

# **USER REPORT**

## **WHEELCHAIR SURVEY PROJECT (Gauteng & Northern Province)**

**FOR THE**

**NATIONAL DEPARTMENT OF HEALTH**

**PREPARED BY  
PROPENTA (PTY) LTD  
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# Executive Summary

In support of the Integrated National Disability Strategy (Deputy President TM Mbeki:1997), which aims to develop disabled people and to promote the protection of their rights, the lack of reliable information on the prevalence of physically disabled persons greatly inhibits the empowerment efforts of the state. Specifically in terms of the provisioning of assistive devices such as wheelchairs, a clear understanding of the dynamics of physically disabled people's needs and environmental conditions must be established. This is paramount in attaining upliftment objectives within the limited available resources.

Under the directives of the Department of Health tender GES66/97-98, the primary objectives of the wheelchair survey project may be summarised as achieving the following by means of a qualitative survey:

- Determine the life span of the different available wheelchair products for urban and rural settings
- Identify the common mechanical strengths and weaknesses of wheelchairs for different terrains
- Determine the extent and nature of usage of wheelchairs, and user benefits, for rural and urban settings
- Evaluate the need for a special wheelchair design for rural areas

This document forms part of the project documentation, describing the project approach and methodology, as well as the results that were obtained in addressing the aforementioned objectives.

From the hardware investigation, it is shown that the average life span of wheelchairs in rural conditions is longer than for urban conditions, and fewer failures are experienced in rural conditions. The most common failures for urban and rural conditions were determined and the dominant wheelchair characteristics were investigated and are discussed. From this, a list of important physical wheelchair capabilities is proposed for evaluating wheelchair products. (Refer to Hardware Report)

From the user investigation, a user profile was developed for wheelchair users in urban and rural conditions from differences and similarities in demographics, abilities, needs, environmental conditions and the extent of wheelchair usage. The results are summarised in a user value system, noting the most important aspects of the above. (Refer to User Report)

Finally, a cost benefit model was developed from the wheelchair user and wheelchair hardware findings, by determining how well the user conditions and needs are satisfied by the different wheelchair products, and at what cost. South African manufactured wheelchairs proved to be well suited to rural conditions, compared to foreign wheelchairs in the same price range. From the analysis it is suggested that specific development of a wheelchair design for rural conditions would not be beneficial, and alternative empowerment initiatives for disable persons are presented. (Refer to Project Report)

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## 1. INTRODUCTION

### 1.1. PURPOSE

The purpose of this document is to present the framework and results of the wheelchair user study. The wheelchair user study forms part of the wheelchair survey project and has been performed by PROPENTA (Pty) Ltd as per appointment by the National Department of Health, for tender number GES 66/97/98. The purpose is also to serve as an input to the Project Report.

### 1.2. SCOPE

This document discusses the project framework, employed methodology and obtained results for the following aspects of the qualitative wheelchair survey project:

- Determining the extent of wheelchair usage in rural and urban settings
- Determining the level of utilisation of wheelchairs under the various conditions
- Determine the benefits that wheelchairs provide to members of the disabled community

### 1.3. BACKGROUND

The primary objectives of the wheelchair survey project may be summarised as:

- (a) Determine the life span of wheelchair products for urban and rural settings
- (b) Identify the common mechanical problems that are encountered for wheelchairs, and the strengths and weaknesses of wheelchairs for different terrains
- (c) Determine the extent and nature of usage of wheelchairs in South Africa for both rural and urban settings, and how effectively and efficiently the needs of disabled people are served, i.e. the user benefits
- (d) Evaluate the need for a special wheelchair design for rural areas by considering the cost benefit of wheelchairs in South Africa, and the suitability of current wheelchair designs to accommodate rural conditions
- (e) Make recommendations, based on the aforementioned, for optimising the employment of wheelchairs and for the empowerment of people from the disabled community

This document addresses objective (c), and is intended to be used along with the Wheelchair Hardware Report (OA01-0002683-D32) which addresses objective (a) and (b), and the Wheelchair Project Report (OA01-0002681-D32) which addresses objective (d) and (e).

By achieving the aforementioned objectives, an improvement of the cost benefit of the state -as the main funder-, and consumers –as beneficiaries-, shall be realised in the procurement and usage of wheelchairs.





GP	Gauteng Province
ISO	International Standards Organisation
NP	Northern Province
SABS	South African Bureau of Standards

### 3. PROJECT FRAMEWORK AND METHODOLOGY

#### 3.1. PROJECT FRAMEWORK

The wheelchair survey project was divided into 4 phases, i.e. for planning, data collection, data analysis and reporting. The project framework, shown in figure 1, shows the interdependence of data analysis models and flow of data for the project as a whole. The shaded areas are covered in this document.

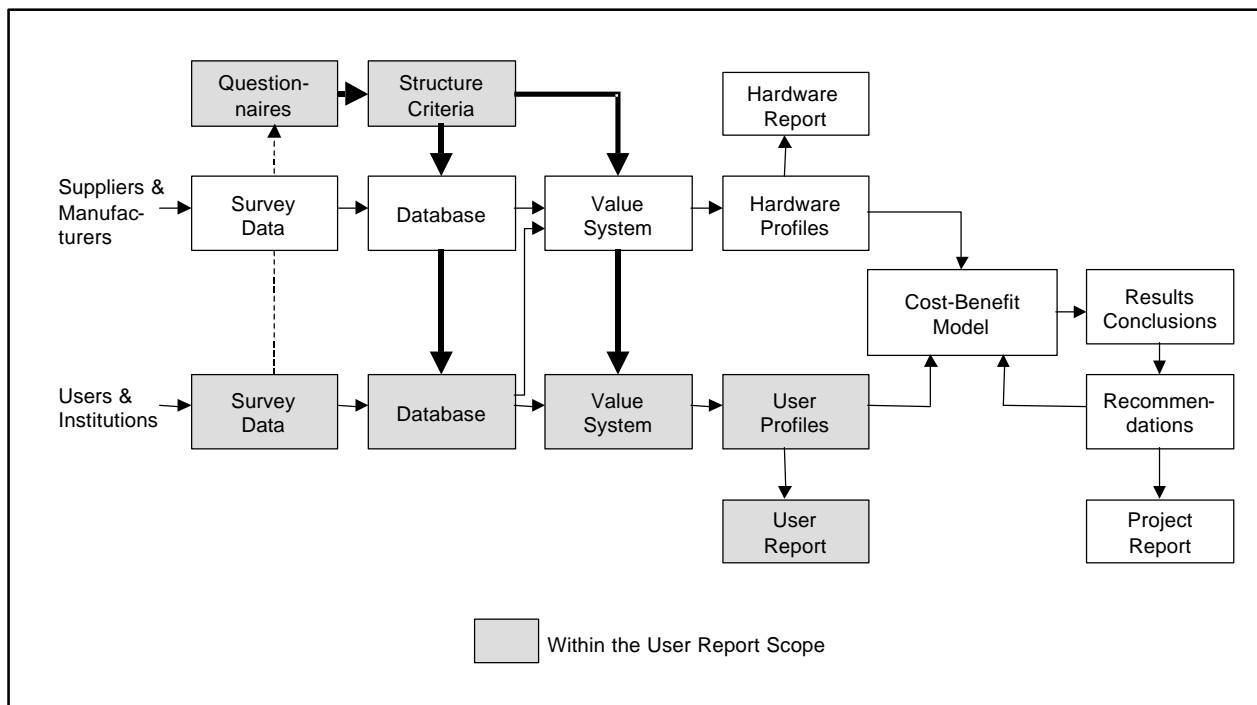


Figure 1: Wheelchair Survey Project Framework

3.2. USER DATA COLLECTION

3.2.1. WHEELCHAIR USER DATA SOURCES

The source of user data was from the interviews with wheelchair users in both urban and rural areas. For this reason the Northern Province and Gauteng province was chosen for the survey, as the Northern Province represented mainly rural conditions, and Gauteng mainly urban conditions. Both provinces were divided into regions (health districts) and user inputs were obtained from all the regions.

3.2.2. GAUTENG PROVINCE

Figure 2 shows the five districts that were covered in the survey for the Gauteng Province.

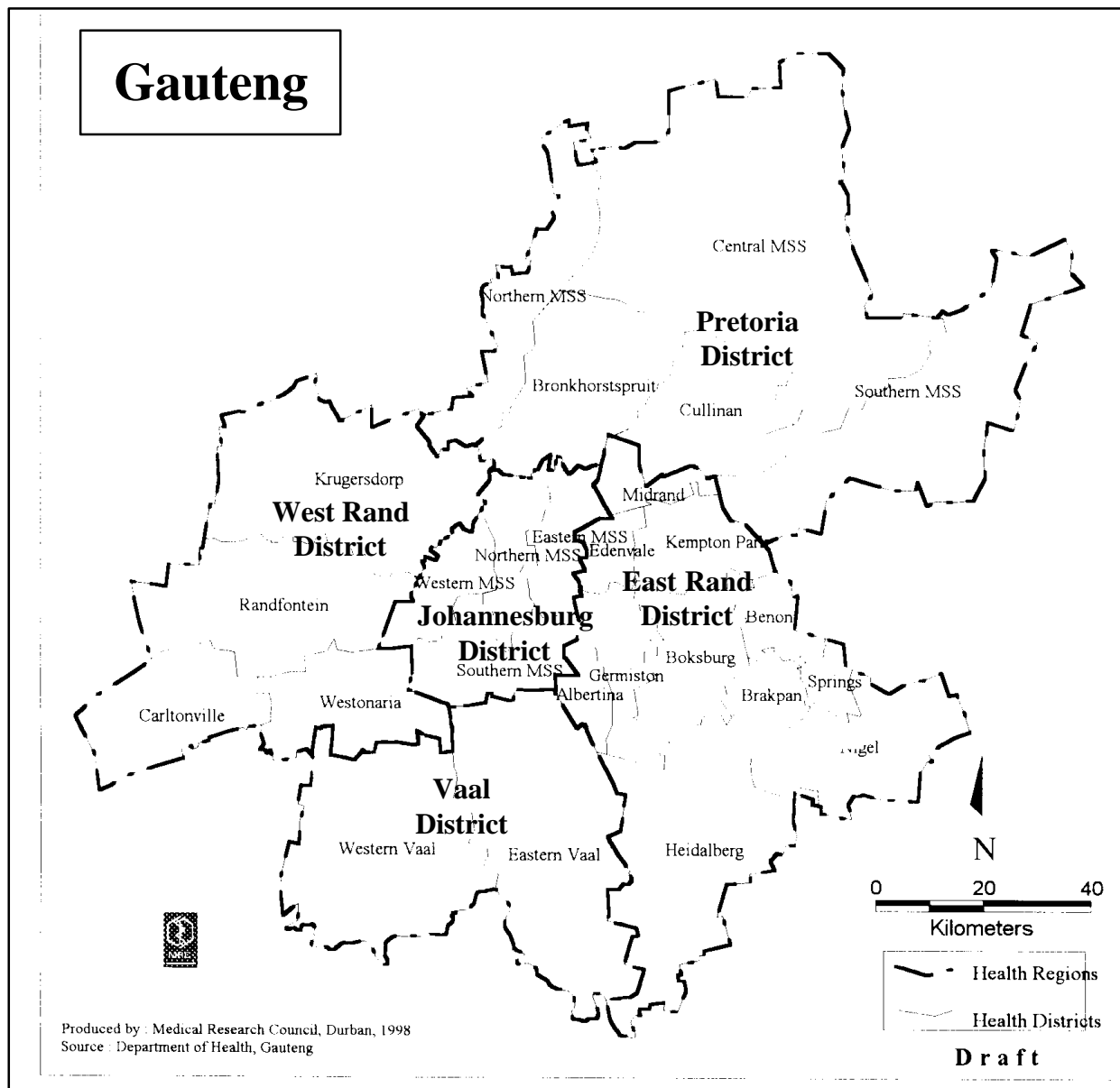


Figure 2: Gauteng Province

Table 1: Gauteng Province Sample

District	Number of Respondents
East Rand	6
Johannesburg	17
Pretoria	41
Vaal	11
West Rand	36

The table above shows the distribution of users that were interviewed in the different districts in Gauteng.

3.2.3. NORTHERN PROVINCE

Figure 3 shows the five districts that were covered in the survey for the Northern Province.

