Implementing care for vulnerable infants under 6 months of age and their mothers

‘Learning by doing’ case study series: **Yemen**

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Keywords

Infant health; mother child health; continuity of care; infants at risk of poor growth and development; small vulnerable infants

Further information

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To find more about the Yemen case study and to discuss how this work can be taken forward, please contact Ahmed Aljabi at ahmed.aljabi@adrayemen.org.

ADRA's Health and Nutrition MAMI assistant conducting a home visit.

Abstract

Background

Many infants are born vulnerable, or become so in the first six months of life, and thus are at an increased risk of poor growth and development, ill health, and mortality. To mitigate risks and safeguard future health, comprehensive continuity of person-centred care for at-risk mother–infant pairs is needed, but it remains challenging to deliver this at the required level of quality and at scale. This case study investigates the process of implementing, adapting, normalising and embedding an integrated care pathway approach for the management of small and nutritionally at-risk infants under six months (u6m) and their mothers (the MAMI Care Pathway) in the Yemeni context to inform sustainable scalability.

Method

In the Yemen case the MAMI Care Pathway approach was applied as an implementation pilot integrated within a health and nutrition emergency programme operated by the Adventist Development and Relief Agency (ADRA) in Yemen. In the case study, mixed methods were used to provide a detailed description of the planning and implementation processes, to explore influences on the adoption of the approach, and to appraise the potential scalability and sustainability of care. Different lenses examined health workers' experiences of implementing the MAMI Care Pathway, which enhanced their capacities through 'learning by doing'. Reflective discussions generated transferable insights into implementation.

The case study did not paint an exhaustive or exclusive picture of the implementation of the MAMI Care Pathway approach. For example, it did not seek the perspectives of mothers, as service users or decliners, and involved only a few clinical health workers. Nor did it evaluate the cost effectiveness, acceptability or feasibility of the Care Pathway approach or compare it to alternative approaches.

Results

In Yemen, policies and guidance on providing comprehensive continuity of care for vulnerable infants u6m outside of hospital settings are limited. ADRA's health and nutrition emergency programme provided an opportunity to introduce the MAMI Care Pathway approach to fill gaps in providing continuity of care for vulnerable mother–infant pairs, because of its favourable organisational environment and established relationships.

The MAMI Care Pathway approach was implemented in nine Ministry of Public Health and Population- (MOPHP-) run health centres supported by ADRA in four districts across three governorates in Yemen. Following consultation with MOPHP, start-up was quick and required minimal financial and technical support. The brief infusion of external expertise was sufficient for ADRA staff and MOHPH health workers to acquire the knowledge and skills needed for implementation.

ADRA's support to health and nutrition services on behalf of MOPHP included making the necessary adaptations in generic materials; training and mentoring health workers; providing supportive supervision; and collaborating within and across health services. The support included a small remuneration to motivate MOPHP health workers to take on the additional workload.

Comprehensively addressing vulnerability factors for "small and nutritionally at-risk infants and their mothers" with a person-centred and continuity of care approach required good skills and continuous mentoring. The intentional shift from disease-focused care to comprehensive person-centred care of the infant and the mother was appreciated by the health workers but its implementation was not fully realised, nor were tasks shared or alignment between services encouraged to streamline care and reduce workload.

Since ADRA focused on implementing and expanding the MAMI Care Pathway approach within the emergency portfolio to reach a wider population, no major attempts were made to advocate for health policy changes or to seek development funding to support further expansion. However, changes in policies and practice and wider local stakeholder engagement were envisaged to mainstream the approach in routine services at scale, including a feasible monitoring, learning and evaluation system.

Conclusion

The Yemen case study provides insights into the feasibility of implementing the MAMI Care Pathway approach in an existing emergency health and nutrition intervention by building on ongoing support for maternal and child health and nutrition services. Showing by example, the success of ADRA's work has sparked the interest of other health and nutrition actors, who have begun making plans to implement and expand the MAMI Care Pathway in Yemen.

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Abbreviations

BHA	Bureau of Humanitarian Assistance
CHNV	Community health and nutrition volunteer
CHW	Community health worker
CMAM	Community-based management of acute malnutrition
CMW	Community midwife
DHO	District Health Office
ENN	Emergency Nutrition Network
GHO	Governate Health Office
GNC-TA	Global Nutrition Cluster-Technical Alliance
IYCF	Infant and young child feeding
IMNCI	Integrated management of neonatal and childhood illness
JSI	John Snow Inc.
LBW	Low birthweight
M&E	Monitoring and evaluation
MAMI	Management of Small and Nutritionally At-Risk Infants Under Six Months and their Mothers
MANR	Multisectoral Assistance and Nutrition Response (USAID-BHA-funded project)
MEAL	Monitoring, evaluation, accountability and learning
MOPHP	Ministry of Public Health and Population
MUAC	Mid-upper arm circumference
NGO	Non-governmental organisation
OTP	Outpatient therapeutic programme
TFC	Therapeutic feeding centre
u6m	Under six months of age
UNICEF	United Nations Children's Fund
USAID	United States Agency for International Development
WAZ	Weight-for-age z-score
WHO	World Health Organization
WLZ	Weight-for-length z-score
YEMLI	Yemen Emergency and Multisectoral Lifesaving Interventions (USAID-BHA-funded project)

1. Addressing care gaps for vulnerable at-risk infants and their mothers

Infant vulnerability

Many infants are born vulnerable, or become so in the first six months of life. These infants are at increased risk of poor growth and development, immediate and long-term ill health and increased mortality (1). Each year, an estimated 8.9 million babies (14.6%) are born with low birth weight (LBW) (2), carrying short- and long-term health risks, especially for those born premature (1). In low- and middle-income countries, an estimated 9.2 million (15.5%) infants under six months of age (u6m) are wasted, 10.3 million (17.4%) are underweight, and 11.8 million (19.9%) are stunted (3). An episode of wasting, particularly in the first three months of life, increases the risk of subsequent and persistent wasting, and concurrent wasting and stunting, as children age (4, 5). This poor start to life contributes to the global burden of 45 million children under five years of age who are wasted and 149 million who are stunted (6), affecting health outcomes in current and future generations and compromising individual and community potential (4, 7).

Gap in evidence to practice

Vulnerable or at-risk infants u6m may be described or present to services in many ways (8). They include newborns with LBW, especially those born preterm or small for gestational age; infants identified with wasting or acute malnutrition, stunting or underweight; infants who are nutritionally at risk, or with acute or chronic illness, disability or other growth and development concerns; and infants whose mothers have nutrition, physical or mental health or social challenges. Many services are provided for these infants, and sometimes their mothers, across health and nutrition services, including for reproductive health (e.g., for LBW, small and sick newborns), nutrition (wasting prevention and treatment), paediatric health (integrated management of neonatal and childhood illness (IMNCI), integrated community case management) and maternal health. However, continuity of comprehensive, quality care centred on at-risk mother–infant pairs is needed to mitigate immediate risks and safeguard future health (9), and this is challenging to deliver at scale (10). Care is therefore complex at both the individual level and the service delivery level.

Connecting within and across services is ideal but is elusive in practice. One critical barrier is a lack of evidence on how to do this in different contexts. The 2013 World Health Organization (WHO) guideline update on wasting recommended outpatient care for stable and “uncomplicated” severely wasted infants u6m (11). However, uptake in national policy and practice has been low and slow, with most countries still recommending inpatient treatment. In 2023, WHO updated the guideline (12) to cover infants u6m at risk of poor growth and development. Knowing how to deliver such care in different settings is critical for national policy-makers and those who support their efforts. National decision-makers need contextualised evidence on what works, where, how and for whom in different settings to enable informed policy and service development within cost and capacity. Without addressing the ‘how’, realising adequate care will remain elusive.

Commitment to country-led learning on 'how'

To help put the WHO 2013 guidelines into practice, the Emergency Nutrition Network (ENN) coordinated the development of the Management of Small and Nutritionally at-Risk Infants Under Six Months and their Mothers (MAMI) Care Pathway in 2015 through a global collaboration of experts and practitioners. Version 3 was released in 2021. The provisions are consistent with the 2023 WHO guideline update's extended scope (12). The MAMI Care Pathway applies, and expands on, updated health and nutrition guidance, including IMNCI and United Nations Children's Fund (UNICEF)/WHO breastfeeding counselling materials and frameworks, as well as integrated continuity of care for at-risk infants u6m and their mothers across health and nutrition services. It has been used in pilot studies, small-scale programmes and, increasingly, government services to help navigate and plan care in multiple settings.

Evidence is needed to show that an intervention is effective, but also to assess the conditions under which it is implemented, to maximise the potential for replicability and sustainable delivery at scale. Learning from small-scale implementation is essential before expanding, which requires active planning from the outset. As a collective, the MAMI Global Network is an active forum practitioners around the world use to collaborate, exchange experience and support each other in caring for at-risk infants and mothers through policy, research and practice. Activities are guided by a five-year strategy (9) that aims to achieve sustainable, scaled care by supporting country leadership, priorities and action to help mothers and their infants to survive and thrive. The MAMI Global Network is committed to supporting learning to capture and appraise experiences of the MAMI Care Pathway and examine implementation models and delivery systems in different contexts.

MUAC of infant measured.

2. Case study series

Three in-depth case studies were carried to explore different implementation modalities of the MAMI Care Pathway approach in three different small-scale settings: in **Pakistan**, **South Sudan** and **Yemen**.

Objectives

The overall objective of the case studies was to explore, capture and generate learning from the application of the MAMI Care Pathway approach in different contexts to inform approaches for sustainable scalability of care.

Specific objectives

1. Describe and learn about what was done, and how and why, in each context.
2. Describe and learn about what worked (or not), for whom and under what circumstances, to bring about routine practices.
3. Examine the spread, scale-up and sustainability of the approach within and across settings.
4. Provide suggestions on how to improve practice and ensure sustainability at scale.

Methods

We applied a mixed-methods approach within and across the three case study settings, including the following elements:

- Developing a *Planning and Implementation Process Framework* for the MAMI Care Pathway Approach to describe in detail the planning and implementation process in each context.
- Exploring the sequential steps of 'normalisation' (adoption) of care, spread, scalability and sustainability by applying *Normalisation Process Theory (NPT)* (13-15), *the Non-adoption, Abandonment, Scale-up, Spread and Sustainability (NASSS) Framework* (16), and the *Checklist for Assessing the Potential Scalability of Pilot Projects or Research* (17, 18).
- Using these methods to apply different lenses to examine experiences in each context and to generate insights that may be transferable to other settings (19).
- Using a participatory and reflective approach of 'learning by doing, together', to deepen the understanding and build the capacity of all participants.

The Yemen case was selected as an example of applying the MAMI Care Pathway approach as an implementation pilot integrated within a health and nutrition emergency programme (started in the Multisectoral Assistance and Nutrition Response project [MANR II] and continued in the Yemen Emergency and Multisectoral Lifesaving Interventions project [YEMLI]) managed by the Adventist Development and Relief Agency (ADRA) in Yemen and funded by the United States Agency for International Development's (USAID) Bureau of Humanitarian Assistance (BHA). The **country health context** **(section 3)** described the implementation environment for our phased investigation:

- First, we described the process of **planning and implementing** the MAMI Care Pathway approach to understand what was done, and how and why **(section 4)**.
- Second, we explored factors that influenced the process of **normalisation and adoption** of the approach and explored perceptions about what worked for whom and under what circumstances **(section 5)**.
- Third, we triangulated and synthesised data on descriptions and perceptions to appraise the **potential scalability and sustainability** of the approach **(section 6)**.
- Finally, we synthesised **insights** generated through the **collective learning** process into suggestions for policy, research and practice, to strengthen the potential for future scale **(section 7)**.

Annex 1 provides an overview of the MAMI Care Pathway approach (who, what, where). Annex 2 lists working definitions. Annex 3 details the methods applied in the three case studies, and their limitations. Annex 4 is a set of generic questionnaires and Annexes 5 and 6 provide more detailed information on materials used for implementation and training. Annexes 7 and 8 present the detailed findings from the appraisal of the adoption process and readiness for scale .

The case study did not draw an exhaustive or exclusive picture of the implementation of the MAMI Care Pathway approach. For example, it did not seek the perspectives of mothers as service users or decliners, and only involved a few clinical health workers. Nor did it evaluate the cost effectiveness, acceptability, or feasibility of the Care Pathway approach, or compare it to alternative approaches.

Community health and nutrition volunteers with their MAMI kits.

3. Country health context

Yemen is a low-income country that faces ongoing protracted crises. The current conflict began in 2015, devastating the economy and resulting in fragile health systems and severe food insecurity. In 2023, an estimated 24.1 million people were at risk of hunger and disease, and roughly 14 million were in acute need of assistance.

The health system in Yemen in fragile areas is supported by international financial and technical partners, whose actions are coordinated by the Ministry of Public Health and Population (MOPHP) and the Health Cluster, coordinated by WHO, and the Nutrition Cluster, coordinated by UNICEF and funded by USAID's BHA. Data on the prevalence of LBW and preterm births in Yemen are not available, but neonatal and infant mortality rates are high (Table 1). Skilled birth attendants assist less than half (45%) of deliveries and only 10% of infants u6m are exclusively breastfed.

Table 1: Key health and nutrition indicators, Yemen

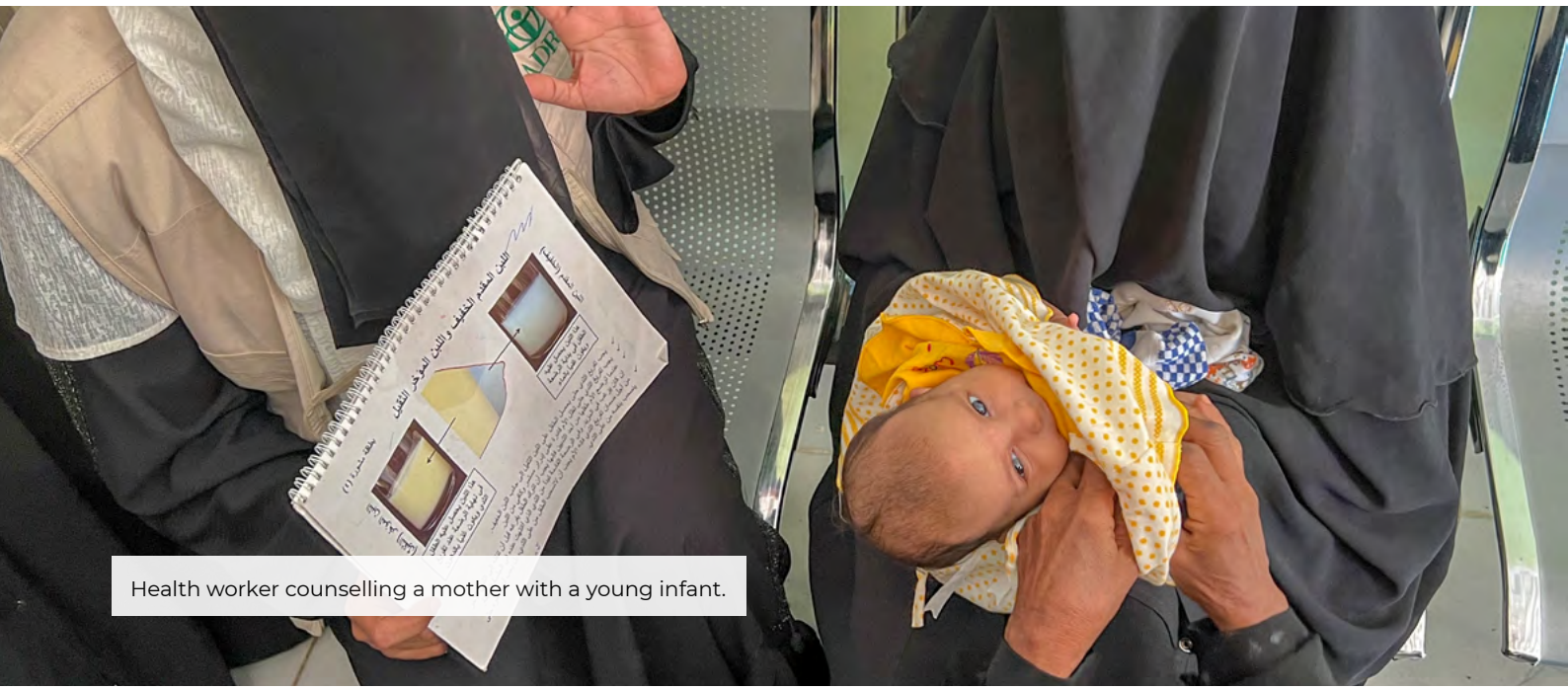
Total population (million)	34.4 (2023) (20)
Fertility (births per woman)	3.4 (2023) (21)
Live birth (births per 1,000 people)	28 (2023) (21)
Neonatal mortality (neonatal deaths per 1,000 live births)	28 (2023) (20)
Infant mortality (infant deaths per 1,000 live births)	47 (2023) (20)
Skilled birth attendance	45% (2023) (20)
Exclusive breastfeeding	10% (2023) (20)
Wasting (children 6–59 months)	18% (2020) (22)
Stunting (children 6–59 months)	35% (2022) (20)
Severe wasting and nutritional oedema (children 6–59 months)	1% (2020) (22)

The MAMI Care Pathway approach was introduced in the Yemen case in 2021 through the MANR II emergency programme on maternal and child health, nutrition and water, sanitation and hygiene, which facilitated embedding of a MAMI pilot within the programme in nine MOPHP-run heath facilities in four districts across three governorates (Figure 1, Table 2). MAMI implementation through MANR II continued until July 2022 and was carried over and extended until August 2023 as part of ADRA's YEMLI project. Additional staff were recruited to implement the MAMI Care Pathway approach at the nine facilities. Over a 12-month period (June 2022–July 2023), 891 mother–infant pairs were enrolled and supported. Implementation of the MAMI Care Pathway approach will continue in the nine sites and expand to 24 fixed health facilities and five mobile clinics through YEMLI II later in 2024.

Figure 1. Location of implementation sites in Yemen (see blue dots ●)

Table 2: MAMI sites in ADRA-supported health facilities in Yemen, 2021–2023

Governorate	District	Health facility	Referral hospital
Lahj	Tuban	Bir Nasser Health Unit	Ibn Khaldoon Hospital
		Al-Hubil Health Unit	
	Al Madaribah and Ras Al Arah	Al-Majza Health Centre	
Abyan	Khanfer	Al-Kood Maternal and Child Health Centre	Al-Razi Hospital
		Al-Gool Al-Shabia Health Unit	
		Al-Darjaj Health Unit	
Al-Dhale'e	Al- Dhale'e	Al-Bajah Health Centre	Al-Nasser Hospital
		Habil Al-Sowq Health Centre	
		Al-Fajarah Health Unit	



Health worker counselling a mother with a young infant.

4. Planning and implementation

This section describes the inquiry into the planning and implementation of the MAMI Care Pathway in the Yemen case that included the following steps:

1. Understanding the health system.
2. Planning for service delivery: who, what and how.
3. Implementing services: steps taken to implement the MAMI Care Pathway approach.
4. Monitoring, improving quality and collaborative learning.
5. Making suggestions for improving planning and implementation.

4.1. Understanding the health system

Key information

- In Yemen, policies and guidance on providing comprehensive continuity of care for vulnerable infants u6m outside of hospital settings are limited. Community management of acute malnutrition (CMAM) guidelines recommend inpatient care for all infants u6m identified with severe wasting or oedema.
- Ahead of the pilot, the capacity of the nine MOPHP-run heath centres in which the MAMI Care Pathway approach was to be implemented was analysed, including staff availability, their medical certifications and whether they had received CMAM and infant and young child feeding (IYCF) training.
- ADRA recruited additional staff to implement the MAMI Care Pathway approach.
- Stakeholder meetings were held with representatives from MOPHP, heads of Governorate Health Offices (GHOs) and District Health Offices (DHOs), community health workers (CHWs) and community health and nutrition volunteers (CHNVs), to present the MAMI Care Pathway approach and garner support.

