

RESEARCH ON UNIVERSAL DESIGN SMART BATHROOM

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ABSTRACT

The concept of smart bathroom plays an important role in the planning of future housing-based models of care. This research is carried out to study the characteristic of the existing common bathroom that should be improved.

Besides that, the study is to propose a layout design of a Universal Design Smart Bathroom that included features such as extra space area, rubber membrane floor material, automatic door, automatic lighting and automatic flush. This is to create flexible environment for aging and disable people (wheelchair user) at home.

Throughout the research, a product will be designed to suit the needs of the target user mainly for disable people (wheelchair user) and aging people.

1.0 INTRODUCTION

Universal design is human-centered design with everyone in mind. Universal design is a framework for designing things, places, and communications so that they work for the widest possible spectrum of users without adaptation or specialized design. It is also called design-for-all and lifespan design. It is not a design style but an orientation to any design process that starts with a responsibility to the experience of the user. Universal design create flexible environment and produce innovative designs that are high in usability, convenience, aesthetics, surprise and fun.

The following principles of universal design have been developed by a working group of architects, product designers, engineers and environmental design researchers at the Centre for Universal Design, NC State University, Raleigh, North Carolina.

There are seven principle of universal design:

Equitable use

The design is useful and marketable to people with different abilities. Provisions for privacy, security, and safety should be equally available for all users.

Flexibility in use

The design accommodates a wide range of individual preferences and abilities.

Provide adaptability to the user's pace.

Simple and intuitive use

Use of the design is easy to understand, regardless of the user's experience, knowledge, language skills, or current concentration level. Provide effective prompting for sequential.

Perceptible information

The design communicates necessary information effectively to the user, regardless of ambient condition or the user's sensory abilities. Provide compatibility with a variety of technique or device used by people with sensory limitations.

Tolerance for error

The design minimizes hazards and the adverse consequences of accidental or unintended actions. Provide fail-safe features.

Low physical effort

The design can be used efficiently and comfortably and with a minimum of fatigue.

Allow the user to minimize sustained physical effort.

Size and space for approach and use

Appropriate size and space is provided for approach, reach, manipulation and use regardless of user's body size, posture or mobility. Provide adequate space for the user of assistive devices or personal assistance.

The different between universal design smart bathroom and current bathrooms:

Universal Design Smart Bathroom	Current Bathroom
Prolong independence	Primarily for independent users
Allow the offering of care	Consider the needs of the human life cycle
Assist care-providers	Address dependent use

There are three key points for universal design:

To be safe

- Safety design in actual size

- Easily and visibly understandable indications and signs.

To be comfortable

- Spaces and fixtures designed to be casual and comfortable.
- Easy repair, replacement and maintenance.

Ease of use

- Convenience in supporting poor and interior physical functions.
- Easy operation without undue physical effort.

Benefits of easy access design include:

- Safety
- Convenience
- Extended usability
- Improved visit ability
- Added value
- Expanded market
- Product differentiation

Universal design is getting popular for two reasons:

It looks nice for the disable people and more people want universal housing.

What makes a bathroom “universal”? Universal bathroom is everyone can use it no matter if the users are young or old, short or tall and healthy or ill.

1.1 PROBLEMS STATEMENT

Disable and aging people face difficulty, more time consuming and more hazardous when they use the bathroom because of the space of the bathroom was too narrow.

Beside that, the disable and aging people take time transferring from the toilet bowl to the bathing area. Most of the toilet and bathing area design in Malaysia was separated.

1.2 OBJECTIVE

The main objective of the research is to study the characteristic of the existing bathroom that should be improve to suit the needs of the target user mainly for disable people (wheelchair user) and aging people.

Besides that, others objective is to study the layout of the existing bathroom and to propose a new layout design of the universal design smart bathroom for the disable people (wheelchair user) and aging people.

Last but not least, another objective is to propose a designed product based on the research carried out.

1.3 HYPHOTHESIS

Hypothesis is a supposition or proposed explanation made on the basis of limited evidence as a starting point for further investigation. (Concise OXFORD Dictionary).

