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"Exploring the Socio-Ecological Barriers & Facilitators to Reducing Meat Consumption in Gugulethu, Western Cape"

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Thesis submitted in partial fulfilment of the degree of Masters of Public Health

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I, *Hannah Wolpe*, hereby declare that the work on which this dissertation/thesis is based is my original work (except where acknowledgements indicate otherwise) and that neither the whole work nor any part of it has been, is being, or is to be submitted for another degree in this or any other university.

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The UCT Knowledge Co-op facilitated this collaborative project.

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Acronyms & Abbreviations

LMICS: lower- and middle-income countries

NCDs: Non-communicable diseases

SA: South Africa

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Part A: Protocol

Introduction and Literature Review

Consumption of meat is rising globally, particularly in middle-income countries like South Africa (SA) (Alexandratos and Bruinsma 2012) which has undergone a 54.4% increase between 2003 and 2015 to now rank as leading consumers worldwide (Delport et al. 2017; Organisation for Economic Co-operation and Development (OECD) 2021). This so-called Livestock Revolution is underway in many other 'developing' nations, with urbanisation, rising income levels, and greater accessibility of processed and animal-based foods leading to a waning of 'traditional' starch-based (and thus-plant-based) diets (Bisschoff and Liebenberg 2017; Delport et al. 2017; Milford et al. 2019). This globalisation - and largely 'Westernisation' - of diets is, in turn, contributing towards a myriad of highly concerning health and environmental repercussions, including the global non-communicable disease crisis (World Health Organization (WHO) 2021). However, meat represents a "highly-charged symbolic food" that "receives special treatment" (Chevalier 2014, 121–28): Its consumption is upheld by a complex web of individual, socio-cultural, and economic forces, all of which require consideration when it comes to addressing this deeply-entrenched practice.

The negative health consequences of meat consumption – particularly red and processed meat – have been increasingly elucidated over recent years: Strong links have been drawn with the upsurge in various non-communicable diseases (NCDs) now coming to predominate in many low- and middle-income countries, such as type two diabetes (Bouvard et al. 2015), cardiovascular disease, and certain types of cancer (Rohrmann et al. 2013; Wang et al. 2016). NCDs are now one of the leading causes of mortality in SA, with the WHO estimating NCDs to account for about half of all deaths in the country in 2016 (NCD Countdown 2030 2022).

This is understood to result from a variety of environmental factors including the 'Westernisation' of diets previously mentioned and unequal access to nutritious food (Kesselman 2023). Perhaps unsurprisingly, the brunt of this burden is in SA felt by the poor, and people of colour (Nojilana et al. 2016). On the other hand, plentiful has found plant-based diets found to be protective against such conditions (WHO 2021).WH

As emphasised by the EAT-*Lancet* Commission, our "diets inextricably link human health and environmental sustainability" (Willett et al. 2019, 447). Animal agriculture (particularly red meat production) is a major driver of anthropogenic climate change, which ultimately threatens the survival of our species, particularly the most vulnerable (24) (25).

Our production and consumption of animal products is furthermore implicated in the spread of foodborne infections and zoonotic diseases (such as Ebola and COVID-19), the latter of which account for approximately 75% of all emerging diseases (Taylor, Latham, and Woolhouse 2001). Animal agriculture is also a leading driver of antibiotic resistance, one of the gravest public health challenges of our time (Centers for Disease Control and Prevention (CDC) 2018). Lastly, animal agriculture threatens food security by siphoning grains away from humans and to livestock, despite offering a more affordable protein source than most meats (Jankielsohn 2015).

On the other hand, adopting more plant-based diets such as vegetarianism and veganism is expected to reduce greenhouse gas emissions related to food by 29-70% by the year 2050 (Springmann et al. 2016). These diets are also consistently associated with better health outcomes (Mcevoy, Temple, and Woodside 2000; Parker and Vadiveloo 2019b): Systematic reviews find them to protect against coronary heart disease, systemic inflammation, cancer, and other NCDs (Dinu et al. 2017; Medawar et al. 2019; World Health Organization (WHO) 2021), and their large-scale adoption is predicted to reduce global mortality by 6-10%

(Springmann et al. 2016). However, vegetarians and vegans may incur certain vitamin deficits if dietary requirements are inadequately met (Mcevoy, Temple, and Woodside 2000), with the possibility existing of confounding variables accounting for some health outcomes (Parker and Vadiveloo 2019a).

Understanding what influences meat over-consumption may thus have a significant public health impact, particularly in Sub-Saharan Africa where diet-related non-communicable diseases are expected to soon become the leading cause of death (NCD Countdown 2030 2022). The ecological model proposed by McLeroy and colleagues (Mcleroy et al. 1988) provides a concise framework for studying factors that influence health-related behaviour, which in the case of meat consumption can be viewed as:

Individual factors (which often receive undue emphasis in food studies) include the enjoyment of meat's taste, beliefs regarding the necessity and naturalness of its consumption (Piazza et al. 2015), and emphasis on the differences between humans and non-human animals (Loughnan, Bastian, and Haslam 2014). On the other hand, abstainers tend to be more concerned about animal welfare and the environmental impacts of animal agriculture (Amato and Partridge 1989; Ruby and Heine 2012).

Interpersonal and *community* factors such as our social networks have a large influence on dietary choices (particularly for youth) (Salvy et al. 2012), as do social norms (Robinson et al. 2014). Meat often comprises the central ingredient in a community's 'soul food' (Chevalier 2014), with its intake reflecting and validating inherited identities and membership to social groups (Ruby et al. 2013) such as SA Afrikaners (van der Spuy 2018). Eating is also a major "vehicle for sharing social life" (Chevalier 2014, 119): For example, participants in a qualitative study from a low-income 'black' informal settlement described how food – and meat in particular – plays a central role in celebrations and funerals, serving as an indicator of

the host's generosity (Puoane et al. 2006). Those who choose not to eat meat may find themselves alienated as their decision often requires accommodation from others, still being received with unease and misapprehension in many contexts (Beverland 2014).

Meat consumption also has strong ties with socioeconomic status, with high-income countries exhibiting significantly higher levels (Beverland 2014), and lower socioeconomic status associated with greater consumption of highly processed foods and lower intake of fruits and vegetables (de Ridder et al. 2017). Other than the obvious factor of affordability, highly processed foods are often portrayed – and thus perceived – as "modern and desirable", particularly in SA where traditional foods have historically been degraded as "poor peoples' foods" (Kesselman 2023, 10). In SA, meat has been said to serve "as a vehicle to earn respect with and provide a measure of one's perceived rank and status in the community" (Fayemi and Muchenje 2012, 1298), with the coveting of larger body size in certain cultures further contributing towards a preference for high-fat meats and sugary items (Puoane et al. 2006).

In addition to socioeconomic status, meat is entangled in a range of gendered and racial connotations, both for those who eat it and for those who choose not to (Daya 2022). Meat is tightly coupled with the concept of masculinity, as expressed by one South African research participant: "I am a man, I have to eat meat every day" (Puoane et al. 2006, 89). The notion that meat is a masculine food is found across a range of cultures, with women tending to eat meat – and report enjoying it – less than their male counterparts (Ruby 2012). This may be understood as stemming from the deeply embedded cultural beliefs regarding the necessity of meat for men's health, as opposed to women who are thought only to require vegetables and other "inferior" foods (Adams 2015; Ruby and Heine 2012).

Meat tends to form a prominent part of our ideas of racial and cultural identity. In their analysis of 60 South Africans' food narratives, Daya (2022) observed how meat occupied an

influential role in the construction of ‘black’ identity, whereas ‘white’ identity was typically defined by an *absence* of meat. One participant explained this dichotomy as follows: “the Black people that care about their health and are all like salady and whatever . . . it’s associated with Whiteness, that side of things. Whereas the assumption is that Black people would like fatty things” (Daya 2022, 10). However, this stereotype is complexified by the popularity of *braai’s* (barbeques) within many ‘white’ South African cultures (Chevalier 2014).

Institutional factors are also important, with meat usually available without question wherever food is served (Erasmus and Hoffman 2017), and plant-based options needing to be actively sought. Furthermore, meat is generally priced to offer higher energy value for money compared to plant-based options, a critical factor in low-income contexts (Swanepoel and Van Niekerk 2018). *Public policy and laws* further influence accessibility: Globally, almost a quarter (22%) of agricultural support measures are directed towards meat products and about a tenth towards milk and dairy (Springmann and Freund 2022), resulting in meat being available for much less than its “true” cost (Rust et al. 2020). There has also been a lack of government-level emphasis on reducing meat consumption, instead being driven by non-profits such as *ProVeg South Africa*.

As a social practice, meat-eating “exists above and beyond the individuals who do it” (Kelly and Barker 2016, 114), manifesting through a complex interaction context-specific factors. Altering the growing reliance on meat in SA requires careful exploration of these linkages to best identify how they may be disconnected, and thus the practice disrupted (Kelly and Barker 2016). Such an understanding necessitates transdisciplinary as well as qualitative approaches. However, this research is sorely lacking, both within SA and food studies overall (Bruckner 2018). Additionally, many studies continue to focus on individual factors, thereby perpetuating the “medicalisation and individualisation of public health and social problems

[that] obscure the food industry's role in constructing people's food desires and behaviours" (Allen and Sachs 2007, 11).

This exploratory, public health-focused study is thus the first of its kind, ultimately aiming to aid in the development of highly context-specific interventions combatting the expected growth in demand for meat in South Africa – currently the highest in Africa (Ritchie and Roser 2017) – and thus its associated consequences. Although full cessation of meat consumption is an improbable and perhaps undesirable goal, even subtle reductions may profoundly improve health and environmental outcomes (Conner and Norman 2017).

The aim of this qualitative study is therefore to investigate the local ecological barriers and facilitators to reducing meat consumption among adults residing in Gugulethu. The specific objectives are:

1. To explore the role of *interpersonal* factors (e.g., relationships and group membership) in reducing meat intake.
2. To explore the role of *community* factors (e.g., meat's role in social and cultural events) in reducing meat intake.
3. To explore the role of *institutional* factors (e.g., cost and accessibility of meat) in reducing meat intake.

Method

Study Design

A qualitative, exploratory-descriptive approach will be used to uncover and develop a detailed account of the complex behaviour of meat consumption, as well as the private experiences and opinions of individuals from their own perspectives (Hunter, Mccallum, and

Howes 2019). It is thus hoped that the resulting account may lend itself well to the eventual development of effective interventions aimed at enabling South Africans to reduce their meat intake (Tolley, Ulin, and Robinson 2013).