Burden and perceived health priority. ADRA in Yemen recognised that many young children just over six months of age are enrolled in CMAM programmes, suggesting that malnutrition begins earlier than this age. Since services to manage infants u6m were limited in Yemen, the MAMI Care Pathway approach was proposed to provide timely support to at-risk mother–infant pairs for feeding, child health, and maternal wellbeing.

Policy context. No formal policy analysis was conducted before implementing the MAMI Care Pathway approach, but it was understood that the approach would fill gaps in Yemeni health and nutrition guidelines in regard to care for at-risk infants u6m and their mothers. ADRA suggested for the Nutrition Cluster to integrate the MAMI Care Pathway approach into the national CMAM guidelines, which upto then proposed to refer all infants u6m with severe wasting (weight-for-length z-score (WLZ) <-3 and/or oedema and/or danger signs (of the integrated management of neonatal and childhood illness [IMNCI]) to in-patient care (in hospital-based therapeutic feeding centres [TFCs]). Infants u6m identified with moderate wasting (WLZ <-2) or breastfeeding problems were referred to IYCF counselling in outpatient therapeutic programme (OTP) sites at the health facilities.

Local health system capacities. ADRA used a capacity mapping questionnaire to assess the services provided at health facilities and the numbers of health professionals available at the facilities. The tool assessed as well health workers' capacities in assessing clinical signs and symptoms (IMNCI), CMAM and anthropometric measurement, and in providing IYCF counselling and support to caregivers. For community-level implementation, community health and nutrition volunteers (CHNVs) were selected. All involved in addressing vulnerable infants u6m and their mothers were trained on the MAMI Care Pathway approach.

Stakeholders. Stakeholder meetings were held with representatives from MOPHP, GHOs and DHOs, community health workers (CHWs) and CHNVs from selected health facilities, to present the MAMI Care Pathway approach. Besides implementing the MAMI Care Pathway approach, CHWs and CHNVs play an important role in championing the approach through community-based sensitisation. At the start, ADRA was the only NGO to implement the MAMI Care Pathway approach in Yemen, but others have since expressed interest or adopted it. For example, Save the Children conducted a one-week training on MAMI in Aden as part of its plans to implement the MAMI Care Pathway approach in Taiz Governorate.

4.2. Planning for service delivery

Key information

- Early engagement with MOPHP, GHOs and DHOs, and the Health and Nutrition Clusters facilitated approval for introducing the MAMI Care Pathway approach in targeted health facilities.
- External guidance was sought from the Global Nutrition Cluster Technical Alliance (GNC-TA), who assigned a MAMI Advisor to orient ADRA staff on the MAMI Care Pathway approach and to support adaptation in the Yemeni context.
- Nine implementation sites were selected. Each site consisted of a MOPHP-run heath centre supported by ADRA, its catchment population and district referral hospital.
- MAMI Care Pathway Package materials and newly developed materials were adapted to the local context and translated into Arabic. ADRA International and ADRA Yemen technical teams approved the final versions used for implementation.
- Facility- and community-based health workers were trained to implement the MAMI Care Pathway approach, according to their level of care. MOPHP focal points attended the training sessions and the MAMI Advisor played an advisory and supervisory role during the initial rollout.

Agency's preparedness, stakeholder engagement, and approval. ADRA International discussed the potential to implement the MAMI Care Pathway approach internally, and then presented the idea of incorporating a MAMI pilot in MANR II to ADRA Yemen. As ADRA did not have expertise in the MAMI Care Pathway approach, it sought external guidance from the GNC-TA on integrating the approach in its existing health and nutrition programme in Yemen.

ADRA held stakeholder meetings with representatives from MOPHP, GHOs and DHOs, and sought approval from MOPHP and the Yemen Health and Nutrition Clusters to introduce the MAMI Care Pathway approach in targeted health facilities.

The GNC-TA MAMI Advisor was assigned to ADRA to prepare and facilitate an orientation (August 2021), followed by a design workshop to discuss adapting the MAMI Care Pathway approach to the Yemeni context and to finalise the MAMI country materials (September 2021). Both the orientation and design workshops were aimed at ADRA's country-level coordinators and managers in Yemen, as well as ADRA's globally based technical advisors supporting the project.

ADRA met with Save the Children to discuss expanding the MAMI Care Pathway approach in Yemen and to share its implementation experience. It linked Save the Children to the GNC-TA, the National Nutrition Cluster and other MAMI focal persons, who attended and supported their five trainings in Aden. ADRA also engaged with International Medical Corps and John Snow Inc. (JSI) to advocate for implementing the MAMI Care Pathway approach and to provide advice and support, as well as with JSI to discuss including the approach as part of the Yemen Momentum for Integrated Health Resilience project, and to support them. It also provided advice to the Health and Nutrition Clusters on incorporating the MAMI Care Pathway approach in the revised CMAM guideline and Minimum Service Package for Yemen (23).

Defining the target population. Criteria to be used to define vulnerability in infants u6m and their mothers were generated with advice and supervision from the MAMI Advisor (Box 1). High-risk classification criteria were aligned with the 2013 WHO guidelines on severe acute malnutrition and moderate-risk classification criteria were agreed through consultation with the MAMI Advisor. Weight-for-age z-score (WAZ) for infants u6m, which was not being used in the OTP sites for children aged 6–59 months, was also added to the agreed list of criteria.

Box 1. Criteria used to identify small and nutritionally at-risk infants u6m and their mothers during screening and assessment in the Yemen case, 2021–2023

Criteria used to identify at-risk infants u6m and their mothers during rapid screening in the community or at any contact with health services, for referral for in-depth assessment

Infant u6m:

- Maternal orphan or mother absent
- Low birthweight <2,500 g
- Premature birth <37 weeks
- Multiple birth (twins)
- Infant mid-upper arm circumference (MUAC) <110 mm (infant <6 weeks) or <115 mm (infant ≥6 weeks)
- Excessive crying or sleep problems, colic and other concerns

Mother of infant u6m:

- Adolescent mother <18 years
- Maternal MUAC <230 mm
- Maternal diseases (HIV, TB, other)
- Maternal mental health concern

Criteria used to identify high-risk infants u6m and their mothers during in-depth assessment for referral to inpatient care

Infant u6m:

- IMNCI general danger sign or sign and symptom of severe disease, including nutritional oedema
- WLZ <–3 or WAZ <–3

Mother of infant u6m:

- Severe maternal mental health concern

Note: High-risk mother–infant pairs are referred to hospital. After their problems have been resolved they return for enrolment in the MAMI Care Pathway and continue to be supported until the infant reaches six months of age.

Criteria used to identify moderate-risk infants u6m and their mothers during in-depth assessment for enrolment in outpatient care

Infant u6m:

- Maternal orphan or mother absent
- Low birthweight <2,500 g
- Premature birth <37 weeks
- Multiple birth (twins)
- Excessive crying or sleep problems, colic and other concerns
- WLZ <–2 but ≥–3 or WAZ <–2 but ≥–3
- MUAC <110 mm (<6 weeks) and <115 mm (≥6 weeks)
- Growth deficit (perceived low growth by mother, low weight gain (<5 mg/kg/day) at three consecutive follow-up visits)
- Feeding challenges

Mother of infant u6m:

- Adolescent mother <18 years
- Maternal MUAC <230 mm
- Maternal diseases (HIV, TB, other)
- Moderate maternal mental health concern

Selecting implementation sites. The MAMI Care Pathway approach was implemented in nine of the 28 ADRA-supported health facilities providing reproductive health, IYCF and CMAM. Sites were selected based on the catchment population, availability of skilled staff, capacity of the health facility, and presence of a district referral hospital. Additional consideration was given to the accessibility, availability and provision of integrated services, including whether World Food Programme- and UNICEF-funded OTP and targeted supplementary feeding programme were available at the pilot health facilities or in their surrounding areas.

Designing the implementation modus. The implementation modus was tailored to the local context and capacities during the MAMI orientation and design workshop involving ADRA Yemen and MOPHP, with support from the GNC-TA MAMI Advisor. The MAMI Care Pathway approach was implemented as a pilot to inform further adaptation and scale-up.

Adapting, aligning, simplifying, testing and using materials. All MAMI Care Pathway package materials were used, with WLZ <-3 added as a high-risk criterion. The MAMI Care Pathway criteria were integrated with those used in CMAM. A MAMI register and referral card for CHNVs were also developed with support from the ADRA Monitoring, Evaluation, Accountability and Learning (MEAL) team. All materials were translated into Arabic. Together, the ADRA International Technical Advisors and ADRA Yemen Technical Specialists approved the final versions of materials used for implementation. Annex 5 provides more detail on the implementation materials.

Training for implementation. Two training workshops were held, one for health workers and one for CHNVs in the nine selected health facilities. Details of the training workshops are provided in Annex 6. The MOPHP focal points for IYCF and the CHNVs attended the trainings and the GNC-TA MAMI Advisor provided mentorship support. The training equipped implementers (according to their roles) with the necessary skills to: (1) screen and assess health status, anthropometry and risks; (2) assess mental health; (3) enrol at-risk pairs; (4) refer and trace absentees; and (5) follow up on treatment outcomes. As part of national guidelines, health workers and CHNVs also received training on awareness messages (nutrition, IYCF, hygiene, and social and behaviour change) to be used in their practice.

4.3. Implementing services

Key information

- The pilot was implemented from December 2021 to August 2023 in nine facilities in five districts across three governorates in Yemen.
- Services were provided free of charge at all facilities. If referral was needed, severe acute malnutrition vouchers were provided to cover the associated costs, paid for and organised through ADRA's USAID-BHA-funded project.
- Sufficient skilled MOPHP and ADRA-recruited staff were available at all facilities and supportive supervision and mentoring were provided to health workers monthly.
- CHNVs received a monthly top-up to their transportation subsidy to motivate their adoption of new tasks in their routine practice.

Access: availability, geographic accessibility, affordability and acceptability. The MAMI Care Pathway approach was implemented in nine facilities in five districts across three governorates in Yemen (Table 2 above). All services were provided free of charge in all facilities. If referral was needed, severe acute malnutrition vouchers of US dollars (USD) 250 maximum were issued to mothers/caregivers to assist with the associated costs, including transport and accommodation during inpatient care. These vouchers were paid for and organised through ADRA's YEMLI project, under which the MAMI Care Pathway was piloted.

Organisation of care. In the community, CHNVs and CHWs conducted screening as part of weekly visits, during which they also provided IMCI, IYCF and CMAM services. They screened mother–infant pairs using a rapid screening guide. If they were identified as at risk according to community-based screening, mother–infant pairs were referred to the health centre for an in-depth assessment. Initially, CHNVs received USD 15 per month for transport, but this was increased to USD 100, which incentivised them to absorb the new tasks into their routine practice.

In the health centres, mother–infant pairs were assessed using the IMCI 'ask, listen, look, feel' approach adopted by the MAMI Care Pathway, and their level of risk was classified according to criteria in the MAMI Care Pathway. If in-depth assessment indicated low risk for the mother–infant pair, CHNVs provided general nutrition counselling and reassurance during household visits. Pairs identified as 'high-risk' with infants aged one month or older were referred to the TFC at the hospital for inpatient care. High-risk pairs with infants below one month of age were referred to the hospital for paediatric care.

If in-depth assessment indicated moderate risk in either the infant or mother, the mother–infant pair was enrolled in outpatient MAMI care at the health centre. Once enrolled, health workers provided management and follow-up according to the adapted MAMI Care Pathway, consisting of tailored counselling and actions to address specific problems (including clinical care, feeding counselling and support, and mental health and psychosocial support for mothers), and monitoring of progress, with adjustments to follow-up as needed. Staff responsibilities included the following: (1) clinical assessment and care by a medical assistant or nutrition worker; (2) tailored IYCF counselling by a midwife or nutrition worker; (3) mental health and psychosocial support for mothers by a medical assistant or midwife; (4) monitoring of progress by midwives or nutrition workers.

Mother–infant pairs remained enrolled in outpatient MAMI care until the infant reached six months of age, after which the pairs were assessed (outcome review) by a midwife or nutrition worker. If further care (beyond six months) was required, malnourished cases were referred to ADRA's supported CMAM activities, feeding problems were referred to IYCF activities, and clinical issues were referred to IMCI activities in the respective health centres. Table 3 lists the components of the Care Pathway across health actors at the community and health centre levels, with minimal variation by site.

Table 3: MAMI Care Pathway components unpacked for integration into health services in the Yemen case, 2021–2023

Activity	Detailed activities	What	Where	Who
Sensitisation	Sensitisation on risks	Information, education and communication	Community	CHNVs
	Health and nutrition promotion	Social and behaviour change communication	Community and health facilities	Health and nutrition officers, health workers, CHNVs, CMWs
Screening	Screening (rapid assessment)	Through MAMI forms, mid-upper arm circumference tapes	Community and health facilities	Health workers, CHWs, CHNVs, CMWs
Assessment	In-depth assessment	Through MAMI forms	Health facilities	Health workers
Follow-up	Referral	Using severe acute malnutrition referral vouchers	Hospitals, health centres, health units	Health workers
	Follow-up in the home during enrolment	Home visits	Every household	CHNVs, CMWs, CHWs

CMW= community midwife; CHNV= community health and nutrition volunteer.

Organisation of staff. Sufficient skilled MOPHP and ADRA-recruited staff were available at all facilities. The MOPHP staff consisted of six nutrition workers and six midwives in each governate of Lahj, Abyan and Al-Dhale'e, as well as 12 CHNVs in Lahj, 20 in Al-Dhale'e and 26 in Abyan. ADRA staff consisted of one MAMI coordinator and three MAMI assistants recruited for the duration of the pilot. Implementation was supported by adapted MAMI Care Pathway materials. Supportive supervision and mentoring were provided to health workers on the MAMI Care Pathway approach and other health-related activities at least once a month in each health facility.

Participation. Because the MAMI Care Pathway approach targeted at-risk mother–infant pairs, mothers were inherently involved in care. Caregivers' perceptions of the need for and interest in the MAMI Care Pathway approach were not specifically assessed, but pairs that met criteria for enrolment were invited to join if they were interested.

4.4. Monitoring, improving quality and collaborative learning

Key information:

- Data on implementing the MAMI Care Pathway approach were consolidated from CMAM reports, baseline and endline pilot data, and six-month age review forms to monitor the impact of implementing the MAMI Care Pathway approach in the nine facilities.
- Primary qualitative data were collected from GHOs and local authorities, as well as community members, to complement the quantitative data. ADRA's implementation research is ongoing and findings from the pilot are being used to improve existing service delivery and to plan further expansion and scale-up.
- Virtual platforms (e.g., WhatsApp, Skype, virtual meetings, emails and YouTube) were used to share information and learning.
- The MAMI implementation team were held accountable internally (ADRA) and externally (Government of Yemen, Health and Nutrition Clusters, USAID-BHA) for providing quality services.

Monitoring and reporting. The indicators selected to monitor the impact of implementing the MAMI Care Pathway approach were the following: (1) the percentage of infants admitted to OTP or targeted supplementary feeding programme who were six to eight months of age; (2) the percentage of infants u6m referred and admitted to TFCs; and (3) the percentage of infants u6m identified with wasting and/or underweight. These indicators assumed that implementing the MAMI Care Pathway approach at the selected health centres would reduce the number of admissions to TFCs and the proportion of infants identified with wasting and/or underweight. Outcome data for infants enrolled in the pilot were also collected when they reached six months of age.

Sources of data included CMAM programme reports, baseline and endline pilot data, and six-month age review forms. Qualitative data were also collected through focus group discussions and key informant interviews with representatives of GHOs, local authorities, and community members to complement information on the quantitative indicators. Table 4 summarises consolidated data (for all facilities) describing MAMI implementation (screening, assessment, enrolment, and outcomes for MAMI pairs) as part of the pilot in Yemen over a 12-month period (June 2022–July 2023).

Table 4. Screening, assessment, enrolment, and outcomes of mother–infant pairs, 12-month period (July 2022–June 2023), Yemen

Key indicators:	
Pairs screened	4,615
Pairs screened identified at risk	2,749
Pairs assessed	1,866
Pairs assessed identified at moderate risk (% of pairs assessed)	891 (47,7%)
Pairs assessed identified at high risk (% of pairs assessed)	60 (3.2%)
Pairs assessed boy/girl ratio	0.84
Key reasons infants' moderate risk	LBW, slow weight gain
Key reasons mothers' moderate risk	Adolescent motherhood
Pairs enrolled in care	891
Pairs recovered at infant aged 6 months (% pairs attending care until infant aged 6 months)	402 (70.3%)
Pairs not recovered at infant aged 6 months (% of pairs attending care until infant aged 6 months)	170 (29.7%)
Pairs missed before or at infant aged 6 months (died, absented, did not return, lost to follow-up) (% of pairs enrolled)	319 (35.8%)

LBW= low birth weight; MUAC= mid-upper arm circumference.

Improving quality and disseminating information and learning. ADRA experienced several implementation challenges during the pilot rollout, including the following: (1) delays in approvals for starting and trainings; (2) turnover of key staff; (3) safety concerns in the field; (4) a lack of statistics on infants u6m; (5) a lack of mechanisms to trace referred cases to verify the impact of the implementation; (6) a lack of services for mothers with mental health conditions; and (7) traditional practices that contradicted MAMI guidance. Several of these challenges made data collection difficult and led ADRA to continue the pilot implementation within the nine health facilities in its follow-on project, YEMLI, rather than scale up to all ADRA-supported health centres. This allowed more time for data collection and analysis.

In-country sharing of information on MAMI was facilitated by virtual platforms (such as Zoom, MS Teams, Skype, email, YouTube, LinkedIn and WhatsApp). Outside the country, information was shared through YouTube, LinkedIn, email, and webinars. ADRA Yemen was involved in the MAMI Global Network (sharing learning and seeking input from peers through the Implementers Working Group) and ADRA International was involved in the Infant Feeding in Emergencies (IFE) Core Group. ADRA's evaluation of the pilot is ongoing, and its outcomes will be used to improve and scale up implementation in ADRA's future programming. No national research institutions were involved and no national learning and information sharing entity (e.g., community of practice, Country Chapter[1]) was established.

The MAMI implementation teams were accountable internally to ADRA International and ADRA Yemen for provision of quality services. Externally, they were accountable to USAID-BHA (donor), MOPHP and the Health and Nutrition Clusters.

Stakeholders who were engaged with different phases of MAMI planning and implementation included the Health and Nutrition Clusters, MOPHP, and other implementing partners interested in adopting the MAMI Care Pathway approach. Activities and tools used to advocate for MAMI with key stakeholders included the following: (1) presentations on the progress of MAMI pilot implementation at Nutrition Cluster meetings; (2) a webinar on the MAMI pilot project; (3) sharing experiences, and lessons learned with Save the Children, International Medical Corps and JSI; (4) advocating for including the MAMI Care Pathway approach in the revised Yemen CMAM guidelines and the Minimum Service Package; (5) expanding the implementation of the MAMI Care Pathway approach in the de-facto authority areas in the north of Yemen; and (6) training health workers, CHNVs, and ADRA staff on the MAMI Care Pathway approach.

Infant's weight, MUAC and length measured by health workers with the assistance of the mother.

1 A MAMI Country Chapter is a network that may be formed at national or sub-national level to enhance capacity, bridge disciplines, highlight evidence gaps or champion the MAMI Care Pathway approach according to local needs and demand.

