

Corporate fast-food advertising targeting children in South Africa

Desiree Lewis, Sheetal Bhoola and Lynn Mafofoⁱ

The health implications of children's increasing consumption of fast foods have been a subject of growing national and global concern. This chapter explains why critically examining corporate fast-food advertising to children is equally important. As we show, fast-food advertising compromises children's rights to health. It also undermines their rights to protection from exploitation through persuasive media messages and rapidly changing foodways.ⁱⁱ

Children's relationships to foods have traditionally been mediated by parents, caregivers, authority figures in schools and other institutions or the communities in which they live. In the context of the world food system,ⁱⁱⁱ fast-food advertisements may have become more influential than these traditional mediating agents.

This chapter addresses the following questions:

- Why does fast-food advertising targeting children warrant research and action?
- How does fast-food advertising manipulate children?
- What is the impact on children's tastes and eating habits?
- What are the political, social and ethical implications, and responses?

Why does fast-food advertising targeting children warrant research and action?

The growing dominance of global foodways

South African children's fast-food consumption rates are high. In a 17-country study completed in 2014, researchers found that fast-food consumption among South African children and adolescents was more frequent than in even high-income countries such as Japan and Belgium.¹ Fast foods are produced by local and global companies, although global corporations are the dominant drivers of child-oriented food and marketing. Transnational corporations are increasingly

targeting children in developing countries because their own markets have become saturated. Moreover, regulations in these countries have made sales and advertising more difficult.² Global companies such as Kentucky Fried Chicken (KFC), McDonald's, and Spur are therefore intensifying marketing strategies in India, China, Brazil, and South Africa, and it has been found that South Africa and India are more receptive markets than Brazil, Russia, and China.³

The dominance of corporate-driven foodways is unique to the present world food system. Within this system, North American food corporations are the most economically powerful. These corporations identify children as lucrative markets because children are highly responsive to new tastes. They also often influence the food tastes and purchasing of their parents and communities.⁴ Like children in other parts of the world, therefore, South African children are instrumentalised as consumers of unhealthy foods in order for corporations to generate enormous profits.

The exploitation of children

Food companies and advertisers realise that children with "pester power" (or influence over adults)⁵ will significantly influence adults' food buying. They are also aware that cultivating fast-food tastes among children will shape their future consumption as adults. Companies' tactical interest in children is reflected in research showing that the global fast-food industry spends over USD 5 million daily in marketing unhealthy foods to children.⁶ Fast-food marketing to South African children is swiftly penetrating different media. Remarking on this situation in Malaysia, some researchers show that existing research and regulations have "focused on traditional media...although...digital or new media marketing expenditure saw a three-digit percentage growth from 2005 to 2009".⁷

ⁱ Critical Food Studies Programme, Universities of the Western Cape, KwaZulu-Natal and Pretoria.

ⁱⁱ Foodways are the cultural and material flows of food items and tastes within families or communities or within societies and across national borders. In the current world food system, these flows are significantly influenced by the production, sale, and marketing of highly processed food produced through corporate-controlled industrial agriculture.

ⁱⁱⁱ The world food system currently involves large corporations controlling the food access and consumption of most of the world's population – from the production of food through industrial agriculture to its sale in globalised supermarkets and other food outlets.

Fast-food advertising directed at children has been analysed extensively in high-income countries such as the United States, the United Kingdom and Australia. This has not been the case in South Africa, where research has prioritised malnutrition linked to stunting and undernutrition.⁸ Yet, Lize Mills notes that “overweight and obesity, which show a greater increase in low- and middle-income countries, are linked to more deaths in the world than underweight”.⁹ With corporate fast food becoming increasingly affordable and accessible, many of the processed products that lead to overweight are fast foods.

The need for regulation and research

At a global level, the advertising of fast food to children has provoked strong opposition and action. This has entailed self-regulatory mechanisms for advertisers and corporations, such as the Advertising Regulatory Board in South Africa. Organised and funded by the marketing industry, the Board is meant to protect consumers through the self-regulation of advertising. Global efforts to regulate marketing have also included industry performance indicators, community and school-led advertising literacy campaigns for children, individual or class action litigation, and local and national regulations.

In 2010, the 192 member states of the World Health Organization (WHO) endorsed recommendations to restrict unhealthy food marketing to children through actions including national legislation.¹⁰ The WHO’s comprehensive and intersectoral recommendations for member states are summarised in Box 4.

As a member of WHO, South Africa has still not enacted legislation on this issue, even though draft legislation exists. Considering the scale of advertising to children, media coverage, public awareness, and research in South Africa have been limited. The small pool of academic research has focused mainly on televised adverts.¹¹ By concentrating on government legislation and self-regulation by industries, South Africa has also neglected the intersectoral responses recommended by the WHO.^{4,9,12} In contrast, fast-food companies have invested enormous amounts into research for effective marketing. They “employ child psychologists and cultural anthropologists, review academic literature...send experts into homes...study children’s drawings, dreams and fantasy lives, and apply the findings to ads and product designs”.¹³

How does advertising manipulate children?

The WHO states that the impact of advertising on children results both from their level of exposure and from its

Box 4: Key recommendations on the marketing of foods and non-alcoholic beverages to children

- Food and beverage companies, food outlets, marketing industries, and the media and entertainment industry should promote healthy diets for children and youth.
- Governments should partner with the private sector to create long-term programmes to support adults in promoting healthy food for children.
- State and local educational authorities should support healthy food for children in school environments.
- Government should use available public policy levers at all levels to foster healthy diets for children and youth.
- National multi-disciplinary research capacity should address the influence of food marketing on children and youth.

Source: World Health Organization. *Set of Recommendations on the Marketing of Foods and Non-alcoholic Beverages to Children*. 2010. Accessed 17 November 2020; <https://www.who.int/dietphysicalactivity/publications/recsmarketing/en/>.

persuasive techniques.¹⁰ The adverts analysed below are powerful in terms of both these criteria.

Manipulating children through promises of “home”

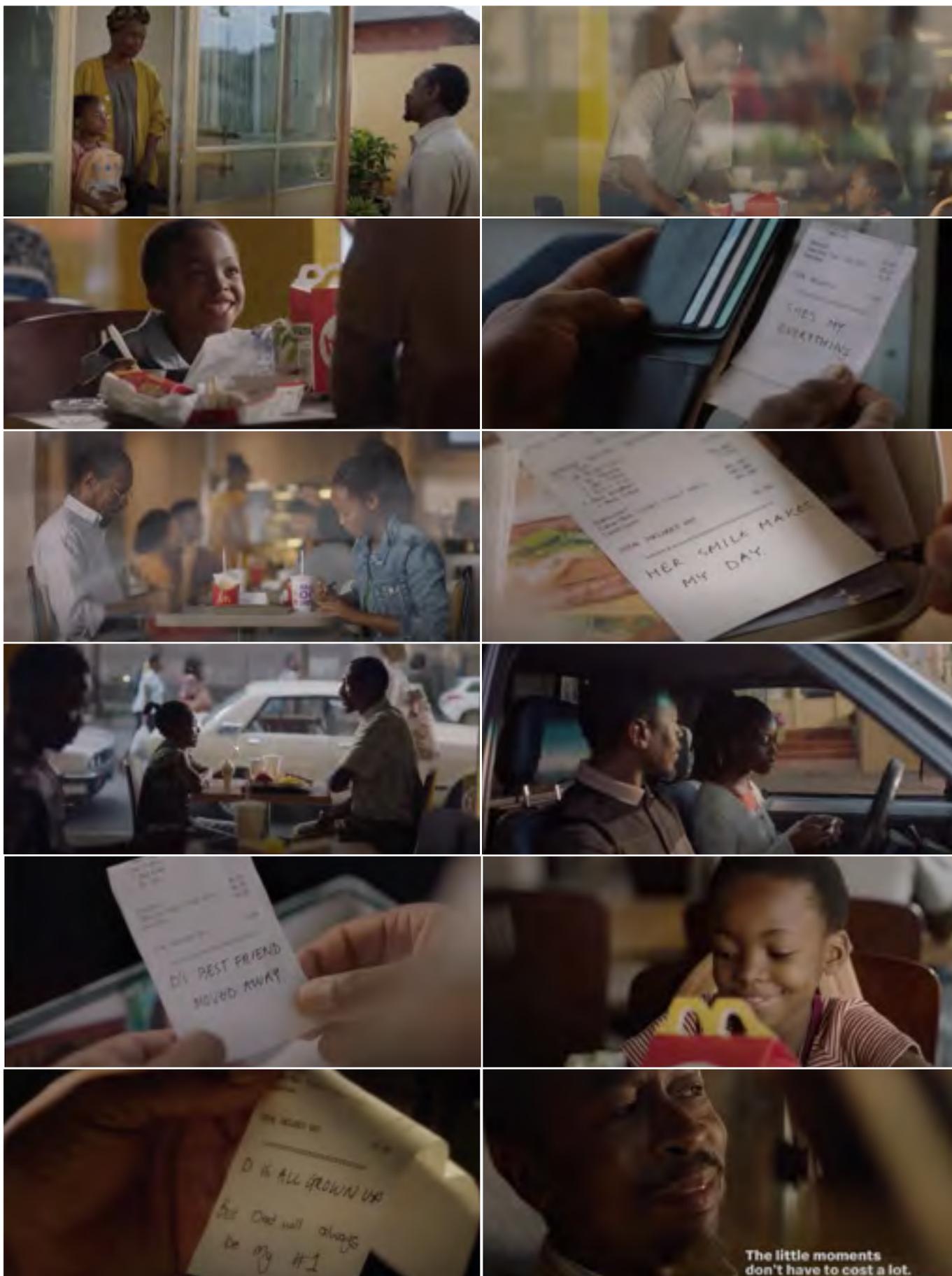
Many fast-food adverts use fantasies of “home” to mould children’s perceptions of food. For example, an advert from McDonald’s “Momentsoflov’in” campaign (see Figure 1) tells the story of a young girl sharing “lov’in’ moments” with her father, from early childhood to adulthood.

The emotional power of the advert comes from the intimacy of these shared moments at McDonald’s. The intensity of these moments is enhanced by the fact that the two do not speak: emotions are conveyed by their expressions and written notes to one another. The advert emphasises how the corporation is an integral part of the child’s journey to adulthood, and this association between fast food and her valued memories will lead to her long-term brand loyalty. The advert exploits children’s elemental needs for parental love and home, positioning a fast-food brand as central to fulfilling these needs.

Promoting valued identities

Another McDonald’s advert tells a story about a schoolchild who chooses an uncomfortable cheap seat in a taxi in order to save money to buy a “Quarter Pounder with cheese”. The advert concludes with him triumphantly showing off his

Figure 9: McDonald's "momentsoflovln" advert



Source: <https://www.youtube.com/watch?v=ru0pz4jXJfs>

McDonald's meal to his ice-cream-eating friends and joining the table of adult men eating burgers.

The child in Figure 10 is portrayed as an enterprising agent of change. While he is obviously poor, he strategically saves the money his grandmother gives him for taxi fare. Buying, displaying, and eating McDonald's food become a means through which the boy acquires valued gendered and classed identities. His school friends' immaturity in eating (unbranded) ice-creams is contrasted with his precocious manliness in buying a burger, seating himself among men, and greeting them with the words, "Yebo, Madoda". Considering that this is an advert for food, it is striking that no reference is made to his appreciation of its taste.

Exploiting children's rights to decision-making

As the largest fast-food chain in South Africa, KFC has addressed demographics that other food advertisers tend to neglect. This is evident in a KFC social media advert with the slogan, "There is nothing more annoying than having your head used as a napkin by your elders" (see Figure 11). The advert is set in a rural context where a poorly dressed boy interacts with his stereotypically traditional grandfather. After eating, the old man routinely wipes his hands on the boy's shaved head. Frustrated by this, the boy buys a KFC meal to share with his grandfather, whose enjoyment of the meal leads him to lick his fingers instead of wiping them.

Figure 10: Advert for McDonald's cheese burger



Source: <https://www.youtube.com/watch?v=PgB0liZTLak>

Figure 11: KFC's finger lickin' good advert



Source: https://www.youtube.com/watch?v=zj_F-N2iKNo

This advert creates two troubling messages. First, it implies that a poor rural South African child has the resources to purchase fast food spontaneously. Consequently, it completely obscures how poverty compromises many South African children's food choices. Secondly, it exaggerates the agency of children in creating valuable eating patterns.

The advert plays on the KFC slogan of "finger lickin' good" in its story of how a rural child transforms the eating habits of a traditional patriarch. This crude popularising of children's agency and right to participate in decision-making has been used to serve the profit-making interests of many companies advertising products to children.

What are the effects of advertising on children's tastes and eating habits?