Research Site

Gugulethu is a low-income, peri-urban community situated about 15 kilometres from Cape Town, South Africa. Gugulethu is densely populated, with the 2011 census recording close to 100,000 people in 30,000 households (Frith 2011). The census furthermore found a predominance of younger age groups, with 99% of the population identifying as 'black African' and 89% speaking isiXhosa as their first language (Frith 2011). The focus groups themselves will be hosted in a local Scout's Hall on the property of the Gugulethu Community Health Clinic given the location's centrality and level of privacy.

Population & Sampling

Participants will be purposefully and heterogeneously sampled according to their ability to offer rich information and varied perspectives relevant to the aims of the study (Hunter, Mccallum, and Howes 2019). Anyone who was a) over the age of 18, and b) has never followed a vegan or vegetarian diet is eligible to join, with sampling further directed at recruiting a relatively equal number of men and women, as well as individuals of different ages. Participants will be recruited by a trained research assistant and a university colleague (who are both from Gugulethu), with snowball sampling later used to find additional participants. Ultimately it is hoped that five focus groups will be arranged, with a total sample size ranging from 30 to 50 (i.e., six to 10 participants in each).

Data Collection & Method

The focus group discussions will ideally last between 40 minutes and 90 minutes, with two conducted in isiXhosa and three in English, based on participants' preferences. Those in isiXhosa will be moderated by the study's research assistant (Nombasa Dumile), with the lead researcher (Hannah Wolpe) sitting in to take notes and keep track of time. The opposite will be true for the English-speaking groups, with Nombasa also assisting with on-the-fly translation as needed.

The group-based format should allow participants to engage with each other's contributions, thereby further clarifying and exploring their views (Kitzinger 1995). This will also help develop an understanding of the topic from a group / collective standpoint, revealing cultural and group norms, values, and beliefs related to meat consumption (Tolley, Ulin, and Robinson 2013). Focus groups also represent a relatively more naturalistic setting than individual interviews, contributing towards greater ecological validity (Willig 2013).

Each discussion will begin with participants being offered refreshments and shown the informed consent forms (available in both isiXhosa and English). They will then be asked to share basic demographic information including age, education level, and meat consumption frequency (see Appendix A) to help contextualise the findings. At the conclusion of each discussion participants will be thanked, debriefed, and provided compensation for their time and travels. Those interested will also provided with informational resources including diet-related pamphlets from the Department of Health, information on the health sequelae of meat consumption, and culturally-relevant plant-based recipes.

Data Analysis

The data from the focus groups will be thematically analysed according to Braun and Clarke's six steps using the software *NVivo* (Clarke and Braun 2017). This involves collating

"repeated patterns of meaning" across the dataset in order to develop a rich, deep description of the experiences of participants in relation to the various ecological factors involved in aiding or hindering meat consumption (Braun and Clarke 2006, 86; Geertz 1973). Basic descriptive statistics will furthermore be derived from participants' demographic information, such as their average age and level of meat consumption.

Ethical Considerations

Ethical approval will be sought from the University of Cape Town's School of Public Health's Departmental Research Committee and the Human Research Ethics Council[1], with written informed consent sought from participants before the start of each focus group discussion (Appendix B). Each participant will be informed that they are free to withdraw at any point without consequence as well as the possibility of confidentiality breaches due to the group-based format of discussions. All identifying information will be removed from the data, which was stored on a secure server. The researchers will debrief participants at the conclusion of each discussion, and provide both their and the South African Depression and Anxiety Group's contact details. Each participant will be reimbursed for their time through the provision of refreshments, an R80 grocery voucher and R20 for transport.

Rigour & Reflexivity

Rigour will be promoted by developing a thick, detailed description of the study setting and sample (with the assistance of the demographic questionnaire) as well as maintenance of an audit trail (Tolley, Ulin, and Robinson 2013). The researchers will regularly debrief with each other and their supervisors, thereby encouraging reflexivity and challenging the developing interpretative accounts (Smith and McGannon 2017). The lead researcher will also keep a

[1] Please note that the approval letter from the Human Research Ethics Council has been included under Appendix C.

reflexive journal to promote introspection throughout the process and to help facilitate the bracketing of biases and assumptions (Cypress 2017).

High levels of reflexivity will be particularly important given both the marked differences in dietary habits between myself (as a long-time vegetarian) and participants (many of whom were enthusiastic meat-eaters), as well as our demographic differences: I am white, middle-income, and university-educated, while the majority of participants are likely to be 'black' individuals from a generally low-income community. Journalling and conversations with the research assistant, who is from the same community as the participants, may aid me in detaching from my personal opinions about the morality of meat consumption and keeping other potential implicit biases in check.

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Part B: Journal Manuscript

Exploring the Socio-Ecological Barriers & Facilitators to Reducing Meat Consumption in Gugulethu, Western Cape

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Exploring the Socio-Ecological Barriers & Facilitators to Reducing Meat Consumption in Gugulethu, Western Cape

Meat consumption is on the rise in low- and middle-income countries such as South Africa, contributing towards myriad environmental and health repercussions, including the non-communicable disease crisis. However, most research on the topic originates from Western contexts and focuses on individual factors. This exploratory, socio-ecological study is the first of its kind, aiming to aid in the development of public health interventions to combat the anticipated growth in demand for meat.

Five qualitative focus groups held with residents of Gugulethu, Cape Town (n = 42) revealed that the vast accessibility and affordability of meat plays a significant role in dietary decisions, with several participants describing feelings of powerlessness over their consumption. Eating meat was furthermore described as a cultural imperative, with plant-based options typically considered untraditional, mundane, impractical, and often inaccessible. Meat's association with race, socioeconomic status, and gender all arose as topics of discussion. Participants identified the use of moderation, meat replacements (e.g., soy) and familiar recipes as strategies for curbing meat consumption.

Reducing meat consumption requires a range of contextualised, interdisciplinary interventions: Government-led efforts are needed to make healthy choices easy choices, particularly for disadvantaged communities, by making such foods more accessible, convenient, and affordable in multiple settings (e.g., through subsidisation and incentives). Social marketing campaigns may be instrumental in shifting norms, with 'nudge' interventions providing cost-effective strategies to promote healthier choices. Lastly, individual interventions including awareness-creation and skills-development would help facilitate widespread change.

Keywords: Meat consumption; meat; dietary norms; food environment; public health; non-communicable disease crisis

Consumption of meat is rising globally, particularly in low- and middle-income countries (LMICs)[2] like South Africa (Organisation for Economic Co-operation and Development (OECD) 2021). Between 2003 and 2015 meat consumption in South Africa has increased 54.4% (Delport et al. 2017), making it one of the world's leading consumers (Delport et al. 2017) (4). This so-called 'Livestock Revolution' is underway in many other LMICs, with urbanisation, rising income levels, and greater accessibility of processed and animal-based foods facilitating a waning of 'traditional' starch-based – and thus-plant-based – diets (Bisschoff and Liebenberg 2017; Delport et al. 2017; Milford et al. 2019). The globalisation of diets contributes towards a myriad of health and environmental repercussions, including the global non-communicable disease (NCD) crisis (World Health Organization (WHO) 2018).

Meat consumption has been strongly linked with NCDs such as type two diabetes (Bouvard et al. 2015), cardiovascular disease, and certain types of cancer (Rohrmann et al. 2013; Wang et al. 2016). NCDs are now one of the leading causes of mortality in South Africa, particularly among people of colour and low-income groups (NCD Countdown 2030 2022; Nojilana et al. 2016), due to the 'Westernisation'[3] of diets, unequal access to nutritious food, and other environmental factors (Kesselman 2023).

As emphasised by the EAT-*Lancet* Commission, our "diets inextricably link human health and environmental sustainability" (Willett et al. 2019, 447). Animal agriculture (particularly red meat production) is a major driver of anthropogenic climate change, which

[2] Middle-income countries are defined by the World Bank as those with gross national income per capita ranging from $1,036 to $12,535z, such as Botswana, Brazil, Russia, India, China, and South Africa. Altogether, these nations home 75% of the world's population (The World Bank 2022).
[3] Dietary 'Westernisation' is generally understood as a shift towards animal-based foods (meat and dairy), processed foods, and wheat as the primary source of starch (Uusitalo et al. 2005).

ultimately threatens the survival of our species (Tilman and Clark 2014; Weber and Matthews 2008).

Our production and consumption of animal products is furthermore implicated in the spread of foodborne infections and zoonotic diseases (such as Ebola and COVID-19), the latter of which account for approximately 75% of all emerging diseases (Taylor, Latham, and Woolhouse 2001). Animal agriculture is also a leading driver of antibiotic resistance, one of the gravest public health challenges of our time (Centers for Disease Control and Prevention (CDC) 2018). Additionally, animal agriculture threatens food security by siphoning grains away from humans and to livestock, despite offering a more affordable protein source than most meats (Jankielsohn 2015).

Adopting more plant-based diets such as vegetarianism and veganism significantly reduces greenhouse gas emissions (Marco Springmann et al. 2016). Vegetarianism and veganism are also consistently associated with better health outcomes (Mcevoy, Temple, and Woodside 2000; Parker and Vadiveloo 2019), with systematic reviews finding such diets to protect individuals against coronary heart disease, systemic inflammation, cancer, and other NCDs (Dinu et al. 2017; Medawar et al. 2019; WHO 2021). Despite generally minor concerns about vitamin deficits (Mcevoy, Temple, and Woodside 2000; and Parker and Vadiveloo 2019), the large-scale adoption of these diets could reduce global mortality by 6-10% (Marco Springmann et al. 2016).

Adverse health effects are, however, rarely sufficient to encourage reduced consumption given meat's position as a "highly-charged symbolic food" that "receives special treatment" (Chevalier 2014, 121–28). Addressing its rising consumption thus requires careful consideration of the web of individual, socio-cultural, and economic forces that shape it. This article examines these considerations in a low-income community in South Africa.

Understanding what aids or hinders a reduction in meat over-consumption has great public health significance given the intersecting climate and NCD crises in Sub-Saharan Africa. The socio-ecological model (Mcleroy et al. 1988) provides a concise framework for studying the various factors that influence health-related behaviour, which in the case of meat consumption can be viewed as:

Individual factors (which often receive undue emphasis in food studies) including enjoying the taste of meat, beliefs regarding the necessity and naturalness of its consumption (Piazza et al. 2015), and emphasis on the differences between humans and non-human animals (Loughnan, Bastian, and Haslam 2014).

