

Problematic feeding behaviours in infants and the mental health of their caregivers: A descriptive study at two public health care facilities in the Western Cape

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Declaration

By submitting this thesis, I declare that the entirety of the work contained therein is my own, original work, that I am the sole author thereof (save to the extent explicitly otherwise stated), that reproduction and publication thereof by Stellenbosch University will not infringe any third-party rights and that I have not previously in its entirety or in part submitted it for obtaining any qualification.

This dissertation includes one publication-ready manuscript. The development and writing of the paper was the principal responsibility of myself and, for each of the cases where this is not the case, a declaration is included in the dissertation indicating the nature and extent of the contributions of co-authors.

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Extended literature review

1. Literature review

1.1 Early infant development and ‘the first 1000 days’

In South Africa, the Department of Health (DOH) has shifted primary health care from a curative paradigm of mainly treating illnesses and disease to one that emphasizes prevention and health promotion.¹ New evidence has led to a focus on the earliest stages of children’s development. Neuroscientific, social science, genetic and biological research in the last two decades is resolute that “the first 1000 days”, which refers to the period from conception to the end of a child’s second year,^{2,3} is fundamental in brain development.

A vast body of literature has emerged for the first 1000 days, which has prompted growing awareness regarding the importance of this period. Development during the first 1000 days has lifelong consequences for health and wellbeing including, mental health, social functioning and cognitive development.⁴ This period is also characterised by maximum developmental growth in the brain,⁵ and presents a critical window of influence not only for whether a child will survive, but also for their ability to grow, learn and thrive.^{2,3}

In the human brain, the amygdala plays a key role in the processing of emotional experiences. Research shows that the amygdala begins working as early as 8 months into gestation⁶ and by birth, infants are able to express and experience different emotions.⁶ Even before acquiring language, infants learn to communicate through emotions. The emotional experiences of young infants occur most commonly during periods of interaction with a caregiver such as feeding, comforting and holding.⁶ Moore⁷ proposes that what an infant learns in the prenatal and first 3 years of life affects neurological and bodily systems to which the brain is connected, with profound consequences over the life course.

3.2 Attachment between infant and caregiver

An infant and young child’s (IYC) brain is driven to connect.⁸ As such, Bowlby’s attachment theory indicates that due to the critical importance of attachment for survival, evolution has led children to become biologically pre-programmed to form attachments to their caregiver.⁹ Attachment describes an inborn motivation to seek physical and mental proximity to a caregiver in order to find safety and care.^{10,11}

Mate⁸ advocates that the essential template for the emotional development of the IYC and for the brain’s healthy physiological development is a nurturing relationship with a responsive carer; a relationship that is able to facilitate the social and emotional development through

sensitivity and being attuned to the child's internal states.¹¹ This type of attachment is crucial in solving developmental tasks, such as adjusting to physical change.¹² Secure attachment was noted by Ainsworth,¹³ as a sense of closeness and feeling protected. This occurs in infants whose primary caregivers respond to their distress in a consistent, caring, and timely manner, such as by picking them up and comforting them. Through these behaviours, infants can feel secure that they can express negative emotion and prompt a comforting response from the caregiver. Attachment research demonstrates that infants and young children with a secure attachment explore more, are easier to manage, are more resilient, have better social skills and relationships with peers as well as more empathy than do children with ambivalent or avoidant attachments.¹⁴

According to Gander *et al.*,¹² insecure attachments from a developmental perspective have been linked to eating disorders in adolescents. Literature has highlighted that caregivers with insecure attachments are less able to practice responsive parenting and are less likely to exercise responsive feeding strategies.¹⁵ Consequently, feeding times may become cumbersome and characterised by inconsistent, non-responsive interaction, and a relationship lacking in trust. Harbron *et al.*,¹⁵ further illustrates how this has potentially negative effects on the child's internal hunger and satiety cues, self-regulation and social and emotional development, all of which may contribute to feeding problems.¹⁵ Some literature has highlighted that one of the pathways which influences the process of emotional and social development is the parent-child feeding relationship, a universally important early relationship.¹⁴ Feeding provides an opportunity for caregivers to be present with their IYC and to give them the necessary attention and interaction needed to process this task. Researchers in the fields of early childhood and brain development emphasize that this interaction is a meaningful event that supports healthy development of the child.¹⁶

3.3 The importance of feeding for infant development

Chang & Roberts¹⁷ define feeding as offering food and the acceptance of food placed in the mouth. Feeding is an essential and primary event in the life of an infant and young child,¹⁸ and much parent-child interaction happens at feeding times.¹⁹ It is an advocate and source of social and emotional interaction through verbal and non-verbal communications such as eye contact, facial expression, tone of voice and intensity of body language.²⁰ From the onset, the feeding experience is central to the development of the relationship with the primary caregiver(s) and by its nature is an interactive and developmental activity. Feeding, beyond providing sustenance, provides a prime opportunity to experience substantial social interaction¹⁸ as well as meet the primal need to attach by connecting with the caregiver.²¹

Chatoor²² explains that the term ‘feeding’ implies a two-way relationship is part of eating in early childhood and comprises a delicate interplay between mother and child in the feeding situation.

Feeding times provide an immense opportunity for learning which Satter²⁴ emphasises takes place between the caregiver and child as they engage in food selection, ingestion, and regulation behaviours. Harbron *et al.*,¹⁵ reveal that humans are born with the capacity to self-regulate their energy intake. This ability is fostered through cause-effect learning, meaning that signals from the child should be interpreted by the caregiver in the correct manner and in a supportive environment. The facilitation of self-regulation skills early in life may predict future food intake and optimal responses to hunger and satiety cues.²³

Successful feeding demands a caregiver who trusts and depends on information coming from the child about timing, amount, preference, pacing, and eating capability. An appropriate feeding relationship supports a child's developmental tasks and helps the child develop positive attitudes about self and the world.¹⁴ Furthermore, Satter goes on to indicate that a responsive feeding relationship enhances the ability to consume a nutritionally adequate diet and to regulate appropriately the quantity eaten. Thus, the feeding relationship reflects the parent-child relationship, and feeding struggles may be an indication of struggle in that relationship.²⁴⁻²⁶

3.4 General problems with feeding

As with other aspects of caregiving, the area of feeding can present difficulty for caregivers.¹⁴ The struggle is usually expressed by the caregiver as frustration or concern about their child's eating behaviour. It has been estimated that 25% to 45% of normally developing children experience feeding difficulties (FD), while 20% to 60% of parents worldwide report their children are not eating well.²⁷ At present, there appears to be a complete lack of evidence regarding the occurrence and prevalence of problematic feeding behaviours in South African infants aged 1-3 years old.

Feeding difficulties include “picky/fussy” eating patterns, strong food preferences, behaviours aimed at ending meals prematurely, such as whining, crying or pushing food away,²⁸ neophobia,²⁹ and eating disorders.³⁰ To some extent, the problematic feeding behaviours are all considered to be part of typical feeding development and are usually transient. However, a young child who displays several problematic feeding behaviours for a prolonged period may be considered to have a ‘feeding difficulty’. This generally implies a mild or transient

problem and, according to Kerzner *et al.*,²⁹ is not considered a “medical condition,” so much as it requires the attention of the primary care provider.

As discussed previously, a young child’s ability to feed well is closely related to the caregiver’s ability to understand and sensitively respond to the physiology and behavioural communications.³¹ The relationship a primary caregiver constructs with an IYC has an enormous impact on their future mental, physical, social, and emotional health. The strength of the relationship could be referred to as a predictor of how well the infant will fare both in learning and in life. The literature has indicated that a secure attachment is founded on the ability of the caregiver to interpret nonverbal emotional communication developed with the infant.³² Segal³² suggests there is a need for the IYC to be able to engage in a nonverbal emotional exchange with their primary caregiver in a way that communicates their needs and makes them feel understood, secure, and balanced.

Mate⁸ explains that when a child does not receive consistent, secure interactions, or experiences painfully stressing ones, mal-development results. Evidence from the literature shows that caregivers tend to respond to problematic eating behaviours using more non-responsive feeding practices, such as pressure, restriction and food as reward.³³ These feeding practices may not only be ineffective, but counterproductive in persuading problematic/fussy eaters’ food intake.³³ For instance, in a non-responsive feeding (controlling, indulgent or uninvolved) relationship between caregiver and infant, the infant’s cues of hunger and satiety could be disrupted.³⁴ When feeding problems at an early age are not addressed, failure to develop age-appropriate feeding skills, failure to thrive, nutrient deficiencies, behavioural issues and impaired parent-child interactions may result.²⁷ The ability of the caregiver to be attuned to the child and be able to respond contingently may be reflective of the caregiver’s state of mind.