4.5. Making suggestions for improving planning and implementation

Key information:

- Implementers underlined the potential benefits of implementing the MAMI Care Pathway approach for the growth and health of vulnerable infants and were eager to involve other partners in providing outpatient care to infants u6m in Yemen.
- Capacity building and context-specific adaptation of the MAMI Care Pathway approach relied on external guidance and support.
- Buy-in and approval from local and/or national authorities was viewed as crucial to successful implementation.
- Inadequate referral services for specialised care (e.g., mental health services) was proposed as a potential barrier to continuity of care.

Preliminary MAMI pilot data suggest that implementing the MAMI Care Pathway approach has promising benefits for infant growth and health and wellbeing and should be considered by other partners interested in providing outpatient care for infants u6m in Yemen. From its experience of implementing the MAMI Care Pathway approach, the ADRA Yemen team suggested that future planning for implementation incorporate the following elements: (1) the use of external MAMI guidance and support when implementing MAMI for the first time to facilitate capacity building and context-specific adaptation of the MAMI Care Pathway approach; (2) securing buy-in and approval of local and/or national authorities; (3) establishing services for specialised care (such as mental health services) alongside MAMI Care Pathway implementation, rather than relying on referrals to services managed by other partners, to ensure smoother continuity of care; and (4) routine collection and analysis of data during the piloting stage to continuously inform implementation.

5. Embedding the MAMI Care Pathway in routine services

Key information:

- Adequate training, orientation, and adaptation to their context helped health workers understand how the MAMI Care Pathway approach built upon and strengthened existing services for at-risk mother–infant pairs.
- Assigning health workers clearly defined tasks and providing incentives ensured their commitment to providing this care as part of their routine practice.
- Training, context-specific tools, continuous mentorship (supportive supervision), review of individual records for mother–infant pairs and participatory discussion were critical for effective implementation and improving quality of care.
- Person-centred care for mother–infant pairs was a new approach for health workers and required a broad skill set and adequate time. This was challenged by high workload and reliance on trained individuals (midwives and nutrition workers) to provide services, therefore preventing task sharing and skills transfer.
- An M&E system was in place to assess service performance, but data were not available for reflective monitoring for quality improvement and learning.

This section describes whether and how clinical health workers in the Yemen case understood and adopted (normalised) the MAMI Care Pathway approach and embedded it in routine practice in primary care (13, 14). (See Annex 3 for methods and their limitations and Annex 7 for detailed findings.) We interviewed one ADRA MAMI coordinator and two MOPHP health workers–one nutritionist and one midwife–assigned to the health centres to support and directly implement the MAMI Care Pathway approach.

First, the inquiry explored the degree to which the approach was adopted in routine work, the contribution of individual and collective action to achieve this and what promoting and hindering factors were involved. Four components of the adoption process were considered: coherence, cognitive participation, collective action, and reflective monitoring. Next the likelihood of the MAMI Care Pathway becoming routine practice from the health workers' perspective was appraised.

5.1. Exploring adoption

The health workers participating in the inquiry were asked 16 questions to explore whether they:

- Understood the components of the MAMI Care Pathway approach (coherence, or what it is about);
- Were committed to and engaged in implementing the practice (cognitive participation, or who does it);
- Worked with colleagues ¬to enable the practice (collective action, or how it gets done); and
- Appraised the benefits of the practice (reflective monitoring, or how it is understood).

Understanding the MAMI Care Pathway (coherence)

The clinical health workers understood and saw the value of the MAMI Care Pathway approach. They saw how care had improved when implementing the MAMI Care Pathway compared to before, including how it facilitated early detection of growth faltering, and filled gaps in routine health and nutrition care for infants u6m and their mothers. They also articulated how the MAMI Care Pathway approach helped provide continuity of care for infants and their mothers. After training, the clinical health workers were able to implement their assigned tasks. They also appreciated the benefits of the approach: in particular, the early identification of problems, close monitoring of growth, the identification and prevention of severe child illness, and support for mothers' own health and wellbeing and care practices.

Coherence was influenced by the following factors:

Enablers

- Training built a base of understanding and created openness to being involved in improved practices.
- An advisor with international experience shared the new knowledge and supported the adaptation of materials to the local context.
- Most components of the MAMI Care Pathway were familiar, and practical guidance was provided on combining care for the infant and mother.
- Participants discussed the tasks and decided on the roles and responsibilities together based on local capacities.

Barriers

- Health workers were initially uncertain about how to operationalise the MAMI Care Pathway in existing services and care pathways.

Engaging with the MAMI Care Pathway (cognitive participation)

The MAMI Care Pathway approach was implemented as part of an emergency response programme in ADRA-supported health centres. Staff were assigned clearly defined tasks as part of their job descriptions and were incentivised to perform them. Training and ongoing supportive supervision by the MAMI coordinator built the knowledge and skills clinical health workers needed, and fostered collaboration among them. Clinical health workers were interested in the MAMI Care Pathway approach as they appreciated how it integrated with existing services and enabled continuity of care for infants u6m and their mothers, who had been previously ignored, and could prevent more severe conditions at older ages. While enthusiasm for the MAMI Care Pathway approach was evident, commitment to sustained implementation will require ongoing support and incentives from ADRA or other implementing partners.

Cognitive participation was influenced by the following factors:

Enablers

- Involvement in the care pathway was mandatory and MAMI Care Pathway tasks were part of the job description of health workers, supported by the emergency response programme.
- Incentives were given for the extra work the MAMI Care Pathway approach required.
- Access to supportive supervision and mentoring increased health workers' interest in implementing the approach.
- Being able to identify risks and provide care for this age group (previously ignored) was appreciated.
- Health workers perceived that the care pathway fit well into established health and nutrition practices (e.g., IMCI, IYCF, CMAM).

Barriers

- The MAMI Care Pathway approach introduced more and longer consultations.
- Staff confirmed their commitment to engage in the future, but this commitment was speculative.

Health worker providing breastfeeding advice.

Organising changes and relationships (collective action)

Operationalising the MAMI Care Pathway approach in primary care and community services required collective action from all health workers, because it built on or connected with other programmes (IYCF, TFC, CMAM, IMCI), which the 'package of MAMI' helped frame, coordinate and strengthen. Training, on-the-job mentoring and supportive supervision ensured that health workers could complete the tasks required at their level. ADRA provided guidance on how to adapt operations at the health centre to work better together. While health workers acknowledged that the skills required to implement the MAMI Care Pathway approach were similar to those they already used in their routine practice, they felt that the initial three-day training was too short to cover the many factors addressed for infants and mothers through the person-centred approach. Substantial on-the-job mentorship and support from the MAMI coordinator were needed to fill training gaps.

Collective action was influenced by the following factors:

Enablers

- Comprehensive implementation records adapted to the context ensured standardised and quality actions (appropriated tools).
- Competent well-trained health workers were enabled to collaborate and share tasks.
- Competent managers and advisors ensured supportive supervision and provided good guidance.

Barriers

- The person-centred approach was new, covered many questions, and dealt with many issues for both infants and mothers, which required a broad skill set.
- Clinical health workers faced a high workload in the short timeframe available for consultations.

Appraising the MAMI Care Pathway (reflective monitoring)

Implementing the MAMI Care Pathway approach required ongoing monitoring and reflection to ensure and maintain quality of care and to monitor progress. Individual records of enrolled infant–mother pairs provided data for monitoring the quality of care and wellbeing of infants and their mothers. Service delivery was monitored by the MAMI coordinator and regular individual and team discussions with health workers were held to provide feedback and solve problems; e.g., when enrolled pairs did not return for follow-up visits. The Save the Children MEAL package for MAMI was used for data collection, in parallel to existing data collection systems at the health facilities. Data were analysed to appraise service performance but were not available for reflective quality improvement or learning.

Reflective monitoring was influenced by the following factors:

Enablers

- The standardised individual records were a tool for ensuring the quality of individual care.
- The efficiency of the Care Pathway provided to mother–infant pairs improved individual care.

Barriers

- Data were collected and analysed to appraise service performance but were not available for reflective quality improvement or learning.

5.2. Overall appraisal of the adoption process

The success of implementing the MAMI Care Pathway approach based on the interviews appraised the four adoption components on a five-point Likert sliding scale, with a score from 1 ("not adopted at all") to 5 ("completely adopted"):

Coherence, score 4.8. Confident managers and advisors shared existing knowledge and experiences and provided good guidance for implementation. Several advancements made this possible: specific recommendations on outpatient care for this age group were included in the 2013 WHO guidelines on the management of severe acute malnutrition; materials for advocacy and implementation were available (e.g., MAMI Care Pathway materials, briefs and videos); learning experiences from other settings were available (e.g., in the ENNs publication, *Field Exchange*); and evidence was published in medical journals. External guidance from the GNC-TA and continuous engagement of the MAMI Advisor to support implementation also helped.

Cognitive participation, score 3.5. Clinical health workers were engaged and saw the value of implementing the MAMI Care Pathway approach but were not directly responsible for or involved in defining or adapting the ways of working.

Collective action, score 2.8. The positive involvement of health workers in their assigned tasks as part of the pilot facilitated changes in relationships and ways of working across implementing health teams. Implementation of the MAMI Care Pathway approach occurred in parallel to, and was not integrated in, comprehensive child health care, but maintained strong links with these.

Reflective monitoring, score 3.0. While an M&E system was in place, health workers were not aware of the appraisal of the quality of care, did not get an overall understanding, and were not involved in decisions on quality improvement.

The scores for the four adoption components were plotted on a spider chart showing the degree of success in the adoption of the MAMI Care Pathway (Figure 2): the larger the area of the spider web, the better the success in adoption.

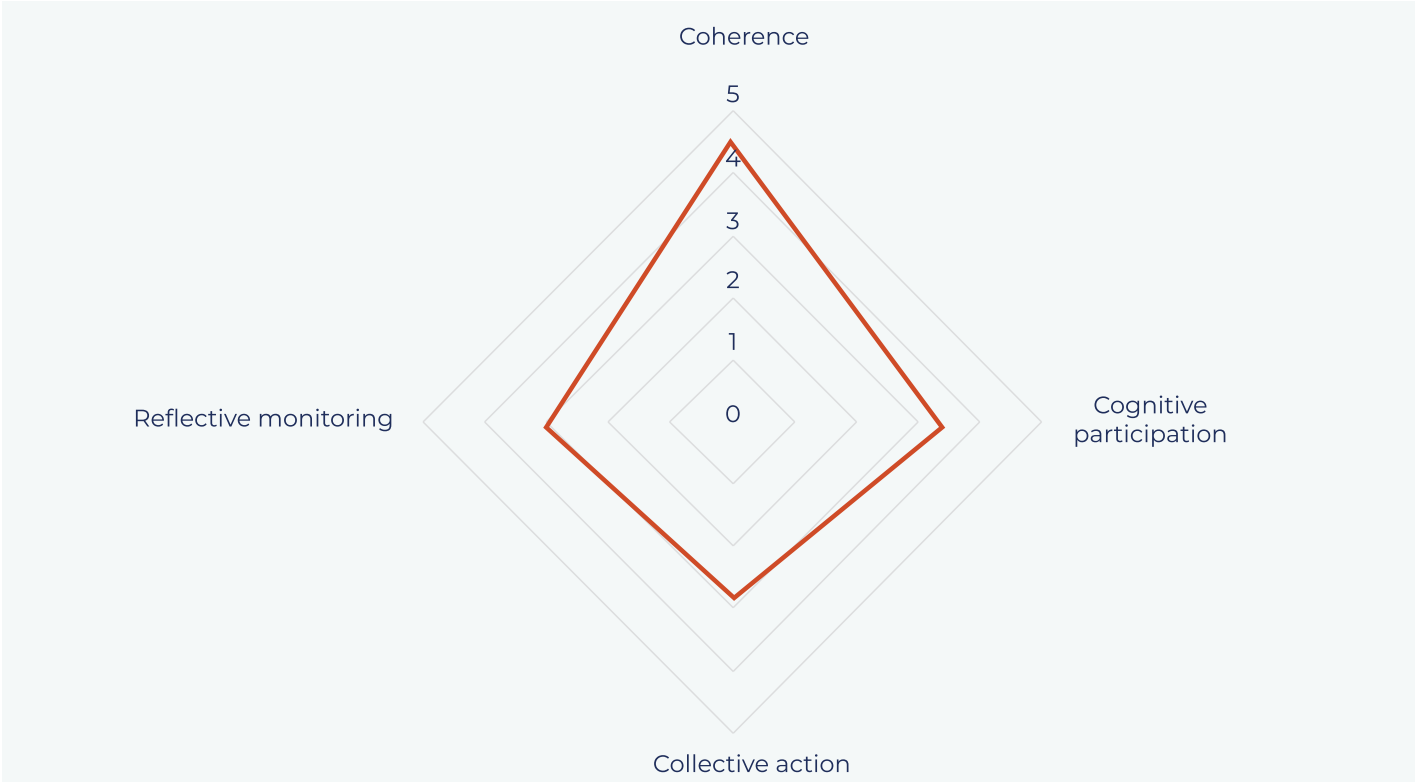


Figure 2: Interpretating the adoption of the MAMI Care Pathway approach in the pilot in Yemen, 2023
(Adoption was scored on a sliding scale from 1 "not adopted at all" to 5 "completely adopted")

We concluded that the overall adoption of the MAMI Care Pathway had an average score of 3.5, indicating that clinical health professionals successfully adopted the approach that resulted of receiving adequate initial training, ongoing supportive supervision and monthly incentives. Subsequent steps in quality improvement may should consider overcoming the barriers identified in this section to improve implementation – and thus the effectiveness of the approach.

6. Considerations for scalability and sustainability

This section examines the readiness to scale up the MAMI Care Pathway approach, applying two methods to identify challenges and generate insights to improve scalability.

6.1. Exploring challenges to scale-up, spread and sustainability

Key information:

- Health workers understood the condition described as "small and nutritionally at-risk infants and their mothers", as adapted to their level of care, but they found some vulnerability factors difficult to understand.
- The technology involved in the MAMI Care Pathway required expanding from existing maternal and child health and nutrition approaches, sometimes demanding different skills, contextual adaptations and organisational changes.
- Both healthcare workers and mothers understood and appreciated the MAMI Care Pathway, which addressed a perceived need.
- Introducing the MAMI Care Pathway threatened the professional identity, values and scope of practices of some health workers. Mothers who attended care experienced an increase in their understanding, trust and appreciation, but there were challenges in these areas for those who did not attend care.
- Organisation of care needed good leadership, which was challenging in an environment with limited resources.
- Financial and policy support were faced with competing health priorities and were difficult to anticipate or predict in the protracted emergency context. Dependence on external short-term emergency funding limits the potential for sustainability and scale unless longer-term funding is secured.
- Interacting health system factors hindered the adaptation or co-evolution of the MAMI Care Pathway approach into a routine service, and meant that collective reflection and adaptive actions have been missing to date.

The first method identified challenges and generated insights to improve scalability to explore factors that might predict the success of sustainable scalability of the MAMI Care Pathway (16) (See Annex 3 for methods and their limitations and Table Annex 8a for detailed findings.) We interviewed the MAMI coordinator and two clinical health workers (one midwife and one nutritionist).

Reflective participatory discussions examined the MAMI Care Pathway approach across seven domains to identify challenges on scalability related to the condition ("small and nutritionally at-risk infants and their mothers"), the technology (methods used in screening, assessment and care), the value proposition, who are the adopters, the health or care organisation, the wider system, and embedding and adapting over time. Next, the case study investigators graded the chal-

lenges as 1 (simple–straightforward, predictable, few components), 2 (complicated, with multiple interacting components or issues), or 3 (complicated, dynamic, unpredictable, not easily disaggregated into constituent components).

The condition. The condition "small and nutritionally at-risk infants and their mothers" was well-described and well-understood by the health workers, when adapted to their level of care (primary care). However, some risks were new and not easily detectable, understood, or predictable (e.g., disabilities, congenital abnormalities, maternal mental health). The "mother–infant pair" focus was a new way of describing a condition when evaluating simultaneous conditions related to the infant and the mother. One example here is the mother's physical and mental health and socioeconomic situation affecting the appraisal of the infant's vulnerability of the combined mother–infant condition.

We graded the vulnerable mother–infant condition as **complicated** (grade 2) because while the condition was well-understood by the health workers when adapted to their level of care, some factors of vulnerability were less clear, and were outside of the comfort zone of their expertise.

The technology. Methods and tools to assess, classify and support "small and nutritionally at-risk infants and their mothers" (technology) were mostly known, as they expanded on or overlapped with IMCI, CMAM and IYCF approaches. However, putting the mother–infant pair at the centre of care was new, and was a change from the habitual way of focusing on the infant's condition. Moreover, including maternal factors in the infant Care Pathway required new skills. Assessing and supporting the health and nutritional status of the infant were known procedures, while those for mental health and sociocultural factors influencing feeding and care behaviours were less well-known. The detailed guidance and materials available in the generic MAMI Care Pathway package helped implementers to adapt it to the Yemen context, but it felt complicated to use.

We graded the technology involved in detecting and addressing the vulnerable mother–infant condition as **complicated** (grade 2) because it required expanding from or adopting to various existing maternal and child health and nutrition approaches, some requiring different skills, contextual adaptations and organisational changes.

The value proposition (benefit, or unique selling point). Health workers appreciated the benefit of the MAMI Care Pathway approach for the early detection of at-risk infants, monitoring and improving the infant's health and nutritional status over a period, and addressing maternal vulnerabilities that impact on care and feeding practices. They also appreciated that the infants were prevented from developing a more serious condition. They valued that mothers who got the opportunity to understand the Care Pathway by receiving care and support, appreciated the messages and increased care for their infants. Without this opportunity, mothers often did not understand the value of how vulnerability factors (often invisible) affected their infant's growth and health. Consistency in communication (i.e., health workers speaking the same clinical language) contributed to strengthening mothers' understanding and confidence.

We graded the value proposition of the vulnerable mother–infant condition as **simple (grade 1)** because the benefit of the Care Pathway was appreciated by both health workers and mothers when care was provided.

The adopters. Staff roles changed and new staff were sometimes allocated to implement or support the MAMI Care Pathway. Staff who took on the Care Pathway alongside their regular tasks found the increased workload a serious issue. Some mothers found the assessment and support process burdensome and time-consuming, though they were more receptive and confident when the benefits became clearer. Household and community support helped them to follow recommended care and feeding practices or manage conflicting messages.

We graded the adopters of the Care Pathway as **complex** (grade 3) because introducing the MAMI Care Pathway threatened some health workers' professional identities, values and scope of practice. Mothers' understanding, trust and appreciation increased once they benefitted from care. The impact of the recommended practices on their support networks was important but this was beyond the reach of the Care Pathway assessment.

The health or care organisation. Important changes in the organisation of regular care were needed to integrate and implement the MAMI Care Pathway, which were facilitated by the support from external technical and financial partners.

We graded the organisation of the Care Pathway as **complicated** (grade 2) because many organisational factors interfered, and good leadership was challenging in an environment with limited or insecure resources.

The wider system. National interest in rolling out the MAMI Care Pathway approach grew but con-

siderable financial, technical and policy support were necessary (including understanding risk factors and the risk burden) to adapt it to the context and align it with existing programmes and services.

We graded the wider system to adsorb the Care Pathway as **complex** (grade 3) because competing health priorities were difficult to anticipate or predict in the protracted emergency context.

Embedding and adapting over time. The pilot spotlighted the feasibility of implementing the MAMI Care Pathway in a fragile and dynamic health system and provided a better understanding of how to embed and adapt it in an emergency programme. Making it a routine service would require more learning than the pilot could accommodate. The existing M&E system was too fragile to support quality improvement or stimulate the national learning process for scale-up.

