

PERCEPTIONS OF AIR POLLUTION AND ITS IMPACT ON HUMAN HEALTH IN THE
SOUTH DURBAN BASIN: A COMMUNITY PERSPECTIVE

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I declare that **PERCEPTIONS OF AIR POLLUTION AND ITS IMPACT ON HUMAN HEALTH IN THE SOUTH DURBAN BASIN: A COMMUNITY PERSPECTIVE** is my own work and that all the sources that I have used or quoted have been indicated and acknowledged by means of complete references.

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“In the past, people tolerated pollution as a necessary price to pay for progress. When coal replaced waterwheels in the factories, smoke polluted the air. Dirty skies meant that jobs were plentiful.”

Enger, Kormelink, Smith and Smith (1986:375)

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Abstract

Recent and past events in the South Durban Basin (SDB) have highlighted the possible connection between perceived air pollution concerns and deteriorating health. The aim of this study is to explore how the SDB community perceives air pollution and if this can be related to some of the health problems that are experienced in these communities. The ultimate aim is to determine whether the respondents connect air pollution to specific illnesses and also how they perceive the actions used to combat air pollution and its negative health impacts. This information is gathered through a questionnaire conducted in various study areas both within and outside the SDB, then compared with demographic variables. This is done to determine if perception is related to direct industrial activity or if there are other factors influencing results. Variables such as race and level of education had little impact on the results. The results showed that areas within the SDB experience a high neighborhood satisfaction despite the current general belief of air pollution being connected to ill health. The control areas outside of the SDB support theories of gender and race and its relationship to air pollution, currently presented by researchers in the perception field. Strong associations do exist between general environmental satisfaction and gender. Perception of current legal enforcement is exerting a strong effect on air pollution perception formation. Vitally important is the connection of daily concrete experiences of air pollution with the lack of transparency and communication between industry and communities. It is resulting in the current perception of illness being connected to tangible air pollution. The aim is to further future studies on establishing links between health and air quality. Gaining insight from the study of public risk perceptions based on local knowledge and experience in particular places, will help shape the role of environmental policy and management response systems.

Key terms

Perception; Gender differences; Air pollution; Stigma; Industry; South Durban Basin; Communities; Legal enforcement

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CHAPTER 1

INTRODUCTION

Air pollution is one of many environmental issues confronting the world today (Bickerstaff and Walker 2001:133). Public anxiety over the possible adverse health impacts of air pollution has increased over the years. An example is the concern which has been directed at the possible connection between air pollution and childhood asthma (Hunter *et al* 2003:227). This increase in environmental awareness since the 1980s coincided with a time of political and social transformation in South Africa's history. This heightened environmental awareness resulted in the concern of how to manage these risks, as not only businesses but also the public are influential in directing policy formulation for the management of air pollution (Bickerstaff and Walker 2001:133; Kotze and Van Wyk 1994:29).

Knowledge of peoples' perceptions of environmental problems is important, as it reflects the social dimensions and circumstances in which people live. This knowledge helps to ensure that policy and communication frameworks achieve change in public attitudes, thereby acknowledging the importance of the understanding that people have of air pollution. People recognize that not all pollution can be experienced by the senses; therefore perceptual cues are taken from the environment. Little research has been done on how perceptions of environmental issues are formed. If this information is used correctly, it has the potential to improve and develop appropriate policies and programmes aimed at decreasing air pollution levels and associated negative impacts (Bickerstaff and Walker 2001:137).

1.1 Importance of perception studies

1.1.1 In general terms

Perception knowledge is vital in order to have a sustainable world requiring participation of everyone, providing knowledge, making decisions and changing daily routines. Air pollution studies differ in the emphasis being placed on the human implications (perceived impacts) of air pollution and people's responses in terms of attitudes and behaviour. It is not possible to ascertain from combined research effort whether people are actually perceptually aware of polluted air in their environment or if they are more likely to base responses on media

coverage. Use of perception about the severity of air pollution, on an individual or population level, has not gained general acceptance as a suitable measure of environmental exposure. Indeed a recent monograph on human exposure assessment did not even discuss people's perception as a marker for pollution severity (Hunter *et al* 2003:228).

If people's perception gains acceptance as a measure of exposure to environmental pollution, it would offer advantages such as cost effective estimates of geographical variation in long term pollution damage estimation. Secondly it has been argued that some of the health effects of pollution are caused by psychological mechanisms that are related to people's perception of a threat. Research done by Hunter found that people with respiratory disease report higher pollution levels than the mean average of people in their area. This has suggested recall bias as a cause of the associations i.e. they are more aware of poor air quality as their respiratory symptoms become worse therefore they over report exposure (Hunter *et al* 2004:1-6).

Policymakers thus cannot rely on scientific information alone to drive a public decision-making process, but must also consider location-based factors, the specific make-up of the population, and the avenues through which this population receives information on environmental conditions.

Specifically, public programs must account for each cultural group's perception views regarding air quality through education and enforcement strategies, therefore making residents more accepting of cleaner air initiatives. If the news and media is critical in shaping public perception of air quality, government organizations must ensure that television, radio and printed news sources receive accurate information, convey this information in an easily understandable format, and reach a broad audience. Education campaigns should also be implemented outside of media channels to make residents in local neighbourhoods aware of how their individual behaviour can adversely impact on air quality. Education based strategies should be aimed first at those parts of the population who believe that the air is polluted, whether it is consistent with air quality readings or not (Brody *et al* 2004:1571).

Awareness of air quality is not universal, it is the social and physical encounters within an area that are important in the development of perception. An individual's belief about his / her symptoms and the potential causes of the symptoms has a big impact on their illness behaviour, especially in the case of respiratory illness. Few studies have sought to connect illness to subjective perceptions of environmental pollution. Research done by Hunter *et al* (2003:230-236) has shown, that people's illness-related behaviour were a product of their

opinions and attitudes. Many illnesses, including respiratory illnesses, were either partly or totally related to psychological factors that included a person's beliefs about illness. Studies that only concentrate on the relationship between ill health and pollution is flawed unless consideration is given to respondents' perceptions and socio-behavioural factors.

Issues of air pollution exposure and socio-economic disadvantaged conditions are of special concern in rapidly developing regions, which often have widespread poverty in conjunction with high air pollution levels that typically accompany industrial and economic growth. The proper evaluation of health effects associated with air pollution and socio-economic factors is of paramount importance in establishing the real costs of development and lack of air pollution control policies, and in the distribution of those costs among segments of society. (Bell *et al* 2005: 526)

1.1.2 In terms of the South Durban community

As stated in the previous section an individual's belief about his / her symptoms and the potential causes of symptoms has a big impact on their illness behaviour, especially in the case of respiratory illness. There has been little research done that has sought to connect illness to subjective perceptions of environmental pollution, as indicated by the following quote about the South Durban community:

"Industries in South Durban constantly relay the blame between each other. None of the industries have taken responsibility for the health issues of South Durban, yet they are to blame. Chemicals released by these industries cause heart, kidney and liver damage. ENGEN refinery has never done anything to help these community residents afflicted with these ailments directly linked to the chemicals used in their process and which are released over homes 24/7. Their close proximity to residents makes them our No 1 in regard to detrimental health in South Durban" (SDCEA: Community News 11 December 2007:6).

As stated by Hunter *et al* (2003: 230-236) people's illness-related behaviour can also be a product of their opinions and attitudes. Many illnesses including respiratory illnesses could be caused partly or totally by psychological factors including beliefs about illness. Therefore research that only concentrates on the direct relationship between ill health and pollution will be flawed unless the respondent's perceptions and socio-behavioural factors are considered as well.

"Since the end of the Apartheid Era and the South African elections of 1994, community representatives and community groups in South Durban have become increasingly vocal in their opposition to industry management practices and to the levels of pollution that impact on their communities" (Nurick and Johnson 1998:233).

Consequently, Durban initiated an LA 21 program (Local Agenda 21), with the goal to develop an environmental strategy and action plan for the Durban Metropolitan Area based on the principles of sustainable development and community participation. As part of the second phase of the (LA21) program, a strategic environmental assessment (SEA) was initiated by Durban council in 1994, with the aim of drawing up a policy or planning framework that could provide a means of addressing the environmental implications and guidelines for future policy development (Nurick and Johnson 1998: 233-250).

A critique of the SEA done by the SDCEA (South Durban Community Environmental Alliance) in July 1999 found flaws in the research. (SDCEA 1999:3) The SEA team presumed that the community included knowledgeable people with an elevated level of understanding of all technical issues and their implications. This was not the case as community involvement was ignored throughout the whole process thus causing the community to be marginalised. The LA21 had as one of its core principles to form partnerships with stakeholders for planning, decision-making and collective responsibility. Stakeholder meetings were held but there was no invitation for collective decision making with the community. It was generally felt that the SEA failed to meet community expectations. For example, the community felt patronized during the process of providing comments, which inhibited their ability to comment and register their concerns with the stakeholders (SDCEA 1999:3).

The process has not been transparent and ignored areas of significant community concern, particularly areas of exceedingly high risk such as pipelines, transport, storage and refining. The SEA has not engaged core groups most notably the African and vulnerable groups (such as the poor etc.) in the area. As stated, the community input was important in the SEA process but not all findings and feedback from the limited consultation process has helped to steer strategic development along more socially acceptable lines (SDCEA: 1999:1-10).

A recent health risk study showed that school pupils living in the SDB (South Durban Basin) have one of the highest recorded asthma levels in the world. This has raised the communities' consciousness of air quality level regulations and their adequacy in protecting their health (Robins 2002:3).

The focus of the majority of health studies done in the SDB so far has been on measurement of specific pollutants in relation to human health impacts. One important neglected element in these studies is the personal and collective belief in the community about the quality of their environment and the risks that it poses to their health, as shown by Hunter, Davies, Hill,

Whittaker and Sufi (2003:235). A recent example is the explosion at the Island View Storage Depot in 2007. The South Durban Community Environmental Alliance is concerned about the lack of an evacuation emergency plan that is known to local residents as well as unanswered questions about the toxicity of chemicals in the tanks that exploded (Mercury: September 19:2007). (Refer to Appendix 1 at the back of the dissertation)

1.2 Research objectives

The aim of this study is to explore how the South Durban Basin (SDB) community perceives air pollution and if this can be related to some of the health problems that are experienced in these communities. The design of the study will make provision for a methodology to discover and analyze the perceptions of the residents living in the South Durban Basin, to determine whether they connect air pollution to specific illnesses and also how they perceive the actions used to combat air pollution.

These perceptions will then be taken and compared against demographic, socio-economic, socio-cultural and geographic variables. By collecting data concerning social, cultural and economic variables, the research aims to determine how these variables might be connected to the way people interpret a potential risk in their living environment. This information is gathered through the questionnaire, requiring demographic information such as gender, ethnic group, education level and age. Geographic variables are determined by choosing various study areas within as well as control (outlying) areas surrounding the South Durban Basin. This is done to determine if perception is related to direct industrial activity within a person's home area when compared to other areas outside the South Durban Basin. This information is captured with questions requiring participants to state the area they reside in.

The results of this study can be taken into account when monitoring the impact of industry on the perceivable environment, for the identification of locations to monitor air pollution as well as in decision-making about the health impacts of air pollution. In understanding public perceptions about the links between air quality and health, the focus of research should be as much on the contextual characteristics of places as on people. By illustrating the insights that can be obtained by exploring public risk perceptions based on local knowledge and experiences in particular places; the study should help contribute to future work on the links between air quality and health (Howel *et al* 2003:170).

Gaining perception knowledge from the Durban South community will help in guiding future research and policy development. Perception information has implications for better communication initiatives and education programs that are easily understood by community members. Investigating the aspect of stigma (place and person) will shed more light on how people form perceptions of factors influencing their health, including how such perceptions differ for each local area. Addressing both the actual exposure and perceptions' of ill health believed to be caused by air pollution, will show how daily concrete experiences of air pollution play an instrumental role in the development of the view that disease and illness are related to air pollution.

The specific objectives to be achieved and contribution aimed by this study are as follows:

- To discover and analyse the perceptions of residents of the SDB about air pollution and illness and whether it was thought that illness was related to air pollution.
- To discover and analyse the perceptions of residents of the SDB about actions to combat air pollution.
- To relate these perceptions with relevant variables (socio-economic, socio-cultural, demographic and geographic).
- To suggest how this information can be used in:
 - Development of quality of life indicators.
 - Decision-making about health impacts of air pollution.

1.3 Relevance of the outcomes of the research

In recent years, there have been increasing public and professional concerns about the potential impact of air pollution on health, which has been reflected in many epidemiological studies (Howel *et al* 2003:163). Despite calls for a 'lay' approach, there are relatively few studies in perception formation which have adopted an approach based on public understanding and lay knowledge surrounding environmental risks to health, even though health risk perception plays a continuous role in the public response to environmental exposures. Although there has been research in risk perception studies that identify factors affecting perception, there have been few studies that explored public perception of health risk due to air pollution. By gaining insight from the study of public risk perceptions based on local knowledge and experience in particular places, this study will help in future work establishing links between health and air quality (Howel *et al* 2003:163).

Conclusions about air pollution perception have implications for policy and public communication initiatives aimed at air quality and environmental improvement. Current research related to air pollution reflects a strong techno-scientific epistemology with emphasis on a demonstrated understanding of the chemical processes that are involved. There is a lack of research on the psychological and behavioural responses to air pollution, especially concerning the social side (Bickerstaff and Walker 2001:134).

Without a greater sensitivity to the everyday contexts in which individuals and collective understandings are set, appeals to individual action are likely to fall on deaf ears (Bickerstaff and Walker 2003:60). There is a need to identify individual and contextual factors that mediate perception of exposure in order to illustrate the connection between air pollution and health. This will bring better understanding of the fundamental role of place in perception and also illustrate the importance of place stigma and identity in framing risk perceptions associated with air pollution. There is a growing awareness of possible health threats associated with industry. This results in public risk perception playing an increasingly important role in shaping environmental policy and management response systems (Brody *et al* 2004:1561).

By improving our knowledge of major factors shaping public perception of air quality, the local setting and socio-economic characteristics in the formation of these perceptions need to be examined as well.

1.4 Definition of concepts

Perception - the way people notice things, especially with the senses. In terms of this research it is the cultural and social factors that influence the way people interpret and make sense of risks. These are the cognitive and attitude processes where a certain hazard is viewed to be risky or not and what factors are also playing a role in the interpretation. Such factors are a person's beliefs, judgments, attitudes and the social dispositions they develop towards a certain hazard. It also shows how the public draws upon the physical experience of the senses such as smells, visual icons, health effects even social networks to form an opinion of a certain hazard (Bickerstaff 2004:827-835).

Having a detailed knowledge of a community's / people's perception is important for participation in future policies / programmes in order to develop to a shift in personal behaviour (Bickerstaff and Walker 2001:133).

Quality of Life Indicators - personal concerns identified by a community that show the positive and negative aspects of their community. There are a range of factors such as living conditions and access to local facilities that tend to vary from group to group. These links that people form with their environment start a process where these specific community based indicators develop a framework to monitor and evaluate industrial activity. These issues are also related to quality of life and industry which also change over time. These indicators of concern are crucial in monitoring local development policies and action (Nurick and Johnson 1998:233-240).

Stigma - it is the feelings of disapproval towards living in a particular area or place. In perception formation it is the contextual characteristics of a place as well as daily experiences of pollution which play a role in how people feel about their immediate environment, and which is important in the formation of perceptions (Hunter *et al* 2003:235-236). Stigma also arises from public perception that labels a certain industry or technology as unduly dangerous. The proximity to an industrial source affects the contextual characteristics of a place which can lead to a perceived relationship between air quality and health.

CHAPTER 2

PERCEPTION OF ENVIRONMENTAL ISSUES

“In the past, people tolerated pollution as a necessary price to pay for progress. When coal replaced waterwheels in the factories, smoke polluted the air. Dirty skies meant that jobs were plentiful” Enger, Kormelink, Smith and Smith (1986:375).

Over the years there have been numerous concerns both in the public and professional domain about how air pollution affects health. This has resulted in a large number of health studies but only a handful of these have used an approach where a community’s knowledge and understanding has been taken into account (Howel *et al* 2003:163).

There has been very little research that explored public perception of the risks to health associated specially with air pollution. The frequently observed differences between the lay publics’ perception of environmental and technological risks and that of scientific and policy experts has for long been a cause for concern and even unease among those that are responsible for the management of these risks, especially how social and cultural factors influence the way in which people understand and make sense of a certain risk (Bickerstaff 2004:827).

2.1 Personal cognition and how perception and environment connects.

Relationships between air pollution and people demonstrated in Figure 2.1 illustrate that an individual’s beliefs (aspect B) about his / her symptoms and the potential causes (aspect C) thereof have a big impact on illness behaviour (aspect D). It was almost 50 years ago that research showed that peoples’ illness-related behaviour was a direct result of their opinion and attitudes. Many illnesses, especially respiratory illnesses, have their root causes totally or in part in psychological factors that include beliefs about illness. Yet despite this, few studies have sought to link illness to personal perceptions of environmental pollution (Hunter *et al* 2003:228).

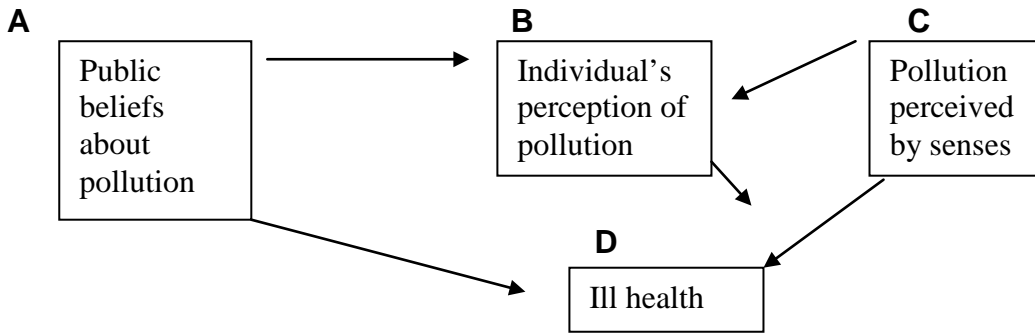


Figure 2.1 Model of the relationship between air pollution and self-reported illness.

(Diagram adapted from Hunter *et al* 2003:235)

“Much of the research effort that has been done especially recently has been focused on trying to improve measures of exposure. However, it is suggested that this focus on the measurement of specific pollutants, though important, has the risk of missing out on an important aspect of disease causes and origins, that of personal and community belief about the quality of their environment and the risks this may pose to their health” Hunter *et al* (2003:228).

Studies that concentrate on the relationship between ill health (aspect D) and environmental pollutants (aspect C) will be flawed unless they consider respondents’ perceptions (aspect A) and socio-behavioural (aspect B) factors, as demonstrated in Figure 2.1. It is strongly argued that epidemiological studies of the association between air pollution and ill health need to address both actual exposure and the populations’ perception about the risk (Hunter *et al* 2003: 236).

2.2 The spatial connection

With regards to the spatial aspect, awareness and concern of air pollution is greatly influenced by where a person lives. Therefore an understanding of how a person’s view of air pollution is formed and why it differs according to the place where they live is required.

Research has shown that the mere presence of an industry can produce a stigma effect in the case where a community lives adjacent to industries. This causes a negative perception of the area (which results in aspect B - see Figure 2.1), as well of the quality of life for community members. It was argued that people make assessments of their health (aspect D) based on their personal knowledge and experiences (aspect B), thus meaning associated with risks are localized for each area (Bickerstaff 2004:832).

If individual reports of exposure are to be used in epidemiological studies, it is important to understand which factors affect such reporting, other than actual air pollution levels. An

individuals' bias towards pollution is likely to be caused by many factors (including location aspects, which are the focus here). Provided these factors are randomly distributed between populations, this will not lead to a systematic bias in the estimate of air pollution. However, if shown to be caused by factors that show substantial variation between geographical locations, then this would undermine the use of annoyance scores as a measure of air pollution (Hunter *et al* 2004:2).

There are gaps in air pollution research that give only a basic view of perception, as the social and cultural dimensions have not been investigated. Bickerstaff and Walker (2001:137-139) recognized that changes in socio-cultural systems play an integral role in perception formation. Being satisfied with the physical appearance of the neighbourhood, respondents would not rate air pollution as a problem, whereas respondents that are less satisfied with their local area are more likely to rate air pollution as a problem. A physical experience and information source of air quality awareness is also supplemented by lay personal experience. For example, negative perceptions of areas are associated with low socio-economic status together with a high source concentration of industry in close proximity. As awareness of air quality is not universal, it is the social and physical encounters within an area that are important in the development of perception. Research shows that industry is usually perceived as the main polluter, especially at local level. This emphasis on industry as being the main source of pollution has been shown to reflect not only the sense of spatiality of local areas but also temporal or historical geographies.

Early studies showed a difference in the evaluations people made about air pollution in their local neighbourhood relative to the wider region. People tended to associate air pollution to communities that are disadvantaged or marginalized and living closer to industry. For example, it was found that individuals tended to rate the air quality in their neighbourhood as much better than in the city as a whole. What is important here is also the geographical distance from the perceived source of maximum pollution. Relating the problem of pollution to others is influenced by two processes: people sense of power over their space, as well attachment. Research done by Bickerstaff (2004:833) showed that peoples' sense of power over spatial and issue domains tends to result in them relating a problem such as air pollution to another area.

This means that people who feel that they have no control over their geographical circumstances and no political or economic routes of escape expressed the strongest concerns about being trapped in a polluted environment. For example, in researching the

perceptions of various groups of residents living next to heavy trafficked roads (Bickerstaff 2004:833), it was found that people who had the strongest opinions about air pollution had little interest to act against it. What is evident is the relationship between power, inequality and the meanings people attach to risk in communities that are or have been marginalized by means of geographic, economic, social or ethnic isolation. This suggests that the spatial reach of air pollution exerts an influence over a person's agency to act in a meaningful way (Bickerstaff 2004:832).

This aspect was also highlighted in a study done by Howel *et al* (2003:163). Two districts were chosen: one was dominated by heavy industries consisting of petrochemical and steel complexes. The other district previously had heavy industry but was now characterized by lighter industry; there was also no general concern over air pollution in the area. In the first district three residential areas were chosen that differed in distances from industry and material deprivation. In the second district two residential areas were chosen; one affluent and the other materially deprived, but both not in the vicinity of any heavy industry.

The research revealed that those interviewees that lived closest to industry felt that air pollution was a problem affecting their neighbourhood. Communities further away from industry, however, tended not to regard air pollution as a problem. This highlights the geographical viewpoint of proximity to industry, as supported by a study done in Northeast England. It was found that self-reported respiratory symptoms plus the belief that emissions from industry affected ones' own health and knowing of people suffering from ill health, increased the closer residents were to industry (Howel *et al* 2003:169). The presence of an industry nearby therefore frames a resident's view about links between air pollution and health (Howel *et al* 2003:170).

In addition a person's socio-economic status, cultural ties and past experiences influence how environmental quality is perceived, as well as reaction behaviour in order to change the quality of the natural environment (Pendleton *et al* 1999:2).

2.3 Geographical realities of the immediate environment

According to Bickerstaff *et al* (2004:2) studies dealing with air pollution and people in geographical situations need to consider how the role of daily concrete experience is perceived by the general public. Peoples' perception of risks caused by environmental and technological issues differ from those of scientific experts. A number of reasons can be put

forward to explain the observed differences, but it is a person's social and cultural circumstances that determine his / her immediate reality.

"All of the studies undertaken in geographical situations associated with urban and industrial air pollution problems stress the role of practical everyday experience in how people come to know air pollution. These studies show how understandings of polluted air are embedded in daily life through the senses and the body" (Bickerstaff and Walker 2003:50).

A study done on the public understanding of air in a major urban area showed that a wide range of non-human agents were involved in peoples' development of meaning about this issue. These include the physical concentration of perceived sources of pollution such as a cluster of industries, and the visual effects that are observed on the environment, especially vegetation, such as its colour and growth (Bickerstaff and Walker 2003:50).

A large number of studies stress the role of vision where physical dirt is seen as matter out of place as it invades persons' boundaries of space. Even smoke and fumes that are emitted from a pollution source are part of the physical experience. The overall factor underlying all research done was that sensory awareness causes anxiety and threat to order.

Bickerstaff and Walker (2003:52) suggested the culture of everyday life to be at work in a subtle way, with a person's habits, norms and practices all contributing to the interpretation of air quality information. For example, concerning the history of air pollution of London the language and understanding of air pollution can be observed in the country's art and poetry, such as Lord Byron's 'Don Juan' and Dickens's 'London ivy'. Therefore a person's understanding and experience of air pollution is culturally biased.

"Local experience of industry is important in forming ideas about pollution, these ideas became more strong if the products that industry produced were in some way taboo or tainted either through powerful visual imagery of pollution or where historical experience such as memory was negative for example views could be influenced by memories of toxic incidents sometimes passed through the community over long time periods. If industry and the communities' memory did not associate with dirt and contamination attitudes tended to be ambivalent" (Bickerstaff and Walker 2003:53).

Therefore concern and awareness of air pollution is influenced by how people experience living in their neighbourhood environment. For many people air quality is spatially bound, living near an industry or motorways it would be perceived that air pollution is a problem.

2.4 Socio-economic factors

Interview research done by Bickerstaff and Walker (2001:139) has shown that two of the most important elements underlying concern for air pollution are a person's socio-economic status and the environmental quality. Least concern was shown by people staying in higher status areas, whereas most concern was shown by those staying in lower income areas. The apparent explanation is that perception is based on the physical attributes of the area, in other words, aesthetic qualities. Where deprived groups in society are restricted to areas of low environmental quality, it is these conditions that result in apathy towards the environment. The work of deGroot (1966) as cited by Bickerstaff and Walker 2001 suggested that an intense dislike for a person's neighbourhood results in a halo effect of undesirable elements in the community, including the rating of air pollution as a serious local problem (Bickerstaff and Walker 2001:134).

By taking a socio-cultural perspective it is argued that a person's perception, as well as response to a risk, is shaped by a range of social, cultural and political factors that are grounded in everyday life experience (Bickerstaff 2004:827; Brody *et al* 2004:1562-1563).

2.4.1 Economically and socially marginalized people

Society is made up of many groups that have different attitudes, perceptions of risks and values that are important to make an acceptable decision to lessen the result of the risk.

An example is Teesside England where a study done by Bush *et al* (2001:53) showed that two communities living at a distance from the source of pollution tended not to associate themselves with air pollution. They tended to attribute air pollution to 'poorer' people that live close to industry. It was seen as belonging to distant 'Others', those communities who live close to industry due to industrial development and socio-economic deprivation. Bickerstaff and Walker (2001:137) realized that there is a relationship between affluence and the way in which people living in poverty is perceived. They found that affluent individuals perceived that deprived society members were restricted to areas of low environmental quality, which causes physical deterioration and social apathy. These people identified their air quality worse than for the rest of the city. Their desire to escape the situation was hindered by no opportunities, which leads to a sense of powerlessness.

According to Bickerstaff (2004:830) attitudes displayed towards risk or danger vary according to cultural biases and to the social and political organization of a person's environment. These attitudes have direct relationship with a person's perception.

Economically and socially marginalized people including women, the politically marginalized, the less affluent and the elderly - in research done by Johnson (2002:726) - rated health risks from hazardous chemical waste sites and from global warming higher than white men. This might be the result of a shared sense of vulnerability to negative effects. Outdoor air quality was rated a high health risk by women and by other politically and / or socially marginalized groups such as African Americans, Asians and Hispanics in the USA.

Men from minority groups in the USA were more likely to report not understanding air pollution information, have more concern about health risk relating to these air quality information reports. The researched minorities were more attentive audiences for information about protecting oneself personally from air pollution. They were also more than likely members of the majority USA culture to rate local air quality as poor and being sensitive to health problems caused by above average air pollution levels. Further research could clarify why and under what circumstances minorities such as these react more strongly to air pollution information and how to make information more understandable and pertinent to their needs. In the USA, where this research has been conducted, non-whites are indeed a minority, but also as a group less affluent, and with a historical legacy of being concentrated in certain areas (Johnson 2002:729).

It was hypothesized that minority groups, especially those that are socio-economically marginalized due to politics, are often located closer to air pollution sources and therefore were more vulnerable to associated health risks (Brody *et al* 2004:1563).

A study conducted by Brody *et al* (2004), pointed towards a relationship between perception of air pollution, age and the history of the area where people stay. What Brody *et al* (2004:1570) also found was that on average non-white older community members in the Houston area of Dallas Texas believed that the air they breathe was less polluted than what the white population believed. This contradicted research done by Howel *et al* (2003:169) in the UK, which found that older residents were more likely to rate local air quality as low. This was said to be the result of them having past memories of bad pollution incidents.

Howel *et al* (2003:169) found that in the study of age, the perception that air pollution caused asthma and lung cancer declined with age, but the view that bronchitis was affected by air pollution increased with age. The reason for the link is unclear. Personal experience of an illness may be influenced by a person's view of the possible influences on the illness. It was found that many sufferers were from the poorer areas, therefore material deprivation needs to be taken into account. The awareness and concern about air pollution is greatly influenced by the personal experience (interpersonal interaction and conversation) and local setting that is especially prevalent in the low socio-economic areas. High incidences of asthma in children are offered as evidence of the risks associated with air pollution.

2.4.2 The unemployed versus the employed

Research done by Bickerstaff (2004:832) highlighted the results of a study conducted in the 1980s, which showed that respondents who were divorced, low income earners or unemployed, over estimated the amount of people dying from pollution. It was argued that if someone is in a situation different to the rest of society, due to a vulnerable and insecure social position, they tend to overestimate risks. It was also mentioned that the most economically and socially disadvantaged participants namely the unemployed exhibited a greater distrust of government departments. This was attributed to their alienation from participating in any decision-making processes.

USA environmental justice literature in which quantitative population and source indicators are used, show that pollution hazards are disproportionately located in poor and marginal communities. Studies by Bush *et al* (2001:48) had shown that communities living in proximity to stigmatized technologies suffer from the social stigma of high poverty levels, unemployment and crime. This combination is referred to as a faulty environment.

It was found that people in the low socio-economic status areas and / or sufferers of air pollution developed health problems not from technical comprehension of air quality reports, but from alertness to the physical environment. In other words what the prevailing weather conditions are when the physical effects of air pollution are at their worst. Physical experience and information sources of air quality awareness were modified and supplemented by another source of secondary evidence, namely 'informal experience', which includes interpersonal interaction and conversation.

A completely different relationship was found in higher socio-economic status areas where the least concern was voiced. It showed that concern was more intense in the working class areas compared to high status areas, even if the perceptions of the environment were similar. This demonstrates the independent influence of 'social class'.

The following three sources of explanation were suggested by Bickerstaff and Walker (2001:139) and feature in social constructions of perception:

- Perception could be viewed as the rational outcome of logical human cognitive processes based upon the source, physical environment and spatial attributes of the local area.
- The role of financial empowerment – for example economic routes that are open for an individual that will alleviate poor air quality such as moving out of the area.
- Public reluctance to recognize negative environmental conditions within the immediate location.

If these three explanations are connected, the implication is that lower socio-economic status is associated with lowered air quality and lack of group or individual empowerment to secure change. The negative social and physical conditions (greenery and visual pollution) of the environment generate a propensity to dislike the neighbourhood and attach a range of negative attributes to the local area.

Research done by Bickerstaff (2004:832) summarized the following observations, namely that people who are the most economically and socially disadvantaged show greater distrust than other groups towards industry and government. This is especially prevalent among unemployed men, which could be the result of alienation from decision-making processes and their economic marginalization. Middle class people, however accept that authority figures (experts and managers) have competence, but at the same time feel that they can challenge authorities if need be. This information demonstrates that a lack of personal control over one's life negatively affects trust judgment.

2.5 Socio-psychological aspects

Only a few research studies on the relationship between ill health and environmental pollutants used an approach based on public understanding and local knowledge. It was noted that risk perception is important in the public's response to environmental exposures. In a study by Hunter *et al* (2003:236) it was argued that research about the health impact of air pollution

concentrating only on chemical exposure will be flawed unless placed in the context of perception and socio-behavioural factors. Therefore it is strongly argued that epidemiological studies of the association between air pollution and ill health needs to address both the actual exposure and population's perceptions about the risk.

2.5.1 Social constructions of risk to human health

Society is composed of different groups, each having different attitudes towards and judgments of what risk is and the values that are relevant to making acceptable decisions. A study done in the 1980s of risk perception, specifically in the field of cognitive psychology showed that people, who overestimated the frequency of death to pollution and nuclear technologies, were more likely to be divorced, have low incomes or be unemployed. It was found that those who underestimated the frequencies of death were more likely to have higher education and an income. Thus it was argued that if people, who are in a state of insecurity and in a vulnerable position, can lead to an overestimation of risks of a perceived threat. In an area a low socio-economic status, a high source concentration of industry in close proximity to residents and the role of local knowledge in the community influences the formation of air quality perception. According to research done, there are different sources of explanation for the relationship between socio-economic status and local air quality perception (Bickerstaff and Walker 2001:142).

In the first instance it could be viewed as the result of human meanings based on the state of the physical environment, closeness to source of perceived pollution and the spatial character of the area. What is important, is the general environment, in other words the level of vegetation or greenery that is present there, aesthetic qualities represent something that is natural. The management of the physical environment such as refuse removal and the prevailing public view also forms part of the processes of perception construction. Consider, for example, the case of deprived individuals restricted to areas of low environmental quality, with these conditions causing public apathy, environmental abuse and physical deterioration.

The second argument pertains to a person's economic situation and the financial routes which are open to a person to help alleviate the problem of poor air quality. If residential location is chosen by an individual, their experience of the environment is more likely to be positive. But where someone is dictated to where they live either through economic constraints or political decisions, such as the Group Areas Act during the Apartheid era, the environment will be

negatively experienced. This is especially seen in marginalised socio-economic groups and those who feel powerless over their immediate situation (Bickerstaff and Walker 2001:142).

2.5.2 The psychology of risk perception

Perception research is the result of an attempt to understand and shorten the gap between expert and the public perceptions of risk. The tendency for public perceptions to be different from those of the experts has usually been attributed to public ignorance of the scientific / technical aspects of a particular issue being studied which is summed up by the quote below:

“...a diagnosis that exemplifies what has been labeled the ‘deficit’ model of public (mis)understandings of science. Early research into public perceptions of urban and industrial air pollution adopted this public ignorance perspective” (Bickerstaff 2004:828).

A large amount of research during the 1990s was mainly focused on attitude surveys. It was found that few people expressed concern about air pollution even if living in a heavy polluted area. This is because everyone’s perceptual experience of where they lived differed, even though it was the same place. More recently research has begun to explore a range of social factors such as values, gender, race, emotions, trust and stigma in shaping risk perception (Bickerstaff 2004:830).

Research recognized that psychological studies of risk perception showed that few people spontaneously expressed concern about air pollution, even if they lived in a particularly heavily polluted area. It also showed that direct perceptual experience was critical in shaping public attitudes to air pollution. For example, in a study done of Teesside North East England (Bickerstaff 2004:828), the residents acknowledged that air pollution is a problem but there was a difference in views. Residents living close to industry viewed air pollution as a problem and were aware of the fact that outsiders saw Teesside as being a polluted area. Residents living further from industry accepted that air pollution was a problem in Teesside due to industry but did not feel that air pollution affected their community (Howel *et al* 2003:168).

This means that perception factors were the underlying aspect causing this difference in understanding (Brody *et al* 2004:1562). It then could be the result of residents living near industry suffering a stigmatized identity. Daily experiences of concrete air pollution played an instrumental role in developing the view that illness was attributable to air pollution. This evidence suggests that factors such as closeness to industry as well as residing in a community where concern for air pollution was present influenced a negative perception of the environment, indicating the importance of neighbourhood identity in the formation of perception

(Howel *et al* 2003:168). A study done by Johnson (2002:737) in the USA (Philadelphia) showed differences in views and attitudes across groups defined by gender and minorities. Minorities in this case African Americans, Asians and Hispanics would rate air quality as poor and be more attentive to air quality information.

Information, awareness and exposure to risk communication messages are considered the most important predictors of risk perception, as the media can increase the social construction of risk to human health. This social construction is a person's mental model of reality, with individuals using the model to explain and predict the outcome of certain phenomena. It is these models that help a person to understand complex systems or problems. These mental models, however, are incomplete, unscientific and have ill-defined limits and it is due to this aspect that wide variations in perception are seen. Few studies have examined the interaction of gender and ethnicity in attitudes, behaviour and risk beliefs. An understanding of these differences is imperative in the future development of plans to communicate information about air pollution.

2.5.3 Identity and power with regards to demographics

In USA based psychological studies, a central idea that ran through research was differences in world-views, control and socio-political factors that could be key determinants of gender and cultural differences in risk judgments. Risk perceptions may then reflect values about technology and the impact on society (Bickerstaff 2004:832).

The conclusions that were made seemed to be consistent with other research in the USA, which highlighted how pollution hazards seemed to be disproportionately concentrated in poor and marginal communities. Studies conducted in the UK and North America had shown inequalities in the distribution of industrial and urban air pollution risks by race and / or income (Bickerstaff 2004:833).

The research revealed that these inequalities were mainly due to political and economic processes of the society in which these groups of people lived. According to Bickerstaff's research, a very similar pattern was occurring when people, especially those that were wealthy, allocated the problem of pollution to other places or poorer communities. It was argued that due to peoples' sense of power to act in a meaningful way over their living environment they had the financial and political means to escape the situation.

“What is then evident in these studies is the relationship between power, inequality and the meanings people attach to risk in communities which have been marginalised by positions of economic, geographic, social or ethnic isolation” (Bickerstaff 2004:833).

Findings from a number of North American quantitative surveys indicated variations between demographic characteristics, such as gender and sensitivity to risk. In one such study risk perception was explored in relation to gender and ethnicity, and it was found that advantaged men (in this case white men), stood out when compared to women and minorities (African-Americans and Hispanics) in their perception and attitudes regarding risk. The reason for this is that these members of society are usually more economically disadvantaged, with white men (in the USA) not as likely to see the world as dangerous. This could be due to the fact that women and men of socially marginalized groups are usually in positions of less power and control, which in turn does not allow them to benefit from industry and technologies. Therefore they view the world as more dangerous. It has been suggested that these differences in world-views, control and other socio-political factors could result in the differences seen in perceptions between different ethnic groups and genders. Individuals of a high socio-economic status may be more concerned and knowledgeable about problems such as air pollution and how to mitigate them whereas research done by Bickerstaff and Walker (2001:137) found that groups with a lower economic status rated air quality lower than the rest of the city.

Another important aspect is an individuals' perception of whether or not they have the ability to change their behaviour and situation by influencing the conditions around them. This was mainly influenced by the community they lived in and how they felt with regards to status, power and alienation. It was found that wealthier communities attributed the aspect of poor health caused by air pollution to the poor communities living near industry.

Myers *et al* (1999:116) found significant differences between male and female students' perceptions, namely that women have a greater environmental sensitivity about smoke and fumes as pollutants. However, Howel *et al* (2003:169) found little difference in the views of air pollution between male and female. It was suggested however, that women do tend to express a higher concern for environmental issues that affect local aspects such as living in an area that is in close proximity to industry and strongly associated health impacts. Men felt that pollution caused an unsightly environment and climate change. But these differences, as mentioned above, between men and women tend to disappear where communities are afflicted by other social problems, such as poverty and crime. Bickerstaff and Walker (2001:137-138) found that it was the lower income groups (especially from culturally homogeneous, disadvantaged groups), identified the local air quality as poor and saw

themselves as being particularly vulnerable to respiratory problems. They also did not understand official information about air quality. Women especially showed a higher concern and belief that the air pollution levels they read about pose a serious health risk. North American disadvantaged cultural minorities in general were significantly more likely to expect serious health effects from above average pollution levels. Yet women from disadvantaged groups in the USA, in this case non-white groups, rated air quality information as personally important to them. In addition it was found that male members of these minority groups rated odour and visibility better than female members.

On the other hand, men in an advantaged economic position and who were in a strong political situation were more likely to rate odor and visibility of air quality as good. They rated risks from air pollution lower than women and men of cultural minorities in the USA. In a study by Flynn (1994) as quoted by Johnson (2002:737), a hypothesis was given for this phenomenon. Due to advantaged men having more control and management of the world, they receive more benefits as well as control over their health. They were also less likely to have any respiratory problems or to believe that knowing about current air quality information is important.

2.5.4 Groups versus Individuals

One of the important insights revealed by research is the aspect of a person's power to bring about change in his / her social situation. This power is closely related to their perception of risk. The important aspect was not the control of one individual, but the wider perception of the collective group and / or the community as a whole. This in turn reflects factors such as power, status and alienation of the community.

Research done by Johnson (2002:726) in the USA (Philadelphia) showed that in the mid-1990s there was little evidence on potential group differences and the importance of message, process and social context for these groups in the effectiveness of risk management. Only a small number of studies dealt with cultural differences in risk communication effects or even generic differences in risk or environmental beliefs between minority and the majority cultural groups of a country. An overview of all American research studies showed that there is a higher concern about technological hazards among women and marginalized groups.

Female groups tend to express higher levels of concern over risks from technology and threats to the environment. This tendency is particularly strong with regard to nuclear plants as well as pollution and risks to health from local industrial facilities. This aspect was stressed by Howel

et al (2003:169) in a Canadian study of people living in an industrial neighbourhood. This study showed that all female groups tended to have higher levels of awareness of environmental issues, especially at local level, than when compared with male groups. Therefore females of all race groups are more likely to report the negative effects of air pollution on human health. But these differences seemed to disappear in neighbourhoods that were stressed by social problems and technological hazards. It was seen through interview research Bickerstaff (2004:832) that respondents who had a tendency towards the systematic overestimation of the frequency of risks were in a state of vulnerability and social insecurity.

Where individuals are politically / economically marginalized some interesting factors are noted, males from less marginalized groups such as white males in the USA, stood out in perceptions and attitudes regarding risk due to power differentials. Those with more power and greatest socio-economic advantage are less likely to see the world more dangerous than others. Females and male members of marginalized groups tend to be in positions of less power and control, benefit less from many technologies and institutions and therefore consider the world as dangerous. Studies done by Brody *et al* (2004:1563) on marginalized groups in the USA focused on the hypothesis that these groups tended to be located closer to air pollution sources and therefore are more vulnerable to health risks. But few studies have been conducted to determine why different cultural groups have varying perceptions on the quality of their surrounding air.

2.6 Role of place, stigma and identity

“An emphasis on the role of industry as a key source of pollution has been shown to reflect not only local spatiality mediated through sensory scopes but also temporal / historical geographies. The local experience of industry was important in the construction of ideas about air pollution” (Bickerstaff and Walker 2003:53).

This was more pronounced where the products of industry were in some way taboo / tainted or where historical experience was negative illustrated by the quote above. An example is the study done by Bush *et al* (2001:47-48) that found that Teesside in Northeast England suffered from a spoiled identity through its long association with steel and petrochemical industries. The area was stigmatized and widely seen to have particular problems with air quality. Recent studies showed that ideas about air pollution are to a large extent influenced by the local environmental and social settings of neighbourhoods and how it is experienced and even peoples' cultural practices. Understanding the public framework of idea formation requires gaining knowledge of ways in which localized assessments of air quality are generated, as well

as how and why these differ from or conform to wider regional appraisals (Bickerstaff and Walker 2003:54).

When a community is labeled as having a stigmatized or spoiled identity, the local people themselves often accept this view of their environment as well. In this way, a wide range of negative socio-environmental characteristics are assigned to these polluted places and the people staying there. They then suffer from not only a spoiled identity but, as disadvantaged or marginalized communities, are often powerless to escape or lessen the effects of such stigma.

“In developing this argument the physical agents of pollution i.e. factories are not ignored but these aspects interact with the social and political elements of society that results in a community’s pattern of power and exclusion” (Bickerstaff and Walker 2003:59).

Recent perception studies all emphasized the role of how everyday experience via the senses, especially vision, is how people come to know about air pollution indicated by the quote above. A study done by Howel *et al* (2003:163) showed that daily experiences of highly tangible air pollution played a role in forming the common view that illness in the neighbourhood in this case South Bank (UK) was attributable to air pollution. Opinion surveys done by Bickerstaff and Walker (2001:136) showed that sensory experience (specifically visual experience) was of the utmost importance in how people became aware of poor air quality. Bickerstaff (2004:831) emphasized how local perception is influenced by the collective historical memory of pollution incidents. These historical images cause a stigma to be attached to the area. Neighbours of an industrial facility suffer psycho-social impacts living in the area regardless of whether risks have been established or not. Although research has been done on how stigma affects economic growth, it is the cultural, psychological and social impacts that are significant.

The role of place in understanding the concept of risk perception involves the aspects of stigma and place identity in forming perceptions associated with air pollution. Research needs to focus on the contextual characteristics of place and illustrate insights of local knowledge (daily experience of highly visible and odorous air pollution plays an important role in the belief that illness is caused by air pollution) and how people feel about their immediate environment (Hunter *et al* 2003:235-236).

A study done by Bush *et al* (2001:55) showed that a place could be spoilt on the basis of environmental criteria in the absence of toxic contamination. This geographic stigma arises from public perceptions which label development related to technology as unduly dangerous.

Stigmatized places and technologies appear to have certain features in common a) the source of the hazard elicits high perception of risk and b) violation of a standard of what is regarded as right and natural. Geographic stigma also includes a complex web of factors related to social, economic and historical contexts resulting in spoiled place identity. Other studies concentrated on how stigmatized technologies affect both the identity of the place and of the people living there. An example is the study by Bush *et al* (2001:48) of communities living close to industries with especially hazardous technology. It was found that places that have a stigma also possess a social stigma associated with high levels of poverty, deprivation, unemployment and crime.

It has been shown that communities situated in close proximity to hazardous technologies suffered not only from technological stigma but also social stigma arising from high levels of poverty, crime, deprivation and unemployment, as illustrated by the Teesside study (Bush *et al* 2001:46). Here 12 000 people live within 1km of a large concentration of steel and petrochemical industries. In the 1980s Teesside had the highest unemployment in Britain, industrial air pollution had also been a recurring motif in Teesside's identity as a place and graphic accounts of air pollution feature in many archival documents and literary works. Due to this stigma through historical association with heavy industry, the area was discredited on the basis of poor health. Therefore there was a general view that the Teesside district as a whole suffered from a high incidence of respiratory problems. (Bush *et al* 2001:48) This shows that there is a connected network of relationships that produce spoiled identity and how it is related to space and place.

In the Teesside study the highest proportions of people perceiving an effect were from deprived neighbourhoods, where daily experience plays a key role in framing the common view that illness is attributable to air pollution. Source proximity was seen as the underlying element in the spatial basis of arguments concerning perceptions. Therefore research needs to focus on the exploration of contextual characteristics of an area, local knowledge, as well as experience of a particular place. A place stigmatized through historical association with heavy industry and air pollution results in stigma negotiated at a variety of spatial scales depending on proximity to the industry. Therefore residents nearer to the industrial area will suffer from a spoiled identity and labeling. A strong relationship was seen between poor air quality and poor health. Therefore a certain area, due to its stigma, was seen as a place having a high incidence of respiratory problems. But within the same area disassociation strategies were seen with communities living at a distance from the industry where residents perceived that there were no ill health effects.

This negotiation of stigma occurs when people from outside polluted areas confirm the cleanliness of their own area in contrast to the dirtiness of the perceived polluted area, in other words social and geographical distancing that results in those being closest to industry being associated with ill health. Therefore stigma associated with technologies, air pollution, social exclusion and poor health are strongly interlinked with communities that are close to industry and that have a long history of both industrial development and social-economic deprivation. Communities living at a distance from industry saw air pollution and health impacts as belonging to others, in other words marginalized communities living next to industry. There are many reasons for a spoiled identity but the important ones are a) visual icons of heavy industry and air pollution are important as they are constantly available for perception and therefore define a place historically, geographically and symbolically and b) the significance of visibility in the production of a spoiled identity recognizes the special indignity suffered by those stigmatized. A dirty neighbourhood means an unhealthy neighbourhood; therefore the two reinforce each other. Communities that were the closest to industry held the common view that many people suffered poor health. Inflated percentages were shown to illustrate the perceived association between industrial air pollution and poor health. Children were labeled as asthmatic due to where they lived.

According to Bickerstaff and Walker (2001:134), a 'neighbourhood halo effect' showed reluctance for individuals to attribute a high level of air pollution to their home area. This stresses the importance of neighbourhood satisfaction connected with the physical environment in the formation of environmental perceptions. Respondents less satisfied with their local area are more likely to note air pollution as a serious local problem. This shows that social and cultural aspects shape peoples' perceptions. The importance of the everyday tangible experience of air pollution identified through the senses is influential in forming public perception of air quality. There was increased dissatisfaction with air quality as particulate matter in the environment increased.

All this, or specifically the last parts being mentioned, is echoed by Brody *et al* (2004:1571) as little research has been done since the 1960s, explaining spatial aspects of perception such as proximity, neighbourhood characteristics and location.

2.7 The role of the media

Members of the general public mainly receive their knowledge of environmental issues through the mass media. The media plays an important role in the formation of perception views as well as understanding, illustrated by the quote below.

“By understanding the characteristics of risk information, knowing what is important within that information and conveying these messages through the media of choice, a more efficient and effective use can be made of communication tools, either planned or opportune. Of equal importance, however, are systems to implement change following a successful communication strategy” (The Day After Tomorrow: Lowe *et al* 2005:28).

According to Bickerstaff and Walker (2002:2175) the risks portrayed by the media influence the decisions and behaviours of individual members of the public. Therefore risk-management programs, such as reducing greenhouse gas emissions, need to include the different behaviours presented by different members of society in how people develop an understanding of their environmental responsibilities. Only then can institutional approaches such as new environmental policies be advanced. It is believed through research done by Bickerstaff (2004:832-833) that assigning blame for environmental risks will reflect the political and cultural biases of individuals and groups.

Research done by Frewer (2002) on the Chernobyl accident asked the question whether the media plays a role in forming people's risk perception of a potential danger. One of the hypotheses is that the constant reminder of issues or events such as accidents and / or disasters that are frequently presented in the media, are easily remembered by people of a community. Actual or even hypothesized incidents or accidents will have an extensive impact on public perceptions and behaviours if communicated via the media or by people that have had personal experience of the risk and its effects. Another noteworthy example where media, especially film, had a major influence on public perception and behaviour was the film, “The Day After Tomorrow” which depicted climate change of Earth into new an ice-age. It led to claims of the possibility of having a major influence over the perceptions of society, therefore leading to a change in behaviour and motivating personal change in a people's daily live. The research (Lowe *et al* 2005:28) that was conducted witnessed some changes believed to be attributable to the film. An important part of this communication process is how a risk event is portrayed through risk signals such as images, signs and symbols.

These risk signals can include an increase or even a decrease in information about an event in order to highlight the most noticeable aspects of a message. This can lead to secondary

effects such as a loss of credibility and trust in risk regulators such as government departments, stigmatization and increased risk perception for one important visual aspect of a hazard would become the focus of risk information for the public. Although trust, credibility of risk regulators and information sources are likely to be more important especially for hazards that people feel they have no control over.

There are a number of psychological mechanisms that are used by people in forming risk perceptions. This includes solving a problem by past experiences that can give useful judgments, but it can also lead to systematic biases. For example, people can be too confident in judgments about an issue, therefore preventing an individual from realizing how little they know about a hazard. In relation to media, it is the impact of reporting risk that predicts whether a person will judge an event as likely to happen if it is easily recalled or easy to imagine. Even the reverse is true where no information is given about a hazard, it may be perceived that the information is being hidden for some reason or vested interest.

It is important to emphasize that when people do not have direct personal experience of a hazard, they are inclined to learn about the risk from other people and the media. Particularly is the influence disadvantaged groups have in determining the majorities' reaction to a report of a risk. Disadvantaged groups are both the information sources and transmitters and are also able to influence majority decisions even to a greater extent than majority groups themselves. But it is the way these disadvantaged groups are seen in a particular society that determines the extent of their influence. It has been found that minority groups who deliver consistent messages on a certain subject tend to have greater power over majority groups, especially if they are perceived as being experts on a subject that affects the welfare of the general public.

2.8 Methodological considerations

Consultation of air pollution literature reveals that research about the level of public awareness of air pollution has mostly been conducted through opinion surveys. Through this research two sources of personal cognition have consistently been shown to influence awareness:

- nature of pollution, and
- level of pollution.

It was not possible to ascertain from combined research effort (Bickerstaff and Walker 2001:134) whether people were actually perceptually aware of polluted air in their environment or if they were more likely to base their responses on media coverage. This supports the

neighbourhood halo effect in survey work, where individuals show reluctance to attribute high levels of pollution to their own area. Therefore the importance of neighbourhood in physical experience is instrumental in the formation of environmental perception. If people were not satisfied with their environment they were likely to rate air pollution as a serious problem. Gaps or weaknesses exist in air pollution research effort to date, which is restricted mainly to the chemical processes relating to health effects and measuring techniques. According to Bickerstaff and Walker (2001:139) people become aware of air pollution through:

- direct, personal experience;
- sensory experience; and
- everyday personal experience providing evidence of local environmental risks.

There was also a positive relationship between times when air pollution was high and complaints related to health. This showed that visual indicators such as dirt and pollution influenced perception.

The methodology used in most of the research was the random selection of individuals or households within predetermined areas. Such as in the study by Bickerstaff and Walker (2001:135-136) of Birmingham in the UK, that involved examining perceptions of air pollution. The methodology involved three diverse residential districts that were different in socio-economic status, education level, occupation and car ownership, as well as closeness to a pollution source. The study of Bush *et al* (2001:47) involved the idea of environmental stigma and contaminated communities in the USA and achieved similar results to a study done in the UK. In the methodology they employed, emphasis was given to exploring local perceptions according to different communities that also differed in socio-economic status, proximity of industry and how it related to health. This methodology was employed extensively in the research done by Bickerstaff and Walker (see all references) in their research of public perception in North East England. Howel *et al* (2003:164) employed the same methodology in their study of the same area, but compared how differences in the contextual factors of an area might affect perception of air pollution and its impacts on health.

The methodology used in most of the research (Hunter *et al* 2003:231; Howel *et al* 2003:164; Bickerstaff and Walker 2001:135-136) was the random selection of individuals or households within predetermined areas. The significant differences in previous South Durban Basin research were the age groups covered, as well as method of data collection. (Robins 2002:3).

Areas selected in each of the studies were all in varying proximity to industry in other words one was close and another further from an industry. The areas chosen also reflect different socio-economic, ethnic and demographic information. Data collection was done through a public survey to gain a general idea of the public responses to air pollution and behavioural attitudes. This was then followed up by a small number of semi-structured interviews encompassing all socio-economic groups.

The approach using households rather than individuals has distinct advantages, in that a larger number of people can be covered and that selection bias is avoided. This semi-individual type of study is seen to be more powerful and the appropriate approach for the investigation of the perceived association between air pollution and health. Portions of the total number of respondents in the literature were selected for an in-depth interview on the basis of socio-economic and demographic characteristics. The selection seeks to achieve diversity in behavioural positions in the survey data. It is also important that the contextual characteristics of place are considered and not only people. The focus of research should be on contextual characteristics of places as well as people in understanding public perception about links between air quality and health. Residential choice needs to achieve a cross-section in terms of socio-economic status and proximity to sources of pollution (Egunjobi 1989:60; Hunter *et al* 2003:231; Howel *et al* 2003:164; Bickerstaff and Walker 2001:135-136).

Howel *et al* (2003:170) found that differences in views about air pollution causing illness in the neighbourhood, showed the importance of stigma and neighbourhood identity in development of risk perception.

Due to South Africa's legacy of Apartheid, the emphasis is currently on the inclusion of marginalized people / groups in the development of policies. This is crucial, as the public has a major influence in the determination of future policies and programs dealing with air pollution (Mahler 2005:2; Bickerstaff 2003:827). Policymakers cannot just rely on the collection of scientific data, but need to account for location-based factors, population specific make-up as well as the avenues through which information is received about environmental problems (Brody *et al* 2004:1564).