3.5 Mental health problems amongst caregivers

Caregiver mood and emotional state are critical determinants of caregiver behaviour and has consequences for the child’s health and development.³⁵ Studies of maternal depression illustrate how self-preoccupation and a negative mood can disrupt caregiving. Faced with chronic stress or anxiety, the caregiver may withdraw from their infant and become inattentive to the child’s physical and psychological states.³⁶ With a lack of attention and poor surveillance, the caregiver is not aware of early signs of illness or that a child has not eaten sufficiently during the last meal, or that no one has praised the child for efforts to do something or provided the child with guidance and limits for behaviour. Chronic stress,

associated with poverty and other environmental challenges, can also disrupt the capacity of caregivers to give loving care. The effects of caregiving on young children can persist well into adolescence and include behaviour disorders, anxiety, and depression.^{8,34} A study in Bangladesh found that caregivers described a decrease in affection toward their children in times of distress.³⁷ This finding is supported by other literature that shows an association between maternal depression, insecure attachment and low quality of mother-child bonding.³⁴

Globally, anxiety and depression are the third leading cause of disease burden for women 14 to 44 years of age.³⁸ The World Health Organisation (WHO) reports that 15 to 57% of women in low- to middle-income settings experience symptoms of depression such as depressed mood, tiredness, insomnia, low self-esteem and lack of energy and interest in the environment.³⁹ In South Africa, approximately 40% of women living in relative poverty suffer from depression during pregnancy, which is three times the rate documented in high-income countries.⁴⁰ Perinatal depression is therefore a significant public health problem in South Africa, with potentially devastating consequences for the mother, foetus, infant and family. Overall, the high burden of postnatal depression in South Africa appears to relate to specific risk factors prevalent in South Africa, including poverty, intimate partner violence, and lack of partner support, and the high prevalence of HIV.⁴¹ As a result, caregivers suffer from impaired capacity to provide sensitive, responsive and stimulating care.³⁹

3.6 Potential implications of caregiver mental health status in terms of feeding

Children respond to their caregivers' limitations in a variety of ways. They may react positively and with adaptability of their own, or they may withdraw, scream or present fussy behaviours during meal times.³⁵ A number of studies have found an association between maternal mental health problems and child feeding problems.⁴²

Insecure attachment in the literature has been related to feeding problems and non-organic failure to thrive in infancy.⁴³ For example, studies from Pakistan and Ghana (both low-income settings) demonstrated a link between maternal mental health problems and reduced caregiving behaviour.³⁴ Children are also known to have a higher incidence of diarrhoeal disease when mothers have depressive symptoms that include insomnia, fatigue, irritability, forgetfulness, headaches,³⁸ compared to those children with healthy mothers.⁴⁴ Research in the United States and United Kingdom has found that maternal depression symptoms were associated with non-responsive feeding behaviour,⁴⁵ which may negatively influence infant dietary intake, child feeding practices and child care.³⁴ Moreover, child feeding problems are

often associated with decreased parental emotional and psychological wellbeing. Thus, the relationships and interactions around feeding are important factors that play a role in the development and maintenance of eating difficulties.

3.7 Malnutrition and poor maternal mental health

Inappropriate and inadequate feeding practices have been linked to an estimated one-third of IYC malnutrition.³⁸ Guled *et al.*,⁴⁶ links malnutrition occurring at the early stages of life with damage of health and brain development, diminished intelligence and productivity of children, and a heightened risk of non-communicable diseases in later life. The World Health Organization (WHO) indicates that approximately 45% of global deaths (equivalent to 3.1 million deaths) among children under the age of five can be linked to undernutrition, mostly occurring in low- and middle-income countries.⁴⁷ Young children affected by malnutrition causing underweight, stunting and micronutrient deficiencies⁴⁷ suffer with lower levels of cognitive ability, slower immune response, increased risk of acquiring infections, increased hospital admissions, and longer length of recovery time.^{2,48} Several long-term studies show that these effects continue through to adulthood and are associated with lower IQs, poorer levels of educational attainment and more frequent mental health problems.² A growing body of evidence suggests a link between maternal mental illness and child undernutrition in low-income settings. A recent meta-analysis reported a 40% increased risk of stunting for children of mothers with depression symptoms.³⁴

Chronic malnutrition is a common phenomenon in low- to middle-income countries, such as South Africa.⁴⁹ In low-income settings, a chronic lack of resources is prevalent.⁴³ Berg⁴³ further depicts that this chronic lack of resources includes the lack of supportive relationships and material resources, and makes people more vulnerable to additional stress, which adds to further resource loss. In South Africa stressful life events, such as food insecurity, are part of everyday hardships and are associated with symptoms of depression and anxiety.³⁴ Thus, food insecurity and psychological distress can be construed as interrelated problems occurring in the context of poverty and adversity. Stressful life events experienced by the caregiver introduce struggle into the feeding relationship and are risk factors for child fussy eating.⁴²

3.8 The South African context

South Africa is a developing country, two decades into its democracy, within which widespread inequality still exists. Poverty and hunger that are rife in many communities.⁵⁰

Within the South African context, there is a shortage of knowledge regarding the nature and incidence of problematic eating behaviours also referred to as “fussy or picky” eating behaviour. South Africa’s political history presents a complex socio-economic scenario within the country, indicating that the nature of problematic eating behaviours within the South African context may differ from that reported internationally. Therefore, the nature of problematic eating behaviours within the low- to middle-income South African context must be explored to inform the management of children presenting with such difficulties. Consequences of feeding difficulties are some of the most clearly agreed on conceptual elements across disciplines. Malnutrition, undernutrition and growth failure represent a few common consequences of feeding difficulties.¹⁹

South Africa is one of twenty countries that house 80% of the world’s undernourished children.⁵¹ In 2016, The South African Demographic and Health Survey (SADHS) results showed that 6% of all children are underweight and 1% is severely underweight. The prevalence of stunting, which is a well-established risk factor for poor child development,⁵² has been shown to generally increase with age between 8 months and 23 months.⁷⁶ In relation to the prevalence of childhood malnutrition, South Africa correspondingly has a high burden of mental illness, of which the Western Cape has the highest 12-month and lifetime prevalence of common mental disorders among South African adults.⁵³ The mental health burden can place significant stress on parent-child interactions with substantial adverse impacts on both caregiver and child state of mind and attachment.

Atlantis, a town in the Western Cape province of South Africa, is an example of a community of people that, because of past disadvantage due to apartheid, experienced social determinants of ill-health. These include lack of education, unemployment, overcrowding and poverty.⁵⁴ The town owes its existence to Apartheid spatial planning. The Apartheid regime has been known to impact health in a number of ways including diminished positive self-identity, increased stress, substance misuse and self-harm, decreased access to social supports and reduced quality of education and employment.⁵⁵ The community of Atlantis is characterised by a breakdown of social norms, evident for example in the increase of family violence, drug and alcohol abuse, and high rates of gang and drug related activities.⁵⁴ The abovementioned stressors are likely to place significant psychological distress on caregivers in the Atlantis community, as well as impact the quality of caregiving capacity. This in turn, could have serious implications on the caregiver-child interactions and ability to bond and attach. Ultimately this rupture in the relationship within the first years of the infant’s life, as the

above literature has demonstrated, affects all levels of growth and development well into adulthood.

The everyday stressor for caregivers in low- to middle-income settings influences child caring capacity. These stressors contribute to a rupture in the caregiver-child interactions and this struggle continues into the feeding relationship. Early experiences with feeding set the stage for feeding-associated behaviours later in the child's life and into adulthood.¹⁸ Given the vastness of underprivileged and poor communities in South Africa, there is a need to understand fully the relationship between the mental health of primary caregivers in these communities and the possible problematic feeding behaviour in their infants. This information is crucial as it would make a small but meaningful contribution to improving nutrition and well-being in all populations and particularly in poor communities. The findings would provide information for the primary researcher who works in this setting. This study is expected to increase awareness amongst health practitioners regarding the importance of the relationship between infant and caregiver and the impact of the caregiver's mental state on the feeding relationship. Exploring the mental health of primary caregivers of infants and young children 1-3 years' old displaying problematic feeding behaviours, and do they present with common mental health symptoms as knowledge that would inform service delivery policies by equipping community health workers with the appropriate skills to support the caregiver-infant relationship.

Publication-ready manuscript

The following manuscript has been prepared for submission to The South African Journal of Child Health. The journal's aims and scope, as well as author guidelines are given in Appendix A.

Problematic feeding behaviours in infants and the mental health of their caregivers: A descriptive study at two public health care facilities in the Western Cape

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Abstract

Background: Maternal mental health (MMH) is considered a risk factor for feeding difficulties in young children. Problematic eating behaviour may not pose an immediate physical health threat; however, long-term poor dietary intake is a known contributor towards poor developmental outcomes.

Objectives: To describe the common mental health symptomatic status of mothers of children (1-3 years old) that present with problematic feeding behaviours at government health sites in Atlantis and a nonprofit organization – Courage-to-Care in the Western Cape.

Methods: Using a cross-sectional study design with purposive sampling, 16 mother-child dyads were recruited. Problematic feeding behaviours were screened for using the Montreal Children's Hospital feeding scale and anthropometric measurements were used for growth development. MMH was assessed using the Patient Health Questionnaire-9, Generalized Anxiety Disorder 7-item and the Common Perinatal Mental Disorders screening tools.

Results: Infants had a current median (IQR) age of 22 (18.00-36.00) months. Most infants had normal growth development. However, 43% of infants scored as having severe feeding difficulties. Mothers had a mean (SD) age of 28.40 (7.03) years with 18% reporting severe anxiety symptoms and 25% with severe depressive symptoms. Suicide risk was high (50%). Infants with severe feeding difficulties were noted for 25% of mothers with severe depression and 32% of the mothers that screened in the suicidal risk category.

Conclusions: The findings suggest that MMH screenings should be integrated at baby wellness clinics to help mothers who may be experiencing common mental health disorders to seek early intervention at primary health care settings.

Introduction

Emerging evidence from the last two decades suggests that there is a greater need for studies focussing on the earliest stages of children's development, known as "the first 1000 days".^{3,2} This period refers to the time from conception to the end of a child's second year and is fundamental to brain development.^{3,2} It presents a critical window of influence not only for whether a child will survive, but also for their ability to grow, learn and thrive.^{2,3} Current thinking posits that what an infant learns in the prenatal and first 3 years of life affects neurological and bodily systems to which the brain is connected, with profound consequences over the life course.⁸

An infant and young child's (IYC) brain is driven to connect⁸ and as such, Bowlby's attachment theory indicates that due to the critical importance of attachment for survival, evolution has led children to become biologically pre-programmed to form attachments to their caregivers.⁹ Attachment describes an inborn motivation to seek physical and mental proximity to a caregiver in order to find safety and care.^{10,11} In infants whose primary caregivers respond to their distress in a consistent, caring, and timely manner, they feel secure to express negative emotion and prompt a comforting response from their caregiver.¹⁴ This type of attachment is crucial in solving developmental tasks, such as adjusting to physical change,¹² which includes the eating experience.

