Psychosocial stimulation for children suffering from severe acute malnutrition in Koutiala, Mali.

Contextual adaptation and evaluation of the feasibility and acceptability of an intervention. Study report.

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Preamble and thanks

This study report is the full report of the StimNut study which took place from July 2022 to June 2023 in Koutiala, Mali. Two other *ad hoc* reports were produced for phases 1 and 2 of the study: " Exploratory phase " (phase 1) and "Participatory adaptation phase" (phase 2). They are available at the following address: https://epicentre.msf.org/stimnut-une-recherche-action-communautaire-innovante-de-stimulation-psychosociale-pour-ameliorer-0. For more details on the first two phases, please refer to the corresponding reports.

This report deals more specifically with phase 3 of the study "Implementation and acceptability of the adapted psychosocial stimulation intervention", while presenting a summary of phases 1 and 2. It was written by the following people from Epicentre and MSF: Claire BOSSARD, Sofia PAYOTTE, Aissatou DIALLO, Pascale LISSOUBA, Giulia SCARPA and Gregory KEANE and by Karine LE ROCH from Action Contre la Faim. The appendices to this report are grouped together in a separate document also available at the following address: https://epicentre.msf.org/stimnut-une-recherche-action-communautaire-innovante-de-stimulation-psychosociale-pour-ameliorer-0.

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Acronyms and abbreviations

ACF	Action contre la Faim
AMEDD	Association Malienne d'Éveil au Développement Durable
AS	Health workers
CMAM	Community management of acute malnutrition
ComHC	Community Health Centre
CNESS	National Ethics Committee for Health and Life Sciences in Mali
DHS	Demographic and Health Survey
EPDS	Edinburgh Postnatal Depression Scale
EPI	EPI stands for Individual Protective Equipment.
ERB	Ethical Review Board
FUSAM	Follow-Up of Severe Acute Malnourished children
GCP -ICHGCP	stands for Good Clinical Practice -International Conference Harmonisation
IPC	Infection Prevention and Control
IR	Interpretative repertoires
MSF	Médecins Sans Frontières
PAR	Participatory Action Research
PICCOLO	Parenting Interactions with Children : Checklist of Observations
SAM	Severe acute malnutrition
PCMA	Programme for community-based management of acute malnutrition
PSW	Psychosocial workers
StimNut	Psychosocial stimulation in nutrition
TFP	Therapeutic Food Programme
UNICEF	United Nations International Children's Emergency Fund
ITFC	Inpatient Therapeutic Feeding Centre
WHO	World Health Organization
WFP	World Food Programme

Glossary

- Accompanying caregivers (or main caregivers, caregivers or caregiver): people who accompany children to malnutrition treatment facilities. This is usually the children's mothers or grandmothers.
- Psychosocial stimulation: this is a method whereby the mother or primary caregivers provides the security, warmth and affection that the child needs to grow and develop, through exchanges based on sensory (visual, auditory, tactile), cognitive and social interactions. As part of a psychosocial stimulation intervention, the activities proposed to support mother and child are adapted to the child's developmental age and aim to improve parenting skills and the quality of interactions (definition adapted from: (1)).
- Precede-Proceed Model: is a cost-benefit evaluation framework that can help health programme planners, policy-makers and other evaluators to analyse situations and design health programmes effectively. It provides a comprehensive framework for assessing health and quality of life needs, and designing, implementing and evaluating health promotion and other public health programmes to meet them.
- Participatory Action Research (PAR): gives communities a place in the production of knowledge and innovation, alongside researchers. This type of research concerns all scientific fields and all subjects, in a variety of forms. It helps to ensure that societal issues are taken into account.
- Mixed methods research: research design in which researchers collect and analyse quantitative and qualitative data within a single study to answer a research question.
- Recovery: This is a result and a process (2) in which individuals (e.g. caregivers of SAM children) and groups (e.g. a team of psychosocial stimulation workers) develop the control, access to resources and decision-making skills they need to influence their environment. (3). Empowerment involves psychological, social and structural elements, focusing on a sense of efficacy and social and systemic change in the conditions that limit the potential of individuals and groups. In this way, the notion of "power" refers to mastery (of knowledge, practices, etc.) and is therefore not linked to domination. (4).
- Interpretative repertoires (IR): These are discursive systems made up of different linguistic resources (e.g. metaphors, concepts, etc.), constructed and shared socially (e.g. within a team of health workers, within a community). Interpretative repertoires enable individuals to construct particular versions of reality. They are flexible and vary according to context.
- Othering: Othering is a concept that refers to identity processes that enable an individual or group to categorise, characterise and distance themselves from an object (e.g. a disease such as HIV). (5)) or another group that is different from their own. The function of alteration is to protect the endogroup ("us") and to distinguish it from an exogroup ("them"). For example, in the field of malnutrition, studies highlight the process of othering mothers of children with SAM in the discourse of members of a community (6) and in the press (7).
- Floating reading: the first stage of qualitative analysis, allowing the data to be read without the need for direct data processing and interpretation. (8).

Summary

In addition to the increased risk of illness and early death, children who recover from severe acute malnutrition (SAM) often face delays in their cognitive and physical development. In Mali, SAM represents a major challenge, increasing children's vulnerability to a range of illnesses, in a context marked by widespread food insecurity since 2010 and exacerbated by the socio-political crisis of 2012. Early psychosocial stimulation interventions for malnourished infants and young children have shown significant short- and long-term benefits for their cognitive and social development. With this in mind, Action Against Hunger (ACF) developed a five-session structured psychosocial stimulation intervention for children with SAM using its "Follow-Up of Severe Acute Malnourished children[1] " protocol. The intervention included sessions on communication and play, breastfeeding and feeding practices, massage, bathing, sleep and relaxation needs, as well as a session at the beginning and end for family sharing. In Mali, although psychosocial stimulation is recognised as an essential recommendation in the Protocole de Prise en Charge Intégrée de la Malnutrition Aiguë (Integrated Management Protocol for Acute Malnutrition) its integration into nutritional treatment appears to be hampered by constraints such as lack of time, resources or the absence of a standardised protocol describing the actions to be undertaken with primary caregivers.

The main objective of the StimNut study was to assess the feasibility and acceptability of integrating a psychosocial stimulation intervention, adapted from the FUSAM programme, into the Malian context of the Koutiala Therapeutic Feeding Programme (TFP), aimed at children aged between 6 and 23 months suffering from SAM. This mixed-methods study, combining qualitative and quantitative data, was conducted in two community health centres run by the Malian Ministry of Public Health and Social Development and supported by MSF-OCP in Koutiala (ComHC), as well as in the paediatric ward of the Koutiala referral hospital (MSF hospital). The specific objectives of the study included describing the factors influencing children's nutritional status and development, adapting the FUSAM protocol to the Koutiala context, piloting its integration into the therapeutic feeding programme, assessing its feasibility and acceptability, and measuring changes before and after the intervention, in terms of the knowledge and practices of the people providing care to the children (parents or guardians), and symptoms of maternal depression.

The study was conducted in three successive phases between July 2022 and May 2023:

- Phase 1 (July - August 2022): An initial exploratory phase aimed at gaining a better understanding of the context and the main factors determining malnutrition in the population studied, as well as the experiences and needs of

[1] Monitoring severely malnourished children, FUSAM

people consulting the ComHCs/hospitals. This phase is detailed in an *ad hoc* report: "Exploratory phase" (phase 1).

- Phase 2 (October-November 2022): Adaptation of the existing FUSAM intervention to the Koutiala context using a participatory action research (PAR) approach involving stakeholders concerned with the management of severe acute malnutrition (SAM) in young children in Koutiala. This phase is also detailed in a separate report: "Participatory adaptation phase" (phase 2).
- Phase 3 (February - May 2023): Implementation and evaluation of the feasibility and acceptability of the adapted intervention in three study sites (two community health centres and the paediatric ward of the Koutiala referral hospital).

A variety of methods were used to collect data, including semi-structured individual interviews, focus groups, in-depth interviews with key informants, workshops with committees and sub-committees, and direct observations of caregiver-child interactions (Figure 1). The data were analysed both qualitatively and quantitatively to meet the objectives of the study.

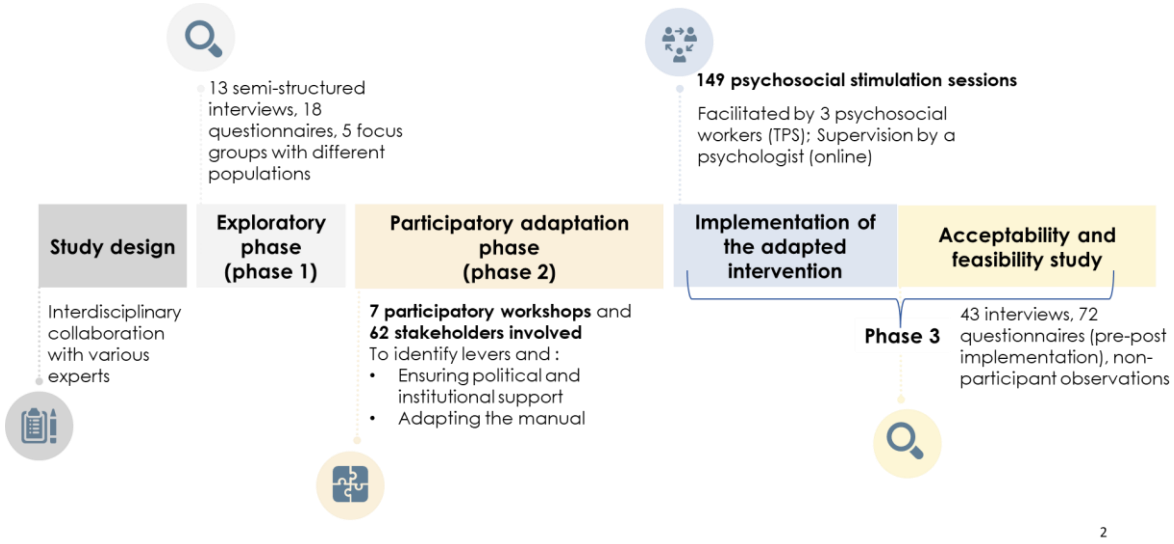

Figure 1Methodology and general organisation of StimNut

The main results of the exploratory phase showed that certain care practices in the FUSAM intervention were more common (e.g. feeding) than others (e.g. play) and that they varied from one family to another. In addition, although the FUSAM recommendations seemed to fit in with the value system of most of the families interviewed, a number of barriers to childcare were highlighted. For example, the overwork of mothers/primary caregivers, their heavy dependence on heads of household in the event of a child's illness, the high number of children per family, the lack of financial resources and knowledge, and the stigma attached by mothers to their child's malnutrition. The results of this first phase were used to adapt the intervention to the Koutiala context.

In the second phase of the study, the contextual adaptation of the FUSAM intervention, seven workshops were organised with participants from a variety of backgrounds, divided into three committees: 1) the advisory committee (administrative, political, health authorities, NGOs) provided institutional support for the project; 2) the extended committee (local decision-makers, parents of SAM children, health staff, project managers, co-investigators) led the organisation of the PAR; and 3) the restricted committee, a sub-group of the extended committee, worked on the adaptation of the intervention. The process, moderated by AMEDD and documented by Epicentre, used a variety of group exercises and followed scientific principles. Although suggestions were made, such as integrating local traditions into the care, no major changes to the content of the sessions were recommended. Suggestions were made to facilitate the implementation of the intervention, such as raising awareness among families, providing psychological support for mothers, strengthening human resources in health facilities and integrating the intervention into the care of SAM children. The participants expressed their support for rapid scaling-up if the results were positive.

During phase 3, the implementation of the adapted intervention, 149 psychosocial stimulation sessions were offered to 36 families by 3 psychosocial workers (PSW) trained by an independent psychologist specialising in the subject. Supervision sessions were offered to the PSWs every fortnight by the same person. Of the sessions carried out, 118 were individual sessions (79%) and 22 were group sessions (15%). 31 sessions took place in the hospital (21%) and 114 in one of the ComHCs (77%). The median duration of the sessions was 54 minutes [IQR: 40-64], ranging from 42 minutes for the first session to 58 minutes for the last. In total, a family member other than the caregivers was present for 28 sessions (19%), mainly the fathers of the families (18 sessions) and the grandmother (7 sessions). Measurements were taken before and after the intervention. Among the striking results, symptoms of perinatal depression were observed in 53% of mothers before the intervention and in 28% after the intervention ($p=0.001$). Positive changes in the mother-child relationship were observed in 83% of participants after the intervention, with caregivers responding more frequently and appropriately to the child's emotional state.

In terms of acceptability, according to the caregivers, StimNut met their two main expectations: To contribute to their children's recovery, and to involve fathers in caring for their children. The StimNut intervention played an important role in strengthening and building the emotional bonds between the caregivers and their children, the material, moral and emotional support provided by family members, and in establishing a relationship of trust with the PSW. In addition, the caregivers felt more competent and legitimate in making decisions and caring for their children. Within their own households, they helped to pass on the information, knowledge and parenting skills they had acquired or developed during the intervention (husbands/fathers, co-wives, sisters-in-law, neighbours, etc.). Some of them even helped other women in their household to adopt new care practices. StimNut was also deemed acceptable by the health staff as the intervention complemented and reinforced existing care services for SAM. In particular, the healthcare staff appreciated the structured

organisation of the StimNut sessions, the creation of dedicated spaces, the well-defined roles and functions, and the introduction of new activities and materials. In addition, the intervention helped to improve the relationship between the healthcare staff and the caregivers (rebuilding trust, deconstructing prejudices) and had positive effects on the activities carried out (e.g. reduction in consultation time, caregivers feeling calmer and better informed about the child's health). Finally, according to the psychosocial workers (PSW), the implementation of StimNut was also deemed acceptable. They noted changes in the behaviour of the caregivers and their children (improved mother-child relationships, improved child health, improved mental health of the caregivers) and, in some cases, a change in attitude on the part of other family members (e.g. involvement of certain fathers) and care staff (e.g. reduction of prejudices). The work of the PSWs was adapted to the specific context and fulfilled five main functions: supporting the children's development; providing emotional support for the caregivers; referring them to specialists and targeted services; and mediating between the caregivers and the nursing staff.

In conclusion, the StimNut intervention, which is currently being pursued in Koutiala, has had positive effects on the mental health of mothers of SAM children, the mother-child relationship, the involvement of fathers in care, and caregiver-child relationship. The study demonstrated feasible by integrating trained and supervised human resources into an existing nutrition service. The intervention was also deemed acceptable by families, health staff and psychosocial workers. Consistent with MSF's current "patient-centred care" initiatives, this intervention could have positive effects on emotional bonds, family support and the quality of childcare, and its replication should be encouraged in similar contexts as well as piloted in different contexts following the approach proposed in this study.

Phases	Measurement tool	Main result(s)	Unit measured
Phase 1	*Questionnaires for accompanying children SAM*	- Variable knowledge and practices in terms of breastfeeding and feeding (6 women surveyed (33%) replied that exclusive breastfeeding was recommended until the child was 6 months old; 16 (89%) felt that foods other than breast milk should be introduced two or three months after birth; and 11 of the 18 women (61%) had already given another liquid such as powdered milk before the child was 6 months old). - 16 caregivers (89%) wanted more information about breastfeeding and feeding their children. - Strong perception of mother-child interaction but more mixed attitude regarding the possibility of interacting while carrying out household activities (16 women (89%) answered that it was "very important" to interact with children from birth. Just over half the women replied that it was possible to interact with the children while doing other activities such as housework (n=10, 55%). - Work overload was the main barrier to mothers caring for their children. - Some FUSAM intervention practices, such as eating, seemed to be more widespread than others such as playing, and varied from family to family.	Attitudes and declared care practices.
	Discussion group for caregivers of non-SAM children	- Certain care practices in the FUSAM intervention were more widespread (e.g. feeding, hygiene) than others (e.g. showing affection, breastfeeding) and varied from case to case. - Childcare practices relating to feeding, playing, sleeping and bathing were mainly carried out by women, with little male participation. - Identification of a number of perceived barriers to childcare: women's overwork, mothers' heavy dependence on heads of household in the event of illness, large number of children to manage with little spacing between births, lack of financial resources and knowledge, precarious hygiene conditions. - Stigmatisation of mothers of SAM children, who are often perceived as "ignorant", "negligent" and "responsible" for their children's illness.	Collective beliefs and attitudes linked to childcare practices.
	Key informant interviews	- Stigmatisation of mothers of SAM children, perceived by some as ignorant, negligent and responsible for their children's illnesses - Women's overwork, lack of decision-making power and financial dependence were the main barriers to childcare. - The course of treatment initially focuses on traditional medicine and self-medication, followed by a consultation at the health centre if this fails. - Norms and beliefs relating to parenthood are often at odds with the childcare practices encouraged by FUSAM.	Beliefs and attitudes linked to childcare practices.

Phase 2	*Adaptation documentation*	- Suggestions and recommendations for improving the content of the FUSAM protocol. - Importance of stakeholder recognition and inclusion in implementation. - Ownership of the project by local players, a crucial factor for sustainability.	Collective dynamics.
Phase 3	*Documentation of the intervention*	- Gradual increase in the duration of psychosocial stimulation sessions from the first to the last session. - Mums confide less in the presence of fathers during sessions. - Continuation of the intervention after the study (maintenance of 2 PSW, supervision provided by ACF).	Implementation process.
	Questionnaire on care practices (before and after)	- 6 of the 36 mothers questioned reported suicidal thoughts in the last 2 weeks. - Positive effects of the intervention on caregivers' attitudes and perceptions of care practices. - Positive effects of the intervention on the care practices (games) of other family members (not present during the intervention). - Reduction in the number of accompanying mothers presenting high scores of "dusukasi", a local symptom of perinatal depression after the intervention. - There was no significant change in the caregivers' perception of social support before and after the intervention.	Beliefs & attitudes; self-reported care practices; symptoms of maternal depression; social support.
	Observations of caregiver-child interactions	- Significant improvement in the quality of the caregiver-child relationship after the intervention, particularly in the areas of affection, responsiveness and encouragement ($p < 0.0001$), and teaching ($p < 0.001$).	Behaviour and quality of interaction between caregiver and child.
	Session satisfaction questionnaire	- High level of participant satisfaction with the sessions, increasing as the intervention progressed.	Attitudes sessions.
	Semi-structured interviews with caregivers	- Improving self-perception and the role of mother. - Strengthening of the emotional bond between caregivers and children, increased material, moral and emotional support for family members, and creation of a relationship of trust with the PSW. - The caregivers see StimNut as an effective intervention, meeting two main expectations: their children's recovery and the involvement of other family members. - Passing on the information, knowledge acquired and parenting skills developed during the intervention to close family and friends (husbands/fathers, co-wives, sisters-in-law, neighbours, etc.).	Experiences, beliefs, attitudes and declared practices.

