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"We Know More Than You Might Think" - Community Knowledge On Climate Change: A Case Study Of Ethekwini, Durban

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Abstract

Climate change has never been more undeniable. The devastating effects have been experienced worldwide affecting communities through extreme weather events, food insecurity and water scarcity among others. Community knowledge of climate change is an understudied area particularly in the African context. Understanding communities' knowledge of climate change and their information sources, will enable a tailored approach to climate change communication. This paper aimed to explore the knowledge of communities and their sources of information regarding climate change within eThekwini, in South Africa as a case study. The study was guided by a qualitative research approach, and purposively sampled participants comprising of community members from varying demographic, educational and socio-economic backgrounds. Participant groups were stratified reflecting the main sectors within South Africa i.e. rural, urban, peri-urban and informal. The findings provided an insight into the notions held by community members regarding the causes of climate change. Participants described their perceptions and experiences of the phenomenon as well as their beliefs on the causes of climate change. They also identified the platforms that introduced them to information on climate change. This is particularly significant for climate change communication. This study offers a nuanced perspective of communities' understanding of climate change and highlights the opportunities for climate change communication to address the knowledge gaps.

Keywords: *Climate change communication, community knowledge, climate change literacy*

1. INTRODUCTION

South Africans are presently experiencing the effects of climate change (Wright et al., 2021) such as heat stress (Engelbrecht et al., 2015), heavy rainfall leading to flooding (Singh et al., 2022, Mashao et al., 2023), increased vulnerability to climate change associated disease (Wright et al., 2021), drought (Malherbe et al., 2016), threats to food security (Feng et al., 2021) and an increase in infectious disease such as malaria (Adeola et al., 2017). Community action related to climate change requires knowledge and awareness of environmental issues (Khatibi et al., 2021). It is therefore essential that South Africans adapt and develop resilience towards the impact of climate change event, given the current trajectory of weather-related events (Kreft et al., 2016). Unless this occurs, the health, education and food security status of South Africans will be jeopardized, further increasing the inequality gap of the population (Khine and Langkulsen, 2023).

Literacy on the topic of climate change is a predictor of a community's resilience and capability to adapt to the changing climate (Engelbrecht et al., 2015). It requires countries and communities to develop adaptative solutions and implement actions to respond to current and future climate change impacts. South Africa entered into the Paris Agreement adopted in 2015 (UNFCCC, 2021) and committed to invest into land restoration and energy efficiency as well as a lower carbon economy (Republic of South Africa, 2016). The eThekwini Municipal Council adopted the first multi-sector Durban Climate Change Strategy (DCCS) in 2015, followed by the Durban Climate Action Plan in October 2019. In 2020/2021,

the municipality revised and updated the DCCS (Republic of South Africa, 2022). One of the objectives of the strategy is research, communication and capacity building (Republic of South Africa, 2022).
The United Nations Human Settlements Programme (UN-Habitat) (United Nations, 2018) posits that the resilience of a community improves significantly where the community is aware and understand the risks, the impacts and the actions required to adapt to climate change. This research was conducted in response to the local authorities aim to determine the current understanding of climate change among residents of eThekwini and the means with which communities are receiving information on climate change. This paper aims to examine the knowledge held by local communities within eThekwini and the sources that have shaped their understanding of climate change. This will assist local government in strategically enhancing current climate change information strategies.

2. METHODOLOGY

2.1 Study area

eThekwini Metropolitan area, more commonly known as Durban, is situated on the east coast of South Africa. It is located in the province of KwaZulu-Natal (KZN) which consists of 12.4 million people in the province (Statistics South Africa, 2022). The metro has 3.9 million people, accounting for 34.7% of the total population of the KZN Province (eThekwini Municipality). eThekwini is stratified into four different sectors, namely, urban, peri-urban, rural and informal.

2.2 Research design

A qualitative approach was used to guide this research, with an exploratory case study design. This qualitative method was most appropriate as it allowed for a rich understanding of the knowledge of communities' knowledge and information sources which shaped understanding of climate change. Creswell et al. (2007) describes a case study approach as the exploration into a group of people (eThekwini residents), who are bound by either context, a period or an event. Participants of this study are bound by place constituting a "bounded system".