Interpersonal and *community* factors such as social networks and social norms, which significantly influence dietary choices (particularly for youth) (Robinson et al. 2014; Salvy et al. 2012). Meat often comprises the central ingredient in a community's 'soul food' (Chevalier 2014), reflecting and validating inherited identities and membership to social groupings (Ruby et al. 2013). Eating is also a major "vehicle for sharing social life" (Chevalier 2014, 119); for example, participants in a qualitative study from a low-income 'black' informal settlement described how food – and meat in particular – plays a central role in celebrations and funerals, indicative of the host's generosity (Puoane et al. 2006). Those who choose not to eat meat may be alienated by others, with their decision received with unease and misapprehension in some contexts (Beverland 2014). This may be particularly true in food insecure contexts where "…the choice to eschew meat can appear, at best, to be a mark of privilege, the prerogative of predominantly White, urban elites" (Yount-André and Zembe 2023, 1).

Meat consumption has strong ties with socioeconomic status: while high-income countries exhibit significantly higher levels of consumption (Beverland 2014), lower socioeconomic status is associated with greater intake of highly processed foods and lower

intake of fruits and vegetables (de Ridder et al. 2017). Highly processed foods (including certain meats) are often cheaper, but also portrayed and perceived as "modern and desirable" - particularly in South Africa where 'traditional' non-meat foods have historically been degraded as "poor peoples' foods" (Kesselman 2023, 10). Fayemi notes that in SA, meat can serve "as a vehicle to earn respect with and provide a measure of one's perceived rank and status in the community" (Fayemi and Muchenje 2012, 1298). Ultimately, poor households in South Africa spend a disproportionate amount of their income on meat (Kroll 2017).

In addition to socioeconomic status, meat is entangled in a range of gendered and racialised connotations (Daya 2022). It is tightly coupled with certain concepts of masculinity, as one South African research participant explained: "I am a man, I have to eat meat every day" (Puoane et al. 2006, 89). This notion is found across a range of cultures, with women tending to eat meat – and report enjoying it – less than men (Ruby 2012). This may stem from deeply embedded beliefs regarding the necessity of meat for men's health, as opposed to women who are thought only to require vegetables and other "inferior" foods (Adams 2015; Ruby and Heine 2012).

Meat forms a prominent part of ideas of racial and cultural identities. In their analysis of 60 South Africans' food narratives, Daya (2022) observed how meat occupied a prominent role in the construction of 'black' identity, whereas 'white' identity was typically defined by an *absence* of meat. One participant explained this dichotomy as follows: "the Black people that care about their health and are all like 'salady' and whatever . . . it's associated with Whiteness, that side of things. Whereas the assumption is that Black people would like fatty things" (Daya 2022, 10). Although *sishanyamas* are common features of many low-income, predominantly 'black' communities (Yount-André and Zembe 2023), this stereotype is complicated by the shared popularity of *braai's* (barbeques) within many 'white' and other South African cultures (Chevalier 2014). Meat-laden *braai's* have, to a certain extent, come to

represent a unified national identity as the promoted means of celebrating SA's annual Heritage Day.

Institutional factors are also important, with meat usually available without question wherever food is served (Erasmus and Hoffman 2017), and plant-based options needing to be actively sought. Furthermore, meat is generally priced to offer higher energy value for money compared to plant-based options, a critical factor in low-income contexts (Swanepoel and Van Niekerk 2018).

Public policy and laws further influence accessibility; globally, almost a quarter (22%) of agricultural support measures are directed towards meat products so that they are sold for much less than its "true" cost (Rust et al. 2020; Springmann and Freund 2022). In South Africa there has also been a lack of government-level emphasis on reducing meat consumption, with this call instead being driven by non-profits such as *ProVeg South Africa* and *Humane Society International / Africa*. Recent legal action has even seen the South African government, acting ostensibly on behalf of meat producers, attempting to ban plant-based meat analogues on the grounds of 'illegally' adopting names traditionally used solely for meat products (Daniel 2022).

As a social practice, meat-eating "exists above and beyond the individuals who do it" (Kelly and Barker 2016, 114), manifesting through a complex interaction of context-specific practises. Understanding and potentially disrupting these ingrained practises requires transdisciplinary and qualitative approaches, both of which are lacking within South Africa and food studies overall (Bruckner 2018). Additionally, there is often an individualisation, moralisation, and medicalisation of people's food behaviours, rather than a critical examination of the environments, industries and institutions that shape them (Allen and Sachs 2007). Although full cessation of meat consumption is improbable, even slight reductions may significantly improve health and environmental outcomes (Conner and Norman 2017).

The aim of this qualitative study was to investigate the barriers and facilitators to reducing meat consumption among adults residing in Gugulethu at the level of the *interpersonal* (e.g. relationships and group membership), *community* (e.g. meat's role in social and cultural events) and *institutional* (e.g. cost and accessibility of meat).

Method

Study Design

A qualitative, exploratory-descriptive approach was used to uncover and develop a detailed account of the complex behaviours linked to meat consumption garnered from participants' perspectives (Hunter, Mccallum, and Howes 2019). This public health-focused study appears to be the first of its kind, ultimately aiming to aid in the development of highly context-specific interventions combatting the expected growth in demand for meat in South Africa– currently the highest in Africa (Ritchie and Roser 2017) – and thus its associated consequences.

Research Site

Gugulethu is a low-income, peri-urban community situated about 15 kilometres from Cape Town, SA. It is the second oldest informal settlement in Cape Town, having been originally established under the apartheid regime as a means of further racially segregating the city (Teppo and Houssay-Holzschuch 2013). Gugulethu is densely populated, with the 2011 census recording close to 100,000 people in 30,000 households (Frith 2011). The census found a predominance of younger age groups, with 99% of the population identifying as 'black African' and 89% speaking isiXhosa as their first language (Frith 2011). Although there is a widening socioeconomic gradient within the community, it remains characterised by basic housing, poor access to many services, high levels of food insecurity, and an

unemployment rate almost 12% higher than the provincial rate (Ewing 2021; Tshangela 2021).

Population and Sampling

Participants were purposefully selected if they were over the age of 18 and had never followed a vegan or vegetarian diet. Heterogenous sampling was further used to recruit a relatively equal number of men and women, and individuals of different ages. Participants were recruited by a trained research assistant and a university colleague (who are both from Gugulethu) as well as by snowball sampling through previous participants before being allocated to one of five focus groups discussions (FGDs). Groups contained six to 11 participants each, with a total sample size of 42. Given that groups met during weekday mornings participation was skewed towards those who had time available to participate and rather than being restricted by work, care, or study arrangements.

The sample included an almost equal number of men and women (see appendix A), with no participants identifying as gender non-binary, and ages ranging from 18 to 66 (mean of 35).

Data Collection

Data collection was conducted between April and June 2023. FGDs allowed participants to explore, and engage with each other's contributions, thereby clarifying their views (Kitzinger 1995). They also helped develop an understanding of the topic from a group standpoint, revealing cultural and group norms, values, and beliefs related to meat consumption (Tolley, Ulin, and Robinson 2013).

FGDs were held at a community hall followed by a participant's private residence in Gugulethu, with each discussion lasting between 40 minutes and 90 minutes and following a semi-structured discussion guide (see appendix B). Two were conducted in isiXhosa (moderated by research assistant Nombasa Dumile) and three in English (with Nombasa

providing *ad hoc* translations as required). No further groups were held as it appeared data saturation had been achieved. Participants were provided with refreshments and asked to fill out an informed consent form and basic demographic questionnaire (in either isiXhosa or English). After each discussion participants were thanked, debriefed, and provided with compensation for their time and travels. Diet-related pamphlets and resources on plant-based eating were also available for those interested.

Data Analysis

The FGD recordings were transcribed, and those in isiXhosa translated, before being thematically analysed using *NVivo.* Braun and Clarke's six steps of thematic analysis were then followed to develop a rich overview of pertinent themes in the dataset (Braun and Clarke 2006; Geertz 1973). Basic descriptive statistics were furthermore derived from participants' demographic information, such as their average age and meat consumption.

Ethical Considerations

Ethical approval was granted by the university's Human Research Ethics Council, with written informed consent sought from participants before the start of each FGD. Participants were informed that they were free to withdraw at any point without consequence and of the possibility of confidentiality breaches due to the group-based format of discussions. All identifying information was removed from the data, which was stored on a secure server. Participants were all debriefed and provided with the contact details of the researchers and the South African Depression and Anxiety Group. Each was also reimbursed for their time through the provision of refreshments, an R80 grocery voucher and R20 for transport.

Results and Discussion

Individual Barriers

Desire for Meat

Although not the focus of this study, individual barriers and facilitators to reducing meat consumption came up frequently in discussions with participants. Many found meat formed an outsized part of their diets, with vegetables typically constituting a side-dish, if included at all. In the short demographic questionnaire given to participants prior to the group discussions most had reported eating meat "every few days", with a "favourite meal" being most frequently reported as one that includes meat (either alone or as a component). Some believed their preference for meat – often fatty meat – to be universal within their social groups, and based on its superior taste and variety: "Other people don't like veg. But I know that everyone like meat [laughter]" (focus group 4, participant? [FG4P?][4]). One man in his early 20s asserted that "to us it's not a meal unless we have meat" (FG2P8), with even originally plant-based dishes like spinach and pap now being mixed with fish. One participant, reflecting on the differences between themselves in the city and those living in the Transkei (Eastern Cape province), who they generally regarded as following a more rural, "traditional" lifestyle, stated that "they consume a lot of meat during those traditional ceremonies but here we eat meat anytime" (FG4P?).

This concurs with the findings on 'Westernisation' of diets previously mentioned. Low intake of fruits and vegetables is a common feature of many South African diets (Shisana et al. 2013), particularly within low-income communities where nutrition competes with many other pressing financial priorities (Kesselman 2023; Smit et al. 2016). Historically,

[4] Some participants were unable to be identified by the transcriber-translator, and have thus been identified with a question mark.

however, Xhosa cuisine is said to have exhibited a conspicuous lack of meat, which was generally reserved for special occasions (Joubert, n.d.).

This disfavouring of vegetables may be influenced by SA's colonialist history which degraded indigenous foods, values and production practices, while replacing them with an industrialised food system and promoting "modern" processed foods (Kesselman 2023). This, in conjunction with unequal access to nutritious foods, has resulted in an epidemic of "hidden hunger" characterised by nutrient deficiencies in conjunction with over- and under-nutrition– the effects of which are disproportionately felt by low-income and/or 'black' populations (Kesselman 2023; Temple and Steyn 2011).