A sufficient feed demands a caregiver who trusts and depends on information coming from the child about timing, amount, preference, pacing, and eating capability. An appropriate feeding relationship supports a child's developmental tasks and helps the child develop positive attitudes about self and the world.¹⁴ Furthermore, a responsive feeding relationship enhances the ability to consume a nutritionally adequate diet and to regulate appropriately the quantity eaten.²⁴⁻²⁶ Thus, the feeding relationship reflects the parent-child relationship, and feeding struggles may be an indication of a struggle in that relationship.

Like other aspects of caregiving, the area of feeding can present difficulty for caregivers, expressed as frustration or concern about their child's eating behaviour.¹⁴ It has been estimated that 25% - 45% of normally developing children experience feeding difficulties (FD), while 20% - 60% of parents worldwide report their children are not eating well.²⁷ At present, there appears to be a lack of evidence regarding the occurrence and prevalence of problematic feeding behaviours in South African infants aged 1-3 years old.

Feeding difficulties include "picky/fussy" eating patterns, strong food preferences, behaviours aimed at ending meals prematurely (whining), crying or pushing food away,²⁸ neophobia,²⁹

and eating disorders.³⁰ To some extent, the problematic feeding behaviours are considered to be part of typical feeding development and are usually transient.⁵⁶ However, a young child who displays several problematic feeding behaviours for a prolonged period may be considered to have a ‘feeding difficulty’ and according to Kerzner *et al.*,²⁹ is not considered a “medical condition,” so much as it requires the attention of the primary care provider.

The ability of the caregiver to be attuned to the child and be able to respond contingently may be reflective of the caregiver’s state of mind. Studies of maternal depression illustrate how self-preoccupation and a negative mood can disrupt caregiving. Faced with chronic stress or anxiety, the caregiver may withdraw from their infant and become inattentive to the child’s physical and psychological states.³⁶ With a lack of attention and poor surveillance, the caregiver is not aware of early signs of illness or that a child has not eaten sufficiently during the last meal, or that no one has praised the child for efforts to do something. Chronic stress, associated with poverty and other environmental challenges, can also disrupt the capacity of caregivers to give loving care.^{8,34}

Globally, anxiety and depression are the third leading cause of disease burden for women 14 to 44 years of age.³⁸ The World Health Organisation (WHO) reports that 15% - 57% of women in low- to middle-income settings experience symptoms of depression such as depressed mood, tiredness, insomnia, low self-esteem and lack of energy and interest in the environment.³⁹ In South Africa, approximately 40% of women living in relative poverty suffer from depression during pregnancy, which is three times the rate documented in high-income countries.⁴⁰ Perinatal depression is therefore a significant public health problem in South Africa, with potentially devastating consequences for the mother, foetus, infant and family. Overall, the high burden of postnatal depression in South Africa appears to relate to specific risk factors prevalent in South Africa, including poverty, intimate partner violence, and lack of partner support, and the high prevalence of HIV.⁴¹ As a result, caregivers suffer from impaired capacity to provide sensitive, responsive and stimulating care.³⁹

The nature of problematic eating behaviours within the South African context needs to be explored to inform the management of children presenting with such difficulties. Due to the scarcity of published literature related to problematic feeding behaviours within the South Africa, there is a lack of consensus on terms or conceptualization to describe problematic feeding behaviours in infants and young children in Dietetics or other healthcare disciplines. However, consequences of feeding difficulties are some of the most clearly agreed on

conceptual elements across disciplines. Malnutrition, undernutrition and growth failure represent a few common consequences of feeding difficulties.¹⁹

A growing body of research suggests a link between poor caregiver mental health and feeding difficulties in infants.³⁴ The aim of this study was to provide a demographic and mental state description of the primary caregivers and their infants 1-3 years old that present with problematic feeding behaviours at government health sites in Atlantis, in the Western health sub-district, and the non-profit organization (NPO), Courage-to-Care in Kuilsriver, in the Northern health sub-district in the Western Cape, South Africa.

Methods

Study design

We conducted a cross-sectional study to describe the common mental health symptoms of primary caregivers of IYC (1-3 years old) that present with problematic feeding behaviours at government health sites in the town of Atlantis, and at a NPO – Courage-to-Care, in the Western Cape. A purposive sampling strategy (non-probability) was used. The study period was from February 2020 to January 2021. National Covid-19 lockdown regulations came into effect from March 2020 and the data collection period was temporarily prohibited and reinitiated in November 2020. It was once again stopped again in January 2021 due to the resurgence in Covid-19 infections.

Study setting

Atlantis is a town located in the Western Cape, South Africa. In 2011, the national census estimated the population at 67 491 people and includes mostly lower-income socioeconomic groups.

Poverty, alcohol and drug abuse, domestic violence, gang activity, large families and limited resources are some of the challenges the community faces.⁵⁴ As a consequence, the levels of stress, anxiety and the feeling of hopelessness among the general population are expected to be relatively high, as seen in other similar areas in Cape Town.⁵⁷ These important risk factors could deleteriously affect the mental health of people living in Atlantis and by extension the mental health or behaviours of the infants in their care.

As a result of the global COVID-19 pandemic, local clinics in Atlantis did not receive outreach services from March 2020 - November 2020. For us to continue the proposed research project, surrounding health facilities were approached that had a similar risk profile

to the community group in Atlantis in the Western health sub district to enable us to continue with the project. Courage-to-Care, a NPO in the Northern health sub district of the Western Cape, provided permission to collect data from patients 1-3 years old experiencing problematic feeding behaviours and their caregivers. The NPO serves a population group that has similarities to that of the Atlantis community, with high substance and alcohol use, unemployment, gangsterism, poverty and domestic violence (Professional Nurse. Andrea Titus, personal communication).

If at any time during the data collection process, the participant was found to have a high scoring on the mental health screening tool it was advised via a referral that the participant make a booking at the mental health clinic at the nearest government health facility in the area offering mental health services.

Study sample

The study population included infants and young children (IYC) (1-3 years old) and their primary caregivers (older than 18years) attending health services at Saxon Sea Clinic, the Paediatric Department, Outpatient Department and Emergency Centre at Wesfleur Hospital, and referrals from home-based carers in the community to the NPO Courage-to-Care for nutritional intervention.

Inclusion criteria consisted of the biological or registered documented caregivers caring for the IYC on a daily basis, and any caregiver with a diagnosed severe mental illness was excluded. Research by O' Hara⁵⁸ and Anna McKenna⁵⁹ were utilised to determine the inclusivity and exclusivity criteria in the perinatal period for the common mental health symptomatic status of mothers within this study. The Common perinatal mental health disorders listed by O'Hara range from mild depression and anxiety, mania, to florid psychosis and fall under the rubric of perinatal mental illness defined as the time during pregnancy and throughout the first post-partum year.⁵⁸ This time period has been acknowledged as a time where women may face increased psychological vulnerabilities to both new and worsening common mental disorders, with depression and anxiety impacting 21%-39% of South African mothers.⁵⁹ The perinatal period has been said to magnify the impacts of anxiety and depression, and overlaps in common mental disorders and its more severe mental illness may occur.^{58,59} All IYC with severe medical (such as acute gastrointestinal illness, neurological, genetic, and psychiatric illnesses) that results in weight loss, malabsorption, increased nutrient losses, developmental delay, and compromised ability to eat were excluded.

Sample size

Sixteen study participants were recruited between 7 December 2020 and 8 January 2021. A higher number of participants were initially estimated based on the average number of children seen monthly for nutritional support. However, due to Covid-19 lockdown restrictions and the concomitant restriction on research and reduced access to healthcare, the final sample size was 16.

Recruitment

Pre-screening took place by the primary investigator and health practitioners at the study sites. ICYs (1-3 years old) with their primary caregivers were screened at routine scheduled visits, immunisations, growth monitoring, Vitamin A, deworming and general health concerns. It is part of routine screening according to the Integrated Management of Childhood Illness policy (IMCI) in the Western Cape to ask caregivers on feeding practices, and then be referred to nutritional support services if growth faltering is identified over 3 consecutive months. Therefore, all children 5 years and under who deviate from their weight curve trajectory and are at risk of being underweight are referred for nutritional support.

Data collection

All personal protective equipment requirements as per the Covid-19 precautionary measures were strictly adhered to. Caregivers were informed about the study and consent to participate was obtained. Caregivers were assured that declining to participate in this study would in no way influence current and future management and/or care of the participant. Caregivers were asked to complete a demographic questionnaire (language, highest level of education, marital status, number of children, employment, household income, living arrangements and age (infant and primary caregiver). Caregivers were also asked if the child had any major medical problems and we collected data from patient medical files (infant's gestational age, birth height and weight, current height and weight, Mid Upper Arm Circumference (MUAC), and growth interpretations). Caregivers were also asked to complete the Montreal Children's Hospital (MCH)-Feeding Scale, The Alcohol, Smoking and Substance Involvement Screening Test (ASSIST) tool, and the mental health screening questionnaire (done in a discussion format that was free flowing and allowed the participant to feel free during the conversation).

Measures

Anthropometric measurements

All the anthropometrical measurements were measured and validated by JMS, a registered dietitian trained and standardised to take anthropometrical measurements and was assisted by the nursing staff when applicable. All the measurements were performed in a private area and World Health Organization (WHO) guidelines were followed to ensure accuracy.⁶⁰ Length, weight and MUAC were used in the assessment of the IYC anthropometrics and nutritional status. Using a portable digital Salter bathroom scale, IYC were weighed to the nearest 0.1 kg. All IYC were able to stand on the scale alone with minimal to no clothes. Length was measured by a measuring tape to the nearest 0.1 cm. MUAC was taken on the left arm using the WHO MUAC tape for children under 5 years old. The measurements were compared with the growth standards of the WHO (2005), and using the WHO charts (2008) they were interpreted. Four anthropometric indices were used: weight-for-age (WAZ), height-for-age (HAZ), weight-for-height (WHZ) and MUAC. Expressed in terms of z-scores to categorize stunting (HAZo₂), underweight (WAZo₂), and wasting (HWZo₂). The MUAC interpretation was read as follows 11.5 cm and under, represented acute malnutrition, 11.5 - 12.5 cm was indicative of moderate malnutrition and 12.6 cm and above was considered normal. All measurements were plotted in the RTHB.