We graded the embedding and adapting of the MAMI Care Pathway approach over time as **complex** (grade 3) because there were significant interacting health system factors, and the lack of wider coordinated implementation and collective reflection constrained its further adaptation or co-evolution into becoming a routine service.

The seven scores were plotted on a spider chart (Figure 3) indicating grade 1 challenges (simple) are understandable or predictable, and relatively straightforward to address; grade 2 challenges (complicated) are less understandable or controllable, thus less straightforward to address; and grade 3 challenges (complex) are incomprehensible or unpredictable, thus systems dynamics methods are required to understand their changing or emergent behaviours. The area of the spider web in figure 3 appraises the overall feasibility or ease of managing the challenges to implementing the MAMI Care Pathway approach in the Yemen case at scale: the larger the area of the spider web, the more challenging the scalability.

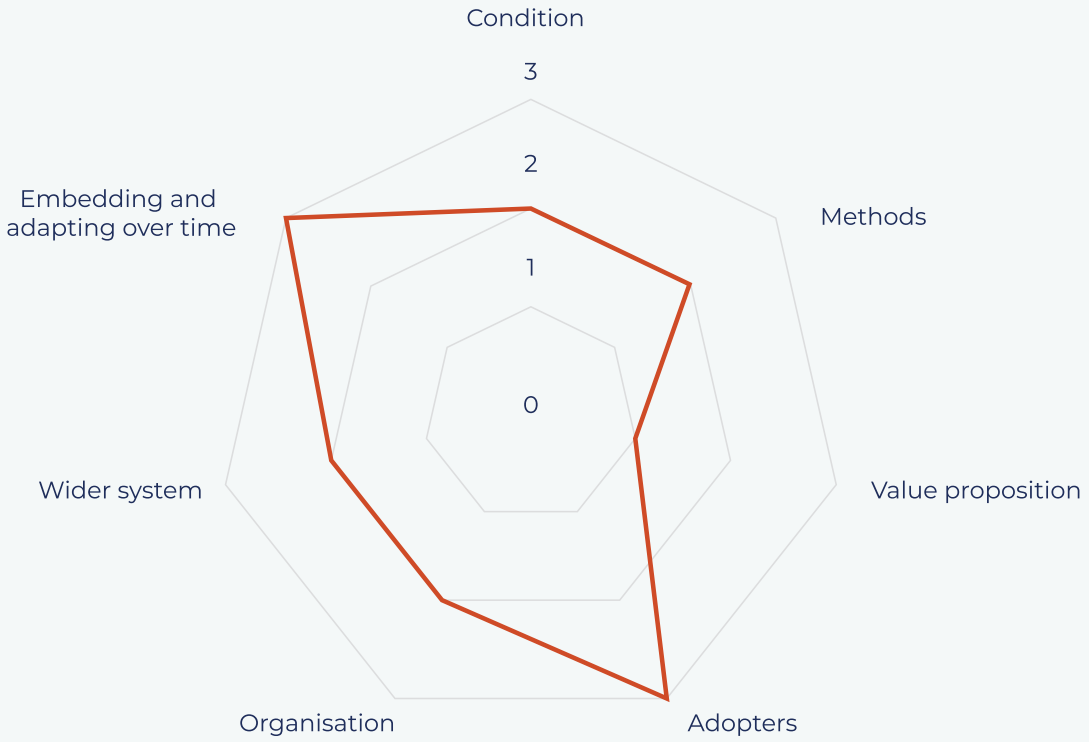


Figure 3: Appraising challenges for scalability of the MAMI Care Pathway implementation in the Yemen case, 2023
(Challenges were graded as 1 "simple", 2 "complicated", and 3 "complex" to address).

6.2. Exploring readiness for scale-up

Key information:

- Actions the Yemen pilot took that could facilitate future sustainable scale-up of the MAMI Care Pathway approach included the following:
  - Engaging key stakeholders in a participatory process.
  - Addressing a persistent health condition, or service.
  - Considering expectations for scale-up in the design.
  - Considering constraining or supportive sociocultural and gender factors.
  - Testing the intervention under existing human and financial resources constraints.
  - Engaging with donors and technical partners to support early and continuous scale-up.

- Actions the pilot missed that could facilitate sustainable scale-up:
  - Keeping the intervention simple without jeopardising the outcome.
  - Testing the intervention in a variety of sociocultural and geographic settings.
  - Assessing and documenting health outcomes and the process of implementation.
  - Planning advocacy for changes in policies and regulations.
  - Designing mechanisms to review progress and promote learning.
  - Sharing understanding of the importance of evidence on feasibility and outcomes prior to scale-up.

The second method explored potential scalability to assess readiness for scale-up by considering critical steps in the design to enhance potential large-scale impact (18). (See Annex 3 for methods and their limitations and Annex 8b for detailed findings.) The case study team triangulated the case study information to populate the table in Annex 8b. They explored 12 key actions in the design of the pilot to provide useful insights for scale-up decision-making. Table 5 shows whether these actions were taken or missed.

Table 5: Appraising potential scalability of the MAMI Care Pathway implementation in the Yemen case, 2023

Appraisal of actions for sustainable scale-up	
1. Involved future stakeholders	Yes
2. Addressed a persistent health condition or service	Yes
3. Considered expectations about scale-up in the design	Yes
4. Considered constraining or supporting socio-cultural and gender factors	Yes
5. Kept package of interventions simple, without jeopardising outcomes	No
6. Tested in a variety of socio-cultural and geographic settings	No
7. Required no extra human and financial resources for implementation	No
8. Assessed and documented health outcomes and process of implementation	Yes
9. Engaged with donors and technical partners to support scale-up early and continuously	No
10. Planned to advocate for changes in policies and regulations	No
11. Designed mechanisms to review progress and incorporate new learning	Yes
12. Shared understanding on the importance of adequate evidence on feasibility and outcomes prior to scale-up	Yes

Missed steps (in orange):

- Keeping the package of interventions as simple as possible, without jeopardising outcomes (step 5): The findings suggest that the MAMI Care Pathway materials underwent only minor changes to align the approach with existing care. This may be explained by the emergency context, in which ADRA provided hands-on support to MOPHP staff.
- Testing the innovation in a variety of socio-cultural and geographic settings (step 6): The findings suggest that the emergency project made it possible to test the innovation in pilot sites in ADRA's impact area without making changes to account for each specific contexts. The site selection depended on where ADRA provided support to health activities.
- Not needing extra human and financial resources for implementation (step 7): The findings suggest that the emergency project was flexible in its resource management, which allowed for additional staff and a salary top-up to compensate for the increased tasks and workload.
- Seeking early and continuous financial support from donors and technical partners for scale-up (step 9): The findings suggest that all activities depended on emergency funding, which could change or end when emergency donor priorities shift. No sustainable development funding was sought.
- Planning for advocacy for changes in policies and regulations (step 10): The findings suggest that no plans were developed in this regard, although ADRA was aware of the need and expressed a desire to engage with the state MOPHP.

Near-missed steps were assessing and documenting the implementation process and health outcomes (step 8), and instituting mechanisms to review progress and incorporate new learning into the implementation process (step 11). ADRA recognised that the MEAL system was weak and planned for external support to improve it. Nevertheless, ADRA succeeded in using time-limited emergency funding to gain initial experiences in implementing the innovative MAMI approach. By sharing their learning and offering their expertise, they drove both the intentional and organic spread of the approach to other emergency and development programmes and actors.

7. Learning to inform practice and scale-up of the MAMI Care Pathway approach in Yemen (summary findings)

The process of accessing learning from the implementing the MAMI Care Pathway approach, as part of an emergency programme in nine MOPHP-run heath centres supported by ADRA in Yemen, involved an empirical investigation in a real-life context. Interviewing members of the implementation team to collect their perspectives, using several sources of evidence, and discussing emerging findings together, uncovered implicit knowledge and expanded learning. Using different lenses to explore what was done, where, by whom, and how, uncovered and heled further generate a range of rich learning about implementing the Care Pathway approach in the given context.

7.1. Planning and implementation

In consultation with MOPHP and the donor, ADRA identified ('created') the opportunity to introduce this new intervention, which addressed a long-standing perceived need in a highly vulnerable population, and for which the emergency programme had the appropriate organisational environment.

Because ADRA had many years of experience in managing an emergency health and nutrition project in Yemen, they had a good understanding of the need and context, as well as established relationships in-country to leverage. This made for a quick start-up, with minimal financial and technical support needed. The brief infusion of external expertise was able to build the knowledge and skills needed for implementation. The implementation focused on providing care to a large population of vulnerable infants and their mothers to prevent infants from slipping into a more serious health or nutrition condition. The health system had not previously addressed this vulnerability for both infants and their mothers.

Health worker taking MUAC measurement of mother.

7.2. Normalisation and adoption

Because the pilot in Yemen introduced the MAMI Care Pathway approach as part of its ongoing support in an emergency context, in the interests of sustainability it was useful to investigate whether clinical health care providers, and their managers or supervisors among MOPHP staff, understood, adopted and embedded the approach in routine practice after they were trained and coached.

ADRA's support to health and nutrition services on behalf of MOPHP ensured that the health workforce could provide the services, made the necessary adaptations in generic MAMI Care Pathway materials, trained and mentored health workers, provided supportive supervision, and ensured collaboration within and across services. Support included a small remuneration to motivate health workers to take on additional workload. Health workers in general were gratified to offer care to a population that was previously ignored or referred to hospital care if they were able to access health services. The shift from disease-focused care to person-centred care of the infant and the mother did not generate an immediately tangible or 'felt' decrease in workloads or improved teamwork, but health workers appreciated the increased expertise.

The appraisal of the adoption process of the MAMI Care Pathway approach generated detailed information on facilitators and barriers useful for improving health workers' adherence behaviours to enable more sustainable health outcomes.

7.3. Considerations for scalability and sustainability

Two methods applying different lenses examined the readiness to scale up the MAMI Care Pathway approach, not to determine whether the approach was scalable, but to provide insights on challenges that need to be addressed when preparing for scale-up. Challenges were characterised as easy (simple), difficult but possible (complicated) or challenging (complex) to overcome to consider in the future.

The Yemen case study shows that the supportive context of the emergency project and the ability of ADRA to garner external (sequenced short-term) emergency funding and technical support catalysed the introduction of an integrated care approach in this context. This has formed a basis which can be built upon. Changes in policies and practice informed by more implementation evidence and wider local stakeholder engagement would be necessary to mainstream and sustain the approach in routine services at scale.

The experience of piloting the approach in the ongoing emergency health and nutrition project facilitated important learning on planning and building capacities and readiness for service delivery that may be transferable to similar emergency settings and for continued service development in this setting. A strengthened feasible MEAL system will be crucial to support this process. The admirable openness and enthusiasm of the ADRA team in regard to mentoring and supporting other partners in starting up the MAMI Care Pathway will encourage and enable others to come on board and will maximise the potential for learning.

ADRA used emergency funding as an entry point to initiate the MAMI Care Pathway approach and used repeated short-term funding to expand implementation and learning, in which they involved key stakeholders, including MOPHP. They did not make major attempts to advocate for health policy changes or to access development funding to support further expansion of the MAMI approach. However, disseminating the success of the approach generated interest from other health and nutrition actors, who have started planning to take up the MAMI Care Pathway approach in Yemen.

7.4. Collective learning and suggestions to strengthen the potential for scale

The empirical investigation of the implementation of the MAMI Care Pathway approach in nine sites in Yemen revealed both achievements and challenges in regard to implementing and adopting the approach, as seen through the eyes of health workers (members of the support team and the implementation team).

Learning from the Yemen case experience was valued as key to paving the way towards improved implementation and sowing the seeds for exploring potential scale-up. ADRA shared the experience of implementing the MAMI Care Pathway approach with other implementing organisations in-country and encouraged them to adopt the approach in

their emergency health and nutrition projects, and offered assistance to doing this. Systematic documentation could facilitate this process.

Regarding mothers' perceptions, as understood by health workers, we learned the following:

- Vulnerable mothers considered the integrated Care Pathway beneficial when they experienced and witnessed positive changes to the wellbeing of their babies, e.g., improved growth.
- Various factors made it difficult for health workers/services to influence affected mothers; advice from health workers conflicted with household and community values and norms.
- Mothers' adherence to care improved when there was clear communication across health workers and services.
- Because risk factors of vulnerable mother–infant pairs were often invisible and because there was no perceived tangible benefit for mothers (such as food supplements, drugs or soap), they lost interest in returning for follow-up visits or complying with care (the cost was too great for the perceived benefit).
- The cost of transport was perceived as a major barrier to attending follow-up visits, as well as being referred to hospital.

From service implementation, we learned the following:

- While most of the MAMI Care Pathway components are part of a national policy or health approach, implementation was weak and the MAMI Care Pathway strengthened and/or filled gaps and connected services (where existing) for vulnerable infants and their mothers.
- Applying a "person-centred and continuity of care" approach in the MAMI Care Pathway was new and needed leadership support across services and actors.
- The "new or strengthened" activities in the MAMI Care Pathway approach increased workload, which was possible to manage this within the emergency programme that had the required financial and technical capacities.
- ADRA's direct support for service delivery allowed care to be provided smoothly, avoided duplication of actions and encouraged and enabled compliance by health workers.
- Harmonising communication about the aim and importance of the MAMI Care Pathway approach to address vulnerability factors stimulated confidence in and between service providers and users.

From the health system, we learned the following:

- MOPHP's engagement from the start was important to create interest and understanding, and to eventually facilitate processes across sectors and actors.
- The initial orientation of stakeholders and training of implementers targeted a small group, which facilitated a quick start but failed to establish an adequate MEAL system for continuous learning.
- ADRA simplified the approach and materials, but adaptation was minimal and did not evolve during implementation because of the limited MEAL system in regard to informing adjustments.
- A financial incentive made it possible to influence the health workers' job descriptions to include the MAMI approach.
- Vertical disease-focused programmes prevailed and overlapped with existing approaches (e.g., IMNCI, maternal, infant and young child nutrition, and CMAM), collaboration was locally managed and duplication for smarter service delivery partially avoided.
- Learning was limited to interested emergency stakeholders; adequate leadership would be needed to expand interest in the MAMI approach.
- ADRA expressed the desire to expand research capacities and is seeking support for doing this.

8. Conclusion

The findings of the "learning by doing" case study are intended to improve practice for service delivery, encourage research, and drive mindful, sustainable approaches for scale-up. Guided by different frameworks, the Yemen case study painted a rich, nuanced picture of the planning, implementation and adoption of the MAMI Care Pathway approach in the implementation.

Comprehensively addressing vulnerability factors for "small and nutritionally at-risk infants and their mothers" with a person-centred and continuity of care approach was complex and required good skills and continuous mentoring. Improving readiness to successfully embed and scale up a sustainable approach within existing health services would require longer term funding commitment and considerable efforts from implementing partners to engage in aligning health and nutrition policies, implementation plans and practices. In the Yemen case, these requirements were partially met by integrating the approach within an existing emergency programme, building on ongoing support for maternal and child health and nutrition services, with good documentation of learning and an openness to sharing lessons learned.

Adopting and scaling up the MAMI Care Pathway approach learning experience in Yemen could build a broad base of expertise to address a critical gap in perceived need and to provide comprehensive, respectful quality care to improve the health, growth and survival of vulnerable infants and their mothers.

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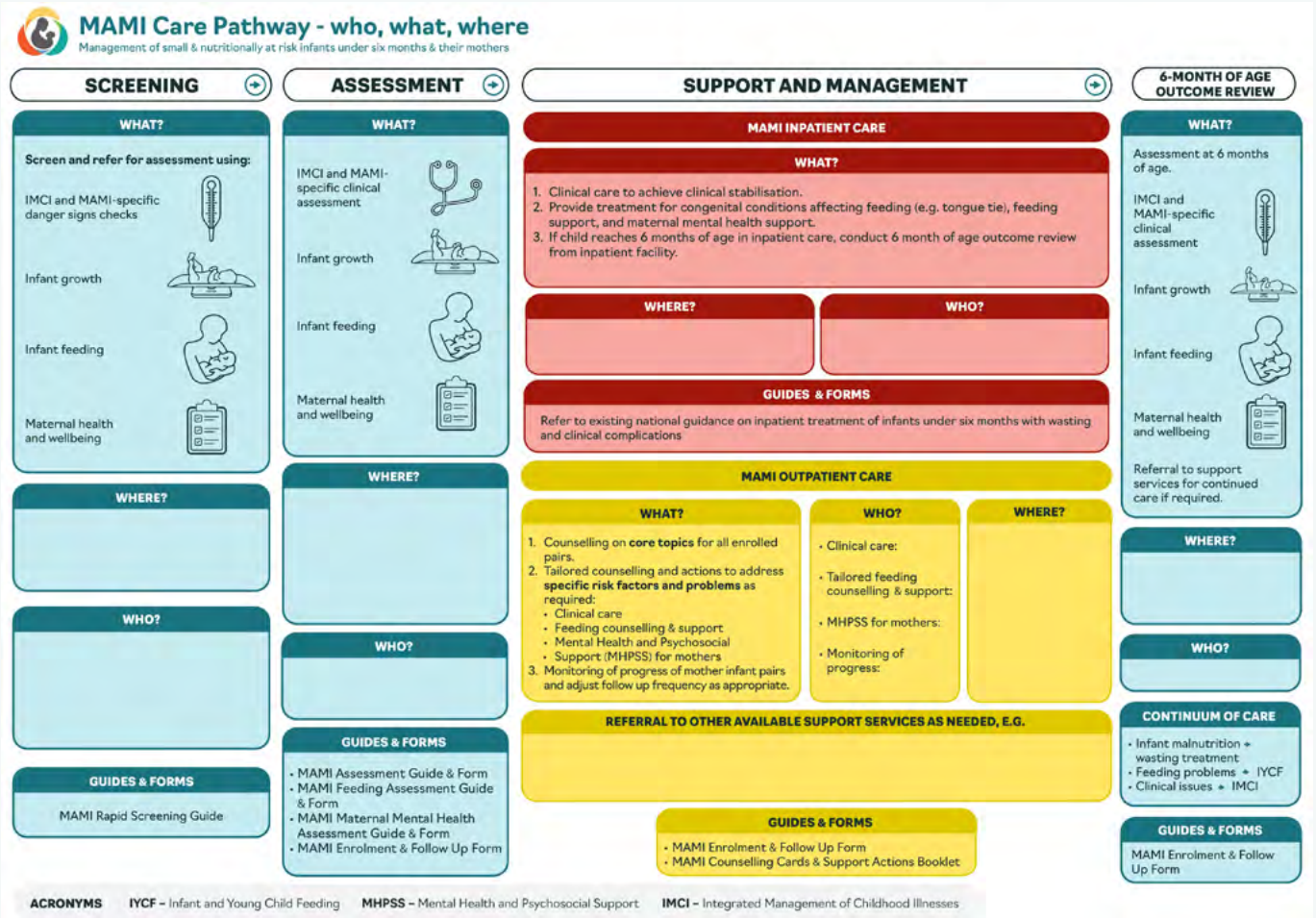
Annexes

Annex 1. MAMI Care Pathway package who, what, where matrix



Annex 2. Definitions

Adoption. Implementing new ways of thinking, acting and organising in health care and integrating new systems of practice into existing organisational and professional settings. (1)

Continuity of care. The provision of services that are coordinated across levels of care – primary care and referral facilities – and across settings and providers; the provision of care throughout the life cycle; care that continues uninterrupted until an episode of disease or risk is resolved; the degree to which people experience a series of discrete health care events as coherent and interconnected over time and consistent with their health needs and preferences. (2)

Embedding. Routinely incorporating a practice or practices as an integral part of the everyday work of individuals and groups. (1) (3)

Family-centred care. An approach to care delivery that can be practised in health facilities at all levels and that promotes a mutually beneficial partnership among parents, families and health care providers to support health care planning, delivery and evaluation. The principles of family-centred care include dignity and respect, information sharing, participation and collaboration. (4)
Implementation. The social organisation of bringing a practice or practices into action. (1)
Innovation. A health intervention or practice that is new in the local setting and tested in a pilot project or research. (5)

Integrated care pathways. Structured multidisciplinary care plans that detail essential steps in the care of patients with a specific clinical problem and that describe the expected progress of the patient (6). See clinical pathway.

