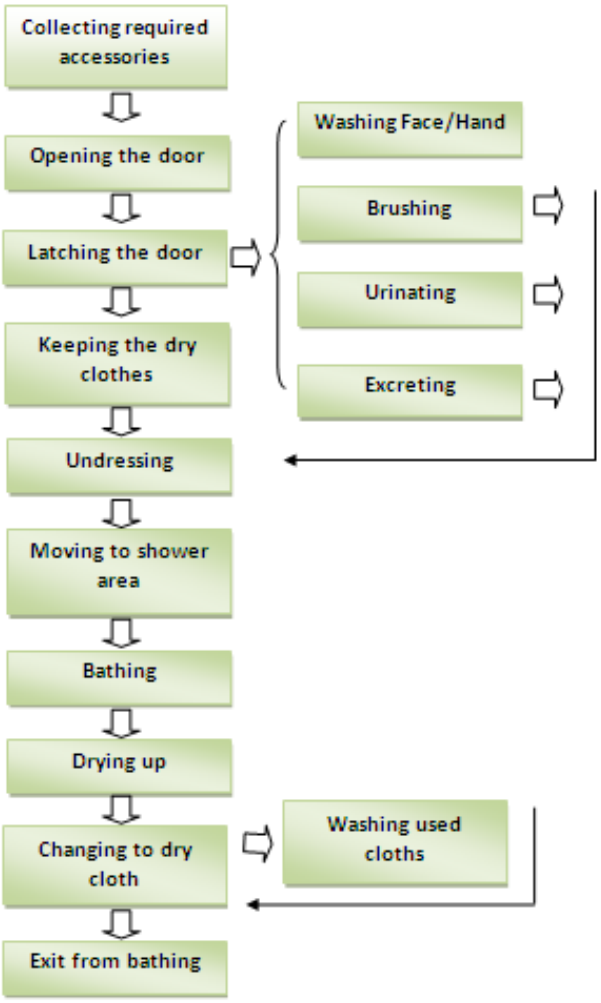


Figure 1: Mapping the Bathroom Activity

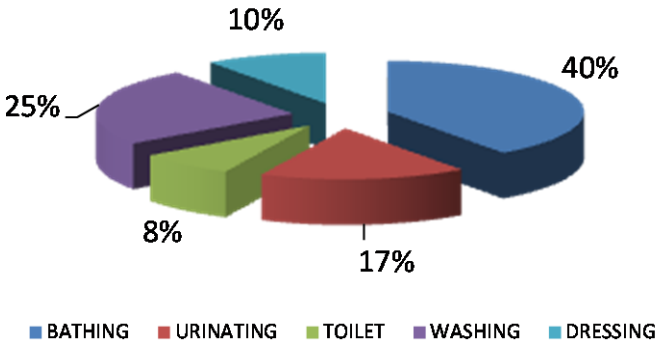


Figure 2: Duration of Bathroom Activity

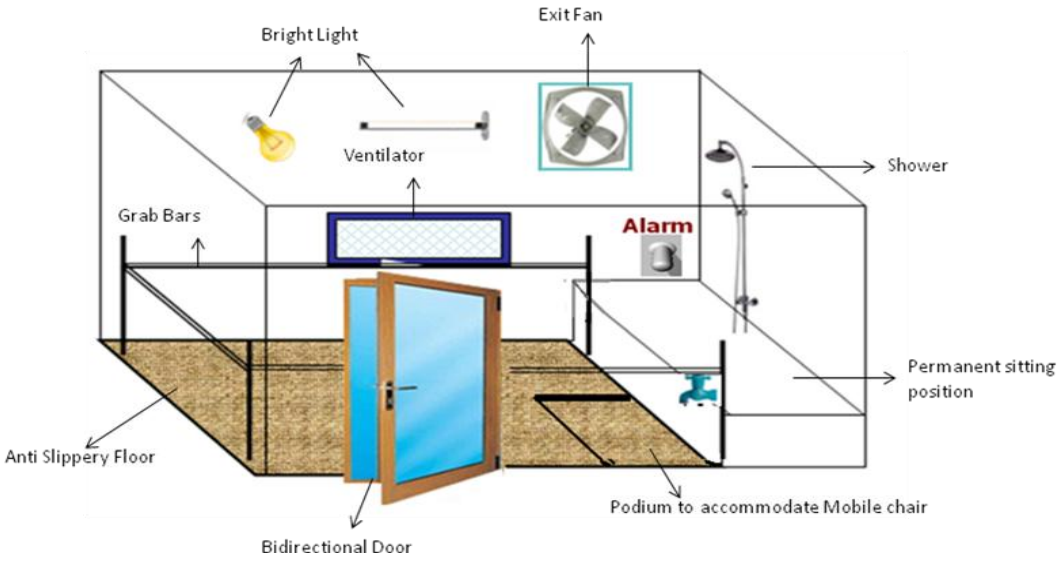


Figure 3: Bathroom layout Design (Model Design 1)