As the KFC example shows, adverts often define children as the active shapers of their own – and others' – food tastes. The following analysis discusses the effects of advertising on 5 – 8-year-old children in a community of South African diaspora Indians living in Durban.^{iv}

Displacing family foodways

This sample study revealed that children and parents often negotiated meal choices. Adults were the overall gatekeepers of children's food consumption, but they allowed discussion about foods for family celebrations, and children usually chose fast foods. Although this may not be adults' intention, this further reinforces a manipulative advertising message: namely, that fast foods are always special and fun, whereas healthy and home-cooked meals are dull.

According to adult respondents, their young children are creating new patterns of influence around food eaten in the home because of their fascination with fast food. Fast foods have also had an influence on local foods such as those in Figure 12, as well as meals prepared at home. Interviews indicated that home-cooked meals include at least one fast-food item alongside other traditional dishes. Sometimes traditional dishes are infused with fast-food favourites such as melted cheese and French fries. These blended meals illustrate how family foodways in the sample have been transformed, often as a result of children being influenced by advertising. Interviews with parents in Durban therefore confirmed findings by other researchers that "the degree to which parents perceive fast-food consumption as socially normative are associated with children's greater fast-food consumption".¹⁴

Figure 12: A popular blended dish of curry and French fries wrapped in a roti



Source: <https://www.google.com/search?q=sunrise+foods+durban&tbm>

Manipulating children's emotions

Children in the sample study were frequently exposed to television and to brand logos and animated characters in adverts. They also often engaged with fast-food marketing through social media. Some children who played "advergames" were unaware that these games promoted McDonalds and that children were being targeted through embedded advertising messages. This confirms Sandra Calvert's claim that children under eight are especially responsive to stealth techniques in advertising, including the use of digital interactive technologies.¹⁵ For example, the use of Instagram allowed some children to follow a food brand by liking, sharing, or commenting on posts. Consequently, in ways that parents may not realise, their children are developing intimate and loyal attachments to fast-food brands through social media advertising.

Parents stated that children want to recreate the social milieu that adverts connect to fast foods. Because of advertising's enticing effects, children feel that they are almost part of the popular Disney movies and television shows often associated with these meals. Interviewed parents explained that their children attached feelings of longing and excitement to fast-food consumption, often mimicking the enthusiasm and excitement demonstrated in adverts.

Children's widely advertised ability to select from a variety of options was another reason for their enthusiasm about fast food. As Jennifer Patino and Eriberto Lozada explain, choice has become a hallmark of children's acquisition of a sense of "modernity" through globalised fast foods produced

^{iv} Telephonic interviews were conducted with parents of children during April 2020 (COVID-19 pandemic lockdown period). Purposive sampling was used to identify parents whose children were between the ages of 5 and 8 years. Five adults were interviewed about their own observations of children and their memories of past and evolving patterns.

Case 6: Food, malls and the politics of consumption

Sophie Chevalierⁱ

Children are not only confronted with industrial food and fast food promoted by the multimedia at home, but also in supermarkets and shopping malls).²⁴ For safety reasons most children are not allowed to roam in public. But malls are a place of licensed freedom for middle-class teenagers (from 10 years up). There they can meet their friends after school, often snack in cafes, stroll around in shops and go to the cinema – without adult supervision. Parents, who pay for it all, participate in choosing the film, but often not the meal afterwards. Children's spending money usually only allows them to eat in a fast-food outlet. This is preferable since they are spared the restaurant culture with its delays, waiter service, ordering from the menu and eating with

cutlery. Food halls are often close to cinemas and the latter sell sugar-sweetened beverages, popcorn and sweets for consumption while watching.

Hanging out in malls allows teens freedom of movement in a closed and protected space, but the standardized food, international movies and clothes designed for their age group also connect them to a global culture, along with pop music, international blockbusters, YouTube, Instagram, and global commerce. This experience constitutes an extended "rite of passage" to adulthood, framed by a neoliberal market geared to globalized mass consumption. Food must be analysed as one element of this broader set of commodities that target children and adolescents.

by corporations such as KFC.¹⁶ This "modernity" signals a paradigm change in liberal democracies, where children are socialised as the bearers of human rights. They are regarded not only as subjects of parental authority, but also as individuals with choices of their own. In her North American study, Amy Best describes how one fast-food advert capitalised on this. The advert depicts a child being told when to get up, being forced to do her homework, and being reprimanded for wearing certain clothes. She feels free to choose only when she stands in front of a fast-food counter to order and declares: "But at Subway I have the power to choose, and I eat it all up."¹⁷

Parents also stated that children were drawn to imagery depicting fast foods in relation to family entertainment and bonding, and adverts encourage children to locate fast foods as a central part of their fantasies and thoughts about home and family life.

What are some of the political, social and ethical implications and responses?

It is unsurprising that both McDonalds and KFC donated food to needy South Africans during the country's lockdown response to COVID-19.¹⁸ Philanthropic marketing strategies are designed to increase the popularity and growth of fast-food companies. They market themselves as generous supporters of families and communities, offering choices in a world where all individuals, including children, are free to make them. Yet analysing fast-food adverts and their effects on children reveals how they restrict children's scope to make healthy, age-appropriate, and informed choices.

Children are a special category, requiring both the right to freedom and the right to guided development. Fast-food advertising, which compromises their health, exploits their consumer status, and manipulates their behaviour, therefore demands multiple, coordinated responses. A legislative route would be guided by the best interests of the child as a principle enshrined in the South African Constitution and by the country's ratification of various treaties.

South Africa seemed ready to meet the WHO's call for state action when it introduced amendments to its Foods, Cosmetics and Disinfectants Act in May 2014. As explained in Case 7, the Department of Health's proposed R429 regulations aimed to prohibit the advertising of unhealthy food to children. They were also intended to ban celebrity endorsements and promotions of unhealthy food to children under the age of 18.¹⁹ Since the draft regulations have still not become law, the delayed legislation around fast-food advertising to children urgently needs to be enacted.

Critical responses beyond legislation also warrant attention. At present, the regulation of advertising to children in South Africa relies mainly on self-monitoring by food industries and marketing companies. Because their primary goal is to make profits through lucrative child markets, they cannot be relied on to address children's needs and rights. In fact, critical research has established that even when food industries formally commit themselves to responsible advertising, unethical and unhealthy advertising targeting children can continue. For example, Oliver Huiszinga and Michaela Kruse show that European food industries' signing

ⁱ University of Picardie Jules Verne

Case 7: Regulating the marketing of foods to children in South Africa: Are regulations necessary?

Mariaan Wicksⁱ

The prevalence of childhood obesity has increased globally, especially in low- and middle-income countries.^{25,26} In South Africa, overweight and obesity affects 13% of young children (0 – 5 years) and 17.4% of adolescents (15 – 19 years).²⁷ Childhood obesity is a strong predictor of adult obesity,²⁸ which holds major health and economic consequences for individuals, their families and society as a whole.²⁹⁻³¹ The marketing of unhealthy foods and beverages to children has been identified as a key driver in the global childhood obesity pandemic. Frequent exposure to food marketing influences children's food knowledge, preferences, consumption, diet quality and health.^{32,33}

In 2010, the World Health Assembly endorsed a set of recommendations to regulate the marketing of food and non-alcoholic beverages to children.³⁴ This was followed by similar measures to limit marketing of unhealthy foods to children in the Global Action Plan for the Prevention and Control of NCDs 2013 – 2020.³⁵ The *South African Marketing to Children Pledge*, a form of self-regulation by the food industry, was adopted by the Advertising Standards Authority of South Africa (ASASA) in 2008. Signatory companies pledged to use marketing communications that support healthier food choices by limiting unhealthy food marketing to children twelve years old and younger during specified timeslots.³⁶ However, participating companies have yet to develop their own action plan and no specific nutrition criteria exist to define unhealthy food products. Research indicates that industry self-regulation has been ineffective in reducing children's exposure to unhealthy food marketing.³⁷ In 2014, the South African Department of Health published draft regulations (R429) relating to the labelling and advertising of foods³⁸ which aim to restrict the marketing of unhealthy foods to children. Guideline 14 of the draft regulations (R429) provides specific criteria relating to the age of children (0 to 18 years), the timeslots in which unhealthy food marketing may not occur, the type of health messages used, and the definition of unhealthy foods. The draft food marketing regulations were followed in 2015 by the Strategy for the Prevention and Control of Obesity in South Africa 2015 – 2020³⁹ which also aimed to ensure responsible and ethical marketing of food by the food industry. Research indicates that such policy interventions are of high priority due to their potential population-wide effects, cost-effectiveness

and sustainability,^{40,41} yet no official action has been taken in South Africa to date.

Research into child-directed food marketing in South Africa is limited. Delpont and colleagues (2015) set out to investigate the various marketing techniques used in food and non-alcoholic beverages television advertisements aimed at children in South Africa. During the months of April, June, September and November of 2014, all advertisements aired on the four free South African TV channels were captured from 06:00 to 22:00. Of the advertisements captured, 21% were of food and non-alcoholic beverages of which 47% were aimed at children. Marketing techniques included the use of child actors (80.5%), tie-ins to popular television shows and cartoon characters such as Spongebob Squarepants® and Spiderman® (9.9%), and advertising during children's programmes (9.6%). Many of the adverts also used wording such as "good food made for great kids" and "smarter, tougher, faster". Food and beverage advertisements were primarily aired during family viewing time and included fast foods (20%), sweets, confectionary and savoury snacks (15%), supermarket promotions (14%), sugar-sweetened beverages and energy drinks (11%), breakfast cereals (9%) and alcohol (7%).⁴²

These findings support the need for progressive restrictions on the marketing of unhealthy foods to children in South Africa. Unhealthy foods are easily accessible, affordable and convenient with children in the poorest household frequently having the highest levels of exposure.⁴³ This can compromise diet quality and lead to an increase in obesity^{44,45} and/or micronutrient deficiencies.^{46,47} There is evidence that the marketing of healthy foods to children has the potential to improve diet quality,^{48,49} posing an interesting question namely, how best can healthy foods be marketed to children? In addition to television advertisements, children are also influenced by food packaging and placement, social media, smartphone applications and webpages. Therefore, governments need to decide if healthy foods may be marketed to children and to which specific platforms marketing restrictions should apply. Investment in child health is essential to promote optimal growth and development of children, restricting the marketing of unhealthy foods to children can contribute to better the health of all children in South Africa.

ⁱ Centre of Excellence for Nutrition, Faculty of Health Sciences, North-West University

of the self-regulating EU Pledge programme did not stop them from continuing to market unhealthy foods.²⁰

Children's lively interest in food rituals, tastes, and novelty has helped to make child-targeted fast-food advertising so effective. But this interest can be channelled in empowering ways. Moreover, responses can actively enlist children's decision-making, curiosity, independence, and creativity. Viveke Glaser illustrates this in his account of holistic strategies for educating children through their active participation in meal preparation.²¹ Pursuing a similar theme, Farber and Laurie show how gardening projects involving children in South Africa can promote children's interest in producing healthy food.²²

The promotion of enticing and healthy food-growing and preparation in schools, communities or homes could help counter the way that fast-food advertising captures children's imaginations in relation to food. As researchers have shown in a study in Soweto, outdoor advertising in many South African contexts is "obesogenic",²³ and even schools and their environments often actively promote unhealthy foods. Child-centred measures would therefore need to be fully supported by adults, paying concerted attention to the intensity and scope of advertising targeting children.

Avenues for critical public discussion through the print or social media, campaigns by communities or parents' groups, and increasing policy, academic, and media research are further ways of driving public and civic action. Such action would allow legislation and self-regulation to be complemented by the more sustainable strategy of internalising knowledge of healthy food within the broader context of critically confronting the current global food system.

Conclusion

As indicated by the WHO's recommendations over two decades ago, responses to the harmful impact of fast-food advertising on children should be wide-ranging. They would need to curb companies' and marketers' promotion of unhealthy foods through government policies and laws, as well as through self-regulation by industry. Interventions should also actively encourage healthy food tastes and interests, especially since marketing has done so much to foster desires for unhealthy foods and social habits around consuming them.

Yet it is also important to consider how responses will always be affected by the economic and political power of dominant interest groups and by the availability of resources. The delayed enactment of a law regulating fast-food marketing for children in South Africa speaks volumes about the political influence of the corporate food industry in this country.

Moreover, for many South Africans, healthy food resources are not available or accessible. This inaccessibility, as well as the limited time, means, and support mechanisms for encouraging healthy eating can severely undermine responses to unethical advertising. It is therefore clear that substantive solutions to fast-food advertising need to confront the exploitative nature of the food system as a whole. While fast-food advertising warrants careful critical scrutiny, it must also be connected to the broader economic system that controls how and what people eat.