Several participants described their desire for meat as not merely a taste preference but as an addiction or necessity for life. For example, one shared that "I don't think we would be able to survive without meat" (FG3P?). Although the notion of food addiction is still debated (Onaolapo and Onaolapo 2018), some agreement does at least exist on the addictive potential of highly- or ultra-processed foods (e.g., sausages, bacon, and hotdogs). The combination of high levels of fat, refined carbs, and often salt, has been found to elicit some behavioural signs of addiction such as binge eating and a loss of control (Gearhardt, Schulte, and Schiestl 2019). The intense desire for meat described by participants may thus be partially understood as a recent development arising from the colonisation and industrialisation of the local food system.

Practicality of Meat VS Plant-Based

Meat was considered a highly practical basis for meals given the ease of sharing, availability of cheaper options (such as tripe and chicken feet), and convenience of purchase: "meat is *easily* accessible around us. For some it's just a go-to. It's not a hassle to get meat, than getting a veggie you have to now go to a shop" (FG2P7).

Plant-based diets, on the other hand, were deemed inadequate by many: meals that did not include meat were thought to be mundane, requiring extra creativity, and not capable of satisfying participants in the way meat would. They were also said to not last long in storage given the scarcity of refrigeration within participants' households, whereas meat-based meals could simply be purchased whenever a desire arose.

Lack of Health Knowledge

A lack of awareness of the negative health consequences of meat was identified by some participants as playing a role in their consumption:

> FG1P7: And I think it's also, when it comes to meat, we not, um, health conscious. Because we don't know when to stop eating meat or how much how much amount of meat do you have to consume a day or a month, because we never thought in that way, we just eat meat.

> FG1P10: For the sake of eating meat.

Beliefs such as meat being required for strength and a plant-based diet being nutritionally inadequate fed into this. Others discussed their concerns surrounding hazardous preparation of meat, including the possibility of eating contaminated meat due to poor quality control, or use of plastics in the *braai's* they purchased from. According to one young woman, who herself works as a street vendor, "… you don't even *mind* how it's made" (FG1P2).

Furthermore, some participants reported knowing, but consciously disregarding, the health effects of their high meat intake:

> FG2P9: It affects us. But we love it [others chuckle].

> FG2P3: We can't help ourselves.

Individual Facilitators

Health Knowledge

Other participants were aware of and moved by the link between high meat consumption and poor health, particularly the increasing rates of diet-related NCDs in their social circles: “Because you see nowadays you get high blood [pressure], high blood it used to be ooh *umakhulu* [grandmother], someone who's old. But you get high blood even if you're 22 years of age, like sometimes that shifts your mind” (FG5P1).

However, research has found that knowledge of what constitutes a healthy diet, and the effect of diet on health, appears to have a limited impact on the decisions we ultimately make (Spronk et al. 2014). The influence of diet knowledge is even weaker in low socio-economic populations such as this sample for whom price tends to trump health considerations (Glanz et al. 1998). Individuals in such communities tend to have both less purchasing power and higher exposure to unhealthy food environments (Food and Agricultural Organization of the United Nations (FAO) 2016), as will be further discussed. Interventions that rely solely on remedying a dietary “information deficit” while ignoring the social and environmental aspects of decisions are thus unlikely to have much effect (Kelly and Barker 2016).

Openness to Changing Diet

Nevertheless, certain participants reported that awareness of the negative health consequences of meat consumption had an influence on the dietary decisions they made:

> FG1P5: It's not easy, but we're trying because now we are reading, or we hear from the adverts, that there are people that are trying to educate us with wellness. Sometimes you don't want to listen to them, say that they can afford and you can't afford, that stereotype [FG1P2 agrees]. You know, you just close the curtain. Because we don't want to lose our beef.

Concern for their family further reinforced their desire to take their health seriously:

> FG5P1: So I'm a parent so I think about my children. Yooh, if I die who's gonna –
>
> FG5P2: Who's gonna look after your children?
>
> FG5P1: Maybe my mother's gonna die also like, stress. Yoh! So who's going to look after my children when I die? [murmurs of agreement] So you have to change your mindset.

Other participants reported an openness towards reducing their meat intake due to a curiosity or preference for plant-based meals, or a resistance to killing animals.

Individual Strategies

When asked to consider ways in which they could be supported in altering their diets to include less meat, participants identified taste as key and suggested making plant-based versions of traditional favourites. Unsurprisingly, taste is generally a leading predictor of food choices (Piazza et al. 2015), and thus one of the most commonly reported reasons for not reducing one's meat intake (Lea and Worsley 2003). Enjoyment should thus be one of the priorities when designing plant-based recipes or dietary interventions.

Many believed it impossible to wholly exclude meat from one's diet, instead suggesting moderation (i.e., a 'flexitarian' diet): "I don't think we will ever stop eating meat because it's important to us, but I think we can take more veggie stuff with one piece of meat" (P?G3). Others stressed the importance of a slow transition away from heavy meat consumption rather than attempting to make radical changes: "Comes *ngexesha* [with time]. Bit by bit" (FG5P2). Such an approach is commonly advised, with gradual replacement of meat with plant-based alternatives making what is an often-times drastic change more achievable (Mendez 2023).

Other individual-level strategies identified included choosing "healthier" meats (such as fish and leaner meats) and improving the nutritional value of other areas of their diet (such as steaming rather than frying vegetables). Diets based on meats such as poultry, fish and pork do indeed appear better for individual and planetary health (Hallström, Carlsson-Kanyama, and Börjesson 2015); however, fish in particular is typically less affordable, accessible, and/or desirable within certain South African communities and may thus not represent a viable alternative to red meat (Tulloch et al. 2023).

Lastly, several participants spoke in favour of using meat analogues such as "soy meat" – which many knew from use in school meals – in lieu of "real meat", particularly given its price advantage. However, two individuals raised concerns about potential health effects: "If we can be informed about fake meats. We don't know much about them and we don't know how they affect us and our health" (FG4P?). Work is thus required to raise awareness of the existing research on soy which has found it to not only be a healthful source of fat and high-quality protein, but also a potential player in the reduction of cardiovascular disease, breast and prostate cancer (Lima et al. 2017; Messina 2016; Ramdath et al. 2017).

Interpersonal Barriers

Influence of Family

Family came across as the dominant source of dietary influence at an interpersonal level. For example, one middle-aged woman reflected on the practise of "praising how a child eats meat" (FG3P1) – particularly boys. One's upbringing was seen as the pivotal process through which meat consumption was determined, and through which a reduction was hindered:

> …We're raised and born into a family that tells us and shows the way that meat is always on the plate to make it a full meal… So now if you're gonna take someone and tell them and tell them "Go swimming" and they've never had any swimming lessons,

they’re not gonna be able to swim, they’ll just stand in front of the water and just look at the water. (FG2P7)

Others discussed how it felt difficult, even impossible, to ever go about reducing their meat consumption given their family’s demand for such food: “[my children] just open the plate and then put it in the fridge if there's no meat” (FG1P5). As will be further discussed, meat was furthermore described as a requirement for the men of the household.

Influence of Friends

Friends were also seen as a prominent source of influence, with some participants explaining how they sometimes altered their food choices based on their peers: “Even if you are not in the mood to eat meat but because everyone is eating meat and I would end up joining them… Even if you don’t have money they will buy for you.” (FG3P?). Participants also described how they occasionally pooled money together in order to make large purchases of meat, or form stokvels (collective saving schemes) for special occasions.

Parties and alcohol consumption were described to be frequently paired with meat consumption. According to one young man, “when you are drunk, you want meat [group laughs]. You can't eat veg when you’re drunk (FG2P1)”. This association is borne out in the literature and has even been associated with lower life expectancy (Ranabhat, Park, and Kim 2020). Given this link it may be worth focusing on making specific alternatives to meat easily accessible in such circumstances.

Interpersonal Facilitators

Influencing Family Eating Habits

The interdependency of family members’ eating habits posed an opportunity for reducing meat consumption. Some (female) participants described feeling responsible for their family’s health through the food they provided, and thus which preferences were

formed: “maybe let me change for them not to be like the way I grew up… So it's my mindset that's gonna make them. Because everything I have to introduce to them” (FG5P1). Several participants thus believed that change was possible, even if it took convincing:

> …that is your husband. You sleep next to him, you’re gonna talk to him like when you‘re there in bed: “baby *mamela* [listen], let's try lentils. Let’s just be - because I want to die old with you... He loves you. He will change his mindset. (FG5P1)

Our food-related behaviour is in many ways a shared, social practice. For example, children’s preferences often hold sway over the food served in a household while at the same time being shaped by the dietary habits of those who raised them (Meyer and Simons 2021). Consciously or otherwise, we also mould our food choices to create certain impressions or to mirror people around us; these same people may facilitate or constrain the intentions we set (such as to eat less meat) and our success in achieving such intentions (de Ridder et al. 2017). It is thus vital to consider the influence of relationships – particularly within the household – when attempting to reduce meat consumption, such as by targeting family members who play a leading role in determining their family’s diet.

Community Barriers

Influence of Community Members

Several participants discussed the potential influence community members may have on their eating habits, with one participant recounting how her children “would come back from the neighbourhood to ask for meat because they saw someone eating meat” (FG4P?).

The existence of vegetarians / vegans – or lack thereof – in participants’ social circles appeared to have an influence on how normal and feasible they considered such a diet. One stated that “in our community, it's very rare to find someone that's not eating meat” (FG1P7), whereas others knew of vegetarians including their sons or cousins. Either way, the decision

to not eat meat was said to be met with incredulity or interpreted as an attempt to lose weight. Normalising plant-based diets and informing individuals of the prevalence of vegetarianism or veganism – including in their own social circles – may therefore be a powerful part of promoting a reduction in meat consumption.