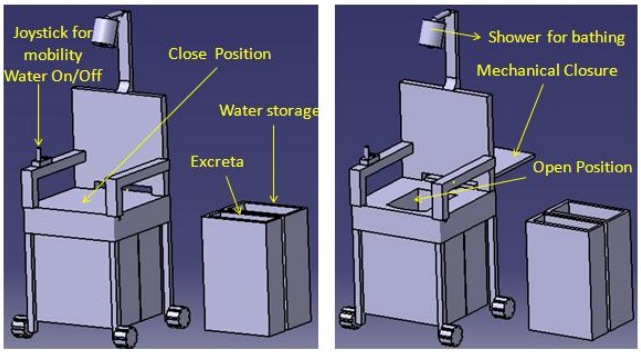


Figure 4: Toiletring and bathing facility on mobile chair (Model Design 1)

Bathroom Specifications:	**Mobile Chair Specifications:**
Length X width: 7 feet X 8 feet Sitting provision: length: 7 feet, height: 1.5 feet and width: 3 feet Floor: anti slippery floor Exit fan, light (both artificial and natural) • Door: width: 4 feet • Height: 7 feet • Podium: To accommodate mobile chair (near tap)	Height: 1.5 feet Width: 3 feet Length: 3 feet Controls: Water control : ON/OFF • Stepper Motor: Movement • Seat: Open/Close (Toileting / Bathing) • Hosejet: washing (Toileting / Bathing)

Figure 5: Bathing facility with folding support (Design II)

Specifications for Design II:
Height: 1.5 feet, Width: 2 feet, and Length: 1.5 feet

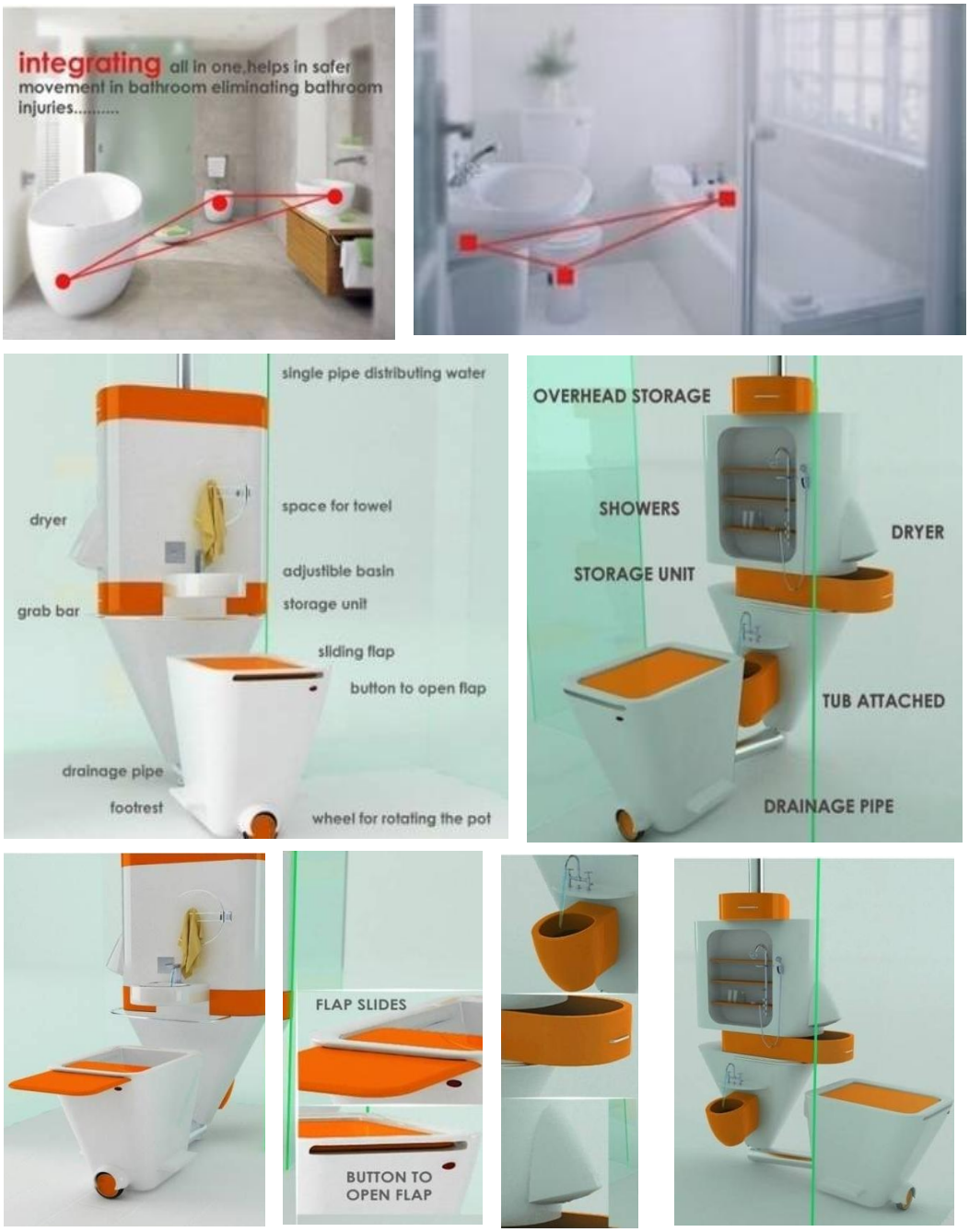
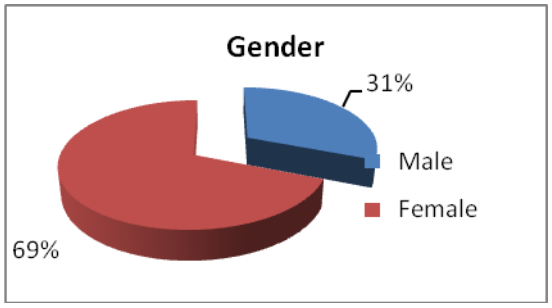
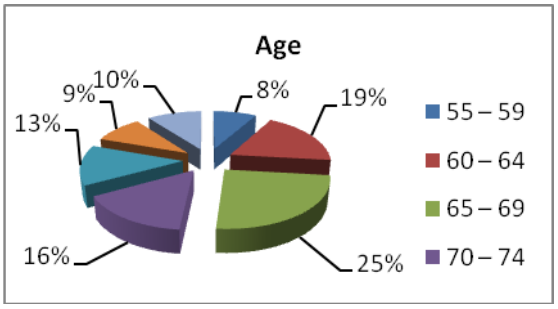