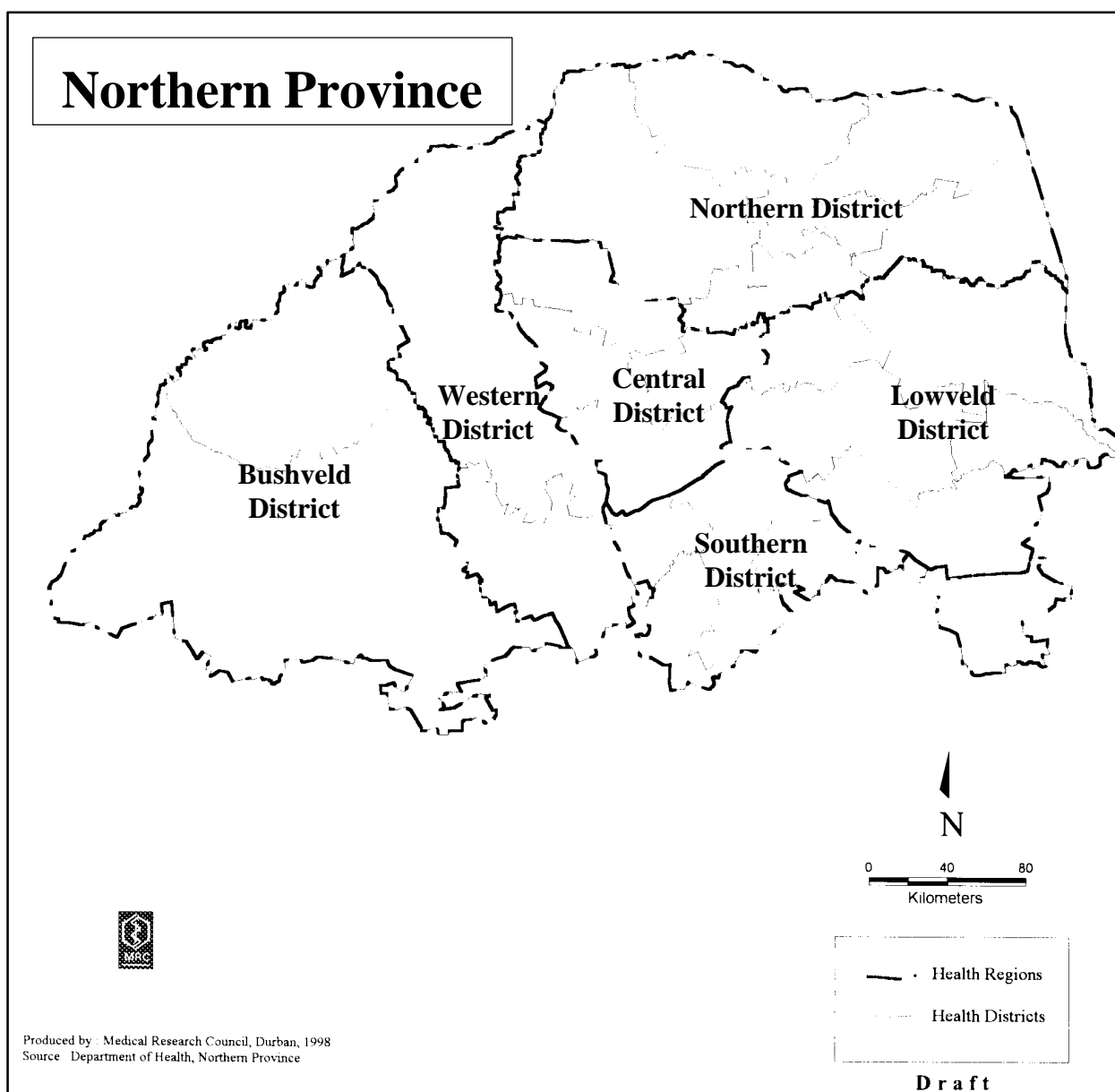


Figure 3: Northern Province

**Table 2: Northern Province Sample**

District	Number of Respondents
Bushveld	2
Central Northern Province	47
Lowveld	16
Northern Province	16
Southern Northern Province	2
Western Northern Province	5

The table above shows the distribution of wheelchair users that were interviewed for the Northern Province.

### 3.2.4. WHEELCHAIR SURVEY QUESTIONNAIRE

The survey questionnaire, as shown in Annexure B, was used for the interviews. The questionnaire contains questions on the following main areas:

- Background information about the wheelchair user
- Biographical information for the user
- Medical benefits of the user
- Physical capabilities of the user
- Environmental information for where the wheelchair is used
- The user's wheelchair particulars
- The user's experience with wheelchair failures and repairs
- The extent of usage of the wheelchair by the user

All questionnaires were filled in during interviews, by trained field workers (4 in the Northern Province and 7 in the Gauteng Province) at disability institutions, workplaces and homes. The field workers from both the provinces were trained simultaneously on the following:

- Background information on wheelchairs and everyday problems that are experienced by wheelchair users. The training was performed by a paraplegic wheelchair user, and it included fieldworkers performing some basic actions in wheelchairs, such as manoeuvring and transfers.
- Training for approaching and effectively communicating with disabled persons by means of simulation through role-play exercises. The training was performed by two industrial psychologists and a paraplegic person.
- Sampling requirements for performing the survey. The training was performed by the compilers of the questionnaire and project management.

### 3.2.5. WHEELCHAIR USER DATA AND SAMPLE

The purpose of the survey was to obtain qualitative data in terms of wheelchair usage for the Gauteng and Northern Province. Due to the lack of available information on wheelchair user volumes and distribution in the regions, a representative sample size for user data collection could not be scientifically established. An assumption was therefore made that 300 respondents (based on 30 respondents per institution, at 10 institutions to be visited) would be targeted for the survey in the Gauteng Province. Similarly 200 respondents (based on 20 respondents per institution, at 10 institutions) were targeted in the Northern Province. Due to the lower than expected availability of wheelchair users at institutions, additional centres were targeted as far as the available resources allowed.

A total of 200 questionnaires were completed in both provinces, of which 89 were from the Northern Province and 111 were from the Gauteng province. Due to the qualitative nature of the survey, the obtained data was considered to be sufficient for the study. Informal follow-up discussions were also held with wheelchair users, in order to ratify the obtained results.

### 3.3. USER DATA ANALYSIS

#### 3.3.1. SCOPE OF ANALYSIS

The scope of the analysis was derived from the task directives as stated in the Scope (paragraph 1.2) of this document. The analysis required of user data is for:

- Determining the extent of wheelchair usage and the level of utilisation of wheelchairs under the rural and urban conditions
- Determining the benefits that wheelchairs provide to members of the disabled community

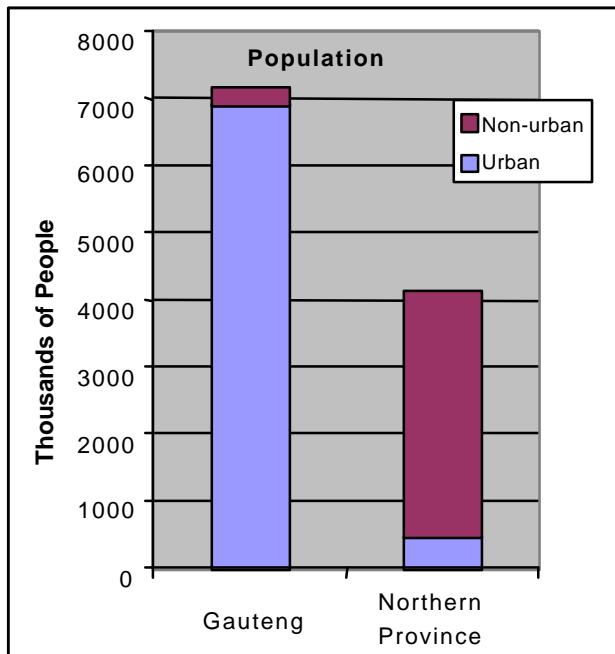
#### 3.3.2. ANALYSIS METHODOLOGY

All the obtained data of the wheelchair products, suppliers, and users were accumulated in a database, in order to allow for ease of storage and access to data for analysis. The steps that were taken during the analysis are described individually at the stated results. The typical steps in the analysis approach may be expressed as follows:

- Identify the major parameters driving the result in the output and a suitable representation of the output
- Access the parameter data of all the relevant questions from the questionnaire and product data that are related to the output
- Determine the dependence of the aforementioned data sets to other factors, such as bias of different interviewers, demographically characteristics of the sample relative to the population, different sizes of samples, etc.
- Edit and code the raw data in order to eliminate erroneous and biased data
- Choose suitable descriptive methods for representing the data in graphical or table format

- Implement probability theory tools for data evaluation and comparison purposes, such as normalisation and / or weighting of data
- Perform statistical inference qualitatively, or quantitatively where possible, in order to answer questions and reach conclusions
- Establish other possible parameters that may be used to support the findings in the output
- Repeat the analysis of the aforementioned and compare to the previous findings
- Investigate and identify reasons for differences, and improve the analysis criteria, if necessary

In order to compare the wheelchair hardware aspects for both rural and urban settings, the survey data is compared between two samples: one for the Northern Province and one for the Gauteng Province.



	<b>Gauteng</b>	<b>Northern Province</b>
Urban	96.40%	11.90%
Non-urban	3.60%	88.10%

**Table 3: Population**

**Figure 4: Population**

Figure 4 (from the Central Statistics Service) shows the ratios of people that are living under rural conditions and under urban conditions, respectively for the Northern Province and Gauteng Province. 96% of the people in Gauteng live under urban conditions, and 88% of the people live under rural conditions in the Northern Province. (The definitions of urban and non-urban conditions, from the Central Statistics Service, coincide with the definitions for urban and rural as defined in this document.)

From the assumption that the aforementioned rural/urban distribution also applies to physically disabled persons in the two provinces, wheelchair users in Gauteng is treated as urban users, and users in the Northern Province as rural wheelchair users.

#### 4. USER PROFILE ASSESSMENT

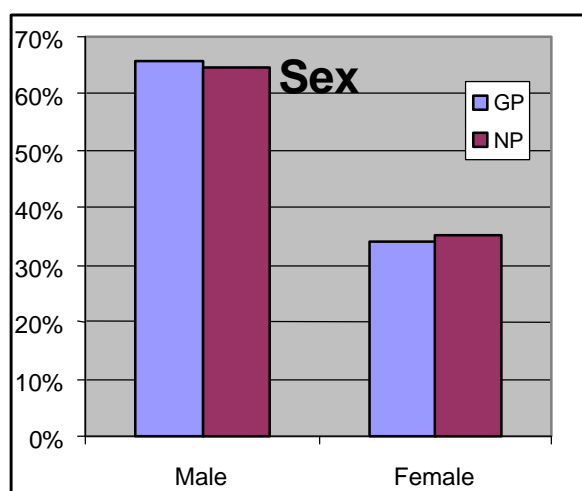
This section discusses the findings from the survey, related to the following aspects of the wheelchair users:

- Demographically information of the users, in terms of gender, education, employment and period in a wheelchair
- Abilities of the wheelchair users in terms of general health, disability and physical capabilities
- Financial status of the wheelchair users
- User needs, in terms of mobility requirements

Where possible, the results for urban and rural conditions are compared, in order to establish the differences in requirements from wheelchairs between the two categories.

#### 4.1. DEMOGRAPHICS OF THE SAMPLE

##### 4.1.1. SEX



Sex	GP	NP
Male	66%	65%
Female	34%	35%

Table 4: Sex

Figure 5: Sex

Figure 5 shows the ratio between the male and female people interviewed. The total number of male respondents in Gauteng and Northern Province is larger than the number of females for the two provinces. This may be attributed to physically disabled males that were more available for interviews than females, or possibly that fewer physically disabled women have access to wheelchairs in these regions.

4.1.2. TOTAL POPULATION AGES

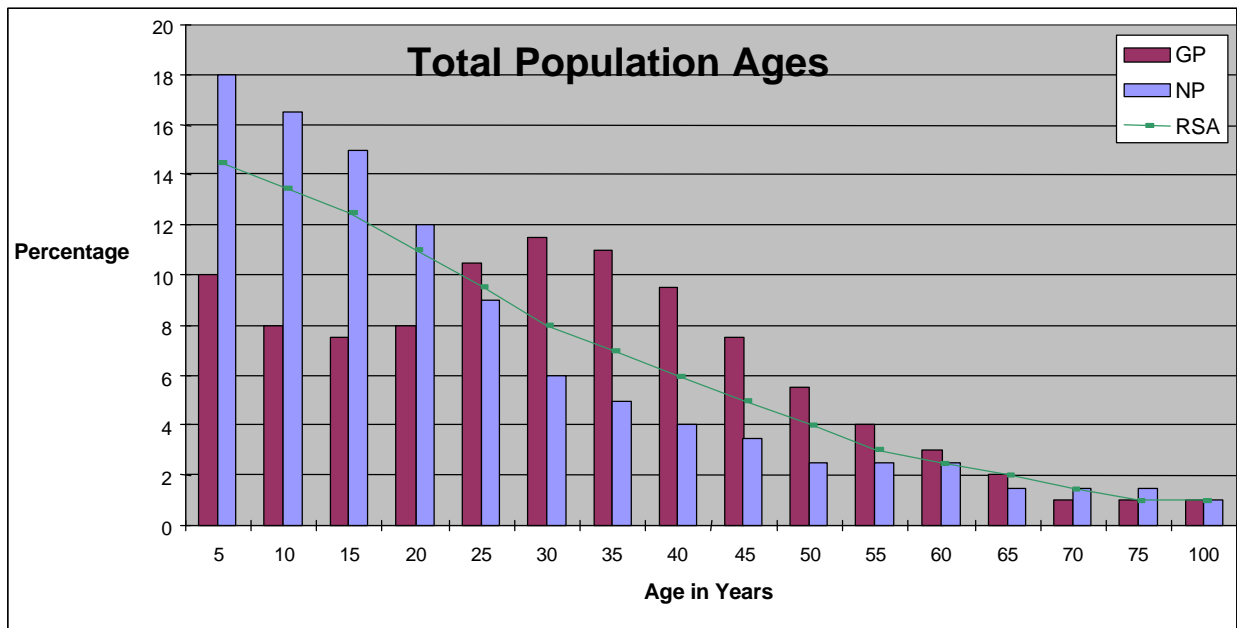
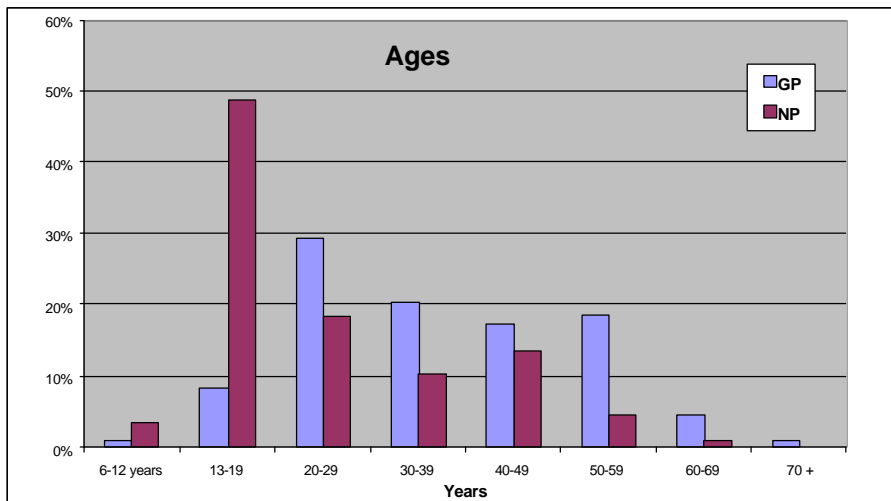


Figure 6: Total population Ages

The graph in figure 6 shows the age distribution of the total population in RSA (Central Statistics Service), Gauteng and Northern Province. The overall size of age groups in RSA decreases with older age groups. This trend is also reflected in the age distribution for the Northern Province, but the age group sizes for ages of 20 years and younger is dramatically smaller for Gauteng than in the Northern Province. The population of Gauteng is older than that of Northern Province, with larger age group sizes for ages more than 20 years.