2.9 Conclusion

Awareness of poor air quality is far from universal; perception research therefore has two potential benefits. Firstly, that past experience from the local community as well as information from both 'expert' and 'lay' knowledge helps to avoid misjudgments in effective decision-

making process. Secondly, having a more systematic and comprehensive appraisal of social and cultural values can help to avoid the policy process becoming bogged down in controversy and confrontation. (Bickerstaff 2004:837) Further research will be flawed in the investigation of the relationship between ill health and environmental pollutants unless a community's perception and socio-behavioural aspects are considered.

An important part of risk communication planning is to establish whether or how much target audiences share pertinent beliefs, attitudes and behaviours. Differences can affect actual risk, as well as the success of communication messages and strategies. Few studies have examined the relationship of gender and cultural roots in risk beliefs, attitudes and behaviours (Johnson 2002:737).

Awareness and concern of air pollution has been greatly influenced by where a person lives. In other words how close to industry an individual resides and how he / she will make assessments regarding health due to personal experiences of industry in their living environment. It has also been implied that a community who has a low socio-economic status is usually associated with low air quality and a lack of group empowerment to secure change. If an individual is satisfied with his / her environment he / she is less likely to attribute ill health to an industry presence in the area. An important aspect that is taken into account in this research is if a residential location is chosen by an individual he / she will experience the environment as positive and therefore feel in control of their immediate situation (Bickerstaff 2004:833; Hunter *et al* 2004:5; Bickerstaff and Walker 2001:139).

A greater sensitivity is needed to the local diversity of the community which would involve the community in drawing up approaches that identify what environmental issues affect them and how they can be involved in designing and implementing policy and communication responses to problems (Bickerstaff and Walker 2001:144).

Findings have also shown that there is gender as well as cultural differences in the formation of perception in that women and members of marginalized (sometimes ethnic) groups tend to express higher concern of technological hazards and over estimate the frequency of risks to health.

Links between air pollution and health are mediated by the perception of exposure and other individual and contextual factors of people and places. By showing the insights that can be

obtained by exploring public risk perceptions based on local knowledge and experience helps to inform future work on the links between air quality and health (Howel *et al* 2003:170).

CHAPTER 3

STUDY AREA AND RESEARCH DESIGN

3.1 Spatial-temporal orientation

South Durban is the industrial giant of Kwa-Zulu Natal. It is home to two of the biggest oil refineries in South Africa, a chemical tank farm, landfill sites and various mills, processing and manufacturing industries - all in close proximity to residential and recreational areas. Durban is South Africa's third largest city with a population of over 2.3 million people. It is the primary route for imported crude oil and exported refined petroleum and petrochemical products for South Africa. In the port itself is the Island View bulk chemical storage facility which contains an extensive infrastructure of tanks and pipelines. Some of these run to the Natref refinery in Sasolburg. While others lead beneath residential streets to Durban refineries. A total of 1300 storage tanks up to 33 000m³ in size and containing substances that range from vegetable and crude oil to toxic chemicals (acrylonitrile and benzene) are only a few yards from residents' homes (*groundWork* 2003: 29, SDCEA: 2007:1).

It is also the major port terminal to import chemicals for the whole of Southern Africa. The odour problem that comes from this industrial belt is well known (SDCEA: Volume 11 2007:1) So far there is no data monitoring of air pollution levels for the residential areas surrounding the complex. Nor does the area fall under the air pollution monitoring program instituted by Norway. The South Durban Basin extends south from the port and has five industrial belts where over 120 industries are located as seen in figure 3.6. This includes South Africa's two largest crude oil refineries: Sapref (jointly owned by Shell and BP) and ENGEN (controlled by PETRONAS). The ENGEN refinery in South Durban is the focus of environmental concern regarding industrial pollution. Besides being one of the largest refineries in South Africa, it is also one of two largest sources of sulphur dioxide pollution in Durban (SDCEA: 2005:1). It is located next to two low-income residential areas (see figures 3.1 to 3.5) and it is this proximity that optimizes many problems related to health and quality of life.



Figure 3.1

View of South Durban from Wentworth showing from left the Engen refinery, in the centre the Sparef refinery and to the right Mondi. (DEAT- South Durban Basin MPP Case Study Report: 2007)



Figure 3.2

View of the southern portion of the Engen refinery from the residential area of Austerville with Merewent in the background.

(DEAT- South Durban Basin MPP Case Study Report: 2007)



Figure 3.3

View of the Mondi industry in Merewent West (**DEAT- South Durban Basin MPP Case Study Report: 2007**)

Sapref and ENGEN are situated about one kilometer apart. Many residential areas are located between and adjacent to the referred industrial belts. Due to the presence of air pollution from the above mentioned industries, this area is nicknamed “cancer valley” as the incidence of leukemia in South Durban Basin is 24 times higher than in any part of South Africa. (*groundWork:2003:58*) This area includes Bluff, Clairwood, Jacobs, Wentworth, Merebank, Isipingo, Umlazi, Amanzimtoti and Umbogintwini. (SDCEA 2002:9-10).

This industrial complex is located in a part of South Durban where less affluent African, Indian and mixed race communities reside. People here believe they have suffered health wise because of the impact of the ENGEN refinery and other facilities which have operated with little government oversight for decades. Apartheid laws gave many companies a free hand and there was barely any environmental accountability (SDCEA 2008:6).

“Due to the vital importance of oil, information on consumption, refinery capacities and product split at all South African Refineries is protected by the Petroleum Products Act 120 of 1977. This makes an analysis of air pollution from crude oil refining processes exceedingly difficult” (Fuggle and Rabie 2000:421).

Pollution from industry is often the result of maximization of profits while spending the minimum on waste disposal. Preventing pollution of the environment depends on the success of penalties given to industries. In order to be successful, the penalty needs to be an effective

deterrent where it is strict enough to overcome the motive of monetary and economic gain. Presently the penalty for contravention of the Act is R500 or imprisonment for six months. Further contravention is a fine of R 2000 or imprisonment for one year. (Fuggle and Rabie 2000:441) An amendment has been made to the NEMA legislation in 2004 where a fine up to R10 million can be instituted. This act was subsequently used during 2005 where an investigation by the local NGO SDCEA stated that ENGEN exceeded the sulphur dioxide 10 minute level on 35 occasions as well as 6 exceedances of the 24 hour guideline. Although eThekweni Municipality acknowledged that 13 exceedances recorded were related to ENGEN, unfortunately the city could not hold ENGEN accountable as there are no punitive measures in place as yet (2005). Although ENGEN admitted that there were 17 exceedances in the area they believed that their contribution was nil (SDCEA: 2005:6).

The ENGEN refinery continued to operate in Durban and elsewhere in South Africa despite the international protest about Apartheid that caused other many major companies to leave the country.



Figure 3.4

Engen refinery stacks in close proximity to residents. **(DEAT- South Durban Basin MPP Case Study Report: 2007)**



Figure 3.5 Emission stacks in close proximity to Treasure Beach Bluff (DEAT-South Durban Basin MPP Case Study Report: 2007)

Since the ENGEN refinery opened in 1954 numerous spills and accidents have occurred, but only a few of these were publicly documented (Sparks: 2006:6). It was only with the termination of the Apartheid regime that the extent of accidents and pollution incidents has been fully realized.

According to the 2001 and 2006 health reports commissioned by the eThekweni Municipality, pollution levels for South Durban far exceed those for North Durban (Naidoo *et al* 2006:7). Findings for South Durban show large numbers of children and the elderly suffering from persistent asthma and bronchitis. The South Durban Community Environmental Association has called for a review of permits issued to companies for the management of emissions. (Naidoo *et al* 2006:7) During the last few decades, especially from the 1960's to 1990's increased attention has been paid to environmental pollution and its effects on health. Studies have either focused on respiratory outcomes in areas located close to large industrial areas, or examined mortality levels in exposed communities. Increasingly, concepts such as "quality of life" among exposed populations are being considered not only to be physiological but also psychological in nature. (Rotko *et al* 2002:4593; Myers *et al* 2004:134)

3.2 Research in the area and resultant key institutional factors.

“Since the establishment of heavy industry in South Durban in the early 1950’s, many events have occurred that have shaped the air pollution history of the area. Events are categorized as government-, industry- or community-related and the roles of each at different stages are emphasized. Based on mean annual SO₂ measurements over nearly 50 years, it is noted that there have been marked fluctuations in ambient air quality.” (Diab *et al*: 2007:22)

National government has mainly influenced pollution issues in the South Durban area through policy and legislation, as well as the facilitation of discussions aimed at resolving pollution disputes and ambient air quality monitoring. These policy issues and the effects they have are seen in Table A (Diab and Motha: 2007:23).

Table A

Legislation	Effect of legislation
<p>In the 1950’s and 60’s there were changes in surrounding air quality due to the establishment of industry. ENGEN (Stanvac) in 1954, Sapref in 1963 and Mondi in 1967.</p>	<p>The first piece of legislation developed in 1965 was the Atmospheric Pollution Prevention Act. This was criticized for failing to control urban and industrial pollution as it did not provide for enforceable air quality standards and penalty systems and it also failed to protect public health.</p>
<p>The Group Areas Act of the 1950’s also played an important role in the exposure of communities to air pollution from industry.</p>	<p>This provided legislative support for the relocation of non-whites to areas outside industry to form a labour pool for industry.</p>

<p>National Key Point Act 1980 and the Information Protection Act 1982 were developed.</p>	<p>These Acts were used during the 1980's and early 90's to restrict communities access to emissions information due to complaints from neighbouring communities that air quality was deteriorating.</p>
<p>In 1996, through the South African Constitution, it became possible for communities to fight for clean air.</p>	<p>Since 1997 any new industrial installations, such as expansions and upgrades, required an Environmental Impact Assessment (EIA). In 2000 the Promotion of Access to Information Act made it possible for air pollution information to be accessed by communities.</p>
<p>Besides legislation, national government was responsible for two important interventions in the South Durban Basin.</p>	<p>During 1995 a visit by President Mandela to the South Durban Basin was marked by protest by the local community outside ENGEN refinery. This resulted in a South Durban Multi-Stakeholder Environmental Meeting to resolve conflicts between industry and the communities.</p> <p>Secondly several actions were proposed to deal with air pollution. These actions formed part of the Multi-Point Plan (MPP).</p>
<p>National Environment Management Air Quality Act 39 of 2004. It provides for fines up to R10 million</p>	<p>This act was used as a test case in 2005 by local NGO's for sulphur dioxides exceedances caused by ENGEN. No prosecution was made as eThekwini stated that there were no punitive measures in place.</p>

All of the involved stakeholders in South Durban (government, industry and the community) have recognized the need for reliable data on air pollution and its relationship with adverse health effects. There is a need for more innovative research methodologies among populations perceived to be at a high health risk due to air pollution. It was the intention of the Multipoint Plan (MPP) to monitor pollution levels in the greater Durban area.

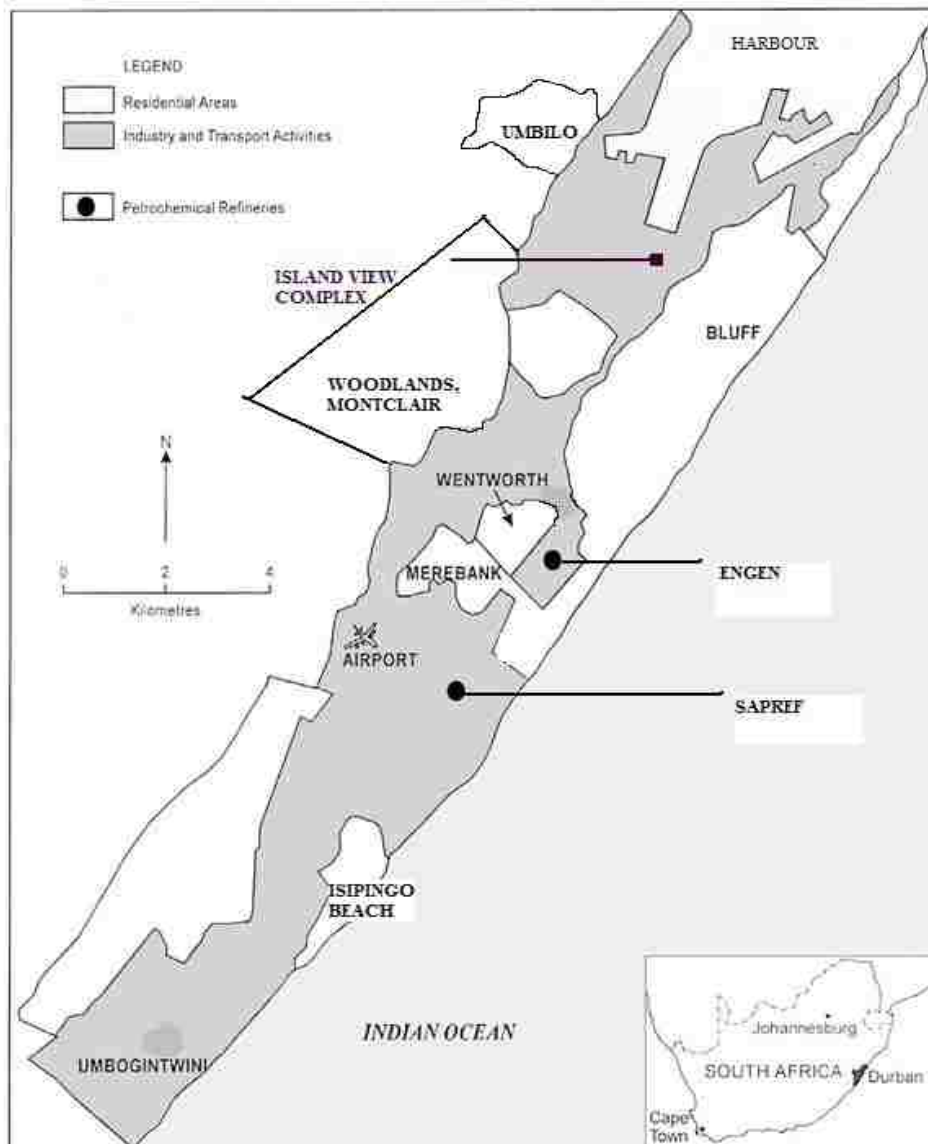


Figure 3.6 Map of study area (Map adapted from Scott and Diab 2000:1832)

During the late 1980s the local community of MerEBank complained about the unresponsiveness shown by the management of ENGEN to the environmental pollution occurring in their area. Investigative studies by local journalists (refer to Appendix 2) showed that the rate of leukemia in South Durban may be up to 24 times higher than in other parts of South Africa (*groundWork* 2003:56). Furthermore the South Durban community is aware of the loopholes within South Africa's environmental legislation, therefore they took the initiative to

enforce responsibility. The South Durban Community Environmental Alliance (SDCEA) represents the concerted effort of community representatives seeking environmental responsibility with the increased incidence of respiratory problems, cancer and other health related complications. During August 2008 a letter was given to ENGEN refinery by concerned women of South Durban which highlighted the major concerns that the current community presently still has, namely:

- Even though the health study at Settlers Primary School proved that 52% of students suffer with asthma – ENGEN perceives that the community is fine. Transport to Wentworth Hospital during an asthma attack for the poor is an issue that ENGEN has not taken into consideration. ENGEN is required to understand the specific health needs to the community.
- There is concern about the secrecy detailing any technological changes to the refinery. ENGEN does not inform the community in writing. Poor communities do not have internet access.
- Full monitoring of chemicals is not done.
- The Community Liaison Forum set up to address the above concerns is controlled by ENGEN and does not adequately address peoples' concerns. (SDCEA 2008:4)

ENGEN had initiated the Community Awareness and Emergency Response (CAER) in 1994 to negate these above problems. This was unsuccessful as the community was unable to voice their concerns or appoint their own members.

3.3 Spatio - temporal images of air pollution in South Durban

The South Durban Basin (SDB) is widely recognized as an area that has poor air quality. Local communities have expressed concern about the deteriorating air quality as far back as the 1960s with concern increasing during the 1980s and 90s as air quality decreased even further. There were constant complaints of odours, visible emissions, chemical leaks and health complaints (DEAT 2007:4).

SO₂ is used as the indicator pollutant as it is one of the main pollutants emitted by industries in South Durban and has the longest data record (Scott and Diab 2007:22). High SO₂ levels are linked to the development of respiratory problems. The Council for Scientific and Industrial Research (CSIR) started a system for measuring SO₂ levels by means of bubbler instruments and smoke (using a soiling index) during the 1960s. Averages obtained from measurements at the stations showed the South Durban Basin was an area of great concern due to high levels

of air pollution this shown in figure 3.7 and figure 3.8 (Scott and Diab 2007:22). There were a number of initiatives introduced such as the South Durban SO₂ Liaison Committee which later became the Wentworth / Merebank Sulphur Dioxide Committee. The aim of the committee is to monitor sulphur dioxide with the belief that other chemical pollutants were being emitted at a similar ratio. A network of four stations was established, namely at Wentworth, Southern Sewage Works, AECI and Athlone Park. Reporting was done on a daily, monthly and annual basis. The committee then changed its name to the Air Quality Management Association in the recognition that there were pollutants other than SO₂. This resulted in ozone and NO_x analysers being added to the instruments at the Wentworth monitoring station. Some of the monitoring station locations changed over time and a mobile station was acquired as well. At the same time a monitoring station was established at the Settlers School due to the frequent complaints about health problems in the area. This particular station was the first to monitor CO, Total reduced sulphur (TRS) and PM₁₀ continuously, in addition to NO₂, SO₂, NO_x and NO. The monitoring network was expanded when the Multi-Point Plan came into effect in 2000.

3.3.1 The air quality monitoring network as part of the Multi-point plan

This network was established in the South Durban Basin in response to the request by the community for cleaner air and therefore formed part of the Multi-Point Plan (Scott and Diab 2007:22). The goal of this project was to provide accurate air pollution data which could be used to assess whether health based criteria were met or not. The aim was to give a quantitative measure of air quality as well as to verify the dispersion modeling system.

The air quality monitoring network focuses on the South Durban Basin, but extends into the city centre and there are two background stations as well. Each station measures industrial and traffic pollution. The pollutants that are measured include:

- sulphur dioxide
- total reduced sulphur (TRS)
- oxides of nitrogen
- particulate matter (PM10)
- ozone
- carbon monoxide

There are eleven stations all together; each monitoring station analyzes a different air pollution chemical component.

The Multi-Point Plan aimed to:

- Provide improved and integrated decision-making for air pollution at local government level.
- Reduction of air pollution to health based air quality standards.
- Achieve improved quality of life for local community.

The expected benefits of the Multi-Point Plan were as follows:

- Reduction of air pollution levels to acceptable standards.
- Promoting business competitiveness in the South Durban Basin.
- Demonstrate the effectiveness in multi-stakeholder co-operation in managing complex air pollution problems.
- Overall improvement of the City of Durban and its people.
- Be an example in helping solve similar air pollution problems in the country.

(DEAT 2007:12)

According to the eThekweni Air Quality Monitoring Network Annual report of 2008, SO₂ levels below guidelines were recorded at all relevant stations. However, analysis of the correlations between wind direction and incidences of high air pollution indicated that industries are the major culprits concerning SO₂. When analyzed over a five year period, the number of times that guidelines levels for 10 minute averaged SO₂ concentrations were exceeded remained the same at all relevant stations. If considering 2007 however, increases can be noticed at the Settlers and Wentworth monitoring stations. Thirty nine of the forty one times that guideline levels were exceeded; it could be directly attributed to ENGEN. But some also came from the Jacobs's area and Sapref. The monitoring stations at Ganges and Prospection also showed high concentrations of SO₂, which supports the evidence pointing towards industries as the biggest contributors to SO₂ emissions which is shown in Figures 3.7 and 3.8 (eThekweni Municipality Annual report 2008:4-5).

Sulphur Dioxide

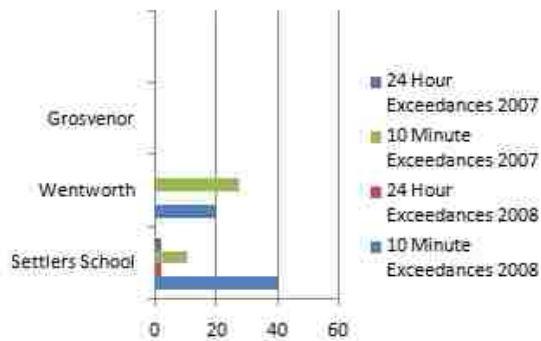


Figure 3.7

Number of sulphur dioxide emissions that have exceeded legal guidelines in South Durban Basin. (eThekweni Municipality Annual report 2008:12)

5 Year Trend of Sulphur Dioxide Concentration (ppb)

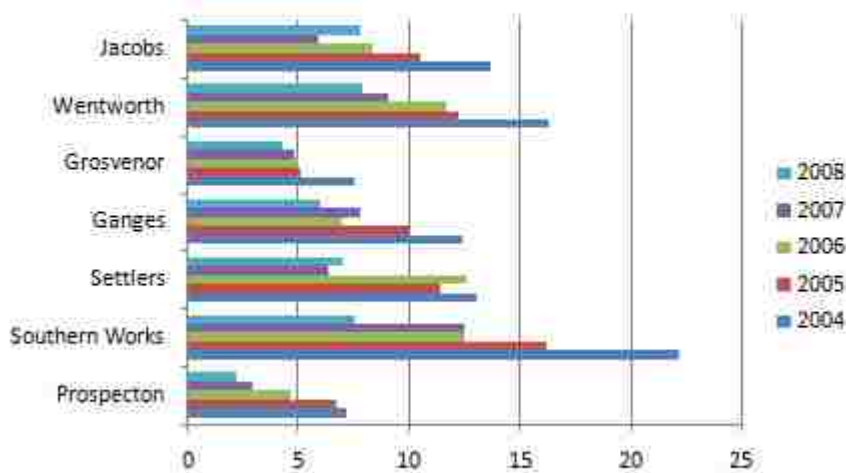


Figure 3.8

Yearly concentrations of sulphur dioxide for each monitoring station from the years of 2004 to 2008. (eThekweni Air Quality Monitoring Network: Annual Report 2008:12-14)

3.3.2 Emission reduction strategies instituted by industry

According to the MPP (DEAT 2007:4) report there has been a 40% reduction in SO₂ from 1999 to 2007 due to fuel switching and control strategies. These are as follows:

- The installation of a scrubber at Mondi reduced their SO₂ emissions by 50% and removed particulate matter from the coal combusted flue gas stream. Attention is still needed to reduce downtime on the scrubber and the use of gas instead of coal.
- Replacement of heavy fuel oil characterized by high sulphur content with gas at both refineries.
- The ENGEN Environmental Improvement Programme, an agreement between ENGEN and SDCEA, which started in 1998, resulted in a reduction of SO₂ by 65%, a 70% reduction in PM₁₀ emissions, as well as reductions in NO_x and flaring. An abatement plan was also instituted at Settlers Primary School but the effects of the different control measures need to be quantified.
- Sapref implemented programs to reduce emissions long before the MPP e.g. the SCOT unit. Emissions of SO₂ has been reduced from 50tpd (tons per day) in 2003 to 20tpd from 2004 onwards, with 2006 levels measuring 11tpd. NO_x emissions increased by 48% from 863tpa (tons per annum) to 1300 tpa during the period of 2000 to 2007. VOC emissions from the plant have decreased by 47% since 1999.
- Conversion of coal fired boilers to electricity at small and medium industries.
- H₂S reductions from Southern Sewage Water Treatment Works and Mondi.
- Initiatives have been launched at refineries and the Island View Complex to reduce VOC emissions such as double seals on floating roof tanks.
- Tongaat-Hulett (Sugar refinery) has been using coal with no SO₂ emissions, therefore resulting in a reduction of 20% in emissions.

3.3.3 Perceptions of the Multi-Point Plan by the South Durban Basin community

Respondents that were interviewed in the Multi-Point Plan report in 2007 all felt that there was a general noticeable improvement in SO₂ levels but certain areas of concern were raised:

- Control of emissions (SO₂) from large industries has been in force before the MPP was implemented and reductions are still ongoing.
- The focus has only been on SO₂ but there are other sources of gases and chemicals which may be toxic to human health such as dioxins and there is a need to have these chemicals monitored as well.

- The focus has only been on big industries, while there is a need to shift it to the smaller industries in the area as well.
- Visible pollution such as biomass burning and the regional influences have not been addressed as yet.
- There have been no noticeable odour reductions or improvements in reducing VOC (Volatile Organic Compound) and chemical emissions.
- Vehicle traffic and diesel emissions have increased; these have not been properly addressed.
- The reporting average trends are not always a true reflection of reality; the 10 minute and hourly SO₂ levels require interpretation. (DEAT 2007:25)

3.3.4 ENGEN's perception of current air pollution

ENGEN views their current treatment by eThekweni Health (ENGEN: Annual Performance 2008:6) with regard to permit requirements especially SO₂ as unfair, as any further reduction requirements are expensive. ENGEN is of the opinion that there are other companies in the area that emit more pollution, but that ENGEN is viewed negatively and therefore given stricter permit requirements. ENGEN's viewpoint is that one set of permits; common reporting and management requirements are needed for all industries in the South Durban Basin.

The opinion of ENGEN is that they made great improvements in reducing pollutants such as SO₂, PM₁₀, NO_x and (VOCs) as a result of their Environmental Management Plan developed in conjunction with eThekweni Health. These improvements are as follows:

- Sulphur Dioxide (SO₂) – Although permits specify 19 tons a day, the average monthly tonnage is between 14 and 11 tons a day. Concerning exceedances especially in the Merebank / Settlers School area (as mentioned in the eThekweni Air Quality Monitoring Report (2008:4)) the culprit is load shedding by ESKOM, which resulted in constant start-ups and power dips – that tainted people's perception of ENGEN. Due to this perception ENGEN's opinion is that they are more closely monitored than any other industry and believes this to be unjust.
- Nitrogen Oxide (NO_x) – ENGEN complied with the permit limit of 8 tons per day.
- PM₁₀ averages remain above 0.4 tons per day until suitable technology is found to further reduce emissions.
- The prime source of VOCs emissions are the stacks and flare that can be monitored. In addition there are "fugitive emissions" coming from the valves, pumps, tanks, pressure relief valves and flanges. ENGEN claims to have reduced emissions by 65%

through installation of a Vapour Recovery Unit and secondary seals on floating tank roofs. During the second half of 2008 permission was granted from eThekweni Health to conduct a trial using SMART LDAR which uses an optical imaging camera to detect fugitive emissions - but this was only done in March 2009.

- Concerning ambient air monitoring, fence line monitoring and boundary sampling has continued to measure fugitive emissions of benzene, toluene, xylene and ethyl benzene and no exceedances were observed.
- ENGEN has undertaken several improvements to the flaring system: flare video monitoring as well as a recording and automated flare sampling system (not yet complete).
- ENGEN has a toll free 24 hours per day complaints management system. Complaints received are logged in a complaints register and investigated by the refinery (ENGEN: Annual Performance 2008: 5-27).

3.3.5 Community monitoring of air pollution – the Bucket Brigade

Air monitoring by the community empowers people to act on air pollution in the area where they live. It gives them a tool to scientifically verify knowledge of air pollution that is perceived by the community. Secondly, through the process of sampling it raises awareness about the surrounding air quality. Thirdly, existing official information is not reliable or comprehensive (or may be perceived as such). Industry officials are also reluctant and sometimes even unable to supply scientific information. Community monitoring establishes communication between industry, government and local community groups. Lastly the information can be used to hold industries accountable for their perceived polluting actions and the negotiation of potential solutions (*groundWork* 2003:10-11).

The bucket method which is simple way that communities test the quality of their ambient air quality uses the “grab” technique to take samples of the surrounding air. Sampling is cheap and it can provide robust data on a wide range of pollutants. There are however limitations to the system (*groundWork* 2003:12):

- Gases from the surrounding air can be collected except for particulate matter and toxins (that attach themselves to particulate matter, such as dioxins), acid rain or radiation.
- Nitrogen oxide cannot be tested in the samples.
- Samples cannot follow pollution in an area over a period of time as it only tests at a specific time and place.

- Samples have to be couriered overseas for testing which is expensive for community based organizations.

During first testing in 2003, samples were taken from both Sasolburg and South Durban. Air samples contained several chemicals on which there is no information such as carbon disulphide, 2-butanone, toluene, ethyl benzene and xylenes.

Analysis of these bucket samples concentrated on two categories of air pollutants:

1. Volatile Organic Compounds (VOCs), which includes benzene - known for its carcinogenic effects.
2. Total reduced sulphur (TRS), which produces an offensive odour and symptoms of eye irritation at low dosage level (an example is, include hydrogen sulphide.)

3.4 History of legal enforcement and communities' perception

South Africa's current environmental problems and issues are rooted in a social, cultural, economic and political context. Due to increased poverty and unemployment which in turn have environmental implications, it is difficult to separate environmental, socio-economic and pollution issues.

Before 1948 the main driver in policy development was the need for industrial development, therefore policy favoured the establishment of industry in the South Durban Industrial Basin and the location of residential areas in close proximity to facilitate cheap labour. At that stage there was no ambient air quality monitoring. Between the years 1948 to 1990 of the Apartheid regime, the driving force in policy development was the need for a reliable oil supply. Refineries were identified as strategic industries. However, the forced and / or incentivized movement of people and concentration of them in certain areas exerted a negative pressure on the socio-political character of certain parts of the SDB. SO₂ concentrations increased during 1958 to 1962, which correspond to the expansion of the ENGEN refinery during 1954 to 1962 (Diab and Motha 2007:24). In 1965 the Atmospheric Pollution Prevention Act No.45 of 1965 (APPA) was put into place, which resulted in SO₂ levels dropping to values present before the industrial expansion. The APPA was developed over 10 years due to complaints of odours received by the Bluff community.

During the late 1960s and early 1970s SO₂ concentrations started to rise again due to further expansion at the refineries and the Mondi paper mill. In the late Apartheid period (1980s to

1990s) the main driving forces (reliable oil supply and industrial development) for policy development were in opposition to each other and this was combined with intense conflict between communities and industry. Constant complaints did not lead to an improvement in air quality, but resulted in responses such as the formation of the South Durban Sulphur Dioxide Steering Committee (SDSDSC), a health study and the closure of the Congella power station.

During the Post - Apartheid era the political and social changes of the early 1990s resulted in changes in the drivers of policy formation. Five main drivers can be identified (Diab and Motha 2007: 29):

- The need for cleaner air
- Community activism
- The need for continued industrial development accompanied with dialogue with communities
- Intervention by national government
- A national and international focus on air pollution issues

Community activism during the Post - Apartheid era was the direct response to the poor state of air quality in the South Durban Basin plus the lack of access to emission information (Diab and Motha 2007:30). This activism resulted in the formation of the SDCEA, the Bucket Brigade; various environmental forums, media research reports and comparative refinery studies. However, industrial development is a driver that not only causes pollution, but helps to alleviate socio-political problems such as of the lack of jobs and stringent economic conditions. This was also accompanied by a greater awareness for the need for sustainable development, as well as the need for industry to move towards cleaner production technology. At the beginning of the 1990s the air quality in the area was poor, with SO₂ levels exceeding WHO guidelines. A steady improvement in air quality occurred due to community pressure such as a switch to cleaner fuels and the commissioning of Sulphur Recovery Units. The Multi-Point Plan (MPP) was formulated due to community pressure in reaction to pollution incidents across the country and media attention on possible health impacts (refer to Appendix 3) in South Durban (Diab and Motha 2007:29-31).

In 1995 when ENGEN opened its new expanded Phase 2 plant, they promised the community that they would install scrubbers, but this was not done (D'Sa and Reid 2004:36). This resulted in a community protest during the Nelson Mandela visit in 1995. Due to this protest a new national (Multi-Point Plan) policy was formulated that required industry to develop programs to reduce pollution. This policy failed (D'Sa and Reid 2004:36), which resulted in community

activist groups to draw attention to serious industry pollution incidents. The political activity that occurred resulted in an agreement being drawn up between industry and the community called the CAER (Community Awareness and Emergency Response) agreement. This program was modeled on the example of industry and community liaison committees that were formed in USA and Western Europe during the early 1980s and 1990s. These programs were designed to overcome public mistrust by providing residents information about the dangers associated with a certain industries (Sparks 2006:179).

The recent 2006 Multi-Point Plan (MPP) analysis report recognized that further studies had to be done about risk assessment and that strategies had to be developed for attaining compliance with guidelines, standards and targets (Naidoo *et al* 2006:64). A specific need for asthma awareness and education was identified. School based education programmes will help in removing the stigma associated with asthma. The need to obtain additional demographic information was also specified. A case study done by Mahler (2005:1) showed how civil society organizations (CSOs) used scientific evidence to influence air pollution management. It was recognized that data was not only considered valid by the use of correct methodology, but also if it correctly represented the social aspects of society.

The MPP was aimed at addressing industrial pollution by co-ordinating action at all three levels of government, with implementation at the local level. Another initiative of local government included the development of the Local Agenda 21 (LA21). The first phase included a State of the Environment (SoE) assessment report which identified Durban as a pollution hot spot (Diab and Motha 2007:24). The Strategic Environmental Assessment (SEA) formed part of phase two that aimed at investigating alternative development scenarios for the area. This assessment was completed in 1999, but due to community opposition the final report was never approved. The community activist group SDCEA critiqued the SEA and found that from the viewpoint of communities, it contained a series of vital flaws:

- The SEA team assumed that communities included knowledgeable members that would be able to understand all the technical issues discussed and the implications thereof.
- The stakeholder meeting that was held included no collective decision-making.
- There was no transparency with respect to a community request for analysis of the SEA budget and the decisions that were made.
- The environmental consequences of industrial practices were not realistically evaluated.
- Concerns of the community with regard to expanding industrial development were ignored.

- Certain strategic areas were excluded from the study, such as the Island View Complex.
- The process had not been transparent in that it ignored high risk areas such as pipelines, transport, storage and refining (SDCEA 1999:3-4).

The community perceived ENGEN not to be committed to this agreement, which caused further deterioration in relations between industry and the community. Community organizations would like to see local government working together with other departments in national government and industry to provide services, employment and the preservation of the environment for future generations. Legislation is required in order to monitor air quality as until now there have been no effective laws that hold industries accountable for their actions (DEAT 2007:27).

The role of civic organizations is important as it enables and empowers the community to monitor local industry and the environment as well as ensuring that their concerns are fed into the development of appropriate policies.

It was also pointed out that there was a critical need to improve assessments of air pollutants as this basic information is needed to evaluate public health risk, to set standards and to monitor air quality (DEAT 2007:30-31). Developing indicators of concern will be crucial in order to be able to monitor the success and failure of local development policies and actions. Currently respiratory illness of school children in South Durban is four times higher than elsewhere and leukemia rates are reportedly higher than the national average (*groundWork* 2003:31). Local residents have had their daily lives disrupted, and they are forced to move away because of pipeline leaks (The Shell Report 2003:8).

It is evident that the local community in the SDB has a great deal of local knowledge and expertise about daily emissions from industries and the effect it has on the local community. The definition of public interest according to the civil society organization *Groundwork*, implies the involvement of public civil society organizations in the compilation of risk assessment reports.

3.4.1 Access to information and transparency with regard to industry

According to the Multi Point Plan analysis case study (DEAT 2007:27), government and industry felt that there was enough transparency to information, but NGOs felt this was not the case as it depended on the information required. Queries included the following:

- No response from eThekweni Health if monitoring results are queried.
- Websites do not have sufficient information and they need to interpret the information for the community to understand.
- There is no monthly interpretation of data.
- Data quality control checks arouse suspicion.
- Dispersion modeling has not been effectively and efficiently implemented.
- Industry still hides behind the National Key Point Act. The Key Point Act was established to ensure efficient and effective control plus optimum security at National Key Points, Strategic Installations (e.g. oil refineries) and Places of Importance. This includes document security which makes analyzing emissions and steps of the manufacturing process extremely difficult. (DEAT 2007:27; Government Gazette 2007:10)

Community opinion implied a general lack of feedback to affected communities concerning the data collected by the present monitoring system. The communities wanted other staff members from industry coming into the area to explain current and future projects. The placements of monitoring stations need to be reviewed as some need to be located in residential areas. The health studies which had been done were felt to be incomplete in that did not include peer review, nor did they investigate the possible link between air pollution and cancer / leukemia. Fines for non-compliance with permits are not relative to the gross turnover of industries and there should be incentives for improvement. A free 24 hour clinic funded by industry should be available for residents. Lastly the community felt that there should be a dedicated 24 hour toll-free line set-up for pollution complaints (DEAT 2007: 27). This number is regularly out of order and is not toll free from cell phones as some residents do not have land lines. According to Desmond D'sa of SDCEA all reports are not followed up by ENGEN. Members of the public rely on the above community group to follow up their complaints. Community members are also reluctant to contact industry directly and would prefer an independent complaint line.

3.5 Previous health studies

In March 1997 the Durban Metro Council, through pressure from the SDCEA, launched the Strategic Environmental Assessment (SEA) to assess the environmental impacts that the communities face daily and to develop mechanisms to deal with implications of refinery development. The document failed to address a number of issues. Most important was the exclusion of community participation. Stakeholders were not included in the core operational process of planning, but were only consulted on an *ad hoc* basis to make comments when required. (SDCEA 1999:5-13)

In 2000 the SDCEA in collaboration with the national environmental civil society organization *groundWork* launched an air monitoring project. The findings revealed high levels of benzene and 18 other pollutants. This resulted in the establishment of the local air quality management program, the South Durban Multi-Point Plan (MMP). The objectives were to determine health and environmental risks associated with the industries in the area. The MMP not only addressed historical injustices, but also called for the need to address health issues.

Two scientific health studies have been conducted in South Durban in the past seven years to determine whether a causal link can be established between pollution levels and symptoms of respiratory illness. These studies focused on children's health and found that there were indeed causal links between exposures of certain pollutants with and an increase in symptoms associated with decreasing lung function. These two studies are further discussed below.

3.5.1 Settlers Primary School health study

In 2001 a joint study focusing on school children, conducted by the University of Natal and University of Michigan and the Durban Institute of Technology, researched the health costs associated with air pollution. The study was conducted at the Settlers Primary School for an 18 day period from 19 April to 6 May 2001 and found that 52% of the study population had asthma and / or other respiratory problems. This is the highest rate recorded in scientific literature (Robins 2002:3).

During this 18 day period in 2001, the levels of several air pollutants were measured on the school grounds. Participants consisted of 248 school learners and 25 teachers. Interviews established the baseline health status of all participants. A diary of symptoms was kept every two hours during the school day and the breathing function of the participants was measured

as well. Symptoms reported by parents showed that 52% of school learners in Grade 3 to 6 had asthma and 26% had persistent asthma. The breathing tests revealed similar results. Data suggested that most of the SO₂ measured at the school came from three industrial sources: ENGEN, Mondi and Sapref. The strongest relationship occurred when SO₂ reached the school from a north-north-east direction from ENGEN (Robins 2002:3).

The study “strongly suggested” that if a child already has asthma, air pollution can make symptoms worse. It revealed that one in two children at the school experienced asthma-like symptoms. Moderate to severe persistent asthma was highest in households where the income was below R5 000 annually, intermediate in households earning R5000 to R50 000 and the lowest for the greater than R50 000 income bracket.

There were certain limits to the study:

- The study did not address questions concerning the cause of asthma.
- The study did not investigate other populations residing in South Durban.
- The study did not include an unexposed comparison group.
- The resources were not available to conduct a fuller evaluation of other potential risk factors for aggravation of childhood asthma which might include allergy status and assessment of environmental exposures inside of homes.
- The relatively short period over which intense health data was collected.
- It was found that surrounding air pollution levels were lower than average levels recorded in the past, which raises the possibility of historical health effects being underestimated (Robins 2002:4-5).

3.5.2 South / North health study

During 2004 and 2005 the University of KwaZulu Natal and University of Michigan USA undertook an epidemiological study and health risk analysis. The study was done to ascertain if there is a correlation between respiratory health and ambient air pollution. Residents of South Durban were compared with residents of North Durban, where it is less polluted. It measured levels of over 20 outdoor pollutants at 23 different sites. Meteorological data was also collected and used.

The study yielded the following results:

- That exposures to air pollutants such as SO₂, PM₁₀, NO₂ and NO causes poorer lung function among children who have persistent asthma and those who are genetically predisposed to asthma. The highest incidence of this was in the South Durban
- Adults living in South Durban are at a higher risk for respiratory diseases than in the North.
- Exposure to cancer causing chemicals such as benzene and chromium is higher in the South.

The participants kept a symptom diary and underwent lung function tests four times daily for 15 schooldays in each of the four seasons. The study found that children and adults in South Durban were at increased risk of having asthma attacks and other chest ailments. However, the opinion of the general population was not obtained or taken into consideration. The main recommendations made by the report were:

- The need for a prompt review of legal pollution standards in Durban and the enforcement of existing laws.
- Early warning systems and action plans at some schools in the South Durban area to reduce health risks from sudden, large-scale exposures to sulphur dioxide.
- Toxic emission inventories require industries to disclose more information about their toxic chemicals and compounds. (SDCEA 2006:3)

3.5.3 Health studies: To conclude

There are still large gaps in information on health status and producing hard evidence linking industry to localized health.

When the South Durban Health study Multi-Point Plan was launched, the study demonstrated the high prevalence of respiratory disease, namely asthma as well as associations with changes in acute health status. The study further allowed for identifying possible associations between ambient air pollution exposures and disease, as well as quality of life measures. These aspects could be further tested in follow-up studies with respect to pollutant associated effects on non-respiratory disease outcomes.

As quoted by the 2006 report: “ Due to inherent uncertainties’ and limitations of the health risk assessment we anticipate that the communities in Durban may desire additional reassurance or confirmation of results in this report, particularly where risks are stated as being “minimal.” We believe

that the lower risks stated for these pollutants are based on the best available information in a technical study designed to characterize risks, and that the results obtained are credible and applicable to the communities in SDB (and in North Durban). Thus, we urge that public health managers focus on the highlighted risks" (Naidoo *et al* 2006:73).

3.6 Research design and methods

3.6.1 Overview

The aim of this study is to elicit the perceptions of the residents of the South Durban Basin about the link between the illnesses experienced by them and the occurrence of air pollution in the area.

The type of data that is currently available for the South Durban Basin includes the comparison of certain pollutants and their influence on asthma. Research has not investigated how physical attributes of the living environment might influence peoples' perception of their immediate environment. Different cultural groups' views have not been studied either to determine if they differ from area to area. Another gap in knowledge is why economically and socially marginalized groups differ in their perceptual rating of air quality. These characteristics influence a person's experience and have bearing on how they understand and perceive the quality of their current environment and it's the potential effects on their health. The role of local experience of industry in the SDB has never been studied from the viewpoint of how communities form ideas about air pollution. New data therefore need to be collected on community based quality of life indicators and to determine how industry related concerns are linked to these indicators.

This research is based on both a qualitative and quantitative approach. The quantitative analysis formed part of the demographic questions in the questionnaires and interviews (telephonic and individual). The purpose is to draw correlations between the number of similar comments and demographics (gender, age, ethnic group and education). The comments analysed qualitatively in order to determine similarities or dissimilarities with previous research done in the United States and the United Kingdom. Two questionnaires were designed. The first one was found to be too time consuming, therefore it was modified to elicit the same information but in a shorter time frame. Data was collected by telephone interviews, volunteers conducting interviews with members of the public, group discussions, one on one interviews and respondents filling in questionnaires at home. Personal data such as demographics is kept

confidential and used for statistical purposes only. Analysis is firstly done according to the study areas and then further subdivided within each area according to gender, education and ethnic group as has been suggested in the literature (Bush *et al* 2001:49-50, Howe *et al* 2003:164-165).

3.6.2 Questionnaire design

This study used a questionnaire based approach to gather qualitative data. The questionnaire included fixed response as well free response questions. A qualitative approach was used as it attempts to understand people in terms of their own definitions of their world. It helps to provide illumination on complex psychosocial issues and is useful in answering questions such as how and why.

Participants were drawn over a one year period from various communities in the South Durban Basin and surrounding areas. There were two versions of the questionnaire: the first consisted of mainly discussion type questions (Refer to Appendix 4). It was found to be time consuming and not direct enough to the point. Questions overlapped and it seemed that the respondents found the interview too long. A second questionnaire was developed that consisted of multiple choice questions and only a few discussion questions mainly centered on health issues (Refer to Appendix 5).

3.6.3 Data collection

The strategy for data collection included a number of approaches. The questionnaire formed the starting point for data collection. In some cases this was followed by individual or household interviews in order to provide a better reflection on the diversity of spatial, demographic, socio-economic and political characteristics. A focus group was held with eight members of the Merebank / Merewent community to obtain more information on how they perceived ENGEN and Sapref. These communities were selected as they live in close proximity to ENGEN and Sapref. There is also constant conflict between these communities and the previously mentioned industries. This was done to collate information that had been already collected and to determine if there were any deviations in opinion from the telephone interviews.

Interview based or observation based reports enable a more in depth elicitation and contextualization of meanings attached to risk (Bush *et al* 2001:50). Individual / household

interviews allow for a more in depth exploration of perceptions and attitudes. This data helps to explore public views on air quality and health within the local, social, cultural and economic contexts in which these views are framed and negotiated. Comparison of responses to questions with particular variables then reveals the extent of associations.

Data collection had to take into account that the spatial planning of the South Durban industrial basin still reflects the Apartheid era. Therefore the Black communities (Indian, Coloured and African) reside close to toxic industries. The low-income communities which are located in Wentworth, Merebank and Bluff were deliberately situated near industries to facilitate easy access to cheap labour (SDCEA 1999: 2).

Variables such as age, income, education, and race, views of local pollution sources, sources of information on air quality, sense of place, proximity and stigma have been analysed against the perceptions of those staying in each of the demarcated study areas.

The questionnaire was completed by 110 people in the South Durban Basin either through telephone interviews, filling in at home or during individual interviews.

3.6.4 Overview of participants, procedures and time frames

The process to obtain data was divided into two parts. The first part comprised data collection by means of administering the questionnaire. This was done through telephonic interviews, giving it to people to fill out and with the assistance of intermediaries.

In the second part the responses to the questions that were obtained during the first part were used to identify respondents with whom one on one in-depth interview could be conducted. The study took place over 17 months during which the questionnaires were administered and interviews were conducted.

As introduction to each interview session, the researcher broadly described the aim of the project without referring to the research questions. Depending on the interviewee, it was sometimes necessary to prompt them to elaborate on an answer or to keep the discussion focused.

The focus group consisted of residents that lived in the area of Merebank / Merewent for more than 20 years. This group of participants was set up with the help of a local environmental group SDCEA. The aim of the discussion was stated and no personal information was collected from the participants in order to allow for freedom of opinion. The participants were at

first hesitant to give their opinion, but once reassured that no names or neighbourhood areas would be mentioned, the discussion was able to be continued. A large amount of information was collected pertaining to environmental satisfaction that was pertinent to how industry was perceived in the area.

3.6.5 Ethical aspects of the research process

As qualitative analysis was used for the research process. The personal, sensitive and even controversial information gathered during the interviews was safe guarded by emphasizing that participation was voluntary and that no names were to be given. Personal data such as race, gender and age were used to establish differences in opinions and for no other purpose.

Access to and collaboration of participants were achieved by means of an interview and an article in a local community news paper, with the help of SDCEA volunteers who interviewed participants in the Merebank area and by those who accompanied me into the Barracks and surrounding areas. Students from the local karate club were given an incentive per completed questionnaire that they brought back. A local high school in the area also participated: An 'A' class had their parents or other family members fill in the questionnaire. An incentive was given to each school learner for each completed questionnaire. Telephonic interviews were also conducted.

3.6.6 Data analysis

The final data analysis was done quantitatively and qualitatively. By using a qualitative approach it would provide an in-depth, although not generalized knowledge of the meanings participants attach to their local situation

Results were collected and analysed by gender, education and cultural group. The results were then analysed for each area. The completed questionnaires were examined and information for each individual and their responses were entered into the computer using the Atlas software system in order to store comments and responses for each question item for easier reference. This system was able to provide a basic quantitative analysis but did not yield much information from the point of view for research analysis.

The questionnaires were divided into the relevant study areas and then into gender groups. In the case of areas with a diverse, controversial political history, the questionnaires were also

divided according to cultural composition. A division according to level of education was made as well: general educated- those participants who had matric or lower and higher educated - those participants that had a further education after matric.

Each answer for an item was allocated a score of '1' if raised, eventually totaled and then divided by the number of participants in the sample group to express it as a percentage.

The overall impression gained during the interviews and transcription, was that comments made were usually consistent with the literature survey, with no totally unexpected trends being observed. After each interview the main ideas were summarized by the researcher and an impression was written of the general trends and differences and how viewpoints depend on individual backgrounds and experiences. Information was put into the Atlas system in order to do a basic quantitative analysis and to order information. Tape recording and telephone interviews were transcribed verbatim. Transcripts were not returned to participants for accuracy checking. The contents of self-written questionnaires as well as pilot interviews were incorporated into the analysis.

3.7 Conclusion

South Durban's current environmental problems are rooted in a specific social, cultural, economic and political context. Associated with the Apartheid regime, there was a need for a reliable oil supply and locating residential areas close by for cheap labour. During the late Apartheid period both industry and the surrounding communities in the SDB were in opposition to each other. Therefore there is a critical need to include the local knowledge and expertise of the community in the formulation of new policies and the actions to be taken to hold industries accountable (Diab and Motha 2007:29-30).

There are still large gaps in the information which is available on health status in the SDB. Further study is needed to identify a possible link between surrounding air pollution and disease, including quality of life measures such as environmental satisfaction. The type of information that has been collected so far only includes the comparison of how certain pollutants are related to asthma. There has been no investigation in how the physical characteristics of a person's living environment might influence perceptions of air pollution. The views of different cultural / ethnic groups' have also not yet been taken into account and if they differ from area to area. The aspect of economic status has not yet been studied, nor the role of local experience of industry in the formation of perception.

All these aspects can influence a person's experience of his / her environment and how they perceive its quality, which in turn forms the basis of the construction of ideas about the role of air pollution in a community.

CHAPTER 4

PRESENTATION OF PERCEPTIONS

4.1 Introduction

4.1.1 Contextual background

“If you flew into the port city of Durban, or eThekweni Unicity, you might not miss the petrochemical refineries next to the runway, but you might miss two small communities that live cheek-by-jowl with heavy industry. These communities, consolidated in an incongruous industrial-residential landscape by the Apartheid spatial planning, are the ‘Indian’ township of Merebank and the ‘Coloured’ township of Wentworth. On the two sides of Duranta Road, and with roughly similar populations (about 27,000 for Wentworth and 21,000 for Merebank in 2001), these communities have been shaped in similar ways in some respects and in profoundly different ways in others. What is more, though both have lived with similar indignities, such as breathing benzene all their lives, although Merebank’s residents have only slightly higher household incomes, and slightly lower unemployment levels” (Chari 2004:2).

South Durban today has grown to approximately half a million people, with 100 000 people living within the industrial basin between the M4 highway and the seashore, another 390 000 people in Umlazi and roughly 83 000 people in Lamontville, Montclair and Woodlands (SDCEA 2008:6-7).

The existence of South Durban is the direct result of policy positions adopted by the Durban City Council in 1938, when South Durban was planned to be a Black residential area combined with an industrial estate. As a result industries were purposely developed within or very close to Black residential areas. Due to the Land Areas Act, overcrowding in many of these residential areas, accompanied by poor socioeconomic conditions (SDCEA: 1999:3).

South Durban’s development began during the 1800s when indentured labourers arrived to labour in the sugar estates. Eventually many stayed on in Natal, farming in the Clairwood and Merebank areas. At about the same time an introduction of hut taxes forced unmarried African men to look for work in the city. After World War 1 industrial development was further stimulated, therefore requiring more land and a greater work force. The Durban Council then identified the area used by the indentured labourers for farming as an area for industry. Housing schemes were built specifically to supply labour for industry, such as Merebank for Indians in 1949.

In 1952 the Group Areas Act was adopted for Durban, which had the effect forcibly removed Non-whites to areas on the outskirts of the city. The appropriation of land and the removal of people was an important part of the industrialisation process. In 1954 the Stanvac Refinery,

now known as ENGEN was built next to Wentworth and near to the planned township of Merebank. (SDCEA 2008:6-7) The institutionalization of Apartheid in 1948 gave way to social and political conflict with regard to environmental resources. Since the ushering in of the democratic era in 1994, many Non-white people have moved into previously Whites only areas such as Bluff and the border of Wentworth.

4.1.2 Demarcation of study area and division of respondents

For the purpose of this study four different suburbs in South Durban were chosen each differing in material deprivation, closeness to industry, socio-economic status and racial make-up. The areas are:

- Bluff
- Austerville/Wentworth
- Merebank/Merewent
- Umbilo/ Montclair/ Woodlands/Ispingo

The results were divided according to those respondents that had a general education (in other words, matric or lower) and those who had a higher education (education after obtaining matric). Throughout the rest of this dissertation, a general education will be abbreviated with **Ged** and a higher education with **Hed**. This division is related to research done by Bickerstaff (2004:832), which showed that people make their own assessments of health, by judging conclusions against their personal experience and knowledge. For example, people with a higher education are inclined to underestimate the number of deaths associated with environmental risks. Research in Social Science has come to the point of acknowledging the different ways people understand and frame risk based on their cognitive level of understanding.

Results were also subdivided by gender, as research done by Johnson (2002:729) showed that women do tend to rate health risks from pollution higher than men. This research, done in Philadelphia (USA), showed that differences in views of pollution existed across gender groups. Knowledge of these differences is imperative when planning future air pollution policies. A number of surveys done in North America (USA and Canada) have shown that perception and attitudes regarding risk differed according to demographic characteristics such as gender and the ethnicity of a community. It also needs to be seen if these differences between men and women tend to disappear in cases where communities are afflicted with social problems as well as with variations in the distance from a pollution source.

Each study area will be analysed separately focusing on differences and or similarities according to gender, education level and ethnicity. Results will be presented in the form of graphs, representing percentages in terms of the sample for the respective demarcations of the study area. The key abbreviations that will be used in the diagrams are as follows:

KEY:	Hed – Those with a higher education	Nw- non-white
	Ged – Those with a general education	W- white

4.2 Analysis of the Bluff

4.2.1 Contextual background and division of results

The Bluff area consists of several suburbs on the large sand dune overlooking the harbour and the sea. Although it developed largely as a White working class area, research done in the 1990's (SDCEA 4:2008) showed that more than a quarter of the residents earned less than R2000 per month at that stage. Despite being better off than former Non-white areas, there is a general lack of maintenance and dilapidation of the area. Roads and pavements are in bad repair, water pipes often burst, low lying areas are not draining properly and parks have become dumping grounds.

Although the Bluff is elevated and does receive sea breezes, the whole area (Scot and Diab 2000:1833) is affected by bad air quality. The prevailing winds frequently carry chemical pollutants and soot from the harbour industrial zone and even oil spray from the refinery and ash dust from the Mondi plant. The explosions in September 2008 at the Island View Tanker storage (refer to Appendix 6 and 7) have left many residents considerably shaken and concerned about the safety of the underground fuel pipe network.