2.3 Population and sample

The study population consisted of eThekwini residents stratified according to the main household sectors i.e. urban, peri-urban, rural and informal. Community members of varying demographic and socio-economic backgrounds were recruited from each sector until data saturation was reached. Participant responses are referenced by the participant number followed by the sector the participants are from noted as: I – Informal, R- Rural, U – Urban and PU – Peri-urban.

2.4 Data collection and analysis

Interviews were conducted until data saturation was reached. A total of 24 interviews were conducted across all sectors. Thematic analysis was used to analyze the data, which was organized into categories on the basis of themes, concepts or similar features. Trustworthiness was achieved through credibility, transferability and confirmability with participants (Guba and Lincoln, 1994). The credibility of the study was ensured as all participants were permanent and long-standing residents of the respective communities and, therefore, were familiar with the culture of the setting. Participants were encouraged to share honest responses by emphasizing that there were no incorrect responses to the questions. All participants voluntarily participated in the data collection. Transferability was achieved by stratifying the communities according to the different sectors that are present in the broader South African context. This ensures that the study is replicable in other study contexts. Confirmability was achieved through maintaining records of all transcripts and interviews. The trustworthiness of data was achieved through multiple interviews with participants across multiple representative sectors and maintaining an audit trail (Bhagwan, 2017).

3. FINDINGS AND DISCUSSION

Understanding the sources of information accessed by communities', is crucial for climate change communication planning. Table 1 which follows, presents the demographic information of all twenty-four participants across the four sectors. There was an even distribution of participants across the sectors and an even distribution of male to female participants with most participants in the 26-50-year category. Over 54% of participants completed their secondary level education as their highest qualification.

Table 1: Biographical information of participants

Biographical Information	
Gender	
Male	50%
Female	50%
Age	
19-25 years	25%
26-50 years	50%
51 years+	25%
Education	
Primary – Grade 9	8%
Grade 12	54%
Tertiary education	38%

The data reflected that majority of community members had heard of climate change and were able to offer an understanding of the concept. While some communities gain knowledge from mainstream scientific sources, others may acquire indigenous knowledge from parents' or previous generations (Makondo and Thomas, 2018). The findings are presented according to several main themes of knowledge of climate change and sources of climate change information.

Theme 1: Unravelling climate change

Unravelling notions of climate change emerged as the first theme in the data. This theme was underpinned by two subthemes namely (i) lived experiences of weather and seasons and (ii) unfamiliar weather events.

Subtheme 1: Lived experiences of weather and seasons

Participants were asked to share their understanding of climate change as they understood it. The data gathered centred around weather changes that the participants had observed and experienced, as well as the differences in seasons compared to past experience. They described this saying:

"*There are things that are happening to raise the temperatures on Earth and that puts things out of equilibrium such that we could make ourselves extinct over a course of several decades. Temperatures are rising, in other places temperatures are falling, there are mad kind of rainstorms, people having extreme weather conditions that they haven't experienced for 80 years." (P5; U)*

Reflecting on her experience of weather changes, this participant believed that there were unknown factors creating disequilibrium with the temperatures. She believed that these excessively high temperatures were fuelling rainstorms and other extreme weather conditions. This participant shared her fear that humankind could be obliterated, due to the changes in temperatures. There were similar understandings of the term climate change in other studies. For example, climate change was also understood as weather and seasonal changes in a study among rural residents in Nigeria (Abegunde, 2017). Participants in the study reported that they were concerned that climate change could lead to water scarcity for their needs, their crops and animals and cause climate-related disasters, food insecurity and climate change induced diseases. This suggests that both urban and rural communities, as in Nigeria, identify a relationship between the shift in weather patterns and climate change. It is promising that participants have a longitudinal view of the effects of climate change. Other participants shared the similar views:

Climate change is the changing weather patterns, what's going on right now with our floods and the drastic changes our weather (P2; PU)

I can explain climate change as in January we always expect it to be summer but now it seems like everything has changed. It's like summer went to winter and winter went to summer (P12; R)

These narratives support earlier notions that climate change reflects the varied changes in weather patterns from previous years. Similar views were expressed by communities in Limpopo, South Africa who perceived climate change as changes in temperature patterns, erratic rainfall patterns and seasonal change (Chikosi et al., 2019). In the Global South, participants in India reported a significant increase in temperatures and wide variations of minimum temperatures across India (Mondal et al., 2015). Regardless of geographical location, it would appear that people are linking weather events to climate change.