Mental health screening:

Primary caregivers who provided consent were given a self-administered questionnaire by the primary investigator using a translator for their preference of language.

The Patient Health Questionnaire-9, Generalised anxiety disorder 7 and the Common Perinatal Mental Disorder (CPMD) screening tools were used to screen for symptoms of depression and anxiety. The ASSIST tool was used to screen for substance use problems. All of these screening tools have been validated in South Africa and used in previous studies conducted in the Western Cape.⁶¹ The CPMD screening tool has been specifically designed for the South African Population.

Patient Health Questionnaire-9 (PHQ - 9)

The Patient Health Questionnaire (PHQ-9) was developed for detection of depression in primary care settings and has been tested for validity among diverse populations,⁶² including in South Africa.⁶³ It has been validated in both antenatal and postnatal populations in various settings.^{64,65}

The PHQ-9 is an instrument with 9 items that are based on the Diagnostic and Statistical Manual of Mental Disorders, fourth edition (DSM-IV) diagnostic criteria. It is a self-report

measure and designed to assess the presence of symptom criteria for major depressive disorder. Each of the 9 items can be scored from 0 (not at all) to 3 (nearly every day).

PHQ-9 total score for the nine items range from 0 to 20. Scores represent: mild (0-5), moderate (6-10), moderately-severe (11-15), and severe (16-20) depression.⁶¹

Also, a cut-off point of 10 or greater is considered a “yellow flag” on all 3 measures (i.e., drawing attention to a possible clinically significant condition), while a cut-off point of 15 is a “red flag” on all 3 measures (i.e., targeting individuals in whom active treatment is probably warranted).

Generalized Anxiety Disorder 7-item (GAD-7) scale

The GAD-7 is a self-administered 7 item instrument that makes use of some of the Diagnostic and Statistical Manual of Mental Disorders (DSM-V) criteria for General Anxiety Disorder (GAD) to identify probable cases of GAD along with measuring anxiety symptom severity.⁶⁶

It can also be used as a screening measure of panic, social anxiety, and PTSD.⁶⁶ It was modelled after the PHQ9 to be used quickly and effectively within a primary care setting and has been validated for use within the South African context.⁶⁷

Participants are asked to rate the frequency of anxiety symptoms in the last 2 weeks on a Likert scale ranging from 0-3. Items are summed to provide a total score. 0 = not at all, 1 = several days, 2 = more than half the days, 3 = nearly every. GAD-7 total score for the seven items ranges from 0 to 21. Scores represent mild (0-5), moderate (6-10), moderately-severe (11-15), and severe (15-21) anxiety.

Common Perinatal Mental Disorders (CPMDs) screening tool

The Perinatal Mental Health Project (PMHP) developed a locally validated and tested brief CPMD screening tool that can be administered by non-specialist care providers in the antenatal primary care setting.⁶⁸ Psychometric analysis was conducted based on item-by-item and whole tool analysis of several commonly used screening questionnaires compared against the MINI in full diagnostic gold standard.⁵⁹

The scorings system uses three questions with a binary answer (yes/no) and allows for the total score to be easily calculated. This means that scoring is less time consuming and that a lower mathematical literacy is required. If answered yes to the suicidal question, it requires an immediate referral. If the participant has answered yes to two out of three questions a referral is also required.

The Alcohol, Smoking and Substance Involvement Screening Test (ASSIST)

The ASSIST package was developed to help primary health professionals detect and manage substance use and related problems in primary health care and general medical care settings.⁶⁹ The questionnaire screens for all levels of problem or risky substance use in adults. The ASSIST consists of eight questions covering tobacco, alcohol, cannabis, cocaine, amphetamine-type stimulants (including ecstasy) inhalants, sedatives, hallucinogens, opioids and 'other drugs'.

A risk score is provided for each substance, and scores are grouped into 'low risk', 'moderate risk' or 'high risk'. The risk score determines the level of intervention recommended (brief intervention or brief intervention plus referral to specialist treatment). The ASSIST takes approximately 5 to 10 minutes to administer and can be completed electronically via the e-ASSIST or via a pen and paper version.

Problematic eating behaviour questionnaire - The Montreal Children's Hospital (MCH) Feeding Scale

The MCH Feeding scale (MCH- FS)⁷⁰ was used to screen for problematic eating behaviours mainly due to its components of child eating behaviour, maternal concerns, and family reactions. The MCH-Feeding scale is a valid and reliable tool that demonstrates appropriate specificity and sensitivity, and its application can be extended to the general population.^{71,72} The items on the scale were selected according to the biopsychosocial model of feeding problems and targets infants and young children six months to six years of age as children younger than six months of age tended to be exclusively breastfed or bottle-fed.⁷⁰ The items in the scale are general in nature and cover behaviours applicable to all ages (e.g., gags on food textures) rather than age specific (e.g., eats with spoon).⁷⁰ The scale consists of 14 items covering the following feeding domains with some overlap: oral motor (items 8 and 11), oral sensory (items 7 and 8) and appetite (items 3 and 4). Other items cover maternal concerns about feeding (items 1, 2 and 12), mealtime behaviours (items 6 and 8), maternal strategies used (items 5, 9 and 10) and family reactions to their child's feeding (items 13 and 14). Although the MCH-FS was developed in a high-income country with different social and cultural expectations, the maturational component of feeding development makes feeding

parameters universal.⁷¹ The MCH- feeding scale has not been validated with in the South African context.

Item scaling and scoring: Each item is rated on a seven-point Likert scale with anchor points at either end. Seven items are scored from the negative to positive direction, and the other seven from the positive to negative direction. The primary investigator marks each item according to frequency or difficulty level of a particular behaviour or the level of primary care giver concern. The total feeding problem score is obtained by adding the scores for each item. The tool takes approximately 10 minutes to complete and score.

Data analysis

All summary statistics were computed using R using functions from base R (R Core Team 2020) and R packages dplyr (Wickham et al 2021) and psych (Revelle 2020). Continuous variables normally distributed were summarised as mean and standard deviation (SD), or in the case of non-normal distribution as median and interquartile range (IQR). Nominal variables were summarised as counts and percentages. As this was a descriptive study, no inferential statistics were employed.

Ethical considerations

Ethical approval was obtained from the Health Research Ethics Committee of Stellenbosch University (Reference number: S19/08/159), as well as from the management of Wesfleur Hospital, The City of Cape Town Clinics and the NPO - Courage-to-Care. Participation was voluntary and all participants provided written informed consent. All data were anonymised to ensure privacy and confidentiality of participants' personal information, with each participant was assigned a unique identifier.

Results

The aim of this study was to describe the common mental health status and socio-demographic characteristics of primary caregivers and their IYCs problematic eating behaviours, in infants referred for feeding problems. Sixteen caregiver-infant dyads were recruited from Saxon Sea Clinic, Wesfleur Hospital and Courage-to-Care from February 2020 to March 2020 and December 2020 to January 2021. All primary caregivers were the biological mothers of the IYCs.

Table 1 summarises the socio-demographic characteristics of the mothers. The mean (SD) age of the mothers was 28.40 (7.03) years and ranged from 18 to 39 years. More than half of mothers were employed (56%) and almost a third (31%) were financially reliant on child grants. The majority of mothers (62%) were single, with only 25% being married. Most mothers completed formal schooling (62%), with 50% having graduated from high school and 12% obtaining a tertiary qualification.

Table 1: Maternal socio-demographic characteristics (n=16).

Variable	N (%)	Mean (SD)
Mothers age		28.40 (7.03)
First language		
Afrikaans	15 (93)	
English	1 (6)	
Highest level of education		
None	1 (6)	
Primary school	1 (6)	
Secondary school	4 (25)	
High school	8 (50)	
Tertiary	2 (12)	
Employment		
Yes	9 (56)	
No	7 (43)	
Monthly Household income		
No income	2 (12)	
R2001-R4000	3 (18)	
>R4000	6 (37)	
State Grant	5 (31)	
Living arrangements		
Family	10 (62)	
Rented	4 (25)	
Own	2 (12)	
Marital status		
Single	10 (62)	
Married	4 (25)	
In a relationship	2 (12)	
Mother number of children		
One	10 (62.5)	
Two	4 (25)	
>Three	2 (12.5)	

The clinical characteristics of the Infants and young children (IYC) are presented in Table 2. The IYC had a mean (SD) birth weight of 3.03 (0.54) kg and a median (IQR) birth length of 49.50 (48.00-53.25) cm. The IYC had a current median (IQR) age of 22 months (18.00-36.00), ranging from 12 to 36 months and more than half of the IYC were male (56%). The IYC had a current mean (SD) weight of 12.34 (2.75) kg and 75% of IYC classified within normal weight for age z-scores. Twelve percent of IYC were classified as overweight with a

weight for height greater than +2SD z-score. IYC had a current mean (SD) height of 87.75 (8.36) cm and all IYC had length measurements within the normal height for age z-score. All IYC had a normal MUAC. Per the MCH -feeding scale, 43% of IYC scored as having severe feeding difficulties. Fifty six percent of mothers reported that their IYC feeding behaviour affected the family household relationships negatively, with 43% stating that their IYC feeding behaviours affected them (mother/primary caregiver) negatively (data not shown).

Table 2: Clinical characteristics of infants (N = 16).