References

- Braithwaite I, Stewart AW, Hancox RJ, Beasley R, Murphy R, Mitchell EA, et al. Fast-Food Consumption and Body Mass Index in Children and Adolescents: An international cross-sectional study. *BMJ open*. 2014;4(12).
- Whalen R, Harrold J, Child S, Halford J, Boyland E. Children's Exposure to Food Advertising: The impact of statutory restrictions. *Health Promotion International* 2019;34(2):227-35.
- Dant RP, Jin Jeon H, Mumdziev N, Windsperger J. A Cross-National Comparison of Brand Perceptions of Global Franchise Chains in the BRICS. *Journal of Marketing Channels*. 2016;23(4):196-216.
- Cassim SB. Food and Beverage Marketing to Children in South Africa: Mapping the terrain. *South African Journal of Clinical Nutrition*. 2010;23(4):181-5.
- Nichols AJ, Cullen P. The Child-Parent Purchase Relationship: 'Pester power', human rights and retail ethics. *Journal of Retailing and Consumer Services*. 2004;11(2):75-86.
- Prevention Institute. *The Facts on Junk Food Marketing and Kids* [Internet]. (undated). Accessed 20 November 2020: <https://www.preventioninstitute.org/facts-junk-food-marketing-and-kids>
- Tan L, Ng SH, Omar A, Karupaiah T. What's on YouTube? A case study on food and beverage advertising in videos targeted at children on social media. *Childhood Obesity*. 2018;14(5):280-90.
- Devereux S, Jonah C, J M. How Many Malnourished Children Are There in South Africa? What Can Be Done? In: Roelan K, Morgan R, Y T, editors. *Putting Children First: New frontiers in the fight against poverty in Africa CROP International Poverty Studies, vol 7*. Stuttgart: ibidem Press; 2019. p. 157-86.
- Mills L. Selling Happiness in a Meal: Serving the best interests of the child at breakfast, lunch and supper. *The International Journal of Children's Rights*. 2012;20(4):626.
- World Health Organization. *Set of Recommendations on the Marketing of Foods and Non-alcoholic Beverages to Children*. Switzerland: WHO; 2010. https://apps.who.int/iris/bitstream/handle/10665/44416/9789241500210_eng.pdf;jsessionid=85494459A40F867CCC415E228A1ADD5F?sequence=1.
- Cassim S, Bexiga D. The Regulation of Advertising to Children: A comparative assessment. *Alternation*. 2007;14(1):137-65.
- Mchiza Z, Temple N, Abrahams Z. Content Analysis of Television Food Advertisements aimed at Adults and Children in South Africa. *Public Health Nutrition*. 2013;16(12):2213-20.
- Nadeau M. *Food Advertising Directed at Children*. Prepared for the Quebec Coalition on Weight-Related Problems. Quebec, Canada: Public Health Association of Quebec; 2011.
- Grier SA, Mensinger J, Huang SH, Kumanyika SK, Stettler N. Fast-food Marketing and Children's Fast-food Consumption: Exploring parents' influences in an ethnically diverse sample. *Journal of Public Policy & Marketing*. 2007;26(2):221-35.
- Calvert S. Children as Consumers: Advertising and marketing. *The Future of Children*. 2008;18(1):205-34.
- Patino J, Lozada E. Cow's Milk as Children's Food: Insights from India and the United States. In: Klein J, Watson J, editors. *The Handbook of Food and Anthropology*. London: Bloomsbury Academic; 2019.
- Best A. *Fast-food Kids: French fries, lunch lines and social ties*. New York: New York University Press; 2017.
- Pacinamix. *McDonald's South Africa Donates Meals to the Country's First Responders*. [Internet]. 2020. Accessed 20 November 2020: <https://www.bizcommunity.com/Article/196/348/202113.html>
- Department of Health. *Labelling and Advertising of Foods (R429 of 29)*. Draft Regulations. 2014.
- Huiszinga O, Kruse M. Food Industry Self-regulation Scheme 'EU Pledge' Cannot Prevent the Marketing of Unhealthy Foods to Children. *Obesity Medicine*. 2016;1:24-8.
- Glaser V. Children's Active Participation during Meals in Early Childhood and Care Institutions. *Childhood*. 2019;26(2):236-49.
- Farber M, Laurie S. Home Gardening Approach. In: Thompson B, Almoroso L, editors. *Combating Micronutrient Deficiencies: Food-based approaches*. Rome: CAB International and FAO; 2010. p. 164-81.
- Moodley G, Christofides N, Norris SA, Achia T, Hofman KJ. Obesogenic Environments: Access to and advertising of sugar-sweetened beverages in Soweto, South Africa, 2013. *Preventing Chronic Disease*. 2015;12.
- Chevalier S, Food, malls and the politics of consumption: South Africa's new middle class, *Development Southern Africa*, Special issue on South Africa's Emergent Middle Class, 32(1),118-129. 2015.
- Lobstein T, Jackson-Leach R, Moodie ML, Hall KD, Gortmaker SL, Swinburn BA, et al. Child and adolescent obesity: part of a bigger picture. *The Lancet*. 2015;385(9986):2510-20.
- Abarca-Gómez L, Abdeen ZA, Hamid ZA, Abu-Rmeileh NM, Acosta-Cazares B, Acuin C, et al. Worldwide trends in body-mass index, underweight, overweight, and obesity from 1975 to 2016: a pooled analysis of 2416 population-based measurement studies in 128·9 million children, adolescents, and adults. *The Lancet*. 2017;390(10113):2627-42.
- National Department of Health (NDoH), Statistics South Africa (Stats SA), South African Medical Research Council (SAMRC). *South Africa Demographic and Health Survey 2016: Key Indicators*. Pretoria: NDOH, Stats SA, SAMRC; 2019.
- Kelsey MM, Zaepfel A, Bjornstad P, KJ N. Age-related consequences of childhood obesity. *Gerontology*. 2014;60(3):222-8.
- Litwin SE. Childhood obesity and adulthood cardiovascular disease: quantifying the lifetime cumulative burden of cardiovascular risk factors. *Journal of the American College of Cardiology*. 2014;64(15):1588-90.
- Nader PR, O'Brien M, Houts R, Bradley R, Belsky J, Crosnoe R, et al. Identifying risk for obesity in early childhood. *Pediatrics*. 2006;118(3):e594-e601.
- Sonntag D, Ali S, Lehnert T, Konnopka A, Riedel-Heller S, König HH. Estimating the lifetime cost of childhood obesity in Germany: Results of a Markov Model. *Pediatric Obesity*. 2015;10(6):416-22.
- Boylard EJ, Nolan S, Kelly B, Tudur-Smith C, Jones A, Halford JC, et al. Advertising as a cue to consume: a systematic review and meta-analysis of the effects of acute exposure to unhealthy food and nonalcoholic beverage advertising on intake in children and adults. *The American journal of clinical nutrition*. 2016;103(2):519-33.
- World Health Organization. *Report of the Commission on Ending Childhood Obesity*. Geneva: WHO; 2016.
- World Health Organization. *WHO Global Action Plan for the Prevention and Control of Noncommunicable Disease 2013-2020*. Geneva: WHO; 2013.
- World Health Organization. *Set of Recommendations on the Marketing of Foods and Non-alcoholic Beverages to Children*. Geneva: WHO; 2010.
- Advertising Standards Authority of South Africa. *The South African Marketing to Children Pledge* [Internet]. 2008. http://www.asasa.org.za/Default.aspx?mnu_id=114
- Kelly B, Vandevijvere S, Ng S, Adams J, Allemanni L, Bahena-Espina L, et al. Global benchmarking of children's exposure to television advertising of unhealthy foods and beverages across 22 countries. *Obesity Reviews*. 2019;20(S2):116-28.
- DOH. *R. 429 Foodstuffs, Cosmetics and Disinfectants Act (54/1972): Regulations relating to the Labelling and Advertising of foods: Amendment*. Pretoria; 2014.
- National Department of Health (NDoH). *Strategy for the Prevention and Control of Obesity in South Africa 2015-2020*. NDoH; 2016.
- Swinburn B, Kraak V, Rutter H, Vandevijvere S, Lobstein T, Sacks G, et al. Strengthening of accountability systems to create healthy food environments and reduce global obesity. *The Lancet*. 2015;385(9986):2534-45.
- Magnus A, Haby MM, Carter R, Swinburn B. The cost-effectiveness of removing television advertising of high-fat and/or high-sugar food and beverages to Australian children. *International Journal of Obesity*. 2009;33(10):1094-102.
- Delpont J. Branding and cartoon character usage in food marketing to children: the South African picture: North-West University North-West University; 2015.
- Nortje N, Faber M, De Villiers A. School tuck shops in South Africa—an ethical appraisal. *South African Journal of Clinical Nutrition*. 2017;30(3).
- Manyanga T, Tremblay MS, Chaput J-P, Katzmarzyk PT, Fogelholm M, Hu G, et al. Socioeconomic status and dietary patterns in children from around the world: different associations by levels of country human development? *BMC Public Health*. 2017;17(1):457.
- Maher A, Wilson N, Signal L. Advertising and availability of 'obesogenic' foods around New Zealand secondary schools: a pilot study. *The New Zealand Medical Journal*. 2005;118(1218).
- Da Costa Louzada ML, Baraldi LG, Steele EM, Martins APB, Canella DS, Moubarac J-C, et al. Consumption of ultra-processed foods and obesity in Brazilian adolescents and adults. *Preventive Medicine*. 2015;81:9-15.
- Moubarac J-C, Batal M, Louzada ML, Martinez Steele E, Monteiro CA. Consumption of ultra-processed foods predicts diet quality in Canada. *Appetite*. 2017;108:512-20.
- Hanks AS, Just DR, Brumberg A. Marketing Vegetables in Elementary School Cafeterias to Increase Uptake. *Pediatrics*. 2016;138(2):e20151720.
- Keller KL, Kuilema LG, Lee N, Yoon J, Mascaro B, Combes A-L, et al. The impact of food branding on children's eating behavior and obesity. *Physiology & Behavior*. 2012;106(3):379-86.

Food and nutrition security of the unborn child: The role of maternal nutrition

Elize Symington^a, Shane Norris^b and Marius Smuts^c

~ If we change the beginning of the story, we change the whole story. ~

The mother's role in a child's upbringing is all-encompassing. The Nurturing Care Framework recognises the central role of mothers and families in creating an environment in which children can thrive by providing good health, adequate nutrition, responsive caregiving, security and safety, and opportunities for early learning.^{1,2} Yet less emphasis has been placed on the child in the womb. It seems obvious that maternal health and nutrition during pregnancy play an important role in the health of the foetus as complex biological processes and rapid cell differentiation occur during a relatively short period. However, it was only about four decades ago that the extent of adverse foetal exposures on long-term health was highlighted. Barker and colleagues demonstrated that cardiovascular diseases in English and Welsh adults were associated with undernutrition *in utero*.³ This sparked many retrospective and cohort studies which provided evidence in support of the hypothesis – *Developmental Origins of Health and Disease* (DOHaD).

This chapter explores the impact of maternal health on children's nutritional status, and identifies opportunities to address the double burden of malnutrition in women and children, by examining the following questions:

- How do maternal risk factors impact on their children's nutritional status?
- What is the current status of maternal and child nutrition in South Africa?
- What are the drivers of the double burden of malnutrition?
- What are the recommendations for action?

How do maternal risk factors impact on their children's nutritional status?

Epidemiological studies in natural history cohorts identified that a lower birth weight was associated with an increased risk

for glucose intolerance, high cholesterol, and hypertension in adult life.⁴ While maternal iron deficiency in pregnancy is associated with neurocognitive deficits in infants,⁵ maternal obesity and gestational diabetesⁱ increase the risk of their children developing metabolic syndrome and obesity in childhood,^{6,7} as well as obesity and insulin resistance in adulthood.⁸

A child exposed to rapid maternal weight gain during early foetal development, followed by undernutrition postnatally, may be more prone to develop abdominal obesity and non-communicable diseases (NCDs) in later life. Moreover, the offspring of an obese mother might have poor growth and development in early life.⁹ These intergenerational effects have been illustrated in Figure 2 in Chapter 1.

Physical and nutritional exposures are not the only risk factors. Women with mental health disorders have an increased risk of delivering small for gestational age babies,¹⁰ and similarly, violence during pregnancy is associated with decreased birth weight and increased rates of prematurity.¹¹ The adverse effects of tobacco and alcohol use during pregnancy is well known.^{12,13}

There is also growing evidence of the importance of maternal health even before conception. Recent observational studies suggest that micronutrient supplementation both at pre- and periconception may reduce the risk of adverse outcomes.¹⁴

Optimal preconception care can improve the health and well-being of women, couples, subsequent pregnancies, and ultimately, child health outcomes. Therefore, the health of the biological mother and father¹⁵ have a significant intergenerational impact on their children, and optimal maternal well-being is significantly associated with the health of children.