4.2.2 Sample demographics

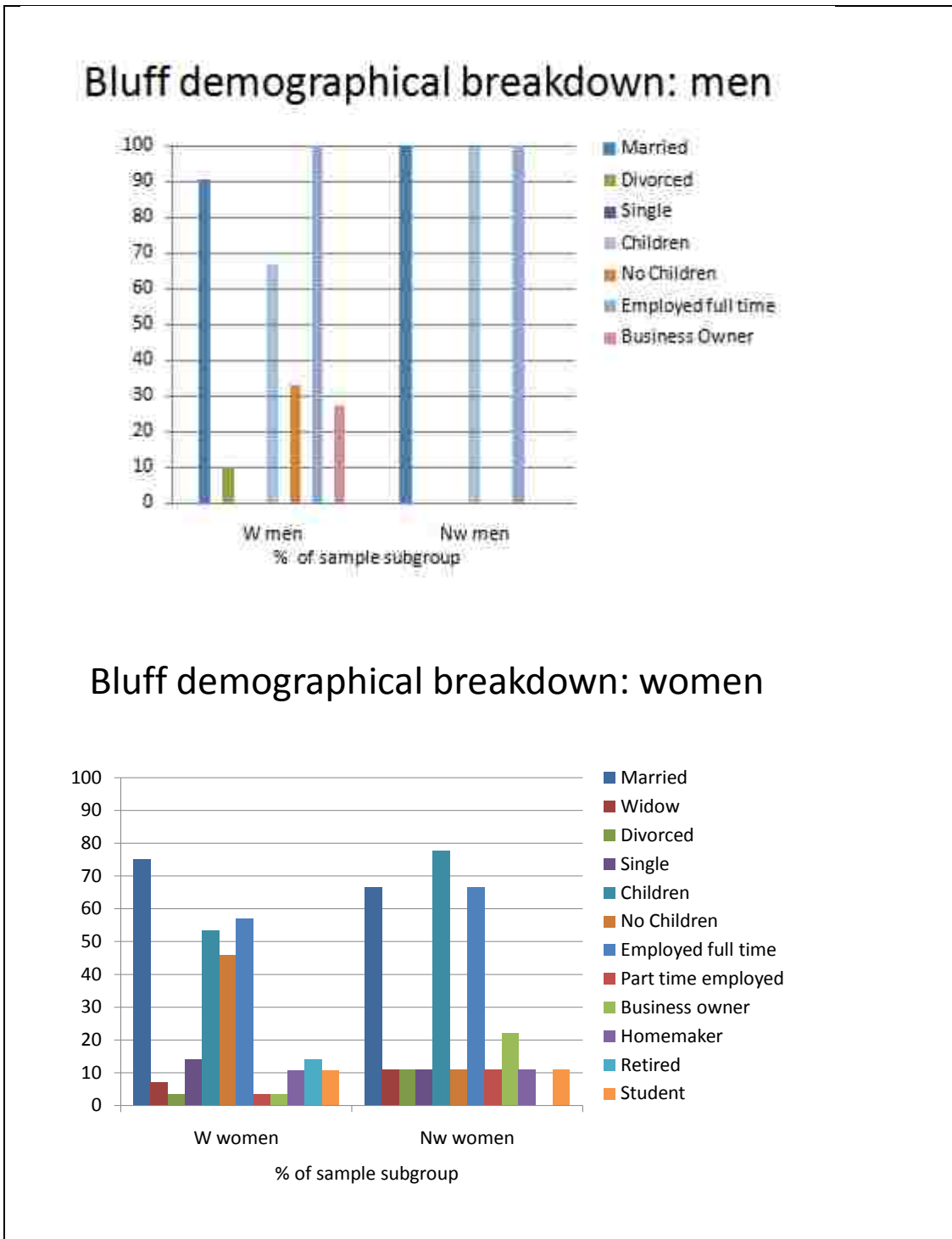


Figure 4.1 Bluff: demographical breakdown: for men and women

The Bluff was designated as a White's only area by the Group Areas Act of 1952 (Scot and Diab 2000:1833). This area is occupied by civil servants, railroad workers, retirees and skilled workers. Included are the areas of Brighton Beach, Fynnlads, Grosvenor, Ocean View and parts of Wentworth that were historically designated for White railway workers. The Bluff always had a culturally diverse population, including Germans, Italians, Portuguese, Afrikaans and English speakers. In recent years a number of Indian and Coloured people from nearby

communities such as Merebank and Happy Valley moved into this former White only area. In the Post-apartheid era the Bluff area consists of 39% Asian and Coloured minority communities, with 61% European residents making up the majority culture.

A total of 53 respondents from the Bluff were interviewed by telephone or filled in a questionnaire: 16 men and 37 women, differing in age, ethnicity and socio-economic status. The results were divided into those with higher education other than matric (54.3%) and those who had matric or lower (45.7%).

In terms of the total sample interviewed for the Bluff, women make up 70% of the sample interviewed for the Bluff: 51% are White and 19% Non-white women. Some interesting differences were found between White and Non-white women, which are highlighted below:

Table B: Significant differences between White and Non-white women

Variables %	White Women	Non-white women
Married	75%	66.6%
Children	54%	78%
No children	46%	11%
Employed full time	57%	67%
Part time workers	4%	11%
Business workers	4%	22%
Retired	14%	0%
General education	46.5%	44.5%
Higher education	53.5%	55.5%

For the total sample interviewed in the Bluff, 9% are Non-white men and 21% are White men (i.e. 30% of the sample consist of men). For all the men in the Bluff sample taken together, 87.5% are married, 6% are divorced, 63% have children and 38% do not have children. 100% are employed full-time with 19% owning their own business. 50% have a higher education, while the remaining 50% have a general education. The only important difference found, is that 27% of White men are businesses owners compared to none of the Non-white men.

4.2.3 Environmental satisfaction versus dissatisfaction

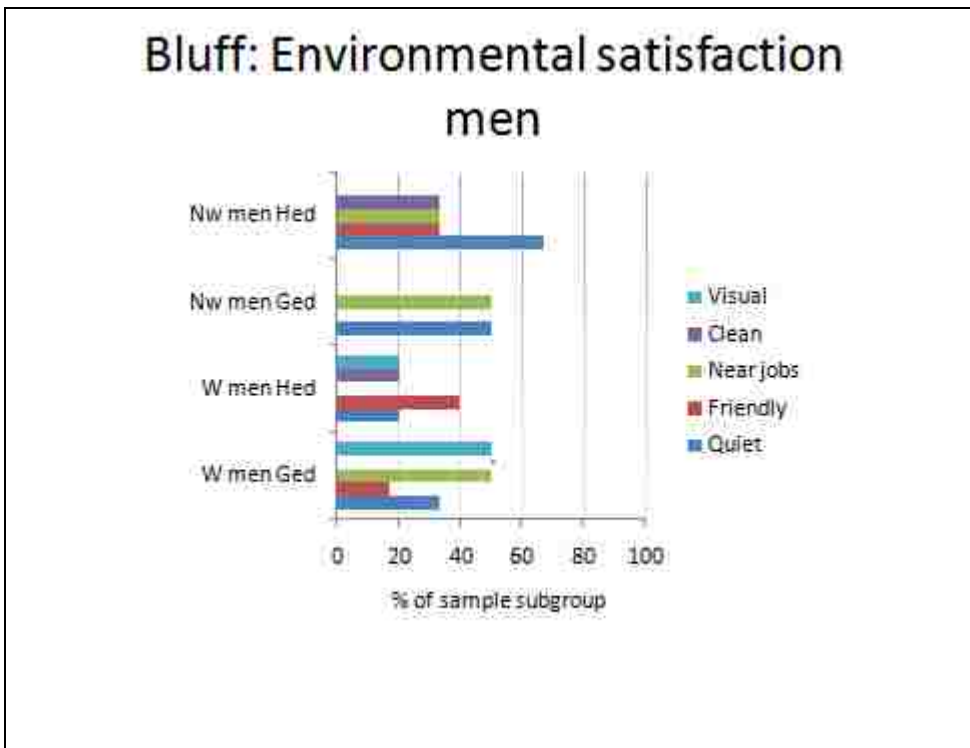


Figure 4.2 Bluff: Environmental satisfaction for men

In Figure 4.2, for the Bluff 50% of White men with a general education are generally satisfied in terms of their physical experience of the environment, as compared to only 20% of White men with a higher education. This refers to pleasant views of the sea and the abundance of trees and wildlife that is enjoyed recreationally. White men of both education levels have the highest social satisfaction of their living environment in terms of the area being friendly (40%). This is also seen with Non-white men with higher educational level.

Non-white men of both educational levels are satisfied with their environment, but in a different way, namely on a social and psychological level: 60% commented that the area is quiet and 40% said it is near their place of work.

A noteworthy difference between the above mentioned ethnic groups, is how environmental satisfaction is personally defined. This aspect, which underlies concern for attributing air pollution as a local problem, shows that the referred to individuals do not perceive their area as having a low environmental quality therefore not regard air pollution as a local problem, as stated by Bickerstaff (2004:831).

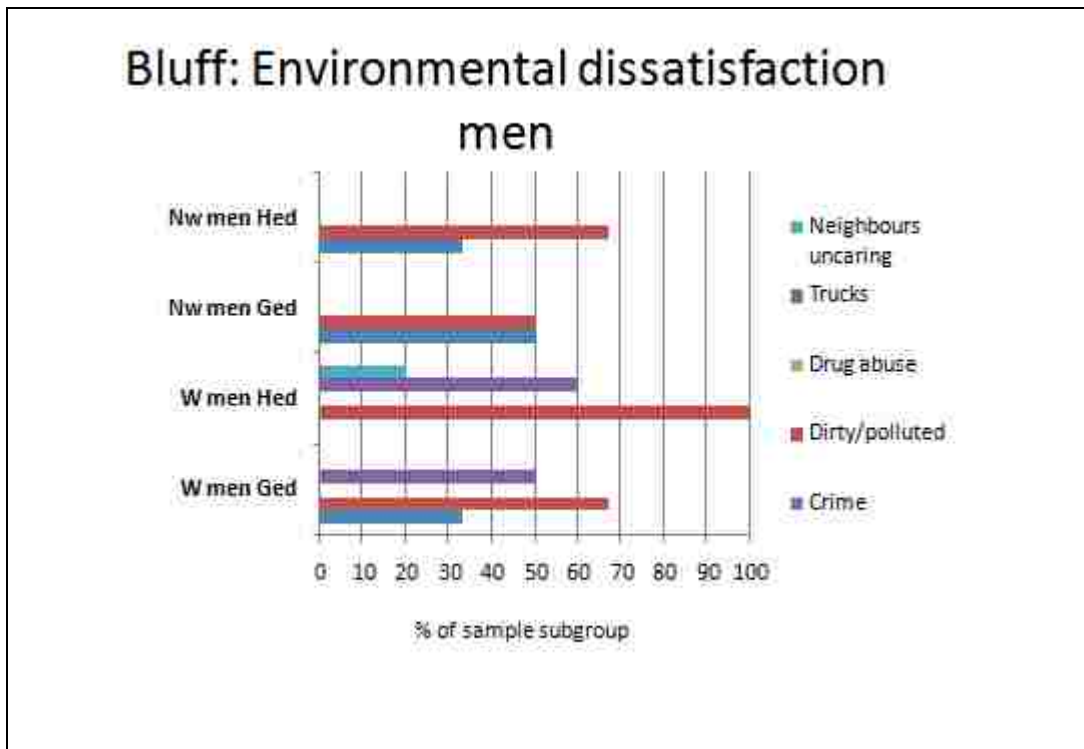


Figure 4.3 Bluff: Environmental dissatisfaction for men

For most men, pollution stands out as the item of highest concern in terms of what they do not like about their area as shown in Figure 4.3. Note, however, that, Non-white men with a general education rate crime at the same level as pollution. This means that 82% of the sample for all men rate pollution as the main problem in their area, while trucks rate second and crime third. It therefore can be seen that in general, men are perceptually aware of pollution. This is despite the findings from Figure 4.2, which implies that due to the high environmental satisfaction experienced by men, air pollution should not necessarily be attributed as a problem of local origin. This is shown in Figure 4.6 further on as well, with 68.7% of men who perceive air pollution as the main problem.

Analysis of the responses of White women in the Bluff shows that 60% of those with a higher education perceive the area as quiet and peaceful, with the corresponding percentage for those with a general education 38% (as illustrated in Figure 4.4).

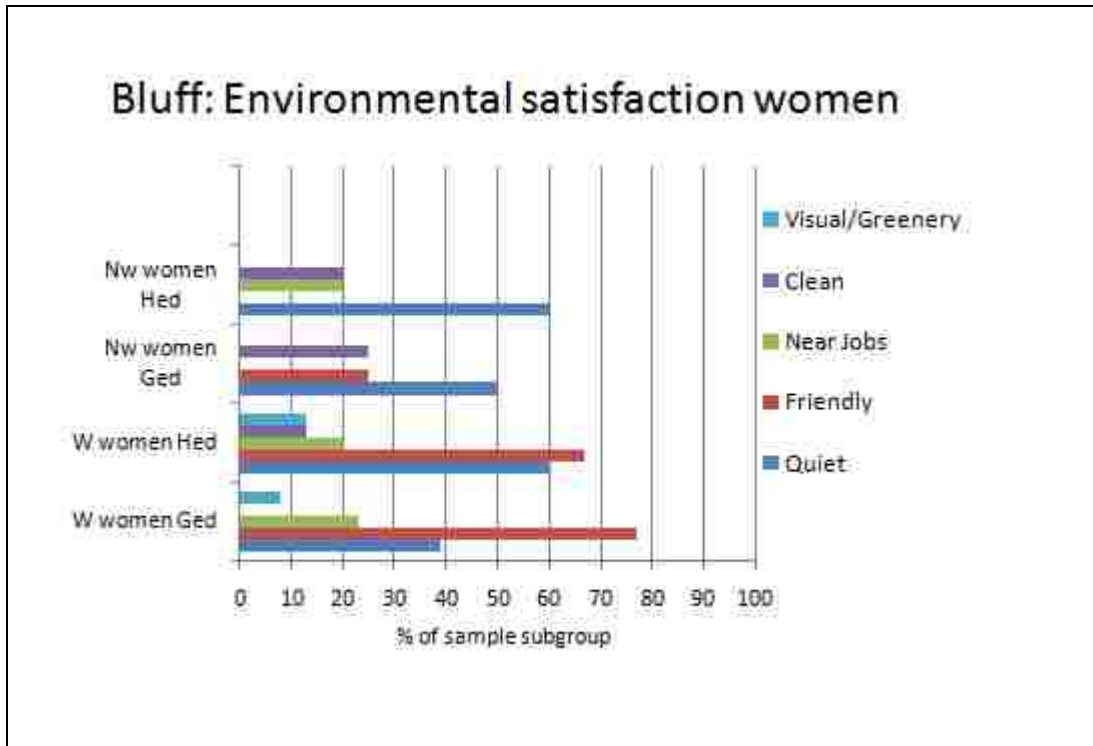


Figure 4.4 Bluff: Environmental satisfaction women

The community is rated as friendly by 60% of women with a higher education, versus a similar rating by 76% of women with a general education. The area is perceived as convenient for jobs by 20% to 23% of all women (both education groups), while 6.5% of the women with a general education perceive the area to be pleasant due to greenery and, 13% of women with a higher education perceive the environment as visually clean (no land pollution and the presence of large amounts of greenery).

For Non-white women with a general education, 50% perceive the area as quiet and peaceful, 25% perceive the environment as friendly and the other 25% perceive the area as clean with no visible land pollution. Similar results were found when looking at Non-white women with a higher education. 60% perceived the area as quiet and peaceful, with 20% indicating in addition that the area is clean with no visible pollution. The only difference is those with a higher education, who in addition indicated that the area is close to their current place of employment. These differences between White and Non-white women can be explained by the demographics observed in Figure 4.1, with 67% of Non-white women who are employed full time, compared to only 57% of White women.

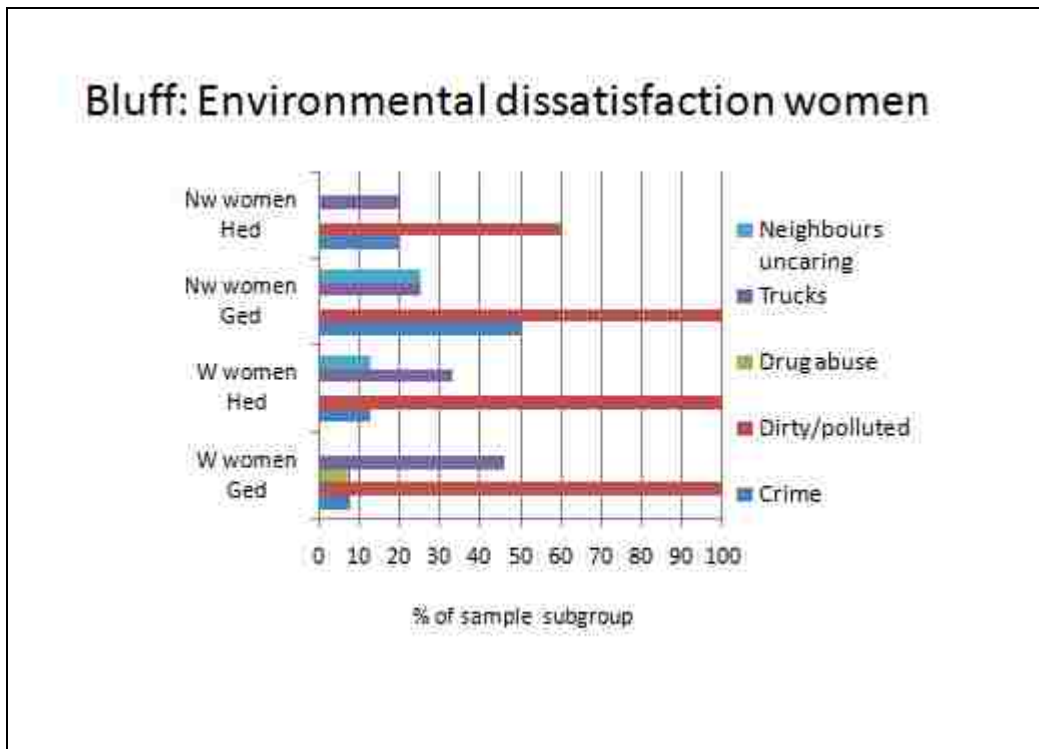


Figure 4.5 Bluff: Environmental dissatisfaction for women

Concerning environmental dissatisfaction, all women in the sample, as seen in Figure 4.5 perceive the area as dirty and polluted, with air pollution, in the form of smoke and smells (refer to Figure 4.5). 94.6% of all women complain about a black greasy dirt deposit that is left on their property and garden vegetation. 35.1% report the constant movement of trucks through the area to the Island View Complex and ENGEN as the second biggest concern. Crime and drug abuse are the third and fourth concerns, rating respectively 16% and 2.7%, while 8.1% have neighbours with degraded properties.

4.2.4 Pollution source awareness

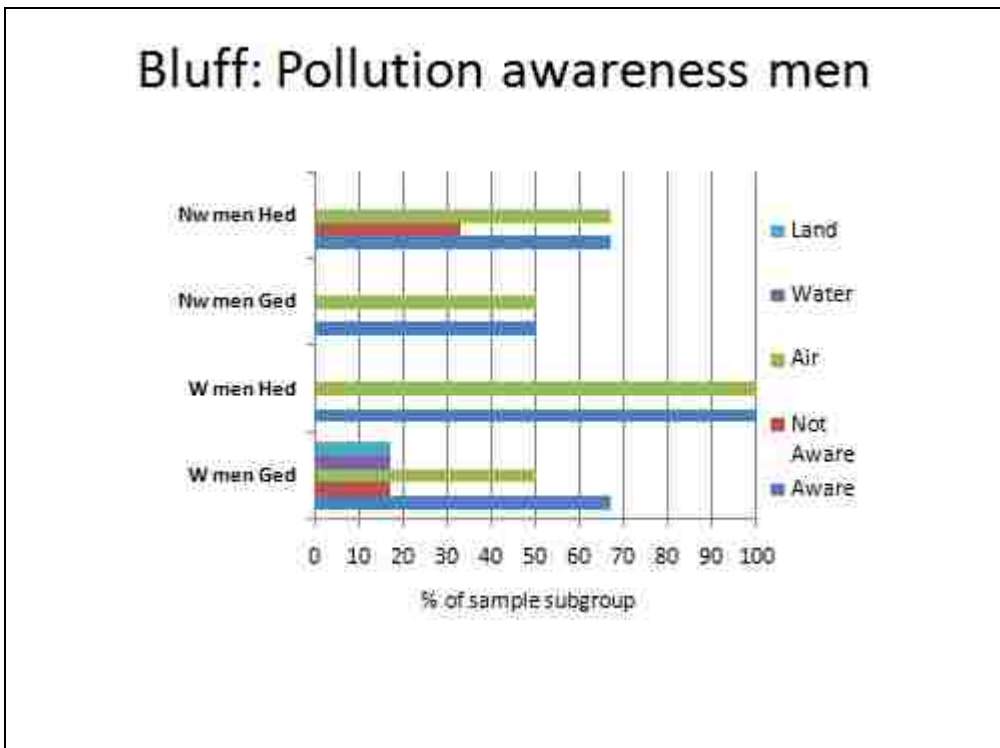


Figure 4.6 Bluff: Pollution awareness for men

While only 12.5% from both groups of men sampled in the Bluff (i.e. both race groups and education levels) claim not to be aware of any pollution (Figure 4.6), a further 12.5% claim that water and land pollution is also a problem. Noteworthy, as seen from Figure 4.6, is that 100% of White men with a higher education are aware of air pollution. Similar high levels of awareness are found with other men, as can be deduced from Figure 4.6. These levels of awareness are unusual in that research by Johnson (2002:726) and Bickerstaff (2004:832) respectively showed that men who are politically and / or economically advantaged, i.e. in this case mostly White men, tend not to associate air pollution as a problem in the areas where they stay.

Another interesting deduction from Figure 4.6 is that previously politically disadvantaged men, i.e. in this case mostly Non-whites who moved into the area from previous Non-white areas that are / were of low environmental quality still identify air pollution as a problem.

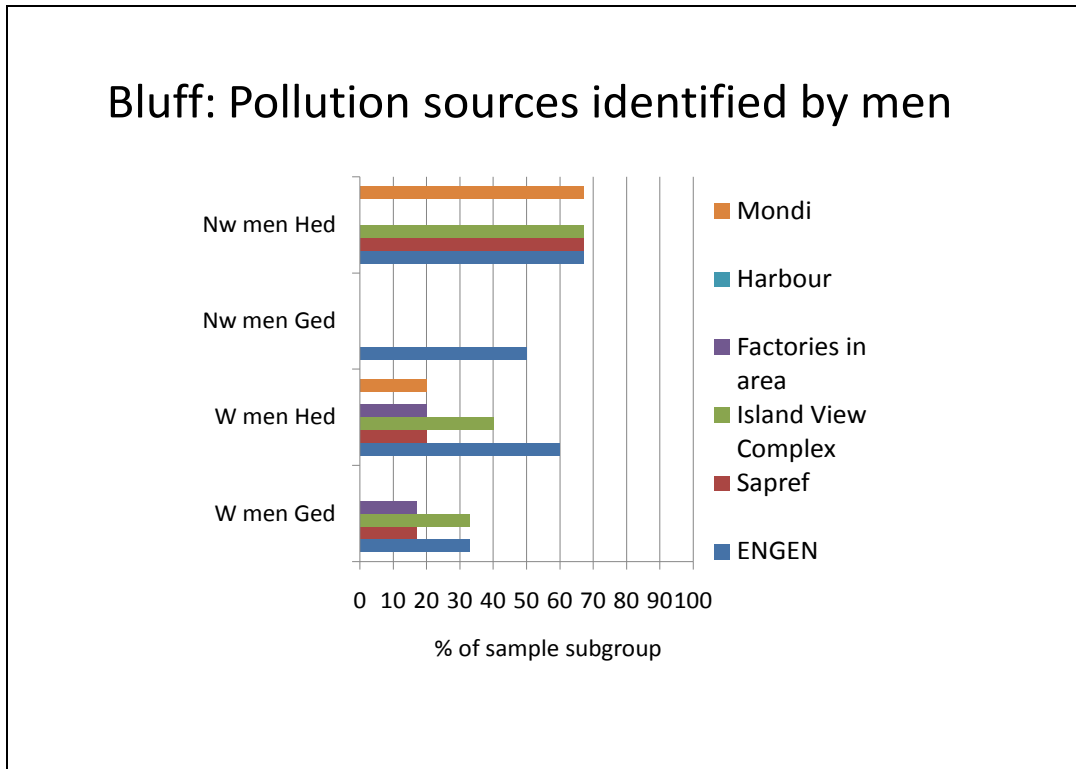


Figure 4.7 Bluff: Pollution sources identified by men

Taking all men in the sample for the Bluff together, as presented in Figure 4.7, the perceived potential pollution sources (some respondents indicated more than one source) are as follows:

1st ENGEN (50%)

2nd Island View Complex (38%)

3rd Sapref (25%)

4th Mondi (19%)

5th Factories in the area (13%)

Among all four groups of men ENGEN is perceived as the main polluter with the Island View Complex as the second biggest polluter.

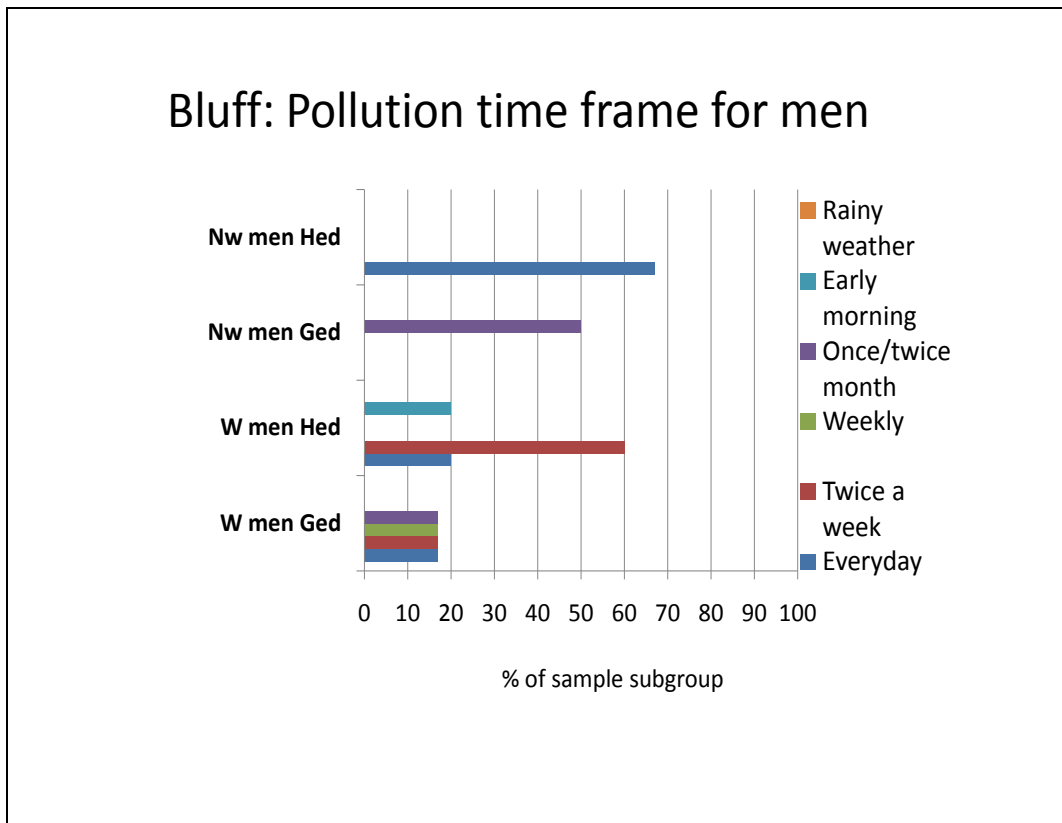


Figure 4.8 Bluff: Pollution time frame for men

Concerning the times when men are aware of air pollution, the results are as follows (this is for all men in the Bluff sample together –Figure 4.8):

Two / three times a week: 38%

Every day: 31%

Once to twice a month: 13%

Only when accidents occur at ENGEN and the Island View Complex: 12%

Early mornings: 6%

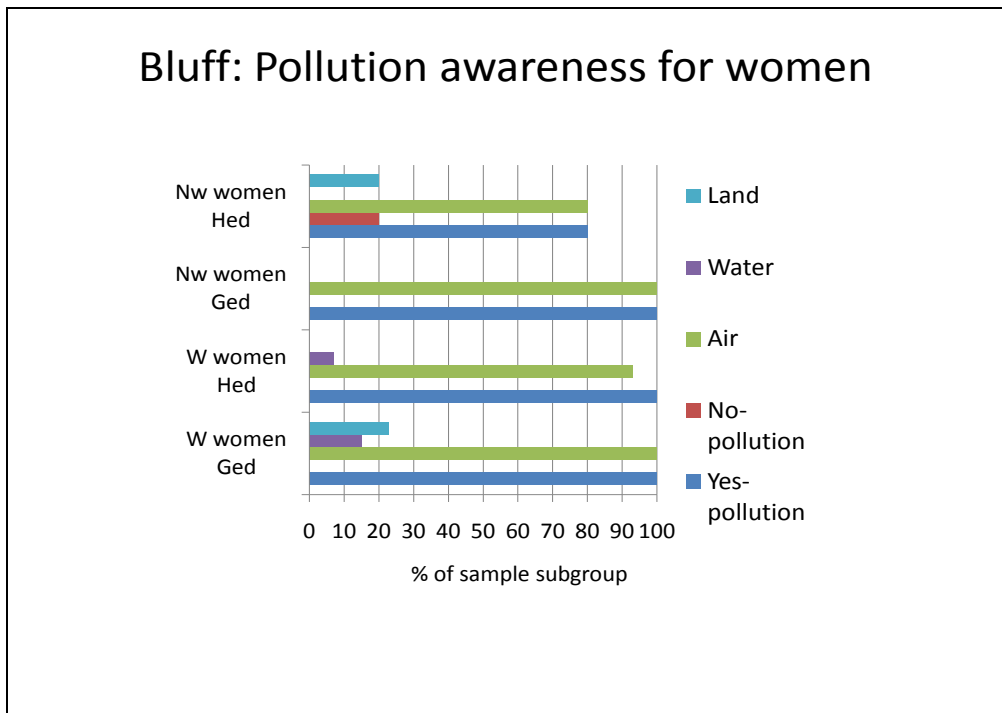


Figure 4.9 Bluff: Pollution awareness for women

Regarding pollution awareness for women (Figure 4.9), it is interesting to note that 80% of Non-white women with a higher education are aware of any form of air pollution, while 20% seem to be concerned with land pollution.

This is probably the result of the respondents working long hours (shift work) and not being at home for extended periods to notice air pollution. In addition 8% are aware of water pollution due to beach use and noticing that sea-life is very sparse.

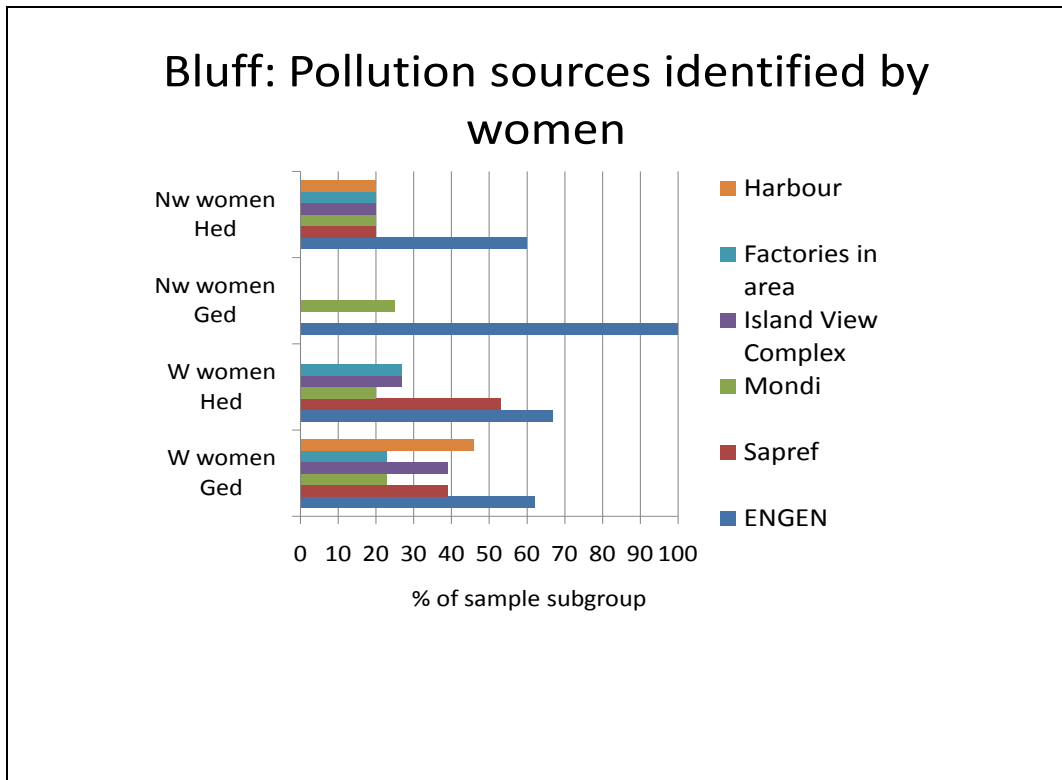


Figure 4.10 Bluff: Pollution sources identified by women

For all women as one group (no subdivisions) the following perceptions with regard to potential pollution sources are noteworthy. (Figure 4.10):

- 1st ENGEN (72%)
- 2nd Sapref (28%)
- 3rd Mondi (22%)
- 4th Island View Complex (12%)
- 4th Factories in the area (12%)
- 5th Harbour (5%)

Viewing the two gender groups together reveals the following perceptions concerning the main polluters in the environment:

- 1st ENGEN (61%)
- 2nd Sapref (33%)
- 3rd Island View Complex (30%)
- 4th Mondi (20%)
- 5th Factories in the area (18.5%)
- 6th Harbour (13%)

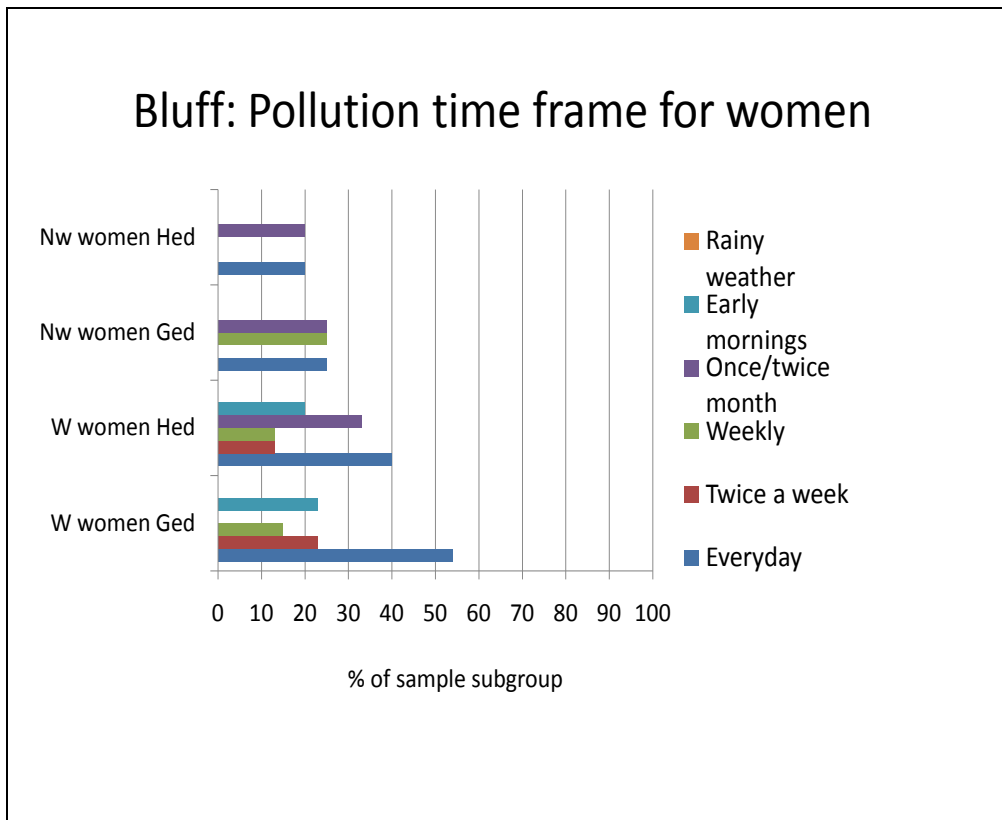


Figure 4.11 Bluff: Pollution time frame for women

The time slots when women are perceptually aware of air pollution are as follows (Figure 4.11):

Every day: 35%

Once / twice a month: 20%

Twice / three times a week: 13%

Early in the mornings: 5%

When comparing men to women it is noteworthy, that both groups are similar in their awareness of pollution on a day to day basis, but differ in their awareness of recurring pollution. A higher percentage of men (38%) than women (13%) show awareness of the occurrence of pollution two / three times a week. This contradicts the literature on gender comparison in this field of study. According to Myers *et al* (1999:116) women have greater sensitivity to the awareness of pollutants than men. But Howel *et al* (2003:169) found that these differences tend to disappear where a community is afflicted by other social problems such as poverty and crime. But this is not case in this situation as the Bluff is not materially deprived compared to other study areas in South Durban.

4.2.5 Health awareness and other impacts

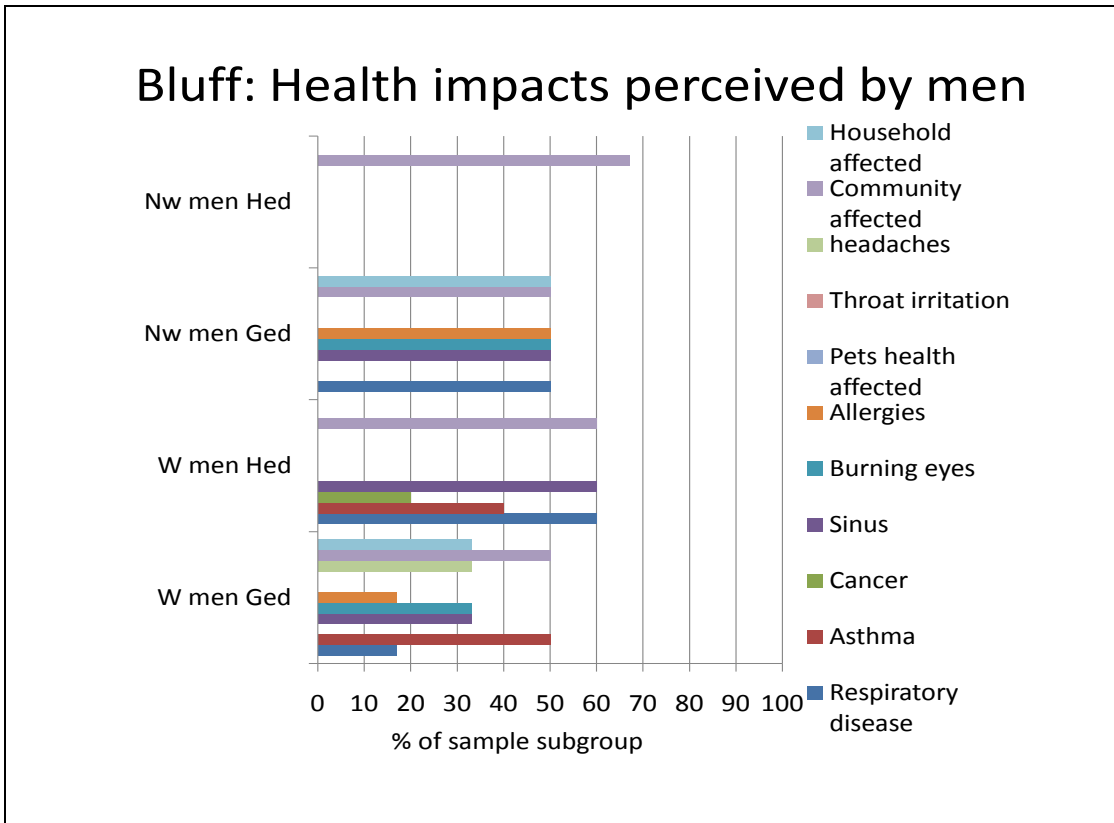


Figure 4.12 Bluff: Health impacts perceived by men

Generally speaking White men feel that their health is affected in one or the other way by air pollution in the Bluff as seen in Figure 4.12. Of those with a higher education, 60% believe that respiratory diseases are associated with air pollution, whereas this is the case for only 17% of those with a general education. Yet 50% of the latter group (Figure 4.12) believes asthma to be associated with air pollution, compared to 40% of men with a higher education. This difference could be attributed to people who are socially more advantaged in terms of life experience being able to distinguish better between asthma and wheezing.

60% of White men with a higher education perceive sinusitis to be associated with air pollution, compared to 33% of those with a general education. But 33% of the latter groups also perceive burning eyes, allergies and headaches to be associated with air pollution. Note, however, that this can be due to a lack of proper understanding of the symptoms of sinusitis.

For Non-white men in the Bluff figure, 50% with a general education and 67% with a higher education perceive the occurrence of respiratory diseases, sinusitis, burning eyes and allergies in the community to be associated with air pollution (Figure 4.12). But they do not feel

that they are affected directly, as only 20% of Non-white men with a higher education report household members affected by diseases related to air pollution. This could be due to moving from a previous Non-white area, where infrastructure was less than adequate, to an area where infrastructure is of a higher standard. This differs from White men, with 54.5% perceiving the community to be affected by bad health, yet only 9% report household members with perceived bad health associated with the pollution in the area.

With regard to health impacts, an important observation in Figure 4.12 is that White men with a higher education perceive air pollution to be associated with respiratory disease, whereas those with a general education specifically perceive asthma to be associated with air pollution. This finding does not tie in with research by Johnson (2002:726), who found that White men in the USA rated air quality as good and also indicated that they did not suffer from respiratory problems associated with air pollution.

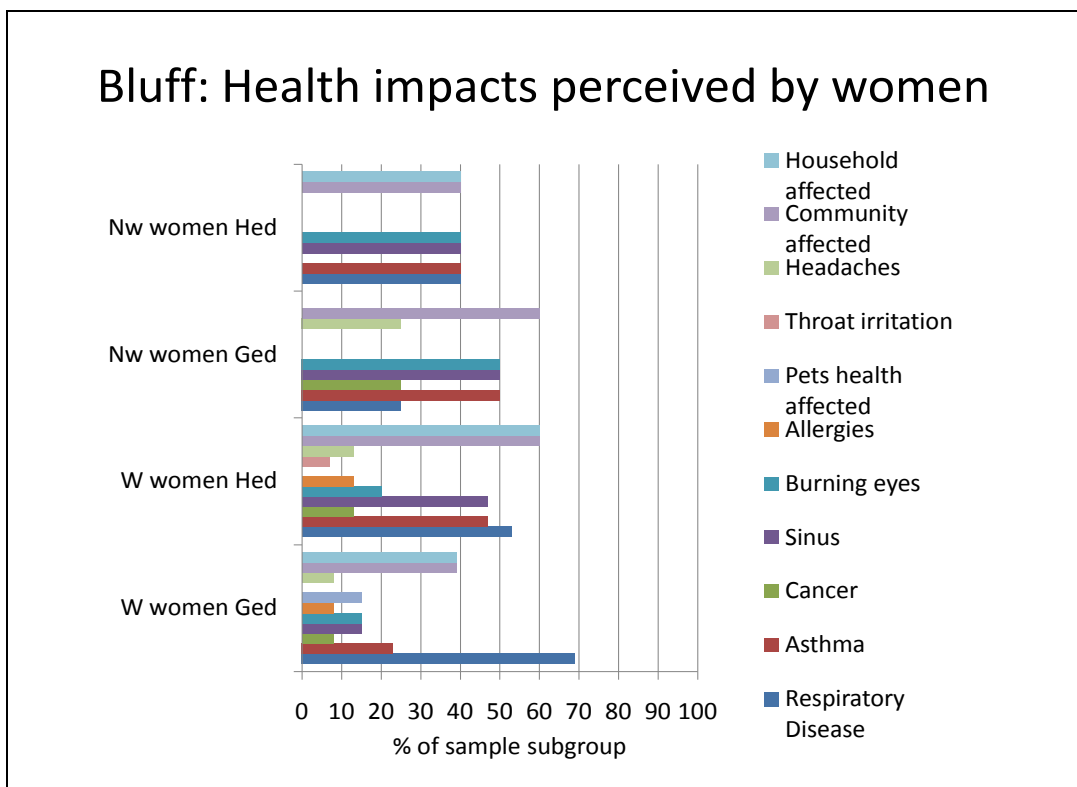


Figure 4.13 Bluff: Health impacts perceived by women

With regard to health impacts in the Bluff, 69% of White women with a general education perceive respiratory diseases to be associated directly with air pollution (Figure 4.13). Yet 40 to 50% of White women with a higher education, as well as all Non-white women (both education groups) perceive asthma to be directly associated with air pollution.

This result could be due to a discrepancy in the understanding of the difference between asthma and respiratory disease (wheezing and bronchitis). In the case of Non-white women this could be ascribed to the life experiences associated with their families living in areas close to industries.

Non-white women with a general education perceive sinusitis not of a high concern (which is the same as for Non-white men). This may be associated with a lack of understanding of the symptoms of sinusitis, in other words considering it as part of respiratory disease (resulting in the high percentage observed in Figure 4.13).

From Figure 4.13 it is furthermore clear that 45% of Non-white women complain of burning eyes, compared to 18% of White women. With regard to headaches, Non-white women with a general education show the highest percentage, namely 25%, compared to 11% for White women (both education groups). This can be explained by considering the percentage of people perceiving allergies to be associated with air pollution. For White women this is 11%, compared to 0% for Non-white women. This could be as a result of a lack of understanding of the symptoms of an allergy, resulting in the varying percentages.

4.2.6 Community awareness of illness related to air pollution

Figure 4.14 indicates that for the Bluff, 54.5% of White men with a general education and 60% with a higher education perceive the community to be affected by bad health directly associated with air pollution. Regarding Non-white men, 50% with a general education and 67% with a higher education perceive this air pollution to be coming from ENGEN, and that as a direct result the community suffers from respiratory infections, such as burning eyes, sinusitis and allergies. The relative high percentage of White men in the Bluff who can identify a link between air pollution and health effects, contradicts research done which indicates that White men (usually in a high - level positions) are not aware of others in their immediate environment being affected by air pollution (Bickerstaff 2004:832; Johnson 2002:726). In contrast, only 9% of White men with a higher education have family members that they believe are affected by air pollution.

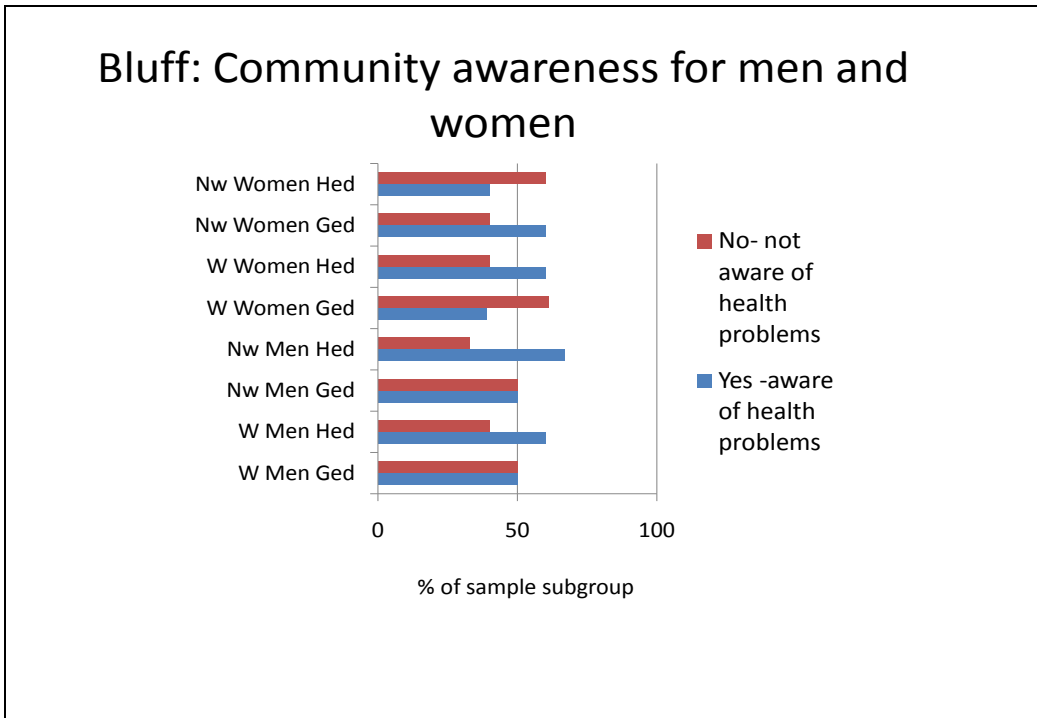


Figure 4.14 Bluff: Community awareness for men and women

For women in the Bluff the picture is as follows: Awareness of others in the community suffering from ill health as a result of air pollution varies from 40% (White women with a general education and Non-white women with a higher education) to 60% (White women with a higher education and Non-white women with a general education). In terms of having family members being affected, 22% of Non-white women report family members currently ill from air pollution, while 50% of White women report family members in this position.

4.2.7 Legal enforcement

As a group, all Non-white men in the Bluff sample are unaware of any regulations that are in place to curb air pollution and where and how concerns and complaints about air pollution can be reported (Figure 4.15).

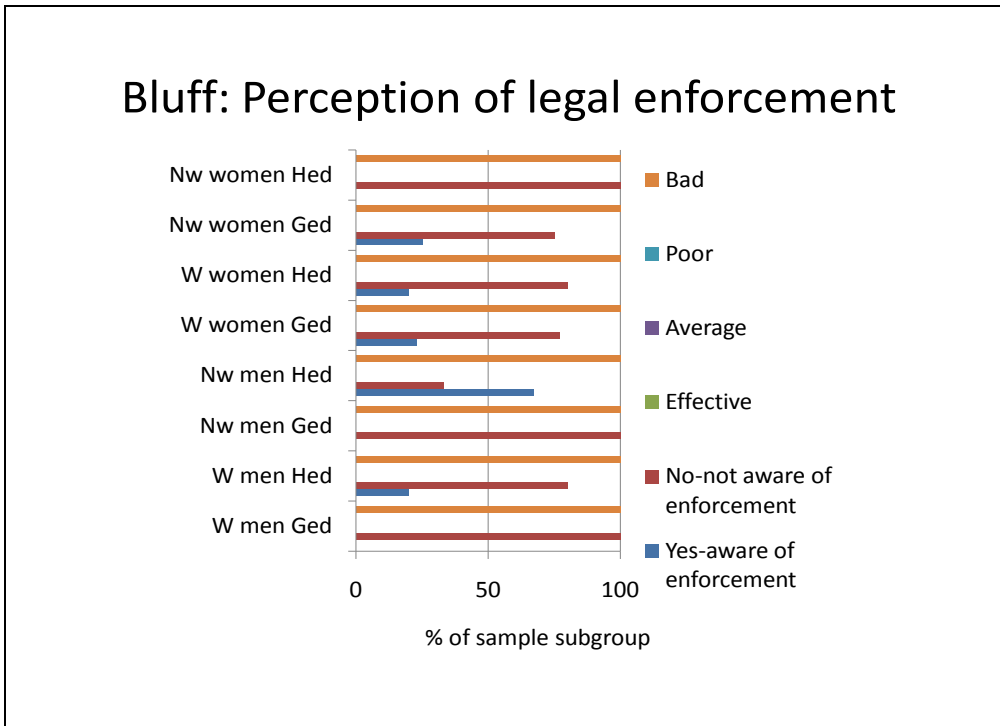


Figure 4.15 Bluff: Perception of legal enforcement

The results for the women in the sample for the Bluff seen in Figure 4.15 are less homogeneous than for the men. All Non-white women with a higher education are unaware of any regulations in place to curb air pollution or where and / or how air pollution incidences and concerns can be reported. For Non-white women with a general education, the corresponding percentage is 75%, for White women with a higher education it is 80% and for White women with a general education it is 77%. The remaining percentages for both groups can be attributed to them accepting the authority of industry officials and feeling that environmental community groups meet their needs.

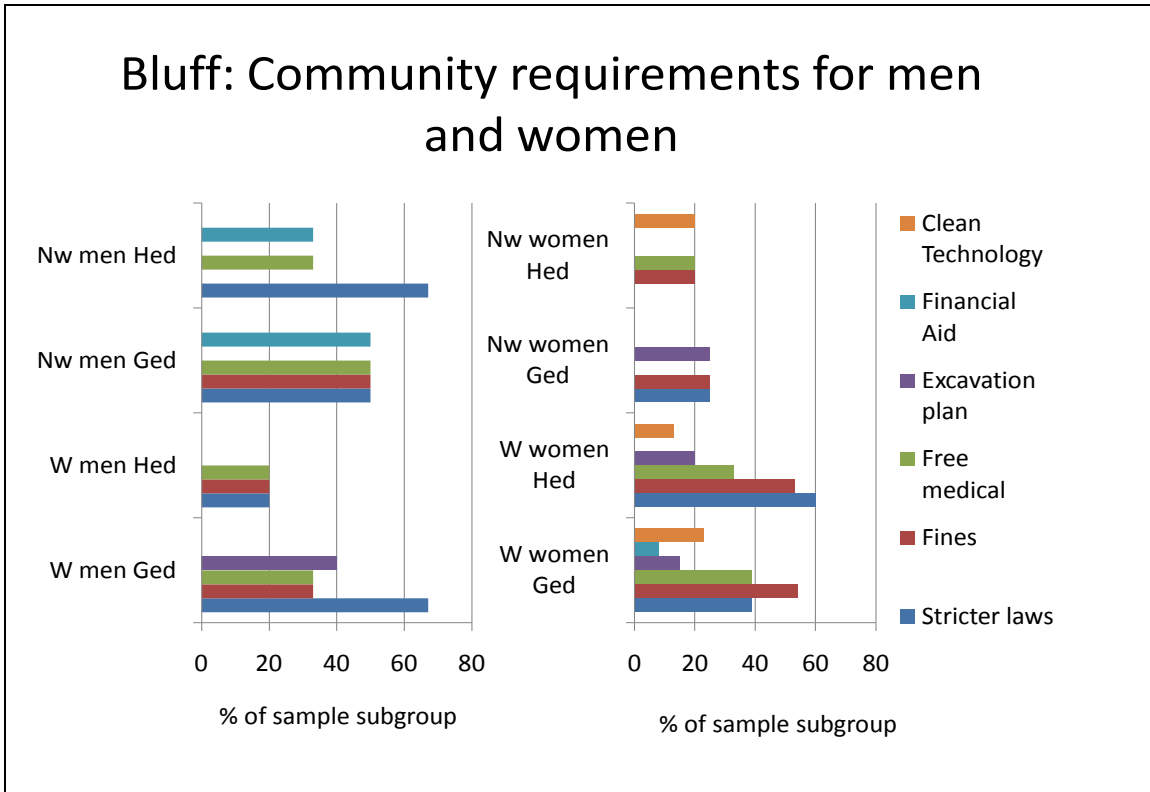


Figure 4.16 Bluff: Community requirements for men and women

For the total sample of White men in the Bluff (Figure 4.15), 82% are unaware of any regulations that are in place to curb air pollution, with only 18% that are aware of some form of monitoring system that exists. The measures suggested by Non-white men are as follows (Figure 4.16):

Tougher laws: 60%

Higher fines: 20%

Financial compensation: 40%

Free medical care: 40%

For the total sample of White men in the Bluff (Figure 4.16) when asked what needs to be done to rectify the current situation the following was indicated:

Tougher laws: 45.4%

Higher fines: 27.2%

Free medical care: 27.2%

Cleaner technology: 27.2%

Evacuation plan when accidents occur at refinery and / or Island View Complex: 18.1%

When asked what needs to be done to rectify the current situation, following was found for Non-white women (both education groups) wanted:

Higher fines: 22%

Tougher laws: 11%

Free medical services: 11%

Evacuation plan: 11%

Cleaner technology: 11%

When asked what needs to be done to rectify the current situation the following was indicated for White women of both groups (Figure 4.16):

Tougher laws: 50%

Higher fines: 57%

Free medical services: 36%

Evacuation plan when accidents occur at refinery and / or Island View Complex: 18%

Cleaner technology: 18%

Financial compensation: 3.5%

Noteworthy is that as a group, men in the Bluff shows the highest percentage requiring free medical care, whereas women are more concerned with having higher fines for pollution and stricter air pollution laws.

4.3 Merebank / Merewent analysis and background

During the late 1950s a number of shack dwellers and small holdings owned by diverse race groups were forced off land in Merebank to make way for industrial development. Some of the groups were relocated to 'Indian' housing schemes in the area that were developed especially to provide labour for industry. Currently 50% of the residents are employed as clerks, salespersons, artisans as well as in industry and manufacturing. More women work at home than in any of the other study areas. In 1994 the population of Merebank totaled 24 770, with a presence of approximately 10% of the Indian Community. A survey done during the early 1990s showed that the communities of the Merebank, Wentworth and Bluff areas' housed more than three-quarters of the population not having completed high school. (SDCEA 2008:42)

The long history of this area ensured a strong community identity. Despite different income levels there are strong civic organizations and a history of Anti-apartheid activism. On both

sides of Merebank and Merewent there are industries and transport arterials. These include the Umlazi Canal and the adjacent industries of SAPREF, Shell Chemicals, Isegen, the Southern Freeway and South Coast Highway, the ENGEN refinery and the transport corridor of Duranta Street, the Southern Works, Stanvac Canal, Mondi industrial road and paper mill.