Hypothesis: To proposed a designed product that can solve the problem for disable and aging people that face difficulties transferring from toilet bowl to the bathing area.

1.4 DEFINITION

Universal

- Of, relating to, extending to, or affecting the entire world or all within the world; worldwide.

(The Online Free Dictionary)

- Philosophy a term or concept of general application / a nature or essence signified by a general term.

(OXFORD University Press)

Design

- To conceive or fashion in the mind; invent / to formulate a plan for.

(The Online Free Dictionary)

- A plan or drawing produced to show the look and function or workings of something before it is built or made.

(OXFORD University Press)

Universal Design

- Which is related to “inclusive design” and “design for all”, is an approach to the design of products, services and environments to be usable by as many people as possible regardless of age, ability or situation.

(The Online Free Dictionary)

Smart

- Capable of independent and seemingly intelligent action / impertinently clever or sarcastic.

(OXFORD University Press)

Bathroom

- A room equipped with facilities for taking bath or shower and usually also containing a sink and toilet.

(The Free Online Dictionary)

- A room containing a bath and usually also a washbasin and toilet.

(OXFORD University Press)

1.5 ERGONOMIC STUDIES

Brief introduction of ergonomic:

Ergonomics comes from the Greek that “ergos” meaning work and “nomos” meaning natural law. Ergonomics is essentially provided to fit the task to the workers and the product to the user. The benefits of ergonomics are improved comfort and productivity as well as reduced injuries and illness. Ergonomics is important in offices, industrial areas, and even also away from work. (www.bsu.edu)

Different explanation of ergonomic means:

Ergonomics is the science of making the working environment safer and more comfortable for workers using design and anthropometric data. Ergonomics is the science of equipment design, as for the workplace, intended to maximize productivity by reducing operator fatigue and discomfort. In the other hand, ergonomics also called biotechnology, human engineering, human factors engineering. The design factors intended to maximize productivity by minimizing operator fatigue and discomfort for the workplace.

Ergonomics is the study of the body at work and the body’s interaction with the environment. The proper application of ergonomics must take into account biomechanics, the study of body forces and movement and anthropometry, or the study of human body measurements especially on a comparative basis. The proper application of ergonomics can alleviate worker discomfort, improve productivity,

reduce absenteeism, and negate medical costs. Through applied product engineering, ergonomics provides equipment adapted to the biomechanics and anthropometrics of the human, instead of the human having to improperly adapt to the product. The best way to stay ergonomically is to look at all the product options and theories of correct posture, use common sense and use what is comfortable for you.

Ergonomic is the applied science of equipment design, as for the workplace, intended to maximize productivity by reducing operator fatigue and discomfort. The best way to stay ergonomically correct is to do three things. Firstly is look at all product options and theories of correct posture. Secondly is use common sense and thirdly is using what is comfortable for you.

Anthropometric

Anthropometrics is defining as the comparative study measurements and properties. The study of anthropometrics (human measurement) is concerned with the physical sizes and shapes of humans. There are differences between and among different populations such as men and women as an example.

Anthropometrics is the measurement of size and proportions of the human body, as well as parameters such as visual range capabilities. If the designers want to design clothing, furniture, automobiles, buses, and subway cars, they need accurate data on height, weight, limb, and body segment sizes. Anthropometrics enable the products design fit the users in proper manner.