This narrative supports the view that climate change can be understood as seasonal changes. The participant did not experience clearly defined seasons as in the past. Hence the traditional seasonal patterns have become porous in nature. Weather conditions typically associated with summer are increasingly being observed during the winter season, indicating a shift in seasonal climate patterns. The response from Participant 12 demonstrates that he has made long-term comparisons of seasonal shifts and was able to identify this change as an outcome of climate change. A scientific report by Collaborative Adaptation Research Initiative in Africa and Asia (CARIAA) stated that temperatures have increased up to 2^0C in the interior regions of South Africa over the past 50 years (Daron, 2014). Projections predict an increase in summer rainfall (north and east regions) and decrease in previous winter rainfall regions (southwest) (Daron, 2014). The comparison of South Africa's expected climate to what is currently being experienced, accounts for participants' response regarding variation in weather events.

Subtheme 2: Unfamiliar weather events

Extreme weather events emerged as the second subtheme related to participants understanding of climate change. In essence, the escalation in the magnitude and severity of natural disasters, was associated with climate change. Flooding events were prevalent across all Provinces in South Africa, in the first half of 2021 (Greenpeace, 2023). The magnitude of the 2017, 2019, 2022 and 2023 floods in eThekwini (KZN) exceeded initial projections. Severe drought conditions were also experienced throughout the country, particularly in KwaZulu-Natal. Several participants believed that climate change has influenced the occurrence of natural disasters. They shared this as follows:

Climate change has an impact on global warming where we see hotter temperatures or extreme temperatures. It can range from extreme heat waves to most probably extreme weather conditions like a cold, ice weather storms, flooding…I think just that when it rains, it comes on quite heavy I noticed compared to other areas (P7; PU)

We can experience heavy rainfalls, winds, sun, storms… Sometimes it can be very bad weather conditions, like if we can experience floods, excessively thunderstorms. It can damage trees, people, animals… the change is the thunderstorm how the storm can be. From last year, it was just normal, but nowadays it can be so dangerous, it can be excessively (P10; PU)

I think we definitely seeing it with the sporadic flooding. I think it was two or three weeks ago when we got hit pretty badly. These flash floods we've never experienced before. Before you'd hear of flooding happening once in a blue moon every like, five, six years. Now Durban, I feel it's become a hot spot for these flooding, for these flash floods. When it rains really heavy, we actually get worried, that there's no damage to the house (P4; U)

One of the participants lamented that her community has been experiencing flash floods, in a way that has never been experienced previously. In addition to the intensity of the floods, it would appear that these natural disasters are occurring more frequently. Community members have begun attributing the occurrence and escalation of extreme weather events to broader changes in climate patterns such as heat waves, storms and flooding to climate change. The occurrences of such are not limited to communities in KwaZulu-Natal. As recent as February and March 2025, torrential rainfalls led to the death of 12 people and flooding of areas in the South of Durban (IOL, 2025). Almost all provinces in South Africa have experienced some sort of extreme weather event. The floods in Gauteng, caused major destruction and death in 2020 (IOL, 2020), the Western Cape, endured a one-in-400-year drought between 2015 and

2018 (Hill-Lewis, 2023), dust storms were experienced in the Northern Cape (Observatory, 2019) and sandstorms in occurred in Bloemfontein and Johannesburg (IOL, 2014). Participants in this study were either affected by flooding or knew people who were affected. Heavy rains leading to flooding is a significant fear for residents as mentioned by P4. Participants' responses underscored the longitudinal dimension of their observations. Although these events are expected, the frequency and intensity have increased.