		- Some caregivers guide other women in the home in implementing new care practices.	
	Semi-structured interviews with healthcare staff	- StimNut has strengthened the services and management of the SAM, providing new concepts, activities and improved organisation within the healthcare structures, while strengthening the collaboration between caregivers and support staff. - The healthcare staff appreciated the structured organisation of the psychosocial stimulation sessions, and the fact that specific areas, defined roles, new activities and new materials were devoted to them. - Stimnut has helped to shed new light on malnutrition, both for families and for the community. - Improving the relationship between care staff and caregivers: rebuilding bonds of trust and deconstructing prejudices. - Acquisition of new knowledge in psychosocial stimulation. - StimNut is seen as useful and effective, responding to existing challenges and difficulties within the community and healthcare structures.	
	In-depth interviews PSW	- At the start of the intervention, the PSW had to deal with negative attitudes from the caregivers (fear, lack of time, mistrust, feelings of guilt), and sometimes difficulties with the children (not very receptive and sociable), as well as distrustful and devaluing comments from certain health staff. - Supervision, support from the coordination team and team communication were invaluable in overcoming these initial difficulties. - From the second and third sessions onwards, the PSW observed changes in the attitudes of the caregivers and the children, gradually gaining their confidence. - Deconstructing PSW prejudice against mothers of children with SAM. - Identification of the 5 roles of the PSW: support for children's development; emotional support for caregivers; referral to specialists and targeted services; and mediation between caregivers and care staff. - Change in attitude towards children and greater involvement of some fathers; change in attitudes among some health workers	Experiences, beliefs and attitudes.

1 Introduction

1.1 Context

According to the World Health Organisation (WHO), worldwide in 2020, an estimated 149 million children under the age of 5 were stunted (too small for their age), 45 million were acutely malnourished and malnutrition was the underlying cause of 3.1 million child deaths. Around 45% of deaths in children under 5 were attributable to nutrition-related factors (9). Malnourished children, particularly those suffering from severe acute malnutrition (SAM), are at increased risk of death from common childhood illnesses such as diarrhoea, pneumonia and malaria. The main underlying causes of SAM in children are related to the environmental conditions that families face, such as limited access to food and water, as well as the prevalence of certain infectious diseases (10). However, factors such as the family socio-cultural context and the parent-child relationship are also considered to be additional risk factors for the development of severe forms of malnutrition. Finally, SAM itself has negative repercussions on the child's health and development, as well as on the quality of the parent-child relationship, making the treatment process and the sustainability of recovery more complex. Malnutrition and poor psychosocial stimulation are two known crucial factors in the deterioration of children's growth and development (11).

Food insecurity and hunger are extremely widespread in Mali. In 2018, according to the Demographic and Health Survey (DHS), an estimated 4.1 million Malians were food insecure and 795,000 faced serious food difficulties. (12). Again according to the DHS, only 9% of children aged 6-23 months had received a minimum acceptable food intake, 22% had achieved minimum dietary diversity and 30% minimum meal frequency. According to data from the retrospective anthropometric and mortality nutrition survey conducted in Mali in December 2021, the national prevalence of global acute malnutrition was 10.0% [9.1-10.7 95% CI] and that of severe acute malnutrition was 1.8% [1.5-2.2 95% CI] (5). The cross-sectional study of health indicators for children under 5 conducted by MSF and Epicentre in 2021 and 2022 in the Koutiala health district revealed prevalences of global, moderate and severe acute malnutrition of 11.5%, 9.5% and 2.6% respectively (13).

In order to reduce infant morbidity and mortality, MSF has been working in Koutiala since 2009, with Mali's Ministry of Public Health and Social Development, to strengthen preventive and curative care throughout the district. The main objectives of the MSF project in Koutiala are to help reduce mortality among children under the age of 5 by providing preventive and curative medical and nutritional care. MSF's nutrition activities in the district are carried out both in the paediatric wards of Koutiala hospital and in the health centres (ComHCs) run by Mali's Ministry of Public Health and Social Development (ComHCs). MSF-OCP is supporting 36 rural and 3 urban health structures in Koutiala through a programme to decentralise care during the high malaria transmission period (July - December). In 2019, a total of 165,000

outpatient consultations were carried out (most common pathologies: malaria (54%), respiratory infections (27%), diarrhoea (8%) and skin infections (4%)).

1.2 Justification

The period from pregnancy to the age of three is well established as the most crucial time in a child's development (14). It is during this period that the brain develops most rapidly. By the time a child reaches the age of three, a considerable number of neuronal connections have already been formed in response to interactions between the child and his or her environment. These neuronal connections are impacted by important external or developmental factors such as nutritional status. They are also critically affected by interactions between the child and its primary caregivers. It has been shown that the combination of these various factors in early childhood form the basis of physical health and emotional well-being into adulthood (15,16). Although children who recover from SAM are at increased risk of illness, early mortality and impaired cognitive and emotional development, studies show that early psychosocial stimulation of disadvantaged infants and young children can have beneficial short- and long-term effects on cognitive and social development (15,17,18). There is a critical relationship between nutritional status and psychological development, and the value of combining interventions that improve early childhood development with those that improve children's health and nutritional status in an integrated model of care has received increasing attention in recent years (19,20).

The Protocol for Integrated Management of Acute Malnutrition in Mali includes psychosocial support among its recommendations (21). In fact, it is recommended that psycho-cognitive stimulation should begin after the acute phase, during the rehabilitation of nutritional status. This psychosocial stimulation should make it possible to increase the likelihood that: "Mothers are encouraged not to punish or give orders; health workers are encouraged to teach mothers to make toys themselves and to organise educational sessions to teach mothers the importance of play and discovery in the psychosocial and physical stimulation that the child needs". It is stipulated that this should be an integral part of the treatment. However, in practice, it seems that this is not always integrated into nutritional treatment, in particular due to a lack of time, resources or a standardised protocol describing the actions to be implemented with the primary caregivers and their children. Furthermore, understanding the social and interpersonal variables specific to each context and addressing some of the risk factors associated with stimulation can have a beneficial impact on nutritional outcomes and encourage positive child development.

In this context, ACF developed a five-session structured psychosocial stimulation intervention for children with SAM in the Follow-Up of Severe Acute Malnourished children (FUSAM) protocol. Between 2014 and 2017, the FUSAM research project was implemented in Nepal to evaluate the effectiveness of a brief psychosocial intervention on child nutrition, health and development by comparing the effect of a combined nutritional and psychosocial intervention (STIMNUT) with a stand-alone nutritional treatment intervention for children with

uncomplicated SAM aged 6-23 months admitted to the Community Management of Acute Malnutrition (CMAAM) programme in Saptari district (22,23). The psychosocial intervention consisted of 5 discussion sessions with the parents on communication and play; breastfeeding and feeding practices; massage, bathing, sleeping and relaxation needs; and a family sharing session. The aim of this study was to adapt this intervention to the Koutiala context and to measure its feasibility and acceptability.

2 Objectives

2.1 General objective

The aim of the STIMNUT study was to assess the feasibility and acceptability of integrating a psychosocial stimulation intervention into the Koutiala therapeutic nutrition programme for children aged 6 to 23 months with SAM.

2.2 Specific objectives

The specific objectives were as follows:

- Objective 1: To describe the key factors, perceptions, norms and practices influencing children's nutritional status and early development among caregivers of children with SAM, caregivers of children without SAM and other key informants;

- Objective 2. To adapt the FUSAM protocol for application in the context of the Koutiala therapeutic feeding programme, using a participatory action research (PAR) approach and involving both health staff involved in the care of SAM children in Inpatient Therapeutic Feeding Centre (ITFC) and certain key informants;

- Objective 3: To manage the integration of the version adapted to the FUSAM context into the care provided in the Koutiala Therapeutic Feeding Programme (TFP) and to evaluate the process of the version adapted to the FUSAM context;

- Objective 4: To measure the acceptability and feasibility of the version adapted to the FUSAM context through qualitative and quantitative measurements using a mixed methods approach;

- Objective 5: To assess changes in the knowledge and childcare practices of primary caregivers, mothers' symptoms of depression and preliminary nutritional indicators routinely collected before and after the intervention.

3 Method

3.1 Type of study

This is an action research project using mixed research methods, including the collection and analysis of quantitative and qualitative data. An adaptation of the "PRECEDE-PROCEED" model (24) was used as the conceptual framework for adapting, implementing and evaluating the intervention. This model, developed for use in public health, provides a framework for the process of designing, planning, implementing and evaluating a community intervention.

As shown in Figure 2the study was carried out in 3 successive stages to meet the various objectives:

-Phase 1: An exploratory phase

-Phase 2: Participatory adaptation of the intervention to the context

-Phase 3: Implementing and evaluating the appropriate intervention

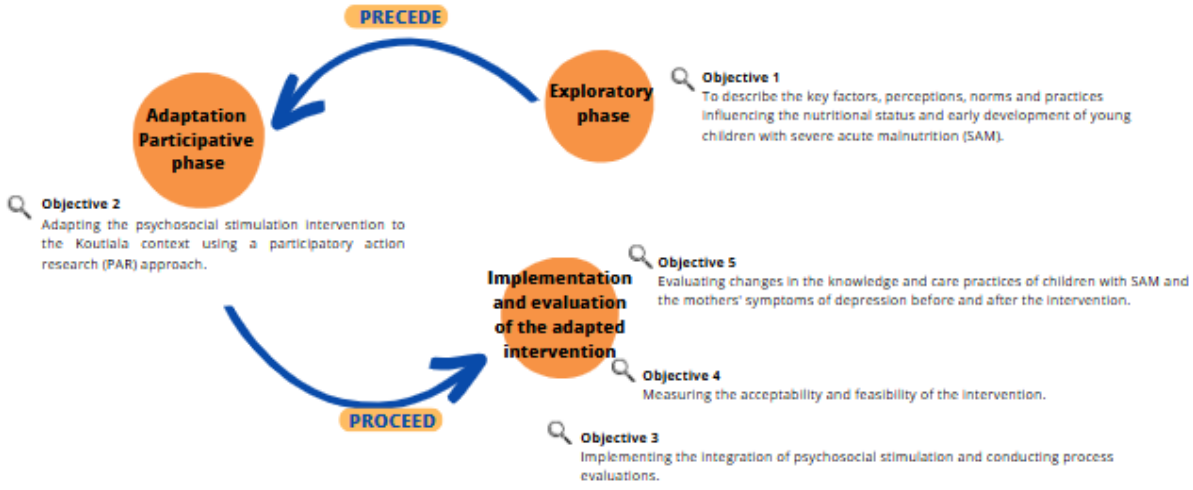

Figure 2 Different phases of the study and associated objectives

3.2 Preparation of the study

During the preparation of phase 1, two methodological workshops were organised by the study's scientific committee in order to adapt the tools to the Malian context and ensure their appropriation by the local partner responsible for data collection (AMEDD). Visits to the study sites (MSF paediatric unit at Koutiala hospital, M'pessoba ComHC and Oula ComHC) were organised in May 2022, to meet the various managers and local authorities at the study sites, and to provide information about the study. Finally, the district nutrition officers and certain partners involved in malnutrition in Koutiala (UNICEF, World Vision, WFP) were also met.

For phase 2, the technical team met to form committees, with the support of the District Medical Officer, who provided guidance by referring to the platforms for combating malnutrition. A meeting was held in the presence of the local authorities and local co-investigators (the Prefect of Koutiala, his first deputy, the Chairman of the Council, the District Medical Officer, the District Nutrition Officer, the MSF Koutiala project manager and the representative of the NGO AMEDD). The aim was to present the study and validate the composition of the various committees involved.

For phase 3, the three psychosocial workers recruited underwent a five-day training course with a development psychologist who had trained the teams during the FUSAM research project in Nepal (programme in Annex 2 of the appendices report). This training was also given to three staff in each ComHC: the technical director or his deputy, the nutrition officer and a midwife. At the hospital, nine staff took part: three health promoters, two doctors, two nurses and two nursing assistants. An induction week was organised for the psychosocial workers, during which they familiarised themselves with the study tools. Finally, an activity launch ceremony was held in the two rural study sites, attended by community leaders, health workers and mayors. The aim was to inform them and ensure their commitment to the study process (this was one of the recommendations from phase 2).

3.3 Study population

3.3.1 Psychosocial stimulation sessions

The study population consisted of children aged 6 to 23 months followed up under the TFP programme in 2 ComHCs supported by MSF-OCP in Koutiala and at the MSF hospital, as well as their main caregivers.

3.3.1.1 Inclusion criteria

- Child's age from 6 to 23 months
- Children treated for SAM in one of the study sites: Transition phase (in hospital) or rehabilitation phase (in ComHCs)
- Companion (Parent or main caregiver) ≥16 years old

3.3.1.2 Non-inclusion criteria

- Child's age <6 months or ≥ 24 months
- Children only accompanied by a person aged <16 or incapable of giving consent
- Moderate acute malnutrition
- Serious illnesses, chronic conditions, clinically apparent abnormalities, obvious disabilities and sensory impairments
- Cases of relapse
- From a health area with volatile security (4 ComHC Sougoumba, MOLOBALA, TIERE and SANGUELA)

3.3.1.3 Exclusion criteria (study discontinuation)

- Death of the child or the parent or accompanying person (the person who gave permission to take part) during the study
- The family moved to another district

3.3.1.4 Identification of participants

All participants in the study were recruited from the study sites that met the inclusion criteria. They were all at least 18 years old and consented to their participation by signing a handwritten consent form, one copy of which was given to the participant and the other retained by the study site coordinator.

3.3.2 The acceptability study

The acceptability study sample consisted of 3 groups:

- 30 main caregivers took part in the psychosocial stimulation sessions (28 mothers and 2 grandmothers);
- 9 health workers attached to the hospital and community health centres (including 1 doctor, 1 technical director, 2 nutrition officers, 1 nutrition supervisor, 1 senior nurse, 3 promoters/educators);
- The 3 psychosocial workers

3.3.2.1 Identification of participants

The main caregivers invited to take part in the interview were those who had completed the five psychosocial stimulation sessions. In addition, the health workers were recruited on the basis of a reasoned choice in order to achieve a plurality of roles and expertise related to the management of SAM in children. Finally, the PSWs were each invited to take part in an individual interview to review their experiences.

3.4 Data collection

3.4.1 Phase 1. Exploratory phase

The first phase of the study combined qualitative and quantitative methods to analyse and document the perceptions, norms and practices influencing the care given to children suffering from severe acute malnutrition and the children's development process.

In addition, the aim of this first phase was to provide information on the barriers and levers to be taken into account in the process of adapting the FUSAM intervention. The results of phase 1 provided additional food for thought and arguments for the collaborative work carried out in phase 2 (PAR). The tools used for phase 1 are given in the appendix to report 1.

The data was collected via:

- Mixed questionnaires with caregivers of children with SAM exploring: The socio-demographic characteristics of the family and the child's nutritional status; practices, knowledge and perceptions of pregnancy and early childhood; practices, knowledge and perceptions of breastfeeding and nutrition (including perceptions of malnutrition); practices, knowledge and perceptions of the main themes of the FUSAM sessions (communication, bedtime, play, sleep, etc.).

Focus groups with primary caregivers (parents) of children not affected by SAM to explore: Community practices, norms and values concerning the care of young children within families (perception, organisation, support); socio-cultural factors that can affect health, nutrition and psychosocial development; knowledge and beliefs about malnutrition held within the Koutiala community.

Semi-structured one-to-one interviews with key informants exploring health and social issues affecting the community and young children in particular: Community practices, norms and values regarding the care of young children within families and barriers to care for children; recommendations regarding determinants that may lead to nutritional status disorders in children.

All the interviews and focus groups were conducted in the local language (Bambara) by a researcher trained in qualitative data collection methods, assisted by a qualified observer.

3.4.2 Phase 2. Adapting the intervention to the Koutiala context

The adaptation of the FUSAM protocol was carried out using a participatory action research (PAR) approach that involved the stakeholders concerned with the management of the SAM for young children in Koutiala. PAR is a type of collective, self-reflexive research that enables research activities to be initiated, designed, conducted, analysed and acted upon. It is collaborative, and draws on the strengths, expertise, skills and resources of all the participants, including the researchers' theoretical knowledge, to lead to concrete action, change or improvement in the subject of the research. (25,26). In the StimNut study, the aim of this adaptation was to develop an intervention that was feasible, relevant and culturally appropriate.

The PAR consisted of a series of seven workshops conducted between October and December 2022, involving both face-to-face and online participants. All workshops were moderated by our partner AMEDD, as an independent party, and documented by Epicentre. The participants, who all gave their informed consent in writing, were brought together in three types of committee. The advisory committee, made up of six representatives of

administrative, political and health authorities and non-governmental organisations, including MSF, ensured the political and institutional support of the StimNut project. The enlarged committee included around forty participants, including local authorities and decision-makers, members of technical services and departments, health project managers, health staff involved in the care and management of SAM children, including MSF staff currently in charge of SAM children in the ComHCs/hospitals selected for the study, caregivers of SAM children, key informants from the community, and the study co-investigators. Finally, the select committee brought together 12 representatives of all these stakeholders, who were nominated by their peers on the extended committee.

Two workshops were organised with the advisory and extended committees, to present and discuss the StimNut study and the FUSAM Nepal experience, to disseminate the results of the initial assessment and to present the aim, principles and challenges of the PAR approach. It was suggested that a select committee with a limited number of participants should be set up for its implementation, and this was accepted. Work on adapting the intervention was therefore carried out with the select committee during the following four workshops. The first two focused on the organisation of PAR for the adaptation of the FUSAM intervention, and all aspects and modalities of the research linked to the planning of activities, the actions to be undertaken, the reflection on the actions and their evaluation were also decided in collaboration around key questions, adapted from a practical PAR guide (27). Members of the select committee were invited to reflect critically on current perceptions, representations and management practices of SAM and encouraged to make practical recommendations on how FUSAM should be adapted. The final two workshops focused on the actual adaptation of the FUSAM protocol, session by session. The process was rooted in the principles and practices of scientific research, and made use of a variety of exercises and activities derived from learning techniques, and practised individually, in sub-groups or collectively. The committee members were also invited to submit an anonymous written evaluation of the organisation, process and results of the PAR. These, essentially the recommendations for adapting the FUSAM intervention, were presented to the advisory and extended committees at the last workshop for review, revision and validation. At this workshop, the characteristics and requirements for implementing the adapted protocol were discussed in order to secure the commitment and ownership of the intervention by stakeholders.