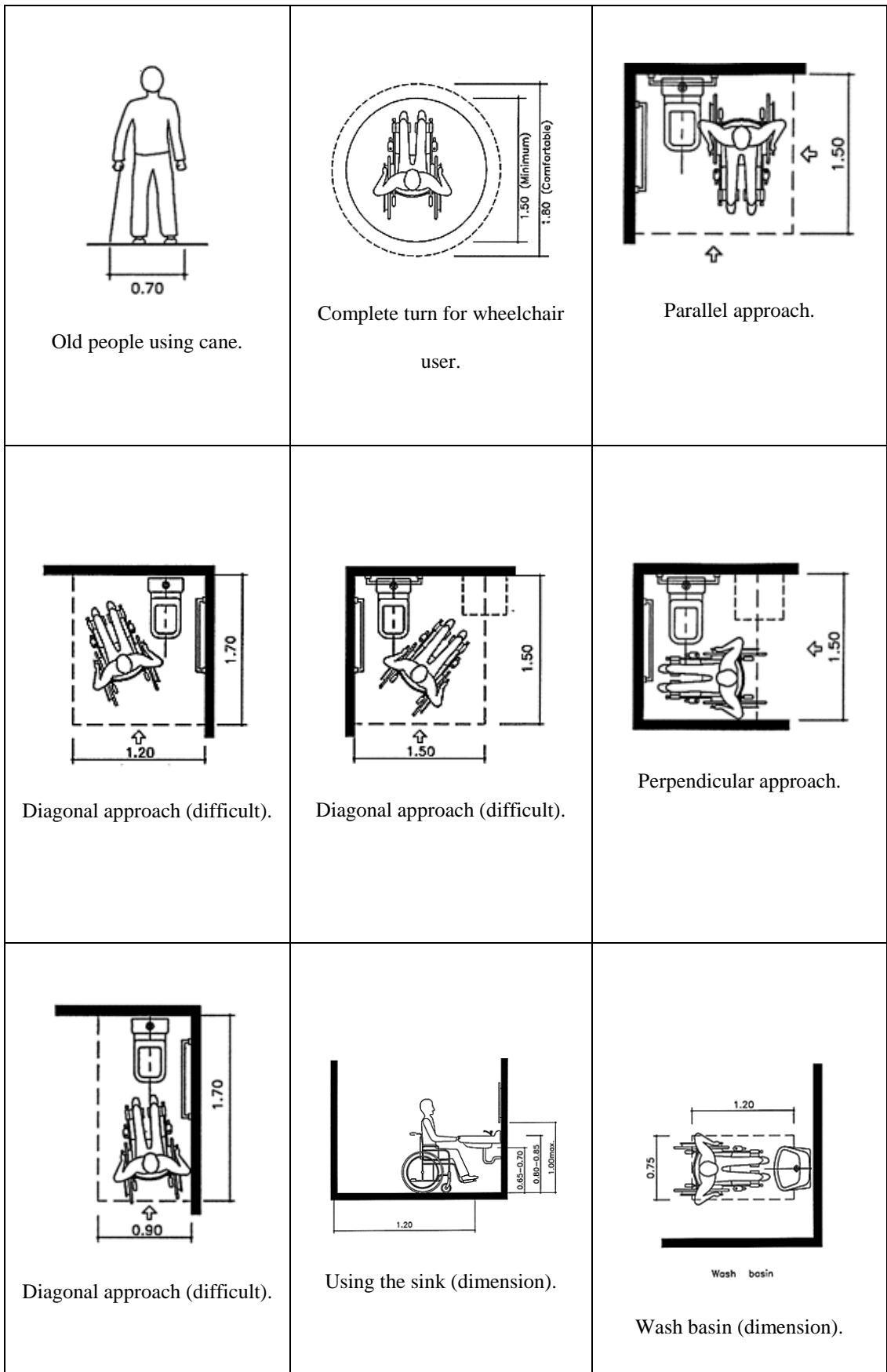


Figure 1: Dimension of wheelchair user and aging people in different situation.