Age (years)	GP	NP
6-12	1%	3%
13-19	8%	49%
20-29	29%	18%
30-39	20%	10%
40-49	17%	14%
50-59	18%	5%
60-69	5%	1%
70 +	1%	0%

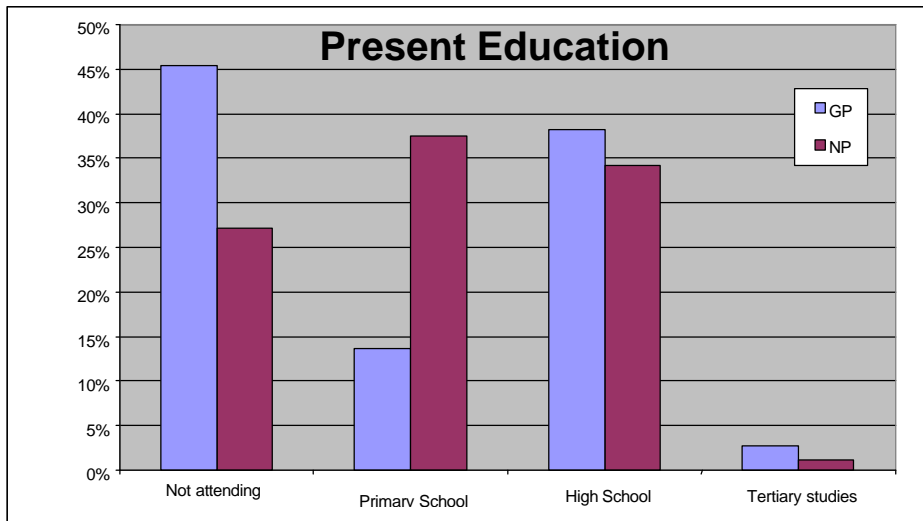
able 5: Ages

Figure 7: Ages

The overall population's age distribution of the two provinces are reflected in the samples for wheelchair users in the Northern Province and Gauteng, as shown in figure 7. Very few users (1% and 4% for the provinces) in the age group of 6 to 12 years formed part of the samples. This could possibly be attributed to disabled children in this age group, who are not yet in possession of a wheelchair.



4.1.3. PRESENT EDUCATION



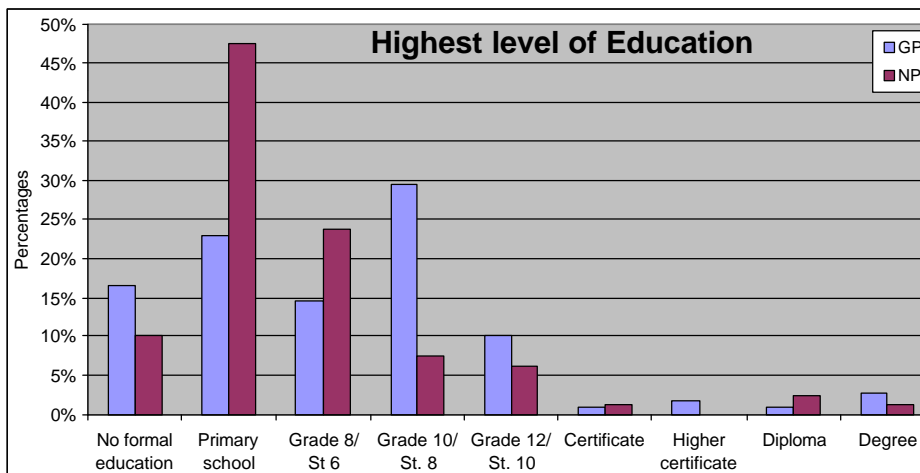
Education (Present)	GP	NP
not attending	45%	27%
Primary School	14%	38%
High School	38%	34%
Tertiary studies	3%	1%

**Table 6: Present Education**

**Figure 8: Present Education**

Figure 8 shows the present education that respondents are attending. In Gauteng 55 % of the people are receiving a form of formal education and in Northern Province, 73% of the people. The aforementioned indicates that a slightly higher demand for access to school facilities (especially primary schools) is required in the Northern Province, than for Gauteng.

4.1.4. HIGHEST LEVEL OF EDUCATION



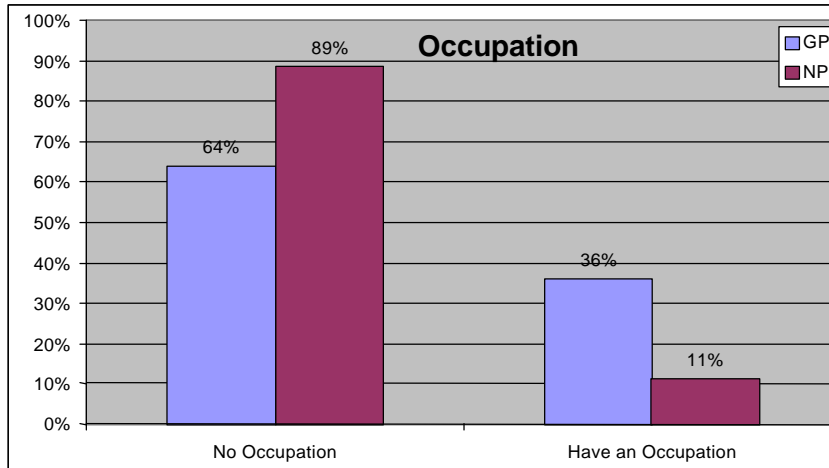
Education (Highest level)	GP	NP
No formal educ.	17%	10%
Primary school	23%	48%
Grade 8/ St 6	15%	24%
10/ St. 8	29%	8%
12/ St. 10	10%	6%
Certificate	1%	1%
Higher cert.	2%	0%
Diploma	1%	3%
Degree	3%	1%

**Table 7: Education Levels**

**Figure 9: Highest level of Education**

Figure 9 shows the highest level of education obtained. The obtained qualifications for the Northern Province is lower than for the Gauteng Province. Generally, wheelchair users in Northern Province would therefore be less likely employed than in Gauteng. This could also be influenced by the skills required for the job opportunities available. This is shown in the next paragraph, by the number of users that have an occupation.

4.1.5. OCCUPATION



Occupation	GP	NP
No Occupation	64%	89%
Have an Occupation	36%	11%

Table 8: Occupation

Figure 10: Occupation

Figure 10 shows the percentages of the users that have an occupation for both areas. In the Northern Province only 11% of the users have an occupation. In Gauteng 36% of the people have an occupation. Approximately 25% of the users in the Gauteng Province indicated involvement in the artisan / crafts category, as an occupation.

4.1.6. PERIOD IN WHEELCHAIR

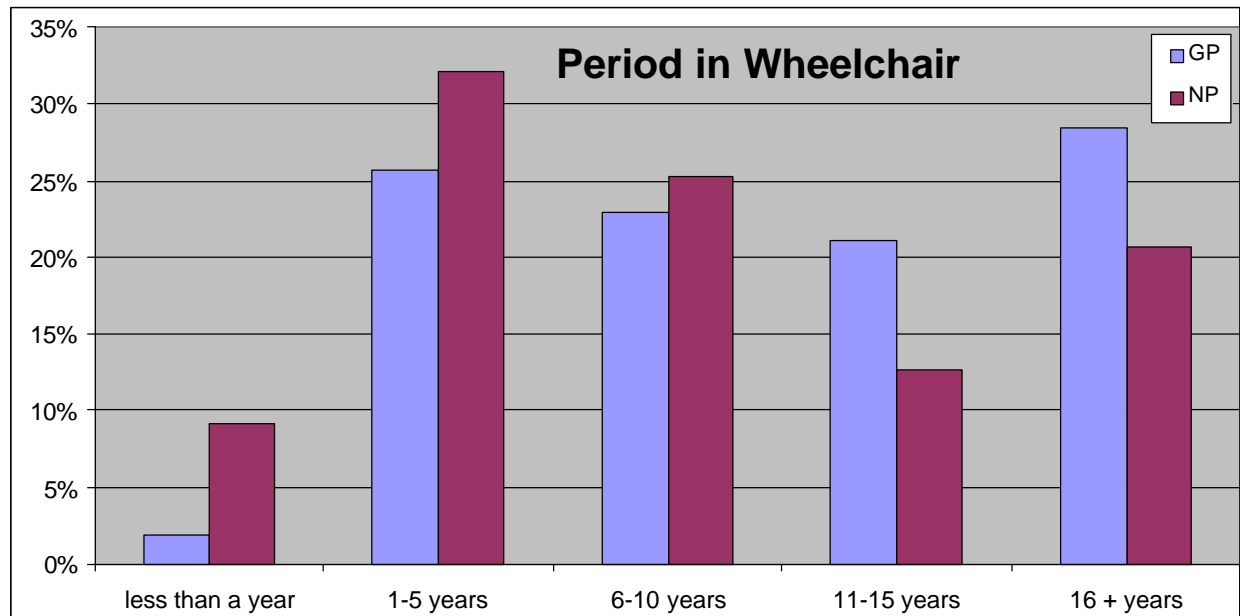


Figure 11: Period in Wheelchair

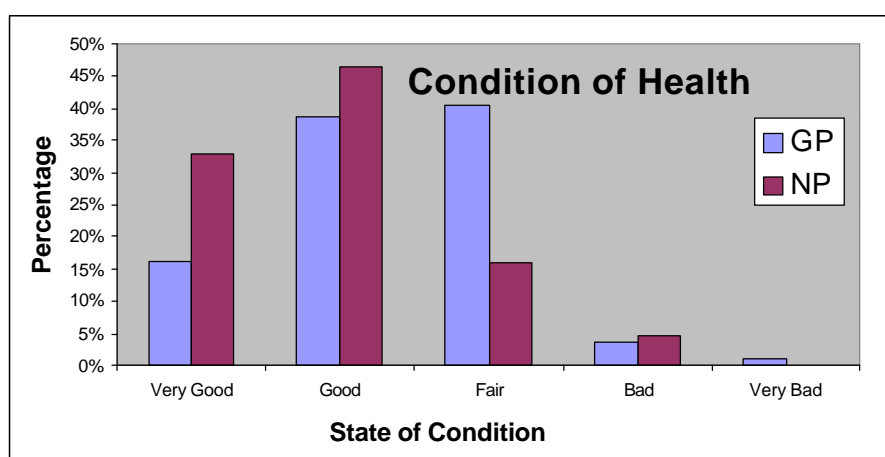
Figure 11 shows the number of years that the people have been in their wheelchairs. Gauteng has more users who have been wheelchair users for more than 10 years, than the Northern Province. Most of the wheelchair users in Northern Province have been wheelchair users for less than 10 years. The aforementioned result is also a function of the population age distributions for the two provinces. See figure 6 and 7.

## 4.2. USER ABILITIES

### 4.2.1. TYPES OF DISSABILITIES

To the open question “What type of disability do you have?” 50% of the respondents in Gauteng and 14% of the respondents in Northern Province replied “Paraplegic”. Whilst 9% of the respondents in Gauteng and 3% of the respondents in Northern Province replied “Quadriplegic”. The other respondents merely stated the cause of their disability and it is unclear how many of them are paraplegic and how many of them are quadriplegic.