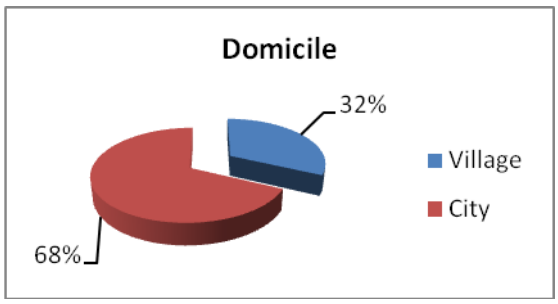
Figure 6: Prototype of integrated module for toilet cum bathing (Model Design 3)

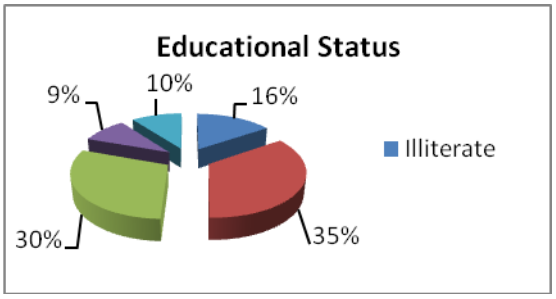
Specifications for Design III:
Height: 1.5 feet, Width: 2 feet, Length: 1.5 feet
Flap slides: open/close: toileting and bathing

