Co-designing an adolescent perinatal mental health intervention in Kenya and Mozambique: the INSPIRE project

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The Lancet Regional Health - Africa 2026;4: 100048

Published Online 15 April 2026
https://doi.org/10.1016/j.lanafr.2026.100048

Summary

Background Interventions to support adolescent perinatal mental health are limited and largely developed for delivery in high-income countries. This study aimed to co-design an intervention to improve mental health outcomes among pregnant and post-partum adolescent girls in Mozambique and Kenya.

Methods 159 adolescent girls (aged 15–19 years) and young women (aged 20–24 years) with experience of a pregnancy during adolescence, their partners and family members, service providers and community influencers were recruited in Kilifi County, Kenya and Moatize District, Mozambique. Those who consented took part in individual interviews, focus group discussions, observations, and workshops to identify key priorities for supporting adolescent perinatal mental health, and co-design an intervention addressing those priorities.

Findings Four priority challenges to adolescent perinatal mental health were identified by adolescents and young women: (1) increase understanding of pregnancy and childbirth; (2) provide sexual health knowledge; (3) address the lack of money to pay for essential items for themselves and their babies; and (4) strengthen caregiving skills. Additional priorities (supporting adolescent perinatal mental health and supporting good mental health, planning for the future, and improving girls' social support networks) were included based on existing evidence and insights from other stakeholder groups. The Thriving Mamas Programme addressees these priorities through a nine-meeting intervention delivered in peer-group, individual and family group formats by trained mothers from the community.

Interpretation This study has highlighted the complex and interconnected challenges to mental health perinatal adolescents face. While priority challenges were addressed through an adolescent-focused intervention, the identified barriers to good mental health during this time highlight the need for a package of interventions to also address mental health stigma at community and family levels, in addition to partner and service provider needs. As the priority challenges and experiences of pregnancy described by adolescents echo the global literature, the Thriving Mamas Programme, if shown to be effective, has the potential for wider generalisability across high-, middle- and low-income countries.

Funding UK Research and Innovation (ref: MR/T019662/1).

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Keywords: Maternal mental health; Adolescent mental health; Intervention development; Public health; Co-design; Sub-Saharan Africa

Research in context

Evidence before this study

We conducted a global review of co-production to develop perinatal mental health interventions (studies published up to 30 May 2023). Five electronic databases (PsycINFO, MEDLINE, Embase, Global Health and Maternity & Infant Care) were searched using terms related to the perinatal period (e.g., 'prenatal period*', 'postnatal period*', 'mothers*', or 'pregnancy*') and co-production (e.g. 'co-design*', 'human centred-design*', 'stakeholder*', 'co-creation*', 'action research*'). Studies were included if they focused on individuals in the perinatal period (i.e., pregnancy up to 2 years post-partum) or stakeholders who support individuals during the perinatal period, perinatal person was the target of the intervention, and mental health and/or psychological wellbeing data were the primary outcome measure for the intervention. The search resulted in 2735 initial references. Eleven studies met the inclusion criteria and were included in the review. "Co-design" was the most common term used in included papers and described a wide range of methodological approaches and participatory activities. Decision-making power of women and girls in these studies varied. Where the clinical impact of these interventions was assessed, mixed results were reported. No included studies evaluated the impact of participating in co-design activities on girls and women.

Added value of this study

This study provides a template and adds to the limited evidence for the use of co-design in adolescent mental health interventions and their delivery strategies in low and middle-income countries. While participants were motivated to participate in co-design activities, their lack of familiarity with these activities resulted in the need to extend the number and duration of workshops to ensure their equitable engagement. Furthermore, this work highlights the difficulties of bringing together diverse stakeholder groups with differing needs, experiences, and expectations. The challenges of conducting co-design work are important to acknowledge and address in light of growing expectations of stakeholder involvement in research and implementation among funders and advocacy groups.

The resulting Thriving Mamas Programme (TMP) provides an option for supporting adolescent perinatal mental health which aligns with the local needs and priorities of adolescents, their families, service providers, and communities. Stakeholders involved in its development have affirmed their support of it and belief in its sustainability and potential impact. This indicates the strength of this approach in developing stakeholder buy-in and ownership of an intervention, an aspect crucial to its ability to successfully integrate into existing systems and services.

Implications of all the available evidence

This project builds upon previous evidence for the suitability of stakeholder engagement in the development of mental health interventions, demonstrating the feasibility and acceptability of using co-design approaches in sub-Saharan Africa. It is still unclear whether or not the use of co-design methods improves the clinical effectiveness and implementation success of resulting interventions. Future work is needed to test these assumptions and provide stronger evidence around the use of these methods.

The identified priorities for improving perinatal mental health (i.e., increased understanding of pregnancy and childbirth; increased sexual health knowledge, improved access to resources needed to look after themselves and their babies, and strengthened caregiving skills) align with those identified in the global literature, indicating the potential generalisability of the intervention globally.

Introduction

The maintenance of good mental health during the perinatal period (pregnancy and the year after birth) is important to the outcomes of women and their children across the life course. However, this period is one of increased vulnerability to mental health conditions. Women in low- and middle-income countries are almost twice as likely to experience perinatal depression (24·7% v 12·5%) and anxiety (30·2% v 16·6%) compared to women in high-income countries.[1,2] This vulnerability increases among pregnant adolescents who must contend with the challenges of adolescence (e.g., social, academic, romantic) in addition to the challenges of pregnancy, childbirth, early motherhood and the stigma and discrimination attached to them.[3] Globally, one in three adolescents experience a perinatal mental health (PMH) condition.[4] Poor mental health has the potential to impact the adolescent's ability to attend antenatal appointments, make care decisions, and participate in school/employment. PMH conditions are associated with increased risk of obstetric complications (e.g., preterm birth, low birth weight), poorer quality of life and relationships, longer-term mental health problems, and mortality driven by suicide.[5–7]

The WHO has identified adolescent mothers as a priority group for mental health promotion.[8] However, few interventions target this group and the majority of evidence comes from high-income countries. Sustainable integration of adolescent perinatal mental health interventions into health and community services in low- and middle-income countries requires development and adaptation of interventions sensitive to the needs and expectations of communities. In the last decade, active engagement and partnership with local communities and those with lived experience has become an explicit requirement by funders and thought leaders.[9–11] A recent review of co-design has highlighted its benefits to the focus, conduct and impact of research and the wellbeing and capacity development of participants.[12]

The Innovative approaches for adolescent perinatal wellbeing (INSPIRE) project addressed the need to using local knowledge to design a mental health intervention by using an approach which blends human-centred design (HCD),[13] systems thinking,[14] and implementation science.[15] INSPIRE aimed to co-design an intervention to promote good mental health among adolescent girls during the perinatal period in Kenya and Mozambique.[16] The objectives were to:

A. Identify the barriers and enablers to maintaining mental health during the perinatal period;
B. Understand the needs and priorities for maintaining mental health during the perinatal period;
C. Co-design an intervention to improve adolescent perinatal mental health;
D. Co-select implementation strategies to deliver the intervention; and
E. Co-develop a programme theory demonstrating how and why the resulting interventions and associated implementation strategies will deliver expected clinical and implementation outcomes.