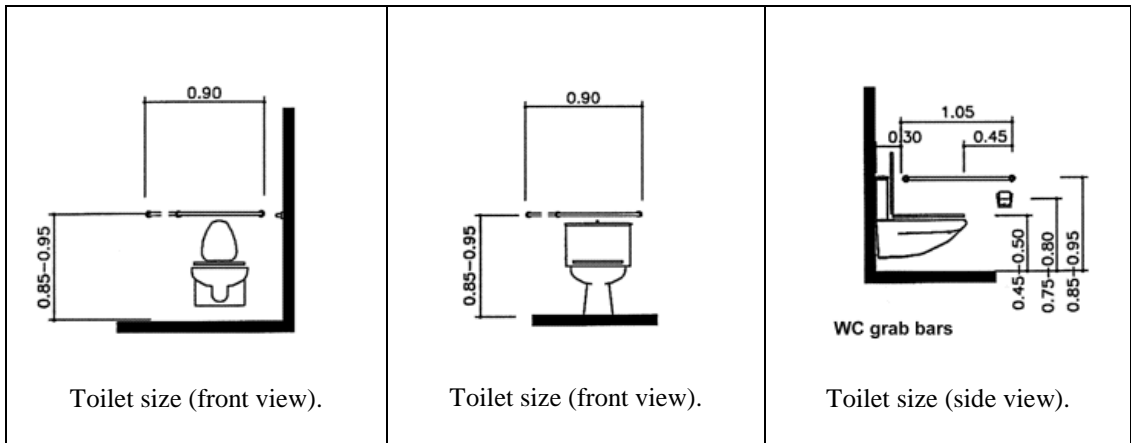


Figure 2: Dimension of the toilet in different view.

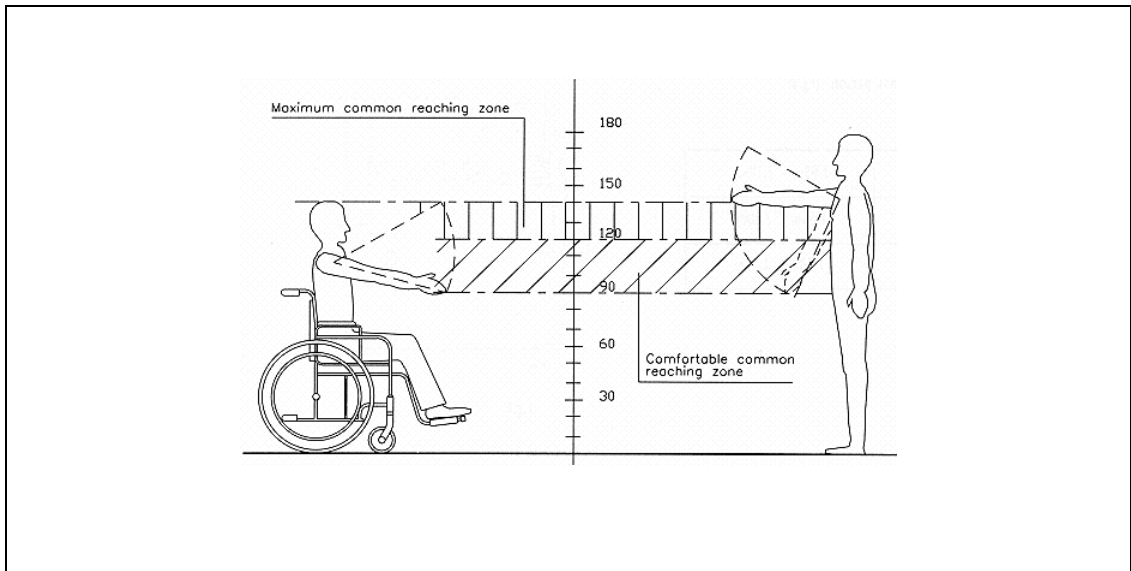


Figure3: Common reaching zone for wheelchair user and normal people.