3.4.3 Phase 3. Implementation of the intervention adapted to the context

3.4.3.1 Documentation of the intervention

The following data were collected during the intervention: duration of the training provided, materials used during the training and for the sessions, organisation of the health facility (participant management, human resources and physical space) to host the intervention, number of sessions delivered per day, median time per session, number and types of participants per session (overall and by type of follow-up: outpatient vs. inpatient). These data

were collected through direct observations during sessions by the study coordinator and by the PSW using a diary of entries.

All the tools used for data collection in phase 3 are presented in Appendices 3 and 17 of the Appendices to the study report.

3.4.3.2 Measuring changes before/after intervention in terms of childcare practices and maternal mental health

Care practices

The caregivers taking part in the intervention completed a questionnaire before the first session and at the end of the last (Appendices 6 and 7) covering the following topics:

- Before the intervention: the child's life (number of children in the mother's care, place of the child in the siblings, low birth weight, breastfeeding and feeding), knowledge and perceptions of child care practices, socio-demographic data on the parents and the family, symptoms of depressive or anxiety disorders in the mother, multidimensional perception of support perceived by the mother.
- After the intervention: knowledge, perceptions and care practices of the child, maternal mental health and multidimensional support perceived by the mother.

The "Dusukasi" scale, a tool for measuring “dusukasi”, a local perinatal depression like syndrome , was used to identify caregivers with high scores (28). This tool, based on the adaptation of two instruments, the Edinburgh Postnatal Depression Scale (EPDS) (29) and the Hopkins Symptom Checklist (HSCL-25) (30) was accurately translated and validated in Bambara, one of the local languages (31,32). Each mother was asked to answer 16 different questions relating to the last 15 days, using a frequency scale (often, sometimes, rarely or not at all): "*In the last two weeks, how often have you felt...*". The following scores were then assigned to each response: 3 for often, 2 for sometimes, 1 for rarely and 0 for not at all, with an average total score then calculated for each participant. The difference between the mean scores before and after the intervention was then calculated for each woman, and compared with the threshold value of 1.03, representing the limit beyond which the presence (score ≥1.03) or absence (score<1.03) of perinatal depression syndrome could be considered.

Perceived social support was measured using the Multidimensional Scale of Perceived Social Support (33) which measures an individual's perceived level of social support from family, friends, relatives and a significant other (partner). Each caregiver was asked to respond to 12 different statements using a 7-category response scale (Very strongly disagree, Strongly disagree, Slightly disagree, Neutral, Slightly agree, Agree, Strongly agree). The average score for each statement was then calculated and the scores ranked as follows: any average score between 1 and 2.9 was considered as low support; a score of 3 to 5 as moderate support and a score of 5.1 to 7 as high support.

3.4.3.3 Measuring the quality of caregiver-child interactions through observation

As proposed and described in the FUSAM protocol, two sessions of interactions between the caregivers and the children were observed, noted and analysed before and after the intervention in order to measure the evolution and effect of participation in the sessions on the quality of the mother-child relationship. The observations consisted of free play sessions lasting about 20 minutes that took place in the 2 ComHCs and the hospital where the study was implemented. Two independent observers, employed by AMEDD and trained at methodological workshops run by Epicentre, recorded the interactions using the observation checklist linked to the results of the PICCOLO (Parenting Interactions with Children: Checklist of Observations (34). This includes interactions in four areas: affection, responsiveness, encouragement and teaching (34). The observations by domain are presented in Table 1 and the complete tool can be found in Appendix 10 of the annexes to the report. If necessary (for example, if the child was asleep during the observation), the observation was repeated to take better account of the child's condition.

Table 1 Domains of the PICCOLO grid

	Domains			
Comments	*Affection*	*Reactivity*	*Encouragement*	*Teaching*
1.	Speaks in a warm tone	Pays attention to what the child is doing	Waits for the child to respond after making a suggestion	Explains the reasons for an action to the child
2.	Smiles at the child	Changes pace or activity to meet the child's interests or needs	Encourages child to handle toys	Suggests activities to extend what the child is doing
3.	Congratulates the child	Demonstrates flexibility when the child changes activity or interest	Helps child make choices	Repeats or expands words
4.	Is physically close to the child	Follows what the child is trying to do	Helps child to do things for themselves	Indicates objects or actions to the child
5.	Uses positive expressions	Reacts to the child's emotions	Verbally encourages the child's efforts	Role-plays with the child

6.	Participates in interaction with the child	Looks at the child when he talks or makes sounds	Offers suggestions to help the child	Carry out activities in a multi-step sequence
7.	Expresses emotional warmth to the child	Responds to the child's sounds or words	Shows enthusiasm for what the child is doing	Talk to the child about the characteristics of the objects
8.				Asking the child for information

Notes were collected for each observation to help the observer make an accurate assessment. Once the scoring was complete, the two observers discussed the results without changing the score assigned. The scores for each observation were then added together to obtain a score per domain, and the scores per domain were then added together to obtain a total PICCOLO score. The observations were non-participatory, with no interaction with the participants. In addition, during the training, the observers learned how to put the parents and children at ease, and how to be as discreet as possible during the sessions to minimise the Hawthorne effect(35), which could occur if the participant behaved differently knowing that he or she was being observed.

Field notes

Field notes on the caregiver-child interactions after the PICCOLO rating were collected and written in French by the two observers, then analysed thematically by Epicentre. Field notes are an important part of qualitative research. In particular, they are used to enrich the data and provide the context for the study (36,37). In fact, analysis of the context can help to understand how, why and for whom an intervention is beneficial or not (38). The definition of context is in fact "the combination of factors accompanying the implementation and evaluation of an intervention and likely to influence its results [...]. It includes the entire environment in which the project takes place" (39).

The thematic analysis comprises six stages, including familiarisation with the data, coding, generation of initial themes, examination of the themes, definition and renaming of the themes, and drafting. (40). As a conceptual framework for analysing the field notes, we used an adapted version of Barnard's model (41) to explain the interaction between the caregivers and the children during the observations, and to define the different contextual situations that contributed to the changes in behaviour.

3.4.3.4 Satisfaction measurement after each session

At the end of each psychosocial stimulation session, the PSW collected a quantitative evaluation of the session based on the participant's experience (Appendix 9). The first part was a simple tool for overall measurement of the session and energy levels after the session (using graphical scales). Scores were then calculated, with higher scores indicating greater

satisfaction. In addition, participants were asked a number of open-ended questions about what they had learned from the session, what they liked about it and what they would like to improve for the next session.

3.4.4 Phase 3. Evaluation of post-intervention acceptability

3.4.4.1 Acceptability measures

The acceptability study was carried out using semi-structured interviews with caregivers (Appendix 14) and health workers (Appendix 15) and in-depth interviews with PSWs (Appendix 16).

The interview guides were based on the acceptability model developed by Sekhon *et* al. (42) with the aim of assessing overall acceptance of the psychosocial intervention, its content and the way it is delivered. The interview guide for the caregivers consisted of 25 questions relating to the past (experience before and during StimNut), present (after StimNut) and future (imagining a fictitious scenario). In addition, in order to gain a better understanding of the perception of certain parenting skills (nutrition, communication and play), the interview guide for the caregivers included a Likert scale[1] (scale ranging from 1 = strongly disagree to 4 = strongly agree). To make it easier to understand the response methods, the figures were illustrated by glasses (filled to varying degrees) representing the level of confidence in different care practices. The semi-structured interview guide for key informants consisted of 16 questions on perceptions of the StimNut intervention and areas for improvement. Finally, the in-depth interview guide for PSWs contained 28 questions relating to the following themes: professional activity before StimNut, perceptions of StimNut, feedback, evaluation of each session and areas for improvement.

A team of local interviewers carried out the interviews with the health workers and caregivers, after attending a methodology workshop. These interviews were conducted in private rooms at the health facilities. On the other hand, the PSW interviews were conducted online by a researcher associated with the study. To note that some interviews were conducted in French (with the PSW and health workers interviews) and others in the local language (in particular with the caregivercaregivers) and then translated into French. All the interviews were recorded and transcribed. All participants received an information sheet and signed a consent form to carry out the interview and be recorded.

3.4.4.2 Measures in the event of abandonment

A short interview was conducted with the caregivers who had dropped out of the intervention. The purpose of the interview guide was to gain a better understanding of the participants' experiences, attitudes towards the intervention, and the barriers or obstacles that might have prevented them from continuing. In addition, the aim of the interview was to gather

recommendations for improving and adapting the programme to participants' needs (Appendix 17).

3.5 Data analysis

The data was analysed by the authors of this report.

3.5.1 Quantitative data

Quantitative data were analysed using Stata software (Stata Corporation, College Station, Texas, USA) (43). Simple unadjusted statistics were calculated to describe the characteristics of the sample, care practices and measures of maternal mental health.

Changes in perceptions, childcare practices, maternal mental health and the quality of mother-child interaction were assessed using the Wilcoxon test. This is a non-parametric statistical test applied to paired data, meaning that there are two measurements taken on the same set of subjects. The test assesses whether the distribution of differences between paired observations is symmetrically centred around zero. The difference between the measurements before and after the intervention is considered significant if the p-value is less than 0.05.

To measure the quality of the interaction between caregivers and children, inter-observer reliability was calculated for observations 'before' and 'after' the intervention. The aim was to statistically measure the homogeneity of the scores given by the two observers for the same observation, in other words, to quantitatively measure their degree of consensus. To do this, a Bayesian model was used to estimate Cohen's Kappa, a statistical measure used to assess the level of agreement between two raters. The model was implemented using the programming language Stan (44).

3.5.2 Qualitative data

3.5.2.1 Free questions in quantitative questionnaires

For the content analysis of the free-form questions in the quantitative questionnaires, the following categories were used, reflecting the themes of the sessions and, more generally, the themes of psychosocial intervention (the well-being of the child and the mother and emotional interactions/bonds):

For care practices :

1. Food: meals; eating; naming foods; breastfeeding; mealtimes
2. Play and communication: game; toy; play; laughter
3 Bathing and massage: bathing; massage; sleep; washing
4 Carrying on the back ;
5. Others: dressing; rocking; putting to sleep; medication

For session satisfaction forms :

1. Food: meals; eating; naming foods; breastfeeding; mealtimes
2 Games and communication: games; toys; playing; communicating;
3 Bathing and massage: bathing; massage; sleeping; sleep; grooming; maintenance
4. others: family; children's health; caring; childcare
5. well-being and development of the child: happy develops soothes relaxes content; intelligent; develops the mind; active
6. mother's well-being: soothing; mother's role; relaxation
7. interactions/affective ties: affective ties; interactions

The results are presented in terms of changes in responses per question and per category for each session.

3.5.2.2 Acceptability interviews

The analysis of the semi-structured and in-depth interviews combined an inductive approach, guided by the acceptability model of Sekhon et al. (42) and a deductive approach, through the analysis of critical discursive psychology (45)[2].

Analyses were carried out using Atlas.ti (46) and were carried out in several stages. Firstly, floating readings were used to identify the main themes structuring each interview. Then, through comparisons of the different observations and indicators, we focused on analysing the content and dynamics (e.g. temporal "before-after" and interpersonal comparisons (e.g. them, me, us), the meanings given to the intervention, the manifestation (explicit or latent) of related affective attitudes, etc.). In this way, a list of codes was developed to provide us with information on different discourse characteristics (e.g. positions, interpretative repertoires). Finally, we mobilised the various components of acceptability of healthcare interventions proposed by Sekhon (42) in order to restructure and redefine the codes more precisely. In addition, the results of the Likert scale used in the interviews with the caregivers were calculated from the average of the responses.

3.6 Ethical authorisations

3.6.1 Ethics committee authorisation

Ethical approval was granted by the MSF Ethics Review Board (Protocol ID: 2201) and the National Ethics Committee for Health and Life Sciences (CNESS) in Bamako, Mali (Protocol ID: 2022097). All approvals are provided in Appendix 19.

3.6.2 Ethical conduct during the study

[2] For more details, see the box in appendix 18.

The study was conducted in accordance with the ethical principles set out in the Declaration of Helsinki and complied with the Good Clinical Practices (GCP) of the International Council for Harmonisation of Technical Requirements for Pharmaceuticals for Human Use (ICH), including the archiving of essential documents.

3.6.3 Information and consent of participants

Each participant provided written informed consent to take part in the study (Appendix 19). Participants were assured of the confidentiality of the answers they gave, and that they were free to stop at any time or to refuse to answer certain questions. Staff were trained in the ethical principles of research. Interviewers were able to refer participants to MSF's counselling services if necessary.

All data obtained through questionnaires or interviews were anonymised using a study identifier, without including personal identifiers such as names.

4 Results for phases 1 and 2

4.1 Phase 1 results

The main results of the quantitative and qualitative analyses show that certain care practices in the FUSAM intervention are more widespread (e.g. feeding) than others (e.g. play) and that they vary according to the family or situation. In addition, although the recommendations of the FUSAM intervention seem to fit in with the families' value system, a number of barriers to childcare have been identified (e.g. mothers' overwork, heavy dependence on heads of household in the event of child illness, large number of children per family, lack of financial resources and knowledge, stigmatisation of mothers of SAM children).

The results of this first phase were used to inform the adaptation of the intervention to the Koutiala context, identifying practices, norms, knowledge about caring for children with SAM, and the main barriers. For more details, please refer to the phase 1 report (see preamble).

4.2 Phase 2 results

Overall the StimNut PAR achieved its objectives. The members of the select committee identified a number of structural challenges, affecting access to and availability of healthcare services, and socio-cultural challenges relating to the family and social context of mothers of SAM children (the main caregivers in the community), in particular their work overload and lack of decision-making power regarding their child's health and the lack of involvement of fathers. Nevertheless, they also stressed that levers were already in place to capitalise on the implementation of adapted psychosocial intervention, as it was aligned with national guidelines. In addition, it was consistent with current child care and nutrition practices, and could make the most of community nutrition-related activities already in place. The committee's recommendations therefore aimed to capitalise on these elements, address the

barriers and propose adaptations that met three essential criteria: they had to be rooted in the psychosocial field, be considered important/relevant in terms of public health, and be easy to implement, realistic, feasible and acceptable.

Apart from a few suggested elements, such as the use of local customs and ancestral childcare traditions, no major changes to the content of the sessions were recommended, but a number of proposals were made to create favourable family, social, health and institutional conditions for implementing the intervention. These included a community-based approach to sensitise members of the community, and in particular heads of family and other decision-makers in the household, to support and help mothers or caregivers, capacity-building for health facilities in terms of trained human resources, dedicated space and equipment, offering the intervention free of charge in group or individual form within these facilities, and integrating it into existing care for SAM children to facilitate referrals. During the presentation of the adapted intervention to the enlarged committee, these recommendations were discussed, revised and validated, and the priority elements for its implementation were clarified. All the participants undertook to support and promote the intervention and expressed their wish to see it rapidly scaled up in the district at the end of phase 3 if the results were conclusive. Finally, the organisation, process and results of the StimNut PAR were evaluated positively by a large majority of participants, particularly in terms of moderation, participation by all, collaboration between members, feedback and the objectives achieved. For more details on phase 2, please refer to the phase 2 report (see preamble).

5 Phase 3 results

5.1 Phase 3 results: implementation

5.1.1 Inclusions

Phase 3 of the study ran from 6 February to 29 May 2023. Of the 47 eligible families, 40 were included in the study, 17 in hospital and 23 in one of the two health centres. During the intervention, 1 child died and benefited from a single session at the hospital, 2 families dropped out during the intervention and one family was "lost to follow-up". 36 families continued the intervention in its entirety (Figure 3). The results presented in this section concern these families.

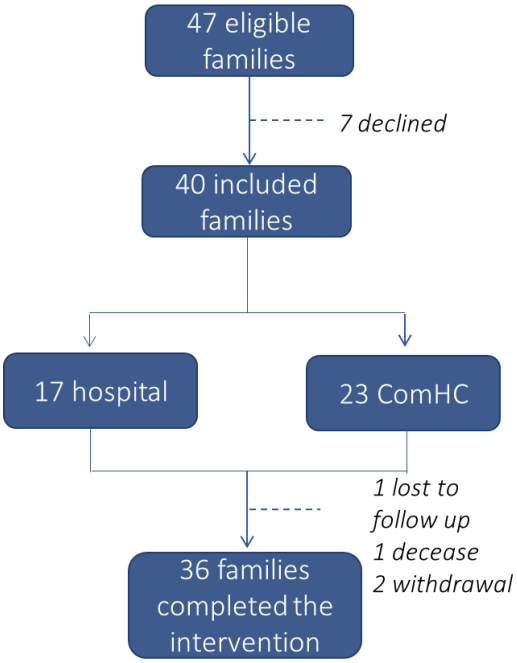

Figure 3 Inclusion of families in phase 3 of the study

5.1.2 Description of the population

The socio-demographic description of the families included and who completed the intervention is given in Table 2. Of the 36 families, 14 (39%) were included while accompanying a child to hospital, the others were recruited from one of the two study COMHCs (61%). The accompanying persons were the children's mothers, except in two cases where it was the grandmother.

The children who took part in the intervention (22 girls and 14 boys) were on average 12 months old. Around 2/3 were born with a low birth weight (as perceived by their main caregiver). The average age of mothers was 28 (IQR 22-30). Most of the caregivers declared themselves illiterate (81%) and 6 had attained primary education (17%). Of the 34 mothers taking part, 22 said they had an income-generating activity (64%), all within their villages.

The accompanying women had a median of 4 dependent children (maximum value: 13). With regard to the fathers' level of education, 19 were illiterate (53%) and 16 had achieved primary education (45%). Most of the fathers had an income-generating activity (n=31, 86%), most often in their village. "Farming and animal husbandry were the most common household activities (n=28, 78%), followed by commerce (n=6, 17%). 67% of the main caregivers considered themselves to be 'moderately poor' and 25% 'poor'.