Methods

A participatory, mixed-method study was conducted in partnership with adolescents (aged 15–19 years), their families, and other key stakeholders (hereafter called collaborators) in Kenya and Mozambique to develop an adolescent perinatal mental health intervention. Collaborators took part in interviews, focus group discussions (FGDs), observations and workshops between November 2021 and December 2022. Ethical approval was obtained from the Psychiatry, Nursing and Midwifery Research Ethics Committee, King's College London, UK (ref: HR/DP-20/21-21956); Institutional Scientific and Ethics Review Committee, Aga Khan University, Kenya (ref: 2021/IERC-/31 (V2); and National Bioethics Committee, Ministry of Health, Mozambique (ref: 691CNBS/21). The full protocol was published prior to completion of the study.[16]

Setting

The study took place in Kilifi County, Kenya and Tete Province, Mozambique. In each study site both urban (Mariakani, Kenya and Moatize City, Mozambique) and peri-urban (Rabai, Kenya and Cateme, Mozambique) settings were represented.

Sample and recruitment

Up to 85 collaborators were recruited in each country, representing key contributors vital to the successful integration of an adolescent perinatal mental health intervention. These included adolescents (aged 15–19 years) who were pregnant or had given birth in the previous 12 months, young women aged 20–25 years who experienced a pregnancy in adolescence, partners and family members, service providers and local and national government officials working in health, social services, and education sectors, and adults deemed to have influence in the community. Adolescents and young women were recruited from health facilities and community-based services in order to increase variance in sampling characteristics (e.g., receipt of antenatal care, parity, marital status, living status). Partners and family members were recruited through participating adolescents and young women as well as community health workers (those unrelated to participating adolescents and young women). Service providers, government officials and community influencers were identified through the research team's existing contacts and snowball sampling. Written informed consent was obtained from all participants prior to their inclusion in the research. Written consent was obtained from caregivers of adolescents younger than 18 years of age as well as from the adolescents themselves.

Data gathering and analysis procedures

Data used to develop the intervention were gathered using the first four stages of the human-centred design approach[12] using interviews, FGDs, desk research and workshops (see Fig. 1). Collaborators recruited to participate in Stage 1 were also invited to attend activities in subsequent stages.

Stage 1–empathize

Data on the challenges, needs, and priorities of adolescent girls during the perinatal period were collected through 65 individual interviews (Mozambique n = 35; Kenya n = 30) with adolescent girls (n = 40); partners (n = 5), and service providers (n = 20). Additionally, 18 FGDs (nine per country; Mozambique n = 52; Kenya n = 53) were held with adolescent girls (n = 8), young women with experience of adolescent pregnancy (n = 16), partners (n = 6), family members (n = 40), and community influencers (n = 32). All interviews and FGDs were conducted using semi-structured topic guides and worksheets. These insights were complemented by 12 adolescent observations (six per country) using the PhotoVoice technique in which adolescents took photos of their daily lives and shared

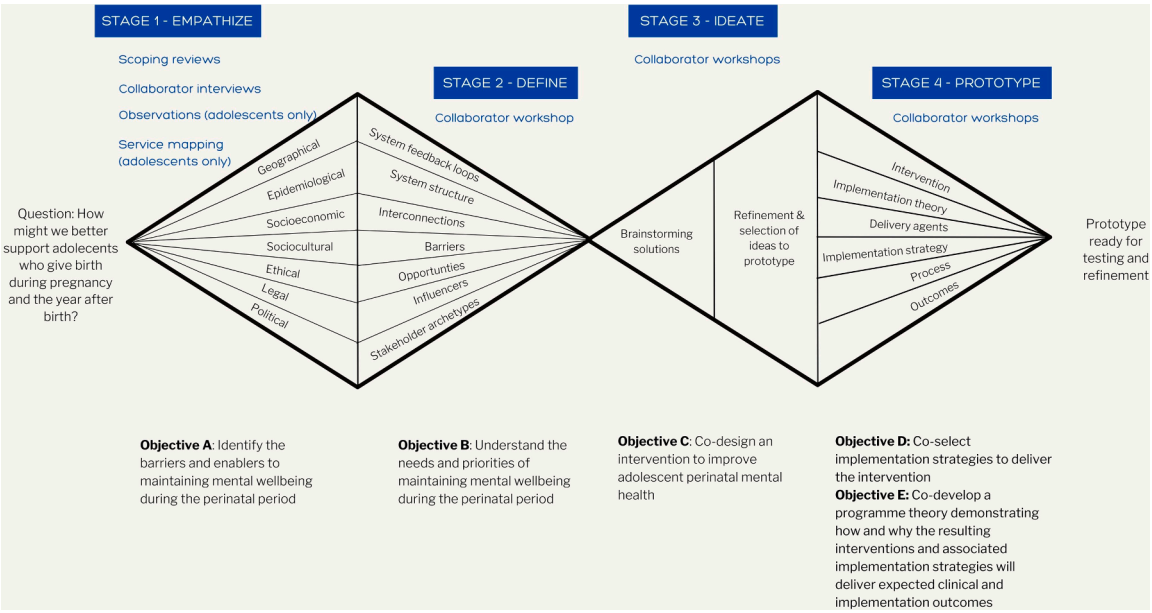


Fig. 1: Stages of data collection.

them during an FGD.[17] Eight girls (four per country) participated in a mapping exercise (i.e. spiral walk) in which they individually walked in larger and larger concentric circles around their home while discussing places in their community that they did or did not visit.[18]

A scoping review of existing policies and interventions available in each country was designed and conducted by the research team. Service mapping exercises were also conducted with adolescent girls, to understand the people and places they go to for support, thereby informing the systems in which the intervention would be implemented. These activities addressed Research Objective A.

Stage 2–define

A one-day workshop was conducted in each country to share the insights from each contributor group collected in Stage 1 with adolescent girls and young women in Kenya (n = 12) and Mozambique (n = 20). Collaborators then created personas, fictional characters representing girls who find themselves pregnant, in small groups as a way of describing the different challenges they faced. These were then shared in the larger workshop group and triangulated with the Stage 1 insights collected from all contributors to create a list of challenges faced. Finally, girls and young women were asked to vote for their top three priority challenges, defined as those that were important, timely and feasible. Vote tallies from both countries were combined to determine which challenges to address through an intervention. These activities addressed Research Objective B.

Stage 3–ideate

Two all-collaborator workshops attended by adolescents and young women (n = 32), partners and family members (n = 19), community influencers (n = 17), and service providers (n = 14) were held in each country. In the first workshop, the identified priority challenges were shared with the group for discussion and consensus. Collaborators brainstormed ways different members of the community might support a pregnant adolescent. Potential interventions were assessed on their feasibility, potential to help pregnant adolescents, and participant willingness to provide or receive the solution.