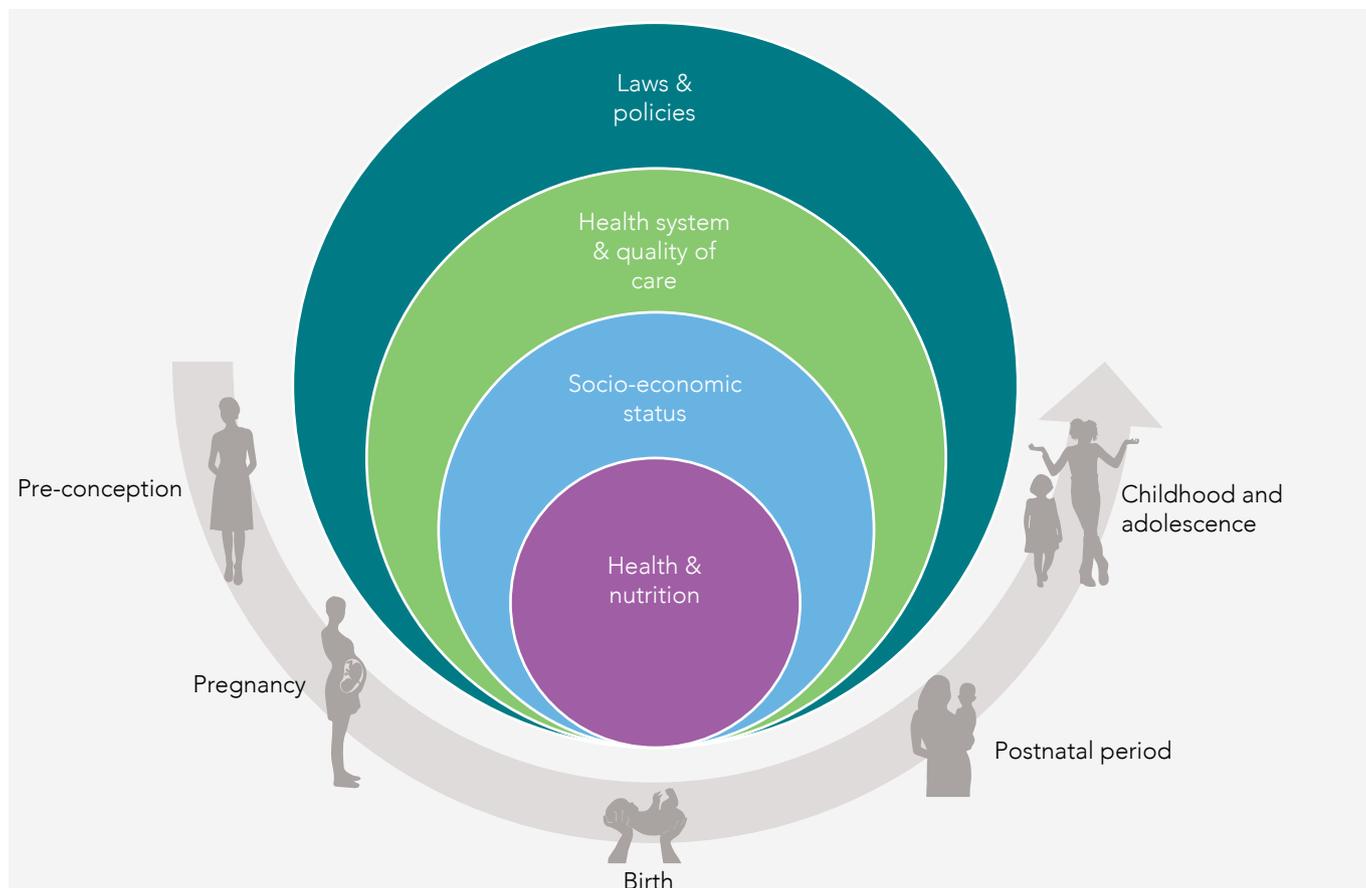
i Where raised glucose or blood sugar levels are first identified during pregnancy.

a Department of Life and Consumer sciences, UNISA

b DSI-NRF Centre of Excellence in Human Development, University of the Witwatersrand

c Centre of Excellence for Nutrition, North-West University

Figure 13: External drivers of maternal morbidity impact on the health and development of their children



Adapted from: Filippi V, Chou D, Barreix M, Say L, Barbour K, Cecatti JG, et al. A new conceptual framework for maternal morbidity. *International Journal of Gynecology and Obstetrics*. 2018;141:4-9.

From maternal mortality to maternal care

Maternal health was not a topic of research, policy-making and programming until 1985.^{16, 17} After a call to global agencies to prioritise maternity care, many programmes and initiatives were implemented to address maternal mortality, including the Millennium Development Goals (MDGs). In the past 20 years, maternal mortality has declined in most parts of the world, including South Africa. However, recent calls for maternal care beyond preventing death have increased.¹⁸ There is a shift in maternal care to ensuring that mothers not only survive but thrive, as outlined in the “Survive, Thrive and Transform” agenda of the Global Strategy for Women’s, Children’s and Adolescents’ Health (2016 – 2030).¹⁹ In 2012, the World Health Organization (WHO) established a Maternal Morbidity Working Group to focus on maternal morbidity and “any health condition attributed to and/or complicating pregnancy and childbirth that has a negative impact on the woman’s well-being and/or functioning”. One outcome from the working group was the Maternal Morbidity Measurement Framework. The framework identifies several factors that require attention to optimise maternal well-being. This

chapter focuses on the external drivers of maternal morbidity (and their children’s health) from a nutrition perspective (Figure 13).

These external factors include the woman’s economic stability, education, social and community context, health and health care, as well as neighbourhood and environment. These social and environmental determinants of health interact with the woman’s reproductive health cycle and influence her risk of becoming pregnant, experiencing illness, and complications during pregnancy and childbirth.¹⁹ The health of women and consequently, that of their children, is affected by this range of external factors which need to be addressed to enable women and their children to thrive.

What is the current status of maternal and child nutrition in South Africa?

South Africa is experiencing a double burden of malnutrition (DBM)²⁰ where undernutrition (i.e. micronutrient deficiency, underweight, and childhood stunting and wasting) along with overweight, obesity (and the associated diet-related NCDs) co-exist within individuals, households and populations,

throughout life.²¹ At household level, DBM is defined as at least one or more members with wasting, stunting or thinness plus one or more members with overweight or obesity within the same household.²⁰ To further qualify as a household with a DBM, it can occur in one of four ways:

- The child is both stunted and overweight.
- The mother is overweight and one child <5 years has wasting.
- The mother is overweight and one child <5 years is stunted.
- The mother is thin and one child overweight.

DBM at household level affects most low- and middle-income countries (LMICs) and South Africa is no exception. According to Popkin and colleagues, DBM is especially prevalent in sub-Saharan Africa, south Asia, west Asia and the Pacific.²⁰ In South Africa, the DBM has been shown in household surveys that indicated that overweight/obese mothers were more likely to have undernourished, specifically stunted, children.^{22, 23}

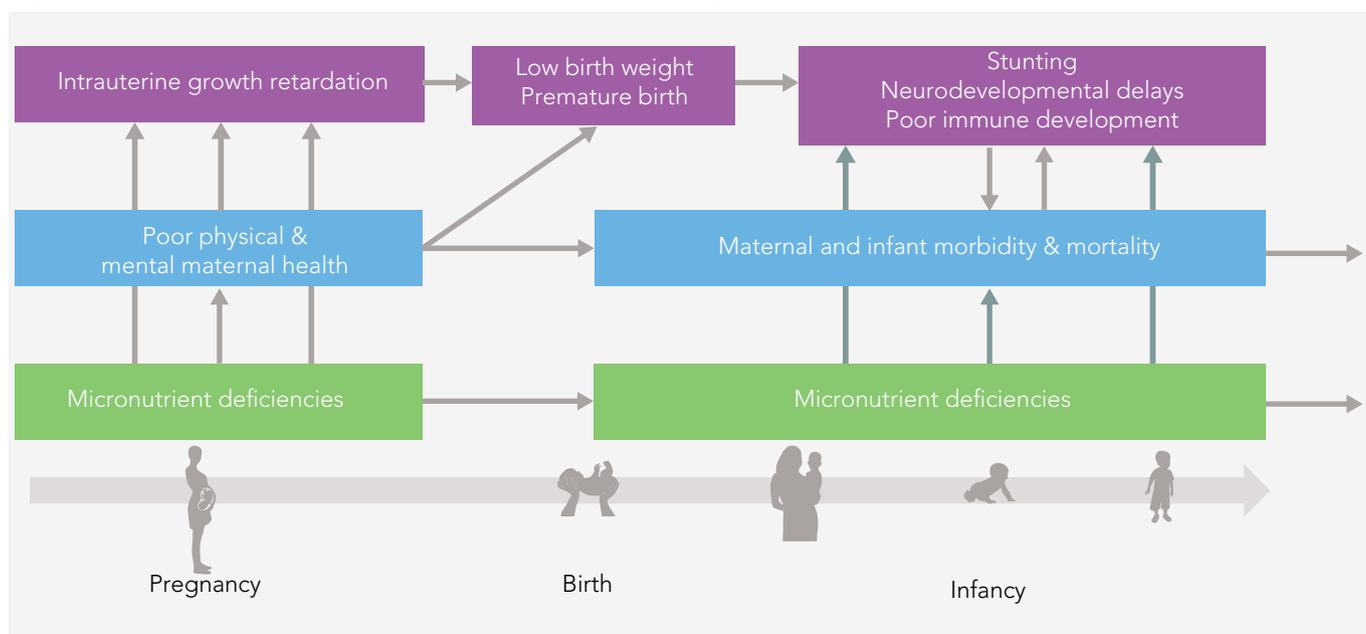
A large body of evidence confirms the effect of maternal malnutrition on foetal development and the health of the child in later years. In this context, the prevalence of the DMB at an individual level, that is in the mother, is a concern. DBM that manifests during the earlier phases in the life cycle (foetal development) is particularly harmful during the sensitive periods or critical windows of development. This is when the expression of the genes and maturation of the microbiome (within the digestive system of the child) is particularly responsive to nutritional influences.⁸ All these

mechanisms respond to both inadequate and excessive levels of nutritional exposures in early life, which explains how crucial early nutrition and growth are for long-term health and human capital.^{24, 25} Figure 14 illustrates the consequences of micronutrient deficiencies in pregnancy.

The double burden of obesity and micronutrient deficiencies in an individual woman of reproductive age may have an even worse effect on the health of her child. The burden on the unborn children of South Africa is therefore of great concern as obesity prevalence among women in South Africa is much higher than the global prevalence of 15%.²⁶ In 2016, 41% of women in South Africa were obese and 33% were anaemic.²⁷ Pregnant women are screened according to body mass index (BMI) and mid upper arm circumference during pregnancy but the Guidelines for Maternity Care in South Africa²⁸ provide no recommendations on nutritional advice to be given according to weight status.

Concerningly, obesity is often associated with poorer micronutrient status.^{9, 29} In South Africa, obesity in women of reproductive age (WRA) was associated with iron deficiency.³⁰ This places an additional risk on the unborn child. Data on the micronutrient status of pregnant women in South Africa is sparse.³¹ Between 2005 and 2015, no national or subnational surveys were published on the micronutrient status of apparently healthy pregnant women in South Africa (compared to 8 studies in Ethiopia and 17 in Nigeria).³¹ The South African Comparative Risk Assessment group estimated that in 2000, 9 – 12% of South African pregnant women had iron deficiency anaemia, which was estimated to contribute

Figure 14: Consequences of micronutrient deficiencies in pregnancy



Adapted with permission from: Module 1 of the ImpENSA capacity building project. Accessed 30 November 2020 at: www.early-nutrition.org/impensa/

Table 8: National surveys on nutrition indicators for women in South Africa, 1998 – 2016

	SADHS 1998 15+ years	SADHS 2003 15 – 49 years	NFCS 2005 16 – 35 years	SANHANES 2012 16 – 35 years	SADHS 2016 ²⁷ 15 – 49 years
Tobacco use during pregnancy	9% (n=198)	Not reported	Not reported	Not reported	1.6% (n=1,574)
Alcohol consumption during pregnancy	7% (n=191)	1% (n=not reported)	Not reported	Not reported	2.8% (n=1,574)
Anaemia Hb <12 g/dl in WRA Hb <11 g/dl in pregnancy	Not reported	Not reported	29% (n=2,126)	16 – 35 years: 23% (n=1,359)	Pregnant: 39.1% (n=109) 15 – 54 yrs: 32.4% (n=3,211)
Iron deficiency Fer <15 µg/L	Not reported	Not reported	45% (n=1,906)	16 – 35 years: 15% (n=1,223)	Not reported
Underweight	5.6% (n=7,970)	6.2% (n=4,481)	4.6% (n=2,403)	16 – 54 years: 4% (n=4,695)	15 – 54 years 2.9% (n=3,497)
Stunting Height <145cm	Not reported	Not reported	Not reported	Not reported	15 – 54 years 1.7% (n=3,672)
Overweight	26% (n=7,970)	28% (n=4,481)	27% (n=2,403)	16 – 54 years: 25% (n=4,695)	15 – 54 years 25.9% (n=3,497)
Obesity	30% (n=7,970)	27% (n=4,481)	25% (n=2,403)	16 – 54 years: 39% (n=4,695)	38.1% (n=3,497)
Vitamin A deficiency Retinol < 0.70 µmol/L	Not reported	Not reported	27% (n=2,450) (serum vit A <20µg/dL)	16 – 35 years: 13% (n=1,158)	Not reported
Night blindness	Not reported	0.7% (n=1,859)	Not reported	Not reported	≥15 years 12.3% (n=333)
Vitamin A supplementation received	Not reported	34.3% (n=1,859)	Not reported	Not reported	≥15 years 33.7% (n=333)

Notes: WRA: women of reproductive age; SADHS: South Africa Demographic and Health Survey; Hb: haemoglobin; Fer: ferritin;

NFCS: National Food Consumption Survey; SANHANES: South African National Health and Nutrition Survey.