Table 2 Description of the study population

Socio-demographic data
Inclusion site (n, %)

hospital	14, 39%
OTP	22, 61%
Gender of child (n, %)	
Girl	22, 61%
Median age of child in months n[IQR]	
Girl	12 [9,14]
Boy	12 [10,12]
Number of dependent children of principal accompanying person	
Median n[IQR]	4 [2,5-6]
Min, max values (n)	1, 13
Median age of mothers in years n[IQR]	28 [22, 30]
Education level of main caregiver	
Illiterate	29, 81%
Primary	6, 17%
Secondary	1, 3%
Father's level of education (n, %)	
Illiterate	19, 53%
Primary	16, 45%
Secondary	1, 3%
Household income (n, %)	
Mother	22, 64%
Father	31, 86%
Mother's place of work (n, %)	
Same village	22, 100%
Father's place of work (n, %)	
Same village	25, 80%
Another village	2, 7%
This district	1, 3%
Other district	3, 10%
Household income-generating activities (n, %)	
Agriculture	28, 78%
Breeding	4, 11%
Self-employed or business owner (small business, driver, etc.)	6, 17%
Salaried employment	1, 3%
Other source of income	4, 11%
Social category perceived by the main caregiver	
Not poor / Sorotigi	0
Moderately poor / don kafisa	24, 67%
Poor / Fan tan	9, 25%
Poor Absolute / fan tan yèrè yèrè	3, 8%

Medical data	
Children with low birth weight (n, %)	
Girl	15, 68%
Boy	9, 64%
Current breastfeeding (n,%)	28, 78%
If no,	
Breast feeding stopped 'cold turkey'	5, 63%
Breastfeeding stopped gradually	2, 25%
Do not know	1, 12%
For children not currently breastfed, age at weaning (in months) n[IQR]	8 [14,18]

5.1.3 Documentation of the intervention

5.1.3.1 Training and supervision

The three PSW recruited for the study attended a five-day training course given by a developmental psychologist. The training programme is detailed in Appendix 2. In addition to the PSWs, other healthcare professionals took part in the training to ensure the contribution and involvement of stakeholders at the various study sites:

- For the two ComHCs: three staff for each ComHC, including the technical director or his deputy, the nutrition officer and a midwife.

- At the hospital: the three health promoters, two doctors, two nurses and two orderlies (MSF posts).

During the course of the study and following the training, nine supervision sessions were organised for the PSWs by the trainer in the presence of the field coordinator. These sessions provided an opportunity to share the participants' difficulties and feelings, and to collectively propose alternatives to the problems encountered. A summary of these sessions is given in Appendix 26.

5.1.3.2 Psychosocial stimulation sessions

A total of 149 sessions were carried out, including 118 individual sessions (79%) and 22 group sessions (15%). Of the sessions, 31 took place in the hospital (21%) and 114 in one of the ComHCs (77%). The median duration of the sessions was 54 minutes [IQR: 40-64], ranging from 42 minutes for the first session to 58 minutes for the last (Table 3).

Table 3 Number, type and location of psychosocial stimulation sessions

	Sessions (n)	Individual sessions (n, %)	Number of group sessions (n, %)		ComHC	Hospital	Median duration (min)
			2 families	3 families			
Family Home	31	25 (81%)	4 (13%)	2 (6%)	18 (58%)	12 (48%)	42
Communication & Games	30	22 (73%)	6 (20%)	2 (7%)	23 (77%)	5 (23%)	52
Feeding & Breastfeeding	33	29 (88%)	2 (6%)	2 (6%)	26 (79%)	6 (21%)	56
Relaxation and sleep for children	29	22 (76%)	6 (21%)	1 (3%)	24 (83%)	5 (23%)	56
Family Sharing	26	20 (77%)	4 (15%)	2 (8%)	23 (88%)	3 (15%)	58
Total	149	118 (79%)	22 (15%)	9 (6%)	114 (77%)	31 (21%)	

In total, a family member other than the main caregiver was present for 28 sessions (19%) (Table 4), mainly fathers (18 sessions) and grandmothers (7 sessions).

Table 4 Presence of a family member other than the main caregiver

	Number of individual sessions	Number of group sessions	Total number of sessions
Father	13	5	18
Grandmother	6	1	7
Grandfather	1	0	1
Brother and sister	11	0	1
Co-wife	1	0	1
Total members	32	6	28

5.1.4 Measuring changes before / after intervention

5.1.4.1 Childcare practices

After the intervention, more caregivers said they enjoyed sharing certain activities with their children, such as bathing or toileting, massages, meals, carrying, naps and playtime. They were also more likely to applaud, hold or play with their child when he or she was behaving well, and to have positive attitudes (talking softly, rocking or playing with him or her) when the child was distressed, unhappy or crying. If the child refused to eat, more caregivers "played with him and tried again" after the intervention. Finally, after the intervention, fathers and

grandmothers (other family members not present during the intervention) were more likely to play with the children than before the intervention. Variables for which the difference before and after the intervention is significant are shown in bold in the Table 5 (p-value < 0.05).

Table 5 Childcare practices and differences before/after intervention

	Before intervention		After the operation		p-value
	n	%	n	%	
Activities that mothers like to do with their children					
Bathing and toileting	28	78	36	100	**0,0078**
Breastfeeding	20	56	26	72	0,0703
Time for a massage	6	17	32	89	**0,000**
Mealtimes	23	64	35	97	**0,0018**
When carrying on the back	19	53	29	81	**0,0129**
During a nap or rest	1	3	7	19	0,0703
Moments of play	10	28	34	94	**0,000**
What do you usually do when your child behaves well?					
I congratulate him	8	22	7	19	1
Nothing in particular	3	8	0	0	1
I applaud him	8	22	18	50	**0,0414**
I give him something	10	28	11	31	1
I say nice / appreciative things to her	8	22	5	14	0,5078
I hold it in my arms or carry it on my back	13	36	24	67	**0,0127**
I play with him/her	7	19	22	61	**0,0074**
What do you usually do when your baby is distressed, unhappy or crying?					
I speak softly to him	3	8	13	36	**0,0129**
I'm not doing anything in particular	1	3	1	3	1
I sing him a song	1	3	5	14	0,125
I scold him	2	6	0	0	0,5
I caress him	1	3	6	17	0,125
I pat him on the back	2	6	1	3	1
I rock him	23	64	32	89	**0,0225**
I breastfeed or feed her	15	42	19	53	0,8036
I hold it in my arms or carry it on my back	9	25	14	39	0,3018
I play with him/her	2	6	10	28	**0,002**
What do you do when your child refuses to eat?					
I force it	4	11	0	0	0,125
I let him do it	1	3	1	3	1
I'll wait and try again	13	36	10	28	0,6291
I put the spoon in his mouth	1	3	0	0	1
I'm not doing anything in particular	2	6	0	0	0,5
I replace it with another food	9	25	8	22	1
I play with him and try again	12	33	26	72	**0,0013**
I'm taking her to the health centre	8	22	12	33	0,3438
I take her to the traditional/ religious therapist	2	6	2	6	1

I rock him or carry him	11	31	17	47	0,2379
Do you think it is possible to interact (communicate) with children while doing other activities such as housework / daily activities?					
Yes	22	61	25	69	0,872
No	4	11	0	0	
Yes, with help	6	17	5	14	
Other (please specify)	4	11	6	17	
If you have time to play/communicate with your child, how often do you do so? (If the person does not play with their child, write "never")					
Several times a day	29	81	34	94	0,1172
Once a day	2	6	1	3	
Several times a week	1	3	0	0	
Never	1	3	0	0	
Other (please specify)	3	8	1	3	
If other members of the family play with the child, please specify who plays most often.					
Father	8	22	22	61	**0,0026**
Siblings	33	92	35	97	0,625
Uncle	1	3	2	6	1
Co-wife	7	19	7	19	1
Aunt	4	11	10	28	0,0703
Grandma	8	22	20	56	**0,0005**
Grandfather	1	3	5	14	0,125
Sister-in-law or brother-in-law	3	8	3	8	1
Other (please specify)	3	8	1	3	1
Do you usually massage your child?					
Yes	33	92	35	97	0,75
No	2	6	0	0	
Someone else is doing it	1	3	0	0	
Other (please specify)	0	0	1	3	
If so, how often?					
Several times a day	24	67	29	81	0,1265
Once a day	4	11	3	8	
Several times a week	2	6	1	3	
Other (please specify)	3	8	0	0	
Other (please specify)	3	8	0	0	

5.1.4.2 Perception of parenting skills

To the question "*In which activities do you feel competent*?", overall, "feeding" and "bathing and massage" were the activities in which caregivers felt most competent before the intervention. After the intervention, caregivers more frequently mentioned "play and communication" and "carrying" (Figure 4).

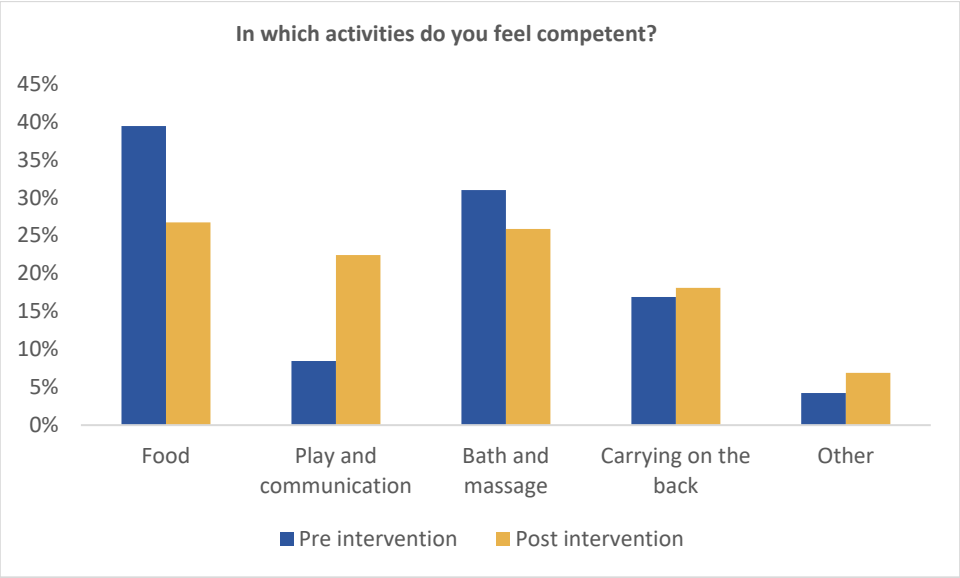

Figure 4 Distribution of caregivers (n=28) in response to the question: "In which activities do you feel competent?" before and after the intervention

5.1.4.3 Needs expressed

Overall, "eating" and "bathing and massage" were the activities where caregivers said they needed the most help (*Question: In which activities would you need help?*). This was mainly financial help and help from another person.

5.1.4.4 Knowledge of activities to help children recover from SAM

When asked "*Do you know of any activities that help your child recover from malnutrition*", many caregivers cited "feeding" before the intervention, while "play and communication", "bathing and massage" and "carrying" were also reported after the intervention (Figure 5).

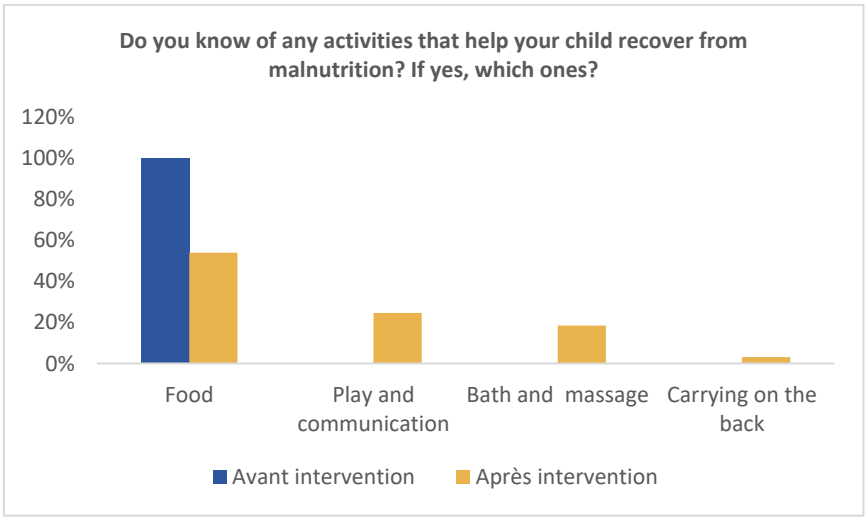

Figure 5 Distribution of caregivers (n=28) in response to the question: "Do you know of any activities that help your child recover from malnutrition? If so, which ones? before and after the intervention

5.1.4.5 Maternal mental health

Maternal mental health was measured by different scores from two scales presented in "Phase 3. Implementation of the context-specific intervention".

Perinatal depression

Fewer accompanying mothers showed symptoms of perinatal depression after the intervention (n=10) than before (n=19) (significant difference), Table 6).

Table 6 Symptoms of perinatal depression and difference before and after the intervention

	Before the intervention		After the intervention		p-value
	n	%	n	%	
Mean score < 1.03 (absence of symptoms of perinatal depression)	17	47,2	26	72,2	0,0011
Mean score ≥ 1.03 (presence of symptoms of perinatal depression)	19	52,8	10	27,8	

Suicidal thoughts

Among the 36 accompanying mothers, 6 had expressed suicidal thoughts in the last two weeks, as part of the Dusukasi scale[3] (pre-intervention questionnaire). For these mothers, a specific referral system was set up: they were offered a medical appointment with a doctor who was independent of the study in order to establish the level of risk of acting on their suicidal thoughts. Specific individual follow-up visits were organised for these mothers. At the same time, a 3-hour workshop was run by a psychiatrist and a psychologist on the assessment and management of caregivers who had answered positively to the question about suicidal ideation.

Perceived social support

The level of perceived social support before and after the intervention was high for the majority of caregivers, with no significant difference (67% and 64% of participants respectively reported a high level of perceived support) (Table 7).

[3] 6 mothers answered positively (i.e. rarely for 4, sometimes for 1 and often for another) to the question "in the last two weeks, you have had thoughts of ending your life".

Table 7 Perceived level of social support and differences before and after the intervention

		Before the operation		After the operation		p-value
		n	%	n	%	
Perceived level of support	Low	2	5,6	3	8,3	0,8872
	Medium	10	27,8	10	27,8	
	High	24	66,7	23	63,9	

Nor was there any significant difference in the scores calculated by category (Table 8).

Table 8 Perceived social support scores by category and differences before and after the intervention

Average [IQR]	Before the operation	After the operation	p-value
Being expensive	6 [5,2;6,5]	6 [5,3;6,5]	0,7764
Family	5,8 [5,2;6,3]	6 [5,1;6,3]	0,4662
Friends	4,8 [3,0;5,5]	4,4 [3,0;5,5]	0,7944

5.1.4.6 Observations of caregiver-child interactions

A total of 36 pre- and 34 post-intervention observations were carried out by two independent observers. Two observations were conducted with the grandmother, as the mother was unavailable or ill.

Quantitative component

Inter-observer reliability

Averaged over all observational variables, Cohen's Kappa for the pre-intervention measures was 0.906 (CI95: 0.697-0.988), minimum value: 0.634, maximum value: 0.977 and for the post-intervention measures: 0.874 (CI95: 0.533-0.991), minimum value: 0.699, maximum value: 0.978. These estimates suggest a very high level of agreement between the two observers (detailed values in Appendix 19).

Before / after measurements

As shown in Table 9the mean difference in scores between each domain (affection, responsiveness, encouragement and teaching) before and after the intervention was positive, with a significant difference ($p<0.0001$) for the domains of affection, responsiveness and encouragement, and <0.001 for teaching. This means that caregivers and children performed better during observation sessions in each domain of PICCOLO after receiving the StimNut intervention.

Table 9 Quantitative results before/after intervention and difference (Wilcoxon test)

Wilcoxon test	PICCOLO Domains	Before	After	Average difference	Level of significance
Total score (average for both observers)	Affection	12,5	13,7	1,21	p=0,0000
	Reactivity	11,7	13,7	1,96	p=0,0000
	Encouragement	9,6	12,7	3,17	p=0,0000

	Teaching	4,6	6,4	1,80	p=0,0004

Qualitative component

In the course of the analysis, the factors influencing caregiver-child interaction during the sessions were identified, along with the corresponding actions/reactions of each component of the caregiver-child pair. We have summarised the results of the observations in Figure 6.

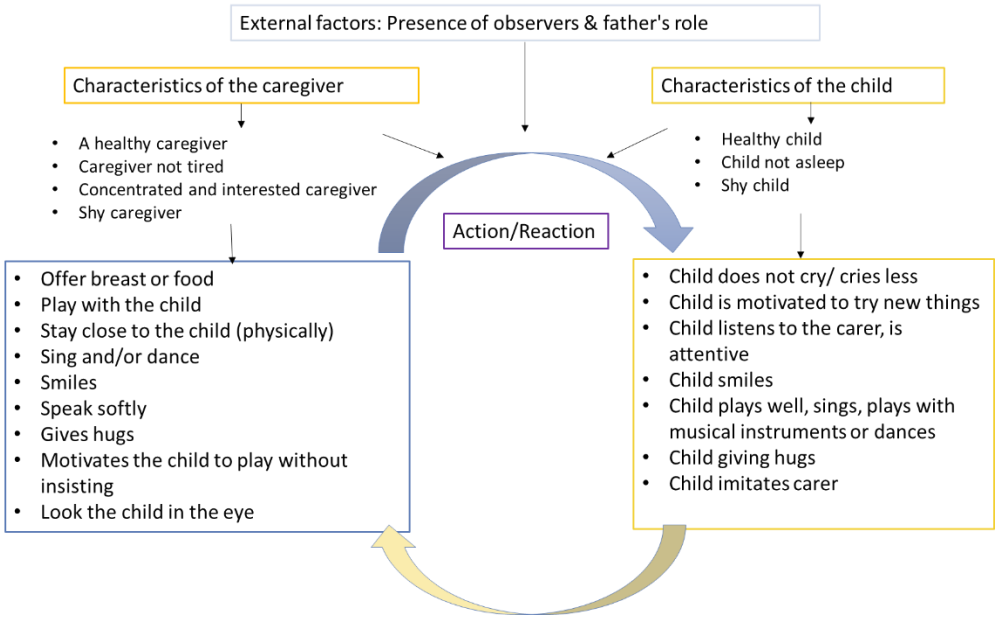

Figure 6 Conceptual framework describing the caregiver-child interaction based on the observations made by the two observers.