One participant mentioned the following:

"*Things have happened that we are not used to, you see, flooding and a tornado (P20; R)" and "Climate change is a period where there are unfavourable weather conditions like insufficient rainfall, severe storms and lightning, all those conditions that happened here in South Africa and all the other places (P24; R)".*

Borick and Rabe (2017) found that direct encounters with extreme weather events, as well as atypical seasonal variations in temperature and precipitation, can significantly influence individuals' perceptions of global warming. Personal experiences influence beliefs and can be a factor that guides mitigation action (Broomell et al., 2015). As seen with participants in this study, they are aware that climate change is no longer a problem that is only experienced by other countries. Another participant reflected on the effects occurring globally saying other countries experience natural disasters such as: *"they sometimes get tsunamis, earthquakes and there are countries that also get tornados. I can say every area in the world now is beginning to be impacted by climate change (P21; U)".* Although these events are naturally occurring and not necessarily induced by climate change, the public are classifying all disasters as caused by climate change. This highlights the need for dissemination of accurate information to the public to ensure they are able to distinguish between natural-occurring and climate-induced disasters. Trenberth (2018) explained that extreme weather events will occur naturally, however the frequency and severity of the occurrence will increase and the primary driver is human-induced climate change.

Theme 2: Perceived causes of climate change

The perceived causes of climate change were the second theme that emerged from the data. This theme was underpinned by three subthemes namely; (i) Human activities, (ii) Acts of pollution and (iii) Farming practices.

Subtheme 1: Human activities

Anthropogenic causes through air pollution and land pollution were amongst the reasons described in the narrative as follows:

I definitely think that it is due to human activities. We all learned that in the 1800's, human activities such as deforestation, pollution, whether it is land, air, water, and it's like an excess amount of greenhouse gases going into the air… there's not a lot of trees, they absorb carbon dioxide and now you are cutting them down. Also, pollution. Humans are just monsters sometimes. A lot of these countries, although they sign these climate change treaties to reduce the emission level, its sometimes just a hoax, just a façade, they don't actually do that because everyone has their own vested interest. So, countries are still pushing out fumes. India, China, America, and then they also dump it in poorer nations (P4; U)

These narratives reflect the notion that diverse human activities had contributed to climate change. They shared that pollution was one of the major contributing factors to climate change. They felt that many people, particularly industries, were acting irresponsibly by generating toxic fumes that were having adverse effects on humans, flora and fauna.

It's because of what we do as human beings. We throw dirty things everywhere. When we are burning, you see here we are surrounded by the sugar cane, they are always burning of which it affects climate change. The cutting of trees is causing climate change. Because trees are giving us something in terms of controlling the weather conditions, when we cut them, it means we are causing another problem (P16; I)

This participant lamented the huge levels of deforestation and lack of trees that can protect the environment. Communities recognize the vital protective function of the natural environment and acknowledge that human activities, such as burning and deforestation, are undermining its integrity.

We as humans highly contribute to climate change. The activities that we do, such as deforestation, such as burning of fossil fuels and land degradation. Burning of waste because there is carbon dioxide emission which leads to air pollution that also contributes to climate change. Burning of fossil fuels in industries (P24; R)

A similar view is expressed by participant 24 who acknowledged carbon dioxide as a contributing emission. Many participants demonstrated an awareness of the role of human beings towards climate change regardless of the sector in which they reside. Participant P4 is from an urban area while P16 and P24 are from the informal and rural sectors respectively. This demonstrates that communities in eThekwini are aware of the key contributors of climate change. Human activities such as land use change, deforestation and water source exploitation are some of the contributors to climate change (Mahmoud and Gan, 2018) along with burning of fossil fuels, greenhouse gases from agricultural and industrial activities and aerosol emissions (Gao et al., 2018). The potential for meaningful and constructive change is enhanced when there is acknowledgement of human responsibility for environmental degradation. Hosta and Zabkar (2021) explained that there is a long-lasting positive effect on environmental responsibility when people acknowledge their individual actions as contributors to climate change. Liu et al. (2020) believe that although recognition alone does not motivate participation in pro-environmental behaviour, it does increase the occurrence of protective action.

A study by Amoah and Addoah (2021) in Ghana found an association between environmental knowledge and engagement in pro-environmental practices. Similar findings were reported by Mahlalela et al. (2020) who evaluated climate change-related perceptions across South African communities. Participants asserted that humankind was responsible for climate change because of their engagement in pollution and deforestation. These responses were common regardless of urban or rural communities in the study which indicates that socio-economic factors are not a differentiating factor among communities' belief in the anthropogenic contribution to climate change. Climate change messaging should be based on the foundation of people acknowledging that human activities are a contributor to climate change. Although the participants were able to explain the causes of climate change, there was some confusion around the difference between climate change and global warming as they used the terms interchangeably. This was evidenced as follows:

Global warming is a gradual increase in the Earth's temperature. That's caused by the depletion in the ozone layer. For me, global warming and climate change, those terms are often interchangeable. So, it's like almost the same kind of meaning for me (P4; U)

I know from pollutants and stuff that the ozone layer is getting damaged so then that increases the sun's rays and causes the earth to heat up, global warming (P18; U)

Participant 4 shared a detailed explanation that global warming is the increase of global temperatures and ozone layer depletion, which is scientifically accurate. She learned about climate change from school, university and having read newspaper articles. This offers a possible explanation for the level of understanding displayed by her responses. However, despite the comprehensive response, P4 could not differentiate between climate change and global warming. This is representative of majority of the population who are unable to distinguish between global warming and climate change and use the terms interchangeably. P18 demonstrated partial understanding having mentioned depletion of the ozone layer and increase in global temperature. It is a note-worthy comment as P18 shared that his understanding of climate change was derived from "people talking out in public" and did not indicate having gained any formal information. P4 is 21 years old and P18 is 48 years old. This is an important factor since both participants, regardless of age and exposure to formal climate change information, were able to demonstrate basic explanations of global warming. According to Benjamin et al. (2017), climate change and global warming are seen synergistically as they describe different aspects of the same phenomenon. Global warming refers to the change in global temperatures i.e. one aspect of climate change whereas climate change refers to other impacts, such as precipitation and moisture (Werndl, 2016). Participants' responses highlight the need for clarity on the two terms. Within scientific discourse, climate change and global warming are often used interchangeably (Penz, 2017). Communities develop their understanding of climate change from exposure to media source's use of certain terms or explanations of environmental issues.

Subtheme 2: Acts of pollution

The second subtheme that emerged related to the causes of climate change was industrial pollution and water pollution. Participants provided the following responses:

Air pollution like factories that produce the toxin that goes into our atmospheres, that causes the ozone layer to deplete so our temperatures keep rising from the sun. They have water pollution from factories or companies dumping into our waters (P3; PU)

Industries like the ones that make cement and the oil industry. They are playing a role in causing the climate to change. South Africa alone is contributing a less percentage as compared to other countries or other continents. The last time I read the statistics, even less than 5% that Africa alone is contributing to climate change, of which we are the victims of that effect. But Asia and Europe, they have the most industries that are producing these things. I think if people could be trained or advised about how we can maybe try to manage these burning of things, we could maybe even as a continent try to eliminate the percentage we are contributing to the causes of climate change (P17; I)

Participants believed that industries were a key contributor to climate change. They believed that pollution from air emissions and water contamination exacerbated the problem however some of these observations are not scientifically correct. P3 mentioned "toxins" which are not a contributor of climate change. It is possible that the participant was referring to greenhouse gas emissions however it highlights the misunderstanding between global warming and climate change. A plausible cause of misinformation is the source of climate change information used by the participant. P17 shared a remarkable insight into the comparison of contribution by countries across the globe by eluding to the fact that South Africa is a minor contributor to climate change in comparison to Asia and Europe. While this may have been the case a few years ago, South Africa has since made significant increases in contributions to greenhouse gas emissions. South Africa was the second biggest emitter of coal emissions in Africa during the 2010-2018 period. It is predicted that Africa is expected to substantially increase contributions to global greenhouse gas emissions by 2050. This is due to rapid population growth of up to 2.5 billion people in 2050 (Mostefaoui et al., 2024).

Participants identified that fossil fuel such as coal, contributes to climate change, "burning of fossil fuels, it's the CO_2 gas emissions that actually have an impact on the climate, which has adverse effects on weather patterns" (P7). According to the World Wide Fund for Nature, South Africa's coal system is a major contributor to carbon dioxide emissions with the electricity sector comprising of 86% of coal powered generation (International Institute for Sustainable Development, 2024). Regardless of the geographical location of participants, exposure to air pollution from industrial sources is unavoidable.