4.3.1 Division of results

Similar to the sample for the Bluff, the results for Merebank / Merewent are divided into gender and then further sub-divided into education levels in order to evaluate any differences in perception. In this regard Bickerstaff (2004:832) indicates that those experiencing the greatest socio-economic advantages, in this case those with a higher education are less likely to see the world as dangerous. In addition, people who are dictated where to live, would usually perceive their living environment as negative. All interviewees were previously politically marginalized Non-white individuals under the former Apartheid regime. Consequently no division of the sample into racial groups was required.

4.3.2. Sample demographics

In the Merebank / Merewent area, 22 respondents were interviewed either by telephone or by filling out a questionnaire. Community volunteers interviewed 7 of these respondents.

The demographical details of the thirteen men in the sample for Merebank / Merewent can be observed in Figure 4.17: For the men with a general education, 50% are married, 20% have children, 40% have full time employment, 40% have part time employment, 10% are unemployed and another 10% are students. For the men with a higher education, 100% are married, have children and are employed full time.

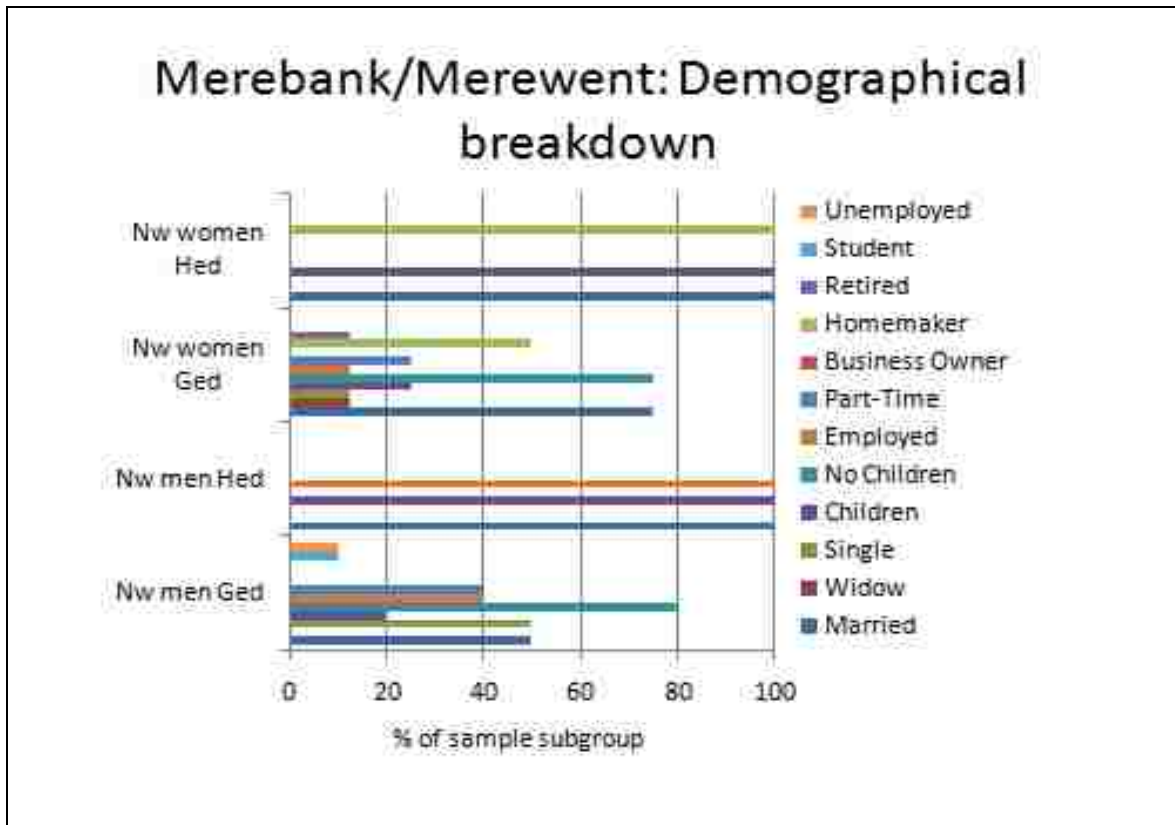


Figure 4.17 Merebank / Merewent: Demographical breakdown

In the sample of nine women for the Merebank / Merewent area, eight have a general education and one a higher education. For all the women as a group, 88% are married and 13% widowed or single. 38% have children, 11.1% are employed full time and 22.2% part-time, 55.5% are homemakers and 11.1% are retired.

For the purpose of this analysis, the different education and gender groups are combined, but if variations are observed, separate analyses are conducted.

4.3.3 Environmental satisfaction versus dissatisfaction

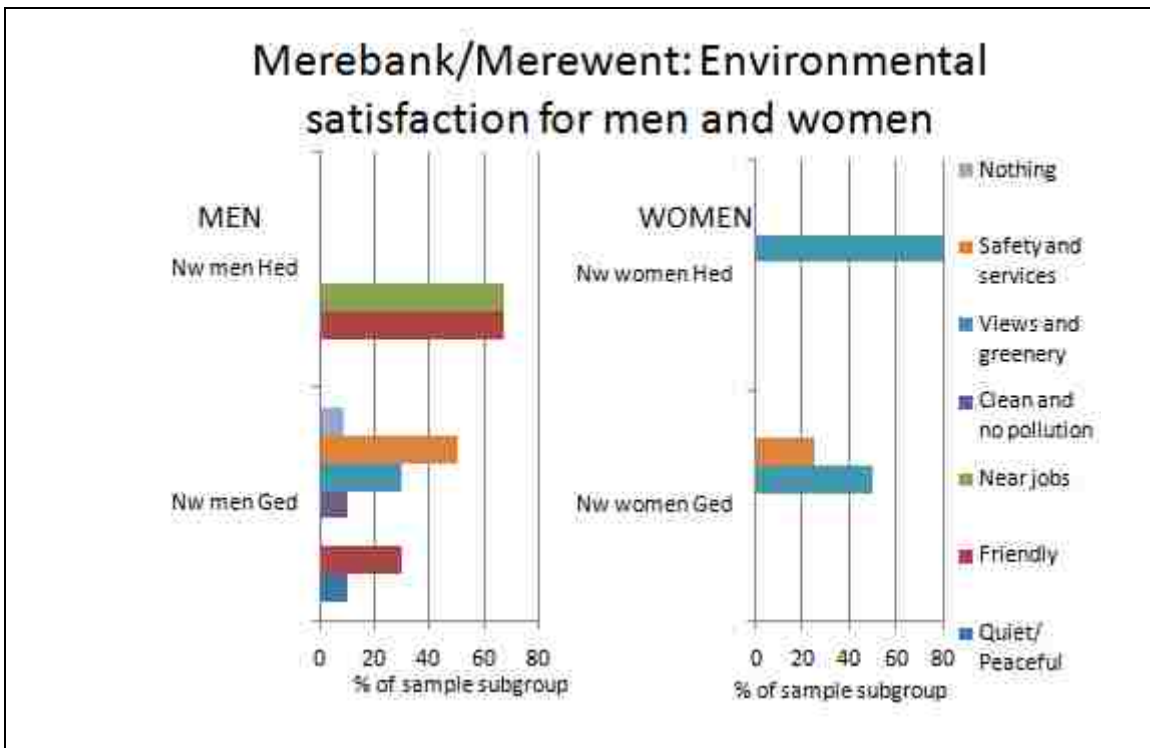


Figure 4.18 Merebank / Merewent: Environmental satisfaction for men and women

Inter group comparison reveals that men with a higher education rate the friendliness of the community and proximity to jobs as most important aspects. Those with a general education, however, perceive the friendliness and safety of the area most important. They also commented about the views and greenery (parks) of the area.

A safe community and close to amenities' (safety and services) are rated as the most important aspects among the two educational groups of men with an average of 57.1%, while friendliness of the community is rated second with an average of 35.7%. The proximity of the area to current employment (jobs) is rated the third most important aspect with an average of 47%.

The perceptions of the women in the sample for Merebank / Merewent about environmental satisfaction differ significantly from that of the men. Considered as a group the woman in the sample are positive about the following aspects of the environment:

Cleanness of the area (clean and no pollution): 11.1%

Area is safe with good infrastructure and transport and is close to amenities: 55.5%

Taking all the sub groupings together, Figure 4.18 therefore indicates a high level of social and psychological satisfaction with their environment for the residents of Merebank / Merewent in other words they enjoy the friendly community, the closeness to their jobs and the presence of services such as transport and shopping centres.

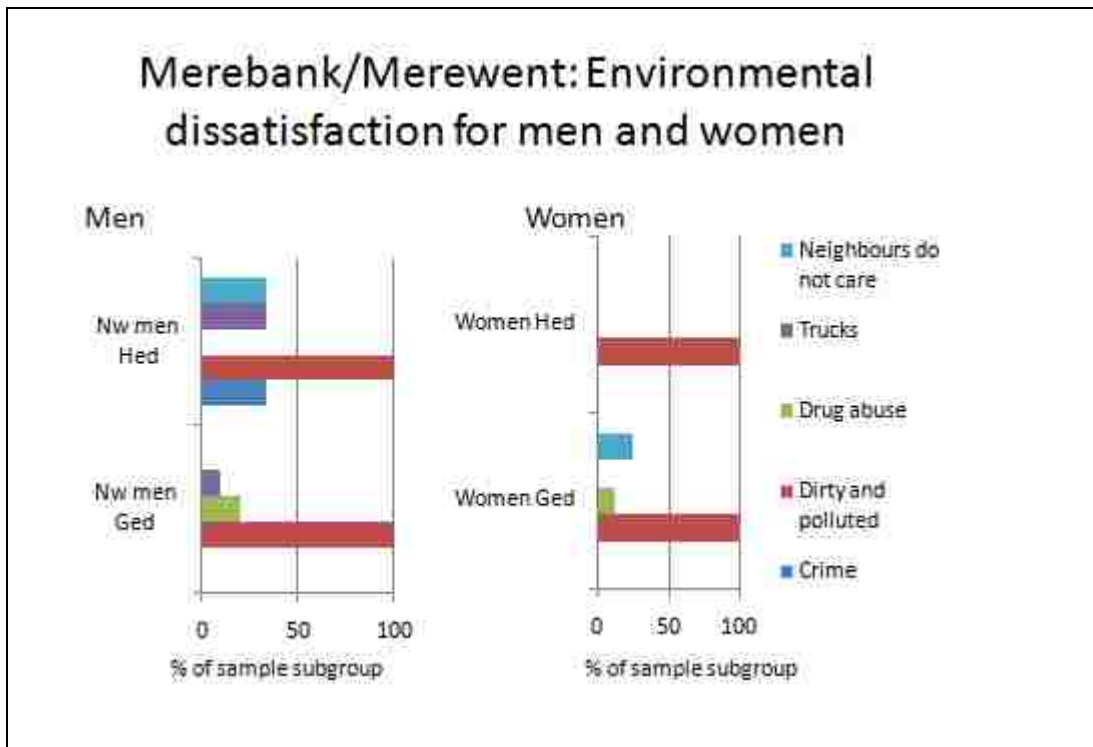


Figure 4.19 Merebank / Merewent: Environmental dissatisfaction for men and women

When both educational groups of men are considered as one group (Figure 4.19), a 100% perceive Merebank / Merewent area as dirty and visibly polluted. Second in importance are the problems of respectively trucks and drug abuse (15%) and thirdly having neighbours that do not care about their property having a negative influence on the image of the area (7.6%).

Considering the results for the sample of women, it is clear that 100% of both education groups perceive the environment as visually and perceptually polluted in the form of smells and smoke. Of this sample, 26% are aware of water pollution, 25% of noise pollution, with 25% who also lived next door to neighbours that do not care about their property.

4.3.4 Pollution source awareness

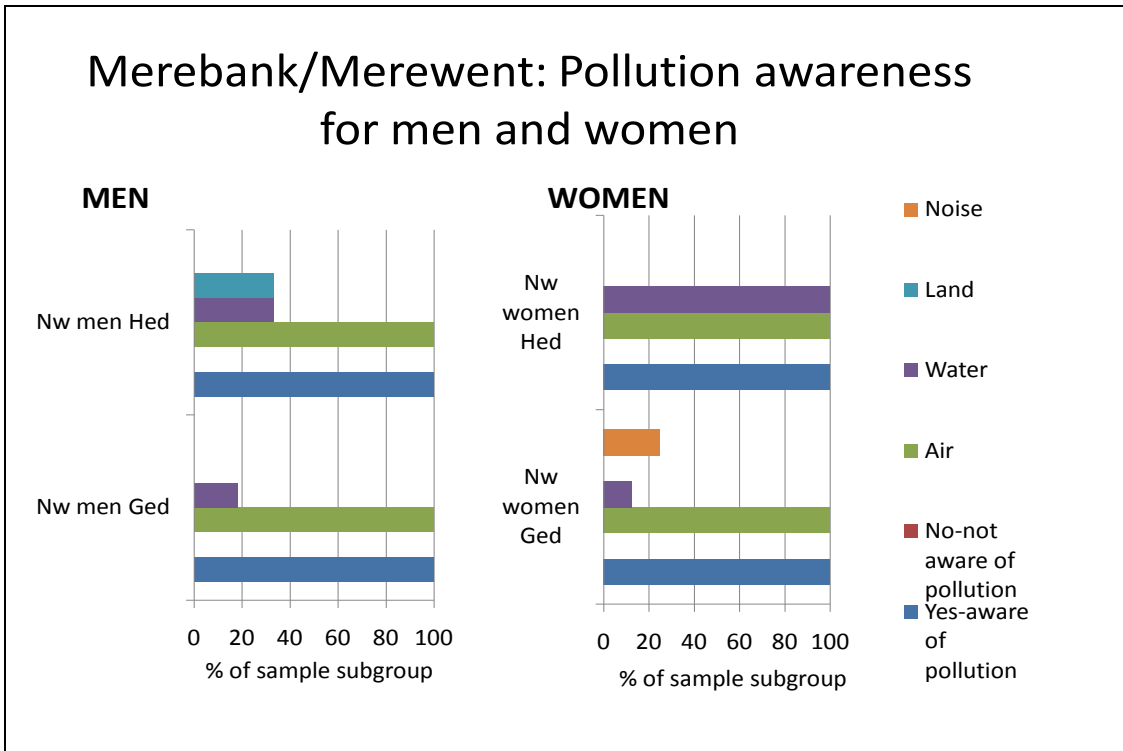


Figure 4.20 Merebank / Merewent: Pollution awareness for men and women

As shown by Figure 4.20 it is immediately clear that 100% of the sample (both men and women) perceive air pollution to be a problem. Viewed as one group, 22.7% of the respondents are aware of water pollution, 4.5% of land pollution and 9% of noise pollution. A noteworthy difference is that only women are aware of noise pollution.

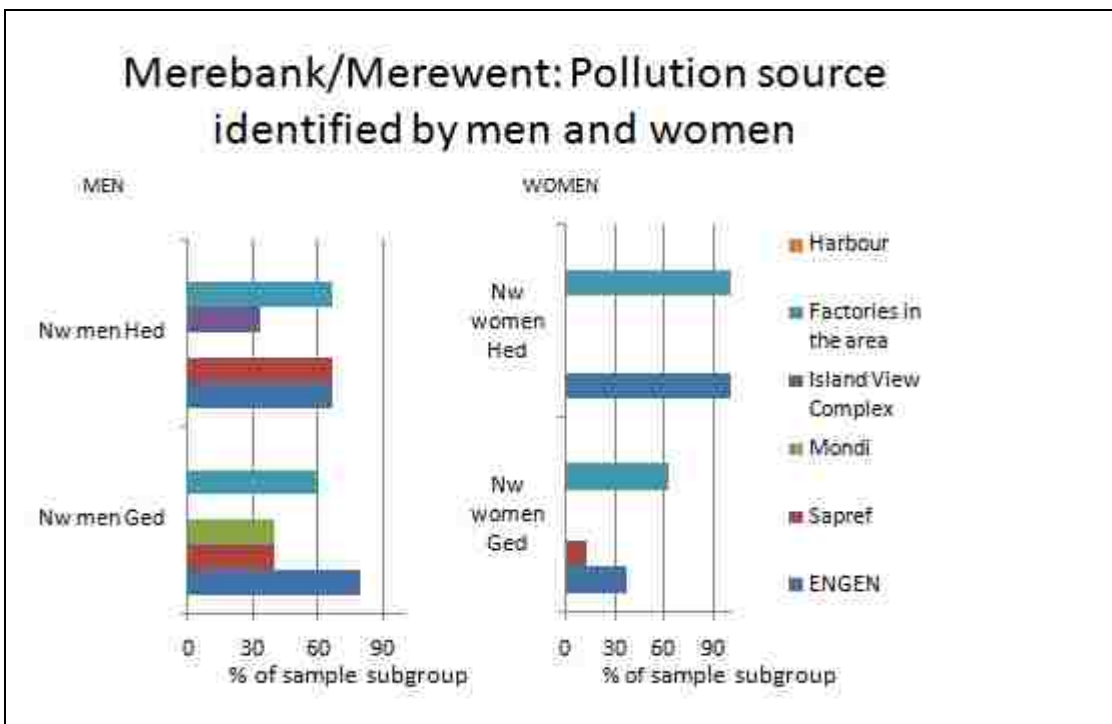


Figure 4.21 Merebank / Merewent: Pollution source identified by men and women

Figure 4.21 provides an indication of the sources of air pollution as perceived by the respondents from the Merebank / Merewent area. Taking together all the subgroups (gender and education) in the Merebank / Merewent sample, the following results were obtained:

1st ENGEN (63.6%)

1st Factories in the area (63.6%)

2nd Sapref (31.8%)

3rd Mondi (18.1%)

4th Island View Complex (4.5%)

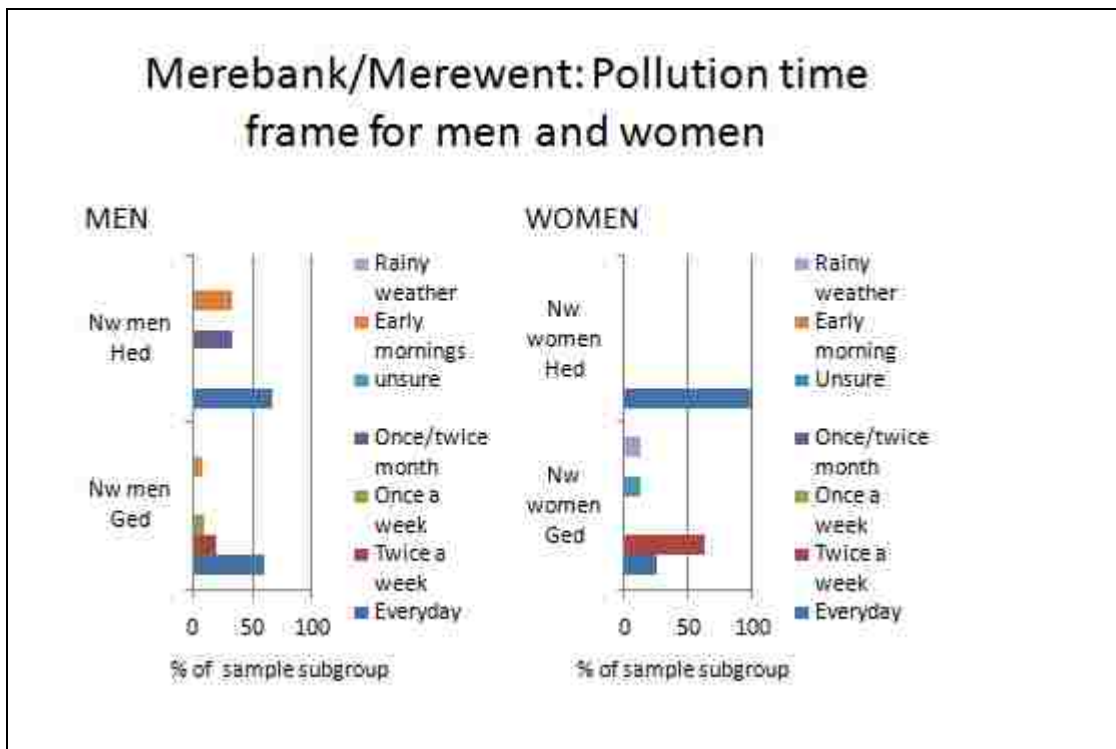


Figure 4.22 Merebank / Merewent: Pollution time frame for men and women

Figure 4.22 provides a breakdown of the frequency with which people are aware of air pollution. The following are the combined results for all the subgroups in the Merebank / Merewent area:

Every day: 50%.

Twice to three times a week: 36.3%

Early morning: 9%

Once or twice a month: 4.5%

During rainy weather: 4.5%

Unsure of when they were aware: 4%

4.3.5. Health awareness and other impacts

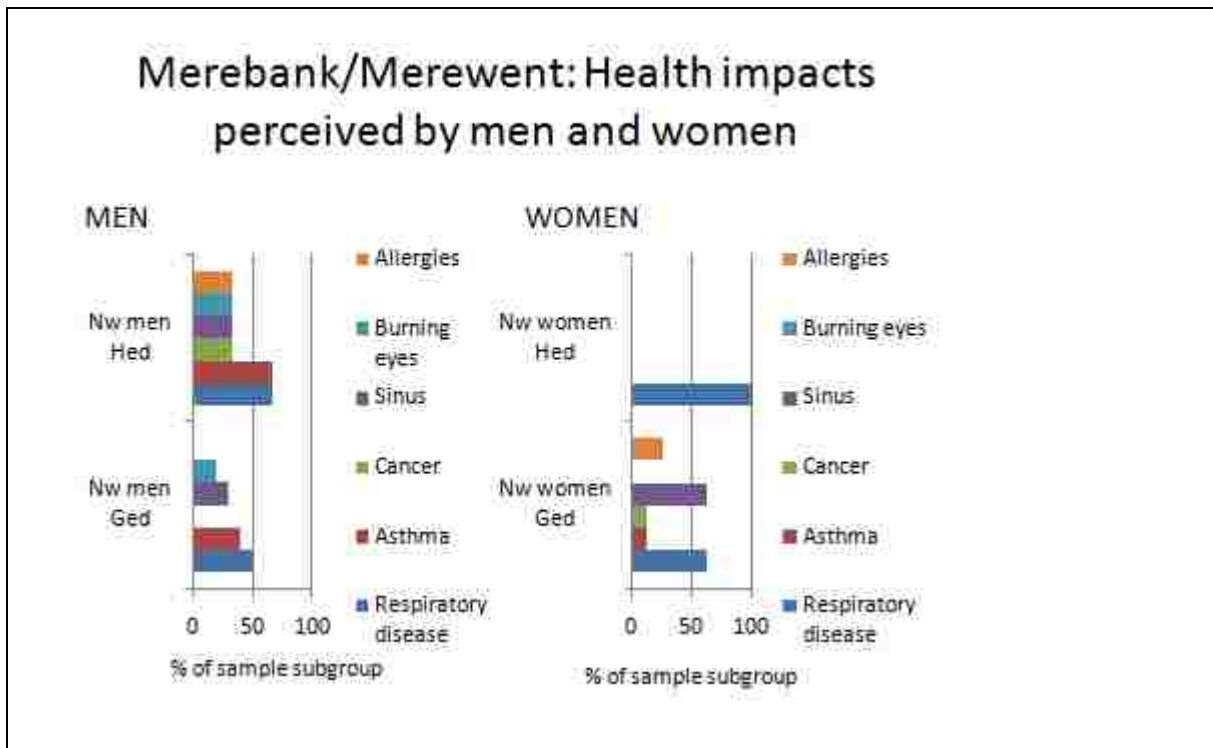


Figure 4.23 Merebank / Merewent: Health impacts perceived by men and women

From Figure 4.23 it can be deduced that 50% of men with a general education in the Merebank / Merewent area perceive respiratory disease to be directly associated with air pollution, compared to only 40% who perceive asthma to be associated with air pollution. This difference could be the result of people not having the necessary background to distinguish between wheezing and asthma. Note that 67% of men with a higher education perceive both respiratory disease and asthma to be associated with air pollution.

The second most prevalent health issue associated with air pollution, identified by 33% of men with a higher education, is that of illnesses such as cancer, sinus, burning eyes and allergies. However, when compared to men with a general education, not a single respondent perceived cancer to be associated with air pollution. The reason for this could be because these respondents place lung cancer in the same category as respiratory diseases. This is probably also the case with sinus, burning eyes and allergies, which 60% of men with a general education report as a problem, compared to 33% of men with higher education (only one respondent commented that air pollution is associated with sinus, burning eyes and allergies).

Considering the female respondents in the sample for Merebank / Merewent as a single group (both education levels), 66.6% associate respiratory disease with air pollution, 55.5% with sinus, 22.2% with allergies and 11.1% with asthma and cancer. The significant difference in the beliefs about health problems associated with air pollution could be explained due to placing asthma and cancer (especially lung cancer) in the category of respiratory disease.

4.3.6 Community awareness of illness related to air pollution

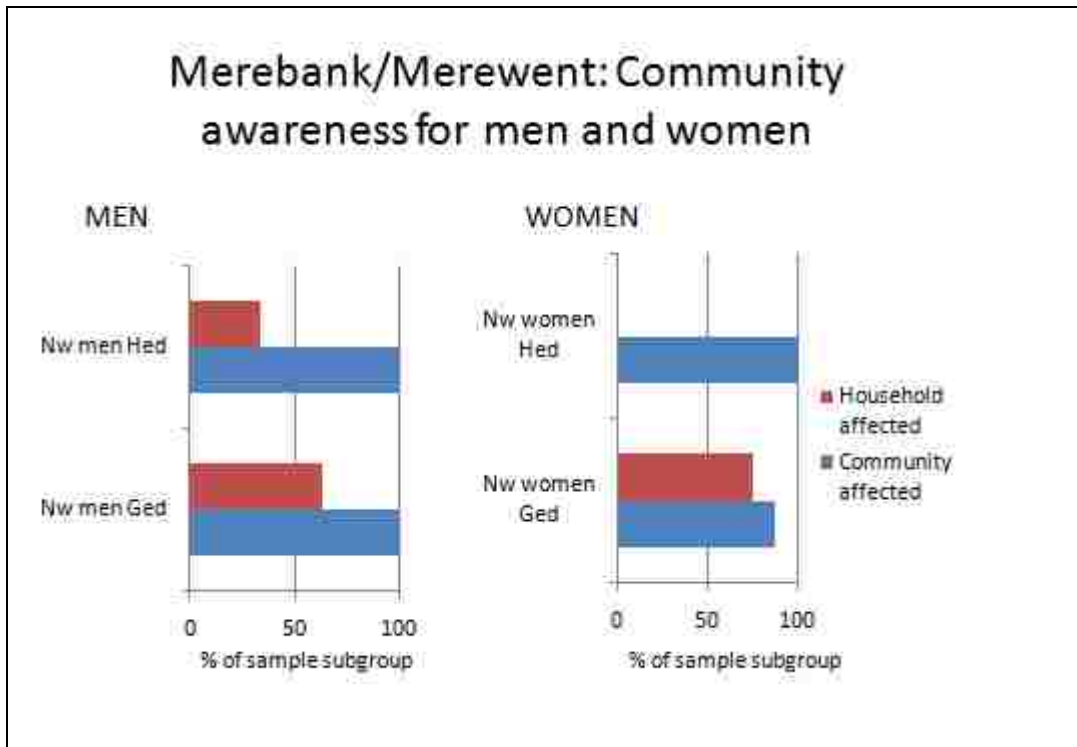


Figure 4.24 Merebank / Merewent: Community awareness for men and women

100% of both male groups perceive their community to be suffering from ill health associated with air pollution (Figure 4.24). Noteworthy is that while 70% of the men with general education commented that household members are personally affected; only 33% of those with a higher education commented similarly. This significant difference in belief can be attributed to power and control in relation to income earned, as 90% of men with a general education earn below R65 000 per year, whereas 100% of men with a higher education earn more than R100 000 per year.

All higher education female respondents are aware of community members affected by ill health associated with air pollution, yet none have household members personally affected. When looking at general educated 87.5% are aware of community members that are ill and 75% have household members that are affected. Concerning awareness of community

members affected by ill health associated with air pollution, 44% of all women obtained this awareness primarily through reports in the media.

4.3.7 Legal enforcement

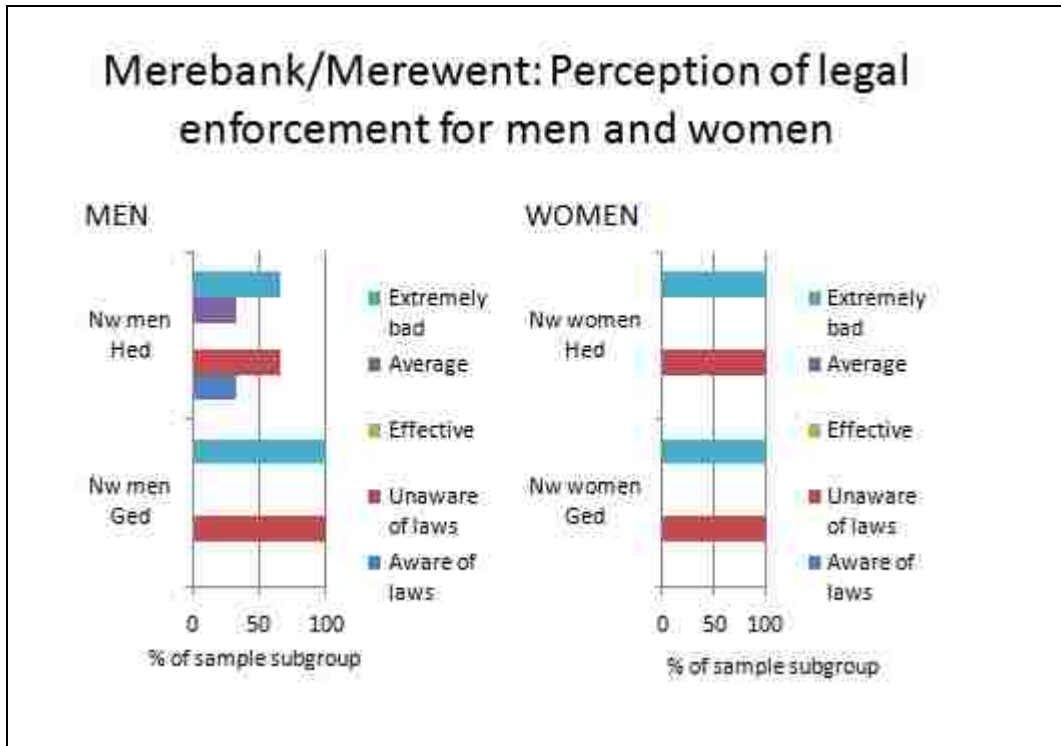


Figure 4.25 Merebank / Merewent: Perception of legal enforcement for men and women

Considering the male respondents in the sample, 100% of those with a general education are not aware of any regulation to minimize effects of air pollution, compared to 67% of those with a higher education (Figure 4.25). Of the latter group, 33% are aware of legal policies in place to curb air pollution. This is due to information distributed via non-governmental organizations. But the same group perceives the available information to be of average quality and therefore feels unsure about the situation.

With regards to women, 100% of the respondents are unaware of any regulation in place to curb or minimized air pollution and feel that policies currently available are ineffective.

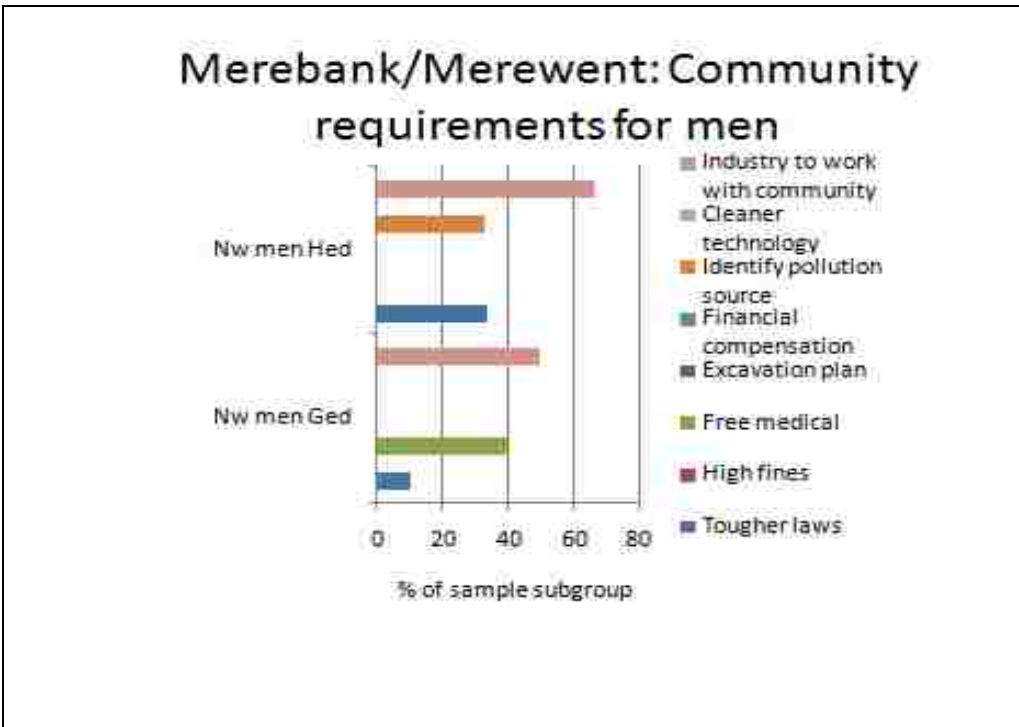


Figure 4.26 Merebank / Merewent: Community requirements for men

Concerning community requirements, 53.8% of the men (both groups together) indicate that the most important action they require is for industry to work with the community (Figure 4.26). Only men with a general education indicate that they want to move the refinery (40%), but this could be due to not benefitting from any employment. During one interview, a resident communicated the perception that all labour comes from the Umlazi area and through contract labour companies.

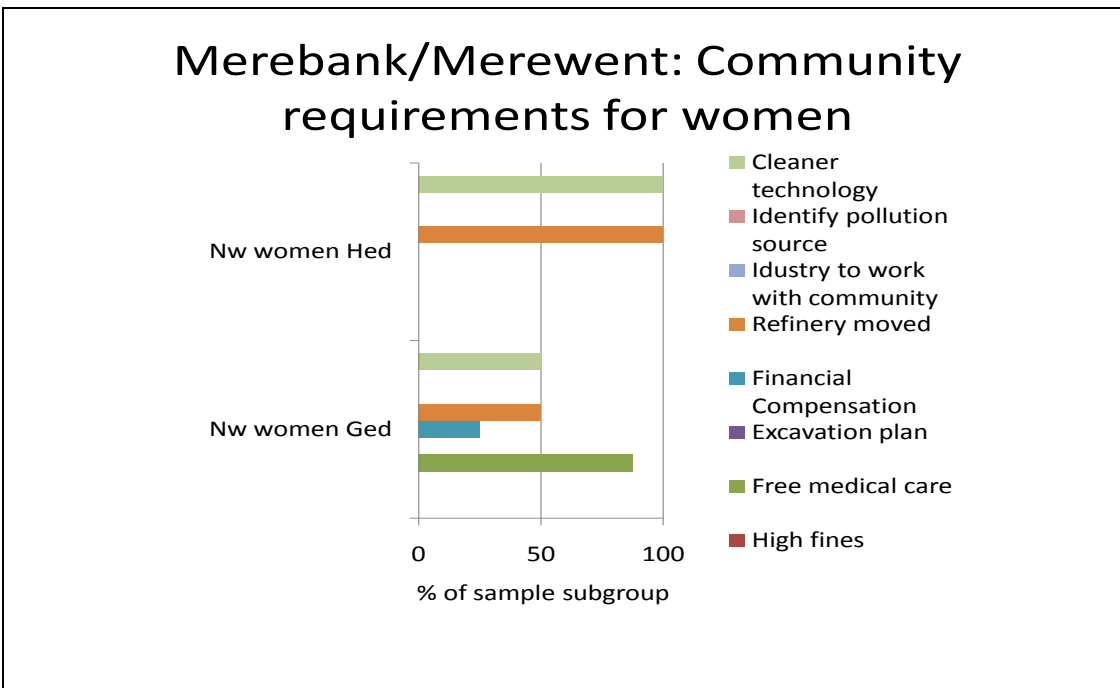


Figure 4.27 Merebank / Merewent: Community requirements for women

The female respondents in the sample for Merebank / Merewent indicate that they require the following (Figure 4.27):

A free asthma clinic open 24 hours every day: 88%

Refinery moved or cleaner technology: 66%.

Financial compensation: 25%

4.4 Contextual background to the Austerville / Wentworth area

In the 1960s Coloured people were moved out of Mayville, Cato Manor and the central area of Durban due to the implementation of the Group Areas Act. They were moved to disused army barracks used by the British Army in Wentworth. In 1963 Austerville was proclaimed as a Coloured Group Area and received people from the rest of Natal, Eastern Cape and Transvaal. Wentworth is very diverse in religion, ethnicity and origins. Austerville lies more towards the Merebank area, whereas Wentworth lies towards the Bluff area.

The workforce in the area consists of skilled and semi-skilled artisans and industrial workers. The community is poorer than in the surrounding areas, with more female headed households. The majority of the people live in publicly owned flats that are in a bad condition. Due to constrained living conditions in flats there has been intense gang activity since the 1960s as well as drug and alcohol abuse. (Chari 2004:1)

Wentworth and Austerville are in the centre of the South Durban Basin and are located at the lowest point. The ENGEN refinery is to the east, and Jacobs's chemical industries to the west. Industrial vehicles use the roads of Duranta, Tara and Quality Street. (SDCEA 2008:42)

The people living in this area belong to both previously politically advantaged and disadvantaged groups. They will be analysed according to gender, education level, ethnic group as well as income level.

4.4.1. Sample demographics

For the Wentworth / Austerville are, 11 respondents in total were interviewed by either telephone or filling in the questionnaire at home. Of these, nine are women and two are men, refer to Figures 4.28 and 4.29.

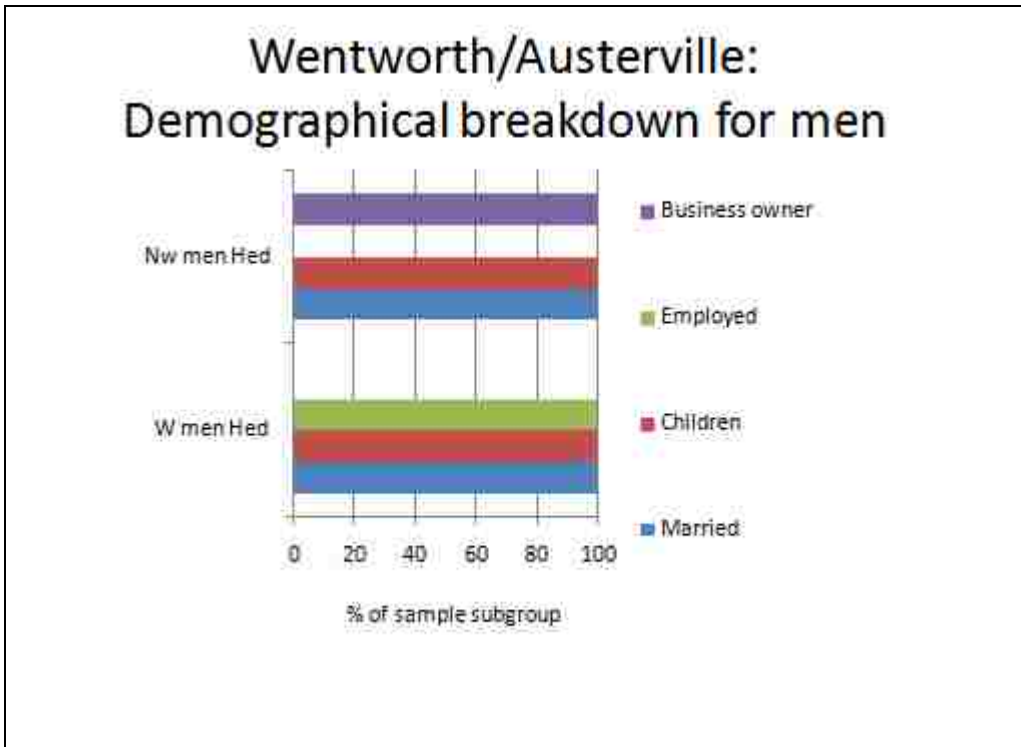


Figure 4.28 Wentworth / Austerville: Demographical breakdown for men

Considering the men, one is White and the other one Non-white. The White respondent has a higher education while the Non-white respondent has a general education.

From Figure 4.28 it is clear that both men are married, have children and are employed full time or are business owners. The only difference is salary, which differs radically between the two (R200 000 versus R29 000 per annum respectively for White versus Non-white).

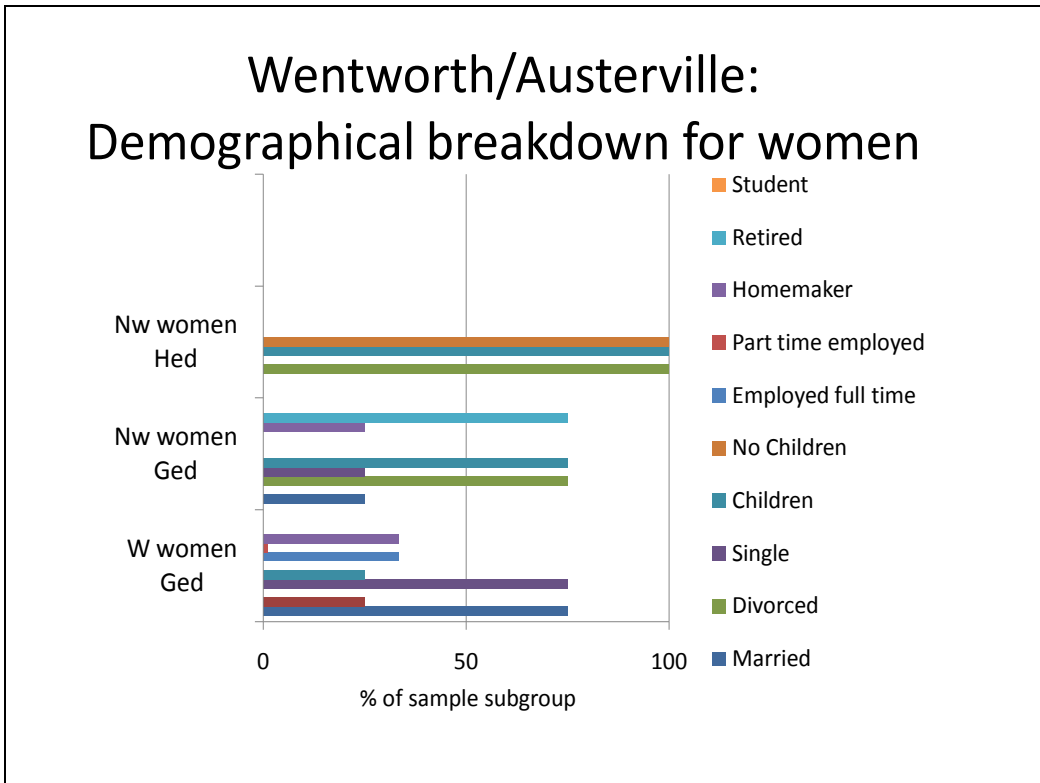


Figure 4.29 Wentworth / Austerville: Demographical breakdown for women

Considering the nine female respondents, four are White and five Non-white. One has a higher education and the other eight have a general education.

The women with of general education can be characterised as follows (Figure 4.29):

Married 50%

Children 50%

Students 37.5%

Homemakers 25%

Retired 25%

Employed part time 12.5%

4.4.2 Environmental satisfaction versus dissatisfaction

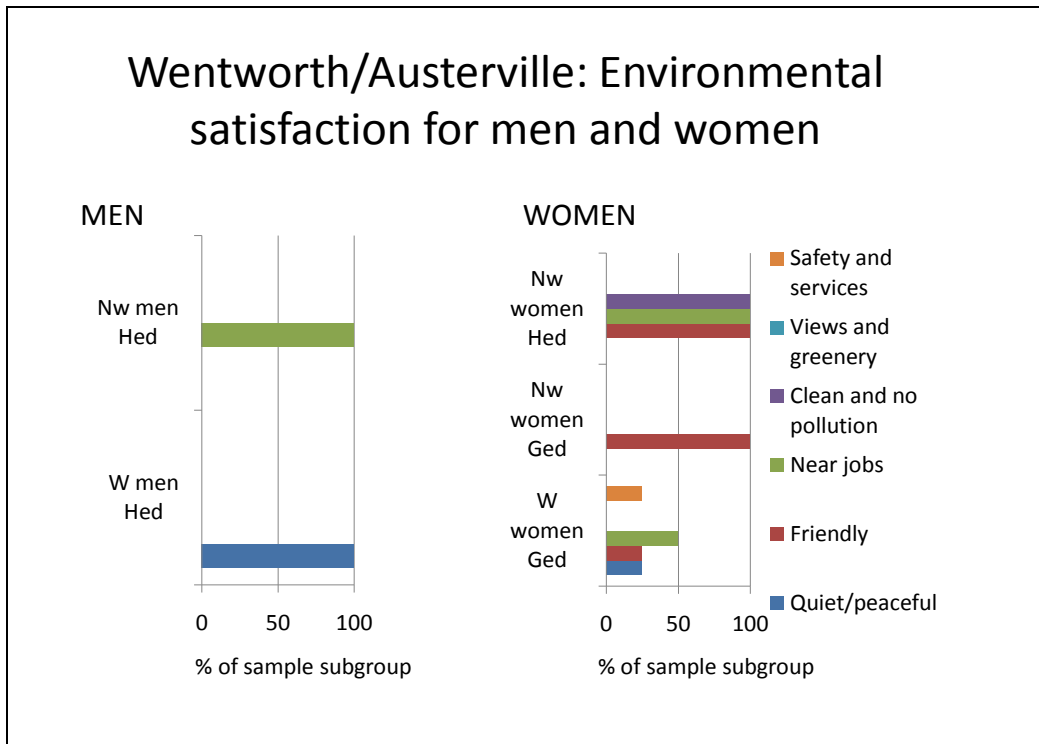


Figure 4.30 Wentworth / Austerville: Environmental satisfaction for men and women

Concerning environmental satisfaction, the two male respondents differ in that one perceives the area as quiet / peaceful, while the other rates proximity to employment as important (Figure 4.30). This difference in perception might be explained by the differences in their income. For the respondent with the higher salary, the peaceful and quiet nature of the area is important, while the respondent with a lower salary as well as lower education is more concerned with the basic task of making a living. Neither of them supplied any comments concerning the physical condition of the environment.

Women with a general education (both ethnic groups), have the following perceptions relating to their environmental satisfaction (Figure 4.30):

Friendly community: 62.5%

Near place of employment: 25%

Area quiet and peaceful: 12.5%

Area safe and near amenities: 12.5%

On the other hand women with higher education perceive the area as close to their current place of employment, the community to be friendly and that no visual pollution in the form of litter is present.

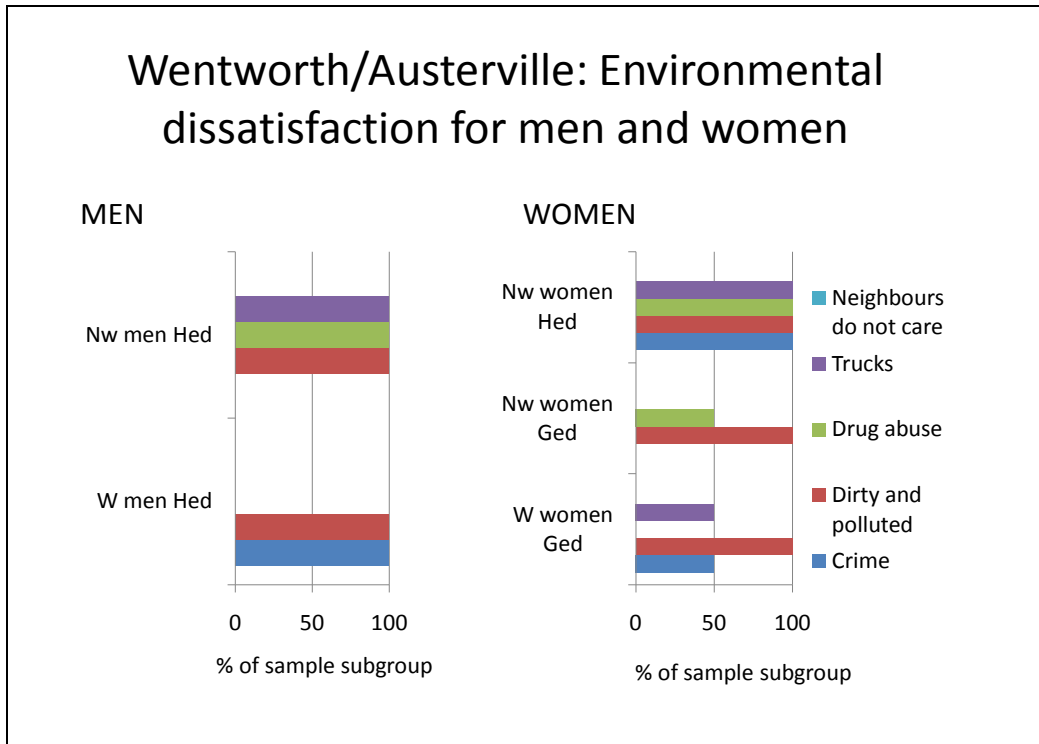


Figure 4.31 Wentworth / Austerville: Environmental dissatisfaction for men and women

The perceptions of both men are in agreement regarding their dissatisfaction with the dirty and polluted environment. In addition, the White male (with a higher education) is concerned about crime, while the Non-white male (with a general education) is concerned about trucks and drug abuse.

Concerning environmental dissatisfaction, the women with general education (as a group) in Wentworth / Austerville perceive the following (Figure 4.31):

Dirty and polluted: 100%

Neighbours do not care about property: 75%

High level of crime: 25%

Drug abuse: 25%

Women with higher education (as a group) in Wentworth / Austerville likewise hold the following perceptions with regard to environmental dissatisfaction:

High level of crime: 100%

Dirty and polluted: 100%

Neighbours did not care: 100%

High volume of trucks: 50%

4.4.3 Pollution source awareness

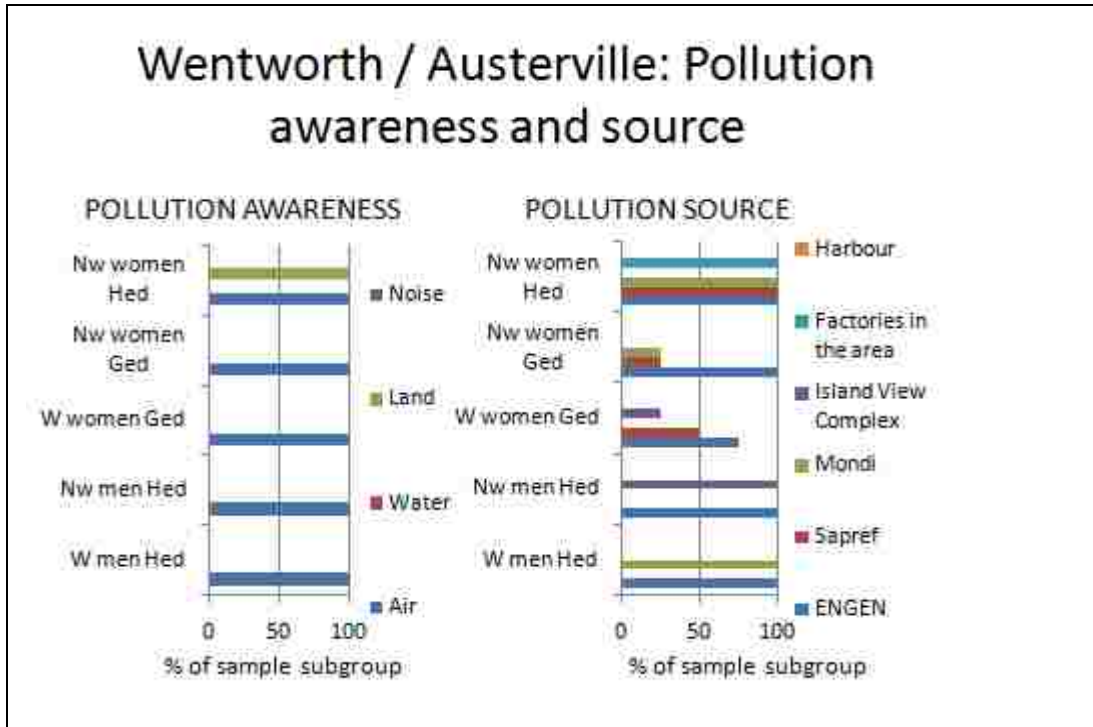


Figure 4.32 Wentworth / Austerville: Pollution awareness and source

It is clear from Figure 4.32 that both male respondents in the Wentworth / Austerville area are aware of air pollution especially visual air pollution such as fumes which darken the sky, black soot on furniture and in swimming pool. This observation stresses the power of vision that is prevalent in the development of air pollution due to visual effects observed in the environment.

In the case of the female respondents in the Wentworth / Austerville area, it is interesting to note that all women with a general education are aware only of air pollution, but the one Non-white women with a higher education is aware of both air and land pollution.

Both men perceive ENGEN as the main contributor to air pollution, with Mondi and the Island View Complex in the second place (each selected by one of the respondents).