We observed that external factors (linked to the observers and the father's role in the decision to make the observations), and factors linked to the caregiver and the child had an impact on the observations.

External factors influencing caregiver-child interaction

- The observers

As the literature points out, the observer can have an impact on the participants and on the interaction between the caregiver and the child. According to the observers, the caregivers and children got used to the observations and seemed more relaxed during the second session than during the first:

"Baby sulks a lot and especially can't stand our presence. We've readjusted our position so that he can't see us, as discreetly as possible, because he doesn't want to play or cry" (*Observer, pre-intervention*).

"He's much happier, isn't frightened by our presence and communicates with his mum, who's even happier - there's a lot of complicity, play and joy" (Observer, post-intervention).

- The father's role in the decision-making process

A few caregivers indicated that the father, who is the head of the household, may or may not allow the caregivers and child to participate in the observation sessions. Although most of the caregivers said they were happy to continue the observations after the pre-intervention measures, one father did not agree to take part in the study, so the mother and child did not take part in the second session.

"Mum thinks her husband won't agree to her continuing with the sessions" (Observer, pre-intervention) "

Factors influencing caregiver-child interaction related to the caregiver and the child

Among the factors linked to the caregiver and the child, we identified: a mother/caregiver who was ill and tired, a mother who was not interested or focused during the session, a child who was ill, a child who was sleeping or wanted to sleep, and a mother/caregiver or child who was very shy.

- A sick and tired companion

The observers reported that the caregivers who were ill were unable to interact with their children and that, as a result, the children were more likely to be stressed during the play session and to be unmotivated.

"A pregnant mum is very sad during the session" (Observer, pre-intervention).

The observers reported that the sick caregivers could not move during the session, and that their children did not move much either as a result. The observer also pointed out the difference between the first and second sessions, when the mother was feeling better:

"She's not tired any more, she's serene, less shy because she's finally got her baby, they're having fun together" (Observer, post-intervention).

- Companion who was not interested or focused during the session

Some mothers, particularly in the pre-intervention measures, were not interested in playing with their child or were not concentrating during the session. However, in some circumstances, the child seemed happy to play without their mother's support:

"Young mother, a bit shy, not very motivated and doesn't move but responds to the child's different expressions (not all of them), the child is very enthusiastic, she plays a lot" (Observer, pre-intervention).

- Sick child

The observers noted that when the child was very ill, even if the mother was motivated to play, interaction was very limited:

"The session starts with crying, baby says she's hungry, we give her biscuits which she eats well but still continues to cry, mum is brave even if she doesn't smile and the motivation to play with baby is not enough probably because of her health", (Observer, Pre-intervention).

Some of the children developed diarrhoea, flu or other infections, while others were weak because of their nutritional status, particularly during the pre-intervention measures. In some cases, the child's inability to interact with his mother made him less motivated to continue the play session:

"Baby doesn't look well (cold), Mum is getting impatient (asks if it's over and says baby doesn't want to play)", (Observer, pre-intervention).

- Child who slept or wanted to sleep

The observers noted that the children who wanted to sleep were unlikely to be playing or interacting with the caregivers at the time of the observations.

"Mum is in a state of pregnancy already observed last Wednesday when the baby was irritated and only wanted to sleep - today the baby didn't play", (Observer, pre-intervention).

- Very shy mother or child

The observers explained that when the mother or child were very shy, they were unlikely to interact during the observations, and the PICCOLO score was lower for this reason. For example, they reported that a shy mother was less likely to encourage the baby to play and move, and that the child was not very responsive:

"The session was shy and calm because Mum was calm and so was baby, they didn't play Mum just gave a soft toy to the child who took it and put it down. Mum sat down and looked at us, then she took baby and put him on her lap to breastfeed him; baby fell asleep until the end of the session", (Observer, Post-intervention).

However, a shy mother does not always influence the child's reaction:

"Mum keeps to herself and doesn't move, but baby crawls around the room, very happy, touches everything and pats her mother, who helps her say a few words, pushes the toys towards baby but doesn't play much" (Observer, post-intervention).

Comparison of BEFORE and AFTER observations

As can be seen from the positive difference in the scores obtained during the pre/post intervention observations, the interaction between the caregiver and the child improved after the intervention. The improvement was particularly noticeable in the "encouragement" and "teaching" parts, for which scoring was not applicable in some sessions before the intervention. In one session, for example, the observer reported that the caregiver was not used to playing with the child before the StimNut intervention:

"Tense session, mum and baby not used to playing together, baby attracted by a toy but mum doesn't encourage him to touch it" (Observer, pre-intervention).

After the intervention, the interaction between the caregiver (mother) and child changed completely and understanding between the two improved significantly:

"This time there was very good interaction, complicity, they understood each other" (Observer, post-intervention).

The observers also noted that after the intervention, the caregivers encouraged their children to play more and that the children often imitated and repeated the sounds, games or actions presented by their mother:

"Mum puts the cuddly toy in the calabash and asks baby to give her a bath, which baby does and then goes to bed [...] she [baby] expresses herself by making sounds, Mum understands and responds Mum encourages her to play, she touches all the toys and baby takes another one", (Observer, post-intervention).

The observers also reported that the mother and child smiled more at each other and made eye contact throughout the observation:

"Mum talks to him and looks into his eyes [...] they're very close (communication, smiles, looks) baby and mum pass the toys around and complement each other" (Observer, post-intervention).

Observers' thoughts

During the debriefing sessions, both observers agreed that there were not many observations for which the scoring differed, as they indicated that the PICCOLO tool was easy to follow and intuitive, which helped to avoid misinterpretations of the observations. The field notes provided more detailed information about the interaction between mother and child, although the level of detail varied from session to session and from observer to observer. The observers reported that after the intervention they felt more comfortable observing the caregivers and children than in the initial sessions before the intervention.

They also pointed out that conducting the observations in an environment other than the hospital could have helped them to observe the caregivers and children in a more "realistic" context.

5.1.5 Satisfaction measurement after each session

5.1.5.1 Answers to numerical questions

Overall, measures of satisfaction after the sessions were high for all sessions. The two indicators measured increased as the sessions progressed (Table 10), rising from an average of 4.3 for session 1 to 4.7 for session 5, while the score awarded to the sessions rose from an average of 4.7 to 5.

Table 10 Level of satisfaction after the sessions

		Average	Standard deviation	Min	Max
Energy level after the session (out of 5)	Session 1	4,3	0,85	1	5
	Session 2	4,7	0,45	4	5

	Session 3	4,8	0,44	4	5
	Session 4	4,6	0,55	3	5
	Session 5	4,7	0,51	3	5
Session grade (out of 5)	Session 1	4,7	0,59	3	5
	Session 2	4,8	0,47	3	5
	Session 3	4,9	0,40	3	5
	Session 4	4,8	0,40	4	5
	Session 5	5,0	0,17	4	5

5.1.5.2 Answers to open-ended questions

Question 1: Did you learn anything important today? (Specify)?

Across all sessions, 'child well-being and development' was the category with the highest number of responses, followed by 'food'. The 'food' category had a higher number of responses in sessions 1 and 2. Next came 'play and communication', 'bathing and massage', 'mother's well-being', 'interactions/emotional bonding' and 'other'. The 'interactions/emotional bonding' category was more represented in session 5 (Figure 7).

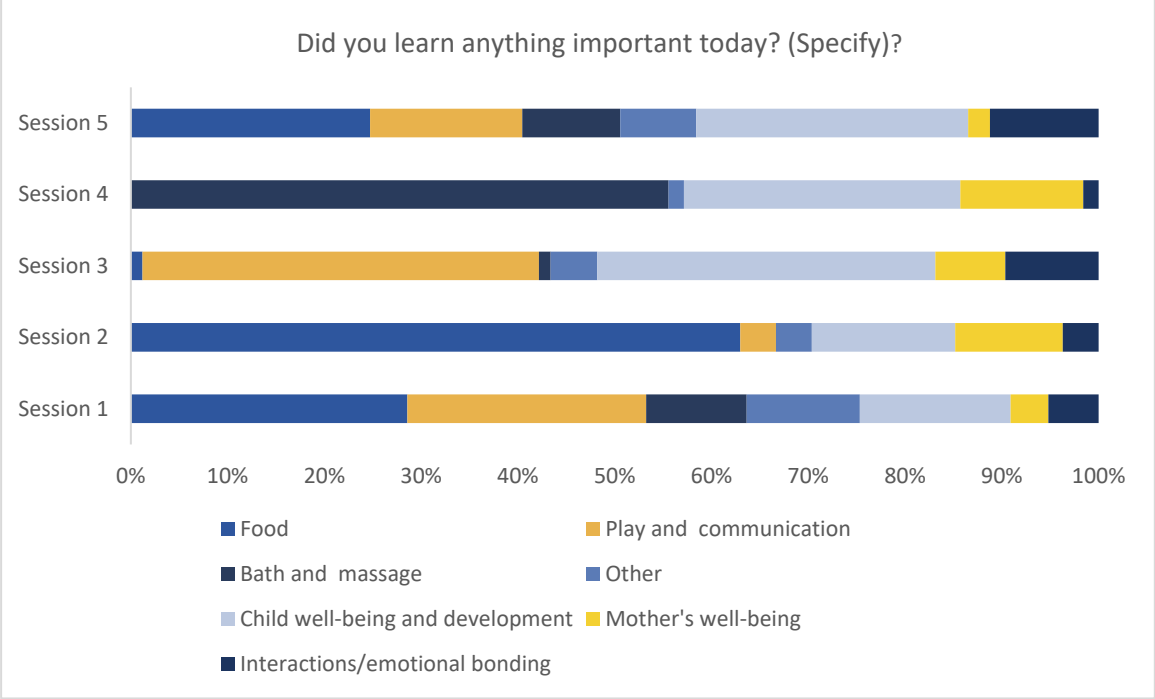

Figure 7 Responses (n=22) to the question: "Did you learn anything important today? (Specify)", by session.

Question 2: What did you like during the sessions?

Across all sessions, 'food' was the category with the highest number of responses, followed by 'bath and massage'. The 'food' category had a higher number of responses in sessions 1 and 2. Next came 'child well-being and development', 'play and communication', 'interactions/emotional bonding', 'other' and 'mother's well-being'. The 'feeding' and 'bathing and massage' categories were more represented in session 5 (Figure 8).

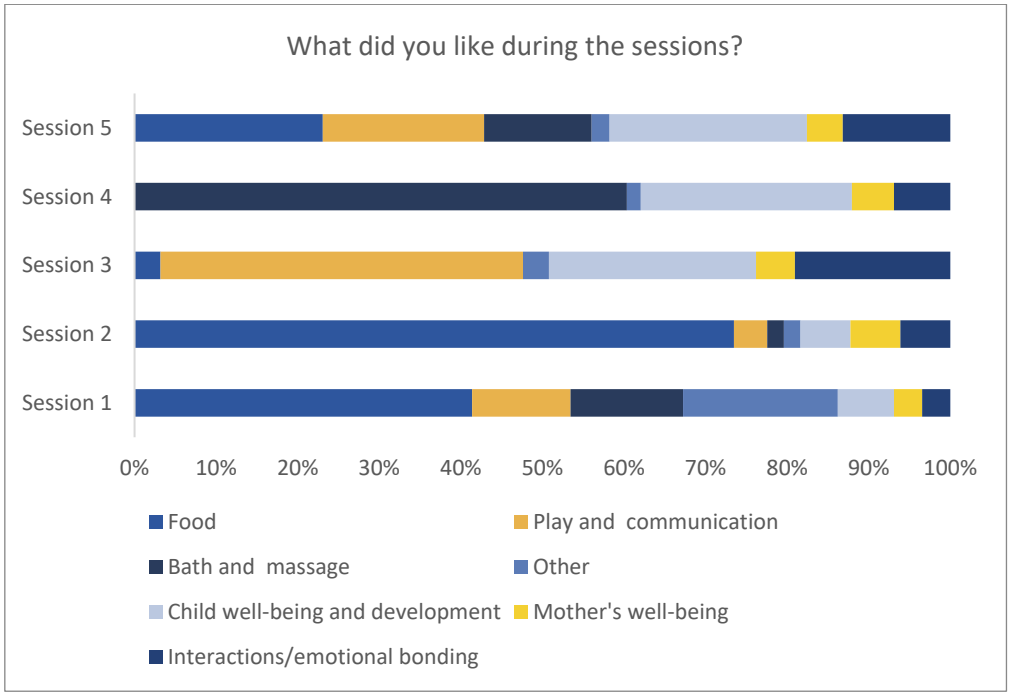

Figure 8 Responses (n=24) to the question: " What did you like during the sessions? (Specify)", by session.

Question 3: What would you like to improve for the next session (specify)?

Overall, "food" was the category with the highest number of responses, followed by "games and communication". The "feeding" category received the highest number of responses in sessions 1, 2 and 5. Next in order were 'bathing and massage', 'child well-being and development', 'other', 'mother well-being', and 'interaction/emotional bonding'. The 'feeding' and 'play and communication' categories were more represented in session 5 (Figure 9).

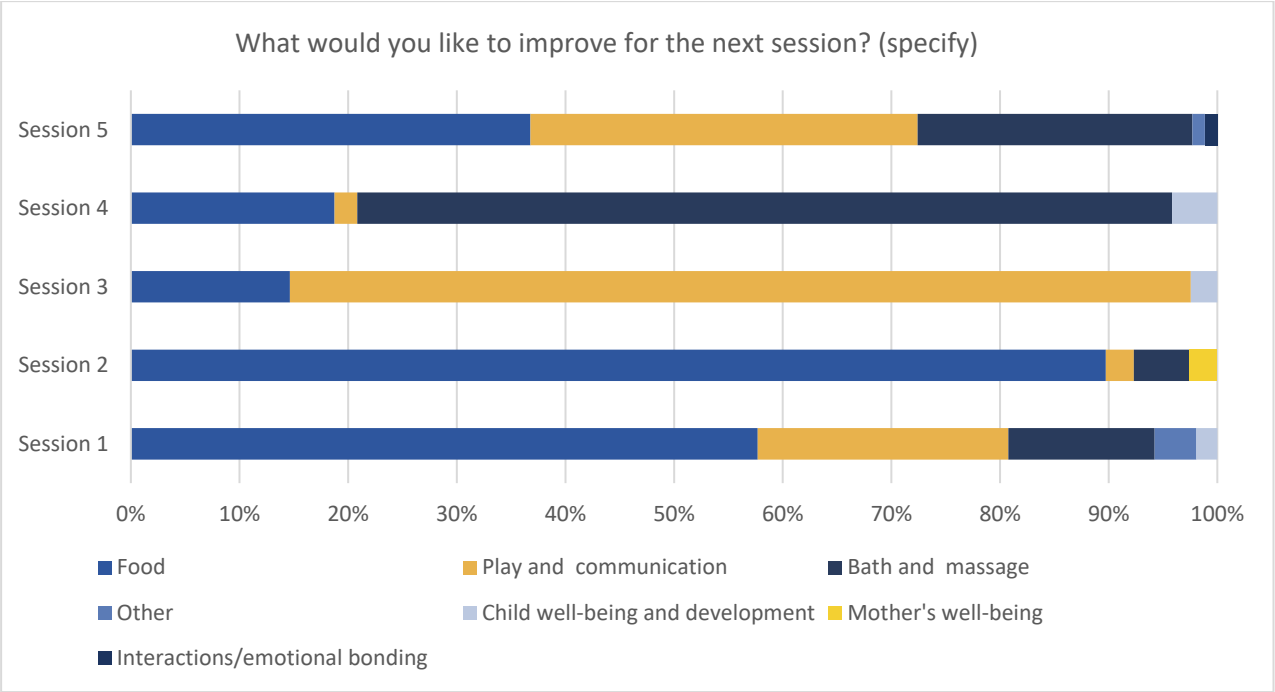

Figure 9 Responses (n=24) to the question: "What would you like to improve for the next session? (Specify)", by session.

5.2 Phase 3 results: acceptability

5.2.1 Results of interviews with caregivers

The interviews with the caregivers lasted an average of 40 minutes. The results are presented in six parts: 1) the emotional representations and attitudes of the caregivers; 2) the (re)building of bonds of trust; 3) the caregivers sense of empowerment; 4) the caregivers expectations and the responses given by the intervention; 5) the transmission of knowledge; and 6) the perceived challenges.

5.2.1.1 What are the emotional representations and attitudes of caregivers towards StimNut?

The analyses highlight a change in interpretative repertoires with regard to StimNut. The Figure 1 summarises the main trends in the participants' accounts of their children's care pathways and their own experiences.