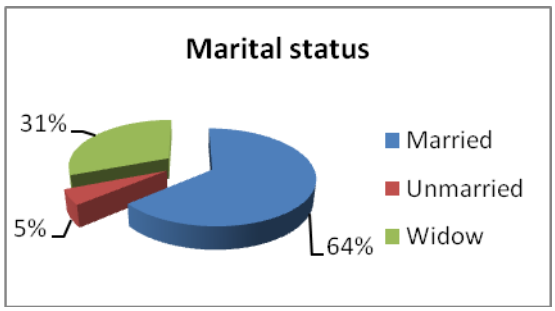
Appendix-1

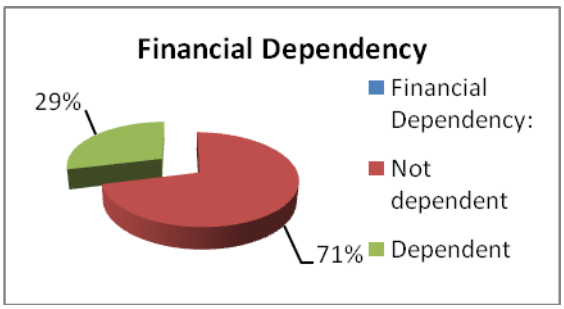


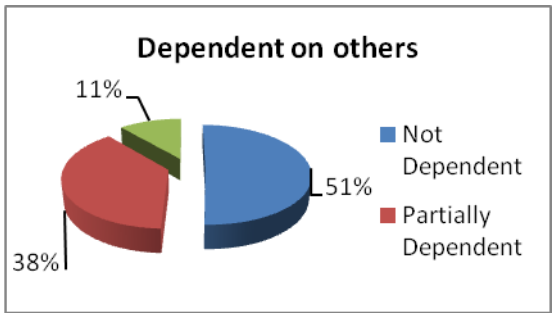












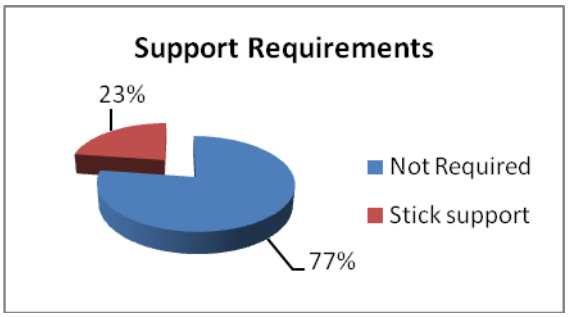
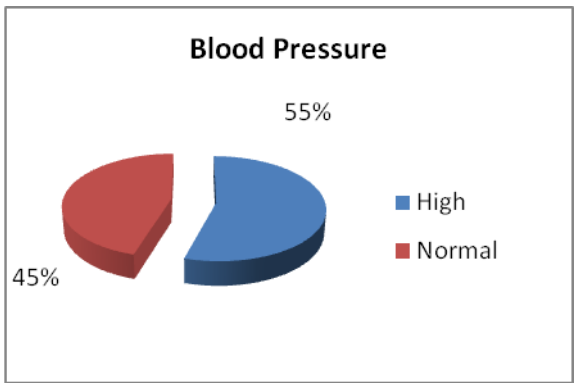
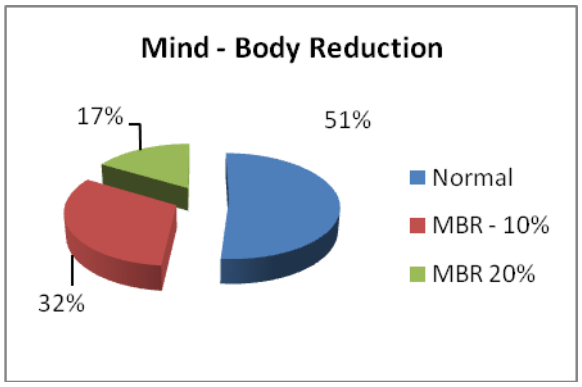
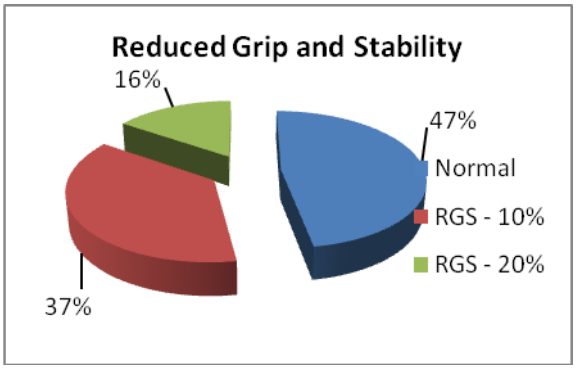
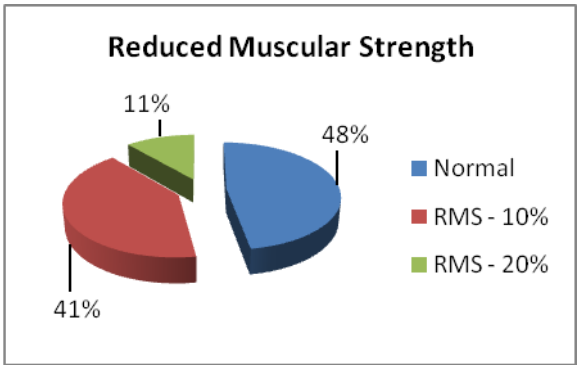