### 4.2.2. CONDITION OF HEALTH



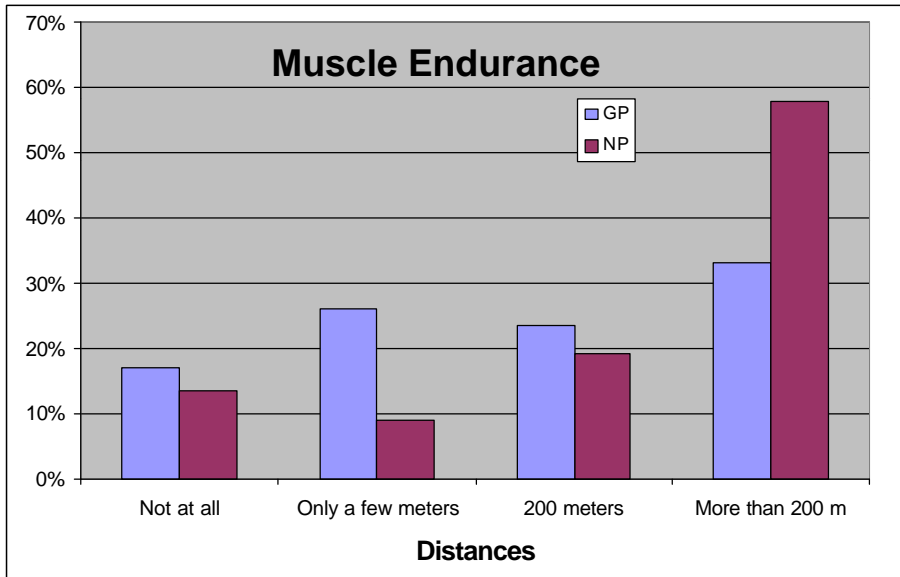
Condition of Health	GP	NP
Very Good	16%	33%
Good	39%	47%
Fair	41%	16%
Bad	4%	5%
Very Bad	1%	0%

Table 9: Condition of Health

Figure 12: Condition of Health

User’s opinions of their general state of health is shown in figure 12. Northern Province users generally rated their health between very good and good, where Gauteng users indicated their health as between good and fair.

4.2.3. MUSCLE ENDURANCE



Muscle endurance	GP	NP
Not at all	17%	14%
Only a few meters	26%	9%
200 meters	23%	19%
More than 200 m	33%	58%

Table 10: Muscle Endurance

Figure 13: Muscle

Endurance

The graph in figure 13 shows the ability of the users to wheel themselves for a specific distance. The muscle endurance of the users, in their own opinion, in Northern Province are much more than that of the users in Gauteng. 77% of users in the Northern Province can wheel their wheelchairs for distances of 200 meters and more. In Gauteng only 55% of the people indicated that they can wheel their chairs for 200 meters and further. The percentage of people in Gauteng who are unable to wheel their wheelchairs at all is greater than that of the people in Northern Province

4.2.4. AVERAGE BALANCE

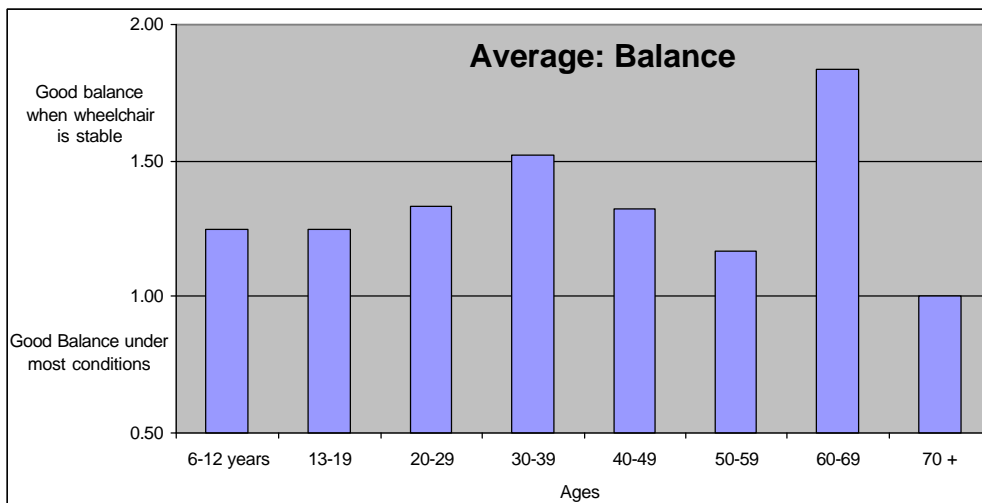
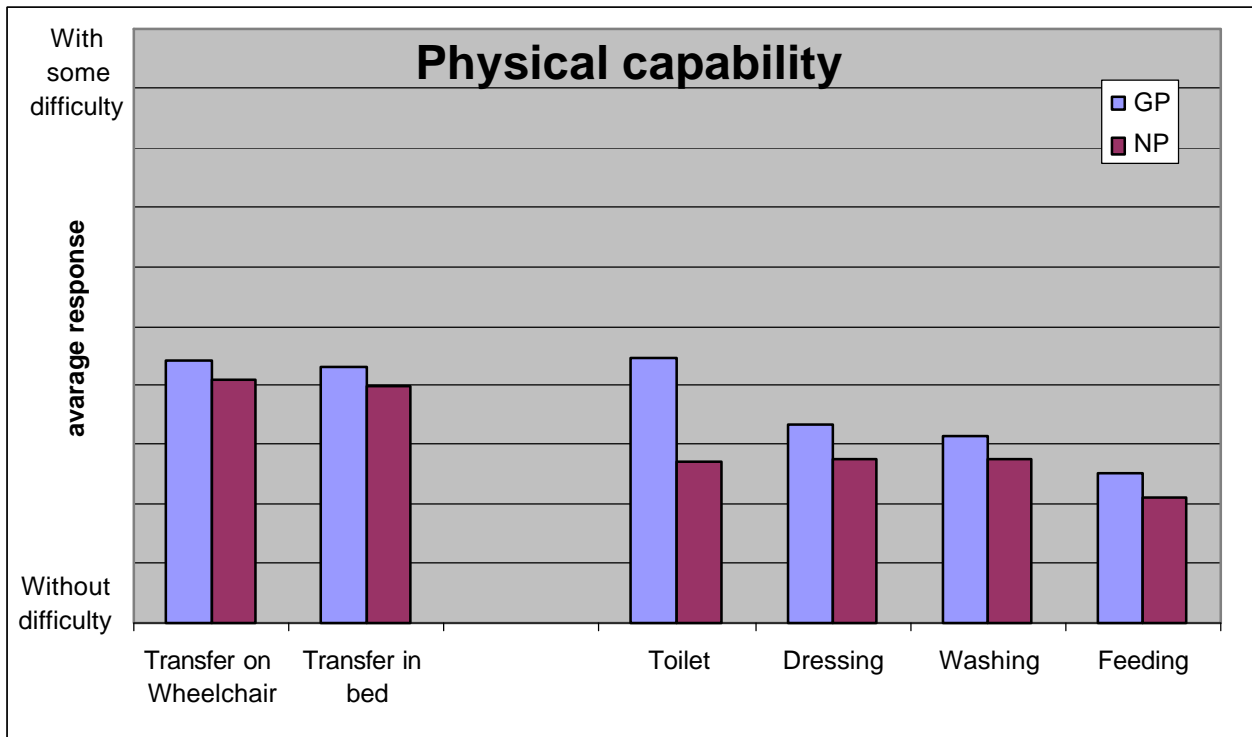


Figure 14: Average Balance

Figure 14 shows the users' ability to maintain their balance in their wheelchairs. Elder people of ages 60 to 69 years are having the most difficulties with their balancing. Overall, most of the people are capable to maintain balance in their wheelchairs.

4.2.5. PHYSICAL CAPABILITY



**Figure 15: Physical Capability**

Figure 15 shows the degrees of ease with which the users are able to transfer from and to their wheelchairs and beds. It also shows their ability to use the toilet, dress, wash and feed themselves. The ordinal responses from the questionnaire were linearly ranked and averaged for the respective provinces. In Gauteng all the actions are perceived to be completed with slightly more difficulty in comparison to those in Northern Province.

4.3. USER NEEDS

4.3.1. NECESSITY

The importance of the wheelchair factors for users, as shown in figure 16, were evaluated from the questionnaires by ranking the ordinal data linearly and averaging the results for the two provinces, for each individual factor.

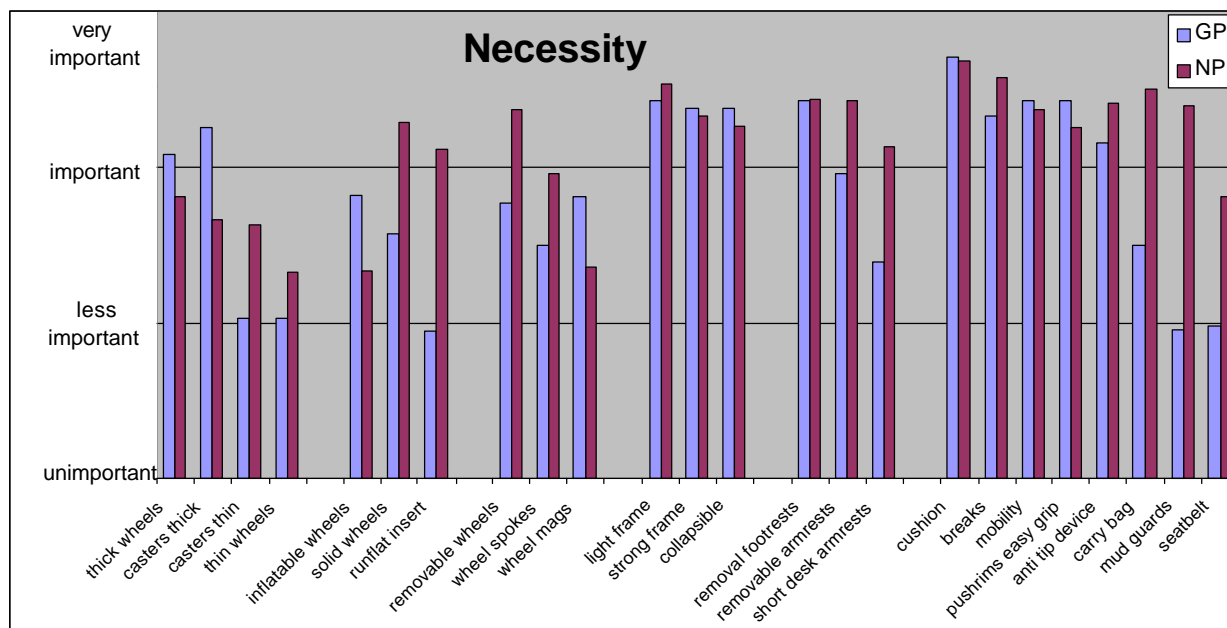


Figure 16: Necessity

The results that were obtained for necessity, may be evaluated as follows:

- Both users from the Northern Province and Gauteng prefer thick wheels and casters over thin wheels and casters. The size of the difference in preference is however greatly less for the Northern Province. This is significant, as thicker wheels are thought to be more suitable for rough terrain.
- Users in the Northern Province indicated a much greater requirement for puncture proof wheels than the Gauteng users. As affordable puncture proof, or solid wheels, are normally thin wheels, this may have an influence on the aforementioned smaller preference of thick wheels in the Northern Province.
- Wheelchair users in the Northern Province also indicated that they prefer spoked wheels over mags, where the urban users in Gauteng prefer mag wheels over spoked wheels. The spoked wheels are more maintainable and affordable than the mag wheels.
- Gauteng users indicated a lower necessity for short arm or removable arm rests than the rural users in the Northern Province.
- Northern Province users indicated a greater need for carry bags, mud guards and seat belts than the Gauteng users.
- Equally high needs were expressed for strong, light and foldable wheelchairs from both the provinces.

4.3.2. DISCOMFORTS

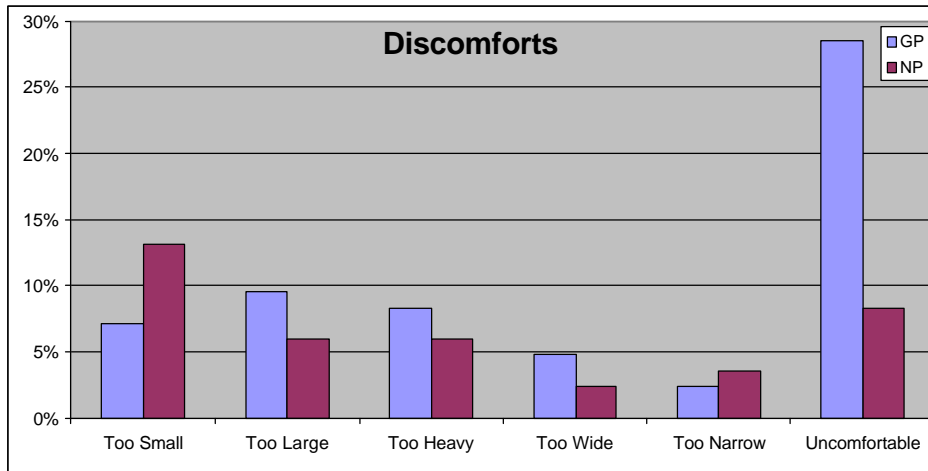


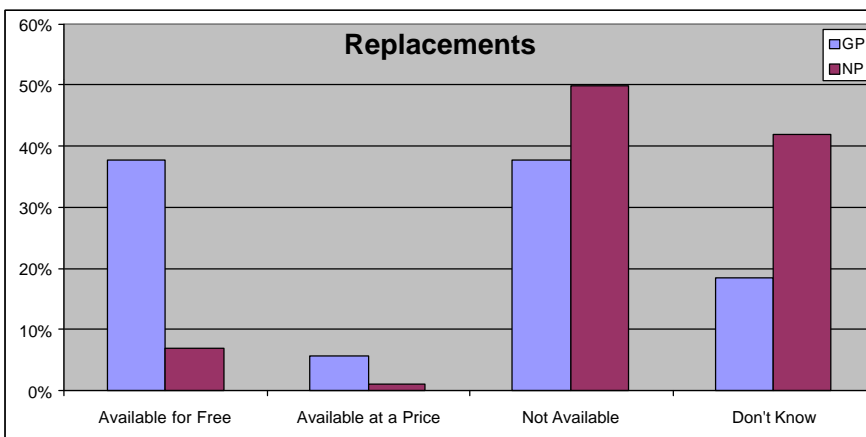
Figure 17: Discomforts

Province	Too Small	Too Large	Too Heavy	Too Wide	Too Narrow	Uncomfortable
GP	7%	10%	8%	5%	2%	29%
NP	13%	6%	6%	2%	4%	8%

Table 11: Discomforts

Figure 18 shows the biggest discomforts of the wheelchairs according to the users. In Gauteng nearly a third of the users complained that the wheelchairs are uncomfortable. Northern Province's biggest discomfort is that the wheelchairs are too small. This may be due to the younger age distribution for the Northern Province users, that are growing out of the provided wheelchairs.