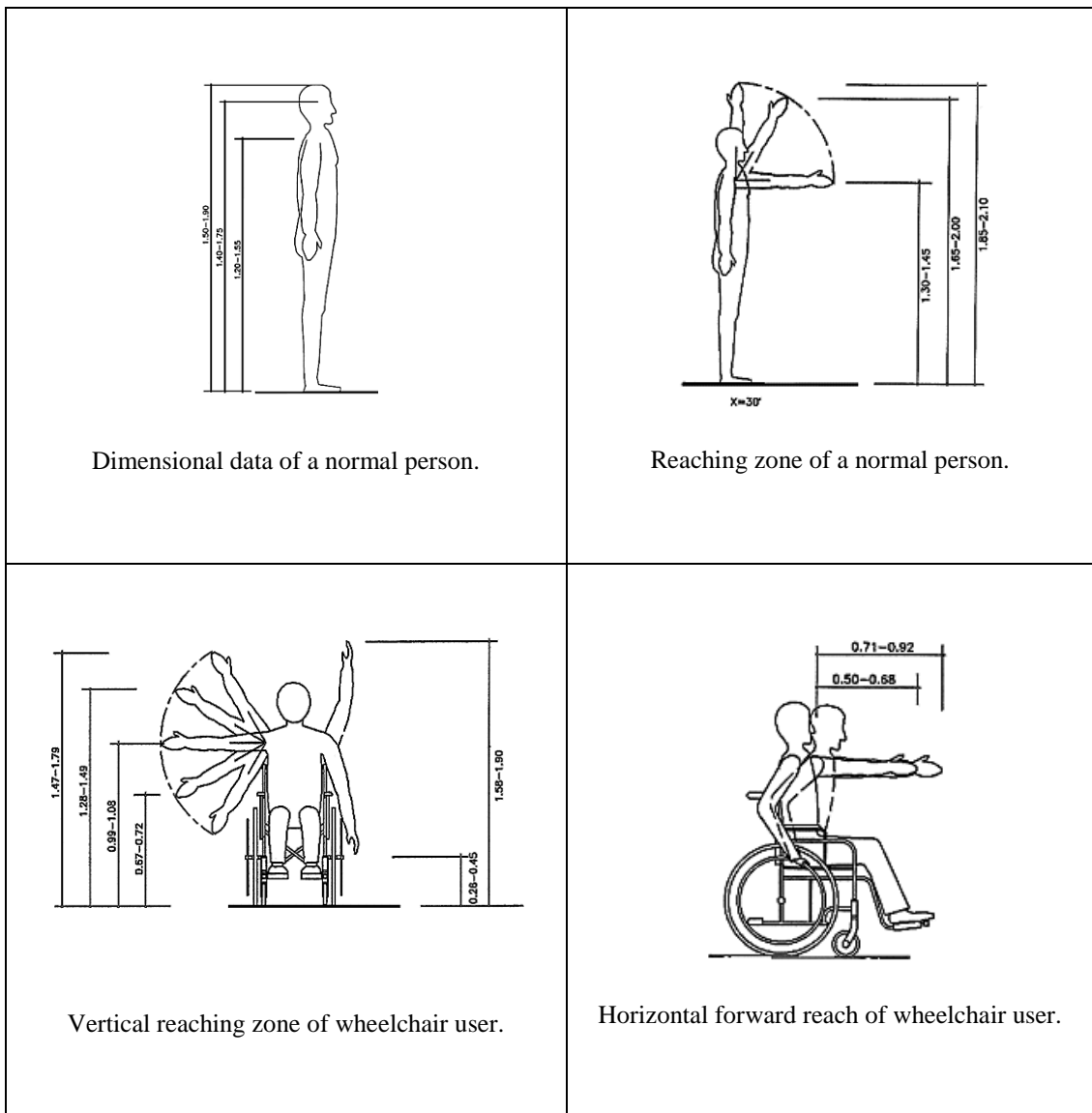


Figure 4: Dimensional data of a normal person and reaching zone of a normal and wheelchair user.

2.0 RESEARCH METHODOLOGY

Variety of methods can be used in conducting a research, but regardless of which methods used, the research must provide information or data that is valid and reliable through investigation, and supported by theory and hypotheses (Kerlinger, 1986).

Data collection

The research is carried out mainly based on research methodology that is primary and secondary data collection.

Collection of primary data

Primary data is very important in order to confirm the findings and conclusion of the secondary data obtained. The primary data were derived from interview and also distribution of questionnaire to the respondents.

An interview approach was chosen for the purpose of obtaining the primary data. The advantage of using this method is that it can clarify questions, clear doubts and rich data can be obtained (Sekaran, 2000). For this research, unstructured interview was used for primary data collection.