Variables	N (%)	Mean (SD) or Median (IQR)
Infant age at Gestation		39.00 (39.00-40.00)
Infant Birth weight (kg)		3.03 (0.54)
Infant Birth length (cm)		22.00 (18.00-36.00)
Infant Gender		
Male	9 (56)	
Female	7 (43)	
Infants age in months		22.00 (18.00-36.00)
Infant Current Weight (kg)		12.34 (2.75)
Infant weight Z score		
+ 2SD	3 (18)	
Normal	12 (75)	
Severely Underweight	1 (6)	
Infant Current Height (cm)		87.75 (8.36)
Infant Height Z-Score		
Normal	16 (100)	
Weight for Height Z-Score		
Normal	14 (87)	
Overweight	2 (12)	
MUAC Interpretation		
Normal	16 (100)	
MCH feeding scale score		
No difficulty	3 (18)	
Mild Difficulty	4 (25)	
Moderate Difficulty	2 (12)	
Severe Difficulty	7 (43)	

Mental Health Screening

Mothers were also screened for a range of mental health symptoms including depression and anxiety using the PHQ-9 and GAD 7 screening tools, respectively. Mothers mental health screening results are summarized in Table 3. Using the PHQ-9 scale, 37% of mothers scored as having mild depression (PHQ-9 score <5) and 25% scored as having severe depression (PHQ-9 score >15).

When screened for anxiety using the GAD 7 questionnaire, 50% of mothers scored as having mild anxiety (GAD 7 score <5) and 18% scored as having moderate-to-severe anxiety (GAD

7 score =11-15). The additional GAD 7 questions assess' a respondent's "difficulty" to perform daily functions, with 50% of mothers scoring as "somewhat difficult."

The ASSIST screening tool was used to assess any problems with substance use. None of the mothers required intervention for alcohol and substance use. For smoking, almost a third of mothers (31%) needed brief intervention (ASSIST score >4).

CPMD was used to screen for mothers who were at risk for suicide. Fifty percent of mothers were identified as having "suicidal risk" based on score of >2 (or 1 if it pertained (yes) to the suicide risk question). This was conducted by the interviewer (JMS) and mothers identified as at risk were referred to the nearest government facility offering mental health services using a catch and match and/or a clinical referral form.

Table 3: Mental Health Screening of Mothers (n=16).

Variables	N (%)
GAD 7 Score	
Mild Anxiety	8 (50)
Moderate anxiety	2 (12)
Moderate to severe anxiety	3 (18)
Severe anxiety	3 (18)
Additional GAD 7 - referring to difficulty in daily functioning	
Not Difficult	6 (37)
Somewhat Difficult	8 (50)
Very Difficult	1 (6)
Extremely Difficult	1 (6)
PHQ9 score	
Mild Depression	6 (37)
Moderate Depression	2 (12)
Moderate to severe Depression	4 (25)
Severe Depression	4 (25)
(CPMD) Mental health referral	
Suicidal risk	8 (50)
No concern	8 (50)
ASSIST- Alcohol	
No intervention	16 (100)
ASSIST- Substance use	
No intervention	16 (100)
ASSIST- Smoking	
Brief intervention	5 (31)
No intervention	11 (68)

Infant feeding and Maternal Mental health

Relationships between IYCs feeding scores and maternal mental health symptoms (GAD-7, PHQ-9, CPMD) were assessed. For moderate-to-severe and severe anxiety symptoms, 24% of

mothers had an IYC with severe feeding problems (Figure 1A), while 25% of mothers who scored “somewhat difficult” for completing daily tasks had an IYC with severe feeding problems (Figure 1B). Twenty five percent of mothers with severe depression had an IYC with severe feeding difficulties (Figure 1C). Moreover, 32% of mothers that screened in the suicidal risk category also had an IYC that screened in the severe feeding difficulty category (Figure 1D).

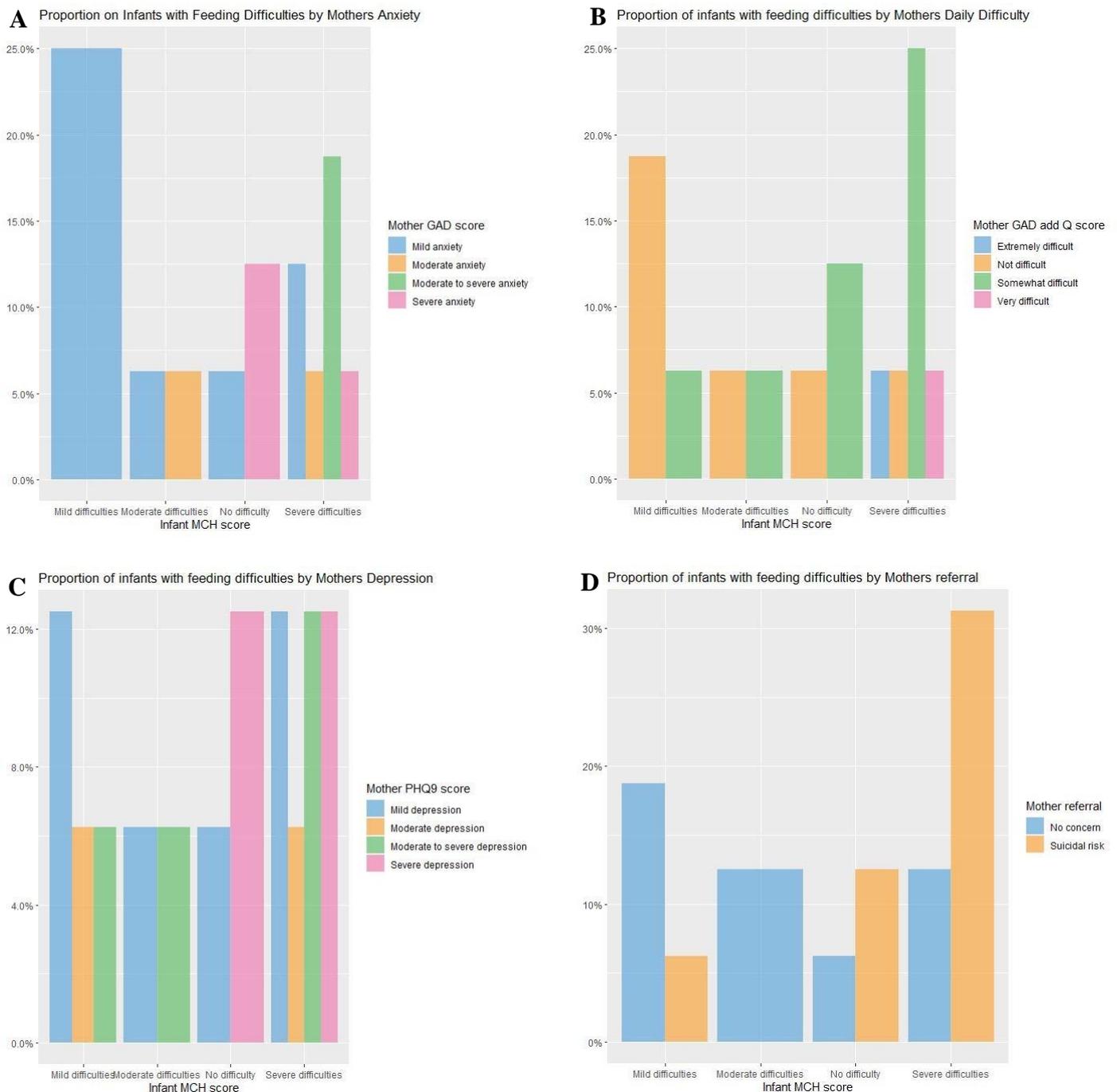


Figure 1: Proportion of young children with feeding difficulties by mothers mental health (A = anxiety (GAD-7), B = “daily difficulty” (GAD-7 additional questions, C = depression (PHQ-9), D = suicide risk (CPMD)).

Discussion

This study aimed to describe the symptoms of common mental health disorders, including anxiety and depression, of primary caregivers of infants and young children between the ages of 1-3 years old who presented with problematic feeding behaviours at government health site and an NPO in the Western Cape.

A mother's first concern is often about whether or not she can maintain the life and growth of her infant.⁴³ A considerable amount of this concern is assigned toward children's dietary intake and feeding behaviours. Globally, approximately 25% to 40% of infants and toddlers are reported to have feeding problems by their caregivers.⁷³ As a result of the variation in the prevalence of problematic feeding behaviours within the literature, it is difficult to establish the actual number of cases that present with problematic feeding behaviours. A study conducted at a Primary Health Care clinic in Tshwane district, Gauteng found that approximately 5% of infants (6-12 months) scored as having feeding problems (5 mild, 1 moderate and 1 severe).⁷⁴ No other study on the prevalence of problematic feeding behaviours in healthy children within South Africa was found, warranting the need for further investigation into problematic feeding behaviours. Using the MCH-feeding scale this study found that 43% of IYC scored in the severe feeding difficulty category, 12% in moderate feeding difficulty and 25% in mild feeding difficulty category. Although research shows IYC feeding problems to be common, and partly transient affecting up to 30% of infants depending on how feeding problems are defined,⁴³ it still may cause parents considerable concern leading to health care visits and possible conflict between caregivers and household members regarding the handling of their child's eating behaviour.⁷⁵ The causes of IYC problematic feeding behaviours are not well known and overlapping in the fields of paediatrics and mental health.⁴³

About one-third of children younger than five years of age in low-income countries are underweight.⁷⁶ South Africa is one of twenty LMICs home to 80% of the world's, undernourished children.⁵¹ According to the South African Demographic and Health Survey⁷⁷ 6% of all children are underweight and 1% are severely underweight. In the current study most of the IYC grew within their normal growth parameters, with all IYC having a normal z-score height and MUAC, 75% had a normal weight for age z-scores, and 12% of IYC in the study were noted as overweight (weight for height greater than +2SD z-score). The South African Demographic and Health Survey (2016) illustrated that 13% of children in South Africa are overweight (weight for height greater than +2SD), this study's finding was below what is expected for children in South Africa. Given the high rates of malnutrition in

socioeconomically disadvantaged settings these findings in growth parameters were unexpected. Possible reasons for these findings may be that in this study more than half of the mothers were employed and could provide for the young child's basic nutritional needs. The mothers reported that whilst at work the young children either attended crèche where they received 2 meals or were in the support of a family member at home. It could also be attributed to having too small numbers participate in the study due to Covid-19 pandemic. Another possible reason is the health and nutrition services received by the community. At every routine well-baby immunisation clinic; health care practitioners educate, promote and advocate to all caregivers appropriate, adequate, safe nutritional intake with what resources the household has available to them.