4.3.3. REPLACEMENTS



Replacement	GP	NP
Available for Free	38%	7%
Available at a Price	6%	1%
Not Available	38%	50%
Don't Know	18%	42%

Table 12: Replacements

Figure 18: Replacements

In order to assess the need for replacement wheelchairs, when the wheelchair is being repaired, the availability of replacement chairs were tested in the questionnaire. Figure 18 shows the availability of replacement wheelchairs. In Gauteng, the option is for free or not available at all. In the Northern Province replacement

chairs are mostly not available, or the users do not know. Very few users indicated that replacement wheelchairs are available at a fee.

#### 4.4. FINANCIAL STATUS

##### 4.4.1. EMPLOYMENT

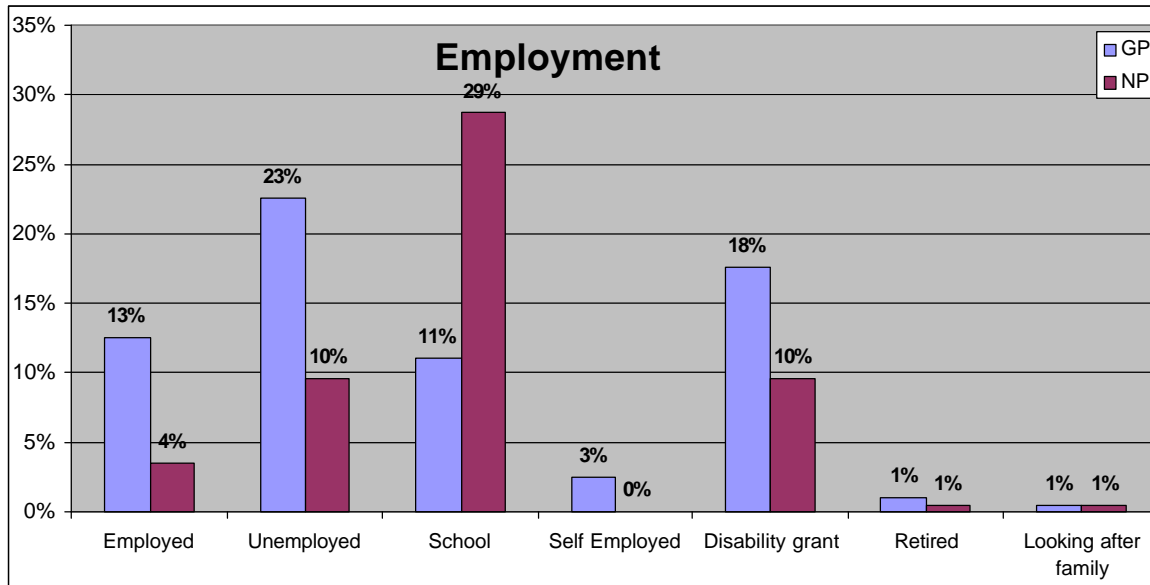


Figure 19 Employment

The graph shows the employment status of the users. In Gauteng, 16% of the users indicated that they are either employed or self employed. The percentage of users in the Northern Province is substantially lower, at 4%. A contributing factor, is the large percentage of wheelchair users that are attending school in the Northern Province. The percentage of users that indicated the benefit of a disability grant is also substantially higher for Gauteng, than the Northern Province.

##### 4.4.2. INCOME

Figure 20 shows the typical wheelchair user income per month. More than 85 % of the people in both provinces have an income between R0 and R500 per month. The income of the people in Gauteng and Northern Province do not differ very much, but a slight shift to higher income exists in Gauteng due to the higher rate of wheelchair user employment in that province. The percentages of the users that have a higher income than R500, decreases rapidly.



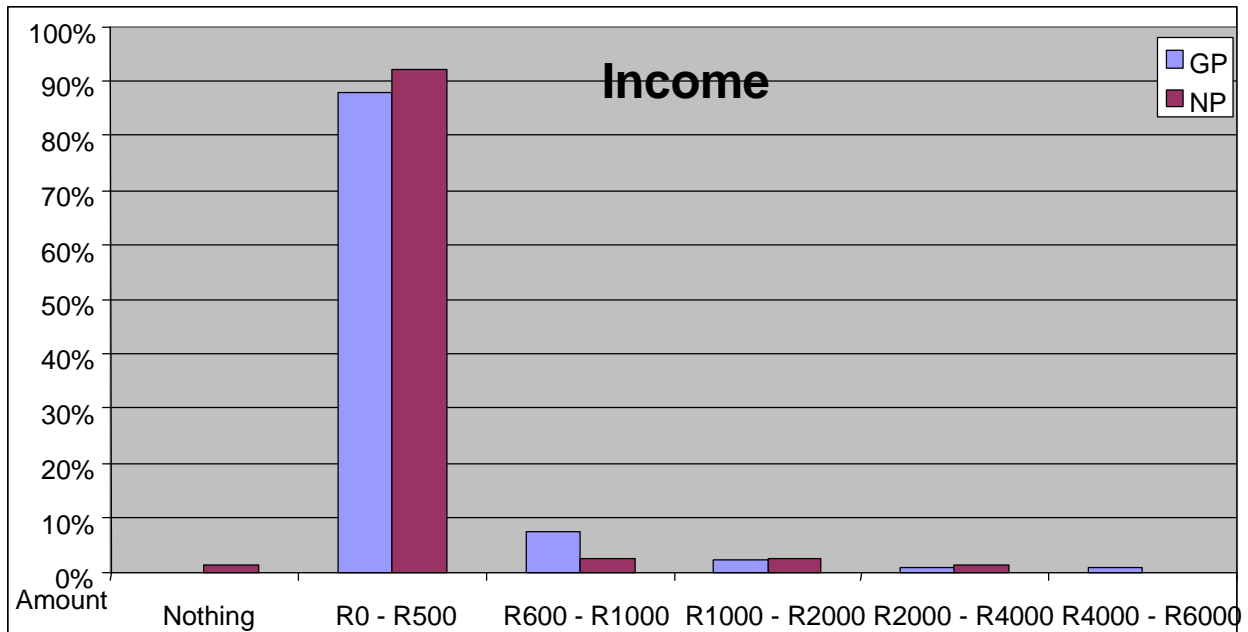


Figure 20: Income

4.4.3. WHEELCHAIR EXPENCES

The ten most common ways of payment for wheelchairs and maintenance is shown in figure 21. The Government plays a prominent role in the procurement and maintenance of the wheelchairs in Gauteng and Northern Province. Gauteng users tend to be more self reliant in dealing with wheelchair expenses.

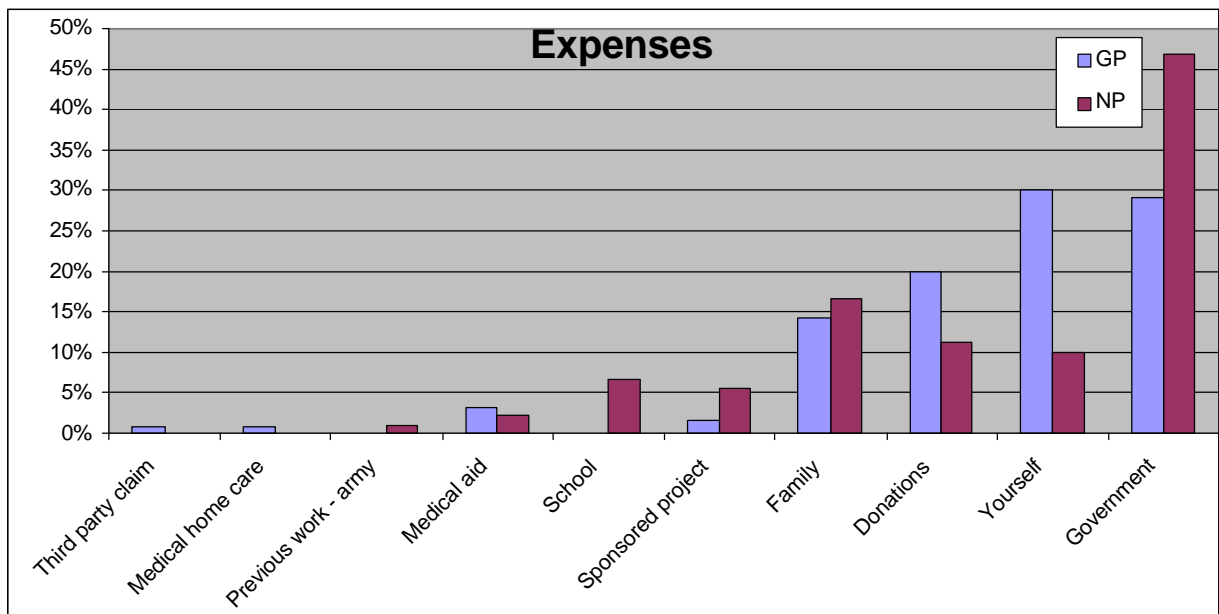


Figure 21: Expenses

4.4.4. MEDICAL AIDS

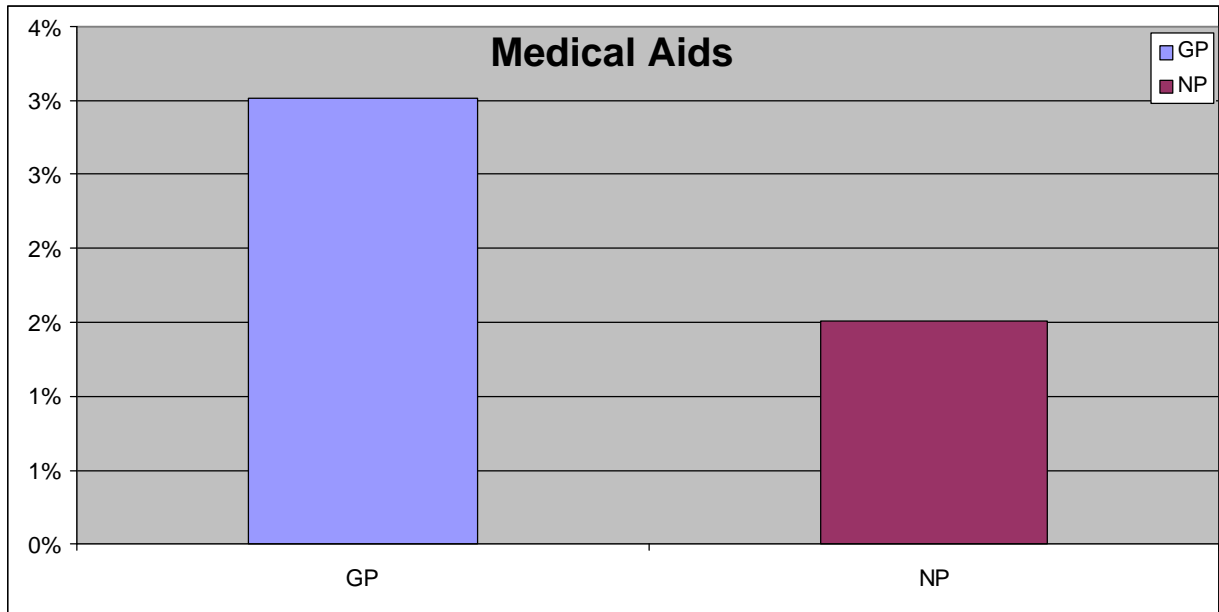


Figure 22: Medical Aids

Figure 22 shows the percentages of users who have medical aids. The percentages for Gauteng and Northern Province are both very low. In Gauteng only 3 % of the respondents have a medical aid and in Northern Province only 1.5 % of the respondents have a medical aid.