Interview approach is carried out at University Malaysia Sarawak clinic to collect the information of the interviewees' opinions on the characteristic of the

common bathroom that should be improved. The interviewees that had been selected are the wheelchair user and also the aging people.

Due to the request of the interviewees, their identities were not disclosed. The interviewees were asked to share their experiences and problems faced while using the existing common bathroom and also knowing about the universal design smart bathroom.

Beside interview approach, distribution of questionnaire also used to collect the primary data. The questionnaire had been divided into three sections. The first section is the demographic research to collect some of the personal data from the interviewees such as the gender, age, occupation, income and others. The second section of the questionnaire is the gathering information of the characteristic of the existing common bathroom that should be improved. Finally is the last section, the section that collect the data about the characteristic that the universal design smart bathroom should have.

Moreover, observation also been used to find out the problems of the existing toilet that should be improved.

Collection of secondary data

The secondary data was collected from printed sources or other forms of publication. All the secondary data were gathered from magazines, newspaper and

journals, books and others printed media. Some of the information was collected from books in the library of University Malaysia Sarawak.

In addition, Internet also used to gather the information to support the research. Internet is the most common and widely used source in today's modern society was used as well to gather the pertinent information.

Indirectly, it assisted the researcher to better define the research topic, develop an approach to the topic and formulate appropriate research methods.

Secondary data can be carried out in a faster manner compare to interview and distribution of questionnaire. This is due to the fact that it is time saving in term of the researcher collects their data at anytime, anywhere without providing any interview and survey. So, time saving will cause to less expense, because the researcher can save up the interview expenses such as transportation fees. As a result, it is relevant method to collect data for research via these secondary resources.

2.1 LITERATURE REVIEW

Information from this book is about the universal design bathroom for disable people. Beside that, studies of anthropometrics also include in to study the measurements of the features in the universal design bathroom. Moreover, some studies of the existing bathroom also include in the book that apply then in the new design of universal design bathroom. (Selwyn Goldsmith, 2000)

Norliza is doing a research on disable people, research about the form and space in the bathroom. From the research, there is information about the disable people using the bathroom. Beside that, there are anthropometrics studies, literature review, pictures of existing product and others that can be used for the studies of the universal design smart bathroom. (Norliza Binti Ahmad, 2000)

3.0 ANALYSIS OF DATA

3.1 PART A: DEMOGRAPHIC RESEARCH ANALYSIS

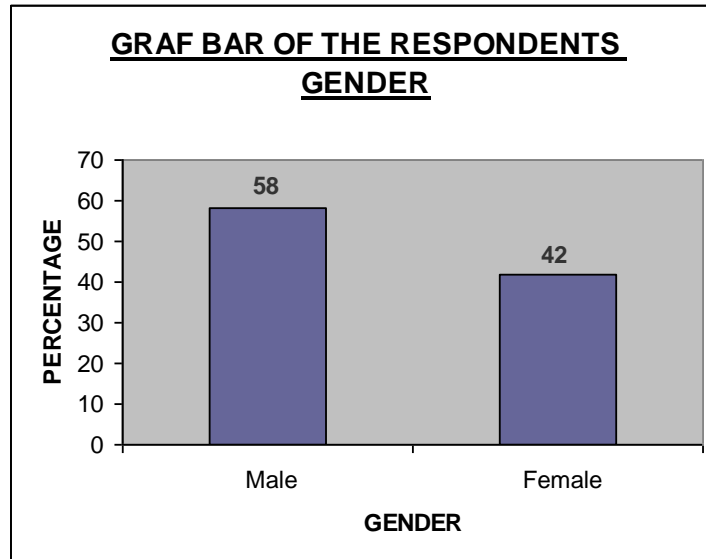


Figure 5: The Percentage (%) of The Respondent Gender.

This graph shows the demographic data of the 50 samplings that consists of almost balanced 29 to 21 of male and female. Among 50 samplings that filled up the questionnaires, 58% is male respondents meanwhile 42% is female respondents.