Integrated services. The management and delivery of health care services so that people receive a continuum of health promotion, disease prevention, diagnosis, treatment, disease management, rehabilitation and palliative care through different levels and sites of care in the health system, according to their needs throughout the life course (7)

Integration. Reproducing and sustaining a practice or practices among the social matrices of an organisation or institution (1)

Normalisation. The successful implementation and integration of interventions into routine work. (1)
People-centred care. Care that is focused on and organised around the health needs and expectations of people and communities, rather than diseases, encompassing clinical encounters as well as attention to the health of people in their communities and their crucial role in shaping health policy and health services. (8)

Person-centred health care. Conscious adoption of the perspectives of individuals, families and communities as participants in and beneficiaries of trusted health systems; respecting patients' values, preferences and expressed needs in coordinating and integrating care, information, communication and education, physical comfort, emotional support, alleviation of fear and anxiety, involvement of family and friends, and transition and continuity. (9)

Quality of care. Health services for individuals and populations that increase the likelihood of desired health outcomes and that are consistent with current professional knowledge, (10) characterised by effectiveness, efficiency, accessibility, patient-/people-centred care, equity and safety (11). Quality of patient care focuses mostly on technical quality, appropriate referral, continuity of care and patient-centredness. (12)

Scale-up. The deliberate attempt to increase the impact of a health service innovation (successfully tested in a pilot or experimental project) to benefit more people and foster lasting policy and programme development. (13)

Spread. The geographic expansion of a health service, making the service available. (3)

Sustainability. The potential to sustain beneficial outcomes for an agreed period at an acceptable level of resource commitment within acceptable organisational and community contingencies. (2, 14)
Sustainability of health services. The capacity to provide ongoing prevention and treatment for a health problem after the termination of major financial, managerial and technical assistance from an external donor. (15)

Sustainable. Able to be maintained or upheld, or to persist, over the long term. (3)

System. A set of things working together as parts of a mechanism or an interconnecting network; a complex whole. (16)

Tacit knowledge. Knowledge-in-practice developed from direct experience and action; highly pragmatic and situation-specific knowledge that is subconsciously understood and applied, difficult to articulate, and usually shared through interactive conversation and shared experience. (17)

Theoretical framework. A conceptual tool that is useful in making sense of a complex social reality that helps design a research question, guide the selection of relevant data, interpret the data and propose explanations of causes or influences. (18)

Theoretical generalisability. A process of reflective learning and reflective practice (what, how, why). (19)

Theory. A set of analytical principles or statements designed to structure observation, understanding and explanation of the world; an explanation of how and why specific relationships lead to specific events. (20)

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Annex 3. Methods and limitations

These case studies used a mixed-methods design in which different theories applied different lenses to examine the introduction, implementation and adoption of the MAMI Care Pathway in each case context and to generate learning and ideas on improving implementation and scalability.

Inquiry tools

First, a *Planning and Implementation Process Framework for the MAMI Care Pathway Approach* was developed, inspired by the 2010 WHO ExpandNet "Nine steps for developing a scaling-up strategy", the 2011 WHO ExpandNet "Beginning with the end in mind" (1) and tacit knowledge of co-researchers (Box A3.1). This was used to generate a detailed description of the planning and implementation process within the defined context of each country case.

Box A3.1: Planning and Implementation Process Framework

Context
- Country context
- Organisational context

Situation analysis prior to starting
- Burden and perceived health priority
- Policy context
- Local health system capacities
- Stakeholders

Planning for implementation
- Initiating discussions – agency's preparedness
- Engaging key stakeholders
- Defining the target population
- Selecting sites for implementation
- Designing the implementation modus – tailoring the innovation to the local context and capacities
- Using, adapting, aligning, simplifying, testing materials
- Training for implementation

Service delivery – implementation
- Access: availability, geographic accessibility/delivery points, affordability, acceptability
- Organisation of care in the community, in the health facility
- Organisation of staff
- Participation
- Partnerships

Monitoring, improving and collaborative learning
- Monitoring and reporting
- Improving quality
- Disseminating information and learning
- Maintaining and sustaining quality services
- Ensuring accountability to users, managers and funders of the services
- Advocating for implementation and scale-up

Suggestions for improving implementation

Second, the *Normalisation Process Theory* provided a conceptual framework that helped to understand and evaluate the processes by which the MAMI Care Pathway approach was routinely operationalised in everyday work (2-4). The theory used a participatory method to explore the four components of the adoption process to uncover what individuals and groups either do or do not do to enable normalisation of the intervention:

1. Coherence – meaning and sense-making – defines and organises the components of a practice;
2. Cognitive participation – commitment and engagement – defines and organises the people implicated in a complex intervention;
3. Collective action – work done to enable the intervention to happen – defines and organises the enacting of a practice; and
4. Reflective monitoring – reflecting on or appraising the benefits – defines and organises the assessment of the outcome of a practice.

The success of implementing the MAMI Care Pathway approach by health workers adopting the practice was scored by the case study team on a five-point Likert sliding scale from "not at all" (grade 1) to "completely" (grade 5).

Third, the *Non-adoption, Abandonment, Scale-up, Spread and Sustainability* (NASSS) *Framework* was adapted and used in a participatory process to synthesise insights on evaluating adoption challenges that impact on scaling up and sustainability (5) (Figure A3.1). It was used as a reflexive guide to generate ideas on challenges related to the following: (1) the condition, (2) the technology, (3) the value proposition, (4) the adopters, (5) organisation, (6) the wider system, and (7) embedding and adapting over time. A grading system was used to express whether the challenges identified were simple, complicated, or complex: (1) simple – meaning understandable or predictable, relatively straightforward to address; (2) complicated – meaning less understandable, controllable, thus less straightforward to address; and (3) complex – meaning not understandable or predictable, a dynamic or emergent behaviour.

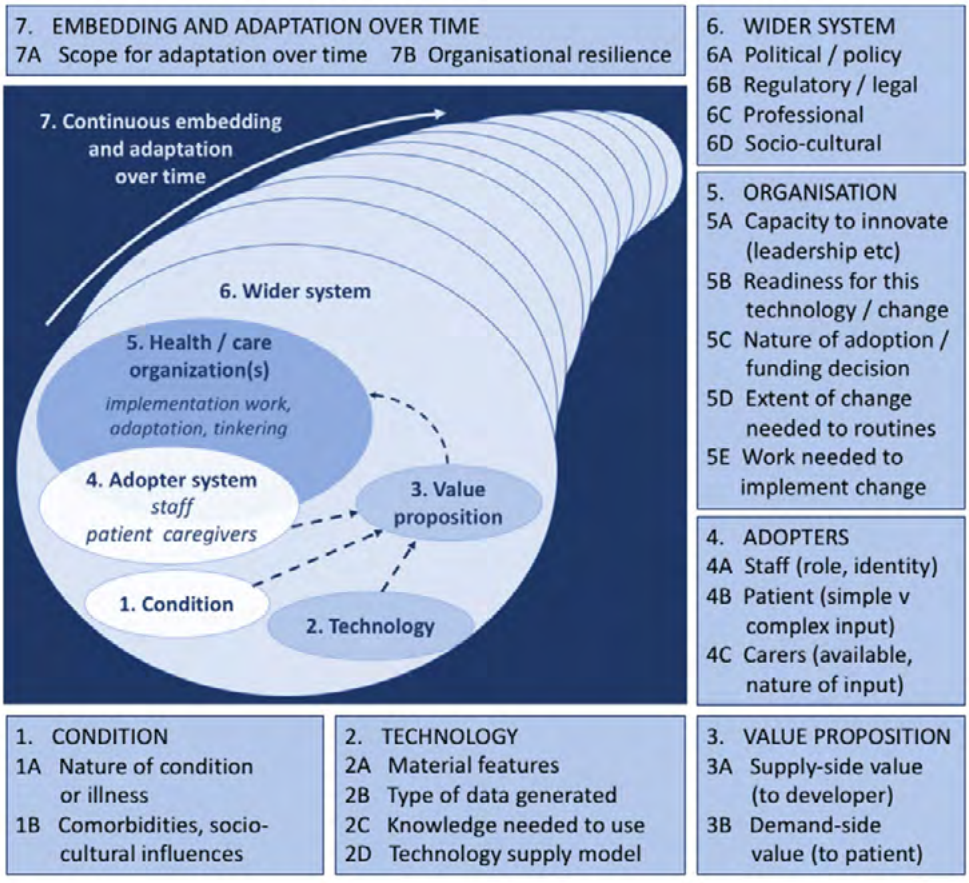

Figure A3.1. The NASSS Framework for considering influences on the adoption, non-adoption, abandonment, spread, scale-up, and sustainability of a health intervention.

Fourth, the *Checklist for Assessing the Potential Scalability* of pilot projects or research (1, 6) was used to explore how easy or difficult it would be to scale up each case and to provide insights into what steps to take to facilitate sustainable scale-up. The checklist provides recommendations in 12 steps on how to design pilot projects considering scale-up that lead to lasting and larger-scale impact (Box A3.2).

Box A3.2: Twelve recommendations on how to design pilot projects with scaling up in mind

Step 1	Engage in a participatory process involving key stakeholders
Step 2	Ensure the relevance of the proposed innovation
Step 3	Reach consensus regarding expectations for scale-up
Step 4	Tailor the innovation to the socio-cultural and institutional settings
Step 5	Keep the innovation as simple as possible
Step 6	Test the innovation in the variety of socio-cultural and institutional settings where it will be scaled up
Step 7	Test the innovation under the routine operating conditions and existing resource constraints of the health system
Step 9	Advocate with donors and other sources of funding for financial support beyond the pilot stage
Step 8	Develop plans to assess and document the process of implementation
Step 10	Prepare to advocate for necessary changes in policies, regulations and other health systems components
Step 11	Develop plans for how to promote learning and disseminate information
Step 12	Plan on being cautious about initiating scale-up before the required evidence is available

Case study selection

Case selection sought a variety of implementation modalities or characteristics, such as the following:

- Implementing a care pathway addressing at-risk infants and their mothers, as a pilot, research or programme;
- Differences in terms of context, implementers, geography;
- Either government-led or partner-led;
- In a development, emergency or fragile setting;
- In a low- or middle-income country setting, either urban, rural or mixed;
- With the availability of data on processes and outcomes;
- With expressed interest and availability to participate in the case study;
- Either in an English- or French-speaking environment.

A primary selection criterion was that participating in this process would add value and contribute to local learning and progress on implementing the MAMI Care Pathway approach.

The country cases selected encompassed a variety of settings where the MAMI Care Pathway approach was applied:

- **Pakistan**: Paediatrician-led services in a private charity hospital in Karachi.
- **South Sudan**: An implementation study where the MAMI Care Pathway approach was integrated into maternal and child health services in urban and rural sites by MIHR project.
- **Yemen**: Pilot implementation integrated into a health and nutrition emergency programme by ADRA.

Data collection

An iterative and participatory process of reflective learning took place across four phases that built on each other. Data tools consisted of generic questionnaires that served as interview guides specifically developed for the MAMI Care Pathway approach and adapted to each country case (Box A3.3) (see Annex 3).

The first phase of investigation was largely descriptive, involving written feedback and clarification. Next, the shared information was built upon, through interviews, to further explore 'how' things happened or not, paying particular attention to social dimensions.

The second phase consisted of participatory discussions with clinical service providers which explored adoption of the MAMI Care Pathway approach as part of their routine work.

The third phase brought together senior managers and clinical health workers to discuss challenges in adopting the MAMI Care Pathway approach.

The fourth phase synthesised the discussion in the third phase across the country cases, allowing for reflection on potential scalability based on triangulating information collected across the three cases.

Box A3.3: Data tools

Phase 1 (Annex 4a): Questionnaire (written and oral investigation) using the Planning and Implementation Process Framework; respondents were (sub-)national health, nutrition, and MAMI managers or advisors.

Phase 2 (Annex 4b): Interview guide applying *Normalisation Process Theory;* respondents were clinical healthcare workers implementing the Care Pathway approach.

Phase 3 and Phase 4a (Annex 4c): Checklist for participatory group discussions using the *NASSS Framework*; respondents were the participating national and (sub-)national health, nutrition, MAMI managers or advisors who discussed their country context in phase 3, and then came together to discuss across countries in phase 4a.

Phase 4b (Annex 4d): *Checklist for Assessing the Potential Scalability* using the information generated across phases.

Respondents were asked to provide their informed consent prior to their participation and withdrawal from the inquiry was possible at any time.

Data were collected through written feedback and during interviews, which were digitally recorded following receipt of consent from all interviewees. Respondents could skip questions for any reason. Where possible, the reason for not answering was recorded but this was not mandatory. Audio recordings were transcribed verbatim within 48 hours of collection using Otter.ai software. All digital data were stored in a password-protected digital space accessible only to investigators. All country-specific data were shared with the country teams.

During data collection and analysis, notes on possible biases, interferences or limitations were recorded and reported on.

Analysis

The stepwise and iterative inquiry appraised the case experiences by applying different lenses to generalise learning through repeated cycles of testing and building ideas (theories) about why things have worked or not, and how (mechanisms of action). This 'theory-driven' iterative analysis involved the following steps:

Descriptive data analysis: Data on introducing and implementing MAMI were summarised by topic to understand processes of planning, introducing, adapting, implementing, monitoring and improving the MAMI Care Pathway approach, to uncover what was done, and how, to appraise readiness for scale-up.

Explorative data analysis: Data on the perceptions of clinical healthcare workers on implementing and adopting the MAMI Care Pathway approach were analysed for emerging themes to explore perceptions on what worked, for whom, and under what circumstances, and to appraise adoption.

Explanatory data analysis: Data on descriptions and perceptions were triangulated and synthesised to inform updates to and evolution of our theories/ideas on the MAMI Care Pathway approach and to identify practical, pragmatic ways to help progress towards scalable, sustainable care.

Data were analysed both deductively (testing our ideas/theories) and inductively (finding new ideas/theories), involving the respondents and requesting their opinion, as well as confirming the generated ideas/theories. Data were synthesised in each step by intuitive-reflective appraisal – which involved perceptions about what immediately felt right or made sense, and then questioning these by considering other possibilities.

Participatory and adaptive, reflexive learning: Interviewers and interviewees were involved in reflective learning building upon each step, thereby 'learning together by doing.' This collaborative 'learning together' deepened the understanding of embedding and adapting the MAMI Care Pathway approach in diverse local systems of health. Besides the strengthening of own capacities and understanding of respondents by tapping into implicit and often invisible and under-appreciated tacit knowledge, this approach was useful for contributing to overall collective learning on the 'how' of the MAMI Care Pathway approach.

Limitations

Each country case covered the introduction and implementation of the MAMI Care Pathway approach on a small scale in a specific context, which limited the generalisability of learnings across broader systems and services within and across countries. Each case study also engaged a limited number of respondents (between two and four, depending on the case), which restricted the breadth of perceptions. However, the different lenses applied through the case study phases generated an in-depth understanding for each case context, while identifying common theories/ideas which influence implementation, adoption, scale-up and sustainability, even across the diverse case contexts, thereby contributing to collective learning.

The qualitative approach involved online interviews, which lack the human presence needed to build trust and to convey the subtleties of eye contact or body language which contribute to multidimensional and nuanced understanding of the ideas/perspectives shared (7).

Specifically, during Phase 2 (*interviews guided by the Normalisation Process Theory*), only one or two clinical health workers responsible for implementing the MAMI Care Pathway approach (assessment, support and progress monitoring of the mother–infant pair) were interviewed. The low numbers of people involved likely limited the extent of perceptions on the normalisation process. The clinical health worker responding was also either an existing, or a newly recruited, staff member accompanied by a trained supervisor or assistant, which may have influenced their answers. Responses often fell into discussions on 'perceived benefits' of the MAMI Care Pathway approach, rather than building on perceptions of the adoption process. Finally, discussions went in various directions, and sometimes the same elements were repeated, or questions were not answered well, or the answer fitted a question that would come later. This resulted in some reorganisation of responses to fit the flow of the interview guide after the discussion.

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Annex 4a. Data tool: Planning and implementing the MAMI Care Pathway approach

[Note that the questions in blue colour are discussed orally, all others are dealt with in writing.]

Responder(s) *(name and function):* _____

Date of response: _____

Agency: _____

1. Context

1.1 Country context relevant to MAMI

1. Describe the demographic and socio-economic context of your country, or the area where you are active.
   (E.g., development or emergency context, stable or fragile/fast changing/chronic, demographic pressure, climate change, political instability or insecurity, rural versus urban population, poverty, migration trends)

2. Describe key determinants that define vulnerability in infants under six months of age (u6m) and young children (data from the most recent survey/surveillance).
   (E.g., exclusive breastfeeding rate, inappropriate/harmful feeding and care practices, adolescent mothers, low birth weight)

1.2 Organisational context for starting MAMI

3. Give name of agency or programme, and a brief description.
   (E.g., expertise/mandate, aim, activities, period of interventions, impact area, future plans, donor)
4. Give the justification for starting MAMI.
   (E.g., expected change, added value, opportunity, contribution, the MAMI Care Pathway could bring)
5. Explain who or what was the tipping point for deciding to start MAMI.
   (E.g., what or who was driving, motivating, enabling the decision; who or what enabled it just then and not earlier)
6. Give the aim or objective of the MAMI project that was defined at the start (and expected result if stated).

2. Situation analysis prior to starting MAMI

2.1 Burden and perceived health priority

7. Give national key health and nutrition indicators (and trend) (with source and year, most recent survey, surveillance). Use the example table to answer.

Example table: Health and demographic information

Information (Year, Source)	Data
Population (YYYY, Ref)	
Population at the MAMI sites YYYY, Ref)	
Fertility rate (YYYY, Ref)	
Live birth rate YYYY, Ref)	
Neonatal mortality YYYY, Ref)	
Infant mortality (YYYY, Ref)	
Low birth weight (YYYY, Ref)	
Assisted deliveries (YYYY, Ref)	
Exclusive breastfeeding YYYY, Ref)	
Global acute malnutrition 6-59m YYYY, Ref)	
Trend information (YYYY, Ref):	

8. Prior to introducing MAMI, was the "vulnerability in infants u6m" recognised as a health or nutrition priority? Specify why or why not, by whom (in your opinion).
   (E.g., for the Ministry of Health (MOH) not a priority presuming that the needs are covered by the various policies and services; for [Agency] a priority because of deteriorating indicators in their impact area)

2.2 Policy context

9. Did you do a policy analysis prior to starting MAMI?

10. If yes, describe what you did, scope, which tool you used. Use the example table to answer.
    (E.g., national integrated management of acute malnutrition (IMAM) guideline covers inpatient treatment of wasting based on weight-for-height z-score (WHZ) <-3 z-score and presence of nutritional oedema in infants u6m; community infant and young child nutrition (IYCN) strategy advises to assess breastfeeding problems and counsel or refer during community growth monitoring sessions; guidelines on mental health cover post-partum depression; guidelines on small and sick newborns include targeted counselling)

    Example table: Health and nutrition policy covering infants u6m and their mothers

Policy, guideline (title, year)	Defined vulnerability in infants u6m and their mothers	Proposed interventions
xx	xx	xx

If no, why not?