Sources: Department of Health, Macro International. South Africa Demographic and Health Survey 1998 [Internet]. Pretoria, South Africa; 2002. Available from: <http://dhsprogram.com/pubs/pdf/FR131/FR131.pdf>;

Department of Health, Medical Research Council, OrcMacro. South Africa Demographic and Health Survey 2003 [Internet]. Pretoria, South Africa; 2007. Available from: <https://dhsprogram.com/publications/publication-FR206-DHS-Final-Reports.cfm>;

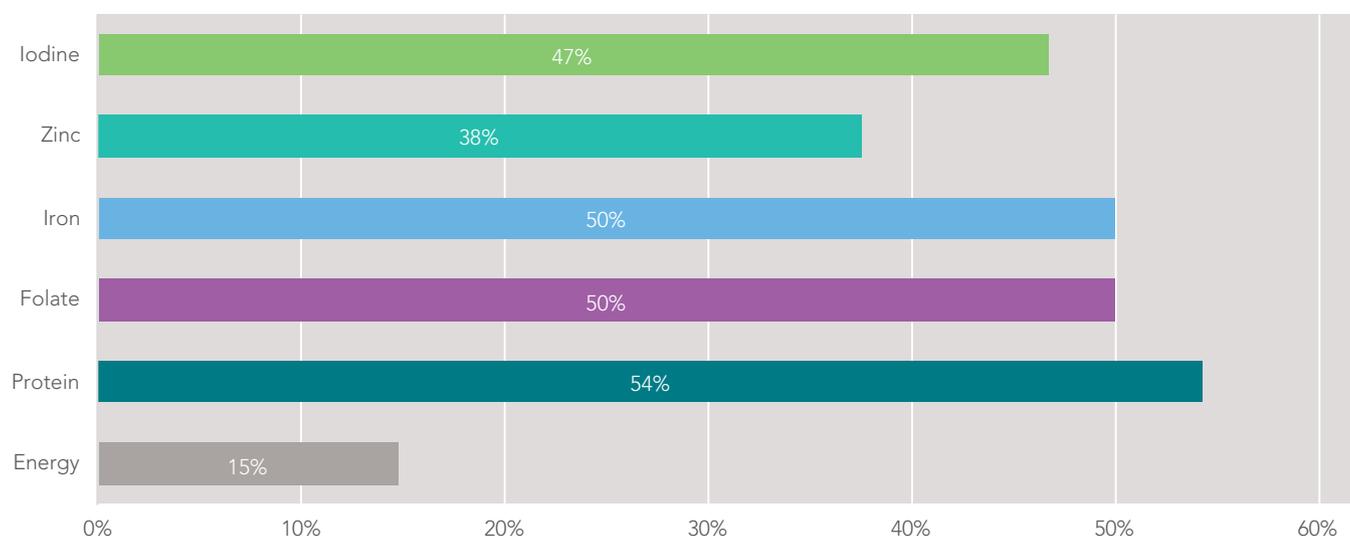
Labadarios D, Swart R, Maunder E, Kruger H, Gericke G, Kuzwayo P, et al. Executive summary of the National Food Consumption Survey Fortification Baseline (NFCS-FB-I) South Africa, 2005. *South African Journal of Clinical Nutrition*. 2008;21(3):245–300;

Shisana O, Labadarios D, Rehle T, Simbayi L, Zuma K, Dhansay A, et al. South African National Health and Nutrition Examination Survey, 2012 (SANHANES-1) [Internet]. 2nd ed. Cape Town: HSRC Press; 2014. Available from: <http://www.hsrc.ac.za/en/research-data/view/6493>; National Department of Health (NDoH), Statistics South Africa (StatsSA), South African Medical Research Council (SAMRC), ICF. South Africa Demographic and Health Survey 2016. Pretoria, South Africa and Rockville, Maryland, USA; 2019; .

to 7% of perinatal deaths and 5% of maternal deaths.³² More recent regional studies indicate no improvement in the prevalence of iron deficiency anaemia among pregnant women. This is despite the routine high-dose iron supplements that are provided (60mg elemental iron)^{28, 33} and the mandatory fortification of staples (maize meal and bread flour) which has been in place since 2003 (with eight vitamins and minerals including iron and folic acid).³⁴ In addition to

iron supplementation, pregnant women receive high dose folic acid (5mg) and 1,000mg calcium daily during pregnancy. Even though South Africa has successfully implemented the salt iodisation policy, iodine deficiency among pregnant women in Limpopo is high (45%). Since there is limited data on pregnant women, studies on WRA are used as a proxy for the deficiency burden in pregnant women (Table 8).

Figure 15: Percentage increase in energy, protein and micronutrient requirements in the third trimester of pregnancy



Source: National Academy of Sciences. Dietary Reference Intakes (DRIs): Recommended Dietary Allowances and Adequate Intakes, total water and macronutrients. 2011. Available from: <https://www.ncbi.nlm.nih.gov/books/NBK56068/table/summarytables.t4/?report=objectonly>; National Academy of Sciences. Dietary Reference Intakes (DRIs): Recommended Dietary Allowances and Adequate Intakes, elements. 2019. Available from: https://www.ncbi.nlm.nih.gov/books/NBK545442/table/appJ_tab3/?report=objectonly; National Academy of Sciences. Dietary Reference Intakes (DRIs): Recommended Dietary Allowances and Adequate Intakes, vitamins. 2011. Available from: <https://www.ncbi.nlm.nih.gov/books/NBK56068/table/summarytables.t2/?report=objectonly> Analysis by Elize Symington.

A 2017 review of micronutrient status among WRA indicates that 23% were anaemic, 16% iron deficient and 10% had iron deficiency anaemia,ⁱⁱ 22% were vitamin A deficient and 20% iodine deficient.³¹ It is important to note that nutritional requirements increase during pregnancy, especially from the second trimester. When compared to pre-pregnancy requirements, energy needs only increase 11 – 15%, while the micronutrient and protein requirements increase up to 54% (Figure 15). Therefore, the emphasis on the inclusion of nutrient-dense foods and dietary diversity becomes essential to meet these micronutrient requirements without providing excessive energy.

The health effects of the DBM include an increased risk for NCDs.³⁸ In South Africa, NCDs are among the top causes of death, accounting for 44% of deaths in WRA in 2013.³⁹ NCDs are major causes of death and disability globally,⁴⁰ killing 41 million people each year (and accounting for 71% of deaths).⁴¹ While previously more common in high-income western countries (HICs), the prevalence of NCDs is rapidly increasing in LMICs.^{42, 43} From 1980 to 2014, the prevalence of diabetes remained mostly unchanged in western Europe but doubled in sub-Saharan Africa, India and China to levels that are now higher than in HICs.⁴⁰ Death rates from cardiovascular disease in many LMICs now also exceed those in HICs.⁴⁴

NCDs are occurring at younger ages and more aggressively in LMICs,⁴⁰ and are creating crippling economic, societal, and personal costs, with worse to come.

Policies, guidelines, and strategies

South Africa has several policies, guidelines and strategies in place to improve the nutritional status of the general population (including WRA) as well as pregnant women by addressing overweight and micronutrient deficiencies (see Table 2 for a summary). These interventions have tended to be fragmented and greater efforts are needed to ensure an integrated approach to the DBM across the life course. This includes a better understanding of the causes or drivers of the DBM.

What are the drivers of the double burden of malnutrition?

Many LMICs have experienced a nutrition transition due to urbanisation, income growth, expansion of the global food industry and change in household dynamics (women working outside of the home).²⁰ This transition has been accompanied by an increase in access to and consumption of ultra-processed foods rich in refined carbohydrates (including sugar), fat, salt and additives,^{45, 46} also referred to

ii Anaemia is measured by haemoglobin status: <12 g/dL for WRA. Iron deficiency is measured by iron stores, i.e. serum ferritin: <15 ng/dL. In iron deficiency anaemia, both haemoglobin and ferritin are low.

Table 9: Summary of South African policies, guidelines and strategies addressing obesity and/or micronutrient deficiency in women of reproductive age and/or pregnant women

Document	Years of implementation	General public (incl. WRA)	PW	Obesity	Micronutrients
National Guidelines on Nutrition Counselling, Support, and Treatment for Malnourished Individuals	2015 ongoing	Yes	Yes	Yes	Yes
Food-based Dietary Guidelines	2012 ongoing	Yes	Yes	Yes	Yes
South African Food Guide	2012 ongoing	Yes	Yes	Yes	Yes
Regulations relating to the Fortification of Certain Foodstuffs	2003 ongoing	Yes	Yes	No	Yes
Regulations relating to the Mandatory Iodisation of Salt	1995 ongoing	Yes	Yes	No	Yes
Roadmap for Nutrition in South Africa	2013 – 2017	Yes	Yes	Yes	Yes
Basic Antenatal Care (BANC) Handbook	2007 ongoing	n/a	Yes	No	Yes
Standard Treatment Guidelines and Essential Medicines List for South Africa	2018 ongoing	Yes	Yes	Yes	Yes
Roadmap for the Provision of a Maternal and Child Health Package of Care for the First 1,000 Days	Draft	Yes	Yes	Yes	Yes
Guidelines for Maternity Care South Africa	2016 ongoing	n/a	Yes	Yes	Yes
Adult Primary Care Guide	2016/2017	Yes	Yes	Yes	Yes
Health Promotion Policy and Plan	2015 – 2019	Yes	Yes	Yes	No
Strategy for the prevention and control of obesity in South Africa	2015 – 2020	Yes	Yes	Yes	No
National Strategic Plan for the Prevention and Control of Non-communicable Diseases	2020 – 2025	Yes	No	Yes	No
Strategic plan for Maternal, Newborn, Child and Women's Health and Nutrition in South Africa	2012 – 2016	n/a	Yes	No	Yes

WRA: women of reproductive age; PW: pregnant women
Dark grey blocks indicate missed opportunities to address nutrition-specific matters

as obesogenic food environments. Ultra-processed foods are often more affordable, accessible and convenient than healthier foods,⁴⁵ which results in limited healthy options for those living in poverty. More than a quarter of South Africans live below the food poverty line.⁴⁷ Many women are unemployed (39%) and are not living in a union (married or living with a partner) (64%), which further contributes to the poverty of pregnant women.²⁷ Poverty is closely associated with food insecurity. Approximately 20% of South African households had inadequate access to food in 2017.⁴⁷ These conditions worsen in unstable situations such as with the national lockdown during the COVID-19 pandemic.⁴⁸

While South Africa is battling household food insecurity, increased access and utilisation of processed food⁴⁹ and an increasing trend in sales of fast and processed food and sugar-sweetened beverages is evident.^{20, 50, 51} High intakes of

processed food are associated with obesity in Africa,⁵² and ultra-processed foods are associated with cardiovascular disease and all-cause mortality in Europe.^{46, 53} Apart from the physiological effect of insufficient food, eating ultra-processed foods has psychological effects too and impacts on the overall well-being of individuals.⁵⁴ Food insufficiency among pregnant women in Cape Town was associated with depressive symptoms.⁵⁵ Depressive disorders are among the most debilitating disorders worldwide and adversely affect the overall well-being of women (pre- and postnatally), compromising their capacity to care for their children and provide nurturing environments. In addition to changing food environments and high levels of food insecurity, South African women's food choices are affected by cultural beliefs. For example, pregnant women in the Eastern Cape reported avoiding nutrient-dense foods such as meat products, fish,

Case 8: Exclusive breastfeeding intentions and food insecurity of pregnant women

Freda Philander, *Institute for Social Development, University of the Western Cape*

Food security is imperative during the antenatal period as the physical and neurological development of the child takes place in-utero.⁶⁶ A nutritious diet during pregnancy contributes to children having a higher birth weight and a better chance of a healthy life.⁶⁷ Yet mothers in low-income households often struggle to purchase adequate nutritious food. Similarly, research indicates that decisions to exclusive breastfeed are made during the antenatal period, and these intentions predict exclusive breastfeeding outcomes.⁶⁸

This case reports on the findings of a cross-sectional research study using self-administered closed-ended questionnaires to determine the influence of household food insecurity on the exclusive breastfeeding intentions of 530 women attending an antenatal clinic in Delft, Western Cape. Seventy-two percent of the women expressed anxiety and stress due to the uncertainty of their households' food supply. Only 3% of the women's households were considered to be food secure, with 7% being mildly food insecure, 11% being moderately food insecure, and a staggering 80% being severely food insecure. Two thirds of women (66%) described living in households without sufficient quality of food, with 56% having an insufficient quantity of food. Half of the women (52%) were unemployed. This was significantly higher than the official unemployment rate of 19% or the expanded unemployment rate of 23% for the Western Cape.⁶⁹ The proportion of women having no income in this study (32%) was much higher than in the broader Delft population (17%).⁷⁰ The Child Support Grant was the only source of income for 14% of the pregnant women and they received grants for only 27% of their prior children.