4.4.5. ALLOWABLE NUMBER OF WHEELCHAIRS

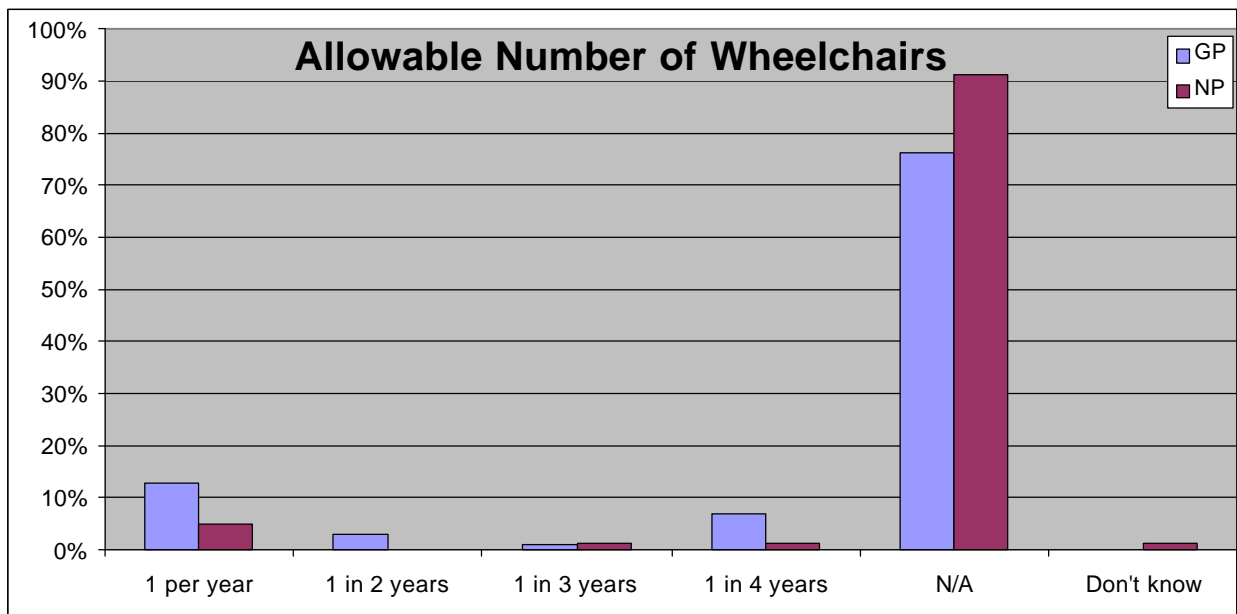


Figure 23: Allowable number of wheelchairs

Allowable Number of Wheelchairs	GP	NP
1 per year	13%	5%
1 in 2 years	3%	0%
1 in 3 years	1%	1%
1 in 4 years	7%	1%
N/A	76%	91%
Don't know	0%	1%

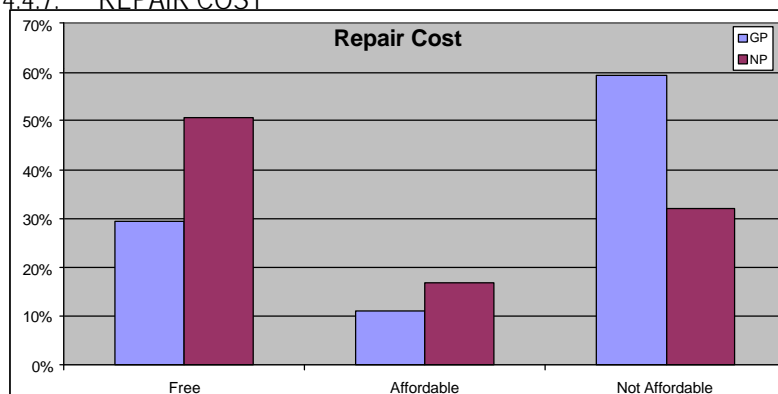
**Table 13 Allowable Number of Wheelchairs**

The graph in figure 23 shows the number of wheelchairs that a medical aid allows the user. The large percentages named “not applicable” shows that most of the users do not have a medical aid and thus this question is not applicable to them. The most medical aids in Gauteng and Northern Province allow the people one wheelchair per year and second most one wheelchair in four years. Some bias may exist in the answers obtained, as the percentages for allowable wheelchair replacement, is higher than the medical aid percentages.

4.4.6. WARRANTY PERIOD

An important factor in the financial status of the wheelchair user, is whether the wheelchair has a warranty or not. Approximately 47% of users, who were interviewed, did not know if their wheelchairs have a warranty. There were 8 % of the users who said that their wheelchairs do have a warranty, and 45 % of the people said that their wheelchairs do not have a warranty.

4.4.7. REPAIR COST



Repair cost	GP	NP
Free	30%	51%
Affordable	11%	17%
Not Affordable	59%	32%

**Table 14: Repair Cost**

**Figure 24: Repair Cost**

The graph shows how affordable the users consider the repair costs to be in the two provinces. The repair services in the Northern Province are mostly free of charge. Where repair costs are however incurred, it is mostly considered to be unaffordable by the wheelchair users.

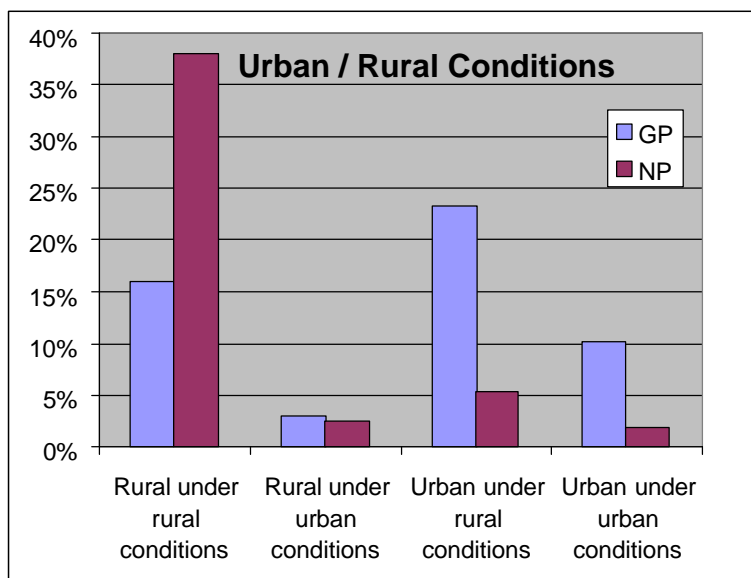
**5. WHEELCHAIR USAGE**

This section shows the results that were obtained, for the usage of wheelchairs in the Gauteng and Northern Provinces. As the extent of usage and level of utilisation depends greatly on the environment of the user, this shall be covered first.

**5.1. USAGE ENVIRONMENT**

The usage environments are evaluated by comparing the surfaces, terrains, and barriers that users experience in the rural and urban areas.

**5.1.1. URBAN / RURAL CONDITIONS**



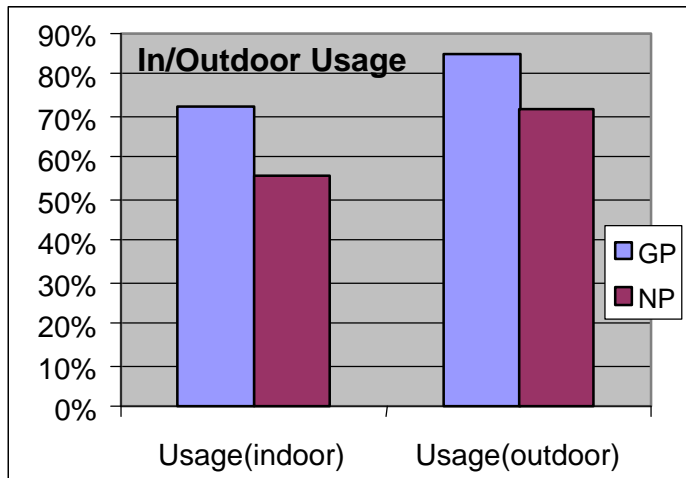
Urban / Rural Conditions	GP	NP
Rural under rural conditions	31%	80%
Rural under urban conditions	6%	5%
Urban under rural conditions	44%	11%
Urban under urban conditions	19%	4%

**Table 15: Urban / Rural Conditions**

**Figure 25: Urban / Rural Conditions**

Figure 26 provides a comparison of the ratios of respondents that experience either urban or rural conditions in a rural area, or in an urban area, respectively. 85% of the respondents from the Northern Province indicated that they experience rural conditions in both urban and rural areas in the province. 63% of respondents from the Gauteng Province indicated that they experience urban conditions in both urban and rural areas in the province.

5.1.2. IN / OUTDOOR USAGE



Usage	GP	NP
indoor	72 %	56 %
outdoor	85%	72%

Table 16: In / Outdoor Usage

Figure 26: In / Outdoor Usage

In two separate questions, users responded as shown in figure 26, on where they mostly use wheelchairs (indoors and/or outdoors). In both provinces, wheelchairs are used both indoors and outdoors.

The ratio indoor versus outdoor usage for Gauteng is 1:1.2, and for the Northern Province it is 1:1.3. This indicates that rural users (Northern Province) tend to be more exposed to outdoor conditions than for urban users.

5.1.3. SURFACE

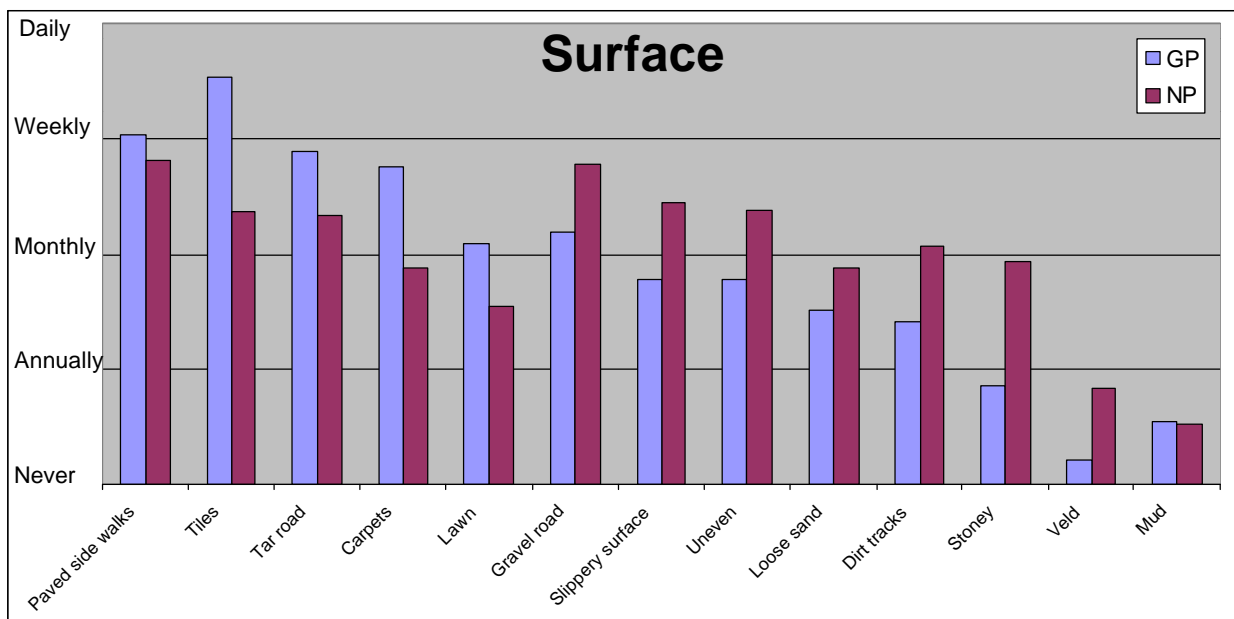


Figure 27: Surface

Figure 27 shows how regularly the users use their wheelchairs on different surfaces. The data items are sorted for the highest frequencies of surfaces for the Northern Province and Gauteng respectively. The ordinal answers from the questionnaire were linearly ranked and averaged for the two provinces.

For Gauteng, the most commonly used surface is tiles. The other commonly experienced surfaces in Gauteng coincides with typical urban phenomenons, such as paved side walks, tar roads, carpets and lawns.

Users in the Northern Province encounter paved sidewalks and gravel roads almost equally and most often. On rough, rural type surfaces, users from the Northern Province indicated a substantially higher exposure to surfaces such as gravel roads, slippery and uneven surfaces, loose sand, dirt tracks, stoney surfaces and veld.

### 5.1.4. BARRIERS

From the open question in the questionnaire (question number 9.3), the following general day-to-day barriers were noted. The stated barriers are both physical and socio-cultural in nature. The items have been ranked (1 being the highest) according to the number of respondents that referred to similar types of barriers.