Analysis of the responses of all women respondents as a group reveals the following perceptions about the potential sources of air pollution according to rank of importance:

1st ENGEN (80%)

2nd Sapref (40%)

3rd Mondi (20%)

4th Island View Complex (10%)

5th Factories in the area (20%)

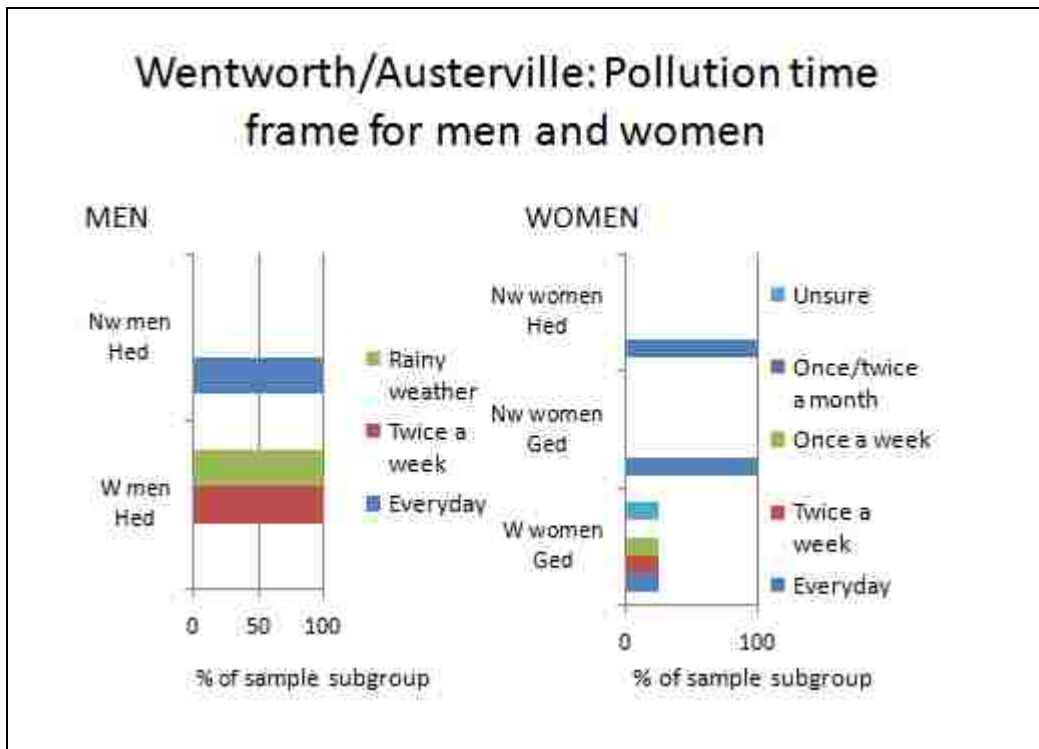


Figure 4.33 Wentworth / Austerville: Pollution time frame for men and women

Concerning the men respondents' analysis of figure 4.33 reveals that awareness varies from everyday (Non-white respondent with a general education) to twice a week, and more noticeable during rainy weather. (White respondent with a higher education)

Awareness of air pollution by all women respondents as a group, centres on the following periods:

Aware of pollution everyday: 60%

Unsure when they noticed pollution: 20%

Aware once or twice a week: 10%

4.4.4 Health awareness and other impacts

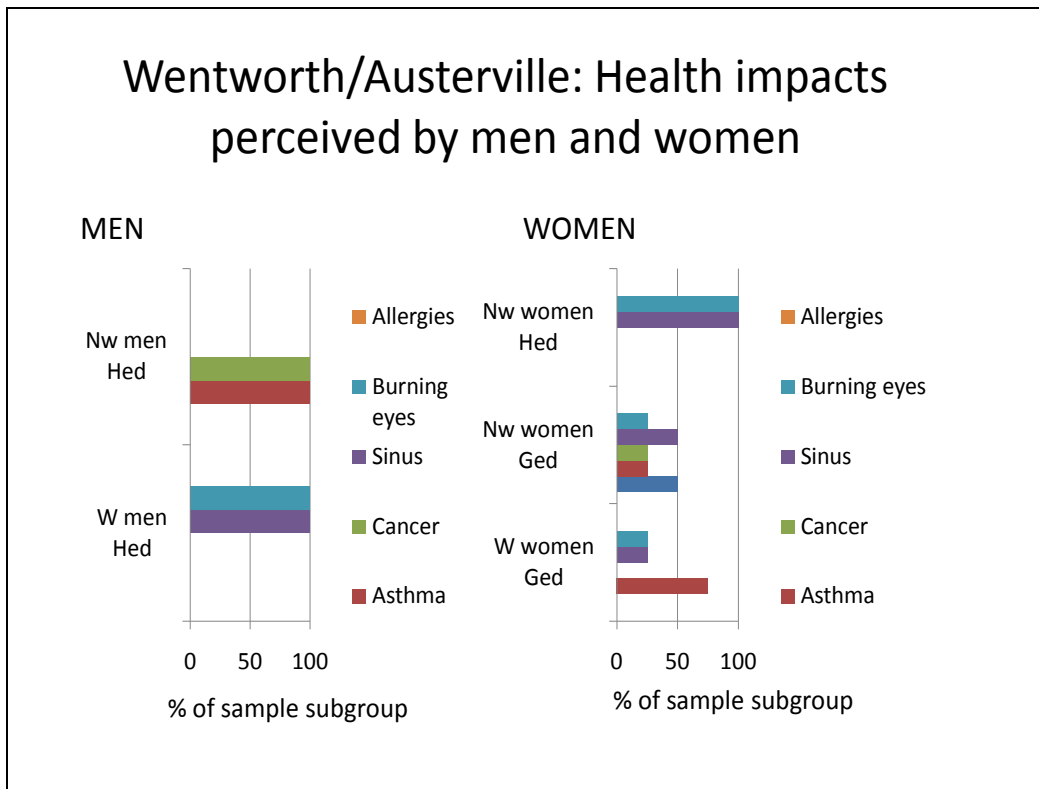


Figure 4.34 Wentworth / Austerville: Health impacts perceived by men and women

Considering the men in Figure 4.34, the perceived health impact of air pollution varies from sinus and burning eyes (White respondent with a higher education) to asthma and cancer (Non-white respondent with a general education).

Based on research in the USA, Bickerstaff (2004:832) and Johnson (2002:726-727) found that Non-white groups are inclined to rate health risks from air pollution higher than White groups. Brody *et al* (2000:1563) hypothesized that the reason for this is that certain marginalized groups, such as Non-whites, are located closer to air pollution sources due to political reasons and are therefore more vulnerable to health risks.

The reality in the case of Merewent / Austerville is that both the White and Non-white respondent have health concerns, although the Non-white respondent has more serious health issues. However, this can also be associated with the lower salary of the latter respondent. Bickerstaff (2004:832) indicates that respondents with low salaries tend to overestimate health risks. This is due to their vulnerable and insecure economic / social position in society. In the case of Wentworth / Austerville, with the respondents located in an area with low-economic status, residents tend to be more alert about the physical environment in other words when the

physical effects of air pollution are at their worst. This is indicated by the following statements given by the respondents:

Statement 1: *“When the stacks are purged during rainy weather the rain turns acidic. Black soot is over house furniture and in swimming pool.”*

Statement 2: *“Fumes from industry are at times quite dark which results in difficulty breathing and eyes that burn.”*

Considering the women with general education, the following associations with air pollution and health impacts can be distinguished:

Asthma: 50%

Respiratory disease: 25%

Burning eyes: 25%

Cancer: 12.5%

Sinus: 37.5%

Yet, women respondents with a higher education believe sinus, burning eyes and asthma are associated with air pollution.

Noteworthy is that more Whites believe health asthma is associated with air pollution whereas more Non-whites believe that respiratory disease is associated with air pollution. This could be because they are placing asthma in the same category as respiratory disease.

As 87.5% of the women respondents in total are aware of concrete daily experiences of air pollution this can play an instrumental role in developing the view that illness is attributable to air pollution as stated by Brody *et al* (2004:1562-1563).

Positions of social and economic power can be a factor as well. As seen in Figure 4.28 and 4.29 only 12.5% of the sample is employed full-time and another 12.5% is employed part-time while 75% are not actively employed at all.

4.4.5. Community awareness of illness related to air pollution

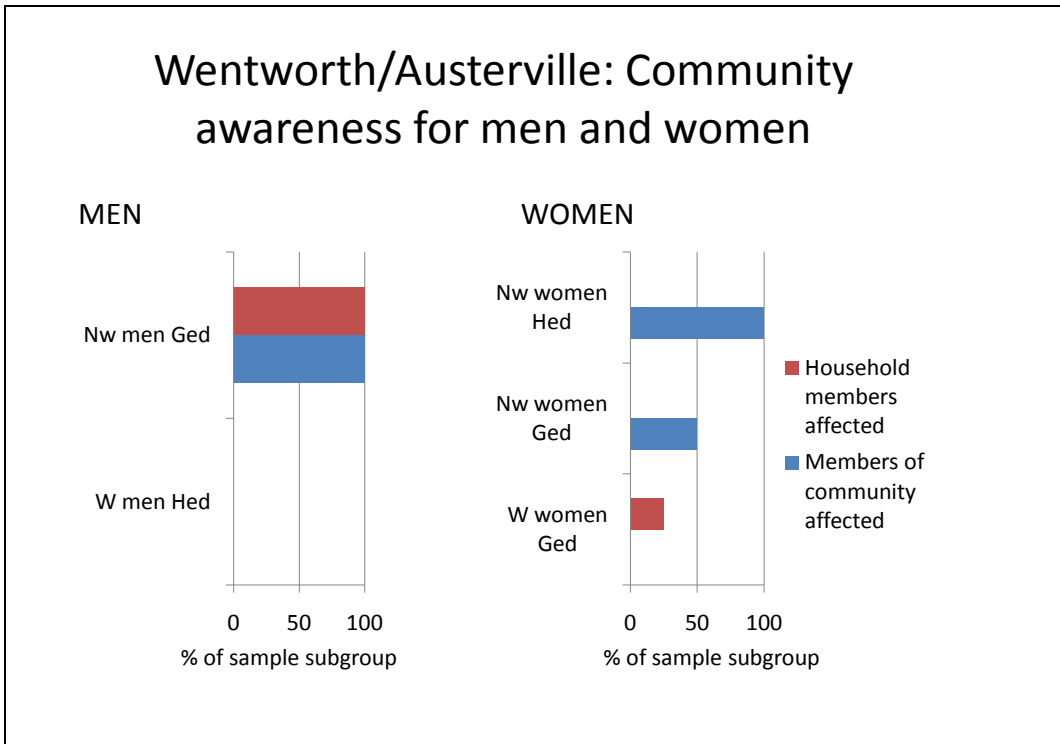


Figure 4.35 Wentworth / Austerville: Community awareness for men and women

Considering the men in the sample, only the Non-white male respondent is aware of the prevalence of illness (es) related to air pollution in the community, as well as in his immediate living environment (Figure 4.35).

For women the situation for those with a general education is that, 37.5% perceive the community to be affected by air pollution, while 12.5% have household members with ill health as a result. The perception of one woman with a higher education is slightly different: she is aware of community members being affected, but interestingly enough reports no affected family members.

4.4.7. Legal enforcement

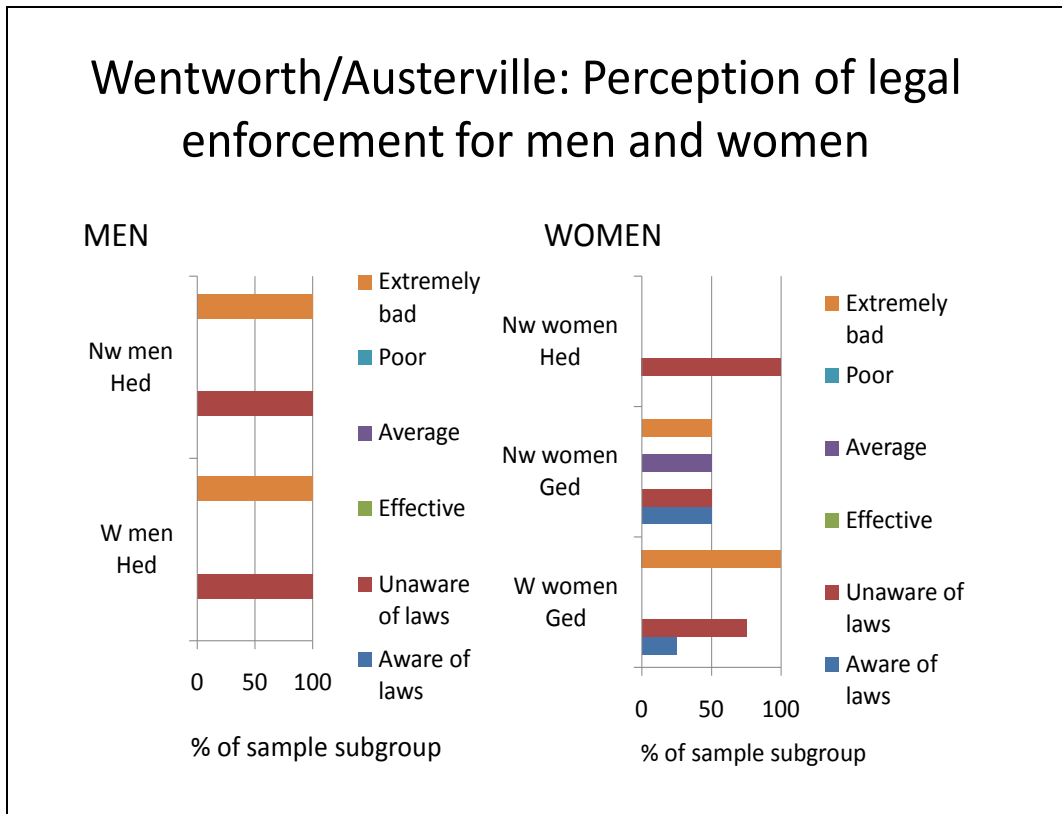


Figure 4.36 Wentworth / Austerville: Perception of legal enforcement for men and women

Both men in the sample for Austerville / Wentworth are unaware of any regulations that are in place to curb air pollution. In addition they either do not know where air pollution can be reported (Figure 4.36). Noteworthy is that even though the economic positions of these two respondents differ greatly, there are no significant differences between their answers.

As depicted in Figure 4.36, the picture for the women in the sample for Wentworth / Austerville is more varied. For those with a general education, 62.5% are aware of regulations to curb air pollution or places where one could report air pollution. In addition, 37.5% are aware of some form of regulations. These respondents' claim that their knowledge of monitoring comes through newspaper articles, referring to the Multi-Point Plan and the air monitoring stations at various points in the area. Yet, only one respondent commented on the effectiveness of the current legislation that is in place and what is required to improve the situation. This is in stark contrast to the one of the women with a higher education, who indicated that she is not aware of any regulation that is in place to curb air pollution.

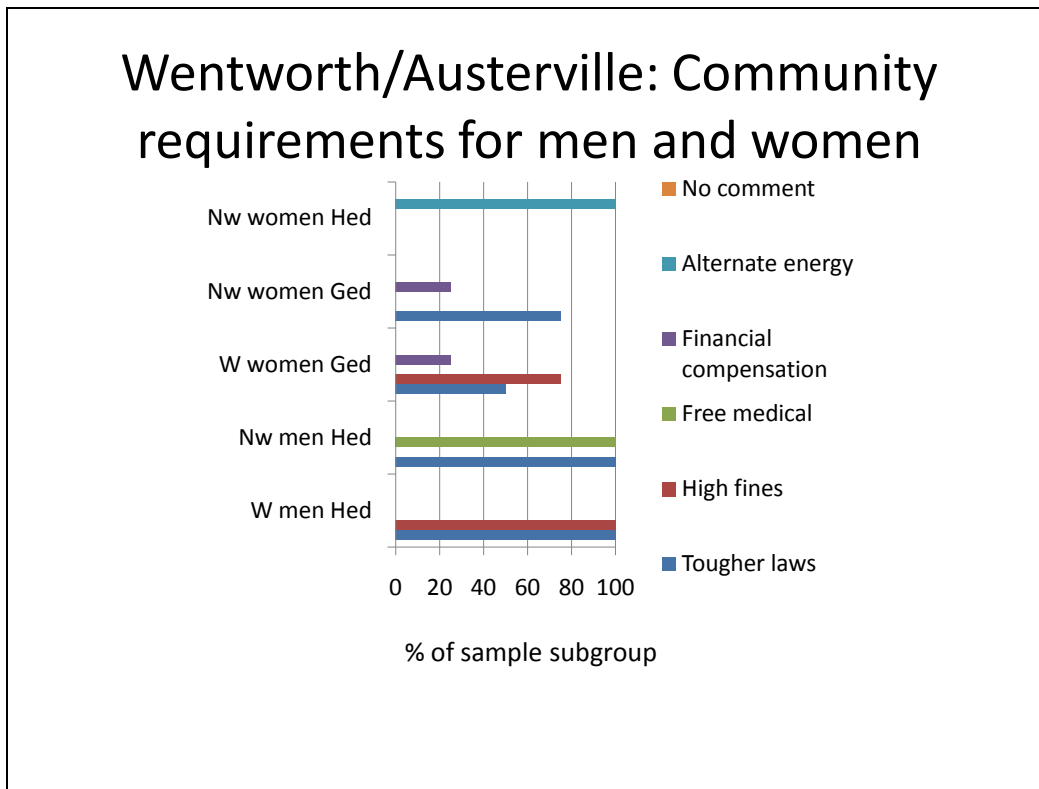


Figure 4.37 Wentworth / Austerville: Community requirements for men and women

Considering community requirements in terms of the air pollution, the respondents in the Wentworth / Austerville area indicated the following (as a group, for finer detail refer to Figure 4.37)

Tougher laws: 58.3%

Higher fines for polluters: 33.3%

Financial compensation: 16.6%

Free medical care: 8.3%

Alternate energy sources: 8.3%

Interesting to note from Figure 4.37 is that White women with a general education are more interested in free medical care than Non-white women at the same level of education.

4.5 Outlying areas of Woodlands, Montclair, Umbilo and Ispingo

4.5.1 Contextual background to these areas

The spatial aspect of air pollution research is important because research has shown that awareness and concern are greatly influenced by where a person lives (SDCEA 2008:42). Because of this, an understanding is required of why the view of air pollution and its impact on

human lives differs from area to area. The following areas were therefore selected because although they lie outside the main industrial basin of South Durban although they are geographically part of the South Durban Basin but vary in distance from different industries and also in terms of the type of industry that is present.

Ispingo- Indians were bought to the area in 1843 as indentured labourers to work in the sugarcane fields. By 1919 the Ispingo Indian Society was formed and Whites also settled at Ispingo during the 1920s. But in 1963 Ispingo was declared an Indian area by the Group Areas Act and the White population was removed. There are 220 businesses in Ispingo which include Toyota Manufacturing, South African Breweries and Republican Press which have in the past caused water pollution and killed off numerous fish species.

Umbilo- This is a culturally mixed area that exists among a collection of small industries and businesses. The population was historically dominated by middle income White people. Even today the area is divided along cultural and economic lines. Safety is a concern due to the number of people visiting and working in the area. Of the inhabitants 31% are not economically active and 59% earn less than R76 800 a year (SDCEA 2008:42).

Woodlands / Montclair- This area is 10 to 11 km outside the South Durban Industrial Basin but close to Coedmore Quarry and the Jacobs Industrial area. It has a culturally mixed population consisting of 37% African, 47% White, 3% Coloured and 17% Indian people. Of the inhabitants 30% is unemployed or not economically active and 53% earn below R76 800 a year.

Due to these areas being so culturally diverse, the results have been divided into education levels as well as different cultural groups (if variations have been observed), although no Non-white European men are included in this specific sample.

4.5.2 Sample demographics

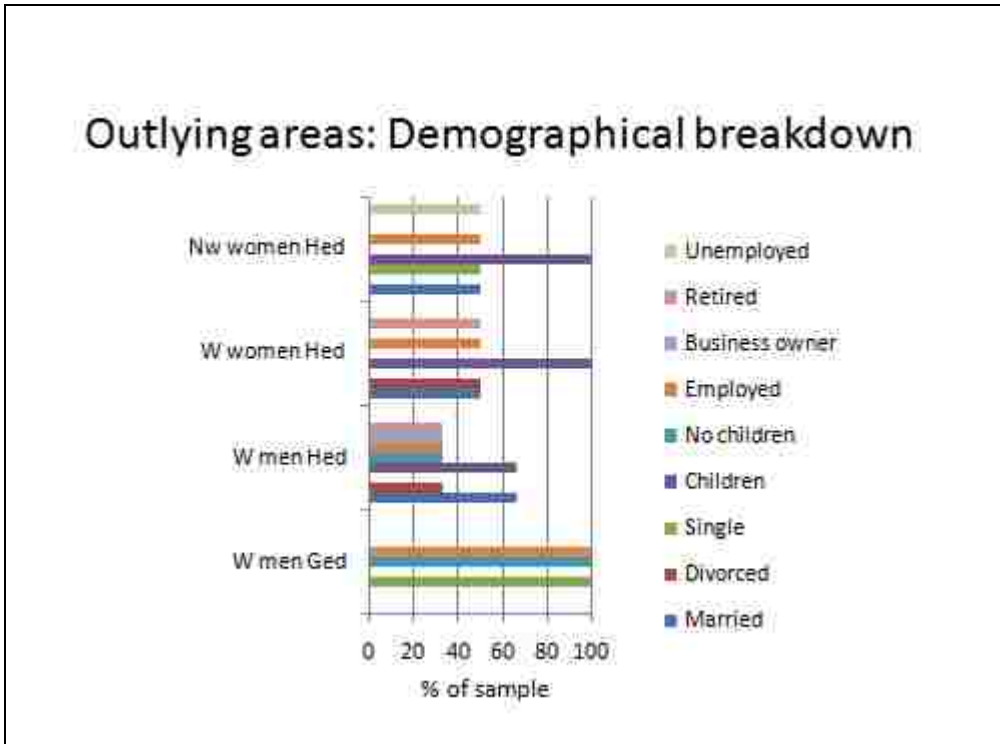


Figure 4.38 Outlying areas: Demographical breakdown

A total of nine respondents took part, all were interviewed via telephone. Five were White men, two White women and two Non-white women.

Considering the men with a higher education (Figure 4.38), 66.7% are married, 66.7% have children, 33.3% are employed full time, 33.3% are business owners and 33.4% are retired. This is in contrast with the men with a general education, of whom 100% are single and have no children, but all are full-time employed.

All women respondents have higher education. Taking all women in the sample for the outlying areas together as one group, the demographical details can be summarized as follows: 50% are married, 100% of the groups have children. Only 50% are employed fulltime, while the other 50% are either retired or unemployed.

4.5.3. Environmental satisfaction versus dissatisfaction

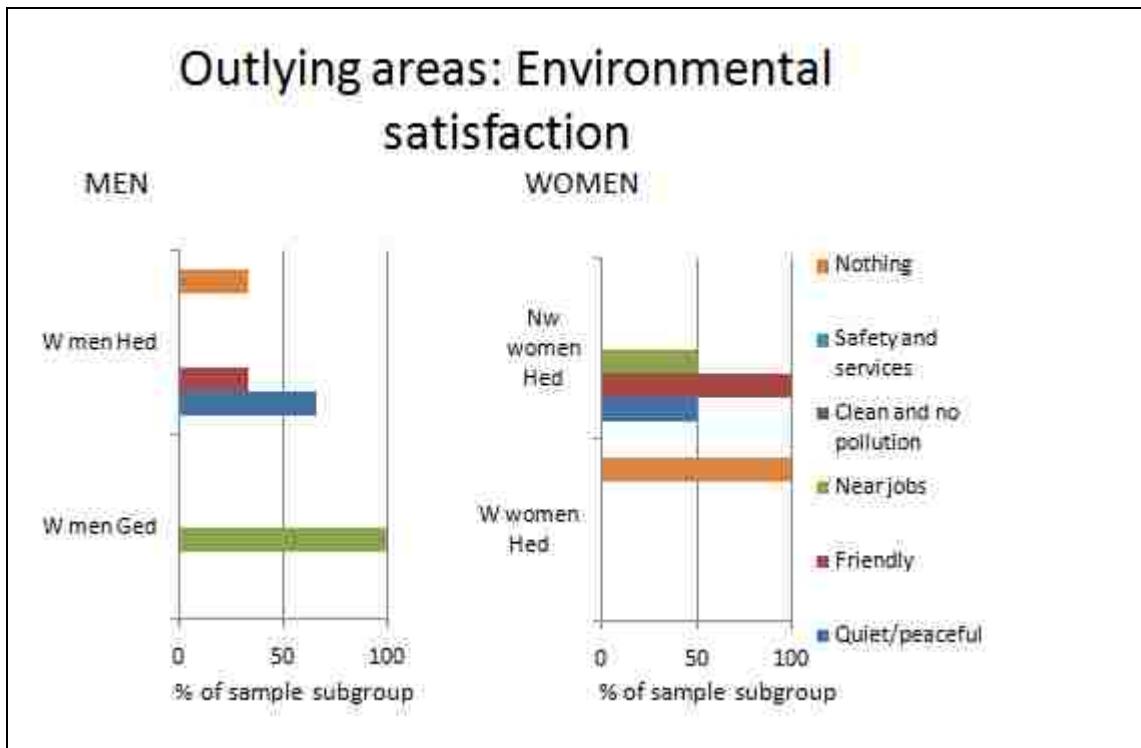


Figure 4.39 Outlying areas: Environmental satisfaction

Concerning environmental satisfaction (Figure 4.39), all men with a general education are satisfied with the fact that the area where they are living, is near their place of employment. However, this is the only aspect that they are satisfied with. For the men with a higher education, 66.7% perceive the area as quiet and peaceful and 33.3% perceive the community as friendly. No comments about aspects of the environment, with which they are satisfied, have been provided by 33.3% of these men.

When comparing the women, 50% of the non-white women perceive the area where they were living as quiet and peaceful, 100% agree that the particular area lived in is friendly and according to 50% the area is near their place of employment. Yet 100% of white women report that they are not satisfied with their environment.

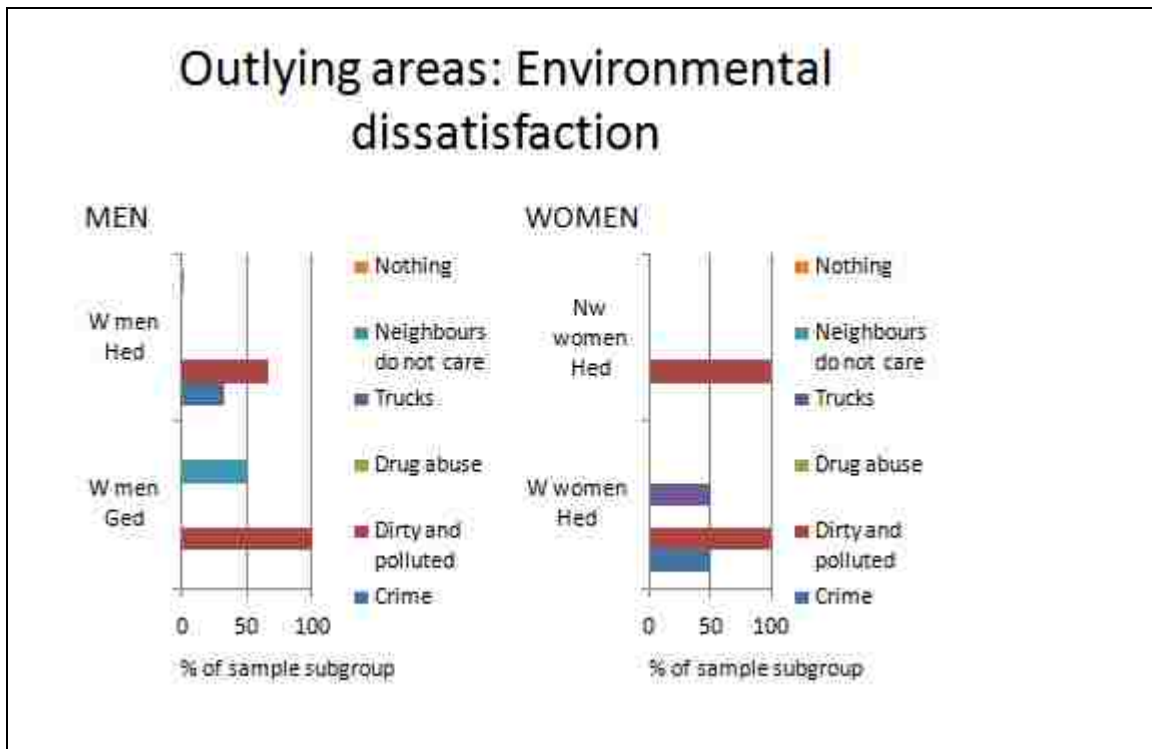


Figure 4.40 Outlying areas: Environmental dissatisfaction

When prompted about aspects that they are dissatisfied with (see Figure 4.40), all the men with a general education comment that the environment is dirty and polluted, with 50% living next to neighbours who have degraded properties. In comparison, 66.6% of the men with a higher education comment their environment is polluted, with 33.3% commenting that crime is a problem in the area.

Due to this noteworthy aspect seen in Figure 4.39, mentioned that 100% of White women commented that their environment is neither clean nor free of pollution. Nor were they satisfied with the social / psychological aspects. What is interesting to note is that all these participants have children. When looking at the rest of the participants 100% complained that their living environment is dirty and polluted. What needs to be noted is that 60% of the women complained about both the crime and volume of trucks in the area. 100% complained either about land or air pollution.

This evidence presented so far seems to support the views of Bickerstaff and Walker (2001:134) namely that if community members are not satisfied with the physical appearance of their environment, they are likely to rate air pollution as a problem. It also supports work done by deGroot (1966) quoted by Bickerstaff and Walker (2001:134), pointing out that an intense dislike for one's neighbourhood may result in attributing undesirable elements to the area. Also, due to being in a less advantaged economic situation, the respondents are

restricted to an area of low environmental quality. They therefore do not have the economic means to escape from their situation.

The above findings directly correlate with research done by Myers *et al* (1999:116) who report that women have a greater sensitivity about smoke and fumes as pollutants. It also substantiates the views held by Howel *et al* (2003:169) that women tend to express a higher concern for environmental aspects such as living in an area close to industries and the associated health impacts.

When considering the total sample of men for the outlying areas, 80% are aware of visual (especially land) pollution, with 60% believing that pollution leads to property damage and an unsightly environment, supporting Myers *et al* (2000:268). This further highlights the theory of Howel *et al* (2003:169) and Bickerstaff (2004:832) that White men usually have more power as well as the greatest socio-economic advantage and are therefore less likely to see the world as dangerous.

4.5.4 Pollution source awareness

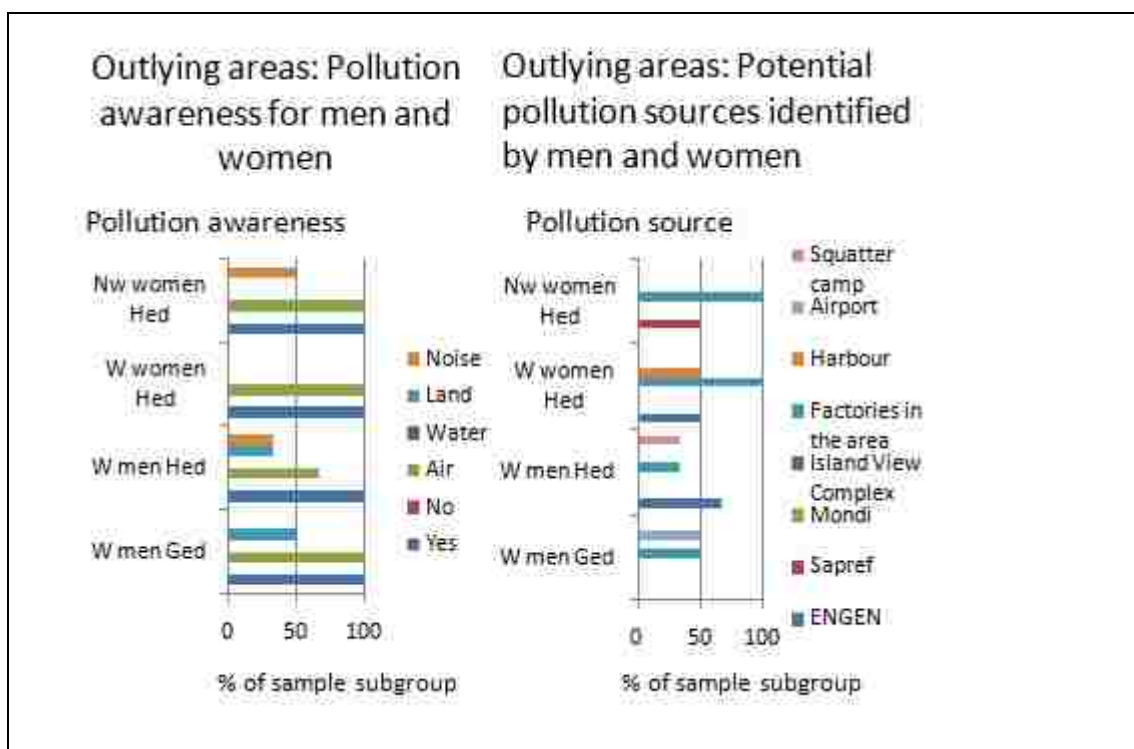


Figure 4.41 Outlying areas: Pollution awareness and potential sources identified by men and women

With regards pollution awareness, Figure 4.41 shows that 100% of the men with a general education perceive their area as dirty and polluted visually due to smoke and land pollution. All the men in the sample (both education groups) are aware of some form of pollution in their

living environment. In addition, all men with a general education are aware of air pollution, while 50% are aware of land pollution. For men with a higher education, 66.7% are aware of air pollution, 33.3% of land pollution and 33.3% of noise pollution.

Although 100% of both groups of women are aware of air pollution, 20% of women are also aware of noise and land pollution. But these groups do indeed differ in terms of where they thought the pollution source is located.

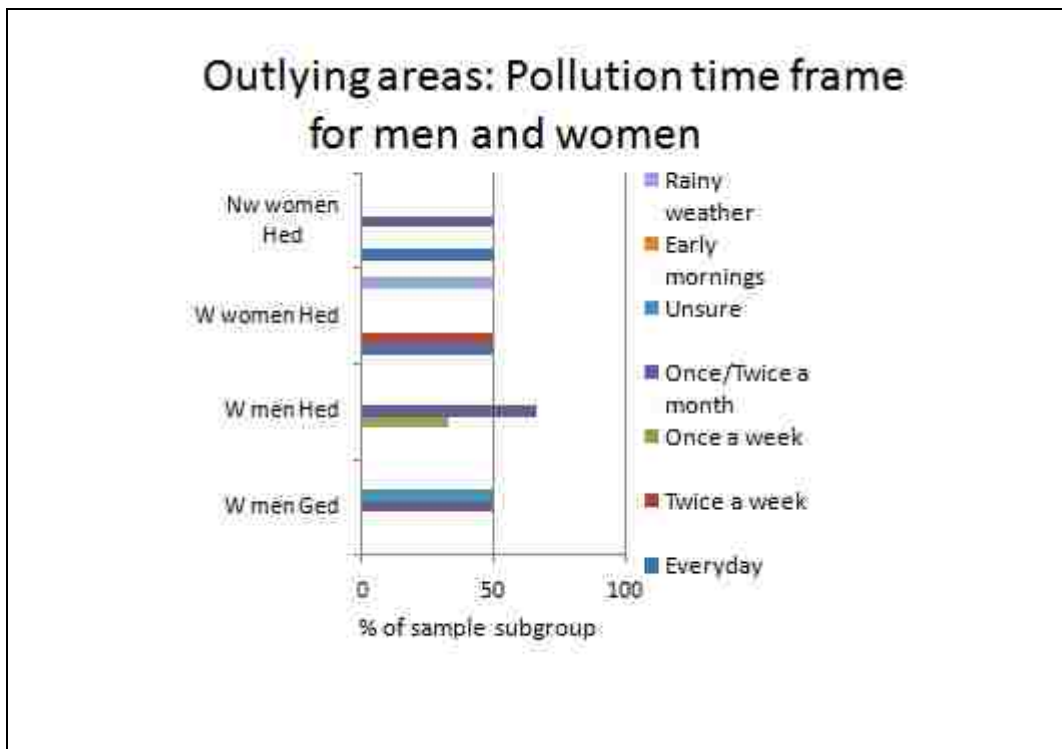


Figure 4.42 Outlying areas: Pollution time frame for men and women

Four out of five respondents in the sample of men made detailed comments about when they experienced pollution, while the other interviewees' made generalized comments (Figure 4.42)

Concerning men with higher education 33.3% are aware of pollution once/twice a week and the other 66.7% once / twice a month. For men with a general education, 50% are aware of pollution once / twice a week and the other 50% everyday.

- First respondent: aware of pollution everyday and has obtained this awareness due to the living environment being dusty. This is believed to be dust residue from jet engines flying overhead as the area is in the flight path to the former domestic airport.

- Second respondent: aware of land pollution and illegal dumping but also complains of smoke from boilers, burning oil and fallout debris coming from a local textile industry every two weeks.
- Third respondent: aware of air pollution twice a week from rubbish being burnt at a nearby squatter camp.
- Fourth respondent: firstly aware of air pollution that is pleasant smelling in that it comes from the bakery and sugar refinery, and secondly of an unidentified type of smell coming from the ENGEN refinery during the winter months of June and July.
- Fifth interviewee: sulphur smells coming from the direction of ENGEN about once a month.

The evidence presented here suggests that daily concrete experiences play a role in attributing air pollution as one of the problems in these neighbourhoods.

With regards to women in the outlying areas, 50% of the sample are aware of pollution every day, with another 50% aware of pollution twice a week to once / twice a month.

The main ranked sources of the pollution (women) are perceived to be as follows:

1st Factories in area (100%)

2nd ENGEN (33.3%)

3rd Squatter Camp (33.3%)

3rd Harbour (33.3%)

4th Sapref (25%)

The women differ, however, in terms of their perception about the **location** of the source of pollution. 100% believe that local factories in the area are to blame. 33.3% of White women perceive the pollution to come from the ENGEN refinery, but this is due to the respondents living in the area of Woodlands - which is closer to the industrial basin. Another 33.3% perceive the pollution to be coming from the harbour area. One Non-white respondent commented that she believes that part of the pollution problem experienced in the area may be associated with Sapref. This is only due to Isipingo Beach being near to the airport, which is depends on Sapref for their fuel needs.

4.5.5 Health awareness and other impacts

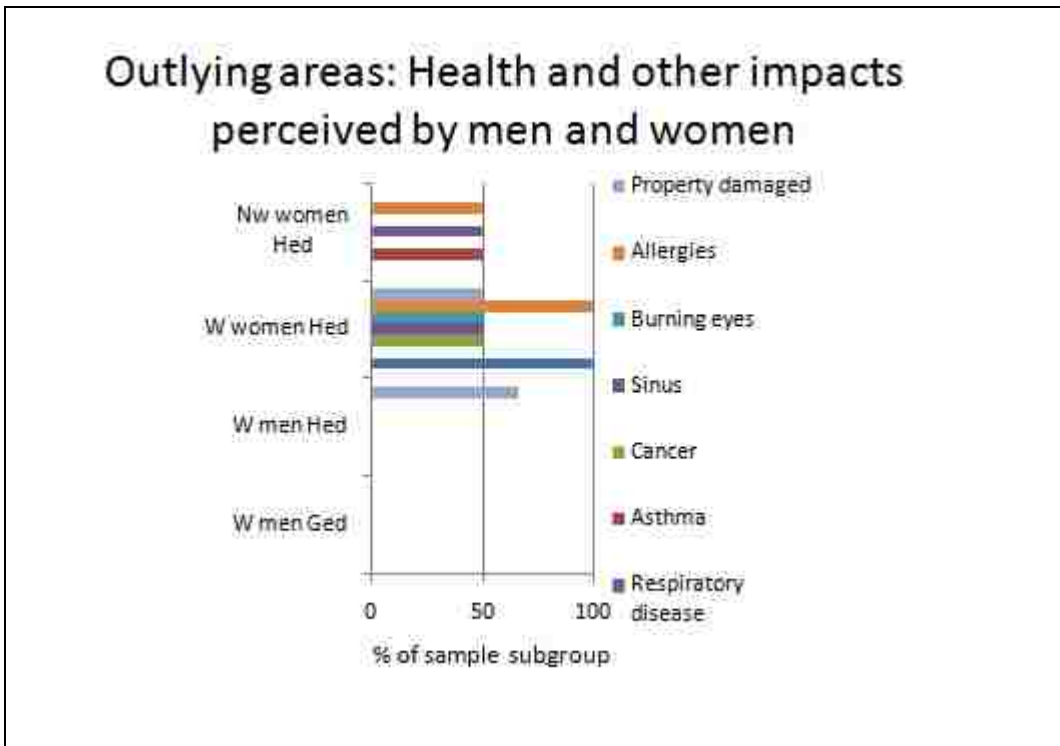


Figure 4.43 Outlying areas: Health and other impacts perceived by men and women

Noteworthy is that no men at all reported their health or that of their families to be affected as seen in Figure 4.43. This supports the findings of Bickerstaff (2004:832) that White men are socially more advantaged and therefore not likely to see the world as dangerous. They are also more likely to benefit from technology and industry. It also supports the findings of Johnson (2002:726) that advantaged men in this case White men, have more control and management of the world and that they receive more benefits as well as control over their health. They are also likely not to experience any respiratory problems or believe that it is important to know about current air quality information (Figure 4.43).

The perceptions of the female respondents concerning impacts, reveal the following: all the White women perceive respiratory disease and allergies to be associated with air pollution and 50% perceive cancer, sinus and burning eyes, respectively, to have a similar association and that property is damaged as well. In the case of Non-white women, 50% perceive allergies, asthma and sinus to be associated with air pollution. This evidence supports Myers *et al* (1999:268) who claim that women have a greater sensitivity about smoke and fumes as pollutants. This is also in support of Howel *et al* (2003:169) who suggest that women tend to express higher concern for environmental issues that affect local aspects, such as living in an area in close proximity to industry and strongly associated with negative health impacts.

4.5.6 Community awareness of illness related to air pollution

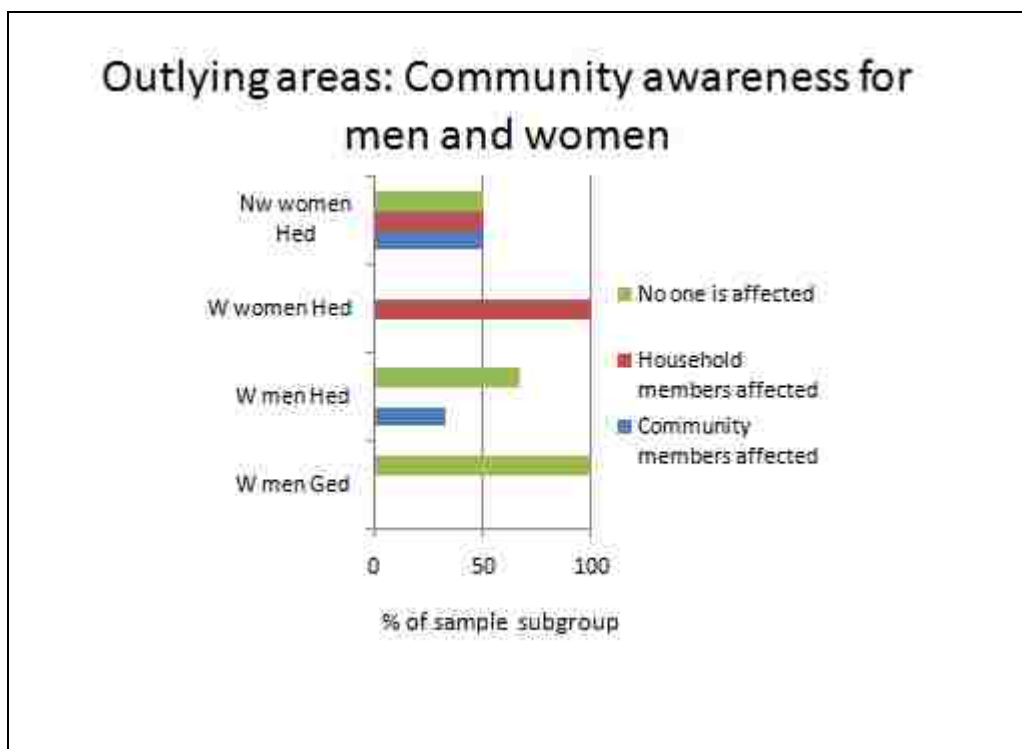


Figure 4.44 Outlying areas: Community awareness for men and women

Noteworthy concerning awareness of how the community is affected is the lack of response by the men (Figure 4.44). One respondent, however, commented that he is aware of the community in Wentworth and Austerville being affected by runny eyes, coughs and sneezing. This respondent is most probably associating air pollution with “Others” due to their close geographical distance to refineries.

This, according to Bickerstaff (2004:831), shows how direct perceptual experience (visual and olfactory) in the South Durban Basin is critical in shaping public attitudes to air pollution. For the respondents living in the outlying areas though characterized by industry, are not associating poor health to the by-products of industry. Bickerstaff (2004:833) also found that communities that were wealthier attributed poor health to poor communities living near industry. Only one non-white female respondent commented that there are community members affected by ill health due to pollution outside of their current living environment in the Umlazi area.

With regards to the rest of the women respondents, 100% currently have family members that are suffering from illness’s they believe are associated with air pollution. This is clear from some of their comments:

- Respondent one: Recently hospitalized due to asthma, she also has sinus and suffers from burning eyes; daughter has multiple allergies and eczema.
- Respondent two: She and her children suffer from respiratory disease, sinus and burning eyes; believes current air pollution to result in germs that cause these diseases.
- Respondent three: Suffers from cancer, respiratory disease and skin allergy caused by an unknown source; according to her GP her health problems are associated with chemical pollution.

4.5.7 Legal enforcement

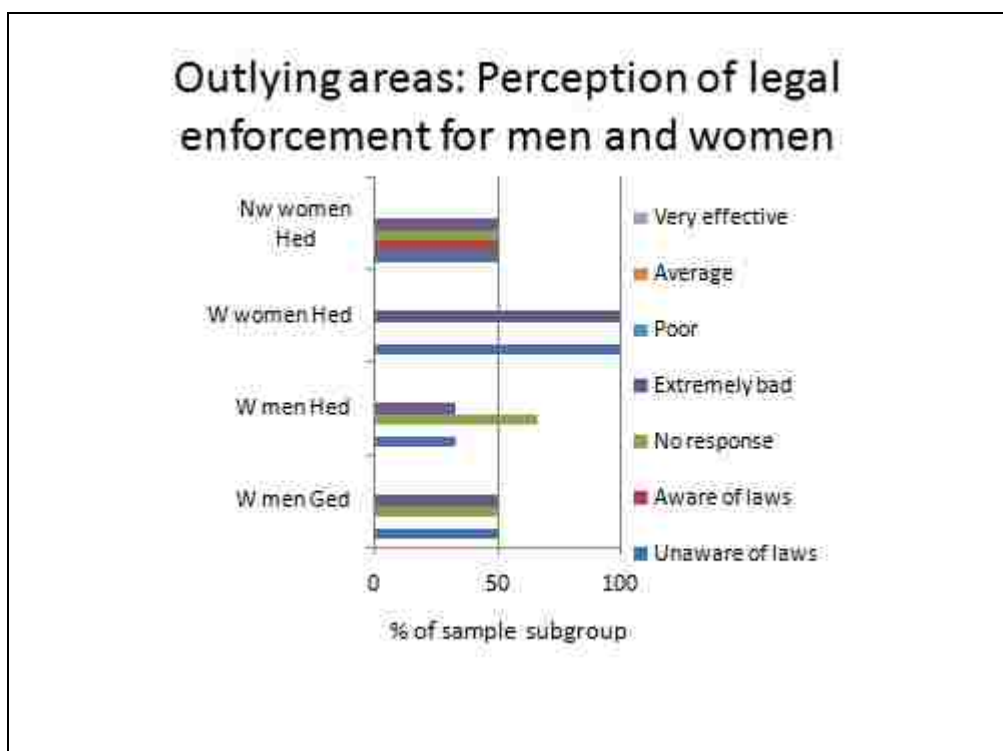


Figure 4.45 Outlying areas: Perception of legal enforcement for men and women

Concerning the men in the sample for the outlying areas as a group, 40% perceive available measures to deal with air pollution as extremely bad, while 60% gave no response (for further details, refer to Figure 4.45). For the women respondents as a group, 75% are unaware of any regulations' in place and another 25% claim to be aware due to reports in the media about declining SO₂ levels. Furthermore 25% of the women perceive the quality of the available measures as average in its effectiveness, while the remaining 75% perceive the available laws as badly ineffective. A very vocal women respondent claimed to have recently been discharged from hospital for asthmatic complications as well as having a daughter that suffers from multiple allergies and eczema and that there is no visible government enforcement that holds polluting companies accountable for pollution infringements.

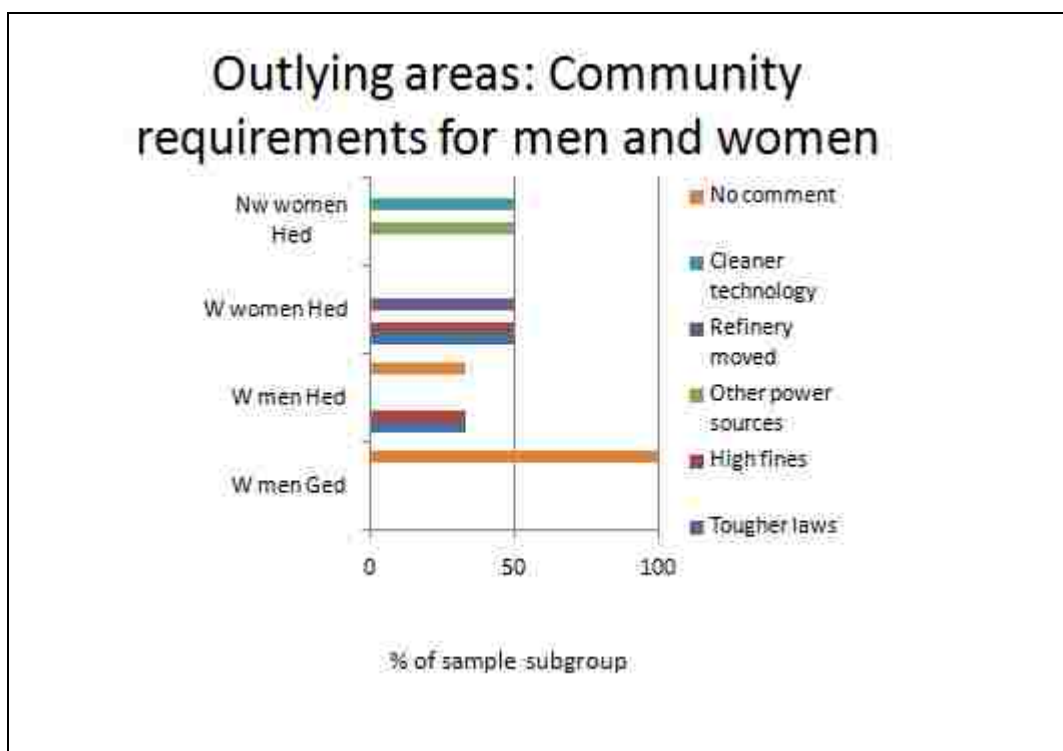


Figure 4.46 Outlying areas: Community requirements for men and women

In terms of requirements voiced by men in the outlying areas as a groups (refer to Figure 4.46), only 20% of the entire sample commented that they wanted either stricter laws or higher fines in place, while 80% gave no comment about this aspect at all. This echoes research done in North America (USA) (Johnson 2002:737) where it was found that politically advantaged groups, in this case White men, are not as likely to see the world as particularly dangerous as they tend to benefit from the industries and technologies in the area.

With regard to the women as a group, varied responses were obtained, depending on their living area and life experiences. Each of the following obtained a 25% response: tougher laws, higher fines, a toll free number and cleaner energy sources, moving the refinery or to identify the main pollution sources.

4.6 Conclusion

Environmental satisfaction in terms of the literature research is personally defined and differs according to gender and socio-economic status and ethnic grouping. What is noteworthy is that especially men in the study areas e.g. the Bluff, who have a high environmental satisfaction experienced air pollution as a serious local problem. This stresses the role of vision, where physical dirt is seen as matter out of place, as it invades a person's boundaries

of space thereby causing anxiety and a threat to order. This stigmatizes the area due to experience of tangible air pollution.

The above explanation also supports the evidence found in the study areas of Merebank / Merewent. Here residents also have a high social and psychological satisfaction of their living area, yet 100% of the sample is dissatisfied with their environment due to visual pollution. This is repeated in the Austerville / Wentworth area where people also enjoy a high satisfaction of their living area, but again 100% of the sample is dissatisfied due to visual pollution i.e. fumes and smoke.

When it came to the outlying / control areas, differences are observed according to gender and environmental satisfaction. The findings for these areas support the literature in that a low environmental satisfaction is experienced especially by women who related air pollution as a serious problem in the area. They also related the problem to current health problems experienced by family members. Men on the other hand feel that pollution is something that belongs to others, i.e. living areas next to industry.

Therefore the aspect of vision and the senses are playing a central role in perception formation in the SDB. Also of importance is how people experience their living environment. These factors are further explored in depth in Chapter 5.

CHAPTER 5

IN-DEPTH ANALYSIS OF PERCEPTIONS

5.1 Introduction, context and aim

As illustrated in Chapter 4, through the detailed analysis of the sample respondents from South Durban Basin (SDB), environmental satisfaction is personally defined according to gender, race and education level. The underlying factor that the research revealed is the role of vision regardless of race and education, although slight differences do occur regarding the latter two aspects. These differences will be analysed if and when they do arise. Vision focuses attention on the threat to order caused by air pollution and the related sense of powerlessness to change current affairs.

In this chapter each study area in the SDB will be examined according to the following combinations of factors:

- Firstly, a person's awareness of the living environment, and the connection it might have with air pollution and possible health impacts.
- Secondly, how sensory awareness is connected to perceptual awareness of air pollution.
- Thirdly, how people related their current health issues to air pollution.
- Fourthly, how the role of stigma, place, identity and trust / authority relationships in determining how people perceive air pollution as a current local problem.

5.1.1 The relationship between the living environment and air pollution related illnesses.

Awareness of air pollution depends on the various social and physical encounters within an area. These factors also play an important role in the development of perceptions concerning air pollution. Numerous researchers (Bickerstaff and Walker 2001:137-139; Bickerstaff 2004:833; Howel *et al* 2003:169; Bickerstaff *et al* 2004:2) have illustrated that awareness and concern about air pollution is influenced by where a person lives. Living near industry can produce a stigma effect that will influence a person's quality of life. Assessments by individuals of their health are based on their personal knowledge of the living environment. Risks, in turn, are therefore localized for each area as well. Perceptions of air pollution can therefore also differ according to the distance of communities from a perceived pollution sources. Another

explanation put forward by Bickerstaff (2004:831) is that air pollution awareness and concern is influenced by how people experience their living environment.

Research by Bickerstaff and Walker (2001 and 2003) illustrates that socio-cultural systems will also play a role in perception formation. When a person / community is satisfied with the physical appearance of their neighbourhood they are less likely to rate air pollution as a problem. Relating also to air pollution is people's sense of power over space and attachment to their living area. These studies emphasize the important role of practical everyday experience as embedded in the senses and body in perception formation (e.g. clusters of industries and the visual effects of that on vegetation) is important in perception formation. For many people air quality is spatially bound. Living near a perceived air pollution source might lead to the belief that poor air quality is a local problem.

Howel *et al* (2003:164) provide the following illustrative example, with a comparison of two districts. One district had heavy industrial activity, while the other was formerly characterized by heavy industry. It was found that respondents living close to industry would tend to associate air pollution as problem. This would in turn increase self-reported respiratory symptoms and the belief that emissions affected one's health. Communities further away from industry, however, tended not to regard air pollution as a problem. This highlights the geographical viewpoint of proximity to industry, thus beliefs about ones' own ill health being affected by potential emissions. Therefore a certain area due its stigma with industry is seen as having a high incidence of respiratory problems. But within the same district dissociation strategies were seen with communities living at a distance from the industry where residents perceived that there were no ill health effects.

The aim of this chapter is to highlight the extent to which the personal perceptions of people's living environment influence the high incidences of ill health reported by residents in the study area.

5.2. The Bluff area

5.2.1. Satisfaction versus dissatisfaction with living environment

As illustrated in Section 4.2.1, the Bluff area was formerly a White's only area consisting of skilled workers and civil servants. During the post Apartheid era a number of Indian and Coloured people moved into the area. The Bluff is widely known (as seen in various newspaper reports) to be affected by bad air quality namely coming from the harbour area

industrial zone (Island View Complex), refinery and Mondi plant. Recent explosions at the Island View Complex have further illustrated the concern of ambient chemical pollutants. (refer to Appendix 1, 6, 7 and 10). The aim of this section is to establish whether respondents from this area, being of better economic status attribute air pollution as a local problem or if visual stigma and historical experience are influencing the responses given.

What do you like about the area you live in?

White Male 51-59 General education

"Friendly communities with beaches close by for fishing."

White Male 40-50 General education

"It is close to work and has outdoor life I enjoy."

Non-white Male 35-40 Higher education

"It is quiet, safe with nice views."

White Female 60+ Higher education

"The areas proximity to good shops, bus routes, the fresh veggie shops and friendly community"

White Female 51-59 General education

"Close proximity to the beach-golf course with the wildlife and trees-the recreation of the beach life."

White Female 41-50 Higher education

"Quiet, pleasant surroundings. Great neighbours. Convenient location as it is close to work and recreational facilities."

White Female 35-40 General education

"Lovely greenery, the sea is wonderful"

Non-white Female 25-34 Higher education

"Clean and no visible pollution."

Judging by the responses supplied above, both gender groups commented on the physical attributes of the area, such as views and greenery, but especially so for the men. Women also commented on the psychological aspect of the area i.e. friendly, quiet and peaceful. The responses of both gender groups therefore indicate a high environmental satisfaction of their environment.

This above information implies that there is not an intense dislike for the neighbourhood which might lead to comments about air pollution as local problem. Important to note here is that the Bluff residents do not feel restricted to a low-quality environment. If this was the case, opinions that are apathetic would have been voiced.