During the second ideate workshop, collaborators created user journeys,[19] diagrams depicting the process of a girl learning about an intervention, deciding whether to take part, and engaging in, completing and exiting the intervention. In addition, participants identified potential topics to be included in the intervention and what resources and support would be needed to make the intervention a reality. In both workshops, collaborators completed activities in small groups comprised of a singular stakeholder group with support from the research team. Activity outputs were then shared by each group to the larger group for further discussion and consensus. These activities addressed Research Objective C.

Stage 4–prototype

A second series of workshops (two in Mozambique and three in Kenya) were held with 31 adolescents and young women (Mozambique n = 24; Kenya n = 7), 34 partners and family members (Mozambique n = 25;

Kenya n = 9), 15 community influencers (Mozambique n = 10; Kenya n = 5) and 15 service providers (Mozambique n = 10; Kenya n = 5) to co-design a working prototype of the intervention. Collaborators were presented with sample information and practical activities from existing adolescent and maternal health interventions as examples from which to develop intervention content. Intervention sessions were piloted during adolescent-only workshops in which specific session activities were conducted and information presented. Adolescents then had a discussion with the research team to ensure the content and activities were acceptable, useful, and engaging. Implementation strategies were also developed to address the contextual barriers identified in the earlier phases of research and to take advantage of existing enablers to support the integration of the intervention in each setting. These activities addressed Research Objectives D and E.

Analysis

Following each data collection activity, in-country members of the research team completed recorded observations, emerging themes, and other insights, inductively, using tailored forms for each activity. Team meetings were held during each research stage to discuss the insights from each workshop and identify areas of overlap in experiences, contexts, and intervention ideas across both countries. The process and results were shared and discussed with collaborators at each Define, Ideate and Prototype workshop to validate the researchers' observations and inform the later activities, stages of the research and the final intervention.

Audio recordings from Stage 1 interviews and FGDs were transcribed in the language they were conducted in and translated into English by local research team members. Local teams then used thematic analysis to identify barriers and enablers which were mapped to the a priori domains (e.g., sociocultural, socioeconomic, geographical) of the Context and Implementation of Complex Interventions (CICI) Framework[14] along with data from observations and findings from the scoping review.

Data collected from each stage were used to develop a co-designed programme theory demonstrating how and why the resulting interventions and associated implementation strategies could potentially deliver expected clinical and implementation outcomes. Components of the programme theory were discussed with contributors during ideation and prototyping workshops and the final programme theory was shared with local advisory boards in each country for validation.

Results

Participant characteristics

One hundred and fifty-nine contributors took part in co-design activities over 15 months (see Table 1). All recruited adolescents and young women were pregnant and/or had given birth to a live baby whom they were raising. While data on ethnic affiliation was not collected as part of the study, all participants were Kenyan or Mozambican.

Barriers to and enablers of adolescent perinatal mental health

Through interviews and observations, and a scoping review, a range of contextual barriers and enablers were identified that shaped the development of the intervention and helped to develop implementation strategies. While contextual differences existed in each country, the perinatal experiences of adolescent girls largely overlapped. Table 2 describes the geographical, epidemiological, socio-cultural, socioeconomic, and ethical barriers and enablers related to adolescent pregnancy and caregiving.

Epidemiological characteristics

Sub-Saharan Africa maintains the highest regional adolescent pregnancy rates with 95·45 births per 1000 adolescents aged 15–19.[18] Both study sites have high rates of adolescent pregnancy compared to their national averages. In Kilifi County, 12·5% (versus 5·7%) of adolescents experience pregnancy.[20,21] In Tete Province, 20% (versus 15·5%) of adolescent girls experience a pregnancy.[20,22] Adolescents in sub-Saharan Africa who become pregnant have an increased vulnerability for mental health conditions with an estimated prevalence of 55·8% during the perinatal period compared to 28·4% among the general population.[23,24]

Political characteristics

Within both countries, there has been political interest in addressing perinatal mental health and the mental health of children and adolescents. In Kenya, priority targets from the Mental Health Action Plan 2021–2025 include the establishment of mental health promotion and prevention programmes, increasing the integration of mental health care within maternal and child health, and establishing peer support groups.[25] Within antenatal services, there is an ambition to include brief screening for depression and anxiety using the two-item version of the Patient Health Questionnaire (PHQ-2).[26] In Mozambique, the Mental Health Strategy and Action Plan 2016–2026 focuses on mental health needs across the lifespan with particular focus on youth mental health.[27] Sensitisation and psychoeducation are highlighted for families, health professionals, and communities to support the uptake of mental health services.

Geographical characteristics

Existing mental health resources are severely limited in supporting those who need them. In Kenya, there are 15·32 mental health professionals for every 1000 people; in Mozambique, this number drops to 1·37.[28,29] To address the lack of human resources for mental health,

Collaborator characteristics	Kenya	Mozambique	Total
Adolescent girls (n)	20	20	40
Mean age in years (range)	18·1 (15–19)	17·9 (15–19)	18·0 (15–19)
First pregnancy (n, %)	17 (85·0%)	20 (100·0%)	37 (92·5%)
Attending education (n, %)	1 (5·0%)	5 (25·0%)	6 (15·0%)
Living alone (n, %)	2 (10·0%)	2 (10·0%)	4 (10·0%)
Employed (n, %)	3 (15·0%)	0 (0·0%)	3 (7·5%)
Young women (n)	12	4	16
Mean age in years (range)	20·0 (20–23)	21·8 (20–24)	20·9 (20–24)
Attending education (n, %)	4 (20·0%)	1 (25%)	5 (12·5%)
Employed (n, %)	3 (25·0%)	0 (0·0%)	3 (18·8%)
Partners (n)	5	6	11
Mean age in years (range)	23·0 (20–26)	22·0 (19–27)	22·5 (19–27)
Attending education (n, %)	3 (60·0%)	0 (0·0%)	3 (27·3%)
Employed (n, %)	2 (40·0%)	1 (20%)	3 (27·3%)
Family members (n)	24	16	40
Mean age in years (range)	37·2 (20–59)	41·5 (20–60)	39·4 (20–60)
Female (n, %)	22 (91·7%)	8 (40·0%)	30 (75·0%)
Primary education (n, %)	14 (58·3%)	13 (65·0%)	27 (67·5%)
Employed (n, %)	18 (75·0%)	1 (5·0%)	19 (47·5%)
Healthcare providers (n)	10	10	20
Mean age in years (range)	42·3 (28–57)	44·8 (28–78)	43·6 (28–78)
Female (n, %)	8 (80·0%)	7 (70·0%)	15 (75·0%)
Nurse (n, %)	10 (100·0%)	5 (50·0%)	15 (75·0%)
Community influencers (n)	12	20	32
Mean age in years (range)	48·6 (29–73)	45·2 (23–64)	46·9 (23–73)
Female (n, %)	7 (58%)	10 (50·0%)	17 (53·1%)

Table 1: **Collaborator characteristics.**

both governments have expanded mental health professionals to include new cadres. In Kenya, counselling teams provide a range of mental health services, including interpersonal therapy, trauma counselling, and substance use interventions. These are delivered through both government and non-governmental organisations. In Mozambique, psychiatric technicians are trained to diagnose and treat moderate mental health conditions as part of the health care system.[30] While there is at least one psychiatric technician within each district of the country, coverage remains poor in rural areas, including the communities in which this research was carried out.