#### Gauteng

1. Accessibility of public transport – railways, busses and taxis
2. Kerbs, escalators, stairs, steep slopes, absence of ramps
3. Accessibility of public spaces - shops, entertainment centres, public toilets
4. Difficult terrain – gravel, sand, stony areas
5. People's negative attitudes towards physically disabled - especially taxi drivers
6. Physical weaknesses – require help/motorised wheelchairs
7. Difficulty reaching - light switches and cupboards
8. Discomfort – sitting in wheelchairs for long periods
9. Wheelchair size - too big to fit into some motorcar boots
10. Difficulty in maintaining the wheelchair

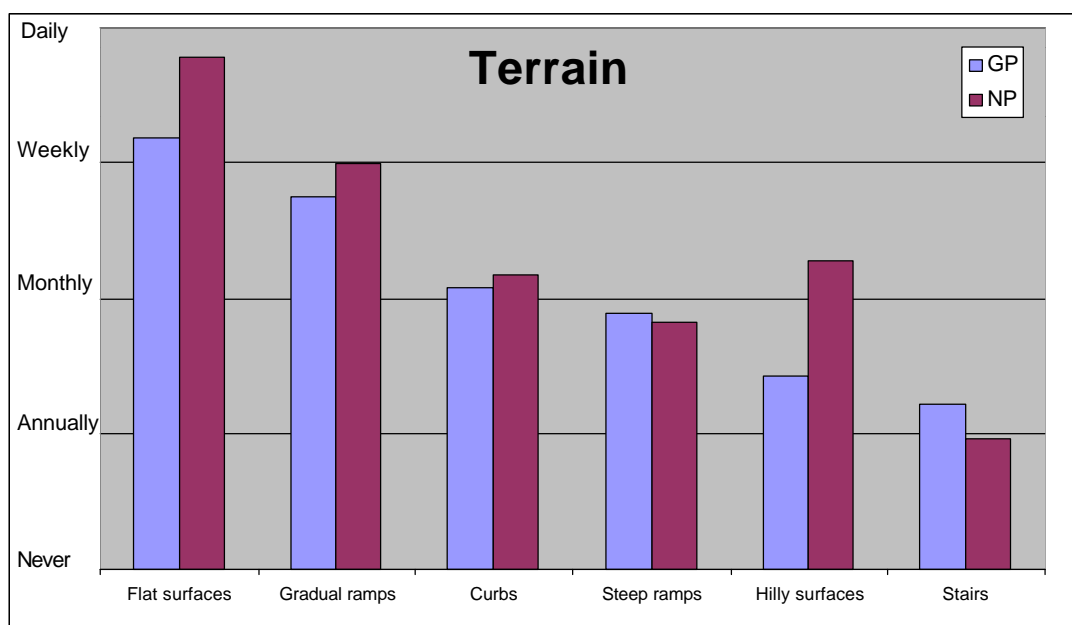
#### Northern Province

1. Kerbs, escalators, stairs, steep slopes, absence of ramps
2. Difficulty in maintaining the wheelchair
3. Access to public spaces – shops, entertainment centres and public toilets
4. Social isolation
5. Difficult terrain – veiled, steep slopes, potholes, sand and mud
6. Public transport – Little public transport is available

7. People's negative attitudes towards physically disabled - especially taxi drivers
8. Financial factors – Cannot afford proper maintenance on wheelchair
9. Physical weakness require help/motorised wheelchairs

### 5.2. EXTENT OF USAGE AND LEVEL OF UTILISATION

#### 5.2.1. TERRAIN



**Figure 28: Terrain**

The graph shows the frequency that the people use the different terrains. In Gauteng and in Northern Province the largest percentage of users travel on flat surfaces with gradual ramps. Northern Province has more hilly surfaces and Gauteng has more stairs and steep ramps. From average of ranked ordinal data.

5.2.2. TRANSPORTATION

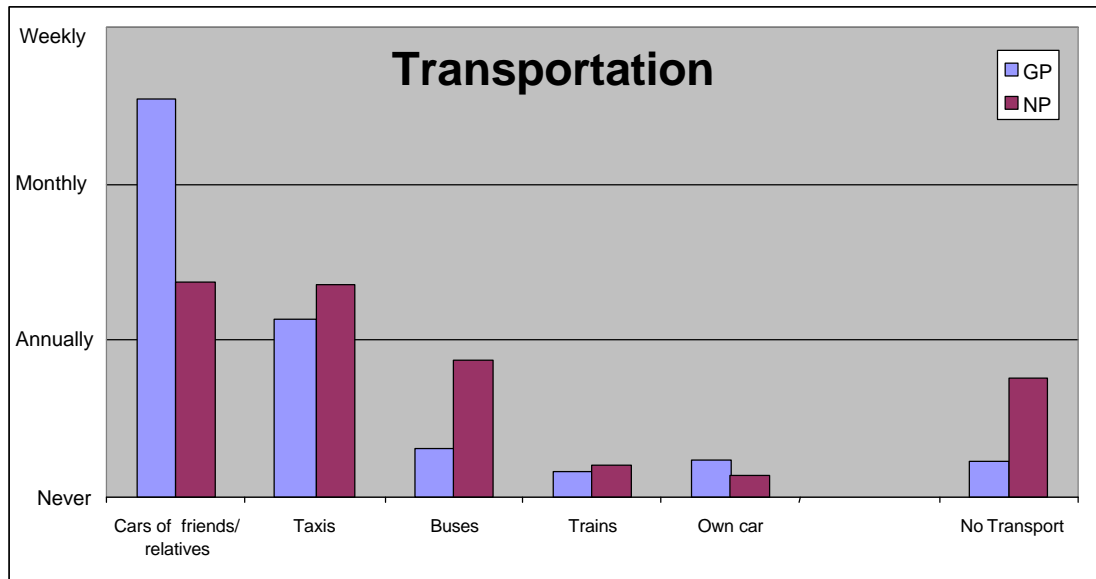
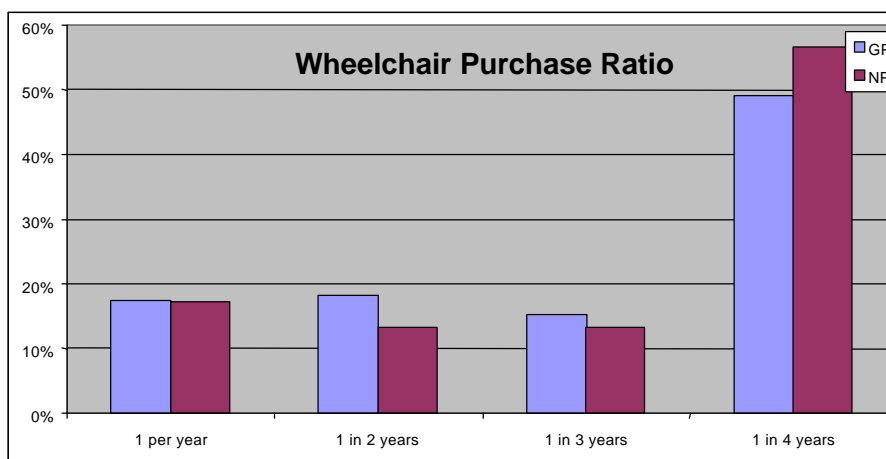


Figure 29: Transportation

The graph in figure 29 shows the modes of transportation that are used by the users. In Gauteng and in Northern Province the wheelchair users most often make use of a friend's or a relative's car, for travelling. Wheelchair users in the Northern Province, however have much less access to private vehicles, and have to rely more on public means of transport, such as taxis, busses and trains. Because public transport is normally not well developed in rural areas, rural wheelchair users indicated that any means of transport are quite often not available at all. From average of ranked ordinal data.

5.2.3. WHEELCHAIR PURCHASE RATIO



Wheelchair purchase ratio	GP	NP
1 per year	17%	17%
1 in 2 years	18%	13%
1 in 3 years	15%	13%
1 in 4 years	49%	57%

Table 17: Wheelchair Purchase Ratio

Figure 30: Wheelchair Purchase Ratio

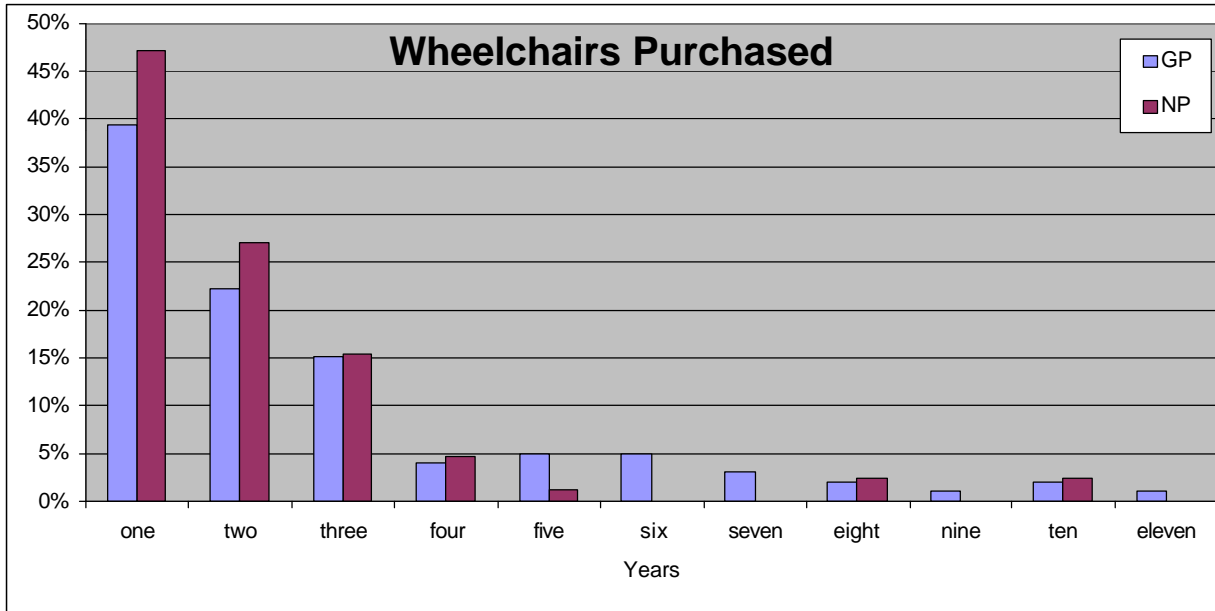
The graph in figure 30 shows an average of the frequency of wheelchair procurements. Overall, wheelchairs are replaced less often in the Northern Province. The average life expectancy of a wheelchair in the Northern



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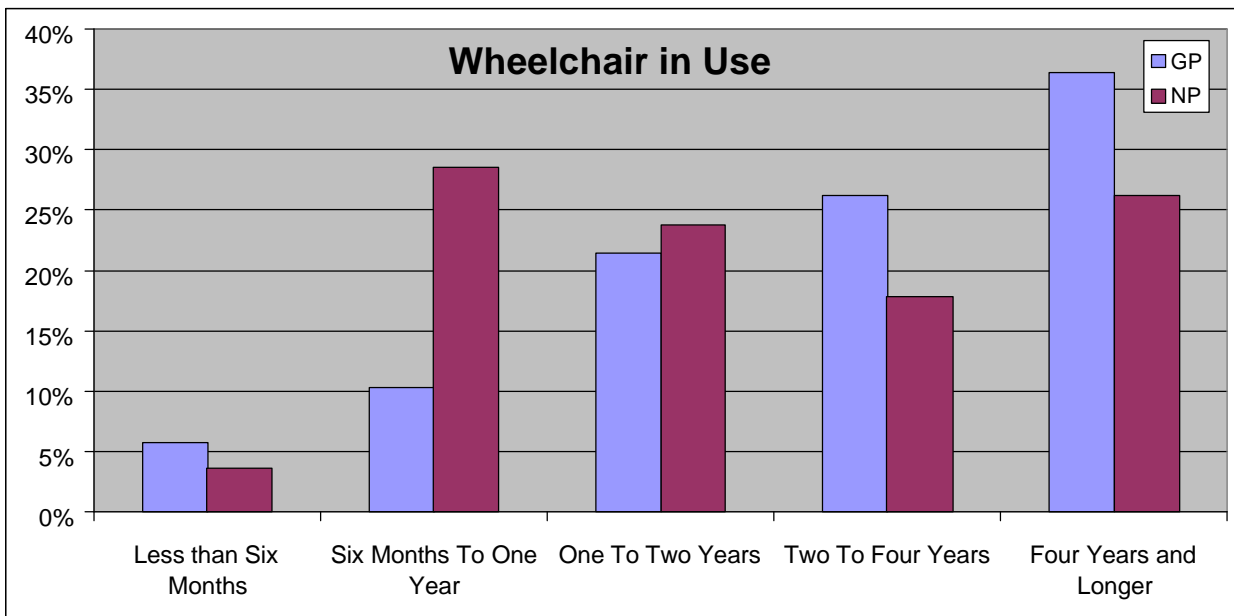
Province was found to be approximately 20% longer than for the Gauteng Province (Refer to wheelchair life in the Hardware Report).

In figure 31, it can also be seen that users in the Northern Province have had fewer wheelchairs than users in the Gauteng province.



**Figure 31: Wheelchairs Purchased**

### 5.2.4. WHEELCHAIR IN USE



**Figure 32: Wheelchair in Use**

Wheelchair in use	GP	NP
Less than Six Months	6%	4%
Six Months To One Year	10%	29%
One To Two Years	21%	24%
Two To Four Years	26%	18%
Four Years and Longer	36%	26%

**Table 18: Wheelchair in Use**

The graph in figure 32 shows the time that the people's current wheelchairs are in use. In Gauteng more than a third of the user's chairs are four years and longer in use. In Northern Province more users have newer wheelchairs. The wheelchair life span in the Northern Province however tend to be longer than for Gauteng. Refer to Wheelchair Life Span in the Hardware Report.

### 5.2.5. USE OF WHEELCHAIR

As far as the general frequency of usage of wheelchairs, all the users (from both provinces) are using their wheelchairs on a daily basis; only one interviewed user uses it once a month. In Gauteng the respondents to the questionnaires also use their wheelchairs for moving/carrying luggage around and in some instances for sport.