2.3 Local health system capacity

11. Did you do a capacity analysis/implementation readiness of the local health system or a feasibility study prior to starting MAMI (or any quick appraisal of readiness of the health facilities that involve in MAMI)?
    - If yes, describe what you did, which tool you used, when you did it in regard to starting MAMI, what are the headlines on what you found.
    - If no, why not?

12. List which MAMI activities were already covered at the community, primary care and tertiary care levels in the planned MAMI sites that were identified prior to starting MAMI?
    (E.g., counselling on breastfeeding difficulties is done by nutrition assistants in the health centre and by community health workers and volunteers in the community as part of the national IYCN strategy)

13. List gaps in services, care, referral for infants u6m and their mothers that were identified prior to starting MAMI?

2.4 Stakeholders

14. Did you do a stakeholder analysis prior to starting MAMI (quick appraisal of who is a MAMI stakeholder, and how to solicit their interest for involving early for what)?
    - If yes, describe what you did, which tool you used, when you did it in regard to starting MAMI, what are headlines on what you found. Please share any report on findings.
    - If no, why not?
15. Could you identify who is a relevant current or future stakeholder to involve in the design, planning, implementation; list who and specify why?
16. Did (could) you identify potential MAMI champions able to generate political will? If yes, who are they?
    (Note: a champion is an influential person who promotes 'a topic' and inspires others to take a more active role in that topic.)
17. List key stakeholders you contacted and had preliminary discussions with on, e.g., introducing MAMI, sharing plans, probing their interest to be involved. Use the example table to answer.
    (E.g., MOH Community Health Department – ways of strengthening active case finding of vulnerable infant-mother pairs, as part of existing community services)

    Example table: Level of interest of key stakeholders to involve in MAMI

Agency, department	Discussion topics on MAMI and level of interest	Name and email contact if appropriate
xx	xx	xx

3. *Planning for MAMI implementation*

18. Give an indicative time line (# months) for inception discussions, designing and planning.

3.1 Initiating discussions - Agency's preparedness

19. Describe key elements of the initial discussions and steps your agency undertook internally, prior to deciding and planning for MAMI implementation.
    (E.g., internal discussion and decision, securing funds for which time span from which source–part of ongoing project, cost extension, additional budget–, hiring staff, securing equipment, planning)
20. Describe key elements of the initial discussions and steps your agency undertook externally, prior to deciding and planning for MAMI implementation.
    (E.g., contacted MOH to discuss the relevance or perceived need, explore their interest in the innovation, feasibility, alignment or integration into the country's health system, roles and responsibilities, departments and technical partners to involve)
21. From whom did you seek approval for introducing MAMI, and how was this approval granted or formalised?
22. Was there a request for a formal description of the project prior to starting? If yes, describe the process, involvement of stakeholders and timeline.
    (E.g., a project outline was shared and reviewed and approved by the MOH, taking two weeks; a study protocol was developed in participation with the MOH and approved (no IRB) taking two months)
23. Did you consult professional expertise within your agency; did you seek support externally? If yes, give profile of expertise and timeline.

- Did your agency conduct formative research prior to starting MAMI, or did you use in-house formative research? If yes, what? Share any reports.
  (Note: formative research typically is done before starting a programme to understand practices and behaviours, needs for an intervention, e.g., a knowledge, attitudes, practices (KAP) survey for a reproductive health project)

3.2 Engaging key stakeholders in the planning process

24. Did you engage with the national and/or local MOH for planning the integration/implementation? Explain how and on what.
25. Who else you engaged with? Explain how and on what.
    (E.g., UNICEF in face-to-face meeting and orientation workshop, for planning and review of materials, offering support for training as resources persons, offering scales and MUAC tapes)
26. In case you organised a meeting or workshop, describe who (and number) participated, how many days, what was the objective and outcome, what topics were covered, what documentation was shared.
27. Did key health and nutrition actors perceive MAMI a relevant innovation? Explain why or why not.
28. Are there lessons you want to share about the process?

3.3 Defining the target population

29. What criteria have been used to define vulnerability in infants u6m, and their mothers?
30. How were key health and nutrition actors involved in defining the target population for MAMI?
31. Are there lessons you want to share about the process?

3.4 Selecting sites for implementation

32. How did you define a MAMI implementation site in your project?
    (E.g., specify the type of health facilities selected for implementing the outpatient Care Pathway, whether referral sites for inpatient care are involved, whether communities in the health catchment area covered, whether links between different sectors at different levels are established)
33. What criteria were used to select the sites?
    (E.g., agency-supported health facilities; referral hospital with inpatient care for severe acute malnutrition)
34. Did key health and nutrition actors involve in selecting the sites? Explain.
35. Are there lessons you want to share about the process?

3.5 Designing the implementation modus

36. Did you tailor the implementation design for MAMI to the local context and capacities? If yes, explain how you did this, with whom and with what tools (if any)?
    (E.g., participatory discussions with key stakeholders in a meeting using the 'who what where map'; informal discussion amongst agency staff)
37. Did you foresee ways of testing and/or adapting the implementation modus based on learning and feedback?
38. How did you appraise the capacity for absorbing MAMI by the local health system, at the selected health facility sites prior to implementing? What tools did you use, what difficulties did you anticipate, how did you plan to fill the gaps?
    (E.g., consider gaps in knowledge, skilled health workers, equipment, space, referral services)
39. Are there lessons you want to share about the process?

3.6 Using, adapting, aligning, simplifying, testing materials

40. Did you use and/or adapt the MAMI Care Pathway v3 materials? If yes, list which of the v3 materials were adapted and how this was done. Use the example table to answer.

    Example table: Adaptation of MAMI Care Pathway v3 materials

MAMI Care Pathway v3 material adapted	Description of adaptation(s) (what)	Method (how)
X	xx	xx
X	xx	xx

41. Did you use existing materials for use in the MAMI Care Pathway? Use the example table to answer.

Example table: Existing materials used and/or adapted in MAMI

Other materials used (adapted)	Description (what)	Method (how)
X	xx	xx
X	xx	xx

42. Did you develop additional materials? Use the example table to answer.

Example table: Materials developed for use in MAMI

Materials developed for use	Description (what)	Method (how)
X	xx	xx
X	xx	xx

43. Who was involved in deciding the final version of materials to use?
44. Did you test the adapted materials prior to using them for implementation? If yes, describe how this was done.
45. Which (if any) materials were translated in a local language?
46. Describe how you overcame the local language barrier.
(E.g., developed a local language vocabulary as a cheat sheet and field tested it).
47. What were key challenges in the adaptation process?
48. Are there lessons you want to share about the process?

3.7 Training for implementation

49. Did you train health workers ahead of implementing MAMI? If yes, explain who was trained (participants), on what (topics), by whom (trainers), how (method), with what materials, for how long (number of days), aiming to achieve what (learning objectives). Use the example table to answer.

Example table: Training for MAMI prior to starting

Training (type and dates)	Participants targeted (profile and #)	Topics covered	Materials used	Learning objectives
xx	xx	xx	xx	xx

50. Were the national and/or local MOH involved in training? If yes, explain.
51. Were supervisors and managers involved in training? If yes, explain.
52. Were existing national or global training materials used? If yes, explain.
(E.g., on breastfeeding, IMNCI, counselling)
53. Did the training develop specific skills? If yes, explain.
(E.g., on using the IMNCI approach, measuring anthropometry, assessing breastfeeding, assessing mental health, targeted counselling)?
54. What skills were considered pre-requisite (skills training not covered)?
55. If you used the MAMI Care Pathway v3 materials, describe how you used these for training.
56. Are there lessons you want to share about the process?

4. *Service delivery – implementation*

[Notes:
***Health services delivery** is about how services are organised and managed to ensure access, quality, safety, and continuity of care across health conditions across different locations and over time. Its core principles are:*

Comprehensive, equitable, sustainable, coordinated, continuous, holistic, preventive, empowering, goal oriented, respectful, collaborative, co-produced, endowed with rights and responsibilities, shared accountability, evidence-informed, led by whole-systems thinking, ethical.

***People-centred care** is an approach to care that consciously adopts the perspectives of individuals, carers, families and communities as participants in, and beneficiaries of, trusted health systems that respond to their needs and preferences in humane and holistic ways. People-centred care also requires that people have the education and support they need to make decisions and participate in their own care.*

https://apps.who.int/iris/bitstream/handle/10665/155002/WHO_HIS_SDS_2015.6_eng.pdf?sequence=1&isAllowed=y]

57. Give an indicative time line for starting implementation support (enrolling first pair).

58. Give an indicative time line (# months) for ending implementation support (exiting of last pair, if relevant).

4.1 Access: availability, geographic accessibility/delivery points, affordability, acceptability

59. Specify the geographical area and sites where MAMI is implemented. Use the example table to answer. (E.g., region, districts, health facilities, start/end date)

Example table: MAMI sites

Region	Health district	Primary care health centre	Referral hospital
Total			

60. Did implementation start at all sites at the same time? If not, why not, how then?
61. Are services free of cost for small vulnerable infants and their mothers? Explain
62. If referral is needed, who organises, who pays for transport? Explain.
63. If referral for inpatient care is needed, who pays the admission fee, who pays for food for the caregiver? Explain.
64. Has your agency plans to expand or scale up MAMI in-country? In other countries? Specify what actions would facilitate this move?

4.2 Organisation of care in the community (evidence-based, continuity (referral), coordinated, integrated, comprehensive, people-centred, equipped, equity)

65. What activities are provided at the community, how, where by whom? Use the example table to answer.

Example table: Who delivers where what services in the community

Activities	How	Where	By whom
Sensitization			
Health and nutrition promotion			
Screening			
Referral			
Follow-up in the home during enrolment			

66. Which MAMI activities were already in place? Did they have to be strengthened or re-organised?
67. Which MAMI activities had to be newly added?
68. Is active screening working well in the community? What screening criteria do you use?

69. How are community health workers/volunteers linking to the health facility? Explain.

70. How did community health workers perceive the extra tasks they were asked to do? Did they express concerns, and if so, what were they?

4.3 Organisation of care in the health facility (evidence-based, continuity (referral), coordinated, integrated, comprehensive, people-centred, equipped, equity)

71. What activities are provided at the health facility, how, where by whom? Use the example table to answer.

    Example table: Who delivers where what services in the primary healthcare centre

Activities	How	Where	By whom
Sensitization on risks			
Health and nutrition promotion			
Screening (rapid assessment)			
IMNCI assessment, triage			
Anthropometry assessment			
MAMI risk assessment			
Feeding assessment			
Mental health assessment			
Classification and referral			
Treatment and support plan			
Enrolment			
Treatment and support			
Targeted counselling on feeding issues			
Targeted counselling on mental health issues			
Targeted counselling other (specify)			
Frequency of attendance decision for follow-up			
Referral in case of deterioration during enrolment			
Evaluate progress			
Evaluate outcome			
Referral in case of non-recovery at 6m			
Follow-up after exit			

72. Which MAMI activities were already in place? Did they have to be strengthened or re-organised?

73. Which MAMI activities had to be newly added?

74. Is routine screening done in all health services and units frequented by infant-mother pairs? What screening criteria are used?

75. Was referral for maternal mental health possible?

76. How is referral to inpatient care organised for pairs whose status deteriorates, does it work well, or not?

77. How is counter-referral to outpatient care organised for pairs discharged from hospital, does it work well, or not?

78. What further support was most needed at 6 months?

79. Is there a follow up period after pairs exit at infant age 6m? If yes, for how long? and how is it organised?
80. Describe how are pairs are followed across services and in time (continuity of care).

4.4 Organisation of staff: numbers, skill sets, sharing of tasks, supportive supervision, mentoring, job aids

81. Were sufficient number of skilled workers available to absorb MAMI? Explain.
82. What guidance or job aids did you use or develop? Explain.
83. Did you use v3 materials (if any) for organising and supporting health facility y implementation (job aids), and how?
84. How are clinical health workers linking, collaborating, sharing tasks, communicating on MAMI care at the health facility? Explain.
85. How are clinical health workers linking, communicating on MAMI care to other health facilities? Explain.
86. How organised and ready for quality implementation were you at the start (your opinion)? What went well, what went less well? Were roles and responsibilities clear for all implementers prior to starting? Explain.
87. Is supportive supervision and mentoring being provided? If yes, how is it organised, which tools are used?
88. How did health workers perceive to adopt the innovation/increase consistency/merge with what they were already doing? Specify for the different activities at the different levels.
89. How did clinical health workers perceive the extra tasks they were asked to do? Did they express concerns, and if so, what were they?

4.5 Participation

90. Do you involve caregivers (community members) in care? Explain.
91. Prior to assessing risks and enrolling, did you ask the caregiver's perceived need and interest in receiving this service?
92. Were caregivers well informed and had a choice, were encouraged to take active part in care, how?
93. How did caregivers perceive the effort to return for follow-on visits? How do you motivate them?
94. Prior to assessing MAMI risks and enrolling pairs, did you ask the caregiver's perceived need and interest in receiving this service?
95. Did you assess the caregiver's satisfaction during and when exiting the MAMI Care Pathway?

4.6 Partnerships

96. What is the role of the local health management system; how are MOH focal points involved in planning, supervising and improving quality, mentoring, evaluating?
97. Are there other technical partners providing support at the MAMI Sites? Who are they, what do they cover, how you collaborate?
98. Are there other technical partners providing support at the MAMI Sites? Who are they, what do they cover, how you collaborate?
99. Is there a communication or coordination system linking the various partners?

5. *Monitoring and collaborative learning*

5.1 Monitoring and reporting

100. Have you a monitoring system in place? If yes, to what degree you use existing data and systems?

101. List the indicators you report on monthly and give results for the period of reporting. Use the example table to answer.

Example table: Key indicators (country or site, period of reporting)

	Total
Sensitization	
MAMI sensitization in the community (# of people reached)	
MAMI sensitization in the health facility (# of people reached)	
Screening (rapid assessment)	
Total pairs screened in the community	
Pairs screened at risk, referred for in-depth assessment	
Total pairs screened in the primary care facility	
Pairs screened at risk, referred for in-depth assessment	
In-depth assessment	
Total pairs assessed	
a. Pairs assessed - male infant	
b. Pairs assessed - female infant	
Pairs assessed classified at moderate risk (yellow)	
Pairs assessed classified at high risk (red) and referred	
Enrolment in outpatient care	
Total pairs newly enrolled	
a. Pairs newly enrolled - male infant	
b. Pairs newly enrolled - female infant	
Referral during outpatient care	
Total pairs referred to hospital	
a. Pairs referred to hospital - infant high risk	
b. Pairs referred to hospital - mother high risk	
Outcome of outpatient care	
Total pairs exited from the outpatient Care Pathway	
Total pairs exited at infant age 6m	
Pairs not recovered at infant age 6m and referred to continue care	
a. Pairs not recovered at infant age 6m - infant special care	
b. Pairs not recovered at infant age 6m - mother special care	
Pairs recovered at infant age 6m	
Total pairs exited before infant age 6m	
Pairs died before the age of 6m	
Pairs lost to follow up (defaulted) before the age of 6m	

Example table: MAMI enrolment by age group (country or site, period of reporting)

	Total
Age of infants at enrolment in outpatient care	
<1 month	
1–<2 months	
2–<3 months	
3–<4 months	
4–<5 months	
5–<6 months	

102. Do you consolidate monthly monitoring data on service performance? Do you use digitized tools? Explain.

103. Do you consolidate individual data on assessment and enrolment? Do you use digitized tools? Explain.

104. Describe if and what qualitative data you collect, for what purpose, how you collect it, with what tools, and how you consolidate and report on them?

105. Do you capture lessons? Explain.

106. What key lessons have you learned that you think would be helpful for managing small and nutritionally at-risk infants u6m and their mothers?

107. What key successes you want to share?

108. What key challenges did you face? Which actions you have undertaken to overcome these, and did you succeed to overcome these, or not?

5.2 Improving quality

109. Are monitoring results (data tables and figures and lessons) used for quality improvement (QI) to identify weaknesses in data collection and quality of care that needs improvement (e.g., in monthly meetings)? Explain.

110. Do you use adaptive management for quality improvement and learning (e.g., using the plan-do-verify-adapt cycle)? Explain.

111. What has MAMI added to your work and experience?

5.3 Disseminating information and learning

112. How is in-country sharing of information on MAMI organized? Explain the different pathways.

113. How is wider sharing of information on MAMI organized, outside of the country? Explain the different pathways.

114. What learning methods or communication platforms are being used by your managers, by the implementers, and how did they come about? Explain.

115. Have you established a national learning and information sharing entity (e.g., community of practice, Country Chapter)? Explain.

116. Have you involved national research institutions in MAMI? Explain.

117. How did you explore their potential involvement in documenting lessons, evaluating evidence gaps and proposing research studies (including donors).

118. Is any evaluation in progress or planned? Explain.

119. Have you identified any research gaps? If so, what are they?

5.4 Maintaining and sustaining quality services

120. Are the MAMI activities that you implement sustainable? Explain.
121. How can the specific MAMI activities be made more sustainable? what are barriers and facilitators? Explain.
122. Are they resilient to shocks? Explain.
123. Can the specific MAMI activities be made more resilient? what are barriers and facilitators? Explain.

5.5 Ensuring accountability to…

124. Who are you accountable to, how and for what?

5.6 Advocating for … strengthening services and adapting policies

125. Are you engaging decision-makers, champions, gate-keepers in MAMI?
126. What advocating tools you use or have you developed to highlight the burden, the importance of addressing MAMI, the effectiveness of MAMI?
127. Are you involved/do you plan to engage in national policies, guidelines, strategies, processes for contributing to evidence and learning? If yes, in what way?
128. Is the accountability of MAMI in your implementation design sufficient, or what is missing, what should be strengthened and how?

6. *Recommendations*

129. List or describe changes you suggest for simplifying or improving the v3 materials.
130. List or describe additional resources you wish to have to improve planning, organizing, implementing, monitoring, learning, or expanding the evidence base.
131. What do you identify as most important gap / need that should be addressed, by whom and at what level?
132. Share any other general or specific recommendations you have?

Annex 4b. Data tool: Adopting the MAMI Care Pathway approach

Name of the responder and position: _____

Date of response: _____

Agency: _____

QUESTIONS Clinical healthcare worker – key informant interview

PRE-QUESTIONS

1. Please confirm, your name is [...], your current position is [...]
2. Where are you working, in which establishment, health facility?
3. Since how long have you worked there? Give start date.
4. When was the MAMI Care Pathway introduced at your health facility? Give start date.
5. What is your function in relation to the MAMI Care Pathway?
6. (If started working after MAMI was introduced) Were you exposed to MAMI before joining the health facility? Where? In what function?
7. (If started working after MAMI was introduced) Did you have specific MAMI knowledge and skills prior to joining the current position?