Characteristics of the intervention setting

The challenges to providing high quality perinatal care for adolescents were discussed by health providers. Health facilities in both countries were described as having inadequate space to provide confidential, tailored support to perinatal adolescents.

> *"Major challenge we have is the infrastructure. We are constrained … we need a youth counselling centre, ideal office, a procedure room you want for this client. These adolescents may not want to mix with the rest, they can be on their own platform or place."*
>
> (Nurse, Kenya)

In addition, health providers noted that they did not have adequate time during appointments to support adolescents. The lack of a clear referral pathway for mental health made it difficult to provide targeted support during pregnancy and after birth. Providers expressed their desire to provide comprehensive support to adolescents and were supportive of interventions to improve their mental health outcomes.

> *"My success is that the adolescent arrives at the facility, gets attended … not only gets attended, but we have that holistic approach. And make sure that this adolescent comes out satisfied. At one moment you ensure that you attend to all the needs. Like a supermarket, you attend to all the needs of this adolescent."*
>
> (Nurse, Kenya)

Support from health care providers could make a substantial difference to a girl's experience of care and pregnancy.

> *"When giving services and you give wholeheartedly, they always turn up on the [appointment] dates. Whenever I give them a date, they always show up. All of them. I would meet some on the street and they tell you, 'Sister I will be coming tomorrow'. That makes me happy."*
>
> (Health care provider, Kenya)

Negative treatment by providers made adolescents less likely to attend future appointments, further reinforcing prejudices against young mothers.

> *"... when I went there [the hospital] she [health worker] asked me, what are you feeling? I said ah, stomach ache and the headaches .... She said ah, you only want to give people work .... Instead of staying at home you are coming here, what do you think you have here?... she said go and call her [the friendly nurse] who will attend to you, I will not attend you."*
>
> (Adolescent, Mozambique)

Socio-economic characteristics

In Kilifi County, 49·2% of people live in poverty, with nearly half (41·4%) of residents experiencing food poverty.[31] Both estimates are 10% higher than national rates. In Tete Province, 39·3% of youth under the age of 18 live in financial poverty.[32] Poverty within adolescents' households was described as a contributing factor for early marriage. Financial instability had a tangible effect on adolescents' experiences of pregnancy and their ability to plan for the future. Some described not having money for food during pregnancy or for items for their babies.

> *"We lack food at home. On lucky mornings, we get porridge. We sometimes don't get it, even my baby misses so he starts crying."*
>
> (Adolescent, Kenya)

Adolescents' reliance on their families for financial support was identified as a barrier to education.

> *"My husband was happy and so was my mother, because she also wanted a granddaughter, but at home, my grandfather said he didn't want that. He wanted for to study, he really wanted for me to go to university and have training ... When they found out that I was pregnant, they said, 'How could you get pregnant, I told you not to get pregnant, to study .... So, since you got pregnant I wash my hands leave it to your husband to do everything'."*
>
> (Adolescent, Mozambique)

Overall, secondary school completion is low for all girls in Kenya and Mozambique–26% and 13%, respectively.[33,34] However, school attendance is even lower following a pregnancy. Only one (5%) adolescent interviewed in each country was currently attending school. While stigma and discrimination by students and staff at school and the need to perform caregiving responsibilities were highlighted as contributors to school drop-out, the lack of money for school fees was another key factor.

Not all girls indicated that they wanted to return to school. Instead, these girls saw employment and earning money as a priority now that they were responsible for raising a child.

Epidemiological characteristics
✗ High prevalence of adolescent pregnancy
Political characteristics
✓ Wider government support of integration of perinatal mental health care in maternal, Newborn, and child health services ✓ Government guidelines have named specific mental health screening tools for use in perinatal care
Geographical characteristics
✗ Limited access to mental health services ✓ Existence of specific mental health cadres to increase coverage of mental health support (e.g. Counselling teams (Kenya); Psychiatric technicians (Mozambique))
Characteristics of the intervention setting
✗ Lack of time during perinatal appointments to screen for mental health problems ✓ Health providers and planners supportive of interventions to improve adolescent perinatal mental health outcomes ✓ Existing community-based programmes to address social determinants of poor mental health (e.g., income generation)
Socio-economic characteristics
✗ Poverty as barrier to good health ○ Inability to pay for/attend perinatal appointments ✗ Poverty as a barrier to future goals ○ Driver for early marriage and pregnancy ○ Inability to pay school fees ✗ Inability to attend school due to household and caregiving responsibilities
Socio-cultural characteristics
✗ High stigma associated with adolescent pregnancy ○ Lack of support to remain in school ○ Viewed as irresponsible by health care workers ✗ Limited social support ✗ Lack of autonomy among adolescent girls ✗ Decisions made by male heads of households are not always in the best interests of the adolescent
Characteristics of adolescents, partners and family members
✗ Limited sexual and reproductive health knowledge ✗ Limited childcare knowledge ✗ Poor attendance of adolescents for antenatal care ✓ Desire to learn how to look after themselves and their babies ✓ Desire for education and employment opportunities ✓ Supportive of interventions to improve the outcomes of adolescents and their babies ✓ Interest in receiving support/being part of the intervention

✗ - barrier ✓ - enabler.

Table 2: **Contextual barriers and enablers to improving adolescent perinatal mental health in Kenya and Mozambique.**

Socio-cultural characteristics

The lack of sexual and reproductive health education for adolescents due to resistance within communities was highlighted as a major challenge to equipping adolescents with knowledge about what happens to their bodies during pregnancy and childbirth. Providing information to young people was seen by some as authorising, or even encouraging, sexual activity.

> *"So sometimes there is that resistance or communication breakdown between us as community health workers, and the community ... Like today you have the session and talk to the young girls on something like family*

planning, [they will ask] 'Is she trying to teach our girl some immorality?' But at the end of the day that is not my aim. So the perception of the community or the school and how they take it from us the health workers, it doesn't add up sometimes"

(Community health volunteer, Kenya)

While pregnancy during adolescence is relatively common in Kenya and Mozambique, high levels of stigma still exist. Rejection was a common experience and fear among girls upon discovery of pregnancy.