Subtheme 3: Farming practices

Theme three focused on the role of agricultural activities as a contributory factor to climate change. Participants' views varied on the subject. Some participants believed that crop farming practices could contribute to climate change through the use of pesticides, fertilizers and chemicals whilst others did not believe that it contributed to climate change. However, participants did not believe livestock farming was a significant contributor, as noted in the following responses:

Farming increases job creation and they're having food (P12; R)

Farming is seen as an activity that creates jobs through employment of farm workers. The practice of farming provides food and allows farm workers the financial means to provide food for their families. P12 is from a rural area which exposes him to farming activities such as cattle farming. This view is perhaps an example of how rural communities view the benefits of farming and how they prioritize issues of climate change in comparison with other societal problems such as unemployment and provision of food. This is similar to communities in the Philippines that would rather prioritize immediate problems over issues of climate change (Nabong et al., 2021).

I don't think it's that big of a problem. It becomes a problem when there's overgrazing (P18; U)

I feel like factories are affecting it more than the farmers are (P21; U)

The responses shared by P18 and P21 indicate that they acknowledge that farming may contribute to climate change but only when there is excessive grazing of land. They believe that it is still not as significant as industrial air pollution. These narratives provide an understanding that while farming may be a problem, it is not a major contributor to climate change. This highlights the gap in community understanding regarding the relationship between agricultural farming, and climate change. The widespread presence of agricultural activities in KwaZulu-Natal may contribute to a desensitization among community members regarding the environmental effects of agricultural farming. Subsistence farming contributes to approximately 40% of agricultural income among communal rural farmers in KwaZulu-Natal (DAFF), 2018). P18 and P21 are both from urban areas. P18 shared that overgrazing may cause an environmental problem but could not explain the reason for their view. P21 viewed agricultural farming as a "lesser evil" when compared to industrial pollution. Extensive research exists on farmers' adaptation practices, knowledge and beliefs on the impacts of climate change on farming. There are however limited studies that explore whether farmers believe that farming practices are contributors to climate change. A study among beef/sheep farmers in Wales reported that only 25% believed that farming contributed to climate change (Hyland et al., 2016). The scientific data may provide irrefutable evidence of the association between farming practices and climate change or global warming but belief among the public is not guaranteed. Factors such as cultural practices and beliefs may pose a challenge in the South African context given the significance of cattle to certain cultures.

The symbolic nature of cattle in the Province is reflected in participants' responses. There are an estimated 10 million Zulu residents in South Africa with majority residing in KwaZulu-Natal. Cattle hold symbolic and material importance and are used for subsistence, exchanged for women as the lobolo (bride-wealth) and as gifts (tributes) to the ruling families, or distributed to the needy (Republic of South Africa). According to the Department of Agriculture, land reform and rural development data, KwaZulu-Natal contributes 19% of the country's cattle, 13% of its goats and 11% of its pigs (Department of Agriculture, 2023) making the province one of the main contributors to livestock.

Participant 5 and 6 shared contrary views on the contribution of farming to global warming and climate change:

I watched a movie about what they claim to be facts that 95% of the issues around deforestation and climate change are caused by agriculture particularly the farming of cows, but it would include pigs and chickens. So, if that's 95%, it almost feels like the other 5% is a waste of time (P5; U)

I know cattle waste releases emissions as well, the gas, methane gas and stuff (P6; U)

However, there was a sense of doubt in the above responses. Participant 5 uses words such as "claim to be fact" indicating that she had some reservations on the statistics. Her view on trying to address the 5% contribution to climate change as a "waste of time" emphasizes her belief that efforts that are focused on other activities, are futile. Lynch et al. (2021) report that a reduction in methane and nitrous oxide emitted from agricultural emissions could significantly mitigate climate change. However, the lack of media coverage may be a possible reason for the inability of communities to make the association between farming practices and climate change or global warming. However, this change may pose new challenges. Research predicts that a shift to crop-only production may increase pressure on land and water resources and threaten plant and animal genetic material. This drastic change could disrupt economies and the global meat trade as well as food security (Dorgbetor et al., 2022).

Theme 3: Sources of climate change information

Sources of climate change information emerged as the final theme in the data. This theme focused on four subthemes namely; (i) school curriculum, (ii) indigenous knowledge and lived experience and lastly (iii) influence of media.