QUESTIONS

Questions seek the opinion of the clinical health worker about implementing the MAMI Care Pathway in his/her setting versus what they did before for small vulnerable infants and their mothers. Ask the respondent to explain their answer (if yes, explain how, if no, explain why not) and give a grade on a Likert scale from 0 (not at all) to 5 (completely):

Coherence – meaning and sense-making

1. Is the MAMI Care Pathway easy to describe? Can you appreciate how it differs from current ways of working, from what you did before to support small vulnerable infants and their mothers?
   Participants distinguish the intervention from current ways of working: not at all to completely

2. Do you and your colleagues have a common understanding of the aims, objectives and expected outcomes of the MAMI Care Pathway?
   Participants collectively agree about the purpose of the intervention: not at all to completely

3. Do you understand what implementing the MAMI Care Pathway requires from you (specific tasks and responsibilities)?
   Participants individually understand what the intervention requires of them: not at all to completely

4. Can you easily grasp the potential value, benefits and importance of the MAMI Care Pathway?
   Participants construct the potential value of the intervention for their work: not at all to completely

Cognitive participation – commitment and engagement

5. Are you (or other key individual) able and willing to get others involved in the MAMI Care Pathway? Are you actively engaged in making the MAMI Care Pathway work in your setting?
   Key individuals drive the intervention forward: not at all to completely

6. Do you believe and agree that being involved is right, and that by accepting the MAMI Care Pathway as part of your work you contribute to its implementation?
   Participants agree that the intervention should be part of their work: not at all to completely

7. Do you have the capacity and are you willing to organise you and your colleagues and collectively contribute to the work involved for implementing the MAMI Care Pathway?
   Participants buy in to the intervention: not at all to completely

8. Do you have the capacity and are you willing to collectively define the actions and procedures needed to keep the practice going (invest your time, energy to keep it going)?
   Participants continue to support the intervention: not at all to completely

Collective action – work done to enable the intervention to happen

9. Are you and your colleagues able to undertake the tasks required to implement the MAMI Care Pathway (to operationalise its components in practice)?
   Participants perform the tasks required by the intervention: not at all to completely

10. Do you maintain trust in the intervention and in each other's work and expertise in implementing the MAMI Care Pathway?
    Participants maintain their trust in the intervention and in each other: not at all to completely

11. Is the work required for implementing the MAMI Care Pathway distributed to participants with the right mix of skills and training? Did it impact on the division of labour, resources, power, responsibilities between colleagues (tasks and skill sharing)? Was extensive training needed before implementing the MAMI Care Pathway? (originally Q13)
    The work of the intervention is appropriately allocated to participants: not at all to completely

12. Is the implementation of the MAMI Care Pathway adequately supported by the advisor/manager?
    The intervention is adequately supported by its host organisation: not at all to completely

Reflective monitoring – reflect on or appraise the benefits

13. Do you have access to information on the quality of care and outcome of the MAMI Care Pathway (monitoring and evaluation information)?
    Participants access information about the effects of the intervention: not at all to completely

14. Do you collectively agree on the quality of care and the effects of the MAMI Care Pathway because of formal monitoring?
    Participants collectively assess the intervention as worthwhile: not at all to completely

15. Do you individually think the MAMI Care Pathway is worthwhile?
    Participants individually assess the intervention as worthwhile: not at all to completely

16. Can you make changes to the intervention as an individual or group in response to the appraisal?
    Participants modify their work in response to their appraisal of the intervention: not at all to completely

Annex 4c. Data tool: Scale-up, spread and sustainability of the MAMI Care Pathway approach

Applying the (non-)adoption, abandonment, scale-up, spread, and sustainability (NASSS) framework in real time (Greenhalgh et al., 2017).

Respondents			
Date of interview			
Context (where, for how long, whom, purpose/design)			
ORIGINAL NASSS QUESTIONS	**ADAPTED NASSS QUESTIONS**	**GRADING CONSIDERATIONS** 1= understandable or predictable aspects are relatively straightforward to address (simple). 2= less understandable or predictable aspects or many factors are involved (complicated). 3= inherently not understandable or predictable, but dynamic or emergent aspects are involved (complex).	**RESPONSE**
Domain 1: The condition or illness (risk factors) Addresses how far the **condition** "small and nutritionally at-risk infants and their mothers" is a) well-characterised, well-understood and predictable, and b) how care is being affected by socio-cultural factors and co-morbidities.			
1a. What is the nature of the condition or illness?	1a. Is the condition "small and nutritionally at-risk infants and their mothers" well-characterised, well-understood and predictable?	1) Is the condition well-characterised, well-understood, predictable? OR 2) Not fully characterised, understood or predictable? OR 3)Poorly characterised understood, unpredictable?	
1b. What are the relevant socio-cultural factors and co-morbidities?	1b. Are socio-cultural factors and co-morbidities relevant for the condition "small and nutritionally at-risk infants and their mothers"?	1) Are socio-cultural factors and co-morbidities unlikely to affect care significantly? OR 2) To affect care and must be factored in? OR 3) Pose significant challenges to care planning and service provision?	
Domain 2: The technology Addresses whether **the methods (technologies)** of the MAMI Care Pathway used for detecting, classifying, and supporting "small and nutritionally at-risk infants and their mothers" a) are newly introduced, b) need new knowledge, c) need continued support, and d) need specific adaptations.			
2a. What are the key features of the technology?	2a. What are key features of the methods (technologies) used to assess, classify and support "small and nutritionally at-risk infants and their mothers"? Are methods known, do they exist?	1) Are methods (technologies) used to assess, classify and support "small and nutritionally at-risk infants and their mothers" already installed or existing, dependable? OR 2) Are they new and need to be developed? OR 3) Do they need to be embedded in an existing (complex) system?	
2b. What kind of knowledge does the technology bring into play?	2b. Is new knowledge generated or made visible when applying the methods to assess, classify and support "small and nutritionally at-risk infants and their mothers"? Has it the potential to detect changes in health and nutrition status?	1) Do the methods used to detect, classify and support "small and nutritionally at-risk infants and their mothers" make risks or changes in risks visible or measurable? OR 2) Partially or indirectly visible/measurable? OR 3) Changes are unpredictable or can be contested.	

2c. What knowledge and/or support is required to use the technology?	2c. What knowledge and/or technical support is required to assess, classify and support "small and nutritionally at-risk infants and their mothers"?	1) No new knowledge is required to assess, classify and support "small and nutritionally at-risk infants and their mothers"? OR 2) Detailed instructions and training are needed. OR 3) Advanced training and support are necessary.	
2d. What is the technology supply model?	2d. Are the methods used in the MAMI Care Pathway generic and standardised?	1) Are the "small and nutritionally at-risk infants and their mothers" methods used in the approach generic, standardised and straightforward to implement? OR 2) Are significant organisational changes in the management of health services needed? OR 3) Is it highly vulnerable to support withdrawal?	
Domain 3: The value proposition Explores whether the MAMI Care Pathway is considered a **valuable intervention and for who** it has value: a) the care provider and b) the user.			
3a. What is the developer's business case for the technology (supply-side value)?	3a. How do health workers perceive the value of the MAMI Care Pathway? Do they understand the value of the short-/mid-/long-term benefits?	1) Is the perceived benefit of the MAMI Care Pathway approach well-understood, over the short/mid/long term? OR 2) Is it undervalued (at risk?) OR 3) Is it unlikely that it will be maintained (after the pilot period), and at risk?	
3b. What is its desirability, efficacy, safety, and cost effectiveness (demand-side value)?	3b. How do the mothers (caregivers) perceive the value of the MAMI Care Pathway? Do they understand the need, do they appreciate the care, is the opportunity cost a barrier?	1) Is the MAMI Care Pathway approach considered needed, desirable, safe, cost-effective by the user? OR 2) Is it unknown, contested? OR 3) Is it considered not needed, undesirable, unsafe, ineffective or unaffordable by the user?	
Domain 4: The adopter system Explores whether the MAMI intervention has been **adopted (accepted) and by who:** a) health staff, b) mothers, c) lay support system of the mother.			
4a. What changes in staff roles, practices, and identities are implied?	4a. Did important changes have to be made for health workers (staff in the health facility) to take on their role in the MAMI Care Pathway? Did new skills have to be learned, new staff be appointed, new tasks be taken on?	1) When adopting the care pathway, were there no changes in staff roles and practices? OR 2) Did existing staff have to learn new skills and/or were new staff appointed? OR 3) Did it pose a threat to current professional identities, values and scope of practices (risk of job loss)?	
4b. What is expected of the patient (and/or immediate caregiver) – and is this achievable by, and acceptable to, them?	4b. Were specific or new actions expected of the mother?	1) Nothing is expected of the mother (principal caregiver). OR 2) Routine tasks and changes in behaviour are expected. OR 3) Complex tasks are expected? Are these achievable, acceptable?	
4c. What is assumed about the extended network of lay caregivers?	4c. By offering MAMI, are other lay caregivers in the mother's network affected (e.g., family members, volunteers, community members), and are there new requirements or expectations for them? Is the wider network requested to be involved?	1) Nothing is required from the extended network of lay caregivers. OR 2) Caregivers are assumed to be available. OR 3) A network of caregivers is needed/expected to coordinate their inputs.	

Domain 5: The organisation Addresses whether **the organisation** of the MAMI intervention required important changes and inputs in the given organisational context: a) capacity, b) readiness to adopt, c) easiness of adoption and funding decision, d) changes in teamwork, and e) tasks to be undertaken (the work).			
5a. What is the organisation's capacity to innovate?	5a. Did the organisational setup have the capacity to innovate, change, and adapt ways of working, and did it have the resources for doing so?	1) Local health system is well-organised (good managerial capacity, well-supported), flexible and available resources, good management, risk taking is encouraged. OR 2) Resources are inflexible, local leadership is suboptimal and risk taking is not encouraged. OR 3) Severe resource pressure, weak leadership, weak resilience.	
5b. How ready is the organisation for this technology-supported change?	5b. Was the organisational setup ready / open to innovating, changing, and adapting ways of working, and did it have the resources for doing so?	1) High tension for change, openness to innovation, widespread support. OR 2) Little tension for change, moderate innovation. OR 3) No tension for change, poor innovation, opponents to change.	
5c. How easy will the adoption and funding decision be?	5c. How easy will the adoption and funding decision for the MAMI Care Pathway be (resources, cost savings, new infrastructure to manage by MOH, NGO or donor lead)?	1) Single organisation with sufficient resources; anticipated cost savings; no new infrastructure or recurrent costs required. OR 2) Multiple organisations with partnership relationship; cost–benefit balance favourable or neutral; new infrastructure found (e.g., repurposing staff roles, training). OR 3) Multiple organisations with no formal links and/or conflicting agendas; funding depends on cost savings across system; costs and benefits unclear; new infrastructure conflicts with existing and significant budget implications.	
5d. What changes will be needed in team interactions and routines?	5d. What changes were needed in MOH, NGO, and health worker team organisation to adopt MAMI? Did team interactions and team routines change (new), align or conflict?	1) No new team routines or care pathways needed. OR 2) New team routines or care pathways that align readily with existing ones. OR 3) New team routines or care pathways that conflict with existing ones.	
5E. What work is involved in implementation and who will do it?	5e. What work is involved in implementing and improving the quality, and who will do it?	1) Established shared vision, few simple tasks, uncontested and easily monitored. OR 2) Some work needed to build shared vision, engage staff, enact new practices, monitor impact. OR 3) Significant work needed to build shared vision, engage staff, enact new practices, monitor impact.	
Domain 6: The wider context Explores whether **financial and policy requirements** are in place nationally for rollout.			
6a. What is the political, economic, regulatory, professional (e.g., medicolegal) and socio-cultural context for programme rollout?	6a. Are financial and policy requirements for MAMI in place for programme rollout? a) what was it like in the previous context, b) what is it like in the new context?	1) Financial and regulatory requirements are in place nationally; professional bodies and civil society are supportive. OR 2) Are being negotiated nationally; professional bodies and lay stakeholders not yet committed. OR 3) Raise tricky or legal or other challenges, professional bodies and lay stakeholders are opposed.	

Domain 7: Embedding and adaptation over time Explores the feasibility of **embedding and adapting** the MAMI approach over time: the feasibility of a) continuing to adapt and evolve over the medium and long term, and b) building organisational resilience.			
7a. How much scope is there for adapting and co-evolving the technology and the service over time?	7a. What is the feasibility of continuing to embed and adapt the MAMI approach (intervention modalities) over time (medium- to long-term)? Are you expecting certain barriers?	1) Strong scope for adapting and embedding the MAMI approach. OR 2) Potential for adapting and co-evolving the MAMI services is limited and uncertain. OR 3) Significant barriers to the further adaptation or co-evolution of the MAMI approach.	
7b. How resilient is the organisation in regard to handling critical events and adapting to unforeseen eventualities?	7b. What is the organisation resilience to detecting and overcoming critical issues or barriers (barriers related to embedding, handling critical events, adapting to unforeseen eventualities?)	1) Sense-making, collective reflection and adaptive action are ongoing and encouraged. OR 2) Are difficult and viewed as a low priority. OR 3) Are discouraged in a rigid, inflexible implementation model.	

Annex 4d. Data tool: Planning for successful scale-up of the MAMI Care Pathway approach

Questions related to potential scalability	Yes (+)	No (–)	More information / action needed
1. Is input about the project being sought from a range of stakeholders (e.g. policy-makers, programme managers, providers, NGOs, beneficiaries)?			
Are individuals from the future implementing agency involved in the design and implementation of the pilot?			
Does the project have mechanisms for building ownership in the future implementing organisation?			
2. Does the innovation address a persistent health or service delivery problem?			
Is the innovation based on sound evidence and preferable to alternative approaches?			
Given the financial and human resource requirements, is the innovation feasible in the local settings where it is to be implemented?			
Is the innovation consistent with existing national health policies, plans and priorities?			
3. Is the project being designed in light of agreed-upon stakeholder expectations for where and to what extent interventions are to be scaled up?			
4. Has the project identified and taken into consideration community, cultural and gender factors that might constrain or support implementation of the innovation?			
Have the norms, values and operational culture of the implementing agency been taken into account in the design of the project?			
Have the opportunities and constraints of the political, policy, health sector and other institutional factors been considered in designing the project?			
5. Has the package of interventions been kept as simple as possible, without jeopardising outcomes?			
6. Is the innovation being tested in the variety of socio-cultural and geographic settings where it will be scaled up?			
Is the innovation being tested in the type of service delivery points and institutional settings in which it will be scaled up? 7. Does the innovation being tested require human and financial resources that can reasonably be expected to be available during scale-up?			
Will the financing of the innovation be sustainable?			
Does the health system currently have the capacity to implement the innovation? If not, are there plans to test ways to increase health systems capacity?			

8. Are appropriate steps being taken to assess and document health outcomes, as well as the process of implementation?			
9. Is there provision for early and continuous engagement with donors and technical partners to build a broad base of financial support for scale-up?			
10. Are there plans to advocate for changes in policies, regulations and other health systems components needed to institutionalise the innovation?			
11. Does the project design include mechanisms to review progress and incorporate new learning into the implementation process?			
Is there a plan to share findings and insights from the pilot project during implementation?			
12. Is there a shared understanding among key stakeholders about the importance of having adequate evidence related to the feasibility and outcomes of the innovation prior to scaling up?			

WHO ExpandNet (2011) *Beginning with the end in mind: planning pilot projects and other programmatic research for successful scaling up*.

1. Engage in a participatory process involving key stakeholders
2. Ensure the relevance of the proposed innovation
3. Reach consensus on expectations for scale-up
4. Tailor the innovation to the socio-cultural and institutional settings
5. Keep the innovation as simple as possible
6. Test the innovation in the variety of socio-cultural and institutional settings where it will be scaled up
7. Test the innovation under the routine operating conditions and existing resource constraints of the health system
8. Develop plans to assess and document the process of implementation
9. Advocate with donors and other sources of funding for financial support beyond the pilot stage
10. Prepare to advocate for necessary changes in policies, regulations and other health systems components
11. Develop plans for how to promote learning and disseminate information
12. Plan on being cautious about initiating scale-up before the required evidence is available

Annex 5. Implementation materials

Table Annex 5. Summary of materials for implementing the MAMI Care Pathway approach in the Yemen case, 2021–2023

Materials from the 2021 MAMI Care Pathway package v3	Description of change (what)	Method (how)
All MAMI Care Pathway package materials	Adapted to context and translated into Arabic Added weight-for-length z-score (WLZ) < -3 as a high-risk criterion	Integrated the MAMI Care Pathway approach criteria with CMAM criteria
Existing materials		
None		
Materials newly developed		
MAMI CHNV training materials	Developed for use by CHNVs	Internal discussion between ADRA Yemen MAMI team and ADRA International Health and Nutrition Advisor, with full coordination with MOPHP
MAMI CHNV screening and follow-up form		
MAMI register for community health and nutrition volunteers (CHNVs)		
Referral card		

Annex 6. Training sessions

Table Annex 6. Outline of training conducted in the Yemen case, 2021–2023

Training (type and dates)	Participants targeted	Objectives	Topics covered	Materials used
Training for health workers (3 days, November 2021)	18 health workers	• Understand the MAMI Care Pathway approach • Be able to use the MAMI Care Pathway approach to screen infants u6m and their mothers • Know how and where to refer at-risk infants u6m and their mothers	• The MAMI Care Pathway approach and MAMI in the Yemen context • Screening and assessment • Management • Monitoring and reporting	• MAMI Guide • MAMI Tools
Training for CHNVs (2 days, January 2022)	58 CHNVs	• Understand the MAMI Care Pathway approach • Be able to use the MAMI Care Pathway approach to screen infants under six months of age (u6m) and their mothers • Know how and where to refer at-risk infants u6m and their mothers	• Screening in the community • Classification of risk and referral pathways	• MAMI Guide • MAMI Tools

Annex 7. Appraising the adoption process

Table Annex 7. Findings on the degree of normalisation* of the MAMI Care Pathway approach in the Yemen case, 2021–2023

Normalisation domain question	Summary of finding
1. Is the MAMI Care Pathway easy to describe? Can you describe how it differs from current ways of working, from what you did before for at-risk infants under six months of age (u6m) and their mothers?	Before MAMI, anthropometric measurements were not taken for infants u6m, only for children 6–59 months. If malnutrition in infants u6m was suspected, they were directly referred to the TFC at the hospital, or the mother was counselled on breastfeeding. When MAMI started, several benefits of the approach were noted: increased knowledge on how to assess and follow up growth of infants u6m, monitoring the mental health and nutritional status of the mother, and improved counselling to prevent bad breastfeeding habits. "MAMI filled a gap in dealing with the mother of the infant u6m, before there was no concern given to these mothers. When meeting mothers in the vaccination room we couldn't provide any services, unless we sent them to the TFC." Participants distinguished the intervention from current ways of working: Grade 4
2. Do you and your colleagues have a common understanding of the aims, objectives and expected outcomes of the Care Pathway?	Since the MAMI training and implementation, knowledge has increased on how to deal with the infant and mother (including for the mother's mental health and nutritional status, and how to monitor growth and development of the u6m group). Quotes: "In Yemen, mothers below 18 years have no experience on how to deal with infants u6m. Now we understand why health and growth monitoring is important; before we didn't understand." "MAMI is dealing with infants u6m and mothers together." Participants collectively agreed about the purpose of the intervention: Grade 5
3. Do you understand what implementing the Care Pathway requires from you (specific tasks and responsibilities)?	After receiving good training on why and how to implement the activities, tasks were understood, and implementation was made feasible. Roles and responsibilities were assigned. Participants individually understood what the intervention required of them: Grade 5