"You only get blames. Let's just say neighbours, family members–They tell you that you did wrong. Now when something happens, instead of their support, everyone is against you"

(Adolescent mother, Kenya)

"Now no family loves me. No one helps me .... When the day of birth arrives, what will I do? Who will support me ya [yes]? When I think about it, ah I get really sad. My heart really starts to beat, it starts to hurt."

(Adolescent mother, Mozambique)

In Kenya, this stigma is sometimes placed on the adolescent's mother, who is often viewed by family and the community as responsible for the pregnancy, highlighting existing gender inequity.

"I felt a very big load, it looked like I had just put a big burden on me ... My husband kept putting on me a burden [saying] 'Oh, your child nowadays keeps leaving ... she will get pregnant ... '. So already there were issues before she even got pregnant. So, when I heard she was pregnant, that's it, I felt finished, I felt sick as well, so I looked for a way to handle her ...."

(Family member, Kenya)

The autonomy of adolescents was heavily restricted in both countries. Adults within an adolescent's household have the most control and influence on her life. Larger decisions are customarily made by heads-of-household (e.g. partners, fathers, fathers-in-law) with domestic decisions made by mothers and mothers-in-law. Girls are often left caught in the middle.

"... one may find a complicated mother-in-law, when something small fails immediately she sends you back to your house, without waiting for the husband to decide and they are the ones that make the decision."

(Adolescent, Mozambique)

One of the primary issues to address once an adolescent becomes pregnant is where she will live. Remaining at home was more likely where adolescents were younger (i.e. less than 17 years old) or where paternity was refused. However, it was common for adolescents in both countries to leave home to live with their partners and/or parents-in-law. The proportion of adolescents married (formally or informally) before their 18th birthday is 22·9% and 52·9% in Kenya and Mozambique, respectively.[35] Many of these marriages are a result of pregnancy. The adolescent may move willingly or be forced out of her home. Forced marriages due to pregnancy are more likely to be unhappy situations for adolescents, their partners, and both their families.

"Usually it's the boy to accept the pregnancy, once he has denied, that is where the problem starts and the police might even be involved ... if he refuses, he will be arrested. So, he has to accept whether the pregnancy is his or not and this brings a lot of anger and neglect once the boy starts living with the girl."

(Partner, Kenya)

Girls may also find they have nowhere to go.

"Some are sent away from the homestead. You are told to go and find somewhere to stay. Maybe you go to the guy who is responsible for your pregnancy. And even there you might be sent away"

(Young woman, Kenya)

Lack of autonomy also impacts adolescents' ability to engage in education and employment, and access medical support.

Characteristics of adolescents, partners, and family members

Limited knowledge meant that many girls were unaware of how and when they could get pregnant. The lack of sexual and reproductive health education further resulted in girls' poor understanding of their changing bodies during pregnancy, increased worries about childbirth, and uncertainty about how to take care of a baby.

"Young mothers ... don't understand parenting ... she doesn't know how to manage the complications that come with pregnancy. After delivery she also has a lot of problems understanding what the baby needs"

(Partner, Kenya)

When asked about what she knew about childbirth, one girl explained that no one had taken the time to tell her what to expect.

"No one talks to me about it, I just wait this time of birth to see, I don't know anything, I never talk to anyone about this subject, I don't know anything."

(Adolescent, Mozambique)

Although many girls described being abandoned due to pregnancy, this was not the case for all. Girls also described highly supportive partners and female relatives who provided advice on how to look after themselves, support with housework and other responsibilities, and emotional support.

> *"I stay with her and I tell her that making a mistake is not wrong but repeating the mistake is, so that she doesn't beat herself about it"*
>
> (Family member, Kenya)

However, sometimes the information shared was not aligned with medical advice, leading to conflict with health care providers who interpreted these behaviours as examples of adolescents' irresponsibility.

> *"Our parents used to come to the clinic late … they will tell you, 'You are going early, won't you get tired?' They will tell you to wait and you will listen to their advice and that's why you will wait up to the eighth or ninth month"*
>
> (Young woman, Kenya)

Where partners were supportive, their capabilities were limited by their own lack of knowledge regarding pregnancy and parenting and financial instability.

> *"… They [parents] leave everything to the man who impregnated her … I am still at school and was required to provide everything for my wife. Yes, let's say both of you are still going to school … will you continue with school or find ways to provide for your family? Another challenge is that the society finds it difficult to understand the youth. Most of the time you are left alone and nobody wants to come to your rescue"*
>
> (Partner, Kenya)

Despite worries about becoming a mother and the challenges they face, many of the adolescents interviewed wanted to do all they could to look after their babies.

> *"… when I found out that I was pregnant I ended up signing up for that platform that is on my mobile phone on the health and wellbeing of the baby."*
>
> (Adolescent, Mozambique)

Developing the intervention

Four feasible needs and priorities for supporting adolescent perinatal mental health were identified. It was agreed that an intervention should: (1) increase understanding of pregnancy and childbirth; (2) provide sexual health knowledge; (3) address the lack of money to pay for essential items for themselves and their babies; and (4) strengthen caregiving skills. Despite contextual differences, these priorities were agreed upon across both countries. Three additional priorities (supporting adolescent perinatal mental health and supporting good mental health, planning for the future, and improving girls' social support networks) from the research team and national contributors were also included following agreement by adolescents. In five further workshops (two in Mozambique and three in Kenya), an enhanced antenatal course emerged, focusing on addressing the identified priorities, and including an emphasis on strengthening life skills and social support as the preferred intervention. Intervention topics were chosen by contributor groups with adolescents having final approval. Relevant content was then derived from existing local and international training and intervention materials.[36–40]

The Thriving Mamas Programme and its implementation strategies

The Thriving Mamas Programme (TMP) consists of nine meetings delivered in either peer-group (five meetings), individual (two meetings), or family group (two meetings) formats over 10–16 weeks with an additional individual meeting 10–12 weeks postpartum (see Fig. 2). Each meeting lasts between one and 2 h. TMP is facilitated by one or two local women, known as Mentor Mothers. Initial meetings focus on the physical, emotional, and social changes experienced during this time. A mid-point meeting allows Mentor Mothers to strengthen their rapport with each girl, better understand her unique experience and needs, and screen for depression and anxiety using the nine-item Patient Health Questionnaire (PHQ-9)[41] and the seven-item Generalized Anxiety Disorder (GAD-7) tool,[42] respectively. The latter meetings focus on childbirth, caregiving, and planning for the future (e.g., education and occupational goals, family planning). Content for the intervention was based on existing, evidence-based interventions.[36–40,43,44]

While opportunities for income generation were identified by contributors as a key priority, it was agreed that inclusion of income generation activities may inadvertently be interpreted as an incentive for girls to become pregnant. Therefore, girls who would benefit from this and other health and community-based interventions are supported to take up existing local services.

Several implementation strategies are incorporated into the intervention to strengthen its uptake and delivery (see Table 3). These include sensitisation activities for health facility staff and community leaders, and training and support of Mentor Mothers, and family engagement.