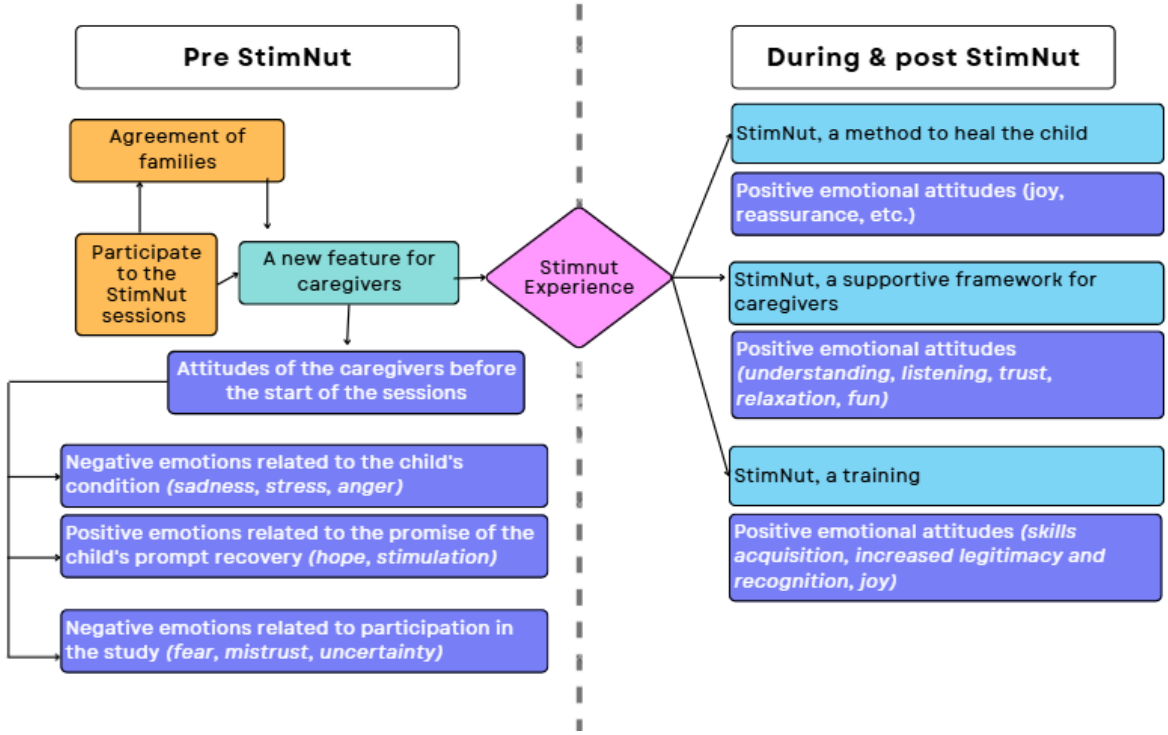

Figure 10 Trends in emotional representations and attitudes

Generally speaking, participation in the study did not require the caregivers to negotiate the agreement with the heads of the concession and/or the children's fathers. Nonetheless, StimNut was a novelty for the caregivers, which gave rise to ambivalent emotional attitudes. On the one hand, they experienced negative emotions linked to the child's state of health (e.g. sadness, stress) and positive emotions linked to the promise of a faster recovery for the child (e.g. hope). On the other hand, participation in a study gave rise to negative attitudes towards healthcare staff and a new term ("psychosocial stimulation"), with which they were not familiar. For example, some caregivers said they had felt suspicious of the PSW and the effectiveness of the intervention (e.g. *"**I hadn't taken this approach seriously**, I hadn't committed myself. I gave my consent just for the fun of it. **But after one or two sessions I knew that the sessions were important**"*. Mother, aged 31). Others expressed fear and/or incomprehension (e.g. "*I thought, ah, **this is new, aren't I afraid of** these people **talking**?" Mother, 30).*

Nevertheless, participation in all the psychosocial stimulation sessions helped to deconstruct the initial perceptions and attitudes towards the study and the PSW. In fact, the accompanying adults' discourse was anchored in **"**before-after StimNut" comparisons which contrasted the perception of the frightening novelty (before) with three other interpretative repertoires (after):

StimNut as a method for healing children. This representation met the expectations of the caregivers to improve children's health. It is linked to positive emotions and feelings such as

joy and reassurance. In these cases, the caregivers position themselves in their role as mothers responsible for the health of their children with SAM.

StimNut as a supportive environment for caregivers. This representation was also linked to positive emotions and feelings such as the feeling of being understood, listened to and supported, relaxed and stimulated. In these cases, the caregivers saw themselves more broadly in their role as women (mothers, but also wives, sisters, daughters-in-law, etc.).

StimNut as training. This representation gave rise to positive emotions and feelings linked to the acquisition of skills and the gain in legitimacy. In these cases, the support staff take on the role of apprentice.

To sum up, we can see that StimNut responds to different expectations (to heal the child, to be supported, to be trained) and the representations of the intervention evolve over time and vary according to the different roles involved (caregivers, women, trainees).

5.2.1.2 StimNut, a special scenario for (re)building relationships based on trust

The StimNut "before-after" comparisons provide information on the development of interpersonal relationships between caregivers and children, family members and PSW. In fact, the results show that the StimNut intervention was a particular scenario for strengthening the emotional bonds and trust between the caregivers and: a) the children; b) the family members; c) the PSW.

(Re)building emotional ties with the child

Discourse analysis highlights the perception of a change in the relationship between caregivers and their children. Generally speaking, these changes relate to the development of emotional ties[4] . According to the caregivers, the strengthening of the caregiver-child bond is due to the improvement in the child's state of health and the care provided (e.g. massage, communication, play). In addition, some caregivers say that the sessions and the application of care practices have facilitated the building of emotional bonds that were previously fragile or non-existent, as illustrated by the excerpt below:

> *"I've been shown the right way to breastfeed, [whereas before] my child would suckle without being satisfied. Now, to breastfeed my child, I stand aside and he sucks peacefully. (...). I didn't have the slightest idea that the child should*

[4] Example: *"Our relationship has improved [...]. He doesn't want me to leave him. [...]. It's all due to the interview, very often I play with him, that's why he's glued to me*", Grandmother, aged 45 ;
"He's happy now, he plays with me, he plays with the children and I communicate with him a lot. His body is fine and our emotional bond has been strengthened", Mother, aged 19.

play with his mum, to tell the truth this child will be different from my other children because he will have my affections. My other children at home don't even know that I'm their mum, there's no affection between us, we don't play together, we don't stroke them, I didn't know any of that, to play with your child to this degree, no." (Mum, aged 30)

In this extract, we can see that StimNut introduces new practices (e.g. play) in an environment where showing affection towards the children was not usual. In addition, in some cases the caregivers report having reorganised their daily routines and activities in order to apply the intervention's recommendations.

Furthermore, the improvement in the relationship between the caregiver and the child is reflected in a change in emotional attitudes towards the child. Comparisons between child-centred emotions before and after StimNut provide information about the improvement in their relationship. Although the emotions expressed varied from case to case, negative emotions (e.g. sadness, guilt, fear, anger) were transformed into positive emotions (e.g. joy, serenity, confidence, tranquillity, affection) (see table in appendix 21).

(Re)building relationships of trust and support within families

Although, generally speaking, the caregivers did not have to negotiate the agreement of their husbands and/or the head of the concession to take part in the study, most of them expressed (explicitly and implicitly) that they had felt a lack of family support. The results of the discourse analysis reveal three key types of social support, highlighted by the Caregivers:

Material support

This refers in particular to financial resources, transport and food. It is provided by the husband/concession manager and makes it feasible for the caregivers to participate. In some cases, the caregivers say that material support has increased after the sessions (e.g. after StimNut, the father buys snacks for the child).

Moral support

Corresponds to the validation of actions and practices according to values (good/evil). Moral support manifests itself through attitudes, the discourse of family members (husband, grandmother, etc.) and practical assistance behaviours. The results show that, in some cases, moral support was limited to the family members' agreement to the caregiver taking part in the study. On the other hand, in other cases, the caregivers perceived a greater commitment from other family members (e.g. practical help with the child's upkeep).

Emotional support

This concerns the availability and responsiveness of family members to relieve and comfort caregivers going through difficult situations in the face of their child's illness. While in some cases emotional support from the family was a motivating factor for taking part in StimNut[5] , analysis of the discourse in other cases reveals the latent expression of a feeling of loneliness among caregivers who, before StimNut, did not find emotional support within the family (e.g. **"***I'm alone with my child" Mum, aged 29)*. In addition, some caregivers spoke of the guilt, "marginalization" and social pressure suffered by family members. In some cases, family members blame the mothers for the child's malnutrition (e.g. *"they lectured me [...]. [They said] things that put me down",* Mother, aged 21*; "But according to the family, it's my fault.* Mum, aged 36). Nevertheless, in some cases, the analysis of the discourse shows that after StimNut there is more listening and an improvement in communication with the other members of the family. In these cases, the StimNut intervention played a role in mediating relations between the different members of the family (e.g. companion-wife), thus helping to improve interpersonal relations. The results also show a transformation of negative attitudes and emotions towards others (e.g. discontent, irritability) into positive attitudes and emotions (e.g. joy, empathy) (see appendix 22).

(Re)building relationships of trust between caregivers and health staff

Discourse analysis reveals a transition from suspicious attitudes towards PSW, initially perceived as strangers, unfamiliar and different from oneself, to positive attitudes in which PSW are perceived as alter-egos. For example, the extract below illustrates the initial perceptions and emotions of some caregivers (mistrust, fear, lack of understanding of the role of PSW):

> *"At the beginning of the sessions I was very hesitant. The day you took my consent, I gave my consent with a doubt. [...]. The day the sessions started, everything the PSW said I hadn't understood because I didn't share the same idea. I only agreed when the PSW said they would help me get out of this situation. And she promised that the child would have an appetite, and from that day on I took the training sessions head on. I said to myself that I would withdraw from the first session because I didn't believe in what they were saying (...). I decided to withdraw from the first session because I didn't understand. It was only after the first and second sessions that I realised it was important. (Mum, aged 31)*

[5] E.g.: **"***Even if I'm discouraged, they [the family members] tell me to come and tell them what we've done, so I come. So I come*". (Mum, 25); **"***I came myself, and I told the three people who said there was no problem. (...) they agreed, that gave me courage. [...]. My husband told me to be brave, because it's thanks to these sessions that my child has put on weight and looks good now*" (Mum, aged 20).

The caregiver went on to explain that, from the first sessions onwards, she felt listened to, safe, understood and encouraged by the PSW. In fact, the caregiver testified that they trusted the PSW thanks to their empathetic attitude and their commitment. As a result, their emotional attitudes changed from distrust and fear to joy and motivation (see table in appendix 23).

To sum up, participation in the StimNut sessions played a role in strengthening and/or building emotional bonds a) between the caregivers and the children, b) in strengthening the support (material, moral and emotional) of family members, and c) in building a relationship of trust with the PSW.

Towards the empowerment of caregivers

Insofar as the term "StimNut" was used in several senses, we began by distinguishing between discourses referring to the study/intervention and discourses relating to the content of the sessions, i.e. the care practices themselves. This distinction enabled us to grasp the issues, developments and changes at two different levels: 1) at the level of self-perception; 2) at the level of perception of the role of mother.

Now I feel good

The caregivers said they had experienced changes in the way they managed their emotions and improved their well-being. In fact, some caregivers said they were "less impulsive", "more serene", "calmer" and "happier". These positive changes are attributed in particular to their participation in the StimNut study, where they claim to have received support and acquired knowledge[6].

"From now on, I'm a player in the child's recovery".

Furthermore, the caregivers' accounts express a feeling of mastery and highlight the acquisition of knowledge in terms of child care. In fact, the caregivers stated that they had developed skills in at least one of the following areas: feeding/breastfeeding, communication, play and massage (see table in appendix 24). The caregivers demonstrated a shift in their use of language, they understood that the child's recovery depended upon them and their actions. In other words, the caregivers felt a sense of empowerment over their child's recovery[7]. This positioning strengthens the role of the caregivers through: a) recognition of

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[6] Example: "*I'm happy today. The day I arrived at the health centre, I was like a sick person, because if a woman is happy, it's because her child is happy too. If a mother's child is not happy, her mother will never be happy. Even just breathing was difficult for me the day I arrived at the health centre; I was restless all the time. The sessions helped me to relax*. (Mum, aged 30)

[7] For example: "*I make", "I prepare", "I buy", "I feed him", "I give him", "I have encouraged myself to communicate with him and this has helped to improve his health", "very often I pay for the bananas for my child myself*", etc.

their efforts (by the PSW and, in some cases, by family members), b) increased confidence and a feeling of effectiveness.

To sum up, the empowerment of caregivers is reflected in improved well-being, the development of parenting skills and a greater sense of confidence and efficacy.

5.2.1.3 StimNut meets the needs of caregivers

The discourse analysis shows that StimNut meets two consensual expectations among the caregivers: 1) the children's recovery; 2) the involvement of other family members (particularly the children's fathers).

"My child is better now

The changes perceived in the child varied from case to case. However, all the caregivers reported at least one change. These changes fall into three categories:

Physical changes: reporting, for example, "*weight gain*" or "*greater strength*". These changes are attributed in particular to nutritional management (e.g. Plumpy Nut).

Changes in psychomotor behaviour: they reported that the child "*walked better*", "*was more alert*", "*ate easily*" and "*slept better*". Generally speaking, the caregivers attributed these changes to the psychosocial stimulation sessions.

Changes at a social level: reporting "*a good mood*", "*more sociable*", "*more dynamic thanks to communication*", "*more autonomous*". The consensus is that these types of changes are attributable to the benefits of the StimNut sessions.

The declaration of these changes represents a concrete response to the expectations and difficulties experienced by the caregivers prior to StimNut. While all the caregivers agreed that the reason for taking part in the study was to see their children cured of malnutrition, some had more or less specific expectations. For example, some mothers emphasised their wish to see their child recover and walk. Other participants talked about how difficult it was for them to interact with the children, because of their apathy (e.g. "All he did was cry, he didn't play with me or with his father, who was always lying down crying". Mum, age unknown). In fact, we observed that the caregivers gave the same importance to changes perceived at the nutritional level as to changes perceived at the level of psychosocial development, as this enabled them to interact more easily.

Improving the relationship between the child and other family members

Some caregivers say they have observed changes in the attitudes and behaviour of other family members (father, co-wife, grandmother) towards the child:

"Now they often pick him up and play with him because he's so happy, which wasn't the case before; people are very interested in him now (...). They often give him fruit" (Mum, aged 19)

In this extract, the mother highlights the change in the child's attitudes and behaviour (happier) and that of the members of the household (they take an interest in the child, they give him fruit). In the accounts of these changes in attitudes and behaviour, we see a gendered distribution of care practices. The new interactions between children and men (fathers, grandfathers) take place through games. On the other hand, some grandmothers and co-wives become involved through play, but also through feeding and bathing. The StimNut intervention was seen as effective because it met the two main expectations of the caregivers: the children's recovery and the involvement of other family members.

5.2.1.4 From knowledge transfer to skills transfer

Generally speaking, the knowledge acquired and the parenting skills developed within StimNut have been the subject of exchanges and interactions between the caregivers and those around them (husbands/fathers, co-wives, sisters-in-law, neighbours, etc.). In fact, some caregivers reported scenarios in which they passed on information (e.g. family members waited for the caregiver to return after each session to find out about the activities carried out with the PSW). In other cases, rather than passing on information, the caregivers reported scenarios in which they helped the other women in the household to implement the new care practices [8].

Prospective section: "If tomorrow you met the mother of a child with SAM, what would you say to her?

With regard to the prospective aspect of the transmission of care practices and parenting skills developed within StimNut, we have identified two distinct interpretative repertoires:

[8] For example: *"With the wife of my husband's younger brother, she asked me the questions I shared with her, the types of food for a good child's diet, I explained that to her. [...]. Eggs, baby food and fish soup as snacks promote the child's well-being. When she got pregnant, the child didn't want to breastfeed, so she prepared a bowl of porridge and I asked her to add eggs, tomato, potato and fish soup to it, so that it would contribute to the child's well-being. [...]. She confirmed that she had seen improvements. I replied that it was this that had improved my child too, and that the sessions had helped us to learn*". In this extract, we see a transmission of knowledge (e.g. *eggs, porridge and fish soup promote the child's well-being*) but also a transfer of skills as the participant guides and accompanies her sister-in-law in the application of care practices. Here, this transfer takes the form of advice (e.g. buying fish) and support (e.g. I give her eggs). At the end of the quote, the practices are recognised as effective by both the participant and her sister-in-law.

"You have to go to the health centre": In these cases, the caregivers encourage medical consultation and emphasise the expertise of the health workers and the need to trust them (e.g. "*I would ask her to take the child to the centre"*).

"You have to take care of the child and support the mother": In these cases, the caregivers put forward their knowledge and parenting skills by directly suggesting recipes and care practices (e.g. giving eggs, bananas, communicating with the child). In these cases, we see a reappropriation of the content of the StimNut intervention and an emphasis on different practices (e.g. "*I would tell her to sit down to make the child suckle*"; *"Be happy with the child, look for little toys for him"). Even if the child is in a bad mood, we have to manage him, play with him so that he's happy"; "I tell her to prepare small meals for the child, play with him, wash him and massage him with oil"*). Furthermore, in this interpretative repertoire, the caregivers recognise the fragility of the mothers and emphasise the need for emotional support and an empathetic stance (e.g. "*I would tell her to take courage"*), thus positioning themselves in a new role as guardians (e.g. "*I will be an advisor for the other women"*).

5.2.1.5 Challenges

Finally, the difficulties encountered by the mothers related to access to the sessions. Some of the caregivers said that the sessions took place far from the village, so travel times were long and sometimes difficult (e.g. vehicle breakdown), which meant that some had to rely on a third party to get to the centre. In addition, during the sessions, the difficulties reported included difficulty concentrating due to the lack of food (e.g. one caregiver explained that she felt hungry during the sessions). In addition, one caregiver explained that she had found it difficult to communicate in Bambara, which is why she recommended adapting the sessions in other local languages. Finally, only one mother said that she had difficulty implementing the StimNut recommendations because she lacked financial resources. The caregivers also recommended increasing the number and length of the sessions and adding more recommendations on childcare practices.

5.2.2 Results in the event of abandonment

Use of the study: the caregiver explained that she took part because StimNut was helping her child to recover.

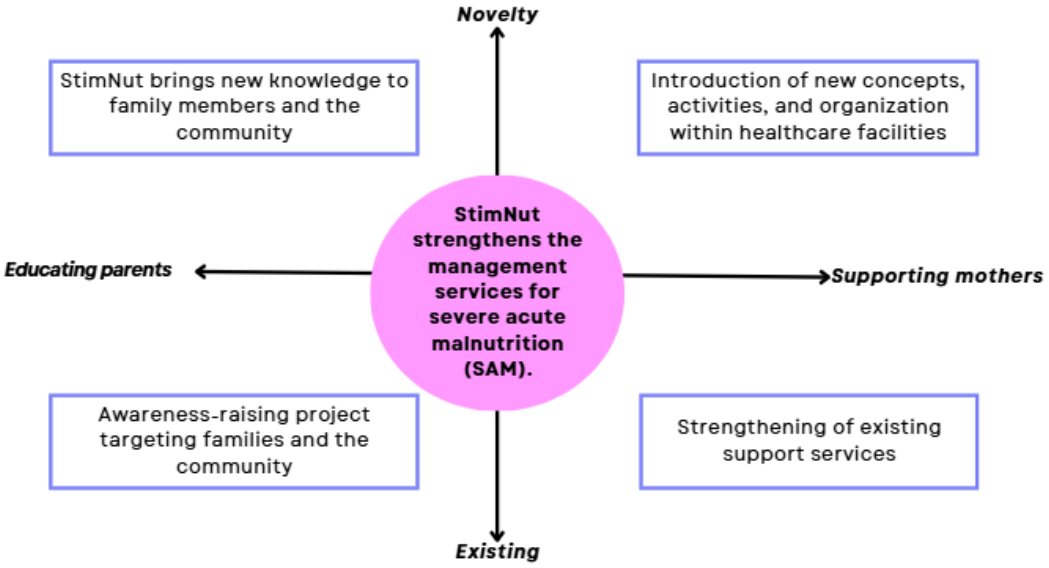
Experiences of the sessions: Although concerned about her child's health, the caregiver said she felt joy during the sessions. In fact, she explained that she had acquired new knowledge about her child's diet (e.g. "*I was given information about nutrition; previously I wouldn't prepare fish for my child. The doctors told me that if you give the child fish soup and snacks, he won't suffer from malnutrition*"). She also expressed a feeling of confidence in the PSW: "*My mind was at ease because I knew I was with people who knew what they were doing*". In addition, the mother said she "*liked the talks"*, particularly the play and communication session.