Subtheme 1: School curriculum

Participants were asked about sources of knowledge regarding climate change. The source of information is an important factor in understanding the views of participants. It was shared that a number of participants' understanding of the phenomenon stems from primary and secondary school exposure through curriculum. Responses were as follows:

In school, years ago. I learned about the weather patterns and the drastic changes in our weather (P2; PU)
I heard about it at high school. I can say the way the weather is changing is not the same as it was supposed to be (P11; I)

I heard about it earlier at school at lower grades. They were always talking about weather conditions, how weather always changed (P16; I)

Like in high school and in primary school, I heard about climate change, so obviously a change in weather associated with like a negative kind of thing, we've been taught about it in natural sciences (P18; U)
I got the knowledge from school. I was doing geography from high school (P24; R)

The above responses were from participants across the urban, peri-urban, informal and rural sectors. All participants mentioned that their initial exposure to climate change was at high school. This information was retained over the vast period since their initial exposure. P2 is now 48 years old, having completed her high schooling at least 20 years ago. P16 is 34 years old while P11, P18 and P24 are 25, 21 and 19 years old respectively. All participants would have been exposed to this knowledge between 2-22 years ago yet are able to recall that climate change affects the weather. These narratives highlight the significance of school curriculum that exposes students to accurate and comprehensive climate change education. The information appears to be focused on changes in weather patterns and not on contributing factors and the effects of climate change. Environmental concepts commence from Grade 1 of the South African school curriculum until Grade 10. All environmental content covered until Grade 9, relates to different aspects of climate change but does not explicitly mention climate change or highlight the association to climate change. In Grade 10, only Economic and Management Sciences and Agricultural Science students delve into specific climate change content but there is no progression into Grade 11 and 12 (Lotz-Sisitka et al., 2021).

Subtheme 2: Indigenous Knowledge and Lived Experience

A few participants shared that they learnt about climate change through observation and lived experiences or from older family members who have shared their knowledge.

My grandmother used to tell me, "There are stars at night, so tomorrow there will be sun", days full of cloud and then tomorrow there won't be sun but nowadays you see stars at night and then in the morning it's raining (P11; I)

his participant had learnt from his grandmother that her generation predicted the weather from observing the stars. These traditions date back decades with various cultures using the stars, moon and astronomy to predict the weather. San (Xam) traditions use the rising of the stars to signify the transition to winter. Yup'ik people in Alaska interpret flickering stars as predictions of wind and Samoans identify an eminent cyclone from the twinkling red star (Hamacher, 2019). Clouds are used as a meteorological indicator in Uganda while high temperatures indicated onset of rainfall by Lushoto communities (Radeny et al., 2019). Climate change has hindered the use of indigenous knowledge systems which was once a valuable generational information system. Indigenous knowledge weather forecasting is engrained and established in many African cultures and communities. Some cultures observe wind direction and clouds to forecast local weather conditions such as rainfall, drought and flood events (Radeny et al., 2019). Petzold et al. (2020) explains that indigenous knowledge systems and practices are often disregarded in policy and research however it can be a significant resource for climate change adaptation. There is a separation between indigenous knowledge systems and mainstream science (Suliman, 2018).

Because I'm working (as a farmer) I experience a lot. Some seasons I produce nice, some season I don't get nothing, but I work the same as the previous year. This year, I had a lot of flowers coming on the mango. But the mango wasn't too good. But on the other year, I had nice production of mangos (P15; U)

As a seasoned small-scale farmer, participant 15 explained climate change through his lived experience. The effects of climate change were evident through a change in his crop production. He explained that despite farming in the same manner he had always done; seasonal changes had altered the quantity and quality of his produce. While participants were unable to explain the science behind their experiences, it is important to acknowledge the indigenous knowledge of communities. Indigenous local observations

and experiences can enrich knowledge of climate change (Chanza and Musakwa, 2022). Direct experiences of events related to climate change are more powerful than second-hand information in informing attitudes and behavior and influencing behavioral change (Codjoe et al., 2014)
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Subtheme 3: Influence of media

Mass media platforms mentioned by participants include television, radio and newspapers. The responses were as follows:

Most of the news and on the internet. I browse, I read the news a lot. Most of the time I listen to radio and that's when I found out on the news that it's due to climate change, and the South African Government is going overseas trying to eliminate other causes (P14; R)

I was watching TV. Sometimes I watch National Geographic. So that's where I learnt about it and there was a book that I read around global warming and climate change (P21; U)