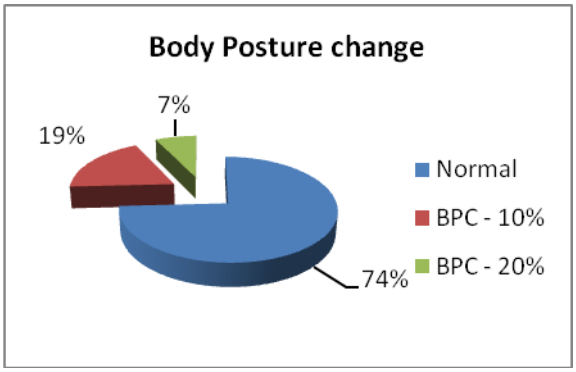
Figure 7: Socio-Demographic Characteristics of elderly people profile











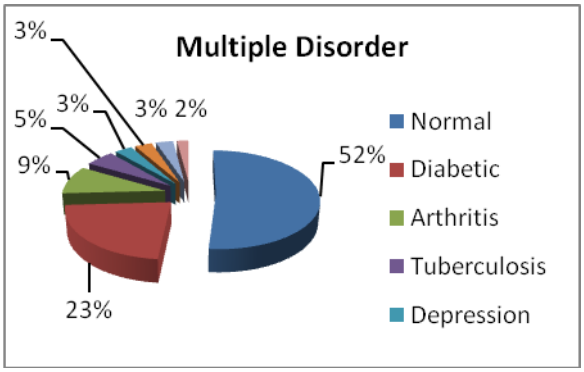


Figure 8: Health profile of elderly people

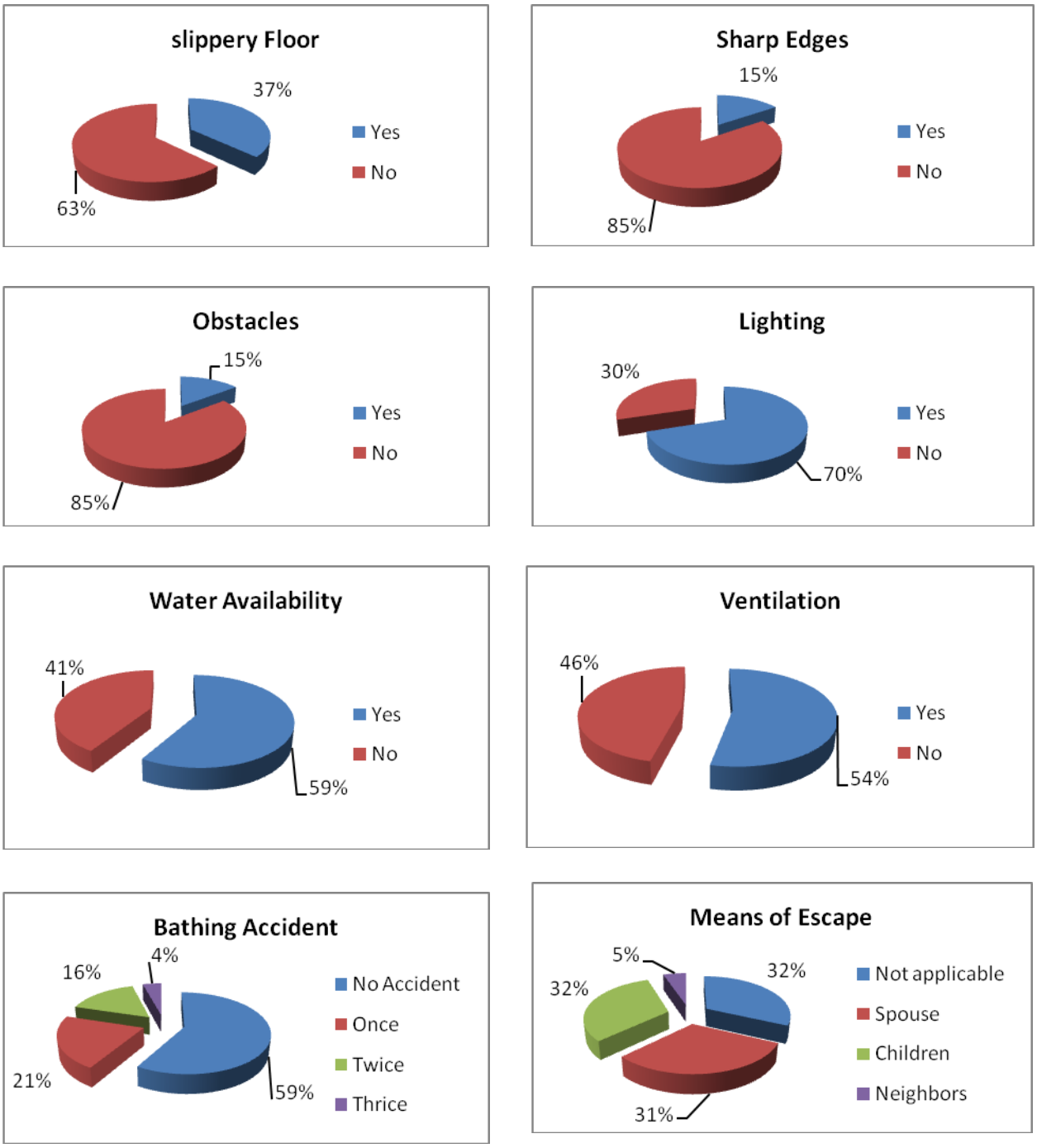


Figure 9: Bathroom profile of elderly people

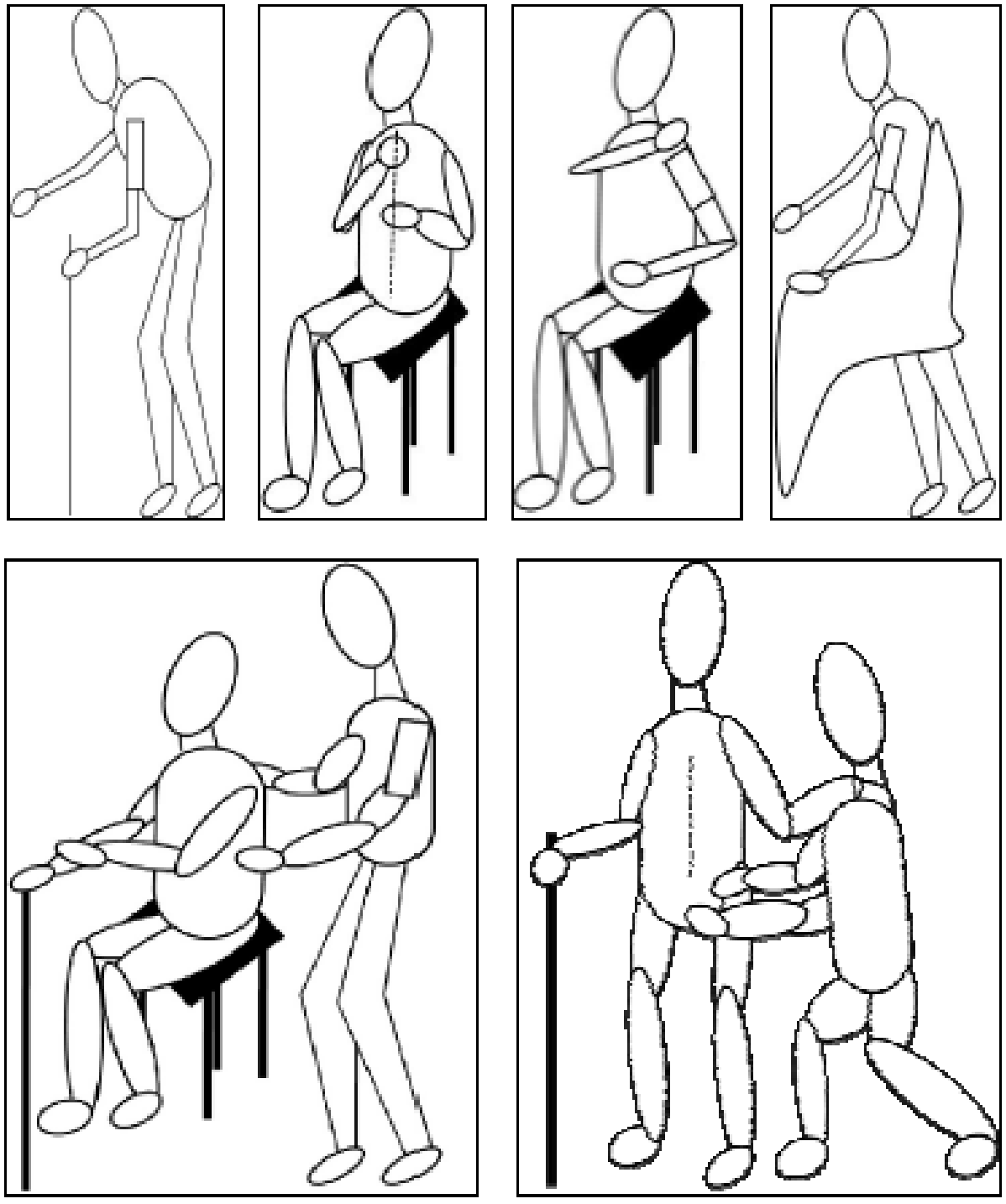


Figure 10: Process while bathing without and with assistance

Appendix-2

Table 1: Typical toilet-bathroom specification in India			
Toilets (in feet)	**Bathroom (in feet)**	**Combined (in feet)**	**Remarks**
3 X 4	4 X 3	5 X 6	Hostels / Public places (low/middle class)
4 X 4	4 X 5	7 X 8	Hostels / Guest house (Upper class)
4 X 4	4 X 4	6 X 7	Single bedroom flats / house
4 X 4	4 X 5	7 X 8	Double/triple bedroom flats/house

Table 2: Abbreviations for table 3,4, 5 and 6			
Ed S	Educational status	DN	Depression
P Sc	Primary Schooling	TB	Tuberculosis
S H Sc	Secondary and High Schooling	SF	Slippery floor
FD	Financial Dependent	SE	Sharp Edges
DO	Depending on Others	OB	Obstacle
PD	Partially Dependent	LT	Lighting