4. Can you easily grasp the potential value, benefits and importance of the Care Pathway?	Several benefits of MAMI were identified: effective support of infants before they are six months of age (before they become acutely malnourished cases); close monitoring and prevention, and identification of illness early; benefits on weight gain. Mothers were grateful for MAMI: they felt it gave them a benefit compared to experiences with children who developed severe acute malnutrition/ moderate acute malnutrition. Mothers with bad habits (not exclusive breastfeeding/mixed feeding) changed their habits, listened to advice, and were more committed to coming to the health centre. Before the MAMI Care Pathway approach, LBW infants, twins, orphans and adolescent mothers (u18) were ignored as vulnerabilities. "Mothers come back more because their young infants need more care, and the health centre can help to teach them how best to care for their infants." Participants constructed potential value of the intervention for their work: Grade 5
5. Are you (or other key individual(s)) able and willing to get others involved in the Care Pathway? Are you actively engaged in making the Care Pathway work in your setting?	Everybody had assigned tasks and supported each other. The MAMI coordinator provided a lot of support to ensure collaboration. Key individuals drove the intervention forward: Grade 4
6. Do you believe and agree that being involved is right, and that by accepting the Care Pathway as part of your work you contribute to its implementation?	In the beginning, health staff faced many challenges and did not have a good model for implementing the MAMI Care Pathway. After training and follow-up/on-the-job training and visits from ADRA, implementation became easier, and the Care Pathway was accepted. Participants agreed that the intervention should be part of their work: Grade 4
7. Do you have the capacity and are you willing to organise yourself and your colleagues and collectively contribute to the work involved for implementing the Care Pathway?	Because MAMI had a lot of benefits and was already accepted by the team, they were interested in it and asked many questions. Cases for MAMI were always there but they did not know how to deal with them. MAMI integrated many services that were already there for older children and that could also be used for infants u6m. "MAMI is the superhero for the programmes on the ground, so many people are asking about MAMI (different people working on health outside of the health centre)." Participants accepted the intervention: Grade 3
8. Do you have the capacity and are you willing to collectively define the actions and procedures needed to keep the practice going (invest your time, energy to keep it going)?	If ADRA was no longer supporting, the health centre would continue with MAMI. After two years of implementation, the health workers had good knowledge and skills in regard to completing MAMI tasks. "We would be willing to teach the colleagues, train in MAMI and expand implementation." Participants continued to support the intervention: Grade 3

9. Are you and colleagues able to do the tasks required to implement the Care Pathway (to operationalise its components in practice)? (Interactional workability)	The MAMI work was considered as teamwork, and required working together. Across the team, they had both health and nutrition people who provided care for at-risk infants/mothers together – integrated, cooperative working between colleagues. When the members of the team provided the different services, they were encouraged by the benefits and the outcomes of implementing MAMI. Participants performed the tasks required by the intervention: Grade 1
10. Do you maintain trust in the intervention and in each other's work and expertise in implementing the Care Pathway? (Relational integration)	There were eight other midwives in the same centre, but MAMI cases would always be sent to the one MAMI focal point. However, ADRA staff made sure that everyone working together was trained and knew what the others were doing, and understood how to cover each other. However, only one midwife and one nutrition worker were trained on MAMI per health centre so not all health centre staff implemented MAMI. There was a plan to train all health workers on screening (not assessment or support) but this had not yet been done due to limitations in the budget. Participants maintained their trust in the intervention and in each other because they were trained and supported: Grade 3
11. Is the work required for implementing the Care Pathway distributed to participants with the right mix of skills and training? Did it impact on the division of labour, resources, power, responsibilities between colleagues (tasks and skill sharing)? Was extensive training needed before implementing the Care Pathway? (Skill set workability)	MAMI was considered a collection of other programmes (IYCF, TFC, CMAM, IMCI), not something new. Once health workers were trained and their capacity was built, they worked as a team to implement the "package for MAMI". The "package" helped to coordinate the activities. The MAMI Care Pathway was considered an integrated programme, aligned with other programmes: ADRA, by means of a matrix, helped health workers to understand how to work together and how to better deal with cases and change operations in the health centre. A three-day training session at the start of MAMI was not enough to build skills: in the beginning, the training was thought to be similar to other programmes, but after working on MAMI it was felt that there was not enough training because many new factors were being addressed and it had to be pieced together in a way that had never been done before, which needed more explanation. The work of the intervention was appropriately allocated to participants with trained skills: Grade 3
12. Is the implementation of the Care Pathway adequately supported by the advisor/manager? (Contextual integration)	At the beginning of implementation, there was some misinformation and a lack of understanding, but after follow-up and supervisory visits the team felt well supported by the manager. The intervention is adequately supported by its host organisation: Grade 4
13. Do you have access to information on the quality of care and outcome of the Care Pathway (monitoring and evaluation information)?	Individual records of enrolled pairs provided data for monitoring progress in the mother's behaviour and the infant's wellbeing. However, data on performance of services were not available for clinical health workers. Participants access information about the effects of the intervention: Grade 2

14. Do you collectively agree on the quality of care and the effects of the Care Pathway because of formal monitoring?	Regular team discussions were held to solve problems; e.g., about cases not returning for follow-up visits. Monitoring of services was done by the coordinator, who met with the health workers to give feedback. The Save the Children MEAL MAMI package was used for data collection. Participants collectively assessed the intervention as worthwhile: Grade 3
15. Do you individually think the Care Pathway is worthwhile?	Multiple benefits of the Care Pathway were expressed (see above). The comprehensive and quality of care promoted by the Care Pathway effectively addressed the risks to mother–infant pairs. Participants individually perceived the intervention as worthwhile: Grade 4
16. Can you make changes to the intervention as individual or group in response to the appraisal?	Feedback on the individual monitoring of care was provided to the mother. Supervisory visits detected, corrected, or clarified this information for the mother. No structural changes were made. Participants modified their work in response to their appraisal of the intervention: Grade 3

*Findings were informed by Normalisation Process Theory (13, 14) (see Annex 2: Methods and limitations), adapted to the MAMI Care Pathway approach, to understand the path followed towards adoption, including enablers and barriers, and to assess the likelihood of the Care Pathway becoming routine in practice. The quotes are from the participatory discussions with the MAMI implementation team.

Annex 8. Appraising readiness for scale

Table Annex 8a. Appraising challenges to scale-up, spread and sustainability of the MAMI Care Pathway approach in the Yemen case, 2021–2023

Domain 1: The condition (including risk factors)	Addresses a) how well the **condition** "small and nutritionally at-risk infants and their mothers" is characterised, understood and predictable, and b) how far care is affected by sociocultural factors and comorbidities.
1a. Is the condition "small and nutritionally at-risk infants and their mothers" well-characterised, well-understood, and predictable?	Clinicians were knowledgeable and skilled as regards addressing the signs and symptoms of the condition. However, too many cases were identified if the description in the V3 Care Pathway is applied, so it was amended.
1b. Are sociocultural factors and comorbidities relevant for the condition "small and nutritionally at-risk infants and their mothers"?	Before, many conditions were not considered; e.g., adolescent pregnancy, lactating women, family planning, close birth spacing.
Domain 2: The technology	Addresses whether **the methods (technologies)** of the MAMI Care Pathway used for detecting, classifying, and supporting "small and nutritionally at-risk infants and their mothers" are a) newly introduced, b) need new knowledge, c) need continued support, and d) need specific adaptations.
2a. What are key features of the methods (technologies) used to assess, classify and support "small and nutritionally at-risk infants and their mothers"? Are methods known, do they exist?	The MAMI Care Pathway approach laid out how to objectively detect and refer vulnerable pairs early for care. Risk factors could be expanded beyond the commonly used(e.g., all congenital abnormalities that impact feeding). On the other hand, tools to comprehensively assess congenital abnormalities that impact feeding were missing.
2b. Is new knowledge generated or made visible when applying the methods to assess, classify and support "small and nutritionally at-risk infants and their mothers"? Has it the potential to detect changes in health and nutrition status?	Implementing the Care Pathway worked well after contextual adaptations were made and training was conducted by an international expert. Some risk factors were missed and further contextual improvements need to be made. The MAMI Care Pathway approach was cross-cutting with many programmes that addressed a limited set of criteria. Therefore, there was felt to be a need for additional criteria for risk factors. For example: maternal physical and mental health was assessed, thus a new vulnerability had to be addressed; disability was detected, but then follow-on care needed to be done in case it impacts on, for example, feeding difficulties. Thus, the MAMI Care Pathway could be improved.
2c. What knowledge and/or technical support is required to assess, classify and support "small and nutritionally at-risk infants and their mothers"?	If possible, training materials and guides could include lessons and videos that help practitioners to work with this infant group. Having access to more learning tools to better detect risks would be useful. For example, the WLZ indicator was challenging, and additional materials were needed to support taking these measurements.

2d. Are the methods used in the MAMI Care Pathway generic, standardised?	For the Care Pathway to be successful, MAMI-specific services needed embedding in routine care. Some changes could facilitate embedding the Care Pathway in routine care, such as the use of the weekly growth chart, adapted for "small and nutritionally at-risk infants and their mothers". The current tools used do not reflect all risks and are not appropriate for infants u6m as they are designed for children 6–59 months of age. For example, existing weight-for-age growth charts do not follow growth in weeks but in months, thus these were adapted. The weekly growth charts were used when the support team was present; otherwise, the regular monthly version was used. More support was needed to improve the organisation of MAMI, with specific tools for use by MAMI. Until recently, context adaptations were easy to make (one person's decision), but in the last few months, as more organisations have got involved in MAMI implementation, there has been less liberty to make adaptations. It was suggested that MOPHP have a national-level discussion or working group across partners to make decisions on context adaptation.
Domain 3: The value proposition	Explores whether the MAMI Care Pathway is considered a **valuable intervention, and for whom** it has value: a) the care provider and/or b) the user.
3a. How do health workers perceive the value of the MAMI Care Pathway? Do they understand the value of the short-/mid-/long-term benefits?	The MAMI Care Pathway approach was valuable and health workers were committed. It improved the teams' skills to cover vulnerable cases that were not being addressed before, helping to make a change and decreasing the risk of severe illnesses developing that need lengthy and expensive treatment. Mid- and long-term benefits mirrored preventative programmes (more so than any other programmes); e.g., detecting and acting upon a health condition early to prevent more serious conditions that need complex interventions later.
3b. How do the mothers (caregivers) perceive the value of the MAMI Care Pathway? Do they understand the need, do they appreciate the care, is the opportunity cost a barrier?	Mothers seemed to understand the benefit in regard to reducing the risk of malnutrition to avoid needing CMAM or being referred to higher-level facilities. MAMI attracted attention to vulnerable infants and mothers.
Domain 4: The adopter system	Explores whether the MAMI intervention has been **adopted (accepted) and by who:** a) health staff, b) mothers, c) the lay support system of the mother.
4a. Did important changes have to be made for health workers (staff in the health facility) to take on their role in the MAMI Care Pathway? Did new skills have to be learned, new staff be appointed, and new tasks be taken on?	ADRA staff supported the health centre team, who gained good knowledge on implementing the Care Pathway. Refresher training was needed (one training was received), when the resources/tools were updated (see above). Many challenges were experienced in implementing the MAMI Care Pathway. At the start, when it was new, there was little interest but now those who have not directly implemented it are more interested in MAMI and have started to inquire and ask questions about it; e.g., MOPHP and implementing partners.

4b. Were specific or new actions expected of the mother?	Mothers (caregivers) had traditional ideas on infants' health, feeding and care practices that prevented them coming to the health centre. MAMI brought new learning for mothers: introduced changes in behaviours (e.g., use of cow milk, faltering nutritional status of mothers due to repeated pregnancies), provided support for identified problems, made linkages between existing programmes, and gave more attention to the infant, which was encouraging for mothers. Mothers said that they feel that there is now someone who is concerned about them and their infant, and that care is well organised, without them having to go to another health centre. Mothers asked more questions, building their own confidence in care for their infant.
4c. By offering MAMI, are other lay care givers in the mother's network affected (e.g., family members, volunteers, community members), and are there new requirements or expectations for them? Is the wider network requested to be involved?	Mothers with infants enrolled tended to bring other mothers, which created an increased interest in the MAMI Care Pathway; this indicated more awareness since MAMI was put in place.
Domain 5: The organisation	Addresses whether **the organisation** of the MAMI intervention required important changes and inputs in the given organisational context: a) capacity, b) readiness to adopt, c) easiness of adoption and funding decision, d) changes in teamwork, and e) tasks to be undertaken (the work).
5a. Did the organisational setup have the capacity to innovate, change, adapt ways of working, and have the resources for doing so?	ADRA Yemen started the MAMI Care Pathway approach as a pilot and will further expand. ADRA leadership embraced the expansion, asking for coaching support from MOPHP, and advocated for others to join in the new project. MOPHP, which was reluctant at the start, saw that the approach provided less complicated support to earlier detected problem cases, and accepted it.
5b. Was the organisational setup ready to innovate, change and adapt ways of working, was it open to doing so, and did it have the resources to do so?	Under ADRA's leadership and guidance, building on their experience, and by engaging MOPHP, this would be possible.
5c. How easy will the adoption and funding decision for the MAMI Care Pathway be (resources, cost savings, new infrastructure to be managed by MOPHP, NGOs or donor lead)?	Resource inputs to strengthen capacities felt more like doing what had been missed before. Now it was like waiting for MAMI to deal with special cases better. The MAMI Care Pathway approach built upon and profited from simple available resources to gain knowledge and skills to address the vulnerable age group.
5d. What changes were needed in MOPHP, NGOs, and health worker team organisation to adopt MAMI? Did team interactions and team routines change (new), align or conflict?	MAMI brought changes to the health centre teams, and workplans were adapted. MOPHP planned to support the ADRA lead to further support the MAMI Care Pathway approach across partners and health facilities.

5e. What work is involved in implementing and improving the quality, and who will do it?	The MAMI Care Pathway was a good resource package that, with adaptations made to account for the context, enabled quality care. Only improvements in expanding risk factors and tools for training needed to be added. Many questions about MAMI implementation evolved from a need to know more details on the MAMI Care Pathway approach. A common vision and stronger leadership are needed to facilitate MAMI in the context of emergency programmes.
Domain 6: The wider context	Explores whether **financial and policy requirements** are in place nationally for rollout.
6a. Are financial and policy requirements for MAMI in place for programme rollout? a) in the past context, b) in the future context?	There were no adequate financial and policy requirements in place for MAMI. While MOPHP was open to adopting the MAMI Care Pathway approach, engagement with donors needed to be strengthened to expand interest with more case studies, more outcome studies, more discussions, more donors. It was suggested to include donors in meetings to share learning. New programmes on health and nutrition expressed an interest in adopting MAMI but more evidence on effective implementation with better adapted tools would be useful.
Domain 7: Embedding and adaptation over time	Explores the feasibility of **embedding and adapting** the MAMI Care Pathway approach over time: the feasibility of a) continuing to adapt and evolve over the medium and long term, and b) building organisational resilience.
7a. What is the feasibility of continuing embedding and adapting the MAMI Care Pathway approach (intervention modalities) over time (medium-long term)? Are you expecting certain barriers?	The MAMI Care Pathway approach was an example of providing comprehensive care. For example, LBW was a risk indicator that had been neglected before. Before, there was no coordinated care system for this vulnerable population. More assistance from the Nutrition Cluster could offer opportunities to close gaps in the existing programmes (CMAM, IYCF) for vulnerable infants u6m.
7b. What is the level of organisational resilience in regard to detecting and overcoming critical issues or barriers (barriers related to embedding, handling critical events, adapting to unforeseen eventualities)?	ADRA built momentum among partners for rolling out MAMI. They were asked to provide support to partner agencies based on their knowledge and experience of MAMI (e.g., MOPHP and NGO partners). The need to address care for vulnerable infants was great and MOPHP was interested in embedding MAMI, despite the challenges.

Table Annex 8b. Appraising the potential scalability of the pilot on integrating the MAMI Care Pathway approach in Yemen, 2021–2023, and suggested actions

Steps in the scale-up appraisal – questions		Suggestions for more information or action needed
1. Is input about the project being sought from a range of stakeholders (e.g., policy-makers, programme managers, providers, NGOs, beneficiaries)?	Yes	MOPHP and national cluster member organisations were solicited for their involvement in the pilot from the start. They were not involved in the pilot's design.
Are individuals from the future implementing agency involved in the design and implementation of the pilot?	No	Health workers from outside ADRA were not involved in the design or implementation of the MAMI pilot.
Does the project have mechanisms for building ownership in the future implementing organisation?	Yes	The desire to involve partners and share learning enabled the strengthening of in-country capacities.
2. Does the innovation address a persistent health or service- delivery problem?	Yes	Policies covered health needs, but a comprehensive approach was lacking in primary care, with only very ill or severely malnourished infants covered (by IMCI and CMAM).
Is the innovation based on sound evidence and preferable to alternative approaches?	Yes	The innovation built upon the evidence and materials made available through the MAMI Global Network.
Given the financial and human resource requirements, is the innovation feasible in the local settings where it is to be implemented?	Yes	If national policies were implemented correctly, then this innovation, which builds upon them, would not require additional resources. The innovation enabled continuity of care for vulnerable mother–infant pairs.
Is the innovation consistent with existing national health policies, plans and priorities?	Yes	See above.
3. Is the project being designed in light of agreed-upon stakeholder expectations for where and to what extent interventions are to be scaled-up?	Yes	Expansion to new sites was ongoing, but the sustainability of the approach (beyond NGO-led implementation) was not considered.
4. Has the project identified and taken into consideration community, cultural and gender factors that might constrain or support implementation of the innovation?	Yes	The primary care setting limits the ability to comprehensively address community and sociocultural factors. There was more clarity and scope about addressing these in the community, but a limit to what they could realistically do.
Have the norms, values and operational culture of the implementing agency been taken into account in the design of the project?	Yes	Norms and values dictated what was feasible, and built upon existing services, because the facilities were already being supported by ADRA.
Have the opportunities and constraints of the political, policy, health-sector and other institutional factors been considered in designing the project?	No	There was a desire and efforts were made to 'knock on the door', but there is no traction yet. Design and implementation was led by ADRA, not driven by national-level policies.
5. Has the package of interventions been kept as simple as possible without jeopardising outcomes?	No	The package was contextualised but only minor changes were made or added.
6. Is the innovation being tested in the variety of sociocultural and geographic settings where it will be scaled-up?	No	Expansion was agency-driven, and site selection depended on where ADRA was active. ADRA has been in Yemen for many years and knew the context well.

Is the innovation being tested in the type of service delivery points and institutional settings in which it will be scaled-up?	Yes	The innovation was tested in health centres supported by the emergency health and nutrition programme, and other similar health centres will be targeted for scale-up.
7. Does the innovation tested require human and financial resources that can reasonably be expected to be available during scale-up?	No	Implementation depended on emergency funding.
Will the financing of the innovation be sustainable?	No	The innovation was tested as part of a multi-year donor-funded and NGO-implemented emergency health and nutrition programme in response to protracted crises that had a limited life.
Does the health system currently have the capacity to implement the innovation? If not, are there plans to test ways to increase health systems capacity?	No	The agency engaged with MOPHP to take on the innovation as a routine service but transfer of learning has only started.
8. Are appropriate steps being taken to assess and document health outcomes, as well as the process of implementation?	Yes	The agency requested external support to improve on this.
9. Is there provision for early and continuous engagement with donors and technical partners to build a broad base of financial support for scale-up?	No	Activities were driven and dependent on emergency funding, which may change or end over time.
10. Are there plans to advocate for changes in policies, regulations and other health systems components needed to institutionalise the innovation?	No	There were no concrete plans but the agency was aware of the need, and had the desire to engage with UNICEF, WHO and MOPHP. They said they were “working on it”.
11. Does the project design include mechanisms to review progress and incorporate new learning into the implementation process?	Yes	The implementers reported that there were gaps in guidance to make implementation easy, and that a robust learning system was not yet in place.
Is there a plan to share findings and insights from the pilot project during implementation?	Yes	Presentations on implementation and progress were shared at various occasions in-country and at the global level, but learning was not systematic.
12. Is there a shared understanding among key stakeholders about the importance of having adequate evidence related to the feasibility and outcomes of the innovation prior to scaling up?	Yes	The understanding to learn from the implementation process was well taken and plans were being discussed.

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