Cause of abandonment: The mother stopped attending the sessions because she was no longer responsible for the child. She explained that the grandparents had taken the child because she was pregnant: *"I was no longer with the child. His parents had taken him away from me while I was in labour. That's why I stopped attending the sessions [...]. [...]. I didn't like it, but I couldn't do anything about it because I wanted to continue with the study"*.

Recommendations: The caregiver said she had no recommendations for the programme and noted that the child's health had improved. She also expressed her desire to **"***get"* the child *back*.

5.2.3 Results of interviews with healthcare workers

Interviews with healthcare workers lasted an average of 40 minutes. The results show that healthcare workers perceive StimNut as a useful project. However, the meaning given to its implementation differed from one healthcare worker to another. Discourse analysis enabled us to identify two distinct interpretative repertoires (IR), illustrated in Figure 11. These IRs share a consensual core that supports the idea that *StimNut is a framework that reinforces existing services* (centre of the continuums on the graph). Nevertheless, the IRs vary according to the level of familiarity with psychosocial stimulation (vertical axis) and the relationship established with the caregivers (horizontal axis).



Horizontal axis: meaning given to the implementation (educate-support). Vertical axis: familiarity with psychosocial stimulation (a new or known concept)

Figure 11 Perception of StimNut by heathcare workers

StimNut is an awareness-raising project that brings new knowledge to members of the community:

In this IR, StimNut is seen as an awareness-raising project in which health workers have the role of educating mothers of children with SAM. This IR raises a top-down hierarchical relationship in which health workers "teach" caregivers (sometimes perceived as negligent) how to care for children ("You will find that some mothers are not patient and they are not brave", "people here are not very interested in children. They don't love children until they're old enough to serve them, otherwise they're not too interested in them"). In these cases, the intervention is associated with existing activities where care is focused on children's health and the benefits of the intervention are perceived at a societal level. Indeed, the primary beneficiaries would be the children and, more generally, the members of the community, who acquire new knowledge about care practices. In this IR, psychosocial stimulation plays a role in preventing SAM (e.g. educating parents to avoid SAM) and in preventing the secondary and long-term effects of SAM (e.g. preventing children from being marginalised). A nurse supervisor and an educator were more likely to be involved in this IR (awareness-raising project that benefits the community).

StimNut offers new concepts and strengthens existing support services:

On the other hand, in this IR, StimNut is seen as reinforcing existing activities, bringing new knowledge to families and health workers alike (e.g. "*we've understood that there are other ways of providing stimulation*", nutrition officer). The role attributed to the workers is no longer that of educator, but rather of companion to help mothers better understand their children's illness, thus raising the idea of a collaboration between caregiver and companion. In these cases, psychosocial stimulation plays a role in the recovery process for children with SAM and in improving the mothers' well-being. This second IR can be observed in the discourses of two educators, three nutrition officers, a doctor and a technical director.

To sum up, on the one hand, StimNut is perceived as an awareness-raising project that benefits only the community. This representation is structured by existing hierarchical relationships (e.g. health workers teaching mothers). On the other hand, StimNut is seen as an innovative project that benefits patients and caregivers as well as healthcare workers. In this case, the relationship between health workers and mothers is more horizontal. These two perceptions of StimNut attribute different roles to psychosocial stimulation: in the first, psychosocial stimulation has a preventive function (before illness and after illness) whereas in the second, psychosocial stimulation plays a role in the healing process.

5.2.3.1 StimNut provides concrete answers to existing challenges

The agents state that StimNut responds to a multiplicity of challenges encountered in the fight against SAM. These challenges and responses are organised: a) at community level (macro); b) at health structure level (meso) and c) at professional activity level (micro) (see table in appendix 25).

Challenges and responses at Community level

At community level, some health workers have raised the issue of the lack of support for mothers of children with SAM and the lack of involvement of fathers in caring for their

children. In this context, the StimNut approach is seen as useful and appropriate because it involves different players in the process of healing children[9] . Moreover, in this context where mothers of children with SAM are often isolated and in difficult situations, some health workers say they have witnessed an improvement in their well-being thanks to StimNut, as illustrated by the extract below:

> *"There were some mums who had problems at home which played a bit on the mind as psychosis. But I can say those few identified, StimNut was a help to them. StimNut gave them special advice different from Doctor X. Doctor X used to talk to mums and husbands too, to help them deal with the problems they had, and he took on a few families like that, which I think was a success. Because he worked to reassure them about all sorts of things" (Doctor)*

Challenges and responses in healthcare facilities

Health workers report that setting up psychosocial stimulation before StimNut was difficult because there was a lack of space and specific programming. In addition, one doctor described the difficulty of working with stable teams to provide holistic care. It is in this context that the health workers perceive the reorganisation of tasks and the framework provided by the StimNut project as useful. In fact, health workers generally valued the structured organisation of the implementation of psychosocial stimulation sessions by defining specific areas, defined roles, new activities and new equipment. Furthermore, the implementation of StimNut is seen as complementary to existing services and activities:

> *"The StimNut study complemented what we were doing before. It's as if we were working on one foot, but with StimNut it's become two feet now" (Technical Director).*

Moreover, in general, the analysis of discourse highlights a perception shared by healthcare workers of a feeling of recognition of expertise, respect for existing services and the quality of inter-team communication. For example, one nurse supervisor emphasised the recognition of his expertise ("*they asked me for my opinion*"). In addition, a nutrition supervisor emphasised the quality of the communication that took place during informal times (e.g. before consultations).

[9] E.g.: "*The difficulties we had beforehand were that the heads of households and families were sidelined during the healing process and that was the concern that existed before, but StimNut alleviated this problem by involving these different players*" (educator).

Challenges and responses in the workplace

Finally, the discourse analysis highlights three other functions of the project: 1) facilitating interactions with patients and caregivers; 2) reinforcing skills and 3) highlighting and enhancing the role of educators.

StimNut makes it easier for agents to work

In fact, some health workers claim that implementing StimNut has had positive effects on their routine activities. For example, some health workers point to the improved relationship between care staff and caregivers. For example, for one nutrition supervisor, the main benefit of StimNut was the rebuilding of trust between the caregivers and the nursing staff. More specifically, the agent maintains that StimNut has helped to deconstruct certain prejudices held by caregivers towards healthcare professionals ("*they say that this doctor is mean*"), which has ultimately facilitated communication and understanding of medical care. In fact, some health workers report changes in the attitudes and behaviour of accompanying persons, whether with regard to services *("they were devoted when it came to coming to the sessions"*), childcare ("*[now] the women take time to breastfeed their children*") or respect for procedures ("*with the arrival of StimNut, these women now respect the instructions given to them*").

In addition, according to one nutrition officer, improved relations with caregivers ensure better care for children[10] . In addition, some staff point to the reduction in consultation time as another positive effect of StimNut on their routine activities [11].

StimNut boosts the skills of healthcare workers

The health workers claim to have acquired new knowledge of psychosocial stimulation in relation to nutrition through the training offered by the project:

"I can say that here at the health centre with the promoters, we often talk to parents, **but there are things that StimNut does or says to parents that we**

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[10] E.g.*: "StimNuT brings children closer to their parents, it also brings us closer to the children's families, because we can stay in the ComHCs and find out what is happening in the child's family because of StimNuT's activities. I don't know if you understand. The StimNuT activities enable us to find out about the child's environment. If you know the environment in which they live, it will be easier for you to find solutions to their problems". (Nutrition officer)*

[11] Ex. *It's also been beneficial for me because the time I used to take to explain things is considerably reduced because StimNut already does these explanations*". Doctor; "*I used to work a lot, but when StimNut arrived, my working time decreased because the problem was understanding. With StimNut, mums understand quickly*" Nutrition officer

don't do [...]. StimNut is something that has brought us change, it has given us new experiences that are really useful". (Doctor)

"When StimNut arrived, we could say that we were still doing what we were doing, but we increased it a little because we saw another interest in addition to the old one, because since we have been at MSF, we had not yet received any training.

Indeed, some claim that StimNut was their first training course in psychosocial stimulation.

StimNut highlights the role of health educators/promoters

Finally, some educators said that before StimNut, it was difficult to demonstrate the effectiveness of the psychosocial stimulation they provided. According to them, the implementation of the project formalised the educators' expertise in psychosocial stimulation and, as a result, their work was recognised[12].

To sum up, the discourse analysis enabled us to identify various challenges faced by health workers before the implementation of StimNut. These challenges relate to the community (macro), health structures (meso) and professional activity (micro). The stories analysed provide evidence of the different responses given by StimNut to these challenges (e.g. involvement of fathers, support for caregivers, new framework to complement existing services, improved caregiver-caregiver relationships, skills enhancement, promotion of the role of educators). In other words, the implementation of StimNut is perceived as useful and effective because it provides concrete responses to existing challenges and difficulties at community and facility level.

5.2.4 Results of interviews with psychosocial workers (PSW)

The in-depth interviews with the three psychosocial workers (PSW) lasted an average of 1 hour and 15 minutes and reflected a wide range of developments and changes over time. The presentation of the results is therefore structured in the chronological order of the events covered in the accounts. The results provide information about the process of adapting the role of the PSW, as shown in Figure 12.

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[12] *E.g.: "Well, we can say that it has brought about a bit of change because we have seen that what we do is important"; "There are certain mothers who have personally congratulated me on the work I have done. Some mothers have told me that").* In these extracts, the educator's testimonial highlights how the StimNut training enabled them to formalise the value of their activities (we have seen that what we do is important) and the recognition of their work by the caregivers.

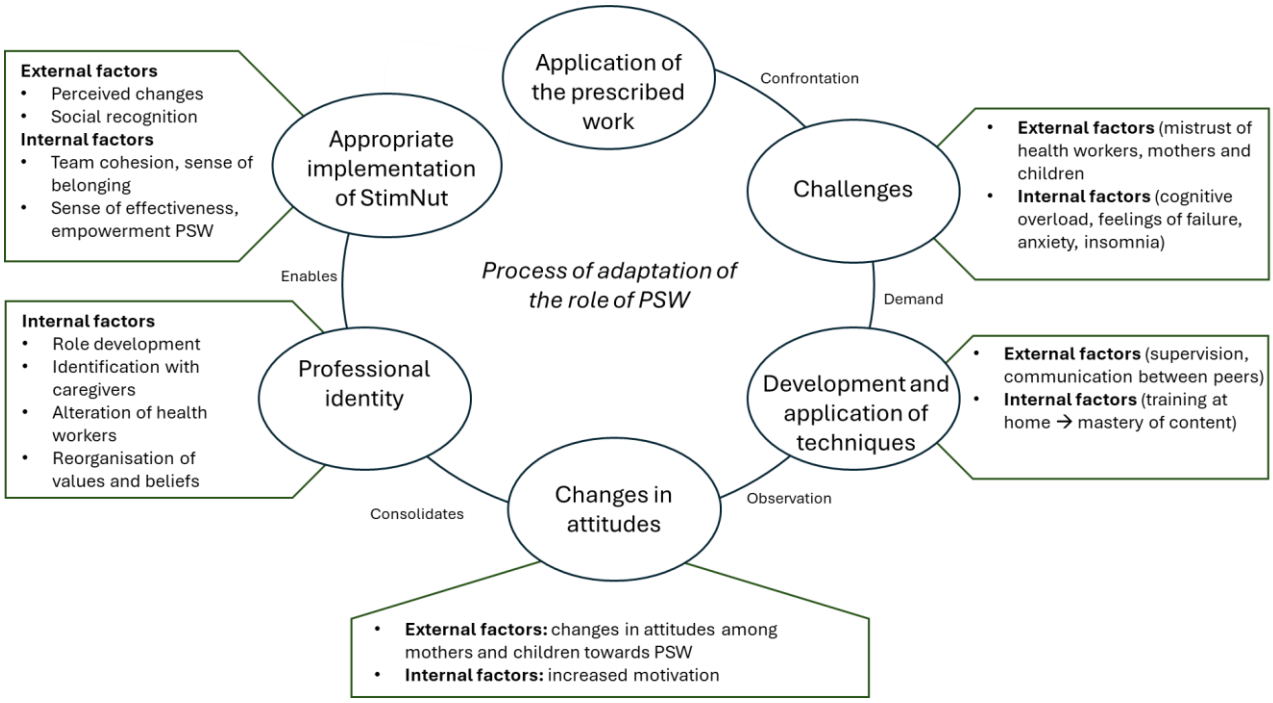

Figure 12 PSW role adaptation process

This represents the various stages in the adaptation process. First of all, the application of the *work prescribed* in the StimNut intervention *confronted* the PSW with multiple *difficulties* (e.g. cognitive overload, mistrust of others, devaluation, feelings of failure, anxiety). This difficult context *required* the PSWs *to develop techniques* for coping with the difficulties. Developing and applying these techniques enabled them to: a) *see changes in* the target population (caregivers and children); b) *consolidate* their *professional identity*. In this way, implementation led to changes at various levels (caregivers, children, fathers, health workers, PSW). More generally, these results provide information on the way in which the implementation of psychosocial stimulation sessions involved *adapting to the cultural context* (e.g. different roles to play with mothers, children and fathers) and *adapting to the existing healthcare system* (e.g. creating a place for oneself in a context of inequalities and hierarchical relationships). In what follows, we will look in more detail at these five stages in the adaptation process, using concrete examples.

5.2.4.1 Applying the prescribed work confronts PSW with a number of challenges and difficulties

The PSWs explain that they were confronted with four major factors which had an impact on their ability to carry out the activities prescribed in the intervention and which also had an impact on their well-being at work:

Difficulties in assimilating the StimNut material: Although rich, the PSWs perceived the content of the training and the intervention as dense, making it difficult to assimilate the information and take on board new knowledge. In addition, the pre-intervention questionnaires were considered long by the caregivers, which made it even more difficult to

implement the activities. For example, one of the PSWs spoke of the cognitive load and the effort required to complete the questionnaires ("I talk, I talk", "I do everything"), as well as the accompanying adults' rejection ("she doesn't like it"). More generally, the three PSWs said they had felt a sense of failure and doubt about their professional skills (e.g. "Oh, there's a new document every day, could I... get to the end of the study?", "we couldn't sleep").

Confronted with mistrust and rejection from caregivers: the three PSWs said that they had been confronted with negative attitudes from caregivers at the start of implementation. Two types of case were highlighted. On the one hand, some caregivers *"remained silent"* and *"were afraid"*. Others paid little attention to the PSW because they were in a hurry to leave the health facility[13] . Indeed, the mistrust of the caregivers led to difficulties in recruiting, signing consent and running the sessions. More broadly, the description of the beginning of their experience with the caregivers is built on words linked to ill-being, for example: "I always felt the blame was on me", "when you do something and it's negative all the time, it really discourages and depresses you", "you're going to feel anxious", "you won't feel at ease".

Children's suffering and mistrust: In addition, the PSWs expressed difficulties in interacting with children who, at the beginning of the sessions, were not receptive and sociable (e.g. "*He refused everyone, everything we did with him was negative. Everything we tried with him at the beginning was negative".* PSW2)

From curiosity to mockery and devaluation expressed by some health workers: Finally, the PSWs had to deal with different reactions from their health worker colleagues which had a more or less direct impact on their activities. All three PSWs agreed that some HCWs were curious and cooperative in carrying out StimNut activities. Nevertheless, two PSWs explained that for some health staff, the principle of confidentiality was difficult to understand and respect[14] . The health staff's mistrust manifested itself in their questioning of the PSWs ("*What's your level? [...]. How much do they pay you a month? Given that you spend all day talking to toys, how much do we pay you a month?*"), but also with accompanying adults (e.g. "*What did she tell you? What did you understand?*").

Distrustful and devaluing attitudes and discourse also manifested themselves in the form of mockery: "*Often when I went away to do the sessions [...] and I took the toys with me, there were others who made fun of me, 'You're here and being this tall, you're allowed to walk around with toys, and then you'd say you work like that*'". More specifically, there was a distancing of the role and activities of the PSWs on the part of some health staff, who associated toys with childish, "not serious" work and the word "psychosocial" with "crazy". According to two PSWs, this devaluation of their activities and role was experienced in particular at the hospital, where

[13] E.g. "*We called them and they took their time, at first they were a bit careless. You're going to feel that they're a bit careless*" (PSW2)

[14] E.g.: "*When I tell them it's confidential, some people can't digest it because they think, Firstly, we're colleagues in the same department. Secondly, it's the same project, so why all the confidentiality?* PSW1

the attitudes and discourse of colleagues were indifferent and/or suspicious of those of the ComHCs:

> *"That's why there's not enough curiosity at URENI [...]. [...]. Some people in other departments, or in the ComHCs, are really curious and want to know what we're doing. Especially when they see the toys, they're really curious because we have the toys with us all the time, so they say what do you do with these toys? They're curious. But at the ureni* ***they*** *don't,* ***they treat us like lunatics****, don't they? they say that it's the lunatics who are going to go dancing or singing somewhere.* ***They think that all we do is sing and dance*** *(laughs). But* ***they don't care, they're not curious, they don't give a damn****. [...].* ***At the ureni, no, they didn't take us seriously****.*

The PSWs were thus put to the test by certain health workers colleagues who sometimes represented social pressure (e.g.: *"Until there were some* ***nut officers*** *who said: 'eh,* ***if you don't change that little one****, he's going to distort* ***your*** *programme, isn't he?)*

5.2.4.2 Developing techniques for dealing with difficulties

External and internal factors enabled the PSWs to cope with the difficulties mentioned above. On the one hand, they say that the supervision and support provided by the coordinator and the time spent communicating as a team have been invaluable in helping them to find courses of action and to alleviate their concerns. For example, the PSWs emphasised the importance of taking informal time with the mothers to find out what was going on in their lives. The PSWs also explained that they practised at home, after working hours, in order to get to grips with the equipment. In addition, they have introduced various techniques to improve the quality of their relationships with the caregivers and the children. For example, being "cheerful", playing jokes, games and riddles with the caregivers, and "*not wearing a smock*" to differentiate themselves from the other health workers.