BP	Blood pressure	WA	Water Availability
ES	Eye Sight	VN	Ventilation
SLS	Short and Long Sight	BA	Bathing Accident
RMBC	Reduced Mind-Body Coordination	ME	Means of Escape
RGS	Reduced Grip and Stability	SR	Support requirement
RMS	Reduced Muscular Strength	NA	Not Applicable
BPC	Body Posture Change	ND	Not Dependent
MD	Multiple Disorders	M	Male
F	Female	IN	Insomnia

Table 3: Anthropometric data of elderly people in India				
Variable	Sex	55-69	70-79	80+
Height	M	165.1±5.3	167.2±6.1	164.9±7.0
	F	154.4±5.5	155.8±4.9	157.5±6.4
Weight	M	58.8±10.4	61.2±13.5	57.4±9.8
	F	52.2±8.2	52.7±7.2	49.5±9.2
BMI	M	21.5±3.0	21.7±3.6	21.0±2.8
	F	21.9±3.3	21.7±2.4	19.9±2.1
Waist Circumference	M	83.7±10.1	81.4±13.8	79.1±11.8
	F	71.1±7.4	72.9±8.9	72.5±12.0
Hip circumference	M	92.4±9.7	90.9±14.1	87.9±13.2
	F	84.1±7.0	85.0±8.0	85.0±17.0
WHR	M	0.91±0.05	0.89±0.05	0.90±0.04
	F	0.85±0.05	0.86±0.05	0.86±0.03

Table 4: Questionnaire need in the study								
Age :			**BP:**			**SF:**	Yes	no
55 – 59	Yes	no	High	Yes	no	**SE:**	Yes	No
60 – 64	Yes	no	Normal	Yes	no	**OB :**	Yes	No
65 – 69	Yes	no	**ES:**			**LT:**	Yes	No