What do you not like about the area you live in?

White Male 60+ Higher education

"The area is polluted; the area smells of gases coming from ENGEN and Sapref"

White Male 51-59 General education

"Area is polluted with smells and smoke, the drainage canal at Island View Complex is so polluted that there are no living things like years ago."

White Male 35-40 General education

"Crime, ENGEN refinery gas that causes headaches, nose drips, illness and large doctors' bills. Bushes are overgrown and truck noise"

White Female 60+ Higher education

"Rubbish removal does not happen, rundown dwellings, owners don't care about property. Roads dug up and not repaired properly by Sapref and Engen."

White Female 50-60 General education

"The pollution, I overlook the Island View tanks. You can smell the pollution every day. My GP has put me on more medication for an inflamed throat as he says that I am allergic to the air pollution chemicals."

White Female 40-50 Higher education

"Litter control, air pollution of soot and diesel. An acetone and jelly baby smells as well as hydrogen sulfide that is pumped out during the rain. Trucks use the area as a thoroughfare to Island View."

White Female 35-40 General education

"We get a lot of bad smells in the air, sometimes especially at night time a sulphur kind of smell. I believe this had a bad impact on animals, trees and humans."

Non-white Female 25-34 Higher education

"It's dirty and polluted and there are a lot of trucks as well. Air pollution is there in the environment even sometimes we can't notice it because it's invisible"

As seen from the above responses, air pollution is very often commented on. This supports the evidence obtained in Section 4.2.3 that 82% of all men and 94.6% of all women in the Bluff

sample rate air pollution as the most serious local problem. Noteworthy is that this information contradicts research by Bickerstaff and Walker (2001:134). This research indicated that satisfaction with the physical appearance of your living environment is not associated with rating air pollution as a problem. This important aspect highlights that visual, personal knowledge and experiences are all playing a vital role in the formation of perceptions. Perception formation in this case will therefore more than likely be grounded in everyday tangible experiences such as the role of the senses i.e. vision and smell. This supports the hypotheses by Bickerstaff and Walker (2003:47) that perception formation depends on social and physical encounters within the living environment.

This is further substantiated by Bickerstaff and Walker (2003:50), who found that a wide range of non-human agents are involved in the development of people's perceptions. These include, perceived sources of pollution as well as the visual effects observed and detected in the environment. This is clearly seen from the quotes above, with complaints centred on the visual icons of industry and the effects on both the living environment and the human senses. This is therefore one of the aspects attributing air pollution as a problem. This aspect will be further explored in the next section.

5.2.2 Sensory awareness and its relationship to perception of air pollution

Bickerstaff and Walker (2003:50) emphasize that one of the ways through which people get to know about air pollution, is by means of everyday sensory experiences. An understanding of polluted air is embedded in daily life through the senses and the effects this has on the human body and the environment around. Sensory awareness also includes vision. This especially involves the effects of pollution on vegetation i.e. its colour and growth. The main underlying factor is that physical dirt is seen as something out of place as it invades a person's boundaries of space. This sensory awareness causes anxiety and a threat to order.

Are you aware of any pollution in your area?

White Male 51-59 General education

"There is air and water in the area coming from ENGEN, Sapref and Island View Complex at least once a week. The drainage canal by Island View empties into the sea, the rock pools do not have the same life as they did years ago and there is no bird-life in the area."

Non-white Male 41-50 General education

“The environment is dirty, community has respiratory diseases. My wife and two daughters experience burning eyes, skin allergies, asthma, sinus, coughing (respectively). Sewer pipes have burst which polluted the rivers and ran into the harbor and wildlife (fishes etc.) were affected.”

White Male 35-40 Higher education

“Been living on the Bluff for two years and the whole family has become sick with constant pain in our legs. Once a week there is a ‘super glue’ and ‘white ant poison’ smell coming from Island View and it is even worse at 4am in the mornings or in wet weather.”

White Male 35-40 Grade 10 education

“Gas ventilation and smoke. You can hear and see it! Two to three times a day.”

White Female 60+ Higher education

“I live next to Island View Complex and there are always strong petrol fumes. I lived in town before 1963 and had no hay fever; now living here I cannot smell anything. Since the fires and explosions at Island View Complex I have developed asthma.”

White Female 51-59 Higher education

“In the middle of the night I wake up because of the bad smell in the air”

White Female 51-59 General education

“There are smells of benzene, burning rubber and diesel. Litter along the beaches you see it.”

White Female 60+ General education

“There is an acetone and ‘jelly-baby’ smell and sulphur dioxide pumped out during the rainy season, it is worse during windy days. Aware weekly of air pollution.”

Non-white Female 25-34 Higher education

“Although I cannot see or smell the pollution it is there as my child has asthma and there is a high number of cancer cases in the area.”

When considering the above comments by the respondents in the SDB, it is clear that sensory experience (especially odorous) plays an important role in perception formation. This sensory awareness causes a threat to people’s sense of order, as emphasized by Bickerstaff and Walker (2003:50). This explains the comments by the female respondents and compliments research by Johnson (2002:726), who found that women generally rate outdoor air quality as a great health risk. The same aspect is emphasized by Howel *et al* (2003:169), who found that women tend to express a higher concern for environmental issues affecting local aspects. They would therefore strongly associate negative impacts with living in close proximity to

industry. But, it does not explain why 75% of the male respondents find the area polluted (for examples, see the responses on previous page).

The responses by White and Non-white men indicate awareness of air pollution, which is unusual, since these men experience a high degree of environmental satisfaction. This contradicts findings of studies by Johnson (2002:726) on differences between gender awareness. Noteworthy is that the everyday experience of air pollution might be playing a role in the formation of perception. This is especially true in the case of odorous sensory experience, which supports Howel *et al* (2003:168). The findings of this research fit in well with this: 59.2% of the Bluff sample is aware of air pollution either everyday or once/twice a week, with a further 12.9% aware during the early morning hours of between 2.00 and 3.30 am.

Research in other countries has shown that a wider range of non-human agents are involved in the development of people's perception of air pollution. These included the physical concentration of industries and the visual effects on vegetation, property and even on pets (judging by the responses given below). Therefore it can be concluded that the visual state of the environment and even the management thereof has shaped the public's perception of air pollution. Supplemented by complaints made by 83% of the Bluff sample about visual dirt, this factor could be playing a key role in the belief that air pollution is a problem.

White Female 60+ General education

"Every day there is an acetone and burned rice smell; my pets' eyes are always runny."

Non- white Female 60+ Higher education

"There are oily deposits on my plants and grass which are dying."

White Female 41-50 General education

"There is black soot on everything and it has become worse over the 19 years that I have lived in the area. My dogs are always affected by allergies."

White Female 35-40 General education

"When I return to the Bluff from being in a different area, I notice air pollution three to four times a week. There is a black oily substance on my motor vehicle every morning."

5.2.3 Health perception related to pollution

As stated by Hunter *et al* (2003:228), it is well known that people's belief about their illness and the potential causes thereof, have a significant impact on their illness behaviour. Respiratory illnesses especially have their root causes either partially or totally in psychological factors.

Awareness of air quality is not universal (Bickerstaff 2004:828), the social and physical encounters within a particular area are important. These aspects include people's sense of attachment and power over their space and geographical distance to a specific pollution sources. This means that people, who feel that they have no control over their geographical circumstances, tend to express the strongest concerns about being trapped in a visually polluted environment. These aspects will be investigated further in this chapter.

Does this pollution affect you personally and the community?

Non-white Male 41-50 General education

"Yes headaches, red eyes, and runny nose and sinus problems. My wife and two daughters have burning eyes, skin allergies, asthma, sinus and coughing. Community affected by respiratory diseases."

Non-white Male 35-40 Higher education

"I am not personally affected but am aware of health problems in the community caused by air pollution"

There is no significant difference between the health perceptions of Non-white men with a higher education and those with a general education. This could be, as mentioned before, due to moving from a former Non-white area to a White area and feeling that the infrastructure is of a higher quality. But interestingly Non-white men with a general education commented that the long term residents in the area are affected by air pollution.

In addition, 67% of Non-white men with a higher education believed that the community might be affected by ill health due to air pollution, although they were not really affected. This illustrates that while staying in a former Whites only area, (with a better infrastructure than where they previously lived), they still identify local air quality as poor. This does not support the findings of Bickerstaff (2004:832) about Non-white men in England, who rated the local air quality as poor only due to the low socio-economic status of the area.

White Male 60+ Higher education

"I am asthmatic with sinus and breathing problems. I am aware of my neighbours having respiratory problems and asthma but they do not complain as they have gotten used to it. The lower area of Bluff is more affected due to valley inversion."

White Male 51-59 General education

"I suffer from burning chest and eyes, even asthma. My adult children have constant allergies. My mother-in-laws asthma has become progressively worse since living in the area. But I think the community (Bluff) is not as badly affected as the non-white areas."

White Male 41-50 Grade 10

"My daughter has asthma and sinus and my son has asthma- we all suffer from headaches.

White Male 35-40 FET education

"We get a lot of bad smells in the air, sometimes especially at night time a sulphur kind of smell. I believe this has a bad impact on animals, trees and humans. I have a lot of friends who have asthma and a lot of people I know have friends and family who have died of cancer."

What is striking when analyzing the above responses obtained from White men, is the type of comments about the health of their families, friends'- and even community, which is unusual for this ethnic group.

This is supported by the following percentages: 36.3% are affected by respiratory disease, 45.4% asthma and sinus, 18.1% constant headaches and burning eyes; lastly 9% have allergies or some form of cancer.

These averages do not support research by Bickerstaff and Walker (2001:137-138) that White men who are more likely in economically and socially secure positions, will not view the world as dangerous. Therefore they are less likely to experience health risks from air pollution. They would also be more likely to comment that air quality is good. This is also supported by Johnson (2002:726) who found that advantaged men (White men) tend to feel more control over and want to manage their environment, which is not the case here. The evidence further supports comments made in Section 5.2.2 about daily / weekly concrete experiences of air pollution that is playing an instrumental role in the development of the view the illness is attributable to air pollution (Howel *et al* 2003:168).

White Female 41-50 Higher education

“Every night I have to take Telfast, and it does not work anymore... Every morning at about 3H30 I wake up, with my nose running, sinuses clogged up, burning eyes and a post nasal drip. It never used to be like this before May 2008. I surely believe something is blowing our way and affected us. My mother, living with me also experiences more sinus attacks. We stay close to the army base on the Bluff.”(Respondent is referring to the Island View Complex)

White Female 51-59 General education

“The benzene and diesel make the back of my throat and tongue swell as does the exhaust smoke of some cars. Community gets continuous chest and nose complaints. Air pollution is being monitored and sent away for analysis but it is totally ineffective. The law be enforced to stop industry and motor vehicles form pumping toxins into the air- littering should carry a hefty fine-industries should be shut down if they violate the international laws for their industries.”

Non-white Female 35-40 Higher education

“Have respiratory disease, asthma, sinus and burning eyes. My child of 2 years has been diagnosed with asthma a few months ago and it s because we live in an industrial area and it’s highly polluted. The community is affected by this pollution because there’s a high number of asthma and cancer growing in this area and I believe it’s not a normal rate there’s more to it.”

White Female 51-59 General education

“All my male friends have died from bladder cancer from living in this area and my daughter has severe asthma. The other people that live here have asthma, bad headaches, runny eyes and nose, coughing in the mornings.”

Considering the responses in the preceding text block, 61% of White women believe respiratory diseases are associated with air pollution, compared to 33.3% of Non-white women. Yet Non-white women have the highest percentage of believers that asthma is directly linked to air pollution. This could be explained by the research of Bickerstaff and Walker (2001:139), who found that individuals of higher socio-economic status (in this case White women (who have had better educational opportunities) might be more knowledgeable about the problems caused by air pollution. However, further research done by same authors determined that previously socially disadvantaged groups such as women tend to show a higher concern about the potential health impacts of air pollution. This aspect is supported by Howel *et al* (2003:169), who found that women show a higher level of environmental awareness and are more likely to report air pollution having a negative effect on human health.

Non-white Female 25-34 Student

“My nephew now has asthma due to the ENGEN oil refinery pollution. Many people especially in the Wentworth and Merebank areas have asthma and many people have lost their lives to this pollution.”

Non-white Female 41-50 General education

“Every night after 1am you can’t go outside the smell of sulphur is so strong that it burns your throat, gives you headaches and makes you feel that your organs are coming out of your body. My mum was hospitalized last year for two severe asthma attacks. The Wentworth hospital’s asthma clinic is aware that the asthma is caused by ENGEN’s and Sapref’s pollution but they are afraid to comment. There is a cover-up due to the publicity of Sapref.”

White Female 35-40 years General education

“My friend’s children developed chest problems and runny noses within a week of moving to the Bluff. House values drop as nobody wants to live in a polluted neighbourhood. Everyone health will eventually be affected and the community will not benefit from holiday makers as they’ll not want to visit here anymore”

With regards to community awareness both groups of women (race and education) are equally aware of community members being affected, with only 22% of Non-white women having family members that are / were personally affected as seen from the examples of responses supplied above.

5.2.4 Role of stigma, place, identity and trust / authority relationships

Research by Bickerstaff and Walker (2004:831) show that when communities live near industry, the mere presence thereof can produce a negative perception of the area, in other words a stigma. This can impact negatively on the quality of life for community members. The argument is that people make assessments of their health based on their personal knowledge and experiences of their living environment. The aim of this section is therefore to determine to which extent the comments about air pollution made by the Bluff residents (being better off than in former Non-white areas), can be attributed:

- To stigma and source proximity of nearby industries, OR
- To trust / authority related to the inequality between residents and industry.

What do know about things that are done to curb this pollution and/ or address the problems caused by it?

White Female 41-50 General education

"I am worried about respiratory problems. There is always a psychological affect from the threat of the nearby industry". (Respondent is referring to the Island View Complex)

White Female 51-59 General education

"We get soot from ENGEN and it messes up the neighbourhood's driveways and your washing- it is not normal dirt."

White Female 41-50 Higher education

"It never used to be like this before May 2008, (the respondent is referring to incidents at ENGEN and Island View Complex). I surely believe something is blowing our way and we stay close to the army base on the Bluff..."

Non-white Female 25-34 Higher education

"We live in an industrial area (respondent is referring to ENGEN) and it's highly polluted. The community is affected by this pollution."

White Male 35-40 Grade 10

"Apart from the damage it's doing to the people (here the respondent is referring to ENGEN) it's affecting the environment also."

Analysis of the preceding comments indicates that the majority of respondents are aware of industry in the area and its potential impact on both humans and the environment.

According to Bickerstaff and Walker (2003:51) local experience of industry plays an important part in forming perceptions of air pollution. This is especially true, if industry is seen to be posing a risk to people or environment, or in the case of negative historical experience as shown by Bush *et al* (2001:49) for Teesside England with regards to petrochemical industries. The latter research showed that industry can stigmatize an area to the extent that the area would be seen as having problems with its air quality. This is supplemented by the role of everyday experience via the senses of tangible air pollution as discussed in Section 5.2.2.

In the SDB the role of everyday experience is illustrated by a recent community newspaper article (July 17: 2009) in which residents complain that air pollution has increased over the past 30 years. (Refer to Appendix 8)

The latter aspect is strengthened by the role of pollution incidents especially at ENGEN and the Island View Complex (refer to appendix 1,7,10,12,13) This causes neighbours of industrial facilities to suffer from psycho-social impacts living in the area, whether or not real impacts have in fact been established (Bickerstaff 2004:831)

The SDB area can therefore be suffering from a stigma associated with historical accounts of air pollution as well as the association with chemical industries. (Refer to Appendix 3, 6, and 8) This in turn could account for the perceived view that the area suffers from a high incidence of respiratory problems. The following comments provided by the respondents serve as confirmation in this regard:

White Male 35-40 Higher education

"We get smells (sulphur) during the day especially at night and we also know through the media reports."

White Male 51-59 Higher education

"Yes, there are programs and regulations in place but they are poorly enforced. The Umlaas Canal had chromium 6 dumped into it with full permission of the council in 1956. The chemical factories in the area dump chemicals into the drainage systems. We need a proper evacuation plan."

White Female 60+ Higher education

"Since living in the area from 1963, I have hay fever. After the fires and explosions at the Island View Complex I developed asthma."

White Female 51-59 General education

"I know that respiratory problems such as children with asthma are much higher than anywhere else in KZN as well as cancer. I know this through what the media says."

Concerning air pollution policies currently in place, all respondents from both gender groups commented on ineffectiveness thereof, as illustrated by the responses given below. In total 79.6% of the sample are not aware of any current legislation to curb air pollution or that holds industries responsible for infringements of emissions or accidents. The rest of the samples, however, is aware of some form of legislation, but that it is ineffective.

White Male 60+ Higher education

“There have been various discussions with ENGEN and there have been upgrades in factories but more needs to be done to take the lower income groups into account.”

White Male 35-40 Grade 10 education

“They- big companies claim to curb and control the pollution, but they don’t do anything really to change their ways to a cleaner way.”

“Do case study environs checks air control and neighbourhood medical study of people’s health. Change to green its better.”

White Male 35-40 Higher education

“Nothing is being done. There are supposed to be air monitoring vehicles in the area (the respondent is referring to Island View Complex) but I only saw one two years ago. There needs to be a governing body that monitors air pollution levels and there needs to be high fines for polluters. The money from the fines needs to go back to the community for development.”

White Female 60+ Higher education

“Feel that meeting held by SDCEA (local environmental group) at the church failed to meet community concerns. Media failed to inform public of what to do during the Island View explosion.”

White Female 51-59 General education

“The law be enforced to stop industry and motor vehicles from pumping toxins into the air- littering should carry a hefty fine-industries should be shut down if they violate the international laws for their industries.”

White Female 35-40 Higher education

“As to date we have no knowledge of this, these people are not living in the area so why should it concern them.”

White Female 35-40 General education

“Not much. Always hear people saying they are doing this and that, but never hear the outcome. Nothing is being done about it! The refineries should take responsibility to reduce pollution or should be forced to pay the medical bills of people falling ill from the pollution.”

The negative nature of the comments by respondents in the SDB with regard to legislative aspects to cope with air pollution could be linked to historical and recent accidents at ENGEN, Sapref and the Island View Complex. These accidents were reported on extensively in the media (Refer to Appendix 1, 6, 9 and 10). This relates to the hypotheses of the Chernobyl

accident, as postulated by Frewer *et al* (2002:1-2). Their hypotheses states that accidents, both current and past presented by the media or by people who have had firsthand accounts of them, have an extensive impact on the perceptions formed by communities as well as individuals.

Even though 20% of the sample of White men earn between R70 000 to R99 000 and 80% earn between R100 000 to R200 000 or higher there is no significant difference between their responses about current air pollution legislation. Therefore advantaged men (in this case White men) do not see themselves as having more control and management over their world and health (Johnson 2002:726). Visual cues and stigma is therefore of importance here. The communication of risk signals such as vivid images, signs and symbols can therefore lead to a loss of credibility and trust in risk regulators, especially in the case of hazards that people have no control over.

When asked what needs to be done to curb the effects of air pollution, the respondents from the Bluff area commented as follows:

Higher fines for exceeding pollution limits: 38%

Tougher laws for accidents and emissions: 31%

Free medical care: 23%

Evacuation plan in place in case of accidents: 15%

Cleaner technology or move industry:14%

Financial compensation: 2%

5.3. Merebank / Merewent

5.3.1 Satisfaction versus dissatisfaction with living environment.

As mentioned in Section 4.3 the existence of this area is a direct outcome of the Apartheid regime. The living environment of residents was therefore dictated for them. This should result in a negative experience of their environment, which in turn would result in air pollution being attributed as a serious local problem. The community is in constant conflict with industry and its perceived effects on the environment. This section will analyse whether the latter reality is contributing to the perception that air pollution is a problem in this area. All the respondents in this area are Non-white.

What do you like about the area where you live?

Male 51-59 Higher education

"It is convenient, close to the CBD and it is a close knit community"

Male 41-50 General education

"The area is quiet, peaceful and friendly community."

Male 35-40 General education

"It's a safe area, very convenient for shopping and traveling."

Male 25-34 General education

"People are friendly and area is secured."

Male 18-24 Student

"This area has a lot of advantages e.g. the beach is close by, the surrounds is clean, the schools is close by and it is safe and even close by with the public transport."

Female 51-59 Education not indicated

"I now have my own house after a long time in a safe area."

Female 41-50 Grade 10 education

"I live along the main road which makes everything easy, like the shop and taxis."

Female 35-40 Higher education

"It's a good and safe community; schools are close by with good recreational facility. Area is well maintained, advantages to public services, buses and taxis to take you to where you need to go."

More than 95% of the respondents from Merebank / Merewent enjoy a positive relationship with their living environment. The preceding quotes provide an overview in this regard, with the sense of community very evident. A negative perception of their environment is therefore not contributing to the problematic issue of air pollution. The above evidence contradicts theories relating negative experience of the environment to situations where people are dictated where to live due to politics.

Even though the residents of Merebank / Merewent were dictated their living environment due to the Group Areas Act of 1952, they are not experiencing their living environment as negative. This contradicts Bickerstaff and Walker (all research) who indicated that people who did not choose their living environment, would have a negative experience due to being powerless over their immediate situation. This means that if a person is not satisfied with his / her neighbourhood, air pollution will be seen as a local problem. This is not the case for Merebank

/ Merewent as the respondents show a high social and psychological satisfaction with their area, whereas the respondents from the outlying areas beyond the borders of the study area experienced less satisfaction with their environment and rated air pollution as a problem.

Further research by Bickerstaff and Walker (2001:136) found that lay personal experience is influenced by a high concentration of industry as well as proximity to industry. This can result in attributing air pollution as a local problem. Merewent / Merewent is in close proximity to industries (see figures 6-10 pages 33-35) that are perceived as the main pollution source. Important here is the presence of industries which can frame the view of residents about air pollution and its possible connection with illness. This highlights the geographical viewpoint of proximity to industry and the perceived connection between illness and the visual stigma of industry. The latter aspect will be explored in the next section

What don't you like about the area you live in?

Male 35-40 General education

"Pollution and industries are too close"

Male 35-40 General education

"Pollution and industries are too close to residential area."

Male 51-59 Higher education

"It smells and crime rate is increasing."

Male 18-24 General education

"Live next to ENGEN, the noise is loud and strong smells. Large volume of traffic-accidents is high."

Male 18-24 Grade 10 education

"There is always strong smells coming from ENGEN and the Stanvac canal that runs through the community."

Female 60+ No education

"Not a good area, because of all the bad smells."

Female 51-59 Education not indicated

"You can see the pollution coming from the industries."

Female 35-40 Grade 10 education

"Yes strange smells from ENGEN and noise from Mondi at night."

Female 35-40 Grade 10 education

“Industries pollute the area with strange smells and noise pollution.”

Female 18-24 General education

“The pollution, on transport routes and there is no chances of employment.”

All respondents are aware of visual pollution in the form of smoke and fumes, with the views expressed in the preceding quotes which can be regarded as representative. This supports research by Myers *et al* (1999:116-117), who stated that women have the greatest environmental sensitivity about smoke and fumes as air pollutants. For Merebank / Merewent it is interesting to note that not just women are complaining about the smells and visual pollution from industry, but men as well.

Analysis of the responses about the physical environment shows that only 23% of the respondents liked the area due to aesthetics. According to Bickerstaff (2004:48), restriction of people to an area of low quality will cause apathy towards the environment. But this is contradicted in the case of Merebank / Merewent, as all respondents enjoy a high psychological satisfaction (63% of the respondents perceive the area as quiet, friendly, safe, near jobs and services). Only 14% do not enjoy a high psychological satisfaction.

This might be explained by Johnson (2002:726), who argues that if a persons' economic situation is not good, it does not allow him / her any alternative financial routes to lessen the problem of poor air quality, such as being able to move to a better area. Concerning the economic situation of the respondents, 66.6% of women are homemakers or retired, while only 13% are employed full-time. The rest are in positions of less power and control and would view the world as more dangerous. This can be one of the reasons why there are such a high percentage of women who are complaining. However, it does not explain the relative high percentage of men that are complaining. Thus there must be other aspects leading to this very high percentage.

One of the hypotheses that might explain the latter high percentage is offered by Brody *et al* (2004:48). They state that marginalized groups, in this case politically marginalized, are often located closer to air pollution sources. Therefore they are vulnerable to the associated health risks. This is the case in the Merebank / Merewent area, which was developed to provide labour for industry during the Apartheid era. According to Howel *et al* (2001:48) communities like these also tended to suffer from social stigma associated with high poverty levels, unemployment and crime, which cumulatively result in attributing air pollution as a problem.

This is not the case in this area as 100% of the respondents are dissatisfied with their environment due to visual pollution (in the form of smoke and smells). Only 2.8% of the respondents are concerned with crime. Noteworthy is that all the male respondents are employed. This points towards an underlying aspect such as visual stigma leading to the perception that air pollution is a local problem. This aspect will be further explored in the next section.

5.3.2 Sensory awareness and its relationship to perception of air pollution

This section aims to explore whether the sense of vision is playing a significant role in attributing air pollution as one of the local problems in the Merebank / Merewent area, relating to research by Bickerstaff and Walker (2003:53). The main underlying concern here is whether the constant visual stigma of nearby industry is contributing to the perception of air pollution.

Are you aware of pollution in your area and how often do you notice it?

Male 60+ Higher education

“There are strong smells in the mornings coming from ENGEN even benzene smells from Hosaf Fibres. You get terrible headaches that you can’t even eat anything. Our children have runny eyes, chest pains and severe eczema. We feel that the asthma here is worse than anywhere else in the community.”

Male 51-59 Higher education

“It comes from ENGEN, Sapref or Mondi depending on the direction of the wind. You notice it every day especially on Sunday afternoon, late at night or during popular TV programs when everyone is inside.”

Male 41-50 General education

“Southern waste water works, ENGEN and Mondi. Whenever I’m off I go fishing and I see the edges of the shoreline is black.”

Male 41-50 General education

“At night especially between the times 02.00-03.30 in the morning. I live nearby Settlers and Nizam Road School and the learners are regularly sent home when fumes are admitted from the stacks at Sapref.”

Male 51-60 Higher education

“Everyday- especially prevalent during winter when factors of valley inversion come into play. I am unaware of any personal health problems but cannot predict latent affects of continuous exposure. Large proportion of the community has asthma.”

Female 60+ No education

"I know when there is a bad smell in the air from ENGEN and all these other big companies every second or third day there is smells."

Female 51-59 Education not indicated

"SDCEA has meeting- We also hear on radio Lotus about the pollution from the community leaders."

Female 35-40 Higher education

"Yes-water and air pollution from ENGEN and the canal that goes to the sea, everyday and sometimes the smell is strong which affects us."

Female 35-40 Higher education

"Yes - on TV on Special Assignment. The children that go to Settlers School how they suffer with pollution related problems."

The preceding quotes clearly point towards the daily occurrence of tangible air pollution, coming from nearby industries - ENGEN and Sapref. These remarks by respondents are illustrative of the high incidence of everyday awareness of visual and sensory pollution in Merebank / Merewent. However, this could also be due to the close proximity of the respondents to industry. In this regard some of the respondents mention that they live nearby the refineries and see the impact of the fumes on the local community. This constant sensory awareness is confirmed by the following observations for the Merebank / Merewent area:

- Aware of air pollution everyday: 38%
- Aware of air pollution twice a week: 63%
- Unsure when air pollution is present: 13%
- Pollution prevalent during rainy weather 13%

It can also be deduced from the above quotes is that the industries in this area presents powerful imagery of pollution, which causes stress to the natural order of the surrounding environment. This supports Bickerstaff and Walker (2003:50), who points out that sensory awareness, is the underlying factor in the formation of perception seen by the quote below:

"All studies undertaken in geographical situations associated with urban and industrial air pollution problems stress the role of practical everyday experience in how people come to know air pollution. These studies show how understandings of polluted air are embedded in daily life through the senses and the body" (Bickerstaff and Walker 2003:50).

This link between sensory awareness and perception is echoed by Howel *et al* (2003:168). They found that daily experiences of concrete air pollution combined with residing close to an

industry, play an instrumental role in the development of a negative perception of the environment and also the view that illness is associated with air pollution.

Also applicable in this context, is the hypotheses of Brody *et al* (2004:1563) about people that are socio-economically marginalized due to politics, who are often located closer to air pollution sources. In the case of Merebank / Merewent the community was placed in this area to supply labour for industry. According to Howel *et al* (2003:169), the presence of an industry nearby a residential area frames the views of residents about links between air pollution and health. Of importance for Merebank / Merewent is that the majority of the female respondents are not employed (66.7%) and are therefore more likely to be looking after sick family or community. This supports Bickerstaff (2004:832) in terms of low income earners who tend to overestimate the number of community members being ill or dying from pollution. But this does not explain the high percentage of men who are aware of air pollution.

One possible explanation of the high percentages is through exposure to risk communication messages provided through the media. Some of the respondents indeed mention that they became aware of air pollution effects via TV and radio. Messages conveyed in this way are important predictors of risk perception, as the media can increase the social construction of risk to human health. People then use this mental model as a frame of reference to explain and predict the outcome of a certain complex phenomena even if risks are not scientifically established.

This echoes Johnson (2002:735), who found that marginalized groups in this case politically marginalized are more attentive to information presented by the media on the health problems caused by above average air pollution.

5.3.3 Health perception related to air pollution

Awareness of air quality is not universal Bickerstaff (2004:827) and is affected by aspects such as:

- People's sense of power over their space
- Psychological satisfaction of their living environment
- Geographical distance to a specific pollution source

This means that people who feel that they have had no control over their geographical circumstances and also do not have any political / economic routes of escape tend to express the strongest concerns about being trapped in a polluted environment. This ought to be

relevant for this community, because their existence is due to the Land Areas Act. To determine if this is indeed the case, this aspect will now be scrutinized in more depth.

How does the pollution affect you personally and the community?

Male 51-59 years Higher education

“There is respiratory disease, asthma and cancer is prevalent in the church congregation. Many church members have recently died due to cancer. People are uneducated in how to minimize the effects of respiratory disease.”

Male 51-59 years Higher education

“Runny nose, watery eyes and you can smell it sometimes. Also sinusitis infections and my daughter breaks out in rashes.”

Male 35-40 years General education

“Yes, my eyes go very red which makes it itch and water. Son has chest infections which lead to asthma attacks.”

Male 18-24 years Grade 10 education

“Lots of people are getting sick, they are complaining and medical service is bad.”

Male 18-24 years General education

“Not me but my dad and my loved ones. My dad has asthma when the air is polluted it effects him and many other people that live around us.”

Female 60+ years No education

“Yes my neighbour has asthma and one has died of cancer, lots of people are sick with wheezing. When there is a strong smell in the air they have attacks of asthma.”

Female 51-59 years Education not indicated

“When it rains the strong smell come from the Stanvac Canal and affects my grandchild. He gets very sick and he has to be rushed to the hospital.”

Female 41-50 years Grade 10 education

“Yes- my husband he wheezes and he start to cough. I know of people that get sick when there is strong smells in the air.”

Female 41-50 years Grade 10 education

“Yes- son has wheezing and people are always sick.”

Female 41-50 years General education

“Yes –my chest gets heavy and my nose is blocked.”

The preceding quotes illustrate the perceptions of residents of Merebank / Merewent concerning the association between air pollution and health. In terms of the research results for this area, 78.2% of the respondents perceive the prevalence of respiratory disease in the community to be directly associated with air pollution. A further 21.7% believe asthma to be directly associated with air pollution as well. (Refer to appendix 2 and 3.) A high percentage of 95.6% believe that the general ill health of the community is associated with air pollution. In all probability these perceptions have been influenced by the high concentration of air pollution sources as well as the proximity of industry to people. This supports the theory suggested by Howel *et al* (2003:168) that communities close to industry tend to express a higher concern for associated health impacts.

Bickerstaff (2004:832) furthermore argues that low income earners (in Merebank / Merewent 60.8% of the respondents have an income below R29 000 per annum) tend to overestimate the number of community members dying from air pollution. They are in an insecure position, unable to escape their environment due to monetary constraints. Earning a higher salary enables better health care and nutrition whereas an individual with a lower income is reliant on government run facilities that sometimes do not have adequate infrastructure.

Another theory of Bickerstaff and Walker (2001:54) is that because groups like these are restricted to areas of low environmental quality, apathy towards the environment is the result. Therefore they are likely to attach undesirable elements to the environment such as the negative impacts of air pollution. But due to the high underlying environmental satisfaction experienced in the area as, discussed in Section 5.3.1, the theory is not applicable in the case of Merebank / Merewent.

Awareness and concern about air pollution in Merebank / Merewent has been greatly influenced by personal experience (constant visual pollution) of industry, its relationship with the community as well as the local setting. This is especially important in areas of low socio-economic status where high incidences of asthma in children are given as evidence of the risks caused by air pollution.

5.3.4 Role of stigma, place, identity and trust/authority relationships

It has already been pointed out that when communities live nearby industries, the mere presence of these is instrumental in the formation of a negative perception of the area i.e. a stigma. This may have an impact on the quality of life for community members. The argument

put forward that people make assessments of their health based on their personal knowledge and experiences of their living environment. The aim of this section is to explore if the comments concerning air pollution by the Merebank / Merewent residents can be attributed to their proximity to nearby industries and the historical experiences with these, or to the nature of the trust / authority relationships and the resulting communication between residents and industry.

What do know about things that are done to curb this pollution and/ or address the problems caused by it?

Female 60+ No education

"They should build a clinic for the community. When they have an accident they must compensate the people for damages."

Female 41-50 Grade 10

"Bring the pollution down by using the overseas method. Build us a clinic that is close by which would help us when we get sick."

Female 35-40 Higher education

"The old and the children suffer, the most due to their age and their immune system is weak. Too much talk with less action, government needs these industries for economic growth so that's why they can't act. Upgrade industries or they should move to relocate. Community can't move due to their long history and it will take a long time for them to build themselves."

Female 35-40 Grade 10

"We know that they can't move but at least bring down the pollution, build us a decent clinic that's close by."

Male 51-59 Higher education

"There are laws and policies in place and things seem to be improving but not 100% sure as there is the cost factor and jobs are at risk."

Male 51-59 Higher education

"I am aware of laws and regulations in place but all have political agendas and the laws are poorly enforced as well."

Male 51-59 Higher education

“We do not trust the information that is available to the public as it does not incorporate other chemicals that are known to be dangerous to people. Monitoring includes common pollutants and is too general. Monitoring stations are not put in the correct areas but in areas that are far from industry. The population was not educated in the 1950’s when industry was built; people were not concerned about pollution but rather with making money. Business have a do not care attitude; local authorities are never seen to be taking action and seem to be constant excuses for accidents. We need to identify who is emitting what? Monitoring stations need to put on the fence line that border residential areas and near the stacks. Authorities need to enforce standards. There has been groundwater contamination by Chromium 6 in Umbogentwini and this has dried up causing cancer producing air pollution.”

Male 41-50 General education

“We are not aware of anything being done to enforce regulations as business seems to have a don’t care attitude.”

Although the individuals quoted here are within the same geographical distance from the industries, slight differences in opinion can be observed. It is evident; however, that dialogue between industry and the community is non-existent. The respondents are aware of the presence of industries, but feel helpless in a situation that is beyond their control. This helplessness has manifested in distrust in industry and even government as well. There seems to be a lack of communication on how industry is held accountable for their actions. This evidence for Merewent / Merebank suggests that factors such as closeness to industry as well as residing in a community where concern for air pollution is present influenced a negative perception of the environment. This clearly indicates the importance of neighbourhood identity in the formation of perception.

Of importance here is not the control of one individual over his / her environment but perception of the collective group and / or community as a whole. Johnson (2002:726) showed that there is a higher concern about technological hazards among women and marginalised groups. These individuals tend to be in positions of less power and control as well as not benefitting from the industries and technologies present in the area. In addition Bickerstaff (2004:835) found that people who are economically and socially disadvantaged exhibit a greater distrust of government departments. This can be attributed to their alienation from participation in any decision-making process, as can be seen from the responses for

Merebank / Merewent. They are often powerless to escape or lessen the stigma effects attached to the area.

Research has suggested that marginalized groups do not understand official information about air quality. Due to media reports, they are indeed expecting bad health effects from above normal air pollution levels. These marginalised groups also rate air quality information as personally important to them. Bickerstaff and Walker (2001:139) also found that people in this position feel powerless to influence a problem as large as air pollution. This reveals entrenched relations of social distrust, with the belief that others (individuals, government and business) will not accept responsibility and act to alleviate pollution problems. When asked what is required in the community, no marked differences between the gender groups could be observed.

Free medical care: 47.8%

Refinery moved: 39.1%

Industry to work with community: 30.4%

Cleaner technology: 21.7%

Financial compensation and stricter laws: 8.6%

Identify pollution source: 4.3%

Some of the respondents do not associate air pollution with the refineries, but with local factories. Noteworthy is that although respondents are in general agreement about the negative role of industries in the area, their comments differed when asked to indicate specific industries as sources of pollution. The impression given is that some people are fearful of implicating blame directly. This can be observed clearly when analyzing the major sources of pollution as indicated by the respondents when asked to rank them:

1st Factories in the area (76%)

2nd ENGEN (51%)

3rd Sapref (13%)

Another possible reason for the distrust of industry was put forward in an article by the various environmental groups in the South Durban Basin. This article highlights that the bulk of the labour force currently employed at the Sapref and ENGEN refinery, are casual labourers outsourced from labour brokers. This supports research done by Nurick and Johnson (1998:246) who report that residents have expressed concern that industry does not employ workers from the area.

Therefore industry is of no benefit to local people which causes increasing hostility to visible pollution based on judgments by the community of industry.

5.4 Wentworth/ Austerville

5.4.1. Satisfaction versus dissatisfaction with living environment

As illustrated in Section 4.4, residents of Wentworth / Austerville were dictated where to live due to the Apartheid regime. This should contribute to a negative experience of their environment, which in turn would cause air pollution to be attributed as a serious local problem. This community has recently been in conflict with industry (specifically namely ENGEN) due to certain accidents and their perceived effects on the environment. This section will consider the extent to which these issues are contributing to the perception that air pollution is a problem in this area.

What do you like about the area where you live?

White Female 60+ General education

“The area is secure, safe and the community is caring.”

Non-white Female 60+ Grade 10 education

“Community is friendly, alive and active in problem-solving. People stand together.”

Non-white Female 18-24 Higher education

“The area is quiet, peaceful with a friendly community and near jobs.”

White Male 41-50 Higher education

“The area is quiet and peaceful to live.”

Non-white Male 25-34 Higher education

“The area is near jobs.”

The preceding quotes are illustrative of the high level of social and psychological satisfaction of respondents within this area. Women frequently cite the sense of community as positive. Men, on the other hand, are positive about the area’s peacefulness and closeness to employment.

Even though these people were dictated where to live due to the Group Areas Act of 1952, they do not experience their social environment as negative. The responses given contradict

Bickerstaff and Walker (2001:139) who found that a negative social and physical experience of the environment will prevail when people are dictated where to live. Bickerstaff (2004:833) expressed that the environment would be negatively experienced in cases where people perceive themselves to be powerless over their immediate situation.

It also contradicts Bickerstaff and Walker (2001:139), who found that lay personal experience of the living environment might be influenced by the high concentration as well as proximity of industry. This meant that if people are not satisfied with the physical attributes of the neighbourhood, air pollution would be considered a problem. This is clearly not the case, as the respondents have a high social and psychological satisfaction of their area.

What don't you like about the area you live in?

Non-white Female 60+ General education

"Fumes from ENGEN and Sapref, roads are in a bad condition."

Non-white Female 60+ Grade 10

"There are fumes, pollution; people are not educated to pick up their litter. Teenage pregnancy and drug abuse is prevalent in the community. The flats are over populated and not maintained properly."

Non-white Female 60+ Grade 10

"The area has crime, its dirty and polluted, large volume of trucks. The area loses land value and it becomes hazardous to walk or drive as the trucks block the road and businesses throw their rubbish down on the ground, they just don't seem to care about anyone or anything. Maybe their only thought is to make money from a residential area. They are just there to make money as well as the transport companies that are operating here."

White Female 41-50 Grade 8

"The area is dirty and polluted. The air is constantly brown and smells."

Non-white Female 18-24 Higher education

"The area is dirty, polluted, high crime, drug abuse and trucks. There is a loss of dignity and pride in the community."

White Male 41-50 years Higher education

"There is crime and pollution in the air and on land. When ENGEN purges their stacks you see the black soot on your home and in the pool."

Non-white Male 25-34 Higher education

“The area has crime, drug abuse, and high volume of trucks and is dirty and polluted. The fumes in the air at times seem to be darker and make it hard to breathe that our eyes get to burn as well.”

In addition, it needs to be emphasized that residents of the Wentworth / Austerville area generally have low incomes. Therefore the findings of Johnson (2002:726-727) should be applicable in this situation (70% of women are homemakers, retired or students). Due to the economic situation of these people, there are no financial routes available for them to alleviate the problem of poor air quality. This area also has the highest number of women headed households and is poorer than the surrounding suburbs. When considering the total number of respondents (men and women) only 33.3% are employed full-time. The rest are therefore in a position of less power and control and will therefore view the world as more dangerous.

According to Bush *et al* (2001:48), communities such as these tend to suffer from social stigma associated with the high levels of poverty, unemployment and crime. With reference to the quotes on the preceding page, the respondents are not only concerned with the current air pollution problem but with other social stresses as well.

- Aware visual pollution:100%
- Concerned about crime: 83.3%
- Concerned about trucks: 33.3%
- Concerned about drug abuse: 25%

This fits in well with Howel *et al* (2003:169) who theorise that if an area is already afflicted by numerous social problems, air pollution would naturally be seen as a problem as well.

In addition, Brody *et al* (2004:1563) hypothesize that marginalized groups, in this case due to political reasons, are often located closer to air pollution sources and therefore more vulnerable to associated health risks. The Wentworth / Austerville area was designated to be a Non-white settlement during the Apartheid era and was developed to provide accommodation for labourers working in the nearby industries.

Considering the results obtained for the physical environment, it is noteworthy that none of the respondents from Wentworth / Austerville comment about the aesthetics (greenery and views). Restriction of people to an area of low quality (visible pollution and degraded buildings) will lead to apathy towards the environment (Bickerstaff 2004:833). The contradiction here is that

although the respondents enjoy a high level of social and psychological satisfaction (66.6% perceive the area as quiet and friendly, 8% as safe, 41.6% as near jobs and a further 8% perceive area as clean with no visible land pollution), aspects such as visual stigma and social stresses are causing the perception that air pollution is a problem in this area.

5.4.2 Sensory and perception awareness of air pollution

This section explores the extent to which the sense of vision is playing a significant role among residents of Wentworth / Austerville in attributing air pollution as a local problem. Following Bickerstaff and Walker (2003:50-51), the main underlying concern is to see whether the constant visual stigma of nearby industry is contributing to the perception of air pollution in this area, as the ENGEN refinery is within 250m to 1km away from residents.

Are you aware of pollution in your area and how often do you notice it?

White Male 41-50 Higher education

“Acid rain from ENGEN, every time they purge their stacks you see the results on your home and pool by the black soot. Durban harbour, death of many fish species and the culprit was never found.”

Non-white Male 25-34 Higher education

“Yes, burning eyes and they (children or family) have picked up asthma.”

Non-white Female 60+ Grade 10

“There are SO₂ and acid smells every day.”

White Female 60+ General education

“Once a week I notice pollution. My friends have asthma due to the fumes and my one friend of 25 years never had health problems until she moved to the Bluff. She has now moved to Johannesburg and now has fewer problems.”

White Female 41-50 Grade 8

“The air is constantly dirty and polluted brown and smells.”

Non-white Female 18-24 General education

“There is air pollution everyday that we experience.”

The quotes which have been provided clearly show that olfactory and visual awareness are playing an important part in perception awareness. Noteworthy, in addition, are the references to the damage caused by the perceived pollution to the environment and to human health. The

high numbers of complaints by men about the effect on their health as well as on the health of their families are unusual. Respondents in Wentworth / Austerville show a relative high average of everyday awareness of tangible pollution (58.3% of the sample). A further 24.9% of the respondents are experiencing pollution weekly. These high averages could be attributed to the close proximity of industry to the respondents.

Analysis of the responses obtained from the residents of Wentworth / Austerville presents evidence in support of the powerful imagery of pollution presented by industry (respondents commented about seeing visual pollution coming from industry stacks). This strengthens the perception that the natural order of their living environment is under stress. This fits in with Bickerstaff and Walker (2003:50-51), who shows how the understanding of air pollution becomes embedded in daily life through the senses and the body. The same aspect is echoed by Howel *et al* (2003:168), who found that daily experiences of concrete air pollution and residing close to an industry play a part in the formation of a negative perception of the environment. It can even lead to the view that illness is attributable to air pollution.

The hypothesis of Brody *et al* (2004:1563) is applicable in this situation as well. This relates to the fact that groups of people, who are socio-economically marginalized due to politics, as in this case with the Group Areas Act, are often located closer to air pollution sources. This community was intentionally placed in the area to supply housing for labour close to industry.

Another theory for the awareness for daily air pollution can be due to social stresses present in the community such as crime and high traffic volumes of heavy vehicles as mentioned in Section 5.4.1. Again from the above responses, the power of vision and social stresses is prevalent in the development of the awareness.

5.4.3 Health perception related to pollution

The aim of this section is to establish whether visual stigma, recent accidents or the socio-economics of the area is contributing to the perception that air pollution is responsible for the health issues being experienced.

How does the pollution affect you personally and the community?

Non-white Female 60+ Grade 10 education

"I suffer from sinus, infected air passages and headaches. My daughter on Marine Drive suffers even worse."

White Female 60+ General education

"My friends have developed asthma because of the fumes; my friend of 25 years never had asthma until she moved to the area. She is now in Johannesburg and does not suffer anymore."

White Female 51-59 Higher education

"The pollution comes from the squatter camp and the glass and tin in the area cause injuries."

White Female 41-50 Grade 8 education

"My husband has asthma and I have allergies and headaches caused by chemical gases in the air, this is what my GP and ENT specialist told me. My friends that live by the Island View Complex have a son whose health is affected by the pollution."

Non-white Female 18-24 Higher education

"I suffer from sinus, burning eyes and post nasal drip. My friend also died from an asthma attack. There is a loss of pride and dignity in the community"

White Male 41-50 Higher education

"I suffer from burning eyes and sinus. The community is affected by acid rain from ENGEN that damages property."

Non-white Male 25-34 Higher education

"I suffer from burning eyes and the people in the community have picked up asthma. Others are affected by cancer."

Analysis of the preceding quotes shows that the respondents are highly aware of other members of the community being affected by ill health. It is clear that men are indeed aware of others suffering. This is unusual because men usually feel that they have more control over their immediate circumstances. An aspect at play here may be that of economic empowerment. This relates to, Bickerstaff (2004:832), who hypothesizes that people in a vulnerable and insecure situation due to economic realities tend to overestimate the health risks associated with air pollution. To be considered for Wentworth / Austerville, is the fact that the majority of the female respondents who are not employed (80%) will more than likely be looking after sick members of their family and will be aware of others being ill in the community.

In Wentworth / Austerville 25% of respondents who earned an income (low level), tended to overestimate the number of community members dying from air pollution. This relates to the fact that they are in an insecure position and unable to escape their living environment due to

monetary constraints. In this regard Howel *et al* (2003:169) state that personal experience of an illness may influence a person's view on the possible cause(s) of an illness. This is seen by the responses referring to someone who is affected personally.

As Wentworth / Austerville is very close to industry, the relevant hypotheses in the literature suggest that the community will express a higher concern for associated health impacts (Howel *et al* 2003:166) .

The role of vision is therefore clearly reflected by the responses thereby supporting Bickerstaff and Walker (2001:136, 2003:59 and 2004:831). It is suggested that a person's development of meaning about the effects of air pollution is connected with visual effects observed in the environment. Concerning Wentworth / Austerville, noteworthy is that all respondents complain that their environment is dirty and polluted (refer to section 5.4.1).

5.4.4 Role of stigma, place, identity and trust / authority relationships

The underlying argument to consider is that people make assessments of their health based on their personal knowledge and experience of their living environment. The aim of this section is to explore whether comments about air pollution by respondents from Wentworth / Austerville can be attributed to the proximity of nearby industries and recent experiences with these industries, or to the inequality in trust / authority relationships and communication between residents and industry.

What do know about things that are done to curb this pollution and/ or address the problems caused by it?

White Female 60+ General education

"Only through media reports it is the only information that is available and the industry only does it to pacify people so that the complaints will stop."

Non-white Female 60+ Grade 10

"There are promises from ENGEN but they have money to buy their way out. They dangle carrots for the community as charity."

White Female 41-50 General education

"Nothing is being done and business does what they want."

White Male 41-50 Higher education

“Aware of nothing being done and what regulations that is in place is ignored by business. Durban harbour had pollutants dumped in it and the culprit was never found”

Non-white Male 25-34 Higher education

“There is nothing being done to stop air pollution, business does what they want.”

From the preceding quotes it can be deduced that the respondents are aware of actions taking place, as indicated by the references to media reports and contact between the community and ENGEN. Another theme evident from the quotes is that the respondents feel powerless in a situation clearly not under their control. The quotes reflect the view that the concerns of their communities are not viewed as important and are ignored. In addition the compensation provided by industries is perceived as inadequate and derogatory to the community. This is substantiated as follows: 75% of the respondents know of no regulations that are in place to curb pollution, with the remaining 25% who commented that there are regulations but that they are poorly enforced.

This suggests that these marginalized groups do not understand officially released information about air quality properly, and will therefore expect negative health impacts from the above normal air pollution levels as reported by the media. These marginalised groups also perceive air quality information as of personal importance to them.

These results for Wentworth / Austerville highlight the important aspect of the perception of the collective group and / or community as a whole. Research by Johnson (2002:727) has shown that there is a higher concern about technological hazards among women and marginalised groups. These individuals tend to be in positions of less power and control as well as not benefitting from the industries and technologies present in the area. As demonstrated in section 5.4.2 and 5.4.3, only 25% of the sample for Wentworth / Austerville earns a salary. Bickerstaff (2004:833-834) points out that economically and socially disadvantaged people exhibit a greater distrust of government departments. This leads to their alienation from participation in any form of decision-making. They are often powerless to escape or lessen the stigma effects attached to the area.

When asked what the community required, the respondents (both gender groups) mentioned the following actions to be taken:

Tougher laws: 58.3%

Free medical care: 8.3%

Cleaner technology: 8.3%

According to Bickerstaff and Walker (2001:138) individuals particularly of low economic status are aware of potential problems caused by air pollution through personal experience. This evidence suggests that factors such as closeness to industry and residing in a community where concern for air pollution is present, lead to negative perception of the environment. This indicates the importance of neighbourhood identity in formation of perception. Bickerstaff and Walker (see all references) also found that people felt powerless to influence a problem as large as air pollution and revealed entrenched relations of social distrust with a belief that others (individuals, government and business) will not accept their own responsibility and therefore not act to alleviate pollution problems.

Due to the constant visual stigma of the large refineries in the area, these installations feature prominently when ranked as the perceived pollution source:

1st ENGEN (83.3%)

2nd Sapref (33.3%)

3rd Mondi (25%)

4th Factories in the area (16.6%)

4th Island View Complex (16.6%)

It can be concluded that the sense of vision, especially in terms of tangible pollution and visual icons of industry, is playing a vital role in the formation of the perceptions of the respondents in the sample for Wentworth / Austerville.

5.5. Outlying areas of Woodlands, Montclair, Umbilo and Isipingo Beach

From the previous sections in this chapter it is clear that perception of air pollution is to a large extent influenced by where a person lives. Therefore awareness and concern of air pollution is geographically and spatially connected. The areas dealt with in this section are further from the main industrial area than those dealt with up to now. They are, however, similar in socio-economic make-up than the other areas considered in this study. The aim is to establish if perceptions in these outlying areas are the same than for the other study areas, or whether they differ as a result of visual stigma attached to (air pollution and industry) well as the nature of relationships with industry.

5.5.1 Spatial awareness and the connection to air pollution

As mentioned in Section 5.1.1 perception development depends on people's social and physical encounters within the area that they live. People's concern about air pollution and its possible adverse effects are influenced greatly by their surroundings. The presence of industry / industries can produce a stigma effect which can greatly influence the quality of life experienced. People make assessments of their health and psychological well being based on their personal knowledge of the living environment. Perceptions can also differ depending on the distances from perceived pollution sources.

What do you like about the area where you live?

White Male 60+ Higher education

"The area is quiet with a village feel to it."

White Male 41-50 Higher education

"It is quiet."

White Male 41-50 General education

"The area is cheap and I have lived here since birth."

White Female 51-59 General education

"The area is near to jobs."

Non-white Female 35-40 Higher education

"The area is quiet, peaceful, and friendly and near jobs."

What don't you like about the area you live in?

White Male 60+ years Higher education

"The area is degraded with no upkeep of properties. Crime in the area. There is noise and air pollution coming from Coedmore Quarry. There are petrol smells during the winter months coming from Jacobs Industrial area and ENGEN refinery."

White Male 51-59 years Higher education

"There is noise pollution and land pollution as well as traffic pollution. The squatter camp also burns their rubbish."

White Male 41-50 years General education

"There is land and air pollution. The neighbours properties are not properly maintained."

White Male 41-50 years General education

“There is crime, drugs, wood borer and people urinating a lot in our public area. There is dust residue from jet engines and noise from jets. It’s from the aircrafts that are flying to their destinations everyday overhead.”

White Male 41-50 years Higher education

“There is sometimes a sulphur dioxide smell in the air.”

White Female 41-50 years Higher education

“The area has crime, drug abuse, neighbourhood properties are unkempt and the area is dirty and polluted.”

Noteworthy is that although the respondents in the outlying area are in politically advantaged position and located further from the industrial basin, they still perceive their area as visually polluted and having an unpleasant quality of life. The feedback obtained shows that 30% of the respondents perceive the area as quiet and friendly, 30% perceive the area to be near jobs, while a surprising 40% like nothing about it. This supports Bickerstaff and Walker (2001:137-139) in terms of a relationship between apathy towards the living environment and the lack of comments about it in general.

The respondents in these areas are not experiencing a high social or psychological satisfaction of their living environment, thereby differing from the other study areas. Perceptual experience of the immediate environment is therefore an important factor. An example is Teesside in North East England, where residents within sight of industry perceived air pollution as a problem. Those living further away accepted air pollution to be a local problem, but felt that it did not affect them. For the outlying areas in this study, the implication is that daily concrete experiences of visible pollution is important in attributing air pollution as a problem (66.6% of the respondents complained of smoke and smells, 11.1% of land pollution and 11.1% of noise pollution). As pointed out in the contextual background supplied in section 4.8, the areas considered here are characterized by the presence of a large number of small industries.

The evidence provided by this study supports Howel *et al* (2003:169-170) in terms of the link between the negative perception of the neighbourhood and a negative perception of the environment, with the result that air pollution is attributed as possible problem.

The responses for the outlying areas support Myers *et al* (2000:268) in terms of women who have a greater sensitivity for smoke and fumes as pollutants. Howel *et al* (2003:169) found that women tend to express a higher concern for environmental issues that affect locals living in an area close to industrial activity. For the outlying areas, only 22.2% of men complained of air pollution compared to 44.4% of women.

5.5.2 Sensory and perception awareness

The aim of this section is to shed light on specifically the differences in awareness of air pollution between the gender groups. On the one hand women experience a relative high level of awareness of air pollution, which may be attributed to their poor economical circumstances and / or feeling powerless in a situation that is beyond their control. Men, on the other hand, have a lower awareness level of air pollution. Both economical and political factors will be investigated in this section as possible explanations.

Are you aware of pollution in your area and how often do you notice it?

White Female 60+ Higher education

“There is a thinners smell and sulphur dioxide coming from ENGEN and the local factories. I have been living for thirty years in the area (Woodlands/Montclair) and things have gradually become worse and I have never been aware of anything being done. My plants are burnt and there is an ash deposit on the leaves. They (industry) open flues in the middle of the night or when it is raining.”

Non-white Female 35-40 Higher education

“I am close to the industry in Bluff and Montclair and there are unnatural smells and smoke once a month.”

Non-white Female 35-40 Higher education

“The cooking oil refinery is right outside my front gate and then there is noise coming from the Toyota factory.”