5.2.4.3 "It's stimulating! the perception of change, a source of motivation

From the second and third sessions onwards, the PSWs began to observe changes in the attitudes of the caregivers and the children. They reported that the children had become increasingly receptive and that communication with caregivers had gradually improved. Thanks to the application of the techniques developed, the PSWs emphasise that they have gradually "*won*" the confidence of the caregivers, which has manifested itself in an increasing amount of time and attention, the sharing of confidences (e.g. confidences about arguments or threats suffered within the family) and taboo issues such as the wish to set up clandestine family planning, i.e. without the husbands' agreement. At the same time, as the sessions progressed, the PSWs felt that they were "*better adapted to the protocol*".

5.2.4.4 Perseverance and empathy: a values-based professional identity

Analysis of the PSWs' discourse provided more information on the process of constructing their professional identity and enabled us to identify a number of roles linked to the activity (prescribed or implicit) of psychosocial workers.

"A moral therapy without a lab coat": Constructing and strengthening professional identity:

Discourse analysis reveals that the construction of the PSW's professional identity is based on a reconstruction of the relationship with the caregivers, who have become alter-egos, a process of alterisation (distancing) from other healthcare workers and a reorganisation of the system of values and beliefs.

Caregivers become alter-egos: First of all, the PSWs claim to have deconstructed the prejudices they had towards mothers of children with SAM thanks to their training and involvement with StimNut. For example, one PSW explained that before StimNut, she had negative attitudes towards the caregivers of children with SAM:

Before the study, [...] I'll say to them "and you, why didn't you come to hospital before? You only come to hospital now when the illness has got worse". My mum looked at me and just cried. So I used to get angry with the parents myself, whereas with the StimNut project I can see that it's no good, it's not good at all. I myself have benefited from it. ***I've never shouted at a mum, I don't judge anyone now. I'll ask them calmly to gain their trust****, really, it's had a big impact on me too... hmm (PSW3)*

Here, the PSW is highlighting a transformation in professional know-how. In addition, the deconstruction of prejudices has led to a more profound reorganisation of social relationships. Whereas prior to the study, the 'caregiver-companion' relationship was based on the hierarchical relationships that already existed in the healthcare system, in the case of StimNut, the PSW-companion relationship is based above all on the shared identity of '*woman*':

"As ***we're all women****, I think that****'s also why we've got their trust****. Because we're all women, we're all in the home and* ***we know all the difficulties in the home****, so they're going to express their problems to us and if we can help, we'll help, we can help morally." (PSW3)*

"We're all women, we're all Malians, we all have our problems. In society, we all have the same problems. *The problem you have, maybe I have the same problem at home. So you go and see if she's ready for us to discuss it and*

exchange ideas, you know. ***When you do that, you'll see that she's at ease and then, little by little, she'll trust you and talk things over****. (PSW2)*

In these extracts, the PSWs highlight both their shared identity as women and their professional know-how in building relationships of trust with the caregivers (e.g. "we can provide moral support", "when you do that, you'll see that she's at ease").

Alteration (distancing) of the health workers: analysis of the discourse reveals an opposition expressed by the PSWs between their know-how and interpersonal skills and those of the health workers. In fact, they describe the lack of support from health workers for caregivers (e.g. "*We can't talk to them [doctors] openly, we can't approach them, even though [caregivers] have recommendations, they're afraid to talk"; "Caregivers and patients have no support for doctors"*). This process of differentiation between the PSW and the other health workers can be seen not only in attitudes towards caregivers, but also in the behaviour (e.g. "*don't wear scrubs*") and values of PSWs. In fact, it was observed that the PSWs based their attitudes, practices and activities on the values of perseverance and empathy, giving them meaning and transforming them.[15]

In other words, the discourse analysis highlights a reorganisation of social relationships through the sharing of a common identity with the caregivers, who have become alter-egos, the deconstruction of the prejudices of mothers of children with SAM and differentiation from the beliefs and attitudes of other health workers, and an emphasis on the values of empathy and perseverance as the foundation of the PSW identity. The development of this particular professional identity has enabled the PSWs to develop and assume different roles.

The role of the PSW :

Discourse analysis enabled us to identify five types of role described (explicitly and implicitly) by the PSW:

Supporters for the development of childcare practices: this required motivating the adoption of childcare practices by the caregivers, and sometimes involved breaking down certain beliefs and habits (e.g. "*because at home, when you wash the child in the morning and in the evening, they will tell you that the child will catch pneumonia"*).

[15] Ex. sense of perseverance and empathy :
"Even when I went to see a mum, after getting her consent, if she didn't agree, I wasn't discouraged;
"You'll see that some mums are really more nervous, and some mums don't speak very well either. It's just the way they talk. When you say that, you'll see that the way she spoke to you is a bit bad, but you'll see that it's their way of speaking or you'll see that she has problems. That's why she can't control herself, that's why she talks to you like that.

Therapists: The PSWs defined their activity as "moral therapy" or "psychological support" for the caregivers, which involved listening and giving advice to improve their well-being. PSWs said that they provided "social support" for caregivers, particularly those who were isolated or ignored by family members. Moreover, in this role, the PSWs sometimes became sentinels of cultural mores, reminding them of certain norms, such as the sanctity of marriage, respect for hierarchy within families, etc. In addition, this "social support" sometimes required the PSWs to mediate between certain accompanying women and their husbands and fathers.

In charge of referrals: PSWs said that they played a role in listening to the difficulties and questions of caregivers and in referring them to other specialists or services to better meet their needs (e.g. referral to the midwife for family planning issues).

Mediators: The caregivers' trust in the PSWs and their expression of interest in their children's state of health had an impact on the system of hierarchical relationships between healthcare professionals. In effect, this configuration has positioned the role and status of the PSWs in a new place, where they perceive themselves and are perceived as legitimate vis-à-vis other health workers (including doctors), as spokespersons for the caregivers, as illustrated by the extract below:

> *"Apart from telling me that the child is suffering from malnutrition, so the child is already taking therapeutic food, they don't tell me anything. Can you try and tell me a bit more about the child's state of health?*

In this way, the PSWs ensure communication between the caregivers and the health workers and advocate for the caregiver-child to be taken care of, which sometimes requires certain health workers to deconstruct their prejudices about mothers of children[16] .

5.2.4.5 Towards appropriate implementation

Finally, the analysis of the discourse enabled us to identify external and internal factors which helped to consolidate the implementation of the intervention adapted to the context. On the one hand, the PSWs noted an improvement in the relationship between the caregiver and the child, the involvement of some fathers and a change in the attitudes of some health workers. Firstly, the PSWs reported changes in the practices of the caregivers, which contributed to improving the emotional and communicational bond with the children. In addition, the PSWs stated that they were more in demand by the caregivers and that they received their thanks:

[16] E.g.: "*Even if I'm sitting in the MSF admissions office, if I see a colleague who has judged a mother, I'll call the person and say 'what you've done is wrong, you're my colleague, the way you welcomed this woman, you mustn't do that. So you have to do that, you have to do that*".

"They kept saying that the study had had a positive impact on me personally, as well as on the child's care. So they kept thanking me, really, you've been brave! (laughs). [...] Well, the day we did the first session, she said that even this lady manages her words. I've only come to listen to her, I'm not going to be able to finish with the sessions. [...]. During the last session, she told me that she really couldn't tell me anything. There's been such a positive change in her, she doesn't even have words for me.

Secondly, the PSWs observed a change in attitudes towards children and the involvement of certain fathers. For example, one PSW explained that some fathers joined in and encouraged the women to take part in the sessions (e.g. "*some fathers told the women to hurry up, today you're going to see the PSW, you have to come on time*"). Another PSW said she had been touched by the case of a family where the psychosocial stimulation sessions had motivated interaction and strengthened the bond between father and child:

"He also said that he had never taken his child to play with him, but thanks to our session, now, as soon as he came home, he played with his child. Now, if he goes out, the child cries. Before, the child was there, he came and went, and the child didn't even look at his dad. But since the dad has started playing with him, talking to him and giving him little presents, the child is so interested in his dad, and I've really enjoyed that too.

The observations of changes in the father-child relationship reported by the PSWs were indirect, through what the caregivers told them (e.g. "*the mother appreciated it, she said that he wasn't even talking to his child*"), but also direct, as two PSWs stated that some fathers recognised and valued their work (e.g. "*Some dads congratulate us, some dads say that there have really been changes, on both the mother's and the child's side"). Some dads say that there have really been changes, both for the mother and for the child*").

Thirdly, the PSWs noted a change in the attitudes of some health workers[17] . In fact, the changes in the attitudes and behaviour of the caregivers led some health workers to recognise the role and effectiveness of the PSW's work.

[17] E.g.: "There are doctors who see that there are positive changes with mothers. Afterwards, they come back to us and say, Ah well, we don't know what you're doing, but with such and such a mother, there's been a positive change in terms of good care and maintenance of the child. Some of our colleagues used to come and tell us that a lot.

On the other hand, the discourse analysis highlights intra-group and intrapersonal processes which also consolidated the adapted implementation of the intervention. Firstly, the accounts express a feeling of belonging to the "StimNut" team. Communication between the PSWs was constant and took place in person (e.g. during meetings with the coordinator) but also via telephone calls and WhatsApp, sometimes outside working hours (e.g. "Even when we leave the field and come in, we also talk to each other"). In fact, the PSWs explain that internal communication time has enabled them to manage their emotions as a team (e.g. frustration or sadness following a relapse) and to collectively identify solutions to the caregivers' difficulties.

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*"We discuss this [difficulties] all the time because **it's become a team** and because the team is made up of three people and we were all very different, weren't we? The three of us didn't think much of each other. Yes. **At the beginning we didn't think much of each other** because we were in different departments and everyone was in their own department. But **now it's become like a family**, there's real support, really, really real support. We talk to each other and give each other ideas.*

This extract shows the evolution of the group's cohesion, its technical usefulness ("we give each other ideas") and its social interest ("there's support").

6 Discussion

The feasibility and acceptability study of adapting and then integrating the psychosocial stimulation intervention into the existing nutrition programme (FUSAM) was carried out in three phases. The expertise of the local project and research teams was crucial to understanding family dynamics in the Malian context, enabling more relevant and culturally appropriate observations and interviews.

The results of the exploratory phase (phase 1) provided food for thought and knowledge for the collaborative work carried out in phase 2. In particular, a number of barriers to childcare were identified (e.g. mothers' work overload, heavy dependence on heads of household in the event of a child's illness, the large number of children per family, lack of financial resources and knowledge, stigmatisation of mothers of SAM children) and taken into account in the rest of the study. The recommendations for adapting the FUSAM intervention that emerged from the PAR (phase 2) focused mainly on contextual aspects rather than on the content of the intervention. The modules of the FUSAM intervention were broadly aligned with existing care practices in the community. However, it is important to note that this alignment could vary in other contexts, which might require specific adjustments. PAR proved to be a fundamental step in ensuring a thorough understanding and positive perception of the intervention by the

various community players involved. Their contributions contributed to the acceptability of the intervention and its sustainability. PAR seems an appropriate method for involving stakeholders in adapting the psychosocial stimulation intervention. In fact, this process required the commitment of decision-makers, beneficiaries, healthcare staff and key players in the community. Our local partner AMEDD also played a key role in facilitating, documenting and summarising the workshops. In addition, significant financial and logistical resources were mobilised to hold the workshops. This allocation of resources was necessary to ensure the involvement of the participants and the effective implementation of the project.

Finally, the results of phase 3, the implementation of the intervention and the acceptability study revealed different levels of effect or change. At an individual level, the well-being and mental health of the caregivers were improved (reduction in symptoms of depression, increased sense of efficacy, increased commitment on the part of the women). It is interesting to note that the duration of the sessions increased over the course of the intervention, rising from 42 to 58 minutes on average between the first and fifth sessions. This reflects the time needed for the mothers to enjoy these exchanges and feel confident with the PSW.

At the interpersonal level, several improvements were observed: 1/improvement in the relationship between caregivers and their children (e.g. development of practices related to communication, affection and receptiveness) observed, for example, through measures of the quality of interactions before and after the intervention, 2/improvement in relationships with family members and friends (e.g. perception of greater involvement of fathers in childcare, some caregivers sharing their knowledge and skills within their household) and 3/improvement in relationships between caregivers and healthcare staff (e.g. deconstruction of prejudices towards mothers of SAM children among healthcare staff). In terms of care services, the results showed an improvement in the care of SAM children (e.g. health workers acquiring knowledge of psychosocial stimulation thanks to the study's training; clinicians saving time because caregivers are more serene and have a better understanding of their children's illness; caregiver satisfaction; inter-team collaboration facilitated by the creation and implementation of procedures and defined roles, etc.), as well as better care for children with SAM.), as well as better care for caregivers of SAM children (e.g. introduction of follow-up for caregivers with suicidal thoughts). These positive changes made the intervention acceptable to the caregivers, the PSW and the health workers.

In addition, adaptations were sometimes necessary during the implementation to respond to the situations encountered. For example, although we wanted to strengthen support for mothers, the presence of another family member, particularly fathers, during the sessions sometimes made mothers uncomfortable (they stopped expressing themselves), thus revealing power dynamics within the families. The sessions were therefore modified to meet this challenge. If necessary, the beginning of the session was held in the presence of the father, who was then asked to withdraw to allow a special moment of exchange with the mother. In addition, the detection of suicidal thoughts in some of the accompanying women highlighted the need to put in place a suitable treatment protocol. MSF therefore introduced

a specific protocol to offer immediate and appropriate psychological support, seeking to improve the safety and well-being of the participants.

Finally, the changes brought about by the implementation of the StimNut intervention (e.g. creation of the PSW post) in the care of SAM children were maintained. In fact, the intervention was continued in Koutiala after the study, and two PSWs continued to conduct the five psychosocial stimulation sessions with the caregivers and children. The objective of strengthening practices integrated into the care pathway was achieved.

6.1 Validation and possible limits

6.1.1 Validation

The StimNut psychosocial intervention has been a success both in terms of its implementation and its positive impact on the caregiver-child relationship, as well as on family dynamics and healthcare staff. StimNut is an intervention based on a flexible but rigorous protocol whose conceptual framework has been adjusted many times. Its appropriation by the psychosocial workers and the quality of the service provided have contributed to the interest shown by the caregivers and the appropriation of the space dedicated to the activities. Other studies report that psychosocial stimulation interventions are difficult to implement and that multiple factors influence the benefits. (47). In the context of StimNut, PAR facilitated the acceptance and integration of the intervention into the care of malnourished children.

Recent studies show and confirm a link between maternal mental health, particularly depression, and infant malnutrition, the latter being an aggravating risk factor (48–50). The deterioration in their mental health means that mothers are no longer able to provide the necessary and adequate care for their children (51). However, low-intensity psychosocial intervention can have positive effects on the child's well-being and development, as well as on the mother's mental health (52). In view of these results, it would be interesting to replicate this type of study by varying the intensity of the intervention.

Finally, although the intervention helps to improve the child's general condition, the link with nutritional status remains to be explored. Cohort follow-up studies after children have been discharged from hospital are rare. With a view to prevention, this would be worth exploring and assessing the impact on preventing relapses in malnourished children.

6.1.2 Limits

There were several limitations to the data collection tools used. Despite the measures taken, the PSW's assessment of satisfaction levels after the sessions may have been influenced by a social desirability bias on the part of the parents.

Although the PICCOLO tool has not been validated in Mali or other sub-Saharan African countries, it has been used in other contexts with limited resources, notably in Brazil (53). The scoring criteria were adjusted in collaboration with the local medical and research team to better reflect the Malian context. The observers noted, however, that family dynamics could be very context-specific, but repeating the observations twice gave a more reliable picture of their relationship.

The relatively small sample could limit the measurement of certain effects of the intervention (depending on the indicators used, this would have required a larger sample and the use of specific statistical methods) as well as the generalisation of the results. However, it should be remembered that this was a feasibility study.

The intervention also benefited from significant resources: a PSW team trained and supervised every fortnight by ACF, support from the coordination team, as well as monitoring of families during their transfer from the hospital to the health centres, etc. The PAR set up during phase 2 also required specific resources, which are not always available in traditional nutrition projects. The PAR implemented during phase 2 also required specific resources, which are not always available in traditional nutrition projects. These resources often exceed those of a standard nutrition project. It is therefore essential to adapt and transfer this intervention so that it can be reproduced in a more conventional context.

7 Conclusion

In conclusion, this study shows that it is feasible to implement a psychosocial stimulation intervention in the care pathways for children with SAM in a rural area of Mali. It showed good acceptability among the mothers as well as among the health staff and psychosocial workers.

A good synergy was found between the various stakeholders: beneficiaries, health staff, local players, members of the community, etc. The results of this study are encouraging and will help to improve programmes targeting maternal and child health and well-being.

In addition, the transformative effect of this study has led to MSF's desire to continue implementing psychosocial services in the care pathway for children with SAM in Koutiala. Since the end of the study, more than 200 sessions have been carried out in the hospital and 65 in the COMHCs in Koutiala, involving almost 300 families.

Finally, during the study period, needs were also identified in other contexts, and a proposed framework for replication of the psychosocial stimulation intervention in other MSF projects and/or contexts is being developed in order to scale up the psychosocial stimulation intervention.

To find out more:

In French: https://epicentre.msf.org/stimnut-une-recherche-action-communautaire-innovante-de-stimulation-psychosociale-pour-ameliorer-0

In English: https://epicentre.msf.org/en/stimnut-innovative-community-led-research-action-psychosocial-stimulation-intervention-improve

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