Thirty one percent of mothers reported that they used the child grant as an income and reported that they ensured that a portion of the grant was allocated toward food. Thus, even though children under the age of 5 years that live in LMICs are at a greater risk of not reaching their full potential due to exposure to multiple risk factors,⁷⁸ particularly poverty, the maternal cohort of this study seemed to play a buffering role toward to the harsh effects of poverty by safeguarding the children's basic nutritional needs. In 2020, The South African child gauge report illustrates that although there is high unemployment, the social grants provide an essential safety net for many households.⁷⁹ Access to the Child Support Grant (CSG) has increased dramatically since 1998 and reaches over 12 million children. The CSG is also associated with a decline in child poverty and hunger. Further findings of this study revealed that 62% of mothers lived with family members that supported and encouraged child food intake. Large families sharing minimal resources are common in the Atlantis community.⁵⁴

Fifty percent of mothers in this study completed high school, of which 12% went on to complete their tertiary studies. Furthermore, 56% of mothers were employed, this was interesting as the recent Child Gauge report states that the expanded unemployment rate in South Africa was 37.3%, with unemployment rates remaining higher for women (41.2%) than for men (33.9%). In the Western Cape, only 8% of children live in households where nobody is working. Twelve percent of mothers in this study were unemployed and reported that as soon as they were able to they would seek employment opportunities. One plausible reason for the low unemployment levels in this section of the Atlantis community is the job seeking programs run by social services to promote contract employment by the factories in the area. Studies have shown that a mother's education and wealth quintile are both inversely related to

stunting levels. Thus, stunting generally decreases with increasing education and wealth quintiles.⁷⁷

South Africa has a high burden of mental illness, of which the Western Cape has the highest 12-month and lifetime prevalence of common mental disorders among South African adults.⁵³ In this study we screened mothers for common mental health disorders. Mothers reported anxiety symptoms at 36% (moderate to severe anxiety using the GAD-7 score >15) and depressive symptoms at 50% (moderate to severe depression using the PHQ-9 score >11). The South African Stress and Health (SASH) study investigated the lifetime prevalence of common mental disorders and found anxiety disorders at (15.8%) to be the most prevalent class of lifetime mental disorders in South Africa.⁸⁰ We expected higher rates of anxiety in the mothers of this study given the everyday challenges and stressors experienced in the community, including exposure to crime, gangsterism, lack of resources, and communal living. A possible reason for this outcome is that the sample set was too small and could possibly not be representative of the wider community in this area. Due to Covid-19 restrictions only one clinic participated in the study in comparison to the three that agreed before the global pandemic.

The WHO reports that 15% to 57% of women in LMICs experience symptoms of depression. A study conducted in a peri-urban settlement in South Africa found that one in three mothers have depression during the early postpartum period,⁸¹ a rate three times higher than what is expected in high income countries.⁸¹ Depression may not only limit a mother's capacity to offer nurturing care to her child, but may also contribute to adverse outcomes for maternal-infant attachment, early infant feeding practices, and result in inadequate nutritional contribution during pregnancy and to the infant resulting in suboptimal infant brain development and growth.³⁸

The evidence linking maternal depressive symptoms to infant's growth are mixed. A meta-analysis of 17 studies from LMICs including Brazil, Nigeria, India, Pakistan and Bangladesh revealed a positive and significant association between maternal depressive symptoms and impaired child growth.⁸² While studies from South Africa,⁸³ Peru and Ethiopia,^{84,85} and Jamaica⁸⁶ did not find any association. Further studies in LMICs, particularly sub-Saharan Africa are needed.

Mothers that scored as having symptoms of severe depression also had an IYC that experienced severe feeding difficulties category. It is possible that maternal depressive symptoms affect the mother's ability to provide quality time with her IYC, thus likely to be

less attuned and attentive to her infants feeding needs and learning experiences. Mothers that scored in the severe depression category in this study reported coming home late from work, being fatigued, having impaired concentration, and little interest in anything. Moreover, 32% of the mothers that screened in the suicidal risk category also had IYCs with severe feeding difficulties. The current study reported that children of mothers with depressive symptoms were more likely to be fussy, problematic eaters and have impaired mother-infant bonding. Correspondingly, studies of maternal depression illustrate how self-preoccupation and a negative mood can disrupt caregiving.^{35,87} Faced with chronic stress or anxiety, the caregiver may withdraw from their infant and become inattentive to the child's physical needs and psychological states.³⁶

Most studies of maternal emotional distress and child feeding have not focused on problematic feeding behaviours in particular,⁸⁸ and much of the literature on problematic feeding behaviours in young children has been cross-sectional⁸⁹ limiting interpretations of directionality. Most feeding research to date has focused on mother-child dyads from socioeconomically advantaged families and fails to consider the complex family feeding dynamic or examine families living in circumstances of socioeconomic disadvantage.³³ This leaves several important gaps in the literature, particularly its generalizability across demographic groups. In addition to limitations in the problematic behaviour literature related to socioeconomic and ethnic diversity, it remains unclear whether problematic eating behaviours is associated with later detriment to child growth and diet and the outcomes driving most parental concerns.⁸⁸

Limitations

There are several limitations of the current study that need to be recognized. One, the sample size was relatively small. Future studies should be based on a larger number of participants to ensure results that are more broadly representative. Secondly, participant recruitment for this study occurred during the global Covid-19 pandemic. Data collection was approved for December 2020, a period during which government health sites experienced a significant decrease in patient attendance. The NPO was also closed until mid-January 2021 and the hospital and clinic sites only resumed full patient attendance in the first week of February 2021. Patients were also hesitant and fearful to attend health facilities for fear of contracting Covid-19. Patients and primary researcher were allocated a time to be in the facility in accordance with Covid-19 precautionary regulations which reduced the interviewing time and time to collect data. 4) Information in patients' files was prioritised in accordance with Covid-19 emergencies thus anthropometrical measurements were not always recorded (if not seen

for emergency purposes). Thirdly, only one of three government health sites in the area approved for data was accessible to for this study limiting the community representation. Finally, it is not possible to infer cause and effect in cross-sectional descriptive studies, but the relationships identified in this study may be useful for developing hypotheses for future research. A strength of this study is that the maternal participants confirmed that none of the anxiety or depression symptoms were as a result of the Covid-19 pandemic.

Conclusion

This study was conducted in an exploratory framework, describing the common mental health disorders of caregivers that present with IYCs displaying problematic eating behaviours between the ages 1-3 years old, in a socioeconomically disadvantaged South African community. The findings suggest that there may be a link between mothers experiencing mental health symptoms and concomitant feeding difficulties in their IYCs. Further research to this end is necessary. In LMICs where healthcare services are overburdened, caregivers become the agents of change for their infants. Health care workers in PHC settings may use these findings to screen for mental health symptoms and identify caregivers whose infants are at risk of poor health outcomes. Policies are needed that will integrate a psychosocial component into existing maternal and child health interventions. This can include counselling for mothers at risk to facilitate mother-infant bonding and, enhance maternal sensitivity and caregiving to prevent poor growth and development of IYC. Future qualitative studies aimed at deepening our understanding of mediating processes and investigating the importance of maternal depression in severe infant malnutrition is needed.

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Conflict of interest

The authors declare that they have no competing interests.

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Appendix A – Journal guidelines

Focus and Scope

The *SAJCH* is an online, peer-reviewed medical journal devoted to all aspects of health and healthcare of neonates, infants and children, of particular relevance and interest to its southern African readership.

The editorial board encourages research articles from emerging researchers and the publication of research conducted during postgraduate studies (such as the MMed). It carries research articles and letters, editorials, clinical practice and other child health articles and personal opinion, South Africa health-related news, obituaries and general correspondence. Review articles are not encouraged.

Manuscript preparation

General article format/layout

Submitted manuscripts that are not in the correct format specified in these guidelines will be returned to the author(s) for correction prior to being sent for review, which will delay publication.

General:

Manuscripts must be written in UK English (this includes spelling).

The manuscript must be in Microsoft Word or RTF document format. Text must be 1.5 line spaced, in 12-point Times New Roman font, and contain no unnecessary formatting (such as text in boxes). Pages and lines should be numbered consecutively.

Please make your article concise, even if it is below the word limit.

Qualifications, *full* affiliation (department, school/faculty, institution, city, country) and contact details of ALL authors must be provided in the manuscript and in the online submission process.

Abbreviations should be spelt out when first used and thereafter used consistently, e.g. 'intravenous (IV)' or 'Department of Health (DoH)'.

Scientific measurements must be expressed in SI units except: blood pressure (mmHg) and haemoglobin (g/dL).

Litres is denoted with an uppercase L e.g. 'mL' for millilitres).

Units should be preceded by a space (except for % and °C), e.g. '40 kg' and '20 cm' but '50%' and '19°C'.

Please be sure to insert proper symbols e.g. μ not u for micro, α not a for alpha, β not B for beta, etc.

Numbers should be written as grouped per thousand-units, i.e. 4 000, 22 160.

Quotes should be placed in single quotation marks: i.e. The respondent stated: '...'

Round brackets (parentheses) should be used, as opposed to square brackets, which are reserved for denoting concentrations or insertions in direct quotes.

If you wish material to be in a box, simply indicate this in the text. You may use the table format –this is the *only* exception. Please DO NOT use fill, format lines and so on.