White Male 60+ Higher education

“There is noise that always comes from the Coedmore Quarry, sugar refinery and bakery. Sometimes there is a petrol smell which I think comes from ENGEN and the Jacobs industry during June and July months. The only areas I think are affected by air pollution are Wentworth and Austerville as those people live nearby industry.”

White Male 41-50 General education

“You see pollution such as fallout debris from the local factories, there is lots of litter in the area as well that is dumped. Feel that the area is exploited because it is low-income place.”

White Male 41-50 Higher education

“I am not aware of any pollution problems but sometimes there is a sulphur smell which I think comes from the direction of ENGEN and Sapref.”

When considering the provided quotes it is clear that both men and women are aware of tangible pollution (both visual and olfactory). Women comment on the visual icons of industry as well as the impact on vegetation. Men interestingly comment on the potential direction from which air pollution is coming and indicate well known industries. This might be due to the stigma associated with these industries through reports via the media.

Judged by the provided responses, awareness of air pollution is supplemented by personal concrete experience. This visual association of industry and air pollution emphasizes the importance of the role of vision. This supports Bickerstaff and Walker (2003:51) in terms of physical dirt (smoke and litter) causing anxiety and a perceived threat to order. In this particular sample air pollution is spatially bound, as the outlying areas are near industries and / or a busy motorway.

In addition, the outlying areas are characterized by relatively low-economic levels, which further explain why air pollution would be perceived as a problem. For the sample considered for these areas, 63.6% of the respondents earn below R100 000 per year. Bickerstaff and Walker (2001:137) points out that the most concern about air pollution is shown by people that live in the low income areas. Most of the people in the areas like these do not experience a high environmental quality, which results in a halo effect of other undesirable elements being ascribed to the area as well.

There is a tendency for some of the male respondents to associate air pollution to the poorer people that live close to industry. The respondents who suggest this are of a better socio-economic status. Bickerstaff and Walker (2003:54) suggest that higher income individuals have the political and financial means to escape the situation if need be. The differences found in terms of women viewing their environment as more dangerous than men, support Myers *et al* (2000:268) as well as Howel *et al* (2003:169).

Comparison of the results for awareness of sensory pollution reveals lower averages for the outlying areas than for the other sample areas. For the outlying areas, 27.7% of the respondents are aware of pollution everyday from traffic and the harbour, with a further 36.3% who are only aware once a month, while 9% who reports awareness maybe once / twice a week. The aspect of visual stigma associated with industry is therefore not as prevalent as in the other areas. Industries are not presented as tainted and there is also no historical negative experience i.e. documented accidents.

The factor underlying sensory perception in the outlying areas seems to be connected to women being in a less advantaged economic and political situation than men. Therefore they feel powerless to escape an environment which they are apathetic about. This supports the development of psycho-social impacts present in the other study areas, as described by Bickerstaff (2004:832).

5.5.3 Health perception related to pollution

As established in Section 4.5.2 the respondents in the outlying areas do not experience a high level of social, psychological or physical satisfaction of their living environment. This section aims to establish whether the respondents from this area, being in a less advantaged economic situation, are relating air pollution to any illnesses being experienced either personally or by the community.

How does the pollution affect you personally and the community?

White Female 60+ Higher education

"I have respiratory disease, cancer and a skin allergy that is from unknown sources. Community does not seem to care or worry about the pollution. My plants in the garden are burnt and have an ash deposit on them."

White Female 51-59 Higher education

"There is land pollution and the glass that is present in the area causes injury and makes the area look like a slum."

White Female 41-50 Higher education

"Unhygienic germs spread causing illness; respiratory infections in the area are more common, allergies."

Non- white Female 35-40 Higher education

“Yes, I have been to hospital due to asthma attacks and my daughter has multiple allergies and eczema. I am aware of children living near the Umlazi landfills that suffer from headaches and nausea”

Non- white Female 35-40 Higher education

“There is air pollution from the industries here but do not know of anyone that is affected by the air pollution.”

White Male 60+ Higher education

“My health is not affected but I am aware that the people of Wentworth and Austerville are highly affected by air pollution.”

White Male 41-50 General education

“There is air pollution from airplanes that fly overhead but neither my health nor the community is affected just my flat and furniture is dirty.”

White Male 41-50 General education

“The industries in the Montclair area dump their rubbish in the area and there fallout debris. This damages our personal property.”

It is clear that women are aware of community health issues associated with air pollution. This awareness relates directly to their own suffering due to ill health and / or family members and / or friends in the community. This supports Myers *et al* (1999:117) in terms of women having a greater environmental sensitivity about smoke and fumes, together with its possible connection with ill health. Men, on the other hand, are more concerned about the unsightly environment caused by air pollution.

The responses by women correspond with Bickerstaff and Walker (2003:50-51), who found that a high physical concentration of industries and the perceived visual effects thereof on the environment, will cause anxiety and a threat to order. Also applicable for the outlying areas are the findings of Johnson (2002:726) that women rate health risks from hazardous technology higher than men due to differences in feelings concerning vulnerability. This is illustrated by the following for the outlying areas:

Reporting household members affected by illness: 66.6%

Reporting respiratory disease and sinus directly to air pollution: 50%

Attributing allergies to air pollution: 66.6%

Attributing burning eyes and cancer to air pollution: 33.3%

Knowing of people affected by ill health in other areas: 16.6%

The results for the outlying areas reflect the research of Howel *et al* (2003:168) who found that the personal experience of an illness is influenced by the views held about possible influences. Possible influences relevant for this study are: living in a deprived socio-economic and low quality environment.

Noteworthy is the slight difference in comments provided by Non-white women staying in the outlying areas. They previously stayed in areas as specified by the Group Areas Act for Non-whites. These areas did not have the same infrastructure as the former white areas where they now residing. They will therefore report a more positive view of their living environment and will not necessarily relate air pollution to ill health.

Focusing on the men in the sample, who are all White, reveals a different picture. They are in a politically and socially more advantaged position and tend to have more control and management of the world, which result in more benefits and control over their health (Johnson 2002:726). They are also less likely to have respiratory problems or to perceive knowledge of air quality to be of importance. This is confirmed for the outlying areas, with 100% of the male sample perceiving their health, as well as, that of their families and community, not to be affected by the presence of air pollution in the area.

5.5.4 Role of stigma, place, identity and trust / authority relationships

This section aims to establish whether the absence of large, well-known industries especially chemical and refinery in the outlying areas will result in only women commenting about air pollution legislation as they are less likely to benefit from technology and industry. The expectation is therefore that they will perceive knowledge of air quality to be of importance to them. White men, on the other hand, perceive themselves to have more control over the world and to be able to proactively manage it; will in all probability believe that knowledge of air quality information is of less importance.

What do know about things that are done to curb this pollution and / or address the problems caused by it?

Female 60+ Higher education

"I am not aware of anything being done to stop the pollution. There needs to be tougher laws and higher fines."

Female 60+ Higher education

"I am not aware of anything being done and I have lived in the area for 30 years and things have become worse."

Female 35-40 Higher education

"We are never informed about what to do when we notice pollution. The pollution officers are not doing their job properly. People can't complain as there is no toll-free telephone number to complain to. Industry does not get back to your complaints, the EIAs are in a technical language and the general public does not understand them. Even though we are an affluent community the people that are well off never complain about the pollution."

Female 35-40 Higher education

"I know that there are regulations because I have read in the media reports that the sulphur levels have been reduced."

Male 60+ Higher education

"I believe that current regulations need to be strengthening but the people who live nearby industry need to put up with air pollution if they want jobs."

Noteworthy is that 60% of the male respondents did not comment on how they feel about current legislation or what could be done to improve it. The perceptions of the male respondents' are closely related to their beliefs about their control over the environment. According to Bickerstaff (2004:832), groups who are in a state of vulnerability and social insecurity tend to overestimate risks. Due to the fact all the male respondents are White and in a more advantaged position, they tend to benefit from technologies and institutions and therefore experience the world as less dangerous.

Considering the responses provided by the women, it is clear that they are more vocal about what is required in the community. Women who have lived in the area for a long time feel that things are becoming progressively worse. Since only 50% of the women are employed their response can be due to economic uncertainty, thereby not feeling in control of over their

environment. This supports Howel *et al* (2003:169) in terms of women tending to have a higher level of awareness of environmental issues.

Noteworthy is the view, especially among men, that only the communities living near heavy industry suffer from air pollution impacts and associated ill health. The main reason for attributing ill health to air pollution is economic insecurity especially among women. In conclusion, the results indicate that due to outlying areas being characterized by a relatively low level of daily experience of air pollution, there is no stigma attached to the area. This results in the perception, that air pollution is not a serious problem and thereby provided evidence in support of Bush *et al* (2001:52).

5.6 Conclusion

It has been emphasized throughout this chapter that awareness of air pollution relates directly to the nature of the social and physical encounters within an area. Therefore assessments of health will be based on personal knowledge of the living environment and in turn risks are localized for each area as well. The most important results for each of the four sampling areas will be first discussed in turn and then be presented together in order to establish any commonalities and / or links.

In the **Bluff sample**, the perceptions of respondents are based largely on personal sensory experiences as well as, knowledge. The role of the senses, especially vision and olfactory, has been found to be of vital importance. Responses are centered on the visual icons of industry and the effects of their by-products on the surrounding environment. Unusual is high percentages of men who are aware of air pollution. This supports the theory that concrete daily experiences combined with historical and recent disasters at ENGEN, Sapref and the Island View Complex, have caused a stigma to be attached to industry. Respondents perceive the relationship between themselves and industry in a negative light. They are aware of structures in place to facilitate communication but perceive themselves as being isolated due to the Key Points Act, which they perceive industry is hiding behind.

Regarding the **Merebank / Merewent sample**, the aim was to establish whether the perceptions concerning air pollution of respondents, being politically disadvantaged, could be attributed to apathy towards their environment. The research highlighted that these respondents mostly experienced a positive relationship with their direct living environment which contradicts theories indicating that a negative environmental would rather be

experienced. Of vital importance in this study area is the issue of visual stigma (both of industry and by-products) and how respondents associate industry with this stigma. With regards visual stigma a high percentage of the response are indicative of tangible pollution. Responses also indicated a flawed dialogue between the community and industry. The respondents complain that industries are not held accountable for perceived air pollution infringements. There is also a sense of helplessness, with the community perceiving themselves not to be in control of their environment. Industry is perceived as being insensitive to community needs.

The **Wentworth / Austerville area** is a dynamic area which is located on the border between the former White and Non-white areas of the Bluff and Merebank / Merewent. The respondents in this area are of different ethnic groups. Regardless of the political disadvantages, respondents in this area experience a high satisfaction with their living environment. The area is unique as it also has the highest number of women headed households, which in part plays an important role as one of the factors underlying perception formation, as women tend to be more sensitive about air quality. Social stresses such as crime are also contributing to perception formation, with sensory awareness (visual and olfactory) playing a vital role as well. This is substantiated by the high everyday awareness of tangible pollution experienced by the respondents especially men. Another factor of importance is that respondents feel powerless in a situation where community concerns are ignored by industry.

Lastly a sample of respondents from the areas of **Woodlands, Montclair, Umbilo and Ispingo** was considered as well. Although these areas are approximately the same in socio-economic make-up than the other sampling areas, they are located further from well-known industries. The aim was to verify the link between the distance factor and the awareness of air pollution and formation of perceptions thereof and to determine if other factors are not at play as well. Noteworthy about the outlying areas is that the respondents did not experience a high psychological or physical satisfaction of their living environment. This is probably due to the presence of a large number of small industries and freeways, combined with the extremely high percentage of visible air pollution being experienced.

While male respondents from the outlying areas complain of visible land pollution and noise, women respondents mainly comment on visual and olfactory air pollution. Most respondents are at a relatively low level of economic well being and also experience a relatively low level of environmental satisfaction. The result is that a halo of negative effects is being attributed to the outlying areas. Visual stigma is not as prevalent as in the other sampling areas. The analysis

of the responses for the outlying areas supports all current theories about air pollution perception. Yet, each of the other sampling areas provides new perspective on the theories concerning the formation of perceptions about air pollution and the role of psycho-social factors therein.

It can therefore be concluded that the underlying aspect running through the research is that awareness and concern of air pollution is greatly influenced by where a person lives. Communities living adjacent to heavy industries have attached a stigma to the area, resulting in a negative perception of the quality of life experienced by community members. Due to the large percentages of respondents perceiving that they suffer from ill health directly related to the presence of air pollution present in the area, industry has attained a negative stigma.

An important aspect that have been raised by the research is the relationship between power, inequality and the marginalization of communities as well as meanings these people attach to their environments. Although the communities studied were either economically / politically marginalized or of a higher economic status, a high psychological and social satisfaction was experienced with their direct living environment. Despite this, all respondents (except in outlying areas) complained about the high incidence of visual air pollution and the unnaturally high rates of illnesses, which they felt were related.

This emphasizes the importance of the role of vision where observations of physical phenomena such as smoke and fumes are seen as a threat to order, thus causing anxiety and other psychological impacts. Due to local knowledge perceived as being of importance (as seen by the statements referring to environmental groups) this has influenced the formation of people's perception. The area as a whole also has a historical association with heavy industry and recent as well as past accounts of graphic air pollution levels.

The most important aspect is that risk-management programs that might in place to reduce air pollution are not effectively communicated to the public. Due to the government and industry not communicating regularly with the communities and not involving them in policy development the communities perceive that information is intentionally being hidden from them for some reason of vested interest. This accounts for the high percentage of respondents commenting that they are not aware of any regulations in place that will help curb the problem of air pollution.

CHAPTER 6

DISCUSSION OF RESULTS AND IMPLICATIONS FOR DECISION-MAKING

ENGEN, Sapref, Mondi and the Island View Complex have all been the focus of environmental concern due to industrial pollution in the South Durban Basin (SDB). These industries are located adjacent to low to middle income residential areas and it is this proximity which leads to concern in terms of health and quality of life. The previous two chapters focused on contextual aspects of the different sampling areas in the SDB. An example is the daily experience and perception of tangible pollution in the form of visible and odorous air pollution. These concrete experiences of air pollution play a vital role in the belief that various illnesses are associated with air pollution. Another important aspect in this regard is the role of satisfaction with the neighbourhood environment in general.

This chapter attempts to synthesize the findings in the previous two chapters by first and foremost analyzing how the sampling areas closer or further from the major industries in the SDB differ or show similarities in terms of perceptions of air pollution and related issues. The role of distance from major industries will be analyzed to determine if health perceptions differ according to variations in distance. The relationship between neighbourhood satisfaction and air pollution awareness will also be looked into. The aim is to determine to what extent a negative experience of the neighbourhood contributes to awareness of air pollution. Following this the respondents' perception of the relationship between air pollution and health will be scrutinized. Lastly the role of demographical characteristics such as gender, ethnicity and education in the formation of perceptions of air pollution and related issues will be highlighted as well.

6.1. Proximity to pollution sources in perception development in study and control areas

Research by Bickerstaff (2004:830) emphasizes the importance of everyday experience of polluted air in the formation of perception about it. Of vital importance is the power of vision, especially the experience of physical dirt (smoke and fumes) within the living environment. A number of researchers (Bickerstaff and Walker all references) have indicated that in the case of communities living next to large, potential polluting industries, a stigma of the area as being polluted may eventually result. This may influence local perceptions and the evaluation of

area, resulting in a negative perception of the community about the impact of air pollution on the quality of life.

The results for the outlying sampling of the SDB (refer to relevant parts of previous two chapters) as well as research by Bush *et al* (2001:51) indicate that communities living at a distance from industry tend to believe that their communities are not affected by poor quality of air and do not associate themselves with effects of industrial pollution. Analysis of the sample for the SDB indicates that perceptions depend on how individuals experience their living environment. Three aspects are of vital importance when dealing with the impact of proximity to industry:

- Presence of visual icons of heavy industry
- Consistent concrete experiences of tangible air pollution in the form of smoke and smells.
- An individual's experience of his / her living environment.

Consideration of the evidence and results obtained from this research on the SDB indicate that differences in respondents' perceptions of air pollution are directly related to community satisfaction or dissatisfaction with their direct living environment. A noteworthy aspect is that respondents from the outlying areas (further away from visual icons of heavy industry) do not experience a high social or psychological satisfaction with their living environment. For the outlying areas, 33.3% of the respondents are not satisfied with their living environment, compared with 0.9% of the respondents in the other sampling areas, even though 100% of them complained of air pollution.

In all of these cases olfactory and visual evidence is prevalent in establishing that air pollution is a problem. Noteworthy is that this research on the SDB contradicts the hypothesis of Bickerstaff and Walker (2001:135-136) that constant concrete experiences of air pollution will have a negative impact on the residents' perception of their quality of life whereas in this case exactly the opposite is true.

6.2 Neighbourhood satisfaction and pollution awareness

In the previous section it was suggested that neighbourhood satisfaction and awareness of air pollution somehow seem to be linked. In this section this apparent relationship will be investigated in more depth.

6.2.1 Main sampling areas of the Bluff, Merebank / Merewent and Austerville / Wentworth

Respondents were first asked how they perceived their neighbourhood environment in terms of both positive and negative aspects. The reason for this was to ascertain to what extent air pollution awareness is due to negative apathy towards the living environment. This is linked to the theory posed by Hunter *et al* (2003:228) about the existence of a relationship between individual as well as community beliefs about the quality of the living environment and the risks it might pose to health. This is because many illnesses have their root causes totally or partially in psychological factors.

The local experience of industry in the sampling areas located directly in the industrial basin has been found to be negative due to recent and past hazardous events that occurred at ENGEN, the Island View Complex and Sapref. (refer to Appendix 9 and 10.) The Bluff, Merebank / Merewent and Wentworth / Austerville areas have always been associated with air pollution problems, mainly through media reports. (refer to Appendix 2 and 3.)

Consideration of the **Bluff** (a former Whites only area, but now culturally / ethnically mixed, with a diverse population), reveals the following. With regard to satisfaction with the immediate environment (socially, psychologically and visually), the majority group, (Whites) in the Bluff sample commented positively on the physical environment such as greenery and wildlife (combined average of 23%) with a further 8% of them who perceive the area to be clean with no visible land pollution. They were further satisfied with the psychological aspects of the area such as friendliness (averaging 50%) and peacefulness (averaging 38%). Considering the other cultural / ethnical groups in Bluff, the same is observed; 100% are satisfied with the area both psychologically and socially, perceiving it as peaceful, friendly and near their place of place of employment and a further 19.5% perceive the area as clean and free of visible land pollution. But still 85.2% of the combined respondents complain of air pollution problems in the area. It is interesting to note that even though a high neighbourhood satisfaction is experienced, air pollution is still perceived as a problem. This supports the findings in Section 5.2 that a range of sensory indicators are involved in attributing air pollution as a problem. Complaints indicated the role played by visual icons of industry and the effects thereof on the immediate environment.

In the **Wentworth / Austerville** area, which has a high degree of cultural diversity, 100% of the male respondents are satisfied socially and psychologically with the area it is perceived as

peaceful, quiet and friendly, near their place of employment as well as safe. Male respondents with a general education emphasized the importance of being near their place of employment as well as feeling safe, while male respondents with a higher education emphasized the quietness and friendliness of the area. Similar as for the Bluff, 100% of the male respondents for Wentworth / Austerville are aware of air pollution. The female respondents also perceive air pollution as a serious problem in their environment (100% average). This high average for both male and female might be linked to the area experiencing social problems such as crime (rating the same as air pollution) and over half of the respondents identifying trucks, drug abuse, degraded neighbourhood properties and visual land pollution as a problematic. This corresponds with Bickerstaff and Walker (2001:142 and 2004:832) who found that people staying in areas that experience high levels of social stresses tend to be more concerned about living next to an industrial area. It adds to the evidence presented in Section 5.4.2 that tangible visual air pollution experienced either everyday or weekly, plus the close proximity to the ENGEN refinery is causing a stress to the natural order of their environment, with the various social stresses mentioned in Section 5.4.2 playing an additional role.

According to the literature the location of a residential community and in close proximity to industries will lead to a negative perception of the area. Being satisfied with their environment in general, on the other hand, community members are less likely to rate air pollution as a problem. This is not exactly the case for the community of **Merebank / Merewent** (a former Non-white area) who experiences strong emotional attachments and psychological satisfaction with many physical aspects of their living environment. For this area 54.5% of the respondents enjoy it for its safety and closeness to amenities, 36.5% commented directly on the aspect of social and psychological satisfaction (friendly, peaceful and near jobs) while 22.6% commented on its cleanliness and greenery. Only 13.6% of the respondents are dissatisfied with their environment.

Judging by this evidence, virtually all of the respondents from these designated post-apartheid area of Merebank / Merewent do not have negative associations with them. As a result perceptions about air pollution in this area will not necessarily be related to the literature concerning individuals being restricted to areas of low environmental quality. The majority of respondents from Merebank / Merewent has a high social and psychological satisfaction with the area but is dissatisfied with the visual and olfactory aspects of air pollution such as its impact on greenery and personal property. This supports the results obtained in Section 5.2.2 and 5.3.2. Sensory awareness is the underlying factor and the everyday concrete impact on

these respondents' lives, can be regarded as the root cause leading to their perceptions of air pollution.

Bickerstaff and Walker (2001:136; 2004:831) suggested that areas such as those that have been studied are likely to develop a spoiled identity, meaning that negative socio-environmental characteristics are assigned them. This is not the case for the main sampling areas which have been studied in the South Durban Industrial Basin, where a high level of neighbourhood satisfaction is experienced, as shown by the evidence provided.

This study about South Durban is that the perceptions held by South Durban communities of their living environment in relation to air pollution, often contradicts the general literature in this regard. Even though the residential locations of half of the respondents have been dictated by the Land Areas Act of 1952, the communities do not generally harbour negative views or apathy towards their living environment. This fits in well with Bickerstaff and Walker (2001:142; 2004:831) in terms of the role of socio-cultural systems in perception formation. Being satisfied with their neighbourhood environment, the literature implies that communities in South Durban ought to be less likely to rate air pollution as a problem. But as has been shown, this is not the case.

Although social stresses differ from area to area in South Durban, perceptions concerning awareness of air pollution and sources show no variations, except for the outlying sampling areas. Variations in the outlying areas support research conducted elsewhere, especially with regards to the differences between gender groups. Men feel in control of their environments and believed that air pollution is a problem associated with areas that are close to industry. Women, on the other hand, are in positions of less economic and political advantage will therefore have a greater sensitivity to sensory pollution having impacts on their living environment. This aspect will be further explained in the next sub-section.

6.2.2 Outlying control areas of Woodlands, Montclair, Isipingo Beach and Umbilo

For the areas outside the main South Durban Industrial Basin and away from the main industries, the evidence provided by this study reflects the results of similar type of research conducted elsewhere in the world (all authors). In other words, perception about air pollution is related to the local setting of neighbourhood environments and how it is experienced (which may be related to the cultural practices of people as well).

Surprisingly, community members from the outlying areas who are aware of their environment being polluted visually due to land pollution, are not as positive about environmental satisfaction (both physically and psychologically) as those staying in areas closer to heavy industry. This, however, is not true for the men in the outlying areas, who tend to be generally more content about where they are staying (refer to the evidence presented in Section 6.2.1).

Daily concrete experiences of sensory awareness such as smoke, debris fallout, burning oil, illegal dumping and jet fuel resulted in respondents from the outlying areas attributing air pollution as a serious local problem. For the male respondents, 41.6% are aware of land pollution and 33.3% of noise pollution (although once or twice a week only).

Respondents perceive the source of air pollution to be the factories within the outlying areas, although some surmise that certain sulphur smells are coming from the direction of ENGEN. The men in this sample are not of the opinion that their health is affected by the pollution, which echoes research that communities living at a distance from large industry will perceive less ill health effects. With regard to female participants, perceptions differ between cultural / ethnic groups. Respondents from Non-white groups are happy with their environment (both psychologically and socially), whereas White women are less satisfied. Both the latter groups, however, are aware of pollution in their environment and also experience social stresses such as crime, drug abuse, trucks and degraded neighbourhood properties.

Women mainly consider local factories as the main source of air pollution. This corresponds with evidence in the literature that women are more sensitive than men to smoke and fumes as pollutants, especially if living relatively close by industrial activity. Over half of the female respondents complain of poor health due to air pollution. This echoes Howel *et al* (2003:169), who found that women tend to have a higher level of awareness of environmental issues at local level than men and are more likely to report air pollution as having a negative effect on human health.

Concerning what is required to improve the living environment, less than half of the male respondents commented. This reflects research stating that men, being in a more socially advantaged situation, tend to see the world as less dangerous as they receive more economic benefits. Research by Johnson (2002:729) is also supported, namely that men are less likely to experience respiratory problems and / or perceive knowing about current air quality information to be important.

6.3 Community perceptions concerning health impacts of air pollution

Perceptions concerning health impacts of air pollution differ greatly between the different parts of the study area. For Merebank / Merewent 95.6% of the respondents believe that current illnesses are directly related to air pollution. For the Bluff area the corresponding percentage is 85.1% and for Austerville / Wentworth it is 45.4%. With regard to the outlying areas, 63.6% of the respondents perceive health in the community not to be affected air pollution, but associated health impacts with those communities living close to large industry (namely refineries and chemical storage facilities).

The evidence obtained from this research suggests a definite relationship between sensory awareness of air pollution and its potential impacts on human health. This highlights the importance of concrete daily experiences of air pollution in framing the perception that illness in the neighbourhood can be related to air pollution.

Another important criterion to take into account is peoples' personal experience of illness, for instance family members suffering from ill health, as mentioned in the interviews.

The following quotes from respondents are illustrative of the perceptions regarding the relationship between air pollution and health impacts in the SDB:

"There are strong smells in the mornings coming from ENGEN even benzene smells from Hosaf Fibres. You get terrible headaches that you can't even eat anything. Our children have runny eyes, chest pains and severe eczema. We feel that the asthma here is worse than anywhere else in the community."

"People are very irritable because of these things because you not enjoying life you are not free, not breathing clean air, as there is constant worry as the symptoms are there such as headaches and sneezing."

"I have sinus so bad that I can't smell and I burn my food."

"I have skin rashes that a dermatologist has said that it is from air pollution. I know when there is air pollution as my throat burns. My sister across the road died of cancer, my friends that were healthy died of cancer and my friend's son died of leukemia. There are young people that

are dying of cancer. The children are suffering badly; there are even whole families in the area that are asthmatic.”

Even though the people in Merebank / Merewent are stigmatized by the press and public opinion, both the focus group and individual interviews revealed that respondents do not want to escape from their environment. Since the community settled in this area long before ENGEN and as ENGEN generates money, they are of the opinion that it is ENGEN that should rather move, and can actually afford to do so. The residents want to improve their environment and perceive themselves to be doing their bit because they pay rent to the municipality to maintain their flats. Even though these people have a low socio-economic status and are suffering from material deprivation, they express feelings of belonging to the community and to upgrade the area and with no desire to move, as illustrated by the quotes provided below. Some of them have lived in the area for more than 40 years and are grateful for just having a roof over their heads.

“I would like ENGEN to be relocated they do not belong in the area. We have beautiful residential areas around us; people look after their properties and gardens. ENGEN must move into the wilderness they have no place in a residential area. They talk of relocating us, they are depriving us of our city status we like Durban. We were here before them even Hosaf Fibres needs to go. ENGEN lets their oil go into the drains and it goes into the nearby rivers and killed the fish.”

“They want to move us but where are they going to put us?”

“There are lovely properties around here getting polluted by ENGEN.”

Over half of the respondents, in this study, excluding those in the outlying areas, perceive ENGEN to be the source of pollution. In the South Durban Basin visual imagery (visual icons of industry and air pollution) is clearly playing a role in the attribution of ill health to air pollution. An important concept that this research about South Durban revealed is that of stigma, not only concerning living near industry, but also attached to industry as such. The historical experience of ENGEN, Sapref and the Island View Complex has been negative due to past and recent explosions and accidents with hazardous results, furthering the breakdown in communication between communities and industry. The area of Merebank / Merewent is stigmatized by bad health, and information about that is published in the media on a regular

basis. (Refer to Appendix 1 and 2). But despite this stigma the respondents of this area experience a high psychological and social satisfaction of their living environment.

The same is observed in the former Whites only areas of Bluff and also in Wentworth. A relatively high level of environmental / neighbourhood satisfaction is experienced in these areas, with not too much stress associated with crime and trucks. Over 60% of the respondents in these areas are aware of air pollution and 61% perceive this to come from the ENGEN refinery (mainly due to visual cues of smoke and a variety of smells). A further 25% perceive the Island View Complex to be the source. In total 33% of the respondents in the study areas experience air pollution every day. Here visual cues of industry play a part - Island View Complex is located within a residential area and also takes the recent accidents at ENGEN into account. This area varies in distance from pollution sources between 1 km to 10km, with ENGEN at the southern end of the Bluff / Wentworth and the Island View Complex at the northern end of the Bluff.

All communities studied in the South Durban Basin are aware of air pollution and believe that they are suffering from illnesses related to air pollution. But despite this, they still experience a relatively high level of neighbourhood satisfaction. This does not show any difference according to the degree of material deprivation and socio-economic status. Of importance is rather the stigma associated with the industries together with role of visual experience.

This supports Howel *et al* (2003:168) as well as Bickerstaff and Walker (2001:136-138), who found that the daily experience of sensory pollution together with presence of visual icons of heavy industry, play an important role in forming a common view that illnesses in the neighbourhood can be attributed to air pollution.

Although communities in South Durban differ in their socio-economic circumstances, not a great deal of differences in neighbourhood satisfaction is observed, even for those areas that originated as post-apartheid Non-white areas. The vast majority of these respondents enjoy a high level of neighbourhood satisfaction. Noteworthy, is that low salaried respondents within the South Durban Basin, who do not display apathy about their environment, perceive cancer and asthma to be related to air pollution. In addition, Non-white respondents living in former Whites only areas also perceive asthma to be related to air pollution. It can therefore be suggested that for the communities in South Durban, apathy towards the neighbourhood environment is not leading to the perception that illnesses are directly related to air pollution.

For the communities in the outlying areas, however, the relationship between apathy towards the environment and the association between air pollution and health problems are clearer.

As mentioned before, the communities in the SDB do not display apathy towards their environment. This contradicts the findings of Bickerstaff and Walker (2001:137-139; 2004:833) that satisfaction with the neighbourhood leads to a reluctance to attribute air pollution as a problem. Corresponding to other research, however, is the finding for the SDB that the daily experiences of particulate matter in terms of smoke and smells are instrumental in attributing air pollution as the direct cause of ill health or agitating already pre-existing medical conditions. This supports research by Nurick and Johnson (1998:244), who found that a major concern of communities was smells, especially SO₂ (that is detectable by smell and irritation on inhalation) and the perceived respiratory illnesses.

6.4 Variation in perceptions according to demographic characteristics

In the main sampling areas (Bluff, Merebank / Merewent and Wentworth / Austerville) there are very little differences in perceptions between men and women. In the former Whites only areas, however, slight differences in responses were observed with regard to ethnicity. Responses by White men reveal an unusual high level of awareness of air pollution, even though a high neighbourhood satisfaction is experienced. This contradicts studies on gender awareness by Johnson (2002) and strengthens the relationship between the senses and perception formation. With regards to Non-white male respondents, differences in opinions about the relationship between health and pollution are evident, especially for those living in the former White areas. Although they are of the opinion that their own health is not affected, they are at the same time aware of possible ill health in the community due to air pollution.

Clear differences in perceptions between gender groups can be observed among the respondents for the outlying areas. These differences are also in line with suggestions in the discussed research literature. Women in these outlying areas namely express greater concern about the impact of pollution on not only their own health, but also the health of others. They are also aware of community members having ill health. Men, on the other hand attribute health problems to 'Others' - those communities that live closer to major industries.

Although a range of technological and social stresses are experienced in the main study areas this does not contribute to any differences in perceptions about air pollution within the different communities in the main sampling area. But this is not the case for the communities in the

outlying sampling areas of Woodlands, Montclair, Umbilo and Ispingo. In these areas perceptions relate to the findings of all authors, namely that men in positions of authority (due to economics or politics) tend to see the world as less dangerous. Men perceive that air pollution only causes an unsightly environment, while women tend to perceive a direct relationship between air pollution and their own illnesses as well as that of their families.

All respondents were asked whether their health is affected by air pollution or if it is making an existing medical condition worse. It was found that women between the ages of 18 and 24 years (Merebank, Austerville and Bluff) perceive their health not to be affected at all. Only two out of the nine respondents within this age group are aware of health problems. This is perceived to be associated with the fact that they live in a previously politically marginalized community (Merebank), with ample visual cues of heavy industry (but with latent effects of air pollution not experienced yet). Analysis of the perceptions of the men of this same age group revealed the opposite. They perceive their own health as well as the health of communities to be affected. All of these male respondents come from the low-income bracket living near the refineries and the Island View Complex. Their opinions therefore reflect feeling powerless and not being able to control their environment.

This perception is also true for South Durban Basin sampling areas, where the majority of women interviewed perceive asthma and air pollution to be linked directly. This is observed for men as well and could be due to the majority of participants being married with children that suffer from asthma. Therefore personal experience could be playing a role in attributing illness to air pollution and feeling powerless to change the situation. This echoes research done other researchers indicating that health problems in South Durban is of the utmost concern, especially asthma and respiratory diseases but also headaches from fumes and skin irritation. All participants perceive respiratory diseases to be more common in South Durban than anywhere else both in this research as well as that of Nurick and Johnson (1998:246).

Differences in the material deprivation of communities do not make any difference in the perceptions which are observed. The only differences to be observed are seen in the communities further away from major industries. Therefore the geographical situation of communities is important, as well as the historical stigma attached to these industries. This supports Nurick and Johnson (1998:244) in terms of proximity to industry, which affects people differently; depending on the distance they live from industry. Those areas that are close to heavy industries feel more impact to their health, even with a high neighbourhood satisfaction, than those further away and with a lower neighbourhood satisfaction.

6.5 Implications of results for management at different levels

6.5.1 Implications for community and industry

As stated by local environmental groups (Chari 2004:2), South Durban communities have a long history of political activism and a struggle for environmental rights. These rights include having contact and co-ordination between communities and industry. This study has pointed out that 99.7% of respondents in the different sampling areas are not aware of any regulations or enforcements with regard to air pollution which have been developed by government. The interest in policies about air pollution relating to industry is due to the public's sense of threat to and anxiety over their living environment. Contributing to this is the increasing number of accidents and the perception that the current increase in respiratory diseases is connected to air pollution.

The results presented in Chapter 5 revealed that the South Durban community needs to be involved in the development of future local government policies. Previous policies, such as the Local Agenda 21, ignored community concerns and also presented the information in a very technical manner not understood by the general public.

Since 100% of the study sample complained of the impact air pollution had on their living environment, there need to be reductions in observable air pollution such as odours and fallout debris. Despite this, strangely, the largest part of the study sample seems to be reasonably content with their living environment. Households need to have access to information on monthly air pollution levels that are easy to understand. Information on year to year trends currently available, do not give an accurate account of the situation. The current perception, as obtained from this study, is that industry is still using the Apartheid Key Point Act to suppress information from the public. This supports the findings of the Multi-Point Plan Case Study, while there is feedback to government, industry, NGOs and Stakeholder forums there is a lack of feedback to the community at large. There also needs to be more accessible venues at which to provide this feedback to the various affected communities. The current air monitoring system needs to include the Island View Complex areas, as no monitoring has been done in the area except after recent accidents.

6.5.2 Implications for local and national government

In terms of local and national government, the respondents from the sampling areas in the SDB are of the opinion that information from the pollution monitoring system is not readily available to act on complaints from the public. The placement of monitoring stations requires review, as they are not close enough to the residential areas. A monitoring station is urgently required at the Island View Complex in order to provide data to investigate the possibility of a link between the high occurrence of cancer and the chemicals being stored in the complex. The recent health studies conducted by government (Naidoo *et al* 2006:13) have neglected to address possible links between air pollution and the ever increasing rates leukemia / cancer. (A cancer registry has been set up in 2009.) This study established that 100% of respondents interviewed perceive air pollution in the different sampling areas to be responsible for either their personal ill health or that of the communities.

As can be observed from the comments by respondents, stricter enforcements are required for air pollution control as current fines are not sufficient enough, especially when taking into account the turnover of the relevant industries per year. Industry needs to invest in cleaner technologies if they want to continue their presence in residential areas. An important aspect raised especially by residents of Merebank and the Bluff, is the need for a free clinic funded by industry and that will be open 24 hours a week. Currently the clinics which are available are only open 5 days a week until 3 pm and some do not have adequate medical supplies. The respondents are of the opinion that they need a dedicated 24 hour toll-free phone number just for air pollution complaints and that there also needs to be feedback once a complaint has been registered. Lastly government, especially at local level, needs to take cognizance that an evacuation plan is required for further potential accidents.

It is thus a priority to maintain the right of the public to information that is understandable to the lay person as well as transparency between industry and community. This will allow a relationship of trust and authority to develop between industry, government and the community.

6.6 Implications of results for policy formulation

In terms of policy formulation this study about SDB revealed two important aspects:

- The visual stigma associated with the presence of industry and the accompanied pollution (smoke, fumes and smells)

- The personal experiences of community members, both recent and historical, about relations between the community and industry as well as lack of information about air pollution impacts and possible reactions

Only 0.3% of entire study sample are aware of any legal enforcement whatsoever that is in place to report exceedances of air pollution or of the legal implications for industries that are exceeding limits. This contradicts Nurick and Johnson (1998:246), who pointed out that during 1998 residents of South Durban acknowledged that positive steps had been taken to reduce SO₂. For this study, however, 99.7% of the respondents are not aware of active legal enforcement and are not satisfied with present governmental legislation. This supports previous research (Nurick and Johnson 1998:248) in the SDB which found that residents staying close to the Island View Complex are of the opinion that the management is reluctant to release information on the chemicals that are stored and transported to the facility. They are concerned that the Key Points Act of the Apartheid era is still in force, preventing access of information to the public. This has subsequently been supported by the study interviews done in the study area after recent tank explosions. Residents are still concerned about the risk of explosions and the threat that the facility poses.

“After the explosion there was no feedback even though the newspaper said that the residents were visited and checked upon, this did not happen were not compensated after the fire. Unsure what they said about the cause of the fire is true. We had no idea where to go after the explosion. There was a meeting with Vopak and ENGEN when the ENGEN tanks caught fire but they are lying about the air quality. The Ministers are hiding information.”

Industries in the South Durban Basin are constantly assessed by local residents in terms of how they interact with community representatives especially when impact of industry is at the forefront of concern. More effective and transparent community participation in policy making needs to be implemented.

6.7 Conclusion

This study has been able to address the following issues not covered by previous health studies in the SDB.

- Different population groupings residing in the South Durban Basin were investigated including an unexposed group.
- Data was collected for over a year, which facilitated comparisons over time.

- A historical health effect, i.e. the stigma of industry was investigated.
- Variations between the gender groups were investigated.
- How the experience of one's' living environment relates to air pollution perception.

Even though social stresses differ from place to place in the study area, perceptions concerning the link between air pollution and health did not differ markedly except for the outlying sampling areas. The latter areas are located further from heavy industry (namely refineries) and the perceptions of the respondents support findings in the general literature concerning perceptions of air pollution. This relatively unexposed group of respondents perceives their area as polluted due to the presence of a number of small industries and the freeway nearby. The low satisfaction with their immediate environment in general results in a halo of negative effects - including air pollution - to be attributed to the area. Only women express concern about the possible connection between ill health and air pollution. Men do not make any connection between pollution and ill health except with regards to the poorer communities living closer to industry. Visual stigma is therefore not the reason behind the formation of perception in this area.

The reasons for perception development in the different parts of the study area suggest that some of the existing theories in this regard need to be re-considered, or that the South African (specifically SDB) context provides a uniquely different set of conditions. Sensory experiences and personal knowledge (both current and past) of industry and pollution are of vital importance in this regard:

- Responses reflect the constant presence of visual icons of heavy industry and its impact on the surrounding environment, such as vegetation, property and even the pets of respondents. High levels of everyday and weekly awareness of smoke and smells are instrumental in relating ill health to air pollution.
- Also of importance is the role played by sensory awareness both visual and olfactory. Constant awareness of tangible air pollution in the form of smoke, smells and property damage (black, greasy soot on washing and vegetation) plus the visual icons of heavy industry is underlying the formation of perception.
- Responses from White men are particularly interesting. Being in a politically more advantaged situation, White men are considered in the literature not to rate the world as dangerous and therefore not to see air pollution as a local problem. White men in the

study areas all commented about their dissatisfaction with the current air quality, but with neighbourhood / environmental dissatisfaction not playing a role in this regard.

- The lack of transparency between industry and local community has emerged as a dominant issue. Recent accidents at ENGEN, Sapref and the Island View Complex have soured relations with local communities due to inadequate follow-ups with affected people and the lack of information during evacuation of households.

The issues specified above will be further addressed and unpacked in the next chapter, especially in terms of their correspondence or contradiction with other theories and also in terms of the appropriate recommendations which may be considered.

CHAPTER 7

CONCLUSIONS AND RECOMMENDATIONS

The results of this study of the South Durban Basin suggest that the respective groups of people that were sampled enjoy a high level of environmental / neighbourhood satisfaction and sense of belonging to their respective communities. Therefore neighbourhood dissatisfaction has been shown not to be the underlying factor causing people to relate air pollution to bad health. Even though each community differs in terms of their socio-economic circumstances, there are no significant differences in environmental satisfaction, except for the outlying communities that have been studied surrounding the South Durban Basin. The results in terms of perceptions of air pollution and related matters for the latter communities support results of similar type of research which have been conducted elsewhere (mainly North America and the United Kingdom). White men in these outlying areas tend not to associate air pollution with their community but to 'others'. They feel in control of their world, which results in the opinion that their own health or that of the community is not affected. Women in the outlying areas tend to show sensitivity about dust, smoke, and fumes and feel to a lesser extent in control of their situation. They do feel that their own health as well as that of their children is affected by air pollution.

Current theory emphasizes that environmental / neighbourhood dissatisfaction results in attributing air pollution as a local problem. This research suggests a new theory in that constant visual icons of heavy industry, tangible olfactory pollution and unharmonious relationships with industry create a visual and sensory mental model on which the respondents are basing their perceptions and in turn their health.

There is a strong link between the sensory awareness of air pollution experienced in the area and the manifestation of ill health. More than half of the participants in this study identify ENGEN as the source of current air pollution problems, due to visual cues of smoke and a variety of smells. This relationship between visual imagery and air pollution has been instrumental in attributing air pollution to health problems experienced in the South Durban Basin, especially the Merebank / Merewent / Austerville areas. Residents of different areas in the Bluff also perceive the Island View Complex as a contributor to the current and past health problems. This direct link between certain industries and perceptions about negative health impacts has been established in the personal interviews done in both these areas.

Interviewee 1 Merebank / Austerville

“The smell of rotten eggs coming ENGEN in the morning is terrible, the smell from a toilet is better. Health has got worse, we getting sick now as we lived in the area for a long time. The children complain of sore eyes, runny eyes and headaches.”

Interviewee 2 Merebank / Austerville

“You can’t even enjoy your cup of tea in the morning because the smell is so bad.”

As illustrated in Section 6.6, this study has revealed two important aspects regarding legal enforcement, namely issues associated with visual stigma and also the personal experience of industry in their dealings with the public. In this study 99.7% of the respondents have been found not to be aware of any active legal enforcement and who are also not satisfied with present legislation and structures available. Respondents are concerned that industry will not divulge information about their production processes and the chemicals used or stored. What is important is that it should be possible for individual residents and the community to approach industry through dialogue structures set up by industry, so that the concerns of communities may be voiced and taken into consideration. Community groups also need to have an input in the development of indicators for the assessment and monitoring of industry.

ENGEN has set up a monthly Community Liaison Forum for the community to address any concerns they might have about ENGEN’s impact on the environment. Local community groups, however, are unwilling to participate due to the following concerns. They feel that their individuality and voice are compromised due to the fact that ENGEN and Sapref are managing the forum. It therefore cannot be seen as representative of the concerns which the local communities have. Another concern is that funds set aside for social investment is not being used at all to improve environmental conditions. For example, in 2007 Sapref spent R3 991 041.47(Sapref: 2007) on education projects and skills development, but nothing on environmental improvement. The general feeling is that this money should rather be used to upgrade facilities at refineries to prevent future accidental emissions as well as for investment in cleaner technologies (refer to Appendix 12, 6).

Community groups need to have an input in the development of indicators for the assessment and monitoring of industry, in order to lead the development of appropriate programs and policies to reduce pollution. In this study 99.7% of the respondents are not happy with current legislation as they perceive it not to address the needs or interests of their communities.

Industry needs to take into consideration the indicators that the community uses to detect the presence of air pollution, such as:

- Presence of sticky dust on property such as driveways and motor vehicles.
- Noxious smells present during rainy weather and early mornings.
- Industrial accidents and insufficient follow-ups with affected communities.
- Damaged / burnt vegetation.
- Pets affected by runny ears, allergies and cancer.
- High incidences of asthma, respiratory disease and sinusitis.
- The perception that leukemia levels are above normal.

These indicators, along with the contributions from industry, need to be incorporated into a baseline system for effective monitoring of air pollution to establish a benchmark for potential impacts in the South Durban Industrial Basin.

Another important aspect which has been established by this study, is the requirements of the general public in order for their concerns to be met by government (including local authority) and industry:

- 24.5% of the respondents require industries to receive higher fines for exceeding emissions standards and for the occurrence of accidents, as the perception obtained from the interviews is that industry is not accountable for their actions. Members of industry management did attend public meetings after recent accidents at Island View and ENGEN. Many residents complain that they were not compensated for damage to property after the recent explosions at the Island View Complex (refer to Appendix 12).
- 30.9% of the respondents require stricter laws to be in place so that local government is visibly seen to be holding industry responsible for infringements of pollution guideline levels. The perception is that industry is hiding information from the public due to the importance of industry to government. There is currently no toll-free number to report air pollution incidents by members of the public. The only other system that is available is via internet, which is not viable especially in the areas of Merebank / Merewent, which are in the lower socio-economic bracket.
- 25.4% of the respondents require free medical care. These respondents mainly come from the Merebank and Bluff areas. Although asthma clinics are available, the community explained that these clinics are supposed to be open 24 hours. In reality they are open only five days a week and only until 3pm, with some regularly in short supply of proper medication. Bluff residents commented that their medical aid funds have been exhausted due to their asthma medication or respiratory illnesses. Some

residents have confirmation from their local GPs that their condition is caused by chemical pollution present in the area. The respondents feel that industry need to contribute to the full subsidization of the asthma clinics.

- 7.2% of the respondents (mainly Bluff residents) require a publically known evacuation plan for future accidents due to the confusion on the night of the Island View Complex explosions. An evacuation plan was developed in 1981, but there is no updated version (refer to Appendix 14, 10).
- 6.3% of the respondents require financial compensation for the damage to their property and health. These respondents come mainly from the Bluff and Austerville / Merebank areas. A further 6.3% want industry to take note of community concerns and to respond to them in an understandable way, as the EIAs are in a technical language that the lay person cannot understand, as seen in the LA21 critique.
- 14.5% of the respondents require industry to invest in cleaner technology in their production processes to limit the sensory impact on the community.
- 9.09% of the respondents require the refinery to move to another area as they feel that their community was established in the area first. This was the general feeling obtained in the individual interviews when asked what they would like to be done.
- 0.9% of the respondents require the source of pollution to be identified.

In order to implement effective future monitoring plans it is important to understand all the variations in perceptions present in the main industrial basin, so that appropriate decisions can be made as to where to place more monitoring systems and what the community can do to monitor pollution and / or contribute in other ways. The information must be fully transparent and understandable to the community to ensure harmonious relations between industry and surrounding communities.

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SDCEA: Community News Volume 11: December 2007 SDCEA: Durban

SDCEA: Community News Volume 11: September 2008 SDCEA: Durban

APPENDIX A

Newspaper articles and Questionnaires

TEST DRIVE A LAND ROVER FROM
LAND ROVER
 LAND ROVER UMHLANGA
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MY CARPIS & BIFTWICKS

MASSIVE explosion shook the harbor harbor, Bluff and CBD, on Tuesday night, followed by a large blast in the Bluff area. The explosion was followed by a large blast in the Bluff area. The explosion was followed by a large blast in the Bluff area.

Fireballs

Local residents represented by the South Durban Community Bluff, although they were not directly involved in the explosion, said they had heard the city to draw up a clear disaster management plan. Emergency services spokesman said the blast had been contained within the emergency zone.

Inter-ocel Services and Ambulance Service was immediately alerted. Despite efforts to contain the blaze, the fire spread to three storage tanks in the Island View area, a ship at berth. The fire, close to the site of the fire, were reportedly moved to other areas in the harbor. The emergency services reported that a joint operations exercise was embarked on by the various fire stations. The harbor fire station and the other fire stations were being coordinated from the Fireballs.

While it was unclear at first whether the smoke was toxic, motorists were advised to drive in their own cars. The entire Island View area surrounding the depot was cordoned off. The Metro Police were in attendance diverting traffic away from the intersections of Baywood and Langberg roads and Baywood and South Coast roads.



HUGE flames and massive clouds of black smoke billow from storage tanks in the Island View area of Durban Harbour last night. The blaze started in road tower which had caught slight at Island View 4, adjacent to the Bulk Connections site. Despite efforts to contain the blaze, the fire spread to the tanks.

Some claims because people see the flames even though they are not in the danger zone. He said there were 15 tanks in the immediate area of the blaze, which at least seven had exploded. Four of these were believed to

contain substances (very volatile and possibly toxic substances). Because it is known that the main product View comprises has a liquid fuel, many tanks full of liquid fuel and other products ranging from jet fuel, solvents, engine oils, paraffin, petrol, diesel, kerosene, paraffin, petrol, formaldehyde, propellant, propellant, formaldehyde, propellant, propellant.

It was first established in 1968 and there are about 150 tanks in the area, not all of which are known as the Central Oil Storage, which is also a national body consisting of 20,000 tanks in the country.

While it was unclear at first whether the smoke was toxic, motorists were advised to drive in their own cars. The entire Island View area surrounding the depot was cordoned off. The Metro Police were in attendance diverting traffic away from the intersections of Baywood and Langberg roads and Baywood and South Coast roads.

10 THE MERCURY
Thursday April 16 2009

City cancer watch

APPENDIX 2

A surveillance unit is to be launched to investigate links between environmental pollution across Durban and cancer cases among its people



Earth Window
TONY CARNIE

DURBAN is taking the lead in attempts to track down cancer cases that may be related to industrial fumes, traffic exhaust emissions and other environmental pollution factors.

The decision to establish the eThekweni cancer surveillance unit follows long-standing concerns about links between environmental pollution and cancer, especially in the heavily industrialised south Durban area.

The initiative is a joint project by the eThekweni health department and the University of KwaZulu-Natal and will eventually cover the municipal area, from Clamsthal in the south, Tongaat in the north, and Hammarsdale in the west.

Professor Rajen Naidoo, head of the university's occupational and environmental health department at the Nelson Mandela School of Medicine, says the project will rely on the voluntary participation of the health profession and cancer patients and their families.

But before work can begin, the unit will need ethics approval from the university because the research will require confidential medical details about cancer patients. Control measures will be needed to safeguard patients' privacy.

Once approval is given, the unit hopes to contact cancer patients using several channels, including information leaflets distributed by community groups or shopping centres.

Naidoo said once patients gave their written consent, they would be interviewed by trained members of the surveillance unit to gather details of the type of cancer they had and their exposure to cancer risk factors.

He said draft amendments to the National Health Act were to be published soon to compel doctors, laboratory heads and other mem-



Emissions from one of two major oil refineries in Durban pour into the air in this picture taken in 2002.

PICTURE: BOBBY PECK

bers of the health profession to report all cancer cases as soon as they were diagnosed.

The South African National Cancer Registry, set up in 1987, is the main source of nationwide cancer data, but there are several gaps in the information it receives because the health sector is not legally required to forward data.

Another major gap in the national registry is that not all patient data can be linked to precise geographical locations, and this hinders research into cancer-causing agents in specific areas.

"It is said that we don't have the proper figures and that cancer remains so low on the priority list

of public health research," said a source close to the registry.

Naidoo has welcomed the legal moves to ensure that all cases are reported to the state and to reform the methods of cancer data collection.

"Rather than waiting for this process to be finalised, we have decided to move forward on a pilot



Raveshni Govender, 11, who died of cancer in Merebank in 1997.



Nathansel Bedassy, 3, who died of leukaemia in Merebank in 1999.

project by setting up a cancer surveillance unit," he said.

Once the national legal reforms are in place, the surveillance unit could be upgraded to a fully fledged cancer registry.

There have been no formal studies to compare cancer rates in south Durban with other parts of the city, but an internationally peer-reviewed health study in 2006 found markedly higher rates of asthma in children at the Settlers Primary School in the heart of the southern industrial area.

As part of this study, scientists from the University of KwaZulu-Natal and the University of Michigan concluded that, based on the type of cancer-causing chemicals, metals and other agents in the air, the theoretical risk of getting cancer in some parts of south Durban was significantly higher than average.

In 2003, a survey by the eThekweni Municipality health department also found high levels of benzene and other cancer-causing pollutants near the Island View chemical storage area in Durban Harbour, in Merebank and in inner-city areas with heavy traffic.

"Obviously there is evidence that some cancers are due to environmental factors - but we don't know for certain if this is occurring in Durban," said Naidoo.

Funding has been secured from Danish government aid agency Danida and other European groups for the initial costs of the unit, but not the long term.

For more information, contact the eThekweni cancer surveillance project manager, Jaftha Nkomoana, at cancer@uiczn.ac.za.

City unit to lead cancer fight

TONY CARNIE

DURBAN is planning to become the first city in the country to set up its own environmental cancer surveillance unit.

The move coincides with a national process to declare cancer a reportable disease and improve data collection on the disease, which kills or disfigures several thousand South Africans every year.

Two years ago The Mercury uncovered evidence of potentially high cancer rates in children in Durban's southern industrial area.

Official figures suggest that at least 50 000 new cases of cancer are diagnosed around the country every year, although these statistics are recognised as an under-estimation of the true picture.

The aim of the new surveillance unit (or registry) is to monitor the number and different types

of portable disease should improve the state of cancer surveillance nationally as the health profession would be required to tell state health officials of new diagnosed cases when they are diagnosed.

It is understood that a draft notice on the cancer notification plan will be published for comment soon in the Government Gazette in the near future.

Although South Africa has a partly functional national cancer registry, its effectiveness is limited because it relies on limited data given voluntarily by private and state pathology laboratories.

Sources say there are major information gaps because few private labs forward information to the national registry.

Along with funding limitations, the lack of compulsion to report the disease has hindered plans to analyse the links between

veg by The Mercury estimated the rate of leukaemia to be 24 times higher than the national average in children under the age of 10 in Merebank, while the incidence of other types of cancer in this age group was also higher than normal.

Although these estimates were based on a very small number of cancer cases found only in Merebank children, public health specialist Dr Duane Blaauw said the results were unlikely to be a "fluke", and he called for more in-depth studies by scientific researchers.

Widespread publicity and community concern soon led to the establishment of the so-called Multi-Point Plan, a high-level government project to tackle industrial air pollution countrywide, with Durban as the national pilot project.

AUGUST 11, 2006

Sun News

Pollution fears well-founded

POLLUTION levels in south Durban far exceed those in Durban north.

This was the finding of a UKZN report commissioned by eThekweni Council into the pollution problems in the city.

"Benzene is the most dangerous chemical in the world, proven to produce leukaemia in children," said Desmond D'Sa, of the South Durban Community Environmental Association.

The survey examined residents living in Durban south suburbs against those in Durban north, and found that in most categories, levels of pollution in the south were far higher than up north.

"It is relatively easy to reduce benzene levels through basic maintenance," said Desmond.

His comments follow the publication of a health study, conducted from May 2004 to February 2005, by UKZN's Centre for Occupational and Environmental Health, and the University of Michigan.

The two universities were awarded the tender to go ahead with the survey by eThekweni Municipality, after a decision by government saw the implementation of a Multipoint Plan (MPP) to monitor pollution in the greater Durban area.

The intention of the plan was to allow

Research shows levels in South Durban are much worse than Durban North

a better understanding of pollution across Durban, and to develop systems to monitor fluctuations of pollution levels.