Thriving Mamas programme theory

The Thriving Mamas programme theory was developed from the insights and experiences gained during its

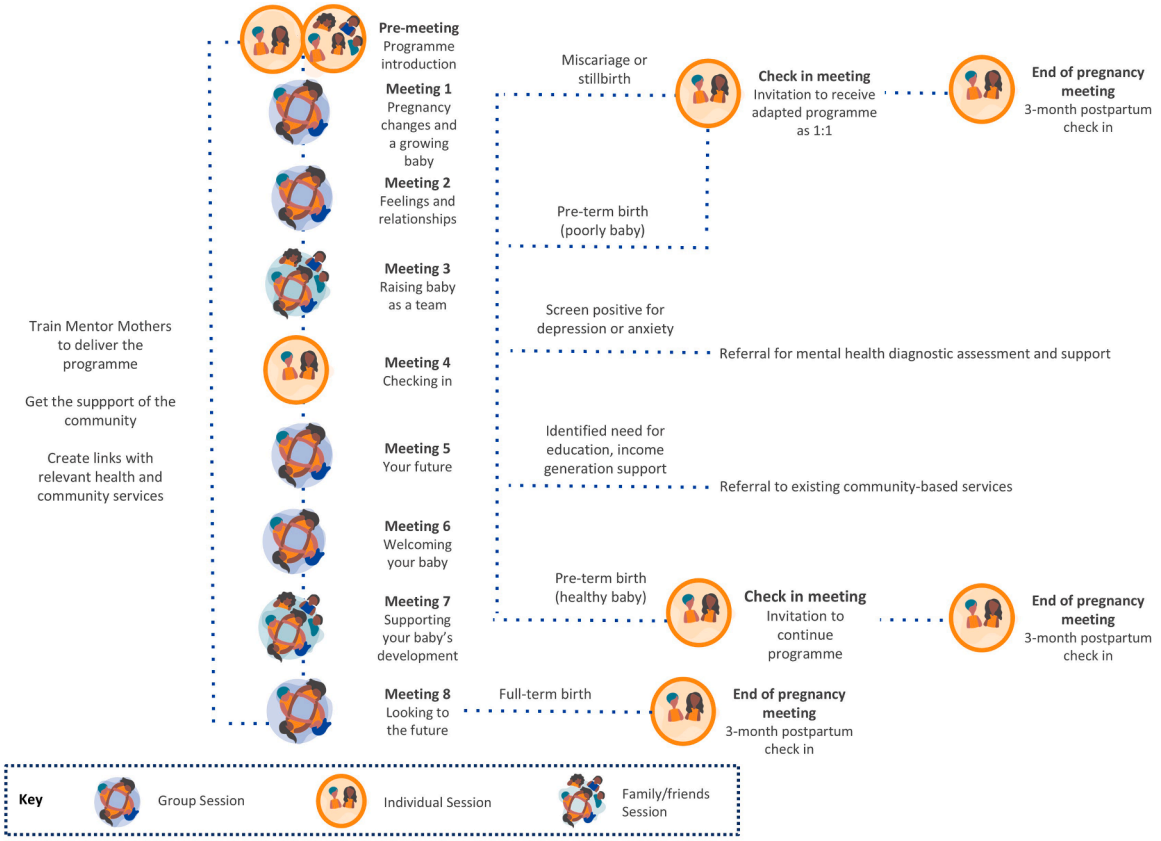


Fig. 2: Overview of the Thriving Mamas Programme.

development. It is based on the idea that addressing social determinants of mental health (e.g. strengthening life skills and social support) and increasing girls' knowledge (i.e. pregnancy, mental health, child development, caregiving) will improve their competencies and confidence in managing their transition to motherhood. This, in turn, will result in reduced perinatal mental health conditions, and improved birth and child health outcomes (see Fig. 3).

Discussion

This paper describes the development of an intervention to support adolescent perinatal mental health through the blending of human-centred design, systems thinking and implementation science approaches. The TMP aims to address the priorities of adolescent girls and their communities in Kenya and Mozambique. This work builds upon previous research supporting the development of an intervention and implementation strategies that are aligned with local contexts and priorities.[45] These priorities are not unique to these countries and demonstrate the potential generalisability (allowing for contextual adaptation) of the intervention to other LMICs if shown to be effective.[23,46,47] It may then provide the core of an intervention which can be delivered with additional components representing local priorities (e.g. re-entry to education, employment skills, table banking) or as part of a programme of interventions targeting different groups (e.g. partners, family members, service providers, community).

The active engagement and decision-making of girls, their partners and families, and the wider community allowed for the intervention to be tailored to local challenges, preferences, and goals. This includes intervention content and activities as well as implementation characteristics. For example, the characteristics of mentor mothers were critical to its attractiveness to participants. In Kenya, it was deemed unfeasible to create a new cadre of service providers, and so mentor mothers needed to be existing community health workers. However, girls perceived discrimination from community health workers to be a barrier to success. Through discussion with girls, we were able to identify characteristics of community health workers that would make them acceptable mentor mothers. In Mozambique, we asked family members and community leaders who would be an appropriate mentor mother to help us identify women in the community to

Identified contextual barriers and enablers		Intervention content	Implementation strategy adopted	Collaborator priority addressed
Epidemiological	High prevalence of adolescent pregnancy	Sessions on sexual and reproductive health		• Increase understanding of pregnancy and childbirth • Improve sexual health knowledge
Political	Wider government support of integration of perinatal mental health care in maternal, newborn, and child health services		• Use of health providers to identify and signpost eligible girls to the intervention • Introductory training session on mental health and sensitivity provided to health facility staff	• Identify mental health problems and provide support
	Government guidelines have named specific mental health screening tools for use in perinatal care	Use of PHQ-9, GAD-7 and FicaBem (Mozambique only) to screen for mental health conditions	• Establishment of mental health screening and referral pathways as part of intervention delivery	• Identify mental health problems and provide support
Geographical	Limited access to mental health services	Screening for depression and anxiety	• Mentor Mothers trained to screen for depression and anxiety	• Identify mental health problems and provide support
	Existence of specific mental health cadres to increase coverage of mental health support	Mentor Mothers provide support and encouragement to engage with health and community-based services	• Establishment of mental health screening and referral pathways as part of intervention delivery	• Identify mental health problems and provide support
Characteristics of the intervention setting	Lack of time during perinatal appointments to screen for mental health problems		• Intervention provided in addition to perinatal appointments • One-to-one meetings to provide opportunity to discuss sensitive topics and signpost to available health and community-based services	• Identify mental health problems and provide support
	Health providers and planners supportive of interventions to improve adolescent perinatal mental health outcomes		• Engagement of health providers and senior management in the development of implementation strategies • Health providers and senior management provided input on the intervention content • Use of health providers to identify and signpost eligible girls to the intervention • Engagement senior management in the development and delivery of training to Mentor Mothers	• Identify mental health problems and provide support
	Existing community-based programmes (e.g. income generation)		• Mentor mothers refer girls to and support participation in existing community-based programmes	
Socio-economic	Poverty as barrier to good health • Inability to pay for/attend perinatal appointments	Intervention sessions on budgeting and Mentor Mothers link girls to income generation activities within the local community	• Mentor mothers refer girls to existing community-based income generation programmes	• Address lack of money to pay for essential items for themselves and their babies
		Activities focus on what girls can do with limited budgets		• Address lack of money to pay for essential items for themselves and their babies
	Poverty as a barrier to future goals • Driver for early marriage and pregnancy • Inability to pay school fees	Intervention sessions on problem-solving Intervention sessions on planning for the future (including educational and employment goals)		• Planning for the future
	Inability to attend school due to household and caregiving responsibilities	Intervention sessions on problem-solving		• Planning for the future