### 5.2.6. OTHER APPLICATIONS

The majority of respondents to the questionnaires indicated that they do not use the wheelchair for other applications. Two respondents from Gauteng area replied that they also use their wheelchairs for sport. Two others replied that they use it for domestic work although it is not clear whether it refers to generating an income or whether it refers to domestic work in and around their own homes.

In the Northern Province two respondents indicated that they use their wheelchairs for sport such as netball, racing and basketball.

5.3. USAGE BENEFITS

5.3.1. DELIVERY TIME



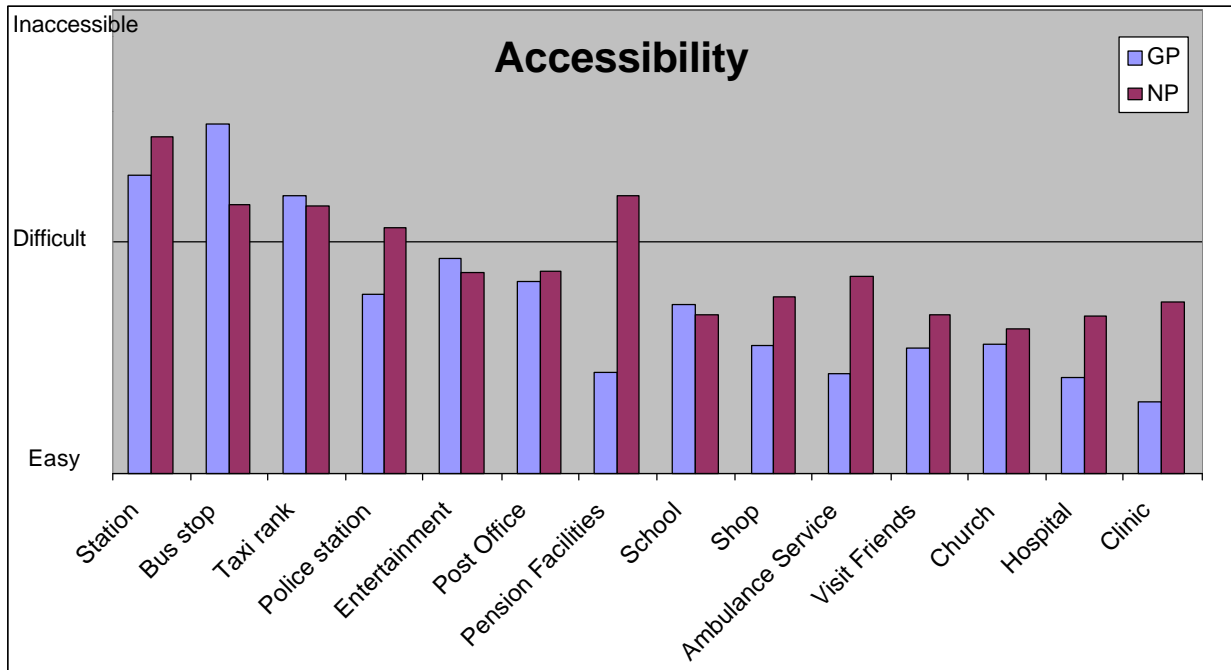
Figure 33: Delivery Time

Delivery Time	GP	NP
Less than One Month	64%	49%
Within Three Months	18%	26%
Within Six Months	9%	4%
Within One Year	5%	8%
Within Eighteen Months	0%	3%
More than Eighteen Months	5%	12%

Table 19: Delivery Time

The graph shows the time it takes for a wheelchair to be provided. In Gauteng more than 60 % and in Northern Province nearly half of the people said that it took less than a month. There are however still users in Gauteng and Northern Province who had to wait more than eighteen months for their wheelchairs. Users in the Northern Province generally have to wait longer for wheelchairs than users in Gauteng.

5.3.2. ACCESSIBILITY



**Figure 34: Accessibility**

The figure shows how accessible users considered the different destinations to be. Access to public transport appears to be the biggest problem for both provinces. Overall, the identified destinations are more inaccessible in Northern Province than in Gauteng.

5.3.3. FUNCTIONAL DISCOMFORTS

The figure 33 shows the functional discomforts and how often they occur, from the average ranked ordinal data. In Gauteng the users are regularly experiencing discomforts with the casters, the collapsibility of the wheelchair and the turning of the wheelchair. In Northern Province three regular discomforts are ineffective casters, brakes and wheeling difficulty.

The overall higher discomfort levels, as experienced by the Gauteng users, may be related to the higher failure levels as shown in the Hardware Report.

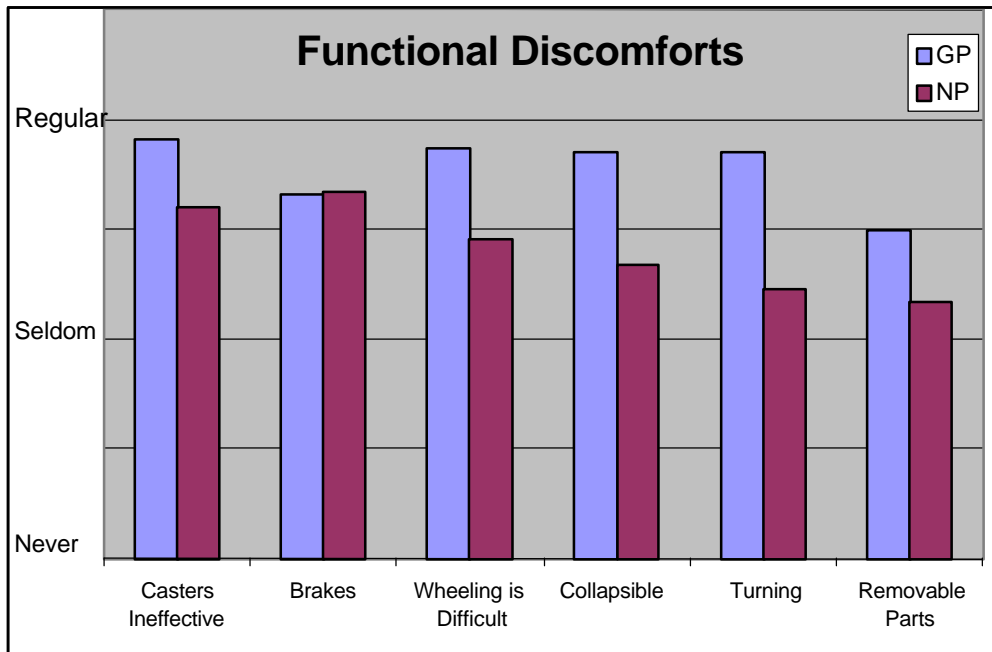


Figure 35: Functional Discomforts

## 6. CONCLUSIONS

### 6.1. WHEELCHAIR USER VALUE SYSTEM

The wheelchair user value systems for urban (Gauteng) and the rural (Northern Province) users are presented in this paragraph as a summary of the salient differences in the usage of wheelchairs for the different areas. The results have been obtained from the data, as presented in this document, and is used in the cost benefit analysis in the Project Report. The cost benefit analysis intends to compare the effectiveness and cost of the different wheelchair products for both urban and rural conditions.

By considering the differences in wheelchair usage between the regions, it is possible to rate the importance of different wheelchair characteristics qualitatively for the cost benefit analysis. Aspects of the wheelchair usage that are similar for both of the areas are also mentioned, but not used in the cost benefit analysis, as the analysis only shows differences in effectiveness between wheelchairs for the two areas, and not absolute effectiveness.

The discussed aspects, related to the usage of wheelchairs, are: user abilities; user needs and wants; and requirements from environmental conditions.

### 6.1.1. SIMILARITIES IN WHEELCHAIR USAGE

The similarities in wheelchair usage for the urban areas (in Gauteng) and the rural areas (in Northern Province) have been established from the user questionnaire, where the same responses from the regions were encountered.

#### **6.1.1.1. User Abilities**

From the assumption that the typical disabilities of wheelchair users for both regions are the same and from the wheelchair user capabilities results in the questionnaire, the physical user capabilities appear to be very similar. This may be attributed to the targeting of standard everyday use manual wheelchair users for the survey.

#### **6.1.1.2. User Needs**

Overall, wheelchair users from both regions expressed the need for wheelchairs to be strong, durable and light. These wheelchair characteristics are available in the market, but at significant cost premiums.

Wheelchair users from both regions indicated that they are mostly unemployed. For this reason only a very small percentage (2 to 3%) have medical aid and monthly incomes of over R500. This places a high financial burden on the users to procure and maintain their wheelchairs. Users from both regions therefore require wheelchair products and services to be as inexpensive as possible.

#### **6.1.1.3. User Environment**

Although the environmental conditions vary greatly between the two areas, respondents from both regions complained about the same barriers such as access to buildings, public areas and transport as being difficult. Both regions indicated curbs, stairs, escalators, steep slopes and the absence of ramps as being the main problems. Not only physical barriers were indicated as problems, but also the generally negative attitude from the public and service providers are experienced.

Almost all the users from the two regions indicated that wheelchairs are being used on a daily basis, for both indoors and outdoors mobility. In very few instances users from both regions indicated that their wheelchairs are used for alternative purposes as well, such as sport and transporting small amounts of luggage.

### 6.1.2. DIFFERENCES IN WHEELCHAIR USAGE

The differences in wheelchair usage for the urban areas (in Gauteng) and the rural areas (in Northern Province) have been established from the user questionnaire where, qualitatively, different responses from the regions were encountered.

#### **6.1.2.1. User Abilities**

The abilities of wheelchair users differ in as far as their general perception of their own wheeling ability and endurance. Users in the Northern Province indicated on average that they are able to wheel further than the users in Gauteng. The Northern Province users also indicated that they consider their general state of health as very good, compared to the average response of "fair" in Gauteng.

#### **6.1.2.2. User Needs**

From the sample age distribution for the two regions, it can be seen that the Northern Province population is relatively younger than Gauteng Province. Most of the respondents for the Northern Province are also busy with primary and high school, where most are attending high school or not at all in the Gauteng Province. This implies that small wheelchairs are provided to growing children, who then outgrow the wheelchairs. This is supported by the response to wheelchair discomforts that are experienced in the Northern Province. Northern Province respondents reported lower discomfort levels than Gauteng users on all counts, except for wheelchairs being too narrow and too small. A greater requirement was also identified for size adjustments of wheelchair dimensions than for Gauteng. It should be noted that the age distribution of the interviewed physically disabled persons in the Northern Province may not be valid for other rural areas in the country.

Substantially more wheelchair users in Gauteng are employed than in the Northern Province. More Gauteng users therefor need to use their wheelchairs to go to work places on a daily basis. This may include the negotiation of more obstacles and more frequent use of public or private transport. Users in the Northern Province also have the need to go to public places on a regular basis, but due to the unavailability of public and private transport systems, these users are often confronted with no means to travel. Social isolation is quite often a result and users in the Northern Province therefor tend to expose their wheelchairs less to the aforementioned environments. The resulting lower activity levels is a contributing factor in the longer life span and lower failure levels of wheelchair in the rural Northern Province.

Due to a much higher rate of employment under wheelchair users in the Gauteng Province, compared to the Northern Province, the average monthly income and number of users with medical aid in Gauteng is also higher. Users in the Northern Province are therefor under greater financial pressure when procuring and maintaining their wheelchairs. Northern Province users indicated that wheelchair expenses are mostly paid with the assistance of their families and the government. The Gauteng users indicated greater self reliance in paying for wheelchair expenses and also indicated that they find wheelchair expenses to be more unaffordable than users in the Northern Province. This sentiment may be biased due to the greater awareness of the costs of

failures than the users in the Northern Province and the fact that more failures are experienced by the users in urban Gauteng.

### **6.1.2.3. User Environment**

Rural areas expose the wheelchair to elements that contribute to wear and corrosion, to a greater extent than for urban areas. Typical elements are from surfaces such as sand, dirt, gravel, stony veld and muddy conditions. These elements cause particles to get into joints and bearings, inducing increased wear on these components. Corrosion is also increased on unprotected surfaces due to the hygroscopic nature of the aforementioned particles. The most common surfaces that are encountered in the urban areas are roads, paved ways, carpets and lawns.

The types of terrains that wheelchairs are exposed to in the Northern Province, tend to be more hilly (with significant up-hills and down-hills) with fewer stairs and abrupt level changes such as curbs. Fixed and negotiable routes are normally established in very rough areas where users in rural areas have to move in order to perform basic functions. Urban users tend to be more exposed to unforeseen obstacles such as stairs and sharp curbs, where movement takes place in urban conditions. Structural failures are normally a result of improper negotiation of such terrains, where wheelchairs are exposed to significant frame flex under loaded conditions. This may be a contributing factor to the higher failure rate in the Gauteng area.

Northern Province users showed a much greater requirement for puncture proof and spoked wheels, than for Gauteng. Puncture resistant wheels are very necessary in the rural areas, where many thorns and other sharp objects are encountered. The number of wheel punctures experienced in the Northern Province, however, rated much lower than for Gauteng. This is due to the fact that most wheelchairs in the rural areas are equipped with solid or puncture resistant wheels. Spoked wheels are preferred in the Northern Province due to the maintainability of these wheels.

Thick wheels are normally considered as being better suited for rough terrains, as found in the rural areas of the Northern Province. Users from both provinces prefer thick wheels over thin wheels.



**7. ANNEXURES**

**7.1. WHEELCHAIR USER SURVEY QUESTIONNAIRE**