70 – 74	Yes	no	Normal	Yes	no	**WA:**	Yes	No
75 – 79	Yes	no	SLS	Yes	no	**VN:**	Yes	No
80 – 84	Yes	no	Cataract	Yes	no	**BA:**	Yes	No
85 – 90	Yes	no	**RMBC:**			No Accident	Yes	No
Domicile:			Normal	Yes	no	Once	Yes	No
Village	Yes	no	10%	Yes	no	Twice	Yes	No
City	Yes	no	20%	Yes	no	Thrice	Yes	No
Gender :			**RGS:**			**ME:**	Yes	No
Male	Yes	no	Normal	Yes	no	NA	Yes	No
Female	Yes	no	10%	Yes	no	Spouse	Yes	No
Ed S:			20%	Yes	no	Children	Yes	No
Illiterate	Yes	no	**RMS:**			Neighbors	Yes	No
P Sc	Yes	no	Normal	Yes	no	1. Your comment on bathing accidents:		
S H Sc	Yes	no	10%	Yes	no			
Graduate level	Yes	no	20%	Yes	no			
Post graduates	Yes	no	**BPC:**					
Marital status:			Normal	Yes	no			
Married	Yes	no	10%	Yes	no			
Unmarried	Yes	no	20%	Yes	no			
Widow	Yes	no	**MD:**					
FD:			Normal	Yes	no			
Not dependent	Yes	no	Diabetic	Yes	no	2. Suggestions to prevent elderly bathing/toilet accidents:		
Dependent	Yes	no	Arthritis	Yes	no			
DO:			TB	Yes	no			
Not Dependent	Yes	no	DN	Yes	no			
PD	Yes	no	IN	Yes	no			
			Cardiac	Yes	no			
			Cancer	Yes	no			