Pregnant women who experience adversity such as food insecurity and stressful life events are more likely to experience mental distress that may extend into the postnatal period and impact on their capacity to care for their newborn child.⁷¹ In addition, pregnant adolescents are more at risk than adult pregnant women to common mental disorders such as depression and anxiety.⁷²

Those women who had no or limited income were 20% more likely to experience household food insecurity (aOR=0.2; Pr=0.03). However, access to the CSG had a protective effect and was associated with a five-fold increase in food security (aOR=5.5; Pr=0.00).

Seventy-three percent of the women expressed their intention to exclusively breastfeed. Reasons given

included that breastmilk is healthy for the baby (34%); it is affordable (9%), and concerns about their HIV-status (1%). The primary reason given by the remaining 27% of pregnant women who did not intend to practice exclusive breastfeeding, was their need to return to work or to seek work. As reported by Witten et. al. (2020), the majority of women (72%) in this study also believed it was important for mothers to consume adequate and nutritional food in order to practice exclusive breastfeeding.⁷³

While the majority of women expressed an intention to practice exclusive breastfeeding, household food insecurity may undermine pregnant women's decision to exclusively breastfeed as the Pearson's chi-squared test confirms a statistically significant association between household food insecurity and exclusive breastfeeding intention.

This study confirms the importance of household food security for pregnant women. The CSG is one of South Africa's largest social protection programmes to improve household food security. Yet, the primary caregiver can only apply for the CSG once the child has been born. *This study recommends that the Department of Social Development extend the CSG to pregnant women to improve household food security and nutrition outcomes.*

Women in low-income communities or no-income communities do not have finances to visit the South African Social Security Agency offices to apply for CSG. *The study recommends that the services provided by the mobile office for the registration of newborns at the clinics be extended to enable mothers who qualify to apply for the CSG.*

Pregnant women also experienced a lack of access to affordable and nutrient-rich food. Having little to no income makes it more challenging for these pregnant women to acquire much-needed food. *The study recommends that community-based non-profit organisations should provide nutritious meals to pregnant women to improve the nutritional health of both the mother and the unborn child. The necessary funding for the NPOs should be provided by the Department of Social Development.*

Food insecurity was one of the factors undermining women's intentions to exclusively breastfeed. Providing income during the antenatal period will increase women's ability to purchase nutritious food at a critical point in children's development. This will not only improve maternal nutrition and foetal development, but also support women's intention to exclusively breastfeed as women still connect what they eat to the quality of their breastmilk.

Table 10: Summary of ten priority candidates for double-duty actions

Health systems	<ol style="list-style-type: none"> 1. Scale up new WHO antenatal care recommendations 2. Scale up programmes to protect, promote, and support breastfeeding 3. Redesign guidance for complementary feeding practices and related indicators 4. Redesign existing growth monitoring programmes 5. Prevent undue harm from energy-dense and micronutrient-fortified foods and ready to use supplements
Societal safety nets	<ol style="list-style-type: none"> 6. Redesign cash and food transfers, subsidies, and vouchers
Educational settings	<ol style="list-style-type: none"> 7. Redesign school feeding programmes and devise new nutritional guidelines for food in and around educational institutions
Agriculture, food systems, and food environments	<ol style="list-style-type: none"> 8. Scale up nutrition-sensitive agriculture programmes 9. Design new agricultural and food system policies to support healthy diets 10. Implement policies to improve food environments from the perspective of malnutrition in all its forms

Adapted from: Hawkes C, Ruel MT, Salm L, Sinclair B, Branca F. Double-duty actions: Seizing programme and policy opportunities to address malnutrition in all its forms. *Lancet*. 2020;395(10218):142-55.

potatoes, fruits, beans, eggs, butternut and pumpkin for cultural concerns about the effect on pregnancy outcome.⁵⁶

Even though the mechanisms are not well understood, it is evident that replacing nutrient-rich foods with energy-dense foods is an emerging contributor to stunting^{53, 57, 58} and that the first 1,000 daysⁱⁱⁱ of life is a particularly sensitive period of development.²⁰ The DBM may also affect the health of both mother and child during childbirth. For example, an overweight mother of short stature who never reached her full height potential may have a smaller pelvis (leading to birth complications) and an increased risk of delivering a high birth weight baby or developing gestational diabetes.⁵⁹ It is due to this complex array of drivers – from food environments to social beliefs – that there is a call for comprehensive actions to address the health of women and their children. These comprehensive actions are also referred to as double-duty actions.

What are the recommendations for action?

The best window of opportunity for interventions to prevent and mitigate the DBM includes the continuum of the early life cycle: preconception, pregnancy, as well as early infancy.⁸

A call for double-duty actions

In the Lancet Series on DBM, Hawkes and colleagues explain how double-duty actions can strengthen the potential to reduce undernutrition, overweight, and diet-related NCDs.⁶⁰ A holistic approach to addressing malnutrition in all its forms is necessary as very often different forms of malnutrition are managed by separate policies, programmes, governance structures, and funding streams. As has become evident from the preceding discussions, undernutrition, obesity, and diet-related NCDs are intrinsically linked through early-

life nutrition, dietary diversity, food environments, and socioeconomic factors. Therefore, double actions are needed to reduce the risk of NCD development. This is reflected in Target 2.2 of the SDGs which aims to “end all forms of malnutrition”.⁶¹ Therefore, the sooner siloed approaches in efforts to tackle malnutrition in all its forms are replaced by double-duty actions, the better off the next generation will be. Using the same platforms for shared actions to address the co-existence of both undernutrition, obesity, and diet-related NCDs is more sustainable and cost-effective. Hawkes and colleagues proposed ten strong candidates for double-duty actions across different sectors, including health services, social safety nets, educational settings, agriculture, food systems and food environments.⁶⁰ This framework has been adapted and summarised in Table 3.

However, there are very few life-course double-duty interventions that start at preconception to impact health outcomes in the child. Such interventions are essential to provide both a better understanding and an evidence base to optimise preconception health and break intergenerational trajectories of ill-health or NCDs. One such example is the Healthy Life Trajectories Initiative in Case 10. Comprehensive approaches are most probably the only solution to this multi-faceted problem and will require societal shifts in the way nutrition and public health are approached.

In South Africa, we propose a double-duty strategy with a focus on the following three elements:

- **Preconception care: Optimising women’s health and nutrition:** The Lancet series on preconception health concluded that optimising preconception health could have a significant benefit for the future health of women and the prevention of intergenerational health risks. Observational evidence from several countries around

iii First 1,000 days of life: the period spanning from conception to the age of 2 years.

the world supports the conclusion that interventions that support women to optimise their health (including micronutrient status and managing their weight even before they become pregnant) may combat intergenerational obesity and NCD-risk. Since preconception clinics do not exist, the opportunities at family planning, diabetic and HIV/TB clinics should be optimised. Dietary counselling and nutritional advice should be built in as part of these services to make every contact count. This should include counselling on optimising body weight and micronutrient status within this health setting. There is motivation for the preconception micronutrient supplementation since most interventions only start after confirmation of pregnancy, in the late first trimester or even in the second trimester, and therefore miss the important processes of epigenetic

change peri-conception and during early pregnancy. Additional opportunities to address preconception health are at school level. This is an early intervention to optimise the nutritional health of young women as well as the potential young fathers. Teachers should receive direct training guided by nutrition professionals and their respective bodies.

- **Perinatal care: Multifaceted interventions to address suboptimal maternal nutrition and health:** Nutrition counselling should be prioritised within ANC visits. Support for appropriate weight gain is important. Guidelines on how to address identified BMI categories should be provided in maternity care guidelines. These may include referral to a dietitian or specific dietary counselling guidelines such as portion control, nutrient density,

Case 9: Food insecurity, domestic violence and common mental disorders

Zulfa Abrahamsⁱ

Like many low- and middle-income countries, South Africa has a high prevalence of common mental disorders (CMDs) such as depression and anxiety during the perinatal period. It is estimated that one in every three perinatal women develop symptoms of depression,⁷⁴⁻⁷⁷ while one in every four develop symptoms of anxiety^{75,78}. Several psychosocial risk factors have been linked to the development of CMDs, including food insecurity and domestic abuse.^{74,79}

Prior to the coronavirus outbreak, more than half of all South Africans lived below the upper-bound poverty line (R1,227 per person per month),⁸⁰ in overcrowded homes with extended family members. In April and May 2020, when all non-essential services were halted during the COVID-19 lockdown, Statistics South Africa reported that the proportion of South Africans experiencing hunger increased from 4% to 7%.⁸¹ The lockdown had the greatest impact on vulnerable groups – i.e. those who were low-skilled and less educated – as it increased the already high levels of unemployment and food insecurity.⁸²

Pregnancy is a particularly vulnerable period, further marginalising already vulnerable women by reducing their income-generating potential and introducing new financial needs, such as having to improve their diet and attend regular clinic visits. In a survey of perinatal women attending public healthcare facilities across Cape Town, more than half the women reported being unemployed, 80% reported experiencing varying levels

of food insecurity and 15% reported experiencing domestic abuse during the lockdown.⁸³ It is therefore not surprising that the proportion of perinatal women experiencing psychological distress increased from 3% prior to the lockdown to 26% during the lockdown, and that experiencing food insecurity or domestic violence significantly increased the risk of CMDs.⁸³

The relationship between perinatal CMDs, poverty and food insecurity is multifaceted with several social issues interacting.^{84,85} Poverty leads to food insecurity, which impacts the mental and physical well-being of the mother, and is detrimental to the care and well-being of her children.⁸⁶ Food insecurity and depression, experienced during the perinatal period, is associated with several adverse birth outcomes, including pre-term birth, low birth-weight and intra-uterine growth restriction.⁸⁷ Postpartum, it affects infant stunting as a result of early cessation of breastfeeding and insecure infant-mother attachments.⁸⁸

It is therefore quite clear that alleviating food insecurity and providing mental health support during the perinatal period is of paramount importance for improving the physical and mental well-being of mothers, neonates, infants and young children. This can be achieved by starting the Child Support Grant during pregnancy and providing routine detection, referral and counselling services to perinatal women attending public healthcare facilities across South Africa.

i Alan J Flisher Centre for Public Mental Health, Dept of Psychiatry and Mental Health

Case 10: The Healthy Life Trajectories Initiative

The Healthy Life Trajectories Initiative (HeLTI) is an initiative of the WHO and a group of funders to address the increasing burden of NCDs around the world (see: <https://helti-net.org>). HeLTI draws on the Developmental Origins of Health and Disease approach. The initiative recognises how environmental factors interact with genes during conception, foetal life, infancy and early childhood in ways that affect the individual's health later in life. This four-country investigation is testing a multi-faceted and integrated health and nutrition intervention that starts at preconception and continues across the life course (pregnancy, infancy and childhood). The aim is to optimise the nutritional status of undernourished women before, during and after pregnancy. This includes support to overweight or obese women to achieve a more optimal body weight and/or metabolic fitness prior to pregnancy. HeLTI should shed light on whether these interventions help improve maternal health and reduce the intergenerational risk of childhood obesity in the next generation.

The HeLTI research platform

The HeLTI programme comprises four randomised control trials in Shanghai (China), Mysore (India), Soweto (South Africa) and two provinces in Canada. Each trial is independently powered but harmonised to enable pooling of data of more than 22,000 women and more than 10,000 pregnancies. After extensive formative work, these randomised control trials are underway in China

and dietary diversity. Since micronutrient requirements increase proportionately more than energy requirements during pregnancy (Figure 3), counselling should emphasise nutrient density. Because previous single intervention trials on multiple micronutrient supplementation (MMS) have shown only modest benefits for pregnancy and child outcomes, recent work included a systematic review⁶² and meta-analyses.^{63, 64} These studies indicated that MMS (with more than four micronutrient components) resulted in improvements in stillbirths, small-for-gestational age and low birth weight babies when compared to iron and folic acid supplementation. Therefore, the 2020 WHO antenatal care recommendations on nutritional interventions were updated and state that "antenatal multiple micronutrient supplements that include iron and folic acid are recommended in the context of rigorous

and South Africa, with India and Canada due to start in 2021. The four populations are at different points in the nutrition transition: Canadian and Shanghai are well advanced, Soweto is relatively deprived and undergoing rapid urban transition, and in rural Mysore, the transition is just beginning. A high prevalence of suboptimal nutrition characterises all sites. In India, calorie, protein and micronutrient deficiencies are frequent in pregnancy, while in Canada, China and South Africa, women often have an excessive calorie intake but also suffer from micronutrient deficiencies. To optimise nutritional status the intervention package includes nutritional counselling (with specific aims to address nutrient-density and dietary diversity); multiple micronutrient supplementation; improved social support through community health workers/nurses trained in healthy conversation skills; and motivation to improve physical activity, quality of sleep and screen time.