The MPP also closely examined the impact on health for those living in areas with higher pollution levels.

"Scientists have proven that there is a pollution problem south of Durban," said Desmond.

"Government needs to put plans into action now. Enough studies have been done."

Numerous testing sites were used, from Umhlanga, Warwick Triangle, to Isipingo, as well as from a range of schools south and north of Durban.

Nearly 400 pupils were selected from schools across Durban to ascertain the impact of pollution levels on children and their families.

The findings show higher figures of

pollutants, as well as an increased possibility of cancer for south Durban residents.

In some categories, the pollutants found in the south were sometimes 10 times greater than in the north.

Where there were higher levels of pollution in the Durban south area, respiratory problems were found to be more prevalent. Numerous families were consulted during the study, and the findings showed large numbers of children and the elderly, suffered from persistent asthma and bronchitis.

A community meeting held at the Austerville community centre reflected a community pleased that a survey was conducted, after many years of constant pressure.

Community members present at the meeting also called upon council to place a permanent monitoring station near the Sapref Refinery and to review the permits issued to various companies releasing pollutants, in an effort to reduce and manage the levels of pollution.

"Industries continue to play games, flaunting environmental laws," said Desmond.

"Serious action must be taken against them."

Perceptions of pollution and its impact on in the

South Durban Basin: A community perspective

Pilot questionnaire 2008

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This questionnaire forms part of an information gathering phase for a Masters Degree on how the community perceives the impact of pollution. This study focuses on the South Durban Basin. This information may help shape future pollution policies and standards in that community' concerns will be addressed. If you like to have a more in-depth interview please phone me on 0727606528 - Amanda

Supervisor: Mr RW Pretorius (UNISA)

Please note that any personal details given will only be used for statistical purposes and not used in documents circulated to the public.

1. Please indicate the closest answer to the question by ticking the appropriate box.

1.1 Which suburb are you staying?

Merebank Wentworth Bluff

Clairwood Montclair/ Woodlands

1.2 Male Female

1.3 Age 18-24 51-59
 25-34 60+
 35-40
 41-50

1.4. Married Widow Single

Divorced Living together

1.4. i Children No children

1.5 What is the highest level of education you have achieved?

a. Std 8/ Grade 10 or lower

b. Matric

c. College (i.e. Nursing/ Police/ Technical/ FET)

d. Trade School

e. Technical University Diploma/ Degree

f. University Degree

g. Masters/ Doctoral Degree

1.6 Are you:

a. Employed full time

b. Employed part time

c. Business Owner

d. Homemaker

e. Retired

f. Unemployed g. Student

1.7 Please indicate your race group.

White	<input type="checkbox"/>	African	<input type="checkbox"/>
Indian	<input type="checkbox"/>	Coloured	<input type="checkbox"/>
Asian	<input type="checkbox"/>	Other	<input type="checkbox"/>

1.8 Which category best describes your annual income:

a. less than R29 000	<input type="checkbox"/>	If you do not want to specify then is your	
		income greater than R65 000	<input type="checkbox"/>
b. R30 000 – R 49 000	<input type="checkbox"/>	or less than R65 000	<input type="checkbox"/>
c. R 50 000 – R 69 000	<input type="checkbox"/>		
d. R 70 000 – R 99 000	<input type="checkbox"/>		
e. R100 000 – R 200 000	<input type="checkbox"/>		
f. Greater than R 200 000	<input type="checkbox"/>		

2. Please answer / respond to the following questions to the best of your ability. Note that there are not wrong or right responses. We are interested in your opinion and how you see / experience things.

2.1 What do you like about the area where you live, not only, but especially in terms of the environment? (Note: Environment includes everything around you)

2.2 What don't you like about the area where you live, not only, but especially in terms of the environment?

2.3 Are you aware of any pollution in your area? Briefly describe the type/s of pollution and explain and how you know about it.

2.4 Where do you think this pollution comes from?

2.5 How often do you notice this pollution or do you become aware of it? (Example once a week or twice a month)

2.6 Does this pollution affect you personally in one or the other way, and if so, describe how.

2.7 Are you aware of anybody staying close to you who have been affected in one or the other way by this pollution, and if so describe how.

2.8 How do you think is your neighbourhood is affected by this pollution?

2.9 How do you think the whole community where you stay is affected by this pollution?

2.10 What do you know about things that are being done to stop the pollution?

2.11 Do you think that the things being done are effective?

2.12 What would you like to be done about this pollution and or the problems caused by it?

2.13 Are there any places that you know of where dangerous pollutants were dumped, spilled or leaked in the past? What happened and where did it happen?

Perceptions of pollution and its impact on in the Durban Basin: A community perspective**Pilot questionnaire 2008**

.....

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Divorced Living together

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a. Std 8/ Grade 10 or lower

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f. University Degree

g. Masters/ Doctoral Degree

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b. Employed part time

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d. Homemaker

e. Retired

f. Unemployed

g. Student

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Coloured

Asian

Other

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a. less than R29 000 If you do not want to specify then is your
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b. R30 000 – R 49 000 or less than R65 000

c. R 50 000 – R 69 000

d. R 70 000 – R 99 000

e. R100 000 – R 200 000

f. Greater than R 200 000

2. Please answer / respond to the following questions to the best of your ability. Note that there are not wrong or right responses. We are interested in your opinion and how you see / experience things.

2.1 What do you like about the area where you live.

Quiet and peaceful Clean and no pollution
Friendly community Near jobs

2.2 What don't you like about the area where you live.

Crime Neighbours do not care about property
Dirty and polluted Drug abuse
Trucks

2.3 Are you aware of any pollution in your area?

Yes No

2.4 If yes what type?

Air (smells and smoke) Water Land (rubbish)

2.5 Where do you think this pollution comes from?

ENGEN Sasol Mondi Island View Complex
Factories in the area Harbour
Other _____

2.5 How often do you notice this pollution or do you become aware of it?

Everyday Twice a week Once a week
Once/ twice a month Other _____

2.6 Does this pollution affect you personally?

Yes No

2.7 If yes how?

Respiratory disease Asthma Cancer Sinus
Burning eyes Other _____

2.7 Do you know of anyone that has been affected by pollution and how?

2.9 How do you think the whole community where you stay is affected by this pollution?

2.10 What do you know about things that are being done to stop the pollution?

Nothing Yes there are programs and regulations in place

2.11 Do you think that the things being done are effective?

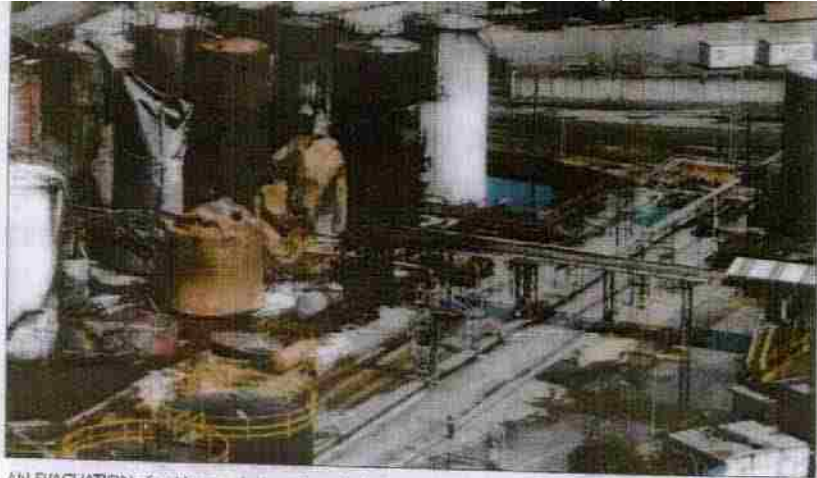
Very effective Average Poor Extremely bad, business does what they want

2.12 What would you like to be done about this pollution and or the problems caused by it?

Tougher laws High fines for polluters Free medical care for sufferers

A proper excavation plan Financial compensation

2.13 Are there any places that you know of where dangerous pollutants were dumped, spilled or leaked in the past? What happened and where did it happen?



AN EVACUATION of residents took place after a fire broke out in some of the tanks at Island View Storage

Chaos, lies and ignorance

LIES, spin and deceit – these are the three words that come to mind when I reflect on the past week, and the events around the Island View Storage catastrophe.

Whether it was the city manager, the emergency control people, the city health officials, the MEC for Agriculture and Environment, or the company representatives themselves – it seems all these entities were in one way or another selective with the truth. Well, to be more forgiving to them, they did not actually know what was going on, so we can't actually say they were lying.

Since then many of the people whom I have spoken to on this issue have been amazed at the sheer audacity of the people who "were in charge" about how they were trying to spin the situation.

They all claimed they had the situation under control, and the most interesting statement made during this time of crisis was by none other than our city manager, Dr Michael Sutcliffe, who indicated that because "it took place at night, people could see it from very far, so they thought it was much closer than it actually was".

Well, when you live across a road which is a few metres away from a ten fence, and all you can see out of your front window are tanks, you are close, it does not need the lack of daylight to inform you of that. We can smell it, see it and hear it.

Chaos

But to rub salt in the wounds of people, Sutcliffe goes on further to deny that there was any chaos in the area.

Sutcliffe has never had the opportunity to live next to such facilities, and to have had the experience of carrying a bed-ridden mother away from such an inferno. I have, and during one of the Ebers fires, and to say things are chaotic is mild. They are dangerous and deadly.

So after trying to convince people that the situation was safe, the spin industry of both government and business kicked into place.

Coupled with the spin, Kotras Eblers, Managing Director of Island View Storage, uses the National Key Points Act to actively withhold information and indicates that he cannot "elaborate on what solvents were leaked".

On national television the next day he

In this opinion piece, environmental activist

Bobby Peek

argues that those dealing with the Island View Storage fire

have been spinning the truth – and community resistance is the only viable option



impact on community air.

He is upfront at least in his admission of spin, when he indicates that the air sample report cannot be released as it needed to be accompanied by a press statement. He goes on to say that there is nothing serious however. So why not release the results? Might I say he did not have the results of the air samples on Friday three days after the fire.

Finally we have to view the local political response to this, and in a recent letter to the media, long-time National Party and Democratic Alliance politician, Duncan de Bois, indicated that the "unexpected is always the unscripted".

Scripted

Well this was not unexpected. The same area had a leak of more than 25 tons of tetraethyl lead in March 2001, and the city did not inform the residents when it occurred, not did they do any environmental monitoring in the community neighbourhood.

In March 2005, I questioned Sutcliffe on the Emergency Evacuation Plans for south Durban. In the *Sunday Tribune* he indicated there was a plan. Still today we have not been briefed on the plan or seen the plan.

So this was scripted – scripted by the nexus of collusion between corporate power and a weak and submissive government.

But as civil society actors we also need to take some responsibility for the situation we are in. We have known of the danger, and we continue to try to "engage" with the system to seek a constructive way forward.

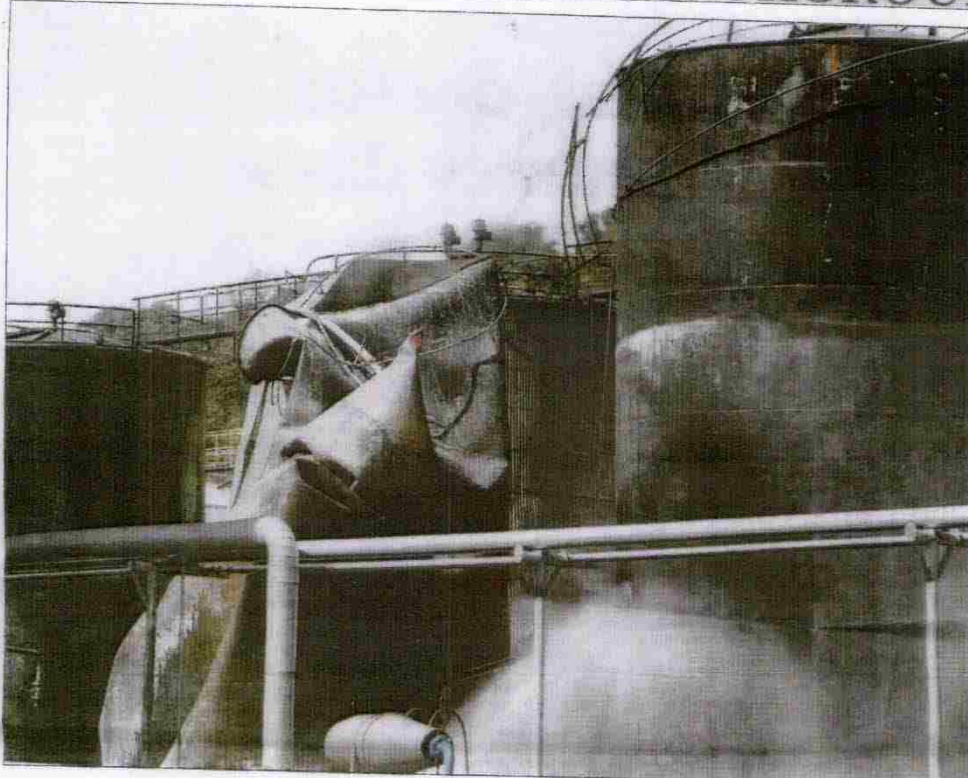
It is clearly not working.

We need another form of engagement, and that is engaging with the people to foster and support a grassroots of resistance to corporate power and government complacency.

The reality is that the city did not know what was in the tank. They do not have an emergency evacuation and response plan – despite what Sutcliffe aggressively maintains – that the community is aware of, and they were in chaos on the evening.

For how much longer are we going to listen to lies, spin and deceit from government and industry in south Durban?

□ Bobby Peek is an environment



EIGHT tanks lie damaged or destroyed after the fire and explosions. Some have collapsed from the heat of the blaze, while others are damaged but with the product inside intact. A fire was still burning in one of the collapsed tanks (middle) yesterday afternoon, while another (right) was being hosed down to keep it cool. PICTURE: TERRY HAYWOOD

PEOPLE WARNED TO EVACUATE HOMES, AND MANY FOUND SHELTER IN SCHOOLS AND CLUBS

Bluff residents tell of night of shock and chaos after blasts

BRONWYN GERRETSSEN

THE streets of the Bluff came alive on Tuesday evening. Many neighbours spoke to each other for the first time and, in some areas, children dressed in pyjamas played together.

From afar, the blaze resulting from that night's explosions at the nearby Island View storage site looked enormous, with the fiery red glare lighting up trees and the thick, black smoke billowing into the night sky. Digital and cellphone cameras and video cameras were used to capture the spectacle.

But closer to the scene, the atmosphere was different.

People anxiously gathered on street corners, looking

concerned and confused. Police had cordoned off roads and were directing people away from the port.

News spread quickly that toxic fumes had been dispersed into the air.

Men were gathering their wives and children, and taking them off the Bluff. Cellphones were ringing as frantic people passed on the warnings or checked to see that loved ones were safe.

Police drove along streets, telling people to evacuate their homes. Some fled their houses, while others chose to ignore the warnings and shut themselves away in their homes, as they had pets they could not leave behind.

Maria Kleynhans, 43, told of

the panic that erupted in her household as people rushed to their vehicles to escape the area, forgetting car keys, medication and other vital belongings, and having to go back for them.

Vibrations

Deen Nicolus, 82, said he heard "one bang of a bang" while his wife, who is "stone deaf", was awakened by the vibrations in their home caused by the explosions. The couple spent the evening at a relative's home in Yellowwood Park.

Cerda van Wyk, 50, tried to remain calm as she gathered together six children, aged from three months to 13 years, trying

to get them out of the house quickly. Like many other residents, Van Wyk was unsure where to go, and eventually spent the night at a local sports club.

There was confusion as people, caught up in the panic, tried to find out where to go.

Many gathered at the local Spar, before being addressed by officials who directed them to schools and clubs in the area.

The fumes in the air were pungent and the atmosphere tense as people feared for their lives and those of their relatives.

At the police cordons where traffic was being redirected, one man demanded to be let through. When refused, he got out of his car and stormed to-

wards the blue-and-white benches, kicking them over in protest, and shouting and screaming at the police officers.

About seven officers joined forces to throw him into the back of a police van, but his protests did not stop. His car remained on the road, hazard lights flashing but with no one behind the wheel.

Yesterday morning, the scene was different. The smoke had cleared and the streets were empty. The only reminder of the previous night's drama was the stench in the air and the incessant chatter in shops and homes about how the night before, the Bluff had been thrown into chaos.

bronwyn.gerretsen@inf.co.za

JULY 17, 2009

Increase in air pollution on Bluff

BLUFF resident, Michelle Atkins phoned the SUN about the increase in air pollution on the Bluff.

Michelle who has lived on the Bluff for almost 30 years said that in the last year the smells are getting worse and more frequent, with 90% of them occurring not in normal working hours. She lives on Torquay Road but said her daughter in

Keston Crescent, off Bluff Road is also being affected. "It was once in a blue moon, now it's three to four times a month," she said. She said this is a result of a lack of supervision and incompetency within the work force loading and unloading chemicals and gases.

The SUN was hit by a strong, almost burning garlic smell on Thursday morn-

ing, July 2 off Marine Drive. Deputy head of pollution control support and risk management, Siva Chetty said air quality in the SDB may be accessed from the website: www2.nile.no/airquality or for air pollution complaints phone during hours 031-311-3555 or after hours 031-361-000. He also noted that complaints are currently being investigated.

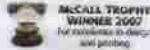
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GET A HEAD START THURSDAY SEPTEMBER 20 2007

CONTRACT WORKER PRESUMED DEAD

Tragedy of port blaze vi

BRONWYN GERRETSEN

ONE man is missing, presumed dead, after Tuesday night's explosions at the Island View storage depot in Durban.

The blasts sent tremors through the neighbourhood and released pungent fumes into the air.

Meshall Reddy, 25, a contract employee working on the Island View Storage company site when the incident occurred, is unaccounted for.

He is presumed dead by family and friends.

Officials were still containing a fire in one storage tank yesterday afternoon as the entire area surrounding the preceding evening's blaze was damped down and monitored.

The toxicity level in the air at schools and residences around the port area will be known today when a full report is submitted to the eThekweni Municipality.

However, preliminary test results have indicated that the pollutants are not sufficiently concentrated to be harmful.

Municipal officials took samples at schools and homes surrounding the scene of the explosion yesterday.

The containers affected by the fire and the subsequent explosions were believed to have contained paraffin, alcohol, solvents and diesel.

Salvin Mudyali, the head of City Health in the south Durban region, said that tests would be done for the presence of volatile organic compounds including caradiol, paraffin, diesel and ethanol.

Preliminary results have shown the levels to be from two parts per million to six parts per million.

For ethanol, the worst concentration would be 1 000 parts per million, Mudyali said.

Officials were also sent to announce to Bluff residents that they should not have any concerns about their children and families as the situation "was safe".

The explosions at the liquid storage tank zone were followed by large blazes that could be seen from as far away as Durban North.

The cause of the incident is still not known, but it is believed that the fire that caused the explosion was the result of



a road tanker catching alight. However, Kobus Ehlers, the Managing Director of Island View Storage, said the incident was still being investigated. He said that the fire had been contained to one area within bay three of the terminal. Eight tanks were destroyed or damaged, with one alcohol tank still burning under controlled conditions yesterday afternoon.

"The environmental effects of the incident are still being assessed," he said. "However, with the current wind conditions, the concentration of air pollution appears minimal."

"Likewise, water pollution within the harbour is minimal."

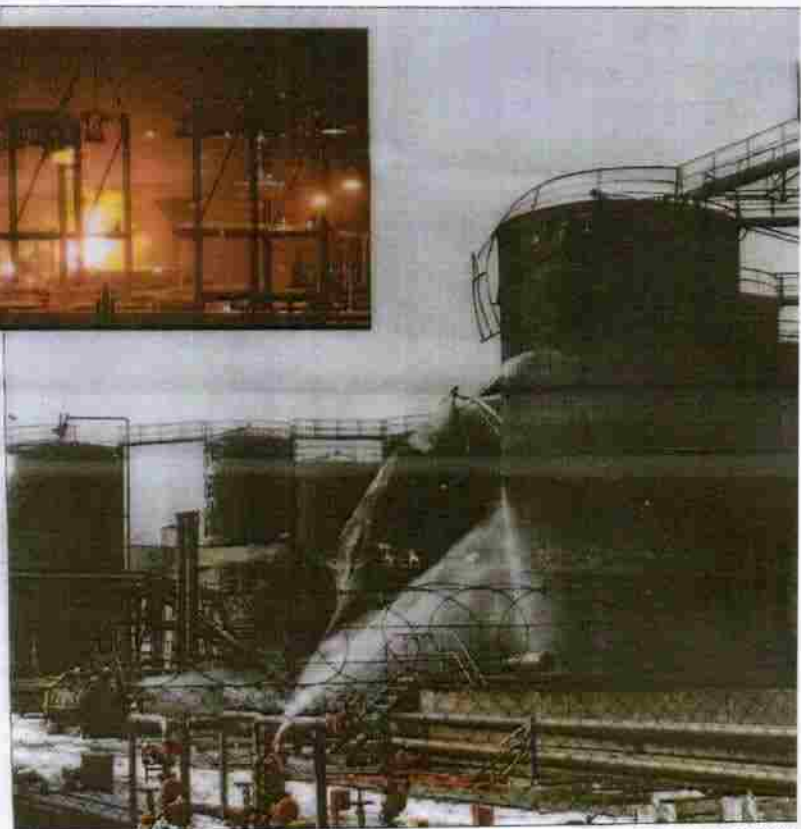
Mudyali said that one of the lessons learned from the event was that the people needed to know where to take their families in such instances.

He said other lessons learned included that data showing the wind direction needed to be readily available as well as the toxicity level dosages of chemicals. That told people of the danger level of a chemical that one would need to be exposed to to fall ill.

In a full-page advertisement in *The Mercury* today Bidvest, the owner of the Island View storage complex, thanks the Durban Fire Department, the Transnet National Ports Authority, the police, other emergency services and the Island View Storage executive and staff for containing the fire.

Bidvest also apologises to people who were inconvenienced by the blaze.

bronwyn.gerretsen@w.co.za



PICTURES: TERRY HAWWOOD & CLINTON WY

MAIN PICTURE: A fire hydrant cools down one of several storage tanks at the Island View storage depot that was rocked by several explosions. ABOVE LEFT: The glow of the resulting fire could be seen from as far as Durban North

NOVEMBER 30, 2007

Sun News

APPENDIX 10



Fuel clouds billow as fire rages

Emergency plan takes centre stage for MEC

A COMMITMENT has been made by the MEC of Agriculture and Environmental Affairs, Mthokozisi Mthimkhulu, to formulate a comprehensive emergency plan for the South.

This follows the MEC's site visit by the fire-ravaged fuel storage tank at Engen Refinery in Tarn Road, which was consumed by flames after an apparent lightning strike ignited the fuel tank.

Mthimkhulu visited the refinery and met with all stakeholders on Thursday, November 22, in an attempt to see the extent of the damage, after he was informed that residents were suffering from post-fire breathing problems.

ALLEGED

The blaze that erupted at about 7pm on Monday, November 19, burnt out only after some 58 hours. A combination of water and foam was used to contain the fire, which was extinguished on Thursday at about 4:30am.

The storage tank, which was 75% full, had held about 7.5 million litres of petrol at the time of the blaze. However, according to William Oosthuizen, general manager of Engen Refinery, the majority of petrol was pumped out while only the minimum

was left to burn.

Thick clouds of black smoke generated by the fire filled the sky for the first part of last week, and when the wind direction changed on Wednesday, smoke was

pushed into the adjacent communities.

Oosthuizen said on Wednesday a treatment station was set up at the Westworth Hospital for members of the community complaining of

breathing difficulties.

"The station was provided for our neighbouring community and all bills will be paid by Engen," explained Oosthuizen.

Dr Joyance Rumbold of Westworth Hospital said the hospital didn't experience a major influx of patients with respiratory problems.

"Since the fire we have treated about six patients due to chest related problems, but it can't be proven that it was caused by smoke inhaled after the Engen fire. Some of the affected residents might have also gone to surrounding clinics for treatment," she explained.

MEC Mthimkhulu said his department will note the urgency to facilitate a process to establish a "grand plan".

He acknowledged that both the refinery and Etshewini Municipality seemed to have their own emergency plans in place, but was worried that there were "gaps" in the co-ordination of a combined emergency grand plan.

WARNING

"Mother Earth is warning us and therefore I want a meeting held soon, before the festive season starts in discuss an emergency evacuation plan," Mthimkhulu added.

Enviro body calls public meeting

A PUBLIC meeting has been called by South Durban Environmental Alliance (SDCEA) following recent fires and explosions which have threatened Bluff communities.

Ivan Moses, of the Minefontein Residents Association, said he was concerned about the long-term effects on people exposed to the smoke.

He said the surrounding communities were disappointed as they felt the Engen fire was not managed properly.

"At the time when the air sample results are made public it will be too late because we're in the air during the fire as the people and children have already been exposed to it. The municipality needs to pull up their socks with emergency pro-

cedures in our area," explained Moses.

"SDCEA has been requested by the communities to invite the national, provincial and local government to attend a public meeting.

"The communities are demanding answers and request that government inform them of how they intend dealing with the polluting industries," said SDCEA chairman Desmond D'Sa.

He added that representatives from Engen and Island View Storage have been invited and the MEC of Agriculture and Environmental Affairs has already confirmed he will attend.

The meeting will be held at the Asiaterville Civic Centre on November 29 at 7pm.

Engen Refinery response to SDCEA

Engen Refinery (Enref) received a memorandum from the South Durban Community Environmental Alliance on 21 March during their demonstration to mark Human Rights Day.

We respond as follows to generalised allegations of us "dumping toxic waste" contained therein, and demands to remedy the alleged situation:

We again stress that the SDCEA's statement is, quite simply, incorrect. There is NO dumping of toxic waste or chemicals from Engen Refinery. The refinery operates a voluntary waste management plan to manage all its waste disposal, including recycling. This system is audited by the authorities, which implies rigorous tracking every step of the way.

Equally erroneous is the suggestion that Engen "disregards" the local government's legal permit system. We abide fully by the permit system, which after all gives us our licence to operate. This system requires us to submit a detailed annual environmental performance report (copies of which go to SDCEA). Engen Refinery complied fully with its permit conditions for the 2007/08 permit year, which is the most recently reported year.

We concede that problems do arise in the course of our business - refining is a complex operation. But when it happens, provision is made for us to give a full and detailed explanation of incidents, the reasons for them, and the steps we will take to resolve the issue and prevent recurrences. This we have always done.

We have previously also explained to SDCEA that there is no foundation to their fears about an ageing refinery. Though the refinery might have occupied the site since the early fifties, the actual facility is constantly being modernised and upgraded - on average plant systems are just over 20-years-old, with some sections closer to a decade or less. None of the systems in use when the first refining took place at Enref is still in operation today.

Our response to specific SDCEA demands is as follows:

• SDCEA DEMAND that in South Durban, ENGEN should characterise their chemicals coming over their fence line and immediately develop and communicate a pollution reduction strategy with the representatives of the SDCEA and Groundwork who represent the local community within 3 months."

RESPONSE: Engen Refinery, along with eThekweni Municipality, has for many years monitored priority pollutants in the area, which includes fence line monitoring of VOCs (volatile organic carbons). Engen's permit also strictly controls these priority pollutants and Engen reports regularly on them to authorities, as well as annually to interested and affected parties through the abovementioned annual environmental performance report. We further report environmental performance to the Community Liaison Forum (CLF) on a monthly basis. As one of the organisations representing the community, SDCEA does not have to wait three months for reports - they will be available at next month's meeting.

• "SDCEA FURTHER DEMAND ENGEN's recognition the Community Liaison Forum should cease immediately."

RESPONSE: It is inconsistent of SDCEA to protest about alleged human rights abuses, and then to seek the restriction of the human rights of others. We refer to the rights of a plurality of community-based non-governmental organisations (NGOs) to freely meet with Engen to discuss issues of mutual concern, and to seek constructive solutions to any challenges that may arise - including right to attend CLF meetings.

• "SDCEA DEMAND ENGEN should immediately work with surrounding industries within months (and) put together plans for a 24-hour asthma clinic, fully manned and operational and paid for by all industries."

RESPONSE: As we have said before when SDCEA raised this issue, the authorities provide a comprehensive service for patients who suffer from asthma. Engen cannot see any reason to duplicate these facilities. The clinics in Austerville, Merebank, Bluff and at the Clairwood Hospital are all fully equipped to deal with the treatment of patients that have asthma. In addition Wentworth Hospital is a well-equipped facility that offers round-the-clock 24-hour service. The hospital, however, reports a very low rate of use of its equipment for the treatment of acute asthma.



Sun News

NOVEMBER 30, 2007

Uproar at refinery no show

THE absence of representatives from Sappref and Engen refineries at a Bluff Enviro Team (BET) public meeting last week was met with fury by over 300 residents.

On Thursday evening, hundreds of Bluff residents piled into the Pigeon Club in Tara Road, expecting a response from both Sappref and Engen, who the BET claim are responsible for various elements of "environmental degradation" on the Bluff.

Angry shouts filled the hall when BET member, Harry Etheridge, informed the concerned residents that there would be no representative

from either refinery to allay their concerns, despite a request being made to both bodies.

The main focus of the meeting was the recent Sappref pipeline project and the lack of representation from the refinery visibly angered the residents.

FACT

Etheridge said the fact no-one came was indicative of the refinery's "lack of care and concern for one of the biggest suburbs in the city."

"We have been neglected, they are

obviously too ashamed to attend such a meeting because they know that they are not delivering."

Turning his attention to Sappref, he said: "Sappref can't offer anything productive back to the public, but they are going to get back what they give out, because they are not being socially responsible."

However, when Sappref's communications manager, Margaret Rowe, was contacted to respond, she said this was not the case.

"Throughout the duration of the pipeline project we have met with residents on a one-to-one basis to

discuss their concerns. We also have three community liaison officers dedicated to the project and have twice offered to meet with the BET to understand their concerns."

Another complaint lodged against Sappref was that they had left road-works unprotected at night, leading to an accident a fortnight ago.

However, Rowe said Sappref was not aware of any accidents "resulting directly" from its road works.

WORKS

"All road works are demarcated with appropriate signage approved by the municipality and with yellow flashing lights at night. In some areas though, these lights were repeatedly vandalised or stolen and on occasion, the security guards on duty were threatened," she said.

Other issues raised by Bluff ward councillor, Durcan Du Bois, included the degradation and damage of roads at Edwin Swales Drive at the hands of heavy-duty trucks, the need for robots and speed humps to be erected at certain problematic areas on the Bluff and the need for basic maintenance of roads and drains.

"We also have to take our beaches back from the scum that have infested it. We need to complain, complain and complain because if we don't it will mean we are happy with the status quo."



Bluff residents attend a public meeting called by the Bluff Enviro Team on Thursday

NOVEMBER 21, 2008

Sun News

Fire heightens fears

Residents decry lack of emergency plan

ONE of the major setbacks which will affect Engen Refinery's ability to start up its operation following Thursday morning's crippling blaze, is the ordering of new materials.

This includes API standard refinery pumps, which will be imported.

"It could take up to three months to receive them," said William Oosthuizen, refinery general manager.

The refinery will lose close on R6-m for every day that it is not operating.

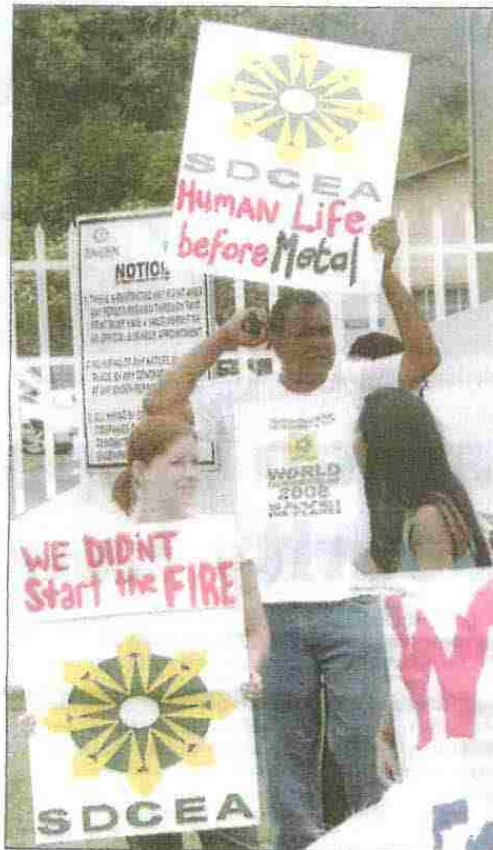
"This one is big, this can run into a several hundred million rand loss for Engen," said William. In terms of the country's fuel stock, he believes "you will see a dip, but it will recover very quickly."

RULED

William strongly ruled out age and lack of maintenance as the cause of the fire. He described the refinery, which has operated on the site since 1954, as "young facilities by international standards." Engen spends in the region of "R200 million per year on plant maintenance and over the past decade spent an average of nearly R60 million per year on projects to improve our environmental footprint." He also thinks it's "unlikely a skill issue."

However, it is only a year since one of Engen's storage tanks holding seven million litres of petrol burnt for 58 hours.

He described the refinery's four fires in the last two years as a "worrying trend for us".



SDCEA chairman, Desmond D'Sa protests outside Engen Refinery.

"We couldn't sleep last night, my chest was tight. The fire was out of control, blazing very high. This is happening too often. The refinery scaring us. We heard the hooters and we wanted to run. They are aware that its going to leak. Who is going to compensate us?" shouted an angry local, Joan Ryan.

On Thursday morning, hours after the blaze, the South Durban Community Environmental Alliance (SDCEA) along with the Wentworth community protested outside Engen. "Phanzi En-

gen, phansi" was loudly heard through the hailer.

Desmond D'Sa, chairman of SDCEA said: "There's still no disaster management or emergency plan for the people. We can only ask why there's been no effort from local government to tighten standards and restrictions and fine industries."

The absolute paranoia of the people as they gathered in groups on the roads into the morning makes me shudder to think how these matric pupils will perform in their exams with no sleep and added stress.

The refinery doesn't understand just how it affects ordinary people," he said.

CARRY OUT

Engen confirmed the refinery's environmental team will carry out regular air sampling during and after the fire. These samples will be sent to specialised laboratories in Italy for analysis.

According to William, the results are due in a fortnight, after which they will be presented to the South Durban Basin community.

Have your say

Share your comment on this issue with the SUN

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Ref. 7/S/1/1

OFFICE OF THE TOWN CLERK
KANTOOR VAN DIE STADSKLERK

February 1981.

The Occupier.

Dear Sir/Madam,

This circular is issued for the guidance of its recipients and should not be taken with alarmist attitude. It has been deemed prudent to prepare an evacuation plan for the inhabitants in those areas close to the fuel storage depots in the Island View and Fynrland sites. As can well be appreciated, should a major fire occur or a fuel tank explode, the consequences could be serious, be they as a result of toxic and noxious fumes or structural damage to property.

2. The area most likely to be affected is dependent on the nature and locality of the incident, wind force and direction, and is approximately as follows :

That area to the North East of a line taken from Kings Rest Police Station and the junction of Boynes Road and Marine Drive.

3. The alarm can be raised in three ways.
 - a. An explosion which results in structural damage to one's own property.
 - b. The property being engulfed in dense, heavy black smoke or chemical fumes.
 - c. By an announcement on the radio or mobile municipal public address vehicle suggesting evacuation of certain areas.

4. Should you consider that the continued occupation of your dwelling has become unsafe due to structural damage or the presence of heavy smoke or toxic fumes, you are advised to consider evacuating your dwelling of all persons and household pets. Please take some warm clothing and your more important personal documents, lock your dwelling and proceed as follows :
 - a. Those residents to the West of Lighthouse Road and Island View Road make their way to Lighthouse Road and Island View Road, turn right and proceed to Tara Road to the designated emergency accommodation.
 - b. Those residents to the East of Island View Road, proceed to Marine Drive, turn in a southerly direction until Garcin Place, then into Moss Road, to link up with Tara Road then to the designated emergency accommodation.

5. Emergency Accommodation is allocated as follows :
 - a. Families with children under 6 years of age
Grosvenor Girls' High School then
Grosvenor Boys' High School
 - b. Families with children over 6 and not more than 14 years of age
Andries Pretorius Junior School
 - c. Families with children over 15 years of age
Brighton Beach Junior School
 - d. Senior Citizens (over 70)
Grosvenor Girls' High School
 - e. Couples without children and single persons
Bluff Country Club

6. Road traffic flow is vital for the fast passage of emergency vehicles to the disaster site. Therefore please observe the following :
 - a. Bluff Road from where it joins Lighthouse Road. One-way for North-bound (towards Island View) traffic and reserved for emergency vehicles.

- 3 -

- b. Island View Road from the North end (Island View) to Save-On Centre. One-way for South-bound (towards Jacobs) traffic.

Traffic jams may well occur. Motorists are asked to be patient and tolerant in order to minimise accidents and ensure the best possible traffic flow.

7. Should you require more information, please contact the Civil Defence Officer, telephone 320-111 ext. 526.
8. Please keep this circular in a convenient place and, should the occasion arise that some properties have to be evacuated, your co-operation in adhering to this evacuation plan will be appreciated.



G. HAYGARTH

Town Clerk

Chief of Civil Defence, Durban.

APPENDIX B
PERCENTAGE TABLES OF STUDY AREAS

Table 1: Bluff Area- demographics and perceived views

	White Men		Nonwhite Men		White Women		Nonwhite Women	
Total	6	5	2	3	13	15	4	5
	General Education	Higher Education	General Education	Higher Education	General Education	Higher Education	General Education	Higher Education
Demographics								
Married	90%	100%	100%	100%	69%	80%	50%	80%
Widow	0%	0%	0%	0%	8%	7%	25%	0%
Divorced	10%	0%	0%	0%	0%	7%	0%	20%
Living together	0%	0%	0%	0%	0%	0%	0%	0%
Single	0%	0%	0%	0%	23%	7%	25%	0%
Children	67%	60%	100%	100%	39%	67%	75%	80%
No Children	33%	20%	0%	0%	62%	33%	25%	0%
Environment								
What is liked about area								
Employed Full time	100%	100%	100%	100%	39%	73%	25%	100%
Part Time	0%	0%	0%	0%	0%	7%	25%	0%
Business Owner	17%	40%	0%	0%	0%	7%	0%	40%
Homemaker	0%	0%	0%	0%	15%	7%	25%	0%
Retired	0%	0%	0%	0%	23%	7%	0%	0%
Student	0%	0%	0%	0%	23%	0%	25%	0%
Quiet and peaceful	33%	20%	50%	67%	39%	60%	50%	60%
Friendly community	17%	40%	0%	33%	77%	67%	25%	0%
Near jobs	50%	0%	50%	33%	23%	20%	0%	20%
Clean and no pollution	0%	20%	0%	33%	0%	13%	25%	20%
Views and greenery	50%	20%	0%	0%	8%	13%	0%	0%

Table 1

	White Men	Nonwhite Men	White Women	Nonwhite Women	White Women	Nonwhite Women
6	5	2	13	3	15	4
General Education	Higher Education	General Education	General Education	Higher Education	Higher Education	General Education

What is not liked about the area

Crime	33%	0%	50%	33%	8%	13%	50%	20%
Dirty and polluted	67%	100%	50%	67%	100%	100%	100%	0%
Drug abuse	0%	0%	0%	0%	8%	0%	0%	0%
Trucks	50%	60%	0%	0%	46%	33%	25%	20%
Neighbours do not care	0%	20%	0%	0%	0%	13%	25%	0%

Aware of pollution

Yes	67%	100%	50%	67%	100%	100%	100%	80%
No	17%	0%	0%	33%	0%	0%	0%	20%
Air(smells and smoke)	50%	100%	50%	67%	100%	93%	100%	80%
Water	17%	0%	0%	0%	15%	7%	0%	0%
Land	17%	0%	0%	0%	23%	0%	0%	20%

Pollution Source

ENGEN	33%	60%	50%	67%	62%	67%	100%	60%
Sapref	17%	20%	0%	67%	39%	53%	0%	20%
Mondi	0%	20%	0%	67%	23%	20%	25%	20%
Island View Complex	33%	40%	0%	67%	39%	27%	0%	20%
Factories in area	17%	20%	0%	0%	23%	27%	0%	20%
Harbour	0%	0%	0%	0%	46%	0%	0%	20%

Table 1

	White Men	Nonwhite Men	White Women	Nonwhite Women	White Men	Nonwhite Women
6	5	2	3	13	15	4
General Education	Higher Education	General Education	General Education	Higher Education	Higher Education	General Education

Awareness of pollution

Everyday	17%	20%	0%	67%	54%	40%	25%	20%
Twice a week	17%	60%	0%	0%	23%	13%	0%	0%
Once a week	17%	0%	0%	0%	15%	13%	25%	0%
Once/twice a month	17%	0%	50%	0%	0%	33%	25%	20%
Early mornings	20%	0%	0%	23%	20%	0%	0%	0%
Rainy weather	0%	0%	0%	0%	0%	0%	0%	0%

Health impacts of air pollution

Respiratory disease	17%	60%	50%	0%	69%	53%	25%	40%
Asthma	50%	40%	0%	0%	23%	47%	50%	40%
Cancer	0%	20%	0%	0%	8%	13%	25%	0%
Sinus	33%	60%	50%	0%	15%	47%	50%	40%
Burning eyes	33%	0%	50%	0%	15%	20%	50%	40%
Allergies	17%	0%	50%	0%	8%	13%	0%	0%
Pets health affected	0%	0%	0%	0%	15%	0%	0%	0%
Throat irritation	0%	0%	0%	0%	0%	7%	0%	0%
Headaches	33%	0%	0%	0%	8%	13%	25%	0%
Members of community affected	50%	60%	50%	67%	39%	60%	75%	40%
Members of household	33%	0%	50%	0%	39%	60%	0%	40%

Table 1

	White Men	White Men	Nonwhite Men	Nonwhite Men	White Women	White Women	Nonwhite Women	Nonwhite Women
6	5	2	3	13	15	4	5	
General Education	Higher Education	General Education	Higher Education	General Education	Higher Education	General Education	Higher Education	

Regulations

I know nothing

Yes there are regulations

100%	80%	100%	33%	85%	100%	100%	100%
0%	20%	0%	67%	15%	0%	0%	0%

Effectiveness

Very effective

Average

Poor

Extremely bad

0%	0%	0%	0%	0%	0%	0%	0%
0%	0%	0%	0%	0%	0%	0%	0%
0%	0%	0%	0%	0%	0%	0%	0%
100%	100%	100%	100%	100%	100%	100%	100%

What needs to be done

Tougher laws

High Fines

Free medical care

Excavation plan

Financial compensation

Other

67%	20%	50%	67%	39%	60%	25%	0%
33%	20%	50%	0%	54%	53%	25%	20%
33%	20%	50%	33%	39%	33%	0%	20%
0%	40%	0%	0%	15%	20%	25%	0%
0%	0%	50%	33%	8%	0%		0%
50%				23%	13%		20%

Table 2: Merebank / Merewent Area - demographics and perceived views

Total	22 Nonwhite Men	Nonwhite Men	Nonwhite Women	Nonwhite Women
	10	3	8	1
	General Education	Higher Education	General Education	Higher Education
Demographics				
Married	50%	100%	75%	100%
Widow	0%	0%	13%	0%
Divorced	0%	0%	0%	0%
Living together	0%	0%	0%	0%
Single	50%	0%	13%	0%
Children	20%	100%	25%	100%
No Children	80%	0%	75%	0%
Employed Full time	40%	100%	13%	0%
Part Time	40%	0%	25%	0%
Business Owner	0%	0%	0%	0%
Homemaker	0%	0%	50%	13%
Retired	0%	0%	13%	0%
Student	10%	0%	0%	0%
Unemployed	10%	0%	0%	0%
Environment				
What is liked about area				
Quiet and peaceful	10%	0%	0%	0%
Friendly community	30%	67%	0%	0%
Near jobs	0%	67%	0%	0%
Clean and no pollution	10%	0%	0%	0%
Views and greenery	30%	0%	0%	100%
Safety and services	50%	0%	75%	100%
Nothing	10%	0%	25%	0%
What is not liked about the area				
Crime	0%	33%	0%	0%
Dirty and polluted	100%	100%	100%	100%
Drug abuse	20%	0%	13%	0%
Trucks	10%	33%	0%	0%
Neighbours do not care	0%	33%	25%	0%
Aware of pollution				
Yes	100%	100%	100%	100%
No	0%	0%	0%	0%
Air(smells and smoke)	100%	100%	100%	100%
Water	20%	33%	13%	100%
Land	0%	33%	0%	0%
Noise	0%	0%	25%	0%

Table 2

	Nonwhite Men	Nonwhite Men	Nonwhite Women	Nonwhite Women
	10	3	8	1
	General	Higher	General	Higher
	Education	Education	Education	Education
Pollution Source				
ENGEN	80%	67%	38%	100%
Sapref	40%	67%	13%	0%
Mondi	40%	0%	0%	0%
Island View Complex	0%	33%	0%	0%
Factories in area	60%	67%	63%	100%
Harbour	0%	0%	0%	0%
Awareness of pollution				
Everyday	60%	67%	25%	100%
Twice a week	20%	0%	63%	0%
Once a week	10%	0%	0%	0%
Once/twice a month	0%	33%	0%	0%
Unsure	0%	0%	13%	0%
Early mornings	10%	33%	0%	0%
Rainy weather	0%	0%	13%	0%
Health impacts of air pollution				
Respiratory disease	50%	67%	63%	100%
Asthma	40%	67%	13%	0%
Cancer	0%	33%	13%	0%
Sinus	30%	33%	63%	0%
Burning eyes	20%	33%	0%	0%
Allergies	10%	33%	25%	0%
Pets health affected	0%	0%	0%	0%
Members of community affected				
Members of community affected	100%	100%	88%	100%
Members of household affected				
Members of household affected	70%	33%	75%	0%
Regulations				
I know nothing	100%	67%	100%	100%
Yes there are regulations	0%	33%	0%	0%

Table 2

Nonwhite Men	Nonwhite Men	Nonwhite Women	Nonwhite Women
10	3	8	1
General	Higher	General	Higher
Education	Education	Education	Education

Effectiveness

Very effective	0%	0%	0%	0%
Average	0%	33%	0%	0%
Poor	0%		0%	0%
Extremely bad	100%	67%	100%	100%

What needs to be done

Tougher laws	10%	33%	0%	0%
High Fines	0%	0%	0%	0%
Free medical care	40%	0%	88%	0%
Excavation plan	0%	0%	0%	0%
Financial compensation	0%	0%	25%	0%
Other				
Refinery moved	40%	0%	50%	100%
Industry to work with	50%	67%	0%	
Community				
Identify pollution source	0%	33%	0%	0%
Cleaner Technology	0%	0%	50%	100%

Table 3: Wentworth/ Austerville Area - demographics and perceived views

11 Total		White Men	White Men	Nonwhite Men	Nonwhite Men	White Women	White Women	Nonwhite Women	Nonwhite Women
		0	1	0	1	4	4	4	1
	General Education	Higher Education	General Education	Higher Education	General Education	Higher Education	General Education	General Education	Higher Education
Demographics									
Married		100%			100%	75%		25%	0%
Widow		0%			0%	0%		0%	0%
Divorced		0%			0%	25%		0%	0%
Living together		0%			0%	0%		0%	0%
Single		0%			0%	0%		75%	100%
Children		100%			100%	75%		25%	0%
No Children		0%			0%	25%		75%	100%
Environment									
What is liked about area									
Employed Full time		100%			0%	0%		0%	100%
Part Time		0%			0%	25%		0%	0%
Business Owner		0%			100%	0%		0%	0%
Homemaker		0%			0%	50%		0%	0%
Retired		0%			0%	25%		25%	0%
Student		0%			0%	0%		75%	0%
Quiet and peaceful		100%			0%	25%		0%	0%
Friendly community		0%			0%	25%		100%	100%
Near jobs		0%			100%	50%		0%	100%
Clean and no pollution		0%			0%	0%		0%	100%
Views and greenery		0%			0%	0%		0%	0%
Safety and services		0%			0%	25%		0%	0%

Table 3

	White Men	White Men	Nonwhite Men	Nonwhite Men	White Women	White Women	Nonwhite Women	Nonwhite Women
	0	1	0	1	4	4	4	1
General Education	Higher Education	Higher Education	General Education	Higher Education	General Education	Higher Education	General Education	Higher Education

What is not liked about the area

Crime	100%			0%	50%		0%	100%
Dirty and polluted	100%			100%	100%		100%	100%
Drug abuse	0%			0%	0%		50%	100%
Trucks	0%			0%	50%		0%	100%
Neighbours do not care	0%			0%	0%		0%	0%

Aware of pollution

Yes	100%			100%	100%		100%	100%
No	0%			0%	0%		0%	0%
Air(smells and smoke)	100%			100%	100%		100%	100%
Water	0%			0%	0%		0%	0%
Land	100%			0%	0%		0%	100%
Noise	0%			0%	0%		0%	0%

Pollution Source

ENGEN	100%			100%	75%		100%	100%
Sapref	0%			0%	50%		25%	100%
Mondi	100%			0%	0%		25%	100%
Island View Complex	0%			100%	25%		0%	0%
Factories in area	0%			0%	0%		0%	100%
Harbour	0%			0%	0%		0%	0%

Table 3

Awareness of pollution

	White Men	Nonwhite Men	White Women	White Women	Nonwhite Women	Nonwhite Women
	0	1	0	1	4	1
General Education	Higher Education	General Education	General Education	Higher Education	General Education	Higher Education

Everyday	0%	100%		25%		100%
Twice a week	100%	0%		25%		0%
Once a week	0%	0%		25%		0%
Once/twice a month	0%	0%		0%		0%
Unsure	0%	0%		25%		0%
Early mornings	0%	0%		0%		0%
Rainy weather	100%	0%		0%		0%

Health impacts of air pollution

Respiratory disease	0%	100%		0%		50%
Asthma	0%	100%		75%		25%
Cancer	100%	100%		0%		25%
Sinus	100%	0%		25%		50%
Burning eyes	0%	0%		25%		25%
Allergies	0%	0%		0%		0%
Pets health affected	0%	0%		0%		0%

Members of community affected

	0%	100%		0%		50%
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Members of household affected

	0%	100%		25%		0%
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Table 3

	White Men	Nonwhite Men	White Women	Nonwhite Women	White Women	Nonwhite Women
	0	1	4	4	1	1
General Education	Higher Education	General Education	General Education	Higher Education	General Education	Higher Education
	100%	100%	75%	75%	100%	100%

Regulations

I know nothing

Yes there are regulations

	0%	0%	25%	25%	50%	0%
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Effectiveness

Very effective

Average

Poor

Extremely bad

No comment

	0%	0%	0%	0%	0%	0%
	0%	0%	0%	0%	50%	0%
	0%	0%	0%	0%	0%	0%
	100%	100%	100%	50%	50%	0%

What needs to be done

Tougher laws

High Fines

Free medical care

Excavation plan

Financial compensation

Other

Refinery moved

Industry to work with

Community

Identify pollution source

Cleaner Technology

	100%	100%	50%	50%	75%	0%
	100%	0%	75%	75%	0%	0%
	0%	100%	0%	0%	0%	0%
	0%	0%	0%	0%	0%	0%
	0%	0%	25%	25%	25%	0%
	0%	0%	0%	0%	0%	100%
	0%	0%	0%	0%	0%	0%
	0%	0%	0%	0%	0%	0%
	0%	0%	0%	0%	0%	0%
	0%	0%	0%	0%	0%	0%
	0%	0%	0%	0%	0%	0%

Table 4: Outlying areas of Woodlands, Montclair, Umbilo and Ispingo demographics and perceived views

Total		White Men	White Men	Nonwhite Men	Nonwhite Men	White Women	White Women	Nonwhite Women	Nonwhite Women	
9		2	3	0	0	0	0	2	2	
Demographics										
Married	0%	Higher Education	Higher Education	General Education	Higher Education	General Education	Higher Education	General Education	Higher Education	
Widow	0%	67%	0%					50%	50%	
Divorced	0%	33%	0%					0%	0%	
Living together	0%	0%	0%					50%	0%	
Single	100%	0%	0%					0%	0%	
Children	0%	67%	0%					0%	50%	
No Children	100%	33%	0%					100%	100%	
Employed Full time	100%	33%	0%					50%	50%	
Part Time	0%	0%	0%					0%	0%	
Business Owner	0%	33%	0%					0%	0%	
Homemaker	0%	0%	0%					0%	0%	
Retired	0%	34%	0%					50%	0%	
Unemployed	0%	0%	0%					0%	50	
Environment										
What is liked about area										
Quiet and peaceful	0%	67%	0%					0%	50%	
Friendly community	0%	33.3%	0%					0%	100%	
Near jobs	100%	0%	0%					0%	50%	
Clean and no pollution	0%	0%	0%					0%	0%	
Views and greenery	0%	0%	0%					0%	0%	

Table 4

	White Men	White Men	Nonwhite Men	Nonwhite Men	White Women	White Women	Nonwhite Women	Nonwhite Women
	2	3	0	0	0	2	0	2
General	Higher	Higher	General	Higher	General	Higher	General	Higher
Education	Education	Education	Education	Education	Education	Education	Education	Education
	0%							
	0%	33%				100%		

Safety and services
Nothing

What is not liked about the area

Crime	0%	33%				50%		0%
Dirty and polluted	100%	67%				100%		100%
Drug abuse	0%	0%				0%		0%
Trucks	0%	0%				50%		0%
Neighbours do not care	50%	0%				0%		0%

Aware of pollution

Yes	100%	100%				100%		100%
No	0%	0%				0%		0%
Air(smells and smoke)	100%	67%				100%		100%
Water	0%	0%				0%		0%
Land	50%	33%				0%		0%
Noise	0%	33%				0%		50%

Pollution Source

ENGEN	0%	67%				50%		0%
Sapref	0%	0%				0%		50%
Squatter Camp	0%	33%				0%		0%
Island View Complex	0%	0%				0%		0%
Factories in area	50%	33%				100%		100%
Harbour	0%	0%				50%		0%
Airport	50%	0%				0%		0%

Table 4

	White Men	White Men	Nonwhite Men	Nonwhite Men	White Women	White Women	Nonwhite Women	Nonwhite Women
	2	3	0	0	0	2	0	2
General Education	Higher Education	Higher Education	General Education	Higher Education	General Education	Higher Education	General Education	Higher Education

Awareness of pollution

Everyday	0%	0%						50%	50%
Twice a week	0%	0%						50%	0%
Once a week	0%	33.3%						0%	0%
Once/twice a month	50%	66.7%						0%	50%
Unsure	50%	0%						0%	0%
Early mornings	0%	0%						0%	0%
Rainy weather	0%	0%						50%	0%

Health impacts of air pollution

Respiratory disease	0%	0%						100%	0%
Asthma	0%	0%						0%	50%
Cancer	0%	0%						50%	0%
Sinus	0%	0%						50%	50%
Burning eyes	0%	0%						50%	0%
Allergies	0%	0%						100%	50%
Pets health affected	0%	0%						0%	0%
Property damaged	0%	66.7%						50%	0%
Members of community affected	0%	33%						0%	50%

Members of household affected

No one is affected	0%	0%						100%	50%
	100%	67%						0%	50%

Table 4

	White Men	White Men	Nonwhite Men	Nonwhite Men	White Women	White Women	Nonwhite Women	Nonwhite Women
White Men	2	3	0	0	0	2	0	2
General Education	Higher Education	Higher Education	General Education	Higher Education	General Education	Higher Education	General Education	Higher Education
50%	33%				100%			50%
Regulations								
I know nothing								
Yes there are regulations	0%	0%						
No response	50%	67%						
Effectiveness								
Very effective	0%	0%						0%
Average	0%	0%						50%
Poor	0%	0%						0%
Extremely bad	50%	33%				100%		50%
What needs to be done								
Tougher laws	0%	33%						0%
High Fines	0%	33%						0%
Free medical care	0%	0%						0%
Excavation plan	0%	0%						0%
Financial compensation	0%	0%						0%
Other	0%	0%						0%
Refinery moved	0%	0%						50%
Industry to work with	0%	0%						0%
Community	0%	0%						0%
Identify pollution source	0%	0%						0%
Cleaner Technology	0%	0%						50%
No comment	100%	34%						0%