(Table 3 continues on next page)

Identified contextual barriers and enablers		Intervention content	Implementation strategy adopted	Collaborator priority addressed
(Continued from previous page)				
Socio-cultural	High stigma associated with adolescent pregnancy • Lack of support to remain in school • Viewed as irresponsible by health care workers	Intervention content for girls and their family members includes discussion of future goals (including return to education)	• Delivered by mothers in the community (Mentor Mothers) • Introductory training session on mental health and sensitivity provided to health facility staff and Mentor Mothers • Mentor Mothers selected to deliver intervention based on low levels of stigmatizing beliefs	• Planning for the future • Improving social support
	Lack of autonomy among adolescent girls	Intervention content for girls and their family members to strengthen relationships (e.g. building positive relationships, problem-solving skills)	• Group format to encourage the development of support networks among girls • Supportive adults/partners invited to attend selected intervention meetings	• Improving social support
	Limited social support	Intervention content for girls and their family members to strengthen relationships (e.g. building positive relationships, problem-solving skills)	• Group format to encourage the development of support networks among girls	• Improving social support
	Decisions made by male heads of households	Intervention content for girls and their family members to strengthen relationships (e.g. building positive relationships, problem-solving skills)	• Mentor Mothers visit families at home to introduce the intervention to girls and their families and obtain participation consent • Supportive adults/partners invited to attend selected intervention meetings	• Improving social support
Characteristics of adolescents, partners, and family members	Lack of sexual and reproductive health education	Intervention sessions on sexual and reproductive health		• Improve sexual health knowledge • Increase understanding of pregnancy and childbirth
	Lack of childcare knowledge	Intervention sessions on caregiving skills	• Supportive adults/partners invited to attend selected intervention meetings	• Increase understanding of pregnancy and childbirth • Improve caregiving skills
	Poor attendance for antenatal care		• Community engagement to increase detection and intervention enrolment • Intervention groups comprised of adolescents enrolled in both first and second trimesters • Mentor Mothers provided with mobile credit to support contact with adolescents	
	Adolescents desire to learn how to look after themselves and their babies	Intervention sessions on maternal health, mental health, and caregiving skills		• Increase understanding of pregnancy and childbirth • Improve caregiving skills
	Adolescents desire for education and employment opportunities	Intervention sessions on planning for the future (including educational and employment goals)		• Planning for the future
	Partners and families supportive of interventions to improve the outcomes and adolescents and their babies	Intervention content for girls and their family members to strengthen relationships (e.g. building positive relationships, problem-solving skills)	• Mentor Mothers visit adolescents and their families to introduce the intervention and obtain consent for participation • Supportive adults/partners invited to attend selected intervention meetings	• Increase understanding of pregnancy and childbirth • Improving social support
	Partners and families interested in receiving support/being part of the intervention	Intervention content for girls and their family members to strengthen relationships (e.g. building positive relationships, problem-solving skills)	• Mentor Mothers visit adolescents and their families to introduce the intervention and obtain consent for participation • Supportive adults/partners invited to attend selected intervention meetings	• Increase understanding of pregnancy and childbirth • Improving social support

Table 3: **Contextual barriers and enablers to adolescent perinatal mental health, contributor priorities, and intervention content.**