HeLTI outcomes: The final outcomes of the studies will evaluate the overall impact on children's nutrition and development at age five, including overweight and obesity, glucose concentration, blood pressure and neurodevelopment. A comprehensive series of measures to track maternal and child health and development including the collection of biospecimens will enable studies into the science and mechanisms of the intergenerational effect. The studies will also track a host of intermediate and process outcomes, as well as the efficacy and acceptability of the intervention package, compared with standard care.

research".⁶⁵ South African guidelines should be updated according to international recommendations.

- **Behaviour change interventions:** In addition to micronutrient supplementation and fortification, population behaviour change interventions (including social grants) could be an effective method for preventing NCDs. A dual strategy should target specific groups that are actively planning a pregnancy, while improving the health of the broader population. Modern marketing techniques could be used to promote a social movement based on an emotional and symbolic connection between improved preconception, maternal health and nutrition, and offspring health. Political theory supports the development of an advocacy coalition of groups interested in preconception health, to harness the political will and leadership necessary to turn high-level policy into effective coordinated action.

Conclusion

Even though maternal mortality in South Africa has declined in the past few years, maternal well-being is of concern. The determinants and drivers contributing to the double burden of obesity and micronutrient deficiencies in pregnant women are extensive and require double-duty actions to mitigate and prevent poor intergenerational health and nutrition outcomes. A shift beyond maternal survival to optimal well-

being is recommended. This will require change in the ways that healthcare services are delivered. The entire health and nutrition community needs to take ownership of such a novel approach and adopt a mindset that involves a more holistic approach to address the whole spectrum of malnutrition-related problems. Double-duty interventions are not only cost-effective but also more efficient and effective than single-duty interventions.³⁸

Case 11: The discontinuation of multiple micronutrient supplements in the public health care system: The experience of KwaZulu-Natal

Lenore Spiesⁱ

The national health policy recommends the use of iron and folic acid (IFA) supplements to address iron-deficiency anaemia in pregnant women.⁸⁹ Yet, between 2010 and 2016, the Kwazulu-Natal Department of Health introduced a policy to provide all pregnant and breastfeeding women with a broader package of multiple micronutrient supplements (MMS) in response to the deteriorating nutrition status and immunity of clients awaiting antiretroviral therapy (ART) as well as the high levels of poverty and food insecurity in the province.⁹⁰

In 2016, South Africa's HIV policy shifted from initiating ART based on a person's CD4 count to 'test and treat' and the provision of ART to all HIV-positive patients regardless of their CD4 count. Routine MMS was therefore discontinued based on the assumption that HIV treatment would improve women's nutritional status. And, in the absence of a national policy aligned to emerging global recommendations, the province was advised to revert to the use of IFA for pregnant women.

Particular enablers of the KZN policy directive were:

- adequate funding from both the provincial equitable share budget and the HIV/communicable diseases national conditional grant;
- a well-developed district health care system with an existing medicine procurement and distribution system that was easily able to accommodate a small delivery and storage item (MMS) within its routine systems;
- the availability of MMS on the national RT9 tender which facilitated ease of procurement;
- MMS were manufactured in-country which facilitated deliveries and reduced stockouts; and

- the review of the national infant and young child feeding guidelines, and the maternal and neonatal health guidelines, which facilitated internal discussion and consultations in order to contribute to the policy agenda.

Particular barriers that resulted in the termination of the policy directive were:

- the removal of MMS from the essential medicines list;
- the lack of international and national policy guidelines on the use of MMS in pregnant women;
- the discontinued use of MMS in the 'test and treat' HIV policy; and
- limited capacity to advocate for the continued use of MMS in the context of competing priorities.

In 2020, the World Health Organization⁹¹ updated its antenatal care guidelines recommending the use of MMS to address multiple micronutrient deficiencies in pregnancy (especially iron deficiency anaemia), given that the dietary intake of fruit, vegetables, meat and dairy products of many pregnant women living in resource-poor contexts is often insufficient to meet increased maternal and foetal dietary needs.

Given the expected impact of the COVID-19 pandemic and the subsequent economic crisis, it would be in the interest of maternal and child health for South Africa to align its maternal and child nutrition policies and programmes to include the use and distribution of MMS. This will require decisive leadership and coordination across a hierarchy of sectors and committees to put policies in place to address the barriers listed above, and to enable implementation.

References

1. Slemming W, Bamford L. The new road to health booklet demands a paradigm shift. *South African Journal of Child Health*. 2018;12(3):86-7.
2. World Health Organization, United Nations Children's Fund, World Bank Group. *Nurturing Care for Early Childhood Development: A framework for helping children survive and thrive to transform health and human potential*. Geneva: World Health Organization; 2018. Accessed 25 November 2020: <https://apps.who.int/iris/bitstream/handle/10665/272603/9789241514064-eng.pdf>.
3. Osmond C, Barker DJP. Fetal, Infant, and Childhood Growth are Predictors of Coronary Heart Disease, Diabetes, and Hypertension in Adult Men and Women. *Environmental Health Perspectives*. 2000(suppl 3):545-53.
4. Kunz LH, King JC. Impact of maternal nutrition and metabolism on health of the offspring. *Seminars in Fetal and Neonatal Medicine*. 2007;12(1):71-7.
5. Benson CS, Shah A, Frise MC, Frise CJ. Iron deficiency anaemia in pregnancy: A contemporary review. *Obstetric Medicine*. 2020;1753495X20932426.
6. Catalano P, Ehrenberg H. Review article: The short- and long-term implications of maternal obesity on the mother and her offspring. *BJOG: An International Journal of Obstetrics & Gynaecology*. 2006;113(10):1126-33.
7. Huang JS, Lee TA, Lu MC. Prenatal programming of childhood overweight and obesity. *Maternal and Child Health Journal*. 2007;11(5):461-73.
8. Wells JC, Sawaya AL, Wibaek R, Mwangome M, Poullas MS, Yajnik CS, et al. The double burden of malnutrition: Aetiological pathways and consequences for health. *The Lancet*. 2020;395(10217):75-88.
9. Tzioumis E, Adair LS. Childhood dual burden of under- and overnutrition in low- and middle-income countries: A critical review. *Food and Nutrition Bulletin*. 2014;35(1):230-43.
10. Sūdžiūtė K, Murauskienė G, Jariėnė K, Jaras A, Minkauskienė M, Adomaitienė V, et al. Pre-existing mental health disorders affect pregnancy and neonatal outcomes: A retrospective cohort study. *BMC Pregnancy and Childbirth*. 2020;20(1):1-7.
11. Bailey BA. Partner violence during pregnancy: Prevalence, effects, screening, and management. *International Journal of Women's Health*. 2010;2(1):183-97.
12. Quelhas D, Kompala C, Wittenbrink B, Han Z, Parker M, Shapiro M, et al. The association between active tobacco use during pregnancy and growth outcomes of children under five years of age: A systematic review and meta-analysis. *BMC Public Health*. 2018;18(1):1-17.
13. Popova S, Lange S, Probst C, Gmel G, Rehm J. Estimation of national, regional, and global prevalence of alcohol use during pregnancy and fetal alcohol syndrome: A systematic review and meta-analysis. *The Lancet Global Health*. 2017;5(3):e290-e9.
14. Ramakrishnan U, Grant F, Goldenberg T, Zongrone A, Martorell R. Effect of women's nutrition before and during early pregnancy on maternal and infant outcomes: A systematic review. *Paediatric and Perinatal Epidemiology*. 2012;26(Suppl 1):285-301.
15. Sergeyev OV, Nikitin AI. Developmental origins of health and disease (DOHaD) and paternal origins of health and disease (POHaD). Multigenerational inheritance. *Obstetrics, Gynecology and Reproduction*. 2020;13(4):326-36.
16. Thomas T. *Maternal Health from 1985-2013: Hopeful progress and enduring challenges*. Chicago: MacArthur Foundation; 2013. Accessed 25 Nov 2020: https://www.macfound.org/media/files/MHRetrospective_FINAL.pdf.
17. Rosenfield A, Maine D. Maternal mortality - A neglected tragedy. *The Lancet*. 1985;326(8446):83-5.
18. Knaul FM, Langer A, Atun R, Rodin D, Frenk J, Bonita R. Rethinking maternal health. *The Lancet Global Health*. 2016;4(4):e227-e8.
19. Filippi V, Chou D, Barreix M, Say L, Barbour K, Cecatti JG, et al. A new conceptual framework for maternal morbidity. *International Journal of Gynecology & Obstetrics*. 2018;141:4-9.
20. Popkin BM, Corvalan C, Grummer-Strawn LM. Dynamics of the double burden of malnutrition and the changing nutrition reality. *The Lancet*. 2020;395(10217):65-74.
21. Davis J, Oaks B, Engle-Stone R. The double burden of malnutrition: A systematic review of operational definitions. *Current Developments in Nutrition*. 2020;4(9):nzaa217.
22. Modjadji P, Madiba S. The double burden of malnutrition in a rural health and demographic surveillance system site in South Africa: A study of primary schoolchildren and their mothers. *BMC Public Health*. 2019;19(1):1-11.
23. Tydeman-Edwards R, Van Rooyen FC, Walsh CM. Obesity, undernutrition and the double burden of malnutrition in the urban and rural southern Free State, South Africa. *Heliyon*. 2018;4(12):e00983.
24. Ng SW, Popkin BM. Time use and physical activity: A shift away from movement across the globe. *Obesity Reviews*. 2012;13(8):659-80.
25. Horton R, Lo S. Nutrition: A quintessential sustainable development goal. *The Lancet*. 2013;382(9890):371-2.
26. World Health Organization. *Obesity and Overweight* [Internet]. 2020. <https://www.who.int/en/news-room/fact-sheets/detail/obesity-and-overweight>
27. National Department of Health (NDoH), Statistics South Africa (Stats SA), South African Medical Research Council (SAMRC), ICF. *South Africa Demographic and Health Survey 2016*. Pretoria, South Africa and Rockville, Maryland, USA; 2019.
28. National Department of Health. *Guidelines for Maternity Care in South Africa*. Pretoria, South Africa: NDOH; 2015. Accessed 25 Nov 2020: <https://www.health-e.org.za/2015/11/17/guidelines-maternity-care-in-south-africa/>.
29. Garcia OP, Long KZ, Rosado JL. Impact of micronutrient deficiencies on obesity. *Nutrition Reviews*. 2009;67(10):559-72.
30. Jordaan EM, Van den Berg VL, Van Rooyen FC, CM W. Obesity is associated with anaemia and iron deficiency indicators among women in the rural Free State, South Africa. *South African Journal of Clinical Nutrition*. 2020;33(3):72-8.
31. Harika R, Faber M, Samuel F, Kimiywe J, Mulugeta A, Eilander A. Micronutrient status and dietary intake of iron, vitamin A, iodine, folate and zinc in women of reproductive age and pregnant women in Ethiopia, Kenya, Nigeria and South Africa: A systematic review of data from 2005 to 2015. *Nutrients*. 2017;9(10):1096.
32. Nojilana B, Norman R, Dhansay MA, Labadarios D, Van Stuijvenberg ME, Bradshaw D, et al. Estimating the burden of disease attributable to iron deficiency anaemia in South Africa in 2000. *South African Medical Journal*. 2007;97(8):741-6.
33. Symington EA, Baumgartner J, Malan L, Wise AJ, Ricci C, Zandberg L, et al. maternal iron-deficiency is associated with premature birth and higher birth weight despite routine antenatal iron supplementation in an urban South African setting: The NuPED prospective study. *PLoS One*. 2019;14(9):e0221299.
34. Steyn NP, Wolmarans P, Nel JH, Bourne LT. National fortification of staple foods can make a significant contribution to micronutrient intake of South African adults. *Public Health Nutrition*. 2008;11(03):307-13.
35. Department of Health, Medical Research Council, OrcMacro. *South Africa Demographic and Health Survey 2003*. Pretoria, South Africa; 2007. Accessed 25 Nov 2020: <https://dhsprogram.com/publications/publication-FR206-DHS-Final-Reports.cfm>.
36. Labadarios D, Swart R, Maunder E, Kruger H, Gericke G, Kuzwayo P, et al. Executive summary of the National Food Consumption Survey Fortification Baseline (NFCS-FB-I) South Africa, 2005. *South African Journal of Clinical Nutrition*. 2007;21(3):245-300.
37. Shisana O, Labadarios D, Rehle T, Simbayi L, Zuma K, Dhansay A, et al. *South African National Health and Nutrition Examination Survey, 2012 (SANHANES-1)*. Cape Town: HSRP Press; 2014. Accessed 25 Nov 2020: <http://www.hsrb.ac.za/en/research-data/view/6493>.
38. Nugent R, Levin C, Hale J, Hutchinson B. Economic effects of the double burden of malnutrition. *The Lancet*. 2020;395(10218):156-64.
39. Nojilana B, Bradshaw D, Pillay-Van Wyk V, Msemburi W, Somdya N, Joubert JD, et al. Persistent Burden from Non-Communicable Diseases in South Africa Needs Strong Action. *South African Medical Journal*. 2016;106(5):436.
40. Wang H, Naghavi M, Allen C, Barber RM, Bhutta ZA, Carter A, et al. Global, regional, and national life expectancy, all-cause mortality, and cause-specific mortality for 249 causes of death, 1980-2015: A systematic analysis for the Global Burden of Disease Study 2015. *The Lancet*. 2016;388(10053):1459-544.
41. World Health Organization. *Ten Threats to Global Health in 2019*. [Internet]. 2019. <https://www.who.int/vietnam/news/feature-stories/detail/ten-threats-to-global-health-in-2019>
42. Zhou B, Bentham J, Di Cesare M, Bixby H, Danaei G, Cowan MJ, et al. Worldwide trends in blood pressure from 1975 to 2015: A pooled analysis of 1479 population-based measurement studies with 19.1 million participants. *The Lancet*. 2017;389(10064):37-55.
43. Zhou B, Lu Y, Hajifathalian K, Bentham J, Di Cesare M, Danaei G, et al. Worldwide trends in diabetes since 1980: A pooled analysis of 751 population-based studies with 4.4 million participants. *The Lancet*. 2016;387(10027):1513-30.
44. Institute for Health Metrics and Evaluation. *GBD (Global Burden of Disease) Compare* [Internet]. 2017. <https://vizhub.healthdata.org/gbd-compare/>
45. Passos CM, Maia EG, Levy RB, Martins APB, Claro RM. Association between the price of ultra-processed foods and obesity in Brazil.