Meat as a Cultural Imperative

Looking beyond families and communities, one's overarching culture is a fundamental force in determining what foods are favoured. One of the most prominent topics in the discussions was the concept of meat being a cultural imperative for participants, all of whom were of Xhosa background. One young man who held a particularly firm view of culture stated that meat is "just a need in in our bodies [murmurs of agreement]" (FG1P7). Another reported "our culture is actually giving us the direction or pushing us to eat meat" (FG1P10). Meat and animal slaughter was seen as integral to many isiXhosa ceremonies: "everywhere we go, like whether we doing any ceremony, whether it's a wedding, whether it's a funeral, you have to eat meat" (FG1P7). Meat was said to connect them as members of a shared culture – a "basic thing for our people" (FG1P7) – as well as to their ancestors. Some furthermore believed that such customs were incapable of changing, and that one had no choice but to comply: "They cannot go against culture" (FG1P10). Drawing on the status-indicator aspect of meat, one woman went so far as to admit she:

> … would have to take into my child's savings to buy five sheep [for a funeral] just because people are watching me. People are going to count the sheep. And then what's that going to say about my name? I'd rather go broke than not buying that sheep. (FG1P2)

On the other hand, diets heavy in plants were viewed by some as belonging to other, 'white' traditions: "Yoh, I've never heard of a plant-based food being traditional, it's impossible [chuckles from group]… It doesn't associate with culture. Plants?" (FG1P10). One

young man asserted that “they are for *you* [white?] guys, non-meat items [FG2P8 chuckles]. Because I won’t eat a spinach, ah ah, they are for you”. However, others held the view that plants and their cultivation formed an integral part of a traditional lifestyle, with vegetables forming a necessary part of all traditional meals.

Livestock and their consumption play an undeniably crucial role in Xhosa society: cattle serve not only as a source of food and secondary products (e.g., clothing and fertilizer), but also as markers of status (such as in the measure of a bride’s wealth in the form on lobola) and a key part of ceremonies. Animal slaughter and subsequent consumption is seen as a necessary addition to monumental cultural occasions such as birth, the initiation of boys into manhood, marriage, and mourning (Nxoko 2015). Consumption of meat, especially those considered “high status”, is also a way to curate a more prestigious image of oneself by indicating a transcendence of poverty (Yount-André and Zembe 2023). However, as previously discussed, plants and plant-based cuisine has traditionally been a central part of Xhosa culture; shifting emphasis to this may therefore be a better approach than attempting to downplay the importance of animal products.

Gender Norms

Participants touched on a host of gender norms regarding meat within their communities which serve to promote its consumption among men in particular. Meat preparation and enjoyment were described as strictly gendered: although men play a central role in ceremonial slaughter, women were described as responsible for the cooking and serving of the meat. Possible consequences of failing to do so included women being “in trouble” with the man of the house or having him grow “mad”, bring home “another girlfriend” (FG5P5), or even “leave you if you don’t cook the meat” (FG5P1).

The notion of meat being a “man’s food” is near-universal (Ruby and Heine 2012), and reflected in their higher and less alterable rates of consumption (Stubbs, Scott, and

Duarte 2018; Quandt 1999). As these excerpts demonstrate, the control over and symbolism of food – particularly meat – may pose a site of power imbalances, and oftentimes conflict, between men and women (Quandt 1999).

Plant-based dishes like *imifino* (spinach and mealie meal) were furthermore described as "a women's thing" (FG2P9). Men were said to be served first, getting "the best cut every day [group chuckles]" (FG2P9). Women, on the other hand, were said to often receive "insides" (intestines and internal organs) only. Xhosa culture uses meat to reflect patriarchal traditions, with leafy vegetables tending to be viewed as "woman's food" (Vorster, Willem, and Sonja 2007), with different men allocated portions of the animal based on their status (e.g., livers being reserved for young men) (Walubengo and Wangare 2023). Altering meat consumption within this community will therefore require an awareness of such gendered dynamics, with particular attention paid to disrupting the striking masculinisation of meat.

Accessibility of Meat

Numerous barriers to reducing meat consumption were discussed at the level of the community. Meat was frequently reported as being both highly available and – at least some types– highly affordable.

Several participants spoke to the vast availability of meat within Gugulethu: "There is meat everywhere. If you go outside, you will find all kinds of meat" (FG3P?). Meat was said to be sold "in each and every shop you go… no matter what" (FG1P10) as well as by street vendors around every corner. This accessibility was said to make meat difficult to resist: participants spoke of being convinced to buy meat because of the good deals they encountered, or the enticing smells that get "in the head" (FG1P4).

Limited Accessibility of Plant-Based Options

Conversely, some participants described vegetables and plant-based meal options as being limited in their communities. Fresh produce vendors were described as "rare" by some,

with “most street vendors… selling meat and fish” (FG4P6). Others described how existing vegetable vendors often do not sell the ingredients they sought: “Sometimes you would look for things like cabbage with no luck. You have to go and look at other places which are very far from where we stay” (FG3P?).

A handful of participants did describe their neighbourhoods as offering a variety of plant-based options, although these seemed to be mostly raw fruits and vegetables rather than convenient, ready-to-eat meals such as in the case of meat. One participant contrasted this to wealthier areas of Cape Town where “healthy food is around you, wherever” (FG1P2).

Healthier Food Expensive

The price of healthier foods (such as vegetables or fish) was unsurprisingly identified by several participants as a barrier to their increased consumption, especially when given the choice of affordable meat options like chicken feet and necks: “A side of cabbage if sixteen rands. So it’s better to buy meat instead because it’s cheaper” (FG4P?).

Cost has been found to be a leading predictor of food purchases in the South African National Health and Nutrition Examination Survey (Shisana et al. 2013), thus serving as a “precondition for actual choice”, particularly for those in insecure financial circumstances such as many in this study (Meyer and Simons 2021, 17).

Unhealthy Food Environment

Participants elaborated on their food environment more broadly by identifying the most available foods beside meat items as so-called “fat food” (FG2P8). Such food was said to be both highly affordable and pervasive in their communities: “…you turn that corner, there's that auntie who’s selling *magwinya* [deep-fried doughnut], you go that corner, there's [name] selling fish and chips” (FG5P6).

Researchers have in recent years elucidated the powerful influence of the built environments on our health, with the concept of a 'food environment' now used to understand how the availability, accessibility, quality and promotion of foods shape consumers' dietary decisions, preferences, and habits (FAO 2016). Informal settlements such as Khayelitsha and Gugulethu are often characterised as obesogenic food environments, with "limited food choices, long distances, high transportation costs to and from the nearest supermarket, and lack of opportunities to engage in physical activity" (Puoane and Tsolekile 2008, 52; Rideout, Mah, and Minaker 2015). Research in South African townships have found a great reliance on small informal food businesses which, while bolstering access to affordable, convenient food and contributing significantly to the economy, also tend to promote highly processed, energy-dense items (Hill et al. 2019; Petersen and Charman 2018).

As described by participants, some low-income areas (so-called food deserts) also have a particular dearth of nutritious foods such as vegetables (Rideout, Mah, and Minaker 2015). The availability of vegetarian and vegan food options in South Africa continues to differ according to the socioeconomic status (and, to a certain extent, the racial demographic) of areas, with such food found predominantly in 'white', middle- to upper-class locations (Yount-André and Zembe 2023).

The availability of healthier and plant-based options is a robust predictor of choosing such a diet and maintaining it over the long-term (de Ridder et al. 2017). The accessibility (i.e., convenience and desirability) is similarly important, with healthier diets generally perceived as more effortful and inconvenient (Wrottesley et al. 2019), potentially requiring additional work to source and prepare (Temple and Steyn 2011).

The cost of plant-based and overall healthier diets remains a major barrier in countries such as South Africa, where a 2023 study found what they deemed a healthy diet to be

unaffordable for 65.2% of the country's population (Ritchie, Rosado, and Roser 2023). Although it is argued that the cost can be significantly reduced through careful, informed choices (Temple and Steyn 2011), this becomes increasingly challenging as the cost of vegetables continues to rise disproportionately compared to meat and other animal protein (National Agricultural Marketing Council (NAMC) 2023). Intervening at the level of the food environment to make plant-based options more accessible and affordable (and meat-based options potentially less so) is therefore imperative.

Institutional Facilitators

High Cost of Meat

The high cost of some meats, such as red meat, was said to sometimes constrain participants' consumption: One man, a self-described "veggie type", explained that price makes a "very big difference. Because instead of me spending R50 on a KFC, I can probably just make a nice sandwich or whatever I want to do and it saves me a lot" (FG1P10). However, there may be limits to how much of a difference price will make. As one participant put it, meat is "very expensive but we can't live without that" (FG2P3).

Lack of Meat in Schools

Educational institutions emerged as a potential setting in which meat consumption may be influenced. Some participants remarked on how they have "never seen them cook meat at school. Never!" (FG1P10), with even food vendors outside school gates tending to only sell cheaper items such as *vetkoek*. Participants did, however, describe how in school they "grew up on soya mince" (FG5P1), which many considered a healthier, more affordable meat alternative. Workplaces were also identified as an institutional setting where meat was not always as available, with many instead bringing sandwiches, fruit, and leftovers from home.

Influence of Healthcare Workers

The question of whether the advice of healthcare workers would be effective in reducing meat consumption also arose in some discussions. This seemed to be a viable point of influence for some participants but not others, with one man stating simply to "let me die because I'm already dying" (FG5P3).

Healthcare professionals may be powerful proponents of plant-based eating given their generally trusted role in matters of health (Mothudi 2023). Unfortunately, the nutrition education they current receive is minimal, although organisations like the *Physicians Association for Nutrition* are currently working on improving the situation.

Public Policy and Laws

Taxes and Subsidies

Lastly, a change in the pricing of food at a governmental level was raised in one group as likely to make a difference to their meat consumption:

FG4P?: If they can only increase prices for meat…

FG4P?: Yes. If they can lower prices for veg and increase prices for meat, it can help.

This idea is not an uncommon one within public health, with "sugar taxes" existing around the world, including SA. Evidence does indeed exist to support taxation of unhealthy foods (e.g., those high in fat, salt, and sugar) in combination with subsidisation of healthier options (e.g., fresh produce), thereby avoiding a widening of social disparities that is likely to result from taxation alone (Friel et al. 2015; Nnoaham et al. 2009).

[Figure 1 near here]

Figure 1. Diagram Summarising Study Results (please see appendix C)

Conclusions and Recommendations

Dietary interventions must be carefully designed using locally derived research such as this to incorporate site-specific influences including food availability, finances, culture and gender. For example, Gugulethu-based campaigns may focus on the affordability of reduced meat consumption and historical reliance on plant-based cuisine within Xhosa culture (Pais, Marques, and Fuinhas 2022). Although the focus here has been on reducing meat intake, this must be part of a broader effort to reduce consumption of other harmful foods while increasing consumption of healthful foods (which tend to be plant-based and/or minimally processed.