Table 5: Socio-Demographic and bathroom profile

Gender :			**BP:**			**SF:**		
Male	30	30.9	High	53	54.6	Yes	36	37.1
Female	67	69.1	Normal	44	45.4	No	61	62.9
Age :			**ES:**			**SE:**		
55 – 59	8	8.2	Normal	31	32.0	Yes	15	15.5
60 – 64	18	18.6	SLS	51	52.6	No	82	84.5
65 – 69	24	24.7	Cataract	15	15.5	**OB :**		
70 – 74	15	15.5	**RMBC:**			Yes	14	14.4
75 – 79	13	13.4	Normal	50	51.5	No	83	84.6
80 – 84	9	9.3	10%	31	32.0	**LT:**		
85 – 90	10	10.3	20%	16	16.5	Yes	68	70.1
Domicile:			**RGS:**			No	29	29.9
Village	31	32.0	Normal	46	47.4	**WA:**		
City	66	68.0	10%	36	37.1	Yes	57	58.8
Ed S:			20%	15	15.5	No	40	41.2
Illiterate	15	15.5	**RMS:**			**VN:**		
P Sc	34	35.1	Normal	46	47.4	Yes	52	53.6
S H Sc	29	29.9	10%	40	41.2	No	45	46.4
Graduate level	9	9.3	20%	11	11.3	**BA:**	**n**	**%**
Post graduates	10	10.3	**BPC:**	**n**	**%**	No Accident	55	56.7
Marital status:	**n**	**%**	Normal	72	74.2	Once	20	20.6
Married	62	63.9	10%	18	18.6	Twice	15	15.5
Unmarried	5	5.2	20%	7	7.2	Thrice	4	4.1
Widow	30	30.9	**MD:**			**ME:**		
FD:			Normal	50	51.5	NA	31	32.0
Not dependent	69	71.1	Diabetic	22	22.7	Spouse	30	30.9
Dependent	28	28.9	Arthritis	9	9.3	Children	31	32.0
DO:			TB	5	5.2	Neighbours	5	5.2
Not Dependent	49	50.5	DN	3	3.1			
PD	37	38.1	IN	3	3.1			
Fully Dependent	11	11.3	Cardiac	3	3.1			
			Cancer	2	2.1			

Table 6: Cross table for Age and Gender										
		Age:							**Gender:**	
		55 – 59	60 – 64	65-69	70-74	75-79	80-84	85-90	M	F
Do	ND	8	18	19	4	0	0	0	16	33
	PD	0	0	5	10	12	7	3	10	27
	FD	0	0	0	1	1	2	7	4	7
BP	High	6	16	15	10	4	1	1	25	28
	Low	2	2	9	5	9	8	9	5	39
ES	Normal	8	9	9	5	0	0	0	13	18
	10%	0	9	15	10	9	4	4	13	38
	20%	0	0	0	0	4	5	6	4	11
RMBC	Normal	7	18	12	6	7	0	0	21	29
	10%	1	0	10	7	3	6	4	7	24
	20%	0	0	2	2	3	3	6	2	14
RGS	Normal	7	14	20	4	1	0	0	14	32
	10%	1	4	4	11	9	5	2	12	24
	20%	0	0	0	0	3	4	8	4	11
RMS	Normal	6	18	12	6	3	1	0	21	25
	10%	2	0	12	9	9	5	3	5	35
	20%	0	0	0	0	1	3	7	4	7
BPC	Normal	8	17	23	13	9	2	0	23	49
	10%	0	1	1	2	4	6	4	5	13
	20%	0	0	0	0	0	1	6	2	5
SR	NR	8	18	24	15	9	0	1	26	49
	Stick	0	0	0	0	4	9	9	4	18
MD	Normal	8	15	21	4	2	0	0	18	32
	Diabetic	0	3	2	9	7	1	0	5	17
	Arthritis	0	0	0	0	3	4	2	2	7
	TB	0	0	0	1	0	1	3	1	4
	DN	0	0	1	0	0	2	0	0	3
	IN	0	0	0	0	0	1	2	1	2
	Cardiac	0	0	0	1	0	0	2	2	1
	Cancer	0	0	0	0	1	0	1	1	1