- Nutrition, Metabolism and Cardiovascular Diseases*. 2020;30(4):589-98.
46. Lawrence MA, Baker PI. Ultra-processed food and adverse health outcomes. *BMJ*. 2019;365:l2289.
 47. Statistics South Africa. *Towards Measuring the Extent of Food Security in South Africa: An examination of hunger and food inadequacy*. Pretoria: Stats SA; 2019. Accessed 25 Nov 2020: <http://www.statssa.gov.za/publications/03-00-14/03-00-142017.pdf>.
 48. Wills G, Patel L, Van der Berg S, Mpeta B. *Household Resource Flows and Food Poverty During South Africa's Lockdown: Short-term policy implications for three channels of social protection*. Working series NIDS-CRAM Wave 1. 2020.
 49. Spires M, Delobell P, Sanders D, Puoane T, Hoelzel P, Swart R. Diet-related non-communicable diseases in South Africa: Determinants and policy responses. *South African Health Review*. 2016;2016(1):35-42.
 50. Hunter-Adams J, Battersby J, Oni T. Food insecurity in relation to obesity in peri-urban Cape Town, South Africa: Implications for diet-related non-communicable disease. *Appetite*. 2019;137:244-9.
 51. Adams J, Hofman K, Moubarac JC, Thow AM. Public health response to ultra-processed food and drinks. *British Medical Journal*. 2020;369:m2391.
 52. Holmes MD, Dalal S, Sewram V, Diamond MB, Adebamowo SN, Ajayi IO, et al. Consumption of processed food dietary patterns in four African populations. *Public Health Nutrition*. 2018;21(8):1529-37.
 53. Srour B, Fezeu LK, Kesse-Guyot E, Allès B, Méjean C, Andrianasolo RM, et al. Ultra-processed food intake and risk of cardiovascular disease: Prospective cohort study (NutriNet-Santé). *BMJ*. 2019;365.
 54. Abrahams Z, Lund C, Field S, Honikman S. Factors associated with household food insecurity and depression in pregnant South African women from a low socio-economic setting: A cross-sectional study. *Social Psychiatry and Psychiatric Epidemiology*. 2018;53(4):363-72.
 55. Tsai AC, Tomlinson M, Comulada WS, Rotheram-Borus MJ. Food insufficiency, depression, and the modifying role of social support: Evidence from a population-based, prospective cohort of pregnant women in peri-urban South Africa. *Social Science and Medicine*. 2016;151:69-77.
 56. Chakona G, Shackleton C. Food taboos and cultural beliefs influence food choice and dietary preferences among pregnant women in the Eastern Cape, South Africa. *Nutrients*. 2019;11(11):1-18.
 57. Huffman SL, Pwovoz EG, Vosti SA, Dewey KG. Babies, soft drinks and snacks: A concern in low- and middle-income countries? *Maternal & Child Nutrition*. 2014;10(4):562-74.
 58. Pries AM, Filteau S, Ferguson EL. Snack food and beverage consumption and young child nutrition in low- and middle-income countries: A systematic review. *Maternal & Child Nutrition*. 2019;15(4):e12729.
 59. Wells JCK. The new "obstetrical dilemma": Stunting, obesity and the risk of obstructed labour. *The Anatomical Record*. 2017;300(4):716-31.
 60. Hawkes C, Ruel MT, Salm L, Branca F. Double-duty actions: Seizing programme and policy opportunities to address malnutrition in all its forms. *The Lancet*. 2020;395(10218):142-55.
 61. United Nations. *Goal 2: Zero Hunger* [Internet]. 2020. <https://www.un.org/sustainabledevelopment/hunger/>
 62. Keats EC, Haider BA, Tam E, Bhutta ZA. Multiple-micronutrient supplementation for women during pregnancy. *Cochrane Database of Systematic Reviews*. 2019(3).
 63. Smith ER, Shankar AH, Wu LSF, Aboud S, Adu-Afarwah S, Ali H, et al. Modifiers of the effect of maternal multiple micronutrient supplementation on stillbirth, birth outcomes, and infant mortality: A meta-analysis of individual patient data from 17 randomised trials in low-income and middle-income countries. *The Lancet Global Health*. 2017;5(11):e1090-e100.
 64. Oh C, Keats EC, Bhutta ZA. Vitamin and mineral supplementation during pregnancy on maternal, birth, child health and development outcomes in low-and middle-income countries: A systematic review and meta-analysis. *Nutrients*. 2012;12(2):491.
 65. World Health Organization. *WHO Antenatal Care Recommendations for a Positive Pregnancy Experience. Nutritional Interventions Update: Multiple micronutrient supplements during pregnancy*. Geneva: WHO; 2020. Accessed 25 Nov 2020: <https://www.who.int/publications-detail-redirect/9789240007789>.
 66. Reichman N, Teitler J. Lifecourse exposures and socioeconomic disparities in child health. In: Landale NS, McHale SM, Booth A, editors. *Families and child health: National symposium on family issues, Volume 3*. New York: Springer; 2013. p. 107-137.
 67. Quisumbing AR, Brown LR, Feldstein HS, Haddad L, Peña C. *Women: The key to food security*. Washington DC: The International Food Policy Research Institute; 1995.
 68. Blyth R, Creedy DK, Dennis CL, Moyle W, Pratt J, De Vries SM. Effect of maternal confidence on breastfeeding duration: An application of Breastfeeding Self-Efficacy Theory. *Birth*. 2002;29(4):278-284.
 69. Statistics South Africa (StatsSA). *Quarterly Labour Force Survey: Quarter 2: 2019*. Pretoria: Statistics South Africa; 2019.
 70. Statistics South Africa (StatsSA). *City of Cape Town - 2011 Census Suburb*: Delft. Cape Town: Statistics South Africa, Strategic Development Information and GIS Department; 2013.
 71. Gausman J, Austin SB, Subramanian SV, Langer A. Adversity, social capital, and mental distress among mothers of small children: A cross-sectional study in three low and middle-income countries. *PLoS ONE*. 2020;15(1):e0228435.
 72. Field S, Abrahams Z, S H. Adolescent mothers: A qualitative study on barriers and facilitators to mental health in a low-resource setting in Cape Town, South Africa. *African Journal of Primary Health Care & Family Medicine*. 2020;12(1):a2279.
 73. Witten CB, Claasen N, Kruger HS, Coutsooudis A, Grobler H. Psychosocial barriers and enablers of exclusive breastfeeding: lived experience of mothers in low-income townships, North West Province, South Africa. *International Breastfeeding Journal*. 2020;15(76).
 74. Abrahams Z, Lund C, Field S, Honikman S. Factors associated with household food insecurity and depression in pregnant South African women from a low socio-economic setting: A cross-sectional study. *Social Psychiatry and Psychiatric Epidemiology*. 2018;53(4):363-72.
 75. Redinger S, Norris S, Pearson R, Richter L, Rochat T. First trimester antenatal depression and anxiety: Prevalence and associated factors in an urban population in Soweto, South Africa. *Journal of Developmental Origins of Health and Disease*. 2018;9(1):30-40.
 76. Hartley M, Tomlinson M, Greco E, Comulada WS, Stewart J, Le Roux I, et al. Depressed mood in pregnancy: Prevalence and correlates in two Cape Town peri-urban settlements. *Reproductive Health*. 2011;8(1):9.
 77. Manikkam L, Burns JK. Antenatal depression and its risk factors: An urban prevalence study in KwaZulu-Natal. *South African Medical Journal*. 2012;102(12):940-4.
 78. Van Heyningen T, Honikman S, Myer L, Onah MN, Field S, Tomlinson M. Prevalence and predictors of anxiety disorders amongst low-income pregnant women in urban South Africa: A cross-sectional study. *Archives of Women's Mental Health*. 2017;20(6):765-75.
 79. Garman EC, Schneider M, Lund C. Perinatal depressive symptoms among low-income South African women at risk of depression: Trajectories and predictors. *BMC Pregnancy and Childbirth*. 2019;19(1):202.
 80. Statistics South Africa. *Poverty Trends in South Africa: An examination of absolute poverty between 2006 and 2015*. Pretoria: Stats SA; 2017.
 81. Statistics South Africa. *Results from Wave 2 Survey on the Impact of the COVID-19 Pandemic on Employment and Income in South Africa*. Pretoria: Stats SA; 2020.
 82. Arndt C, Robinson S, Gabriel S. *Who has been hit hardest by South Africa's lockdown? We found some answers*. The Conversation. 2020. Accessed 11 September 2020: <https://theconversation.com/who-has-been-hit-hardest-by-south-africas-lockdown-we-found-some-answers-138481>.
 83. Abrahams Z, Boisits S, Schneider M, Prince M, Lund C. Domestic violence, food insecurity and mental health of pregnant women in the COVID-19 lockdown in Cape Town, South Africa. *Research Square*. 2020;5 November 2020.
 84. Lund C, De Silva M, Plagerson S, Cooper S, Chisholm D, Das J, et al. Poverty and mental disorders: Breaking the cycle in low-income and middle-income countries. *The Lancet*. 2011;378(9801):1502-14.
 85. Patel V, Lund C, Hatherill S, Plagerson S, Corrigan J, Funk M, et al. Mental disorders: Equity and social determinants. *Equity, Social Determinants and Public Health Programmes*. 2010;115:134.
 86. Simonovich SD, Pineros-Leano M, Ali A, Awosika O, Herman A, Withington MH, et al. A systematic review examining the relationship between food insecurity and early childhood physiological health outcomes. *Translational Behavioral Medicine*. 2020;10(5):1086-97.
 87. Ghimire U, Papabathini SS, Kawuki J, Obore N, Musa TH. Depression during pregnancy and the risk of low birth weight, preterm birth and intrauterine growth restriction: An updated meta-analysis. *Early Human Development*. 2020;152:105243.
 88. Patel V, DeSouza N, Rodrigues M. Postnatal depression and infant growth and development in low income countries: A cohort study from Goa, India. *Archives of Disease in Childhood*. 2003;88(1):34-7.
 89. National Department of Health. *Guidelines for Maternal Care in South Africa. A manual for clinics, community health centres and district hospitals*. 4th edition. 2015.
 90. Bajoria M, Beesabathuni K, Kraemer K. *The Case for Reintroducing Multiple Micronutrient Supplements in South Africa's Essential Medicines List*. Geneva: Sight and Life Special Report/Experience from the Field. 2019.
 91. World Health Organization. *WHO antenatal care recommendations for a positive pregnancy experience: nutritional interventions update: multiple micronutrient supplements during pregnancy*. Report No.: 9240007784. Geneva: WHO. 2020.