Crucially, these efforts must be guided by principles of equity, pushing for government-led, systems-level interventions striving to make healthy choices easy choices for all (Wilson et al. 2016). Inter-disciplinary work is required at all levels of the food supply chain to change how available and accessible highly processed, animal-based foods are compared to minimally processed, plant-based foods (Rust et al. 2020). Such intervention is warranted given the addictive potential of certain meat products, as illustrated by participants, and the extensive impact its consumption has on individual and planetary health.

Examples of such efforts includes limiting marketing of unhealthy foods (particularly to children) while raising awareness of the links between diet, health and the environment - thereby increasing public support of government intervention. Such messaging ought to be accessible, personally-relevant, and in collaboration with trusted individuals and organisations (Wellesley, Happer, and Froggatt 2015). The taxation of – or removal of subsidisation for – unhealthy foods in order to subsidise healthy food may also be considered, although care must be taken to not aggravate existing disparities (Bauer and Reisch 2019).

Meat-free or low-meat options must be made more accessible across settings like workplaces and communities, which may require financial incentivisation (Wellesley, Happer, and Froggatt 2015). Desirability of such options may be enhanced by focusing on taste, adapting local recipes and using meat analogues (while promoting public trust in them). The behavioural economics concept of 'nudges' (i.e., changes in individuals' choice architecture which steer them in certain directions) may improve food choices (Arno and Thomas 2016), for example by: increasing the accessibility, visibility, and variety of healthier options (Anderson et al. 2021); presenting plant-based options as the "default" (Sodexo 2023); and careful menu design that normalises and promotes plant-based items (ProVeg International 2023).

The far end of the supply chain – individual consumer behaviour – represents a final, albeit less impactful, point of intervention. Nutrition education programs can raise awareness on the importance of diet and how to shop and prepare food that is nutritious, affordable, and tasty (Beverland 2014). This may involve keeping alive traditional food knowledge, including use of neglected plants which represent an abundant and affordable source of essential nutrients (Shembe et al. 2023; Vorster, Willem, and Sonja 2007). The normalisation of plant-based diets will also be crucial, such as by highlighting the shift away from meat by some South Africans of colour as resistance to the colonisation of their diet and lifestyles (Yount-André and Zembe 2023). Other participant-identified strategies include the use of meat analogues, slow transitions to plant-based eating, moderation of meat consumption (i.e., flexitarianism), and favouring of "healthier" meats. Various settings, including healthcare and schools, should also be considered as sites for such programs.

Interventions should focus on individuals in "sensitive" life periods during which dietary change is more likely, such as when pregnant or ill (Meyer and Simons 2021). Youth and caregivers are also important groups to target given their capacity to form new, long-

lasting food habits (Leng et al. 2017), as well as the ripple effect their preferences may have on their family's consumption. Dismantling the linkages between meat and masculinity will also be necessary to further promote plant-based eating.

This research study offers a unique contribution to the worldwide conversation regarding meat consumption by bringing in the voices of individuals of a typically overlooked demographic: those from the Global South, and those with limited financial means. Research with such communities is crucial given that they overall represent the global majority, and due to the typical emphasis of such conversations on costly interventions such as guidance from a nutritionist or use of pricey meat analogues. As the study sample was relatively diverse in terms of gender and age it may be possible that its findings will hold true in similar settings; however, care must always be taken in transferring qualitative findings outside their original context. Additionally, findings regarding the pertinence of price may be skewed given that the majority of participants were unemployed. The research and its interpretation were inevitably shaped by the "outsider" position of the lead researcher. However, this etic perspective – considered foundational to cross-cultural research (Williams 2008) – was balanced with a more internal, emic perspective through close engagement with participants and the involvement of a local research assistant in focus group recruitment, moderation, and translation.

Further research is needed on the rapidly changing food environments in LMICs, above and beyond the increasing prominence of meat, in order to find points of intervention through which the looming NCD crisis may be stalled. Meat's central role in many cultures and how to promote the necessary reduction in consumption while still respecting such realities is furthermore a question in need of urgent consideration. Community-engaged research could further explore issues of healthy food availability and accessibility in low-

income contexts, identifying areas for intervention and harnessing community strengths to bring about change.

Reducing the consumption of meat in communities such as Gugulethu thus requires careful consideration of the web of factors that uphold it, and those that stand to facilitate its reduction. Focusing on communities' socio-ecological environment shifts the focus from the individual and their personal decision-making to the context which shapes it. Families were seen as the crucible of dietary habits, which in turn are moulded by a culture and food environment which promotes meat's hyper-consumption. Meat and animal slaughter was seen as a connection to each other and to ancestors, as well as a potential source of physical, economic, and gendered power. The availability and accessibility of meat within the community evidently played a role in upholding its prominence in participants' diet, with the school and healthcare settings presenting opportunities for countering the country's upward trend in meat-intake. Focusing on individual nutritional education is an important precursor to broader, systemic efforts. Nudge interventions and the development of more satiating plant-based options furthermore present mid-level strategies to promote healthier diets. Such action is relatively achievable and profoundly urgent as we begin to feel the effects of the climate and NCD crises in South Africa and around the world.

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Declaration of Interest Statement

The authors declare that they have no known competing financial or personal interests which may have influenced the research reported here. Although partial funding was received by the Humane Society International / Africa, the organisation had no sway over any aspect of the study, including the questions asked or the interpretation of the data.

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Appendices

Appendix A: Self-Reported Demographics of Participants

Category	Sub-categories	Number of participants
Age	• Early adulthood (18-39) • Middle adulthood (40-59) • Later adulthood (60+)	30 10 3
Gender	• Women • Men • Other / non-binary	22 21 0
Education level received	• Primary school • High school • Tertiary institutions	1 39 3
Approximate meat consumption	• More than once per week • Once per week • Every few days • Once per day • Less than once per week	2 6 21 4 10

Part C: Appendices

Appendix A: Participant Demographic Sheet and Informed Consent Form

Please complete the following so we have some background information about our participants:

1. First Name:
2. Age:
3. Gender (male / female / other):
4. What is the highest level of education you have received?
    - Primary school
    - Secondary / high school
    - Tertiary education (university, technical training institutions etc.)
    - Other:
5. How often do you eat meat?
    - More than once a day
    - Once a day
    - Every few days
    - Once a week
    - Less than once a week
    - Never

A. Information sheet

Study title: Exploring the Environmental Barriers & Facilitators to Reducing Meat Consumption in Gugulethu.

You are invited to take part in a focus group discussion on your experiences and opinions about meat. This study is being conducted by the School of Public Health at the University of Cape Town. The study aims to explore your thoughts on factors you believe may make it easier or more difficult for you or others to reduce how much meat you eat.

Before you decide whether you want to participate, it is important for you to understand why the research is being done and what it will involve. The following information will be read and explained to you carefully. You will have a chance to ask any questions that you may have.

Who can participate?

In order to participate, the following need to be true about you. You need to:

1. Be over the age of 18
2. Not currently be vegan or vegetarian (i.e., you do currently eat meat and/or other animal products such as dairy)

Do I have to participate?

Your participation is completely voluntary. If you decide not to participate, there will be no negative consequences for you. You may also stop participating at any point during our discussion and you do not need to give any reasons for this. You will not be punished or penalised if you decide not to participate. Your decision to participate or not participate will not affect your access to healthcare at this clinic. You are only consenting to the processes outlined in the information and consent form at hand. After you have received all the information about the study and provide consent, you can participate immediately.

What would happen if I take part?

You will be invited to participate in one focus group discussion session with other individuals of varying ages. The focus group session will take place in a private room at a location of convenience, and last between 60 minutes and 2 hours.

We will conduct discussions on the following main themes: (1) institutional factors that may make it easier or more difficult to reduce meat intake, and (2) interpersonal community factors that may make it easier or more difficult to reduce meat intake. During the focus group discussion, we would like to record the session so that we can accurately represent your answers. This recording will be kept confidential and private. If you object to any part of the recording, that part will be erased.

Are there any risks to participating in this study?

We do not expect any major risks in participating in this study given that the discussion covers fairly everyday, unsensitive topics. If you become distressed or upset when answering the questions, we are happy to discuss any issues you may have, and to refer you to support services if you desire.

What will happen to the information I provide?

We ask your permission to record the discussion. Afterwards, the recording will be transcribed (written down), and at that point your name and any other identifying details will be removed from the transcript and the recording destroyed.

The information that you provide will be kept strictly confidential and private unless there is risk of significant harm to you. This is a promise that the research team makes. We ask you to make the same commitment to others who will be in the group with you: that you will keep what they say confidential. However, please note that we cannot guarantee that they will keep what you say confidential.

If there is any risk of harm to you, we will discuss possible sources of support following this discussion. If necessary, we may also make a referral to the appropriate services for further assistance.

The transcript will be stored in password-protected servers at the University of Cape Town. Data from the online survey and transcripts from online focus group discussions will be kept for a period of 5 years by the researchers.

Your name will not appear in any report or publication about the results of this study. We may share anonymised direct quotations from your interview in these reports and publication, but these will not be linked to you in any way.

If you would like to have the final research shared with you once it is complete, please do let us know!

Data Protection

The University of Cape Town is responsible for ensuring the safe and proper use of any personal information you provide. It will be used solely for research purposes.

Contacts

If you have any questions or concerns, you are welcome to contact one of the co-Principal Investigators:

- Dr Landon Meyer: landon.meyer@uct.ac.za; 021 406 6661
- Hannah Wolpe: wlphan001@myuct.ac.za; 076 718 7378

If you have any questions or concerns about your rights as a study participant, you are welcome to contact the following ethics committee:

- Human Research Ethics Committee: hrec-enquiries@uct.ac.za; 021 406 6492

If you would like to speak to a trained counsellor, please contact the South African Depression and Anxiety Group: 011 234 4837

B. Consent Form for participants

1. TO BE COMPLETED BY INTERVIEWER

Date:

Name of Interviewer (Print):

Signature of Interviewer:

2. TO BE COMPLETED BY PARTICIPANT

Name of Respondent (Print):

I understand that:

1. I have been given and read the information in this consent form explaining this study.
2. All questions I had on this study have been answered to my satisfaction.
3. I clearly understand what will take place if I agree to take part in this study.
4. I also understand that I have the ability to withdraw and discontinue with the study at any point.
5. I understand that I will be audio-recorded during this interview unless I object and that I can ask for anything I say to be erased.
6. I am aware that all information I will provide in this study will be kept private unless there is a risk of significant harm to myself or anyone else.
7. I understand that all the information I provide will only be used for the purposes of this study.
8. I understand who will have access to my data and how it will be stored and published.
9. I understand how to make a complaint or raise any concerns about my participation.
10. On my own free will, I agree to take part in this study.