Participant 14 lives in the rural sector and has gained her knowledge of climate change from news channels on radio and through the internet. She also had an understanding that the government was involved in international discussions on climate change mitigation. The radio station referred to is Inanda FM, a local station that broadcasts in both English and isiZulu (Inanda FM, 2025). The importance of broadcast media such as radio and television are imperative in climate change communication. P21 explained that he learned about climate change from television, that are focused on nature and the environment. He also had an intrinsic curiosity in global warming and climate change. Communities are exposed to climate change information through television however the accessibility of environmental specific programming may be a challenge. National Geographic is not a free or widely accessible programming channel to the public and requires a subscription to access. It highlights the need for local, accessible news channels and television broadcasting to offer climate change information. Media plays a significant role in climate change communication. It deconstructs the complex issue and brings climate change into the spotlight so communities can prioritize it as the urgent issue that it is (Happer and Philo, 2016).

Equally important is the sharing of scientifically accurate information to the public. Levi (2021) explains that journalists are unable to investigate climate change stories or involve local scientists due to a lack of the necessary resources and training. Climate change stories are mainly covered in English media forums which most South Africans do not have access to. It is also noted that communicating environmental concepts are not simple. Science communication is a skill that must be developed to adequately communicate scientific concepts in an understandable and relatable manner. Some participants demonstrated an eagerness to build on their knowledge. As with participant 9 and 12, who conducted their own research on the topic of climate change:

I started to hear about it from the radio, news and the television. Now I started to go straight to the information, books and the internet to check and understand about how it happened. Because it's not enough to just hear about it. Just go to get information for your own and understand (P9; R)

I learned through the research. And when you research you can see even companies that are doing gas, they don't have the land. Because I used to understand, they should have a land where people are not living around that, but because of the shortage of the land, they have people that are living there (P12; R)

A recent study reported that there has been a "dramatic spread" of creation and dissemination of false information on social media channels (Di Domenico et al., 2021). This could account for the confusion between climate change and global warming. Access to information however, doesn't guarantee exposure or understanding of climate change. Urban low-income communities in Stellenbosch, Western Cape did not demonstrate an understanding of climate change, with some participants having never heard of climate change (Mahl et al., 2020). This is an alarming finding as urban communities have an increased likelihood of access to information sources such as print and social media. A study by Selormey et al. (2019) reported that over half of their participants (59%) had not heard of climate change and less than 25% had understood the negative implications related to the same (2016-2018). A similar study was

conducted in 2021-2023 which yielded a 2% increase in respondents who had heard about climate change. This is a minimal improvement in the 3-5-year period, despite the increased availability and access to climate change information over the recent years (Torsu and Kronke, 2023). The findings of this study offer significantly contrasting views. Therefore, it is crucial that the most effective avenues are used for information dissemination. This means using the preferred sources of communication as provided by the communities themselves.

5. CONCLUSION

This study offered novel perspectives on communities' knowledge and perceptions of climate change in eThekwini, South Africa. The findings highlighted that communities are aware of climate change regardless of the sector, demographic or socio-economic differences. This is a significant finding as it illustrates that future climate change communication should focus on building on this existing knowledge. It also directs communication strategies to focus on the areas that communities have identified as contributors to climate change and to enable them with practical opportunities for mitigation and adaptation efforts. There is also a lack of understanding of the science underpinning the relationship between the contribution of human activities and climate change. While participants were able to observe and experience climate change through daily life events, school curriculum and mass media are sources of information which can be adapted to ensure accurate and effective climate change communication. These avenues are accessed by all community members and are guaranteed to reach the target audience.

Future efforts should involve partnering with mass media to provide information that is contextual, simple and scientifically sound, for it to be effective. The role of information is crucial. Local government can leverage these commonly mentioned platforms to communicate with all sectors of the public in dissemination of climate change information. Indigenous knowledge sources can offer insights into communities' understanding, interpretation and adaptation strategies regarding climate change. Indigenous knowledge systems can be a valuable tool to local government. It also enhances community involvement and increases community uptake and adoption of proposed environmental projects and programmes. This study is of significance as research among communities are scarce particularly in South African communities. The responses offer valuable insight into the knowledge and perceptions of local communities which are critical to inform future efforts. There is a dire need for climate change communication that can inform behavior change and equip communities to adapt to the changing climate.

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