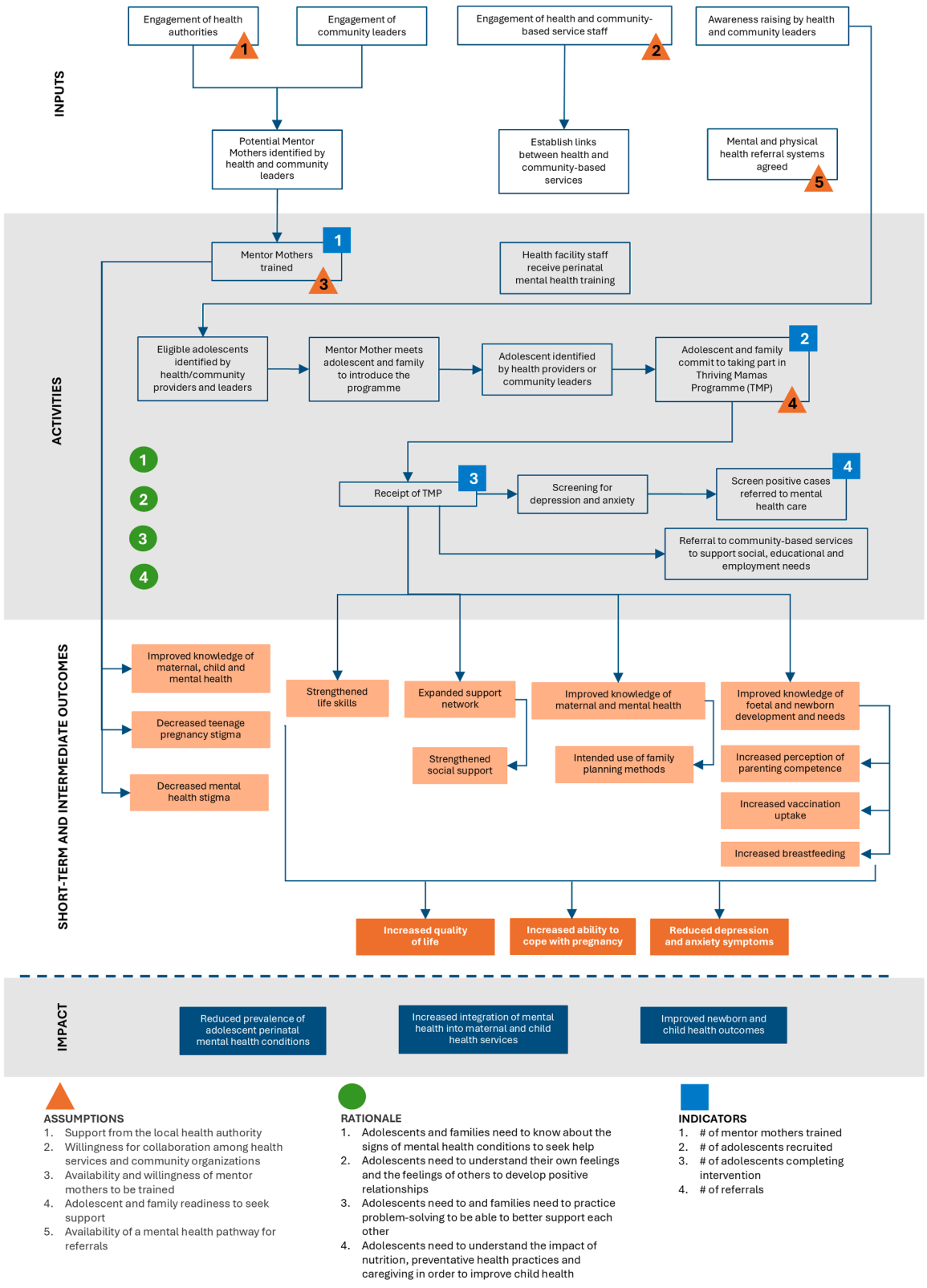


Fig. 3: Thriving Mamas programme theory.

fill this role. By centring the development of the intervention around those integral to its successful receipt and delivery, we have developed strong community buy-in for the intervention. We anticipate this may improve the chances of a successful future pilot.

Although co-design is a significant strength of our work, its implementation was not without difficulties. Contributors were unfamiliar with some of the activities used to elicit thoughts and ideas. This resulted in workshops scheduled for one day taking two, and sometimes three, days to complete. Power dynamics and cultural and religious beliefs occasionally led to challenges in contributor groups effectively working together during brainstorming workshops. For example, high levels of stigma and discrimination associated with adolescent pregnancy led to conflict between stakeholder groups. This threatened the ability of the group to work effectively together. Due to the increased risk of conflict, facilitators of co-design activities must be adequately trained and supported in managing difficult situations to support participants in constructively sharing their perspectives.

Our formative work focused on any challenges during the perinatal period. In addition to stigma, gender inequity, gender-based violence, and poverty were identified as significant challenges faced by girls. This provided a wide variety of potential interventions and groups to target (e.g. adolescents, health providers, partners). The Thriving Mamas Programme specifically targets adolescent girls to develop and strengthen knowledge and skills to help them manage the demands experienced during this time. A limitation of this work was the absence of perspectives from adolescents and young women who had experienced a miscarriage, termination, or stillbirth. While these were not characteristics which precluded participation in the research, recruitment through health and community-based services may have made it harder to reach these individuals. Therefore, it is possible that the intervention may lead to different outcomes for those experiencing adverse obstetric and child health outcomes. A future evaluation of the intervention may provide greater insight into the appropriateness, acceptability and effectiveness of the intervention in these situations. Furthermore, future work should also focus on how to address the structural, cultural, and political challenges faced by adolescent girls at family, health service, and community levels. In particular, interventions to support partners and male heads of household are needed to ensure households support girls' mental and physical wellbeing. Interventions to support high quality of care and strong therapeutic relationships with health providers can also improve wellbeing. These complementary interventions will help shift the view of these challenges as something a girl is responsible for, to one that a family, health service, and society must address together.

The development of the Thriving Mamas Programme provides an example of co-design to improve mental health outcomes. Contributors remained engaged throughout the duration of the research and took an active role in shaping the intervention and implementation strategies. Senior local health and government officials in Kilifi County have committed themselves to supporting the development and delivery of training to mentor mothers prior to piloting the intervention. In Mozambique, the Ministry of Health has provided their support for the research and taken part in discussions to support its sustainability and scale. By engaging key contributors throughout the entire process of intervention development and evaluation planning, we have secured buy-in and support, which has eased the transition to the next phase of the project–pilot testing.

Conclusion

The Thriving Mamas programme is a co-designed intervention to support adolescent perinatal mental health, which packages evidence-based mental health promotion and prevention interventions with key contributor priority challenges. In addition to content, implementation strategies were driven by local preferences, barriers, and enablers to increase the programme's attractiveness, feasibility, and potential for scale. The intervention has the potential for wider generalisability as the priority challenges and experiences of adolescent pregnancy and early motherhood described by participants are echoed in the global literature. While future work is needed to evaluate the effectiveness of the intervention, the equitable research methods used provide evidence of the feasibility and impact of co-design within the field of mental health and among adolescents.

Contributors

TTS: conceptualisation, supervision, formal analysis, writing of the original draft, visualisation and funding acquisition. MdM, MT: conceptualisation, investigation, supervision and review. FC, MH, EL, SK, VN, MN, ML, AM, MB, LN, MSM, KHA, KL: investigation, formal analysis, writing, review and editing. FM, RG: conceptualisation, review, editing. NS: Conceptualisation, supervision, writing, review and editing.

Only local research teams had access to the raw data from their respective countries. TTS had the final decision to submit the manuscript for publication.

Data sharing statement

Anonymised qualitative data from consenting participants will be archived using Rich Text Format and made available to others upon application to the study PI (tatiana.salisbury@kcl.ac.uk). Applications will be assessed by the project steering group. Use of data will require additional ethical approval.

Declaration of interests

TTS is a director of TT Salisbury Research Ltd. and a trustee of the Global Alliance for Maternal Mental Health. FC, MH, EL, SK, VN, MN, ML, AM, MB, LN, FM, MSM, KHA, KL, NS, RG, MdM and MT have nothing to disclose.

Acknowledgements

This project was funded by UK Research and Innovation (UKRI) through a Future Leaders Fellow award to TTS (ref: MR/T019662/1). We acknowledge the generous, ongoing commitment and contributions of the local advisory board members in Kenya (Ms Maureen Asembo, Mr Vespus Chenja, Dr Elwyn Chondo, Mr Geoffrey Katana, Ms Nuru Kibirenge, Mr Kenneth Miriti, and Mrs Sophia Onsare) and Mozambique (Ms Stella Chenga, Mr Carlos José, Ms Mphatso Norman, and Ms Etelvina Sande) and our impact advisory board (Dr Florence Baingana, Dr Robert Stewart, Dr Sally Griffin, Dr Wilza Fumo, Dr Joanna Lai, Dr Anisa Omar, and Mr Emmanuel Mwakera) to the INSPIRE project. We also acknowledge Ms Isabel Menetiane (Department of Adolescent Health) and Dr Wilza Fumo (Department of Mental Health) from Mozambique's Ministry of Health for their insightful recommendations regarding alignment with the country's Adolescent and Mental Health Strategy. We thank all the adolescents, families, service providers, community members, and government representatives with whom we partnered to develop the Thriving Mamas programme for their commitment, insights, and support.

Role of the Funding Source: The funder has had no role in the design, conduct, analysis, write-up or submission of the research for publication.

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