Preparation notes by article type

Research

Guideline word limit: 3 000 words (excluding abstract and bibliography)

Research articles describe the background, methods, results and conclusions of an original research study. The article should contain the following sections: introduction, methods, results, discussion and conclusion, and should include a structured abstract (see below). The introduction should be concise – no more than three paragraphs – on the background to the research question, and must include references to other relevant published studies that clearly lay out the rationale for conducting the study. Some common reasons for conducting a study are: to fill a gap in the literature, a logical extension of previous work, or to answer an important clinical question. If other papers related to the same study have been published previously, please make sure to refer to them specifically. Describe the study methods in as much detail as possible so that others would be able to replicate the study should they need to. Where appropriate, sample size calculations should be included to demonstrate that the study is not underpowered. Results should describe the study sample as well as the findings from the study itself, but all interpretation of findings must be kept in the discussion section, which should consider primary outcomes first before any secondary or tertiary findings or post-hoc analyses. The conclusion should briefly summarise the main message of the paper and provide recommendations for further study.

May include up to 6 illustrations or tables.

A max of 20 - 25 references

Structured abstract

This should be no more than 250 words, with the following recommended headings:

Background: why the study is being done and how it relates to other published work.

Objectives: what the study intends to find out

Methods: must include study design, number of participants, description of the intervention, primary and secondary outcomes, any specific analyses that were done on the data.

Results: first sentence must be brief population and sample description; outline the results according to the methods described. Primary outcomes must be described first, even if they are not the most significant findings of the study.

Conclusion: must be supported by the data, include recommendations for further study/actions.

Please ensure that the structured abstract is complete, accurate and clear and has been approved by all authors. It should be able to be intelligible to the reader without referral to the main body of the article.

Do not include any references in the abstracts.

Illustrations/photos/scans

If illustrations submitted have been published elsewhere, the author(s) should provide evidence of consent to republication obtained from the copyright holder.

Figures must be numbered in Arabic numerals and referred to in the text e.g. '(Fig. 1)'.
Each figure must have a caption/legend: Fig. 1. Description (any abbreviations in full).

All images must be of high enough resolution/quality for print.

All illustrations (graphs, diagrams, charts, etc.) must be in PDF form.

Ensure all graph axes are labelled appropriately, with a heading/description and units (as necessary) indicated. Do not include decimal places if not necessary e.g. 0; 1.0; 2.0; 3.0; 4.0 etc.

Scans/photos showing a specific feature e.g. *Intermediate magnification micrograph of a low malignant potential (LMP) mucinous ovarian tumour. (H&E stain).* –include an arrow to show the tumour.

Each image must be attached individually as a 'supplementary file' upon submission (not solely embedded in the accompanying manuscript) and named Fig. 1, Fig. 2, etc.

Tables

Tables should be constructed carefully and simply for intelligible data representation. Unnecessarily complicated tables are strongly discouraged.

Large tables will generally not be accepted for publication in their entirety. Please consider shortening and using the text to highlight specific important sections, or offer a large table as an addendum to the publication, but available in full on request from the author.

Embed/include each table in the manuscript Word file - do not provide separately as supplementary files.

Number each table in Arabic numerals (Table 1, Table 2, etc.) consecutively as they are referred to in the text.

Tables must be cell-based (i.e. not constructed with text boxes or tabs) and editable.

Ensure each table has a concise title and column headings, and include units where necessary.

Footnotes must be indicated with consecutive use of the following symbols: * † ‡ § ¶ || then ** †† ‡‡ etc.

Do not: use separate columns for n and %:

Rather: Combine into one column, n (%).

Do not: have overlapping categories, e.g.:

Rather: Use $\langle \rangle$ symbols or numbers that don't overlap.

References

NB: Only complete, correctly formatted reference lists in Vancouver style will be accepted. If reference manager software is used, the reference list and citations in text are to be unformatted to plain text before submitting..

Authors must verify references from original sources.

Citations should be inserted in the text as superscript numbers between square brackets, e.g. These regulations are endorsed by the World Health Organization,^[2] and others.^[3,4-6]

All references should be listed at the end of the article in numerical order of appearance in the Vancouver style (not alphabetical order).

Approved abbreviations of journal titles must be used; see the List of Journals in Index Medicus.

Names and initials of all authors should be given; if there are more than six authors, the first three names should be given followed by et al.

Volume and issue numbers should be given.

First and last page, in full, should be given e.g.: 1215-1217 **not** 1215-17.

Wherever possible, references must be accompanied by a digital object identifier (DOI) link). Authors are encouraged to use the DOI lookup service offered by CrossRef:

On the Crossref homepage, paste the article title into the 'Metadata search' box.

Look for the correct, matching article in the list of results.

Click Actions > Cite

Alongside 'url =' copy the URL between { }.

Provide as follows, e.g.: <https://doi.org/10.7196/07294.937.98x>

Some examples:

Journal references: Price NC, Jacobs NN, Roberts DA, et al. Importance of asking about glaucoma. Stat Med 1998;289(1):350-355. <http://dx.doi.org/10.1000/hgjr.182>

Book references: Jeffcoate N. Principles of Gynaecology. 4th ed. London: Butterworth, 1975:96-101.

Chapter/section in a book: Weinstein L, Swartz MN. Pathogenic Properties of Invading Microorganisms. In: Sodeman WA, Sodeman WA, eds. Pathologic Physiology: Mechanisms of Disease. Philadelphia: WB Saunders, 1974:457-472.

Internet references: World Health Organization. The World Health Report 2002 - Reducing Risks, Promoting Healthy Life. Geneva: WHO, 2002. <http://www.who.int/whr/2002> (accessed 16 January 2010).

Legal references

Government Gazettes:

National Department of Health, South Africa. National Policy for Health Act, 1990 (Act No. 116 of 1990). Free primary health care services. Government Gazette No. 17507:1514. 1996.

In this example, 17507 is the Gazette Number. This is followed by :1514 - this is the notice number in this Gazette.

Provincial Gazettes:

Gauteng Province, South Africa; Department of Agriculture, Conservation, Environment and Land Affairs. Publication of the Gauteng health care waste management draft regulations. Gauteng Provincial Gazette No. 373:3003, 2003.

Acts:

South Africa. National Health Act No. 61 of 2003.

Regulations to an Act:

South Africa. National Health Act of 2003. Regulations: Rendering of clinical forensic medicine services. Government Gazette No. 35099, 2012. (Published under Government Notice R176).

Bills:

South Africa. Traditional Health Practitioners Bill, No. B66B-2003, 2006.

Green/white papers:

South Africa. Department of Health Green Paper: National Health Insurance in South Africa. 2011.

Case law:

Rex v Jopp and Another 1949 (4) SA 11 (N)

Rex v Jopp and Another: Name of the parties concerned

1949: Date of decision (or when the case was heard)

(4): Volume number

SA: SA Law Reports

11: Page or section number

(N): In this case Natal - where the case was heard. Similarly, (C) would indicate Cape, (G) Gauteng, and so on.

NOTE: no . after the v

Other references (e.g. reports) should follow the same format: Author(s). Title. Publisher place: Publisher name, year; pages.

Cited manuscripts that have been accepted but not yet published can be included as references followed by '(in press)'.

Unpublished observations and personal communications in the text must **not** appear in the reference list. The full name of the source person must be provided for personal communications e.g. '...(Prof. Michael Jones, personal communication)'.

Appendix B – Ethics approval



03/12/2019

Project ID :

HREC Reference No:

Project Title: Problematic feeding behaviours in infants and the mental health of their caregivers: A descriptive study in the town of Atlantis, Western Cape

Dear Ms Jeannine Subramoney,

The Response to Modifications received on 28/11/2019 15:42 was reviewed by members of Health Research Ethics Committee 2 (HREC2) via expedited review procedures on 03/12/2019 and was approved.

Please note the following information about your approved research protocol:

Protocol Approval Date: 03 December 2019

Protocol Expiry Date: 02 December 2020

Please remember to use your Project ID [redacted] and Ethics Reference Number [redacted] on any documents or correspondence with the HREC concerning your research protocol.

Please note that the HREC has the prerogative and authority to ask further questions, seek additional information, require further modifications, or monitor the conduct of your research and the consent process.

After Ethical Review

Please note you can submit your progress report through the online ethics application process, available at: [Links Application Form Direct Link](#) and the application should be submitted to the HREC before the year has expired. Please see [Forms and Instructions](#) on our HREC website (www.sun.ac.za/healthresearchethics) for guidance on how to submit a progress report.

The HREC will then consider the continuation of the project for a further year (if necessary). Annually a number of projects may be selected randomly for an external audit.

Provincial and City of Cape Town Approval

Please note that for research at a primary or secondary healthcare facility, permission must still be obtained from the relevant authorities (Western Cape Department of Health and/or City Health) to conduct the research as stated in the protocol. Please consult the Western Cape Government website for access to the online Health Research Approval Process, see: <https://www.westerncape.gov.za/general-publication/health-research-approval-process>. Research that will be conducted at any tertiary academic institution requires approval from the relevant hospital manager. Ethics approval is required BEFORE approval can be obtained from these health authorities.

We wish you the best as you conduct your research.

For standard HREC forms and instructions, please visit: [Forms and Instructions](#) on our HREC website <https://app.ethics.sun.ac.za/ProjectView/Index/11383>

If you have any questions or need further assistance, please contact the HREC office at 021 938 9677.

Yours sincerely,

HREC Coordinator,

Health Research Ethics Committee 2 (HREC2).



12/11/2020

Project ID:

Ethics Reference No:

Project Title: Problematic feeding behaviours in Infants and the mental health of their caregivers: A descriptive study in the town of _____, Western Cape.

Dear Ms Jeannine Subramoney

Your amendment request dated 06/11/2020 11:14 refers.

The Health Research Ethics Committee (HREC) reviewed and approved the amended documentation through an expedited review process.

The following amendment was reviewed and approved:

Amendment #1, dated 06 November 2020

1. Request to continue study in new study Area (Courage To Care Non-profit organisation), with Covid precautions in place.