Signature of respondent: _____Date: _____

Please take a photo of any parts of this form you may want to look back on later, or ask Hannah whether you may keep the copy.

Thank you for your time!

Appendix B: Focus Group Discussion Guide

Getting going

- Introduce ourselves; working on study with UCT which seeks to better understand how you and others like **you think about meat and encounter meat** in your lives.
- Ultimate goal = find ways that **make it easier** for people to reduce the amount of meat they eat (if they want to), as research has found this can make a big difference for our **health and for the planet.**
- We believe you have **valuable insight** into this topic, and want to thank you once again for taking the time out of your lives to talk with us today.
- Please grab any last refreshments before we start.
- Please **turn cellphones OFF** and refrain from using them during the discussion.

What to expect

- The full discussion will take anywhere from **45 minutes to 90** minutes.
- **No right or wrong answers** to these questions. Want to have an **open & honest** conversation about your thoughts and experiences.
- You don't have to answer every question, just **join in when you want** to & feel free to **respond** to what each other has to say.
- Please give **space** for others to talk and **respect** what they have to say – You don't have to agree with them!
- Please use **name cards** to identify yourselves in the beginning of the conversation (will make it easier when we listen to the recording to know who is saying what).
- [For English groups] Nombasa can help with **translation.**

Ethical issues

- We'll be **removing your names & identities** from the data, which will only be seen by us and our supervisors.
- Although you will be anonymous in paper eventually written, there's always a chance that someone reading it may recognise you by what you have said.
- Please **keeps what is said here today private**, and don't share what others in the group have said with people *outside* of the group.
- We will be using these audio recorders to accurately capture what you are saying. Please try **speak loudly and clearly** so that it can pick up your voice properly. We may remind you about this during the discussion.

- If any of the questions we ask are unclear please let me know. Is there anything anyone wants to ask before we get started?

Ice-breaker questions

1. Briefly: Who are you, and what is your favourite dish and **why**?

Institutional factors:

1. What **kinds of food** are most available to you in your everyday life in places such as shops, fast-food stores, and street vendors? This can be around your home, or when you're travelling from place to place (e.g., at taxi ranks).
    - How common are plant-based foods or **non-meat items** compared to meat in such places? **DEFINE**: Plant-based / non-meat items = any food not containing meat (e.g., fruit and veg, *slap* chips, veg burgers, etc).
    - **Why** do you think there's more meat?

2. Do you think your eating choices would be **different if alternatives** to meat were more available to you in these places we've been discussing (shops, transport hubs etc)?
    - Why / why not?
    - What if there **more places selling good, affordable food without meat?**
    - Think about comparison with Eastern Cape?

3. What are the **prices** like for meat items compared to non-meat items in the places we've been discussing?

- What **role does the price** of meat compared to non-meat items play in your decision to purchase these items?
- Will the price make a big **difference** or only a little difference in what you decide to buy?

Interpersonal and community factors:

4. How might your **relationships** with other people (such as friends or family) influence your consumption of meat compared to non-meat foods?
    - How might the people around you influence the food choices you make?
    - If the people around you everyday **began eating less meat**, do you think it would make a difference to what you eat? Even if it means you'll now need to go and buy or cook your own meat?

5. In what ways might meat be connected to your **cultural or religious background**? (E.g., In braai's, rituals and celebrations)
    - How might this influence your consumption of meat?
    - What about **plant-based** or non-meat foods, how might they be connected to your cultural background?

6. How might your consumption of meat compared to plant-based foods be influenced by your **gender** (i.e., whether you identify as a man, a woman, or other)?

7. Are there **any other things** in your life and the world around you which you believe influence your consumption of meat compared to plant-based food?

8. What kind of changes do you think could be made to make it easier for people who *want* to eat less meat to do so?
    - What are your thoughts on these **"fake meats"** that replicate the look and tase of meat with plant-based ingredients? (e.g., soya chunks are a cheap example)
    - What do you think about meals based on the ones you currently enjoy, but with **meat replaced with plant-based alternatives**?

<u>Wrapping up</u>

Any questions / comments? Welcome to message Hannah later

Will share recipes & resources on plant-based eating later. Happy to talk more later

Encourage to think and talk more about topic outside the group

Please invite friends & family to participate in future groups – send contact to Hannah

Let me know if you'd like a copy of the paper that's eventually written

Appendix C: Human Research Ethics Council Approval Letter

UNIVERSITY OF CAPE TOWN
Faculty of Health Sciences
Human Research Ethics Committee

Room 45 E-52-E-Floor- Old Main Building
Groote Schuur Hospital
Observatory 7925
Telephone [021] 406 6492
Email: hrec-submissions@uct.ac.za
Website: www.health.uct.ac.za/home/human-research-ethics

07 November 2022

HREC REF: 644/2022

Prof L Myer
School of Public Health & Family Medicine
FHS
Email: Landon.myer@uct.ac.za
Student: Wlphan001@myuct.ac.za

Dear Prof Myer

PROJECT TITLE: EXPLORING THE ENVIRONMENTAL BARRIERS & FACILITATORS TO REDUCING MEAT CONSUMPTION IN GUGULETHU-MASTERS CANDIDATE-MS HANNAH WOLPE

Thank you for submitting your study to the Faculty of Health Sciences Human Research Ethics Committee (HREC) for review.

It is a pleasure to inform you that the HREC has **formally approved** the above-mentioned study, subject to the following minor corrections: -

- The word "harm/damage" is missing from **line 2** of the motivation for expedited review which read..... "...no foreseeable physical, psychological, social or economic to participation."
- **Line 4**, in **last paragraph** of motivation for expedited review has a double "in"

Approval is granted for one year until the 30 November 2023.

Please submit a progress form, using the standardised Annual Report Form (FHS016) if the study continues beyond the approval period. Please submit a Standard Closure form if the study is completed within the approval period.
(Forms can be found on our website: www.health.uct.ac.za/fhs/research/humanethics/forms)

Please quote the HREC REF 644/2022 in all your correspondence.

Please note that the ongoing ethical conduct of the study remains the responsibility of the principal investigator.

Please note that for all studies approved by the HREC, the principal investigator **must** obtain appropriate institutional approval, where necessary, before the research may occur.

Yours sincerely

PROFESSOR M BLOCKMAN
CHAIRPERSON, FACULTY OF HEALTH SCIENCES HUMAN RESEARCH ETHICS COMMITTEE

HREC/ref 644.2022

Federal Wide Assurance Number: FWA00001637. Institutional Review Board (IRB) number: IRB00001938 NHREC-registration number: REC-210208-007
This serves to confirm that the University of Cape Town Human Research Ethics Committee complies to the Ethics Standards for Clinical Research with a new drug in patients, based on the Medical Research Council (MRC-SA), Food and Drug Administration (FDA-USA), International Council for Harmonisation of Technical Requirements for Pharmaceuticals for Human Use: Good Clinical Practice (ICH GCP), South African Good Clinical Practice Guidelines (DoH 2020), based on the Association of the British Pharmaceutical Industry Guidelines (ABPI), and Declaration of Helsinki (2013) guidelines. The Human Research Ethics Committee granting this approval is in compliance with the ICH Harmonised Tripartite Guidelines E6: Note for Guidance on Good Clinical Practice (CPMP/ICH/135/95) and FDA Code Federal Regulation Part 50, 56 and 312.

Appendix D: Journal Instructions for Authors

Preparing Your Paper

Structure

Your paper should be compiled in the following order: title page; abstract; keywords; main text introduction, materials and methods, results, discussion; acknowledgments; declaration of interest statement; references; appendices (as appropriate); table(s) with caption(s) (on individual pages); figures; figure captions (as a list).

Note from Author:

Please note the following email exchange with the *Food, Culture and Society* journal editor clarifying that a combined results and discussion section is accepted:

I have a question about:

Article submission

Name:

hannah wolpe

Email

hannahwolpe@gmail.com

Title of journal (if known)

Food, culture an society

Message:

Good day,
I'm just writing to find out about the structuring of the results and discussion section for this journal. Although the instructions say authors should include a results AND discussion section, I see that published articles exhibit varied structures. The article I hope to submit has a combined results and discussion section, so I am wondering whether this will be permitted.
Kind regards,
Hannah Wolpe

Re: Article submission [ref:!00D0Y035Iji.!5007T0ayagC:ref] #TrackingId:17678204 Inbox ×

Sukhmani Khorana <s.khorana@unsw.edu.au> 26 Jan 2024, 13:46 (3 days ago) Reply
to RFFC-peerreview@journals.tandf.co.uk, journalshelpdesk@taylorandfrancis.com, me

Dear Hannah,

We accept a range of structures if the material is relevant to the journal. Therefore, a combined results and discussion section should be fine in your submission.

Best
Sukhmani

The emails may be forwarded to the examiner for verification upon request.