Where to submit any documentation

Kindly note that the HREC uses an electronic ethics review management system, *Infonetica*, to manage ethics applications and ethics review process. To submit any documentation to HREC, please click on the following link: <https://applyethics.sun.ac.za>.

Please remember to use your project ID _____ and ethics reference number _____ on any documents or correspondence with the HREC concerning your research protocol.

Yours sincerely,

Coordinator: Health Research Ethics Committee 2

National Health Research Ethics Council (NHREC) Registration Number:

REC-130405-012 (HREC1)+REC-230206-010 (HREC2)

Federal Wide Assurance Number: 00001372

Office of Human Research Protections (OHRP) Institutional Review Board (IRB) Number:
IRB0006340 (HREC1)+IRB0006239 (HREC2)

The Health Research Ethics Committee (HREC) complies with the SA National Health Act No. 61 of 2003 as it pertains to health research. The HREC abides by the ethical norms and principles for research, established by the

World Medical Association (2013). *Declaration of Helsinki: Ethical Principles for Medical Research Involving Human Subjects*; the South African Department of Health (2006). *Guidelines for Good Practice in the Conduct of Clinical Trials with Human Participants in South Africa (2nd edition)*; as well as the Department of Health (2015). *Ethics in Health Research: Principles, Processes and Structures (2nd edition)*.

The Health Research Ethics Committee reviews research involving human subjects conducted or supported by the Department of Health and Human Services, or other federal departments or agencies that apply the Federal Policy for the Protection of Human Subjects to such research (United States Code of Federal Regulations Title 45 Part 46); and/or clinical investigations regulated by the Food and Drug Administration (FDA) of the Department of Health and Human Services.

PHQ-9 Depression

Over the last 2 weeks, how often have you been bothered by any of the following problems?

(Use "✓" to indicate your answer)

	Not all	at Several days	More than half the days	Nearly every day
1. Little interest or pleasure in doing things.....	0	1	2	3
2. Feeling down, depressed, or hopeless.....	0	1	2	3
3. Trouble falling or staying asleep, or sleeping too much.....	0	1	2	3
4. Feeling tired or having little energy.....	0	1	2	3
5. Poor appetite or overeating.....	0	1	2	3
6. Feeling bad about yourself — or that you are a failure or have let yourself or your family down.....	0	1	2	3
7. Trouble concentrating on things, such as reading the newspaper or watching television.....	0	1	2	3
8. Moving or speaking so slowly that other people could have noticed? Or the opposite — being so fidgety or restless that you have been moving around a lot more than usual.....	0	1	2	3
9. Thoughts that you would be better off dead or of hurting yourself in some way.....	0	1	2	3

Column totals ___ + ___ + ___ + ___

= *Total Score* _____

From the Primary Care Evaluation of Mental Disorders Patient Health Questionnaire (PRIME-MD PHQ). The PHQ was developed by Drs. Robert L. Spitzer, Janet B.W. Williams, Kurt Kroenke and colleagues. For research information, contact Dr. Spitzer at rls8@columbia.edu. PRIME-MD® is a trademark of Pfizer Inc. Copyright© 1999 Pfizer Inc. All rights reserved. Reproduced with permission

Scoring notes.

- **PHQ-9 Depression Severity**

Scores represent: 0-5 = mild 6-10 = moderate 11-15 = moderately severe
16-20 = severe depression

- **GAD-7 Anxiety Severity.**

This is calculated by assigning scores of 0, 1, 2, and 3, to the response categories of "not at all," "several days," "more than half the days," and "nearly every day," respectively. GAD-7 total score for the seven items ranges from 0 to 21.

Scores represent: 0-5 mild 6-10 moderate 11-15 moderately severe anxiety
15-21 severe anxiety.

CPMD questionnaire

Validated CPMD Screening Questions for use in South African Settings

In the last 2 weeks, have you on some or on most days:

	QUESTIONS	YES	NO
1	Felt unable to stop worrying, or thinking too much?		
2	Felt down, depressed or hopeless?		
3	Had thoughts and plans to harm yourself or commit suicide?		

Suggested scoring guide

A score of 2 or more out of 3 - referral is needed to available resources for further assessment or psychosocial counselling

HOWEVER, if 1 out of 3 is scored on basis of the suicidality item– referral for assessment is still required

A. WHO - ASSIST V3.0

INTERVIEWER ID	<input type="text"/>	COUNTRY	<input type="text"/>	CLINIC	<input type="text"/>
PATIENT ID	<input type="text"/>	DATE	<input type="text"/>	<input type="text"/>	<input type="text"/>

INTRODUCTION *(Please read to patient)*

Thank you for agreeing to take part in this brief interview about alcohol, tobacco products and other drugs. I am going to ask you some questions about your experience of using these substances across your lifetime and in the past three months. These substances can be smoked, swallowed, snorted, inhaled, injected or taken in the form of pills (show drug card).

Some of the substances listed may be prescribed by a doctor (like amphetamines, sedatives, pain medications). For this interview, we will not record medications that are used as prescribed by your doctor. However, if you have taken such medications for reasons other than prescription, or taken them more frequently or at higher doses than prescribed, please let me know. While we are also interested in knowing about your use of various illicit drugs, please be assured that information on such use will be treated as strictly confidential.

NOTE: BEFORE ASKING QUESTIONS, GIVE ASSIST RESPONSE CARD TO PATIENT

Question 1

(if completing follow-up please cross check the patient's answers with the answers given for Q1 at baseline. Any differences on this question should be queried)

In your life, which of the following substances have you ever used? <i>(NON-MEDICAL USE ONLY)</i>	No	Yes
a. Tobacco products (cigarettes, chewing tobacco, cigars, etc.)	0	3
b. Alcoholic beverages (beer, wine, spirits, etc.)	0	3
c. Cannabis (marijuana, pot, grass, hash, etc.)	0	3
d. Cocaine (coke, crack, etc.)	0	3
e. Amphetamine type stimulants (speed, diet pills, ecstasy, etc.)	0	3
f. Inhalants (nitrous, glue, petrol, paint thinner, etc.)	0	3
g. Sedatives or Sleeping Pills (Valium, Serepax, Rohypnol, etc.)	0	3
h. Hallucinogens (LSD, acid, mushrooms, PCP, Special K, etc.)	0	3
i. Opioids (heroin, morphine, methadone, codeine, etc.)	0	3
j. Other - specify:	0	3

Probe if all answers are negative:
"Not even when you were in school?"

If "No" to all items, stop interview.

If "Yes" to any of these items, ask Question 2 for each substance ever used.



Centre universitaire de santé McGill
 McGill University Health Centre
The Montreal Children's Hospital - Pediatric Feeding Program

The MCH Feeding Scale

Children: 6 months (already started on purees) - 6 years

Date: _____ Name of child : _____

Please **CIRCLE** the corresponding number on each item. Note that the meaning of the numbers vary – they do not all go in the same direction. Please read each question carefully. Thank you.

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|-----|---|-------------------------|--------------|--------------|--------------|--------------|--------------|----------------------------------|
| 1. | How do you find mealtimes with your child? | 1 | 2 | 3 | 4 | 5 | 6 | 7 |
| | | <i>Very difficult</i> | | | | | | <i>Easy</i> |
| 2. | How worried are you about your child's eating? | 1 | 2 | 3 | 4 | 5 | 6 | 7 |
| | | <i>Not worried</i> | | | | | | <i>Very worried</i> |
| 3. | How much appetite (hunger) does your child have? | 1 | 2 | 3 | 4 | 5 | 6 | 7 |
| | | <i>Never hungry</i> | | | | | | <i>Good appetite</i> |
| 4. | When does your child start refusing to eat during mealtimes? | 1 | 2 | 3 | 4 | 5 | 6 | 7 |
| | | <i>At the beginning</i> | | | | | | <i>At the end</i> |
| 5. | How long do mealtimes take for your child (in minutes)? | 1 | 2 | 3 | 4 | 5 | 6 | 7 |
| | | <i>1-10</i> | <i>11-20</i> | <i>21-30</i> | <i>31-40</i> | <i>41-50</i> | <i>51-60</i> | <i>>60 min</i> |
| 6. | How does your child behave during mealtimes? | 1 | 2 | 3 | 4 | 5 | 6 | 7 |
| | | <i>Behaves well</i> | | | | | | <i>Acts up, makes a big fuss</i> |
| 7. | Does your child gag or spit or vomit with certain types of food? | 1 | 2 | 3 | 4 | 5 | 6 | 7 |
| | | <i>Never</i> | | | | | | <i>Most of the time</i> |
| 8. | Does your child hold food in his/her mouth without swallowing it? | 1 | 2 | 3 | 4 | 5 | 6 | 7 |
| | | <i>Most of the time</i> | | | | | | <i>Never</i> |
| 9. | Do you have to follow your child around or use distractions (toys, TV) so that your child will eat? | 1 | 2 | 3 | 4 | 5 | 6 | 7 |
| | | <i>Never</i> | | | | | | <i>Most of the time</i> |
| 10. | Do you have to force your child to eat or drink? | 1 | 2 | 3 | 4 | 5 | 6 | 7 |
| | | <i>Most of the time</i> | | | | | | <i>Never</i> |
| 11. | How are your child's chewing (or sucking) abilities? | 1 | 2 | 3 | 4 | 5 | 6 | 7 |
| | | <i>Good</i> | | | | | | <i>Very poor</i> |
| 12. | How do you find your child's growth? | 1 | 2 | 3 | 4 | 5 | 6 | 7 |
| | | <i>Growing poorly</i> | | | | | | <i>Growing well</i> |
| 13. | How does your child's feeding influence your relationship with him/her? | 1 | 2 | 3 | 4 | 5 | 6 | 7 |
| | | <i>Very negatively</i> | | | | | | <i>Not at all</i> |
| 14. | How does your child's feeding influence your family relationships? | 1 | 2 | 3 | 4 | 5 | 6 | 7 |
| | | <i>Not at all</i> | | | | | | <i>Very negatively</i> |