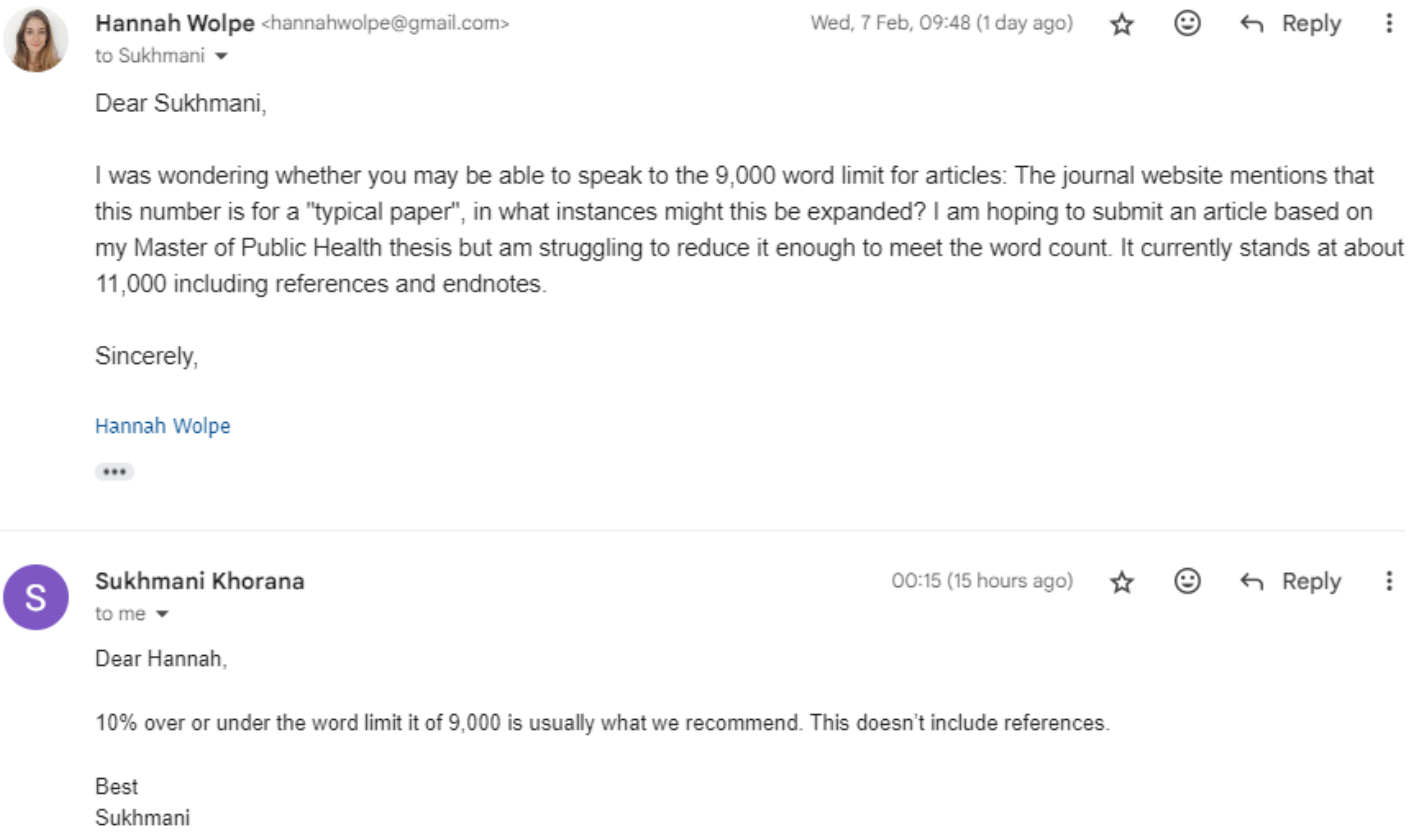
Word Limits

Please include a word count for your paper.

A typical paper for this journal should be no more than 9000 words, inclusive of the abstract, tables, references, endnotes.

Note from Author

In an email exchange with the *Food, Culture and Society* journal editor I was informed that there is a 10% leniency with the word count, and that it does not in fact include the reference list:



Hannah Wolpe <hannahwolpe@gmail.com> Wed, 7 Feb, 09:48 (1 day ago) Reply

to Sukhmani

Dear Sukhmani,

I was wondering whether you may be able to speak to the 9,000 word limit for articles: The journal website mentions that this number is for a "typical paper", in what instances might this be expanded? I am hoping to submit an article based on my Master of Public Health thesis but am struggling to reduce it enough to meet the word count. It currently stands at about 11,000 including references and endnotes.

Sincerely,

Hannah Wolpe

Sukhmani Khorana 00:15 (15 hours ago) Reply

to me

Dear Hannah,

10% over or under the word limit it of 9,000 is usually what we recommend. This doesn't include references.

Best
Sukhmani

The emails may be forwarded to the examiner for verification upon request.

Style Guidelines

Please refer to these quick style guidelines when preparing your paper, rather than any published articles or a sample copy.

Please use American spelling style consistently throughout your manuscript.

Please use double quotation marks, except where "a quotation is 'within' a quotation". Please note that long quotations should be indented without quotation marks.

Alt Text
This journal is now including Alt Text (alternative text), a short piece of text that can be attached to your figure to convey to readers the nature or contents of the image. It is typically used by systems such as pronouncing screen readers to make the object accessible to people that cannot read or see the object, due to a visual impairment or print disability. Alt text will also be displayed in place of an image, if said image file cannot be loaded. Alt Text can also provide better image context/descriptions to search engine crawlers, helping them to index an image properly. To include Alt Text in your article, please follow our Guidelines.

Formatting and Templates

Papers may be submitted in Word format. Figures should be saved separately from the text. To assist you in preparing your paper, we provide formatting template(s).

Word templates are available for this journal. Please save the template to your hard drive, ready for use.

If you are not able to use the template via the links (or if you have any other template queries) please contact us here.

References

Please use this reference guide when preparing your paper.

An EndNote output style is also available to assist you.

Taylor & Francis Editing Services

To help you improve your manuscript and prepare it for submission, Taylor & Francis provides a range of editing services. Choose from options such as English Language Editing, which will ensure that your article is free of spelling and grammar errors, Translation, and Artwork Preparation. For more information, including pricing, visit this website.

Checklist: What to Include

1. **Author details. Please ensure all listed authors meet the Taylor & Francis authorship criteria.** All authors of a manuscript should include their full name and affiliation on the cover page of the manuscript. Where available, please also include

ORCiDs and social media handles (Facebook, Twitter or LinkedIn). One author will need to be identified as the corresponding author, with their email address normally displayed in the article PDF (depending on the journal) and the online article. Authors' affiliations are the affiliations where the research was conducted. If any of the named co-authors moves affiliation during the peer-review process, the new affiliation can be given as a footnote. Please note that no changes to affiliation can be made after your paper is accepted. Read more on authorship.

2. Should contain an unstructured abstract of 200 words.

3. You can opt to include a **video abstract** with your article. Find out how these can help your work reach a wider audience, and what to think about when filming.

4. No more than 10 **keywords**. Read making your article more discoverable, including information on choosing a title and search engine optimization.

5. **Funding details.** Please supply all details required by your funding and grant-awarding bodies as follows:
   For single agency grants
   This work was supported by the [Funding Agency] under Grant [number xxxx].
   For multiple agency grants
   This work was supported by the [Funding Agency #1] under Grant [number xxxx]; [Funding Agency #2] under Grant [number xxxx]; and [Funding Agency #3] under Grant [number xxxx].

6. **Disclosure statement.** This is to acknowledge any financial or non-financial interest that has arisen from the direct applications of your research. If there are no relevant competing interests to declare please state this within the article, for example: *The authors report there are no competing interests to declare.* Further guidance on what is a conflict of interest and how to disclose it.

7. **Biographical note.** Please supply a short biographical note for each author. This could be adapted from your departmental website or academic networking profile and should be relatively brief (e.g. no more than 200 words).

8. **Supplemental online material.** Supplemental material can be a video, dataset, fileset, sound file or anything which supports (and is pertinent to) your paper. We publish supplemental material online via Figshare. Find out more about supplemental material and how to submit it with your article.

9. **Figures.** Figures should be high quality (1200 dpi for line art, 600 dpi for grayscale and 300 dpi for colour, at the correct size). Figures should be supplied in one of our preferred file formats: EPS, PS, JPEG, TIFF, or Microsoft Word (DOC or DOCX) files are acceptable for figures that have been drawn in Word. For information relating to other file types, please consult our Submission of electronic artwork document.

10. **Tables.** Tables should present new information rather than duplicating what is in the text. Readers should be able to interpret the table without reference to the text. Please supply editable files.

11. **Equations.** If you are submitting your manuscript as a Word document, please ensure that equations are editable. More information about mathematical symbols and equations.

12. **Units.** Please use SI units (non-italicized).

Additional style guidelines

Font

Use Times New Roman font in size 12 with double-line spacing.

Margins

Margins should be at least 2.5cm (1 inch).

Title

Use bold for your article title, with an initial capital letter for any proper nouns.

Abstract

Indicate the abstract paragraph with a heading or by reducing the font size.

The instructions for authors for each journal will give specific guidelines on what's required here, including whether it should be a structured abstract or graphical abstract, and any word limits.

If you need further guidance, **learn more on how to write an effective abstract and title.**

What is an abstract in a research paper?

This is your opportunity to 'pitch' your article to the journal editors, and later, its readers. Your abstract should focus on what your research is about, what methods have been used, and what you found out.

Keywords

Keywords help readers find your article, so are vital for discoverability. If the journal instructions for authors don't give a set number of keywords to provide, aim for five or six.

Headings

This will show you the different levels of the heading section in your article:

1. First-level headings (e.g. Introduction, Conclusion) should be in bold, with an initial capital letter for any proper nouns.
2. Second-level headings should be in bold italics, with an initial capital letter for any proper nouns.
3. Third-level headings should be in italics, with an initial capital letter for any proper nouns.
4. Fourth-level headings should be in bold italics, at the beginning of a paragraph. The text follows immediately after a full stop (full point) or other punctuation mark.
5. Fifth-level headings should be in italics, at the beginning of a paragraph. The text follows immediately after a full stop (full point) or other punctuation mark.

Tables and figures

Show clearly in your article text where the tables and figures should appear, for example, by writing [Table 1 near here].

Check the instructions for authors to see how you should supply tables and figures, whether at the end of the text or in separate files, and follow any guidance given on the submission system.

You can **find more detailed advice on including tables in your article** and in our **guide to submission of electronic artwork**.

Here's also our **advice on obtaining permission for third party material** if you choose to use or reproduce work from another source.

Data availability statement

If you're submitting a **data availability statement** for your article, include it within the text of your manuscript, before your 'References' section. Remember to give it the heading 'Data availability statement' so that readers can easily find it.

Spelling and punctuation

Each journal will have a preferred method for spelling and punctuation. You'll find this in the instructions for authors, available on the journal's homepage on **Taylor and Francis Online**. Make sure you apply the spelling and punctuation style consistently throughout your article.

Special characters

If you are preparing your manuscript in Microsoft Word and your article contains special characters, accents, or diacritics, we recommend you follow these steps:

- European accents (Greek, Hebrew, or Cyrillic letters, or phonetic symbols): choose Times New Roman font from the dropdown menu in the "Insert symbol" window and insert the character you require.
- Asian languages (such as Sanskrit, Korean, Chinese, or Japanese): choose Arial Unicode font from the dropdown menu in the "Insert symbol" window and insert the character you require.

- Transliterated Arabic: choose either Times New Roman or Arial Unicode (unless the instructions for authors specify a particular font). For ayns and hamzas, choose Arial Unicode font from the dropdown menu in the "Insert symbol" window. Type the Unicode hexes directly into the "Character code" box, using 02BF for ayn, and 02BE for hamza.

Running heads and received dates

These aren't required when submitting a manuscript for review. They will be added during the production process if your article is accepted for publication.