Development and implementation of a nutrition intervention programme in North West Pakistan: a realist framework

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SUMMARY

Maternal and infant malnutrition is prevalent in rural regions of NW Pakistan. This article reports on the use of a combination of a realist Context–Mechanism–Outcome framework and participatory appraisal methods to facilitate the development of a locally sensitive and responsive nutritional intervention programme. Data were gathered through a series of focus group (FG) discussions with local lady health workers, as well as pregnant and breastfeeding women attending an Emergency Field Hospital in North West Pakistan between May 2008 and March 2009. A nutrition intervention programme was implemented that involved cookery demonstration kitchens and free food supplements, coupled with nutrition and healthcare information and advice for pregnant and breastfeeding women. Subsequent FG discussions revealed that the programme had a positive impact on knowledge gained by women in the community and generated an openness to receiving and spreading knowledge. The framework, which rested on the use of a double feedback loop, involving local women, lady health workers, local researchers and UK-based researchers, has enabled not only the establishment of the programme, but has also given the local team the tools to apply for, and gain, further funding for the development of nutrition support services. The development of such methodological tools, which empower local researchers and service providers (wherever located) to operationalize local knowledge and assess interventions, is particularly relevant in international financially-constrained contexts.

Key words: breastfeeding; participatory style research; health promotion; poverty and health

INTRODUCTION

It is essential in any health promotion intervention to ascertain the contextual and cultural setting to health behaviour (Snowdon et al., 2008). While there is a growing body of research that illuminates the ways in which maternal dietary and infant feeding practices relate substantially to local cultural norms and constraints (Spiro, 2006; Scavendius et al., 2007; Bhutta et al., 2008; Dykes and Hall Moran, 2009), locally pertinent data are often missing. For example, some Muslim women adopt a dress code of complete or partial covering of the
body; they are thus exposed to little or no sunlight affecting their vitamin D status which can have serious consequences during pregnancy and lactation. Some cultural groups within parts of Africa and Asia prefer to avoid giving colostrum to the baby as it is seen as old milk, a waste product, contaminating or even poisonous (Wambach and Riordan, 2010). Without the establishment of such localized knowledge, the development of effective health promotion interventions is unlikely (Nutbeam, 1997).

Theories have been developed that enable the grounding of intervention development within the specific local cultural and geographic context (Chen, 2005; Donaldson, 2007). For example, realist methodologies (Pawson and Tilley, 1997, 1999; Pawson, 2003) pose that it is the interaction between the context of an intervention and its mechanism that enables the most favourable outcomes to be produced. The authors’ experience has shown that UK practitioners have found the use of a realist framework particularly relevant and useful in health promotion practice development and evaluation (Lhussier et al., 2008; Carr and Lhussier, 2008; Carr et al., 2008a,b). This paper presents an attempt to operationalize this strategy for service development in a rural province in North West Pakistan. It thus locates itself in the movement that Catford (2009) described as the development of a ‘science of delivery’ of health promotion interventions.

Realist approaches encourage practitioners to become explicit about the relationships between their context of work (Context), the intervention they deliver (Mechanism) and the expected outcomes (Outcome) from their interventions. In doing so, practitioners thus populate a ‘context-mechanism-outcome’ (CMO) framework, which poses that pairs of Context and Mechanism lead to the production of most favourable Outcomes: Context + Mechanism = Outcome. This enables a surfacing of often implicit forms of knowledge, which can be used to design intervention mechanisms within the particular local context. Practitioners are then encouraged to identify short-, medium- and long-term outcomes, which they expect the intervention might achieve. This strategy enables an explicit acknowledgement of the fact that for many health promotion interventions, the anticipated health improvement outcome may not be fully manifest until several years later. However, it is reasonable to identify short-term indicators that the eventual outcome (such as a reduction in rates of malnutrition for example) is likely to be achieved. Thus, incremental changes may occur as a consequence of the project activity, during the project or after its completion. Identification of such incremental changes is an important aspect of activity planning and evaluation.

The ethos underlying this study was that of participatory health research, as described by Wright et al. (2009), in that it aims to build on local strengths, to facilitate partnership and co-learning, is iterative and aims to achieve a balance between research and action. In this spirit, the tools described below represent both an academic methodological development, and a means to enhance local service provision.

Realism is not a research method, but an approach to enquiry which uses distinctive research strategies and design, with the aim of generating understanding of what works for whom and in what circumstances. The CMO framework is a tool that, we argue here, has the potential to aid intervention implementation, refinement and evaluation. This happens much in the same way as action research would, but with the added emphasis on the impact of context on intervention development and success.

This article describes how the CMO framework has been used to initiate the development of a nutrition intervention programme in a rural location in North West Pakistan. The context for this study is presented, as well as the communication strategies employed between the UK and Pakistan. The key methodological tools utilized are described, and the information gathered using the CMO methodology is presented.

The context for this study
This study was carried out in communities in close proximity to the Emergency Satellite Hospital (ESH) in Nahaqi in the Northwest Frontier Province (NWFP), Pakistan. The NWFP is one of four provinces in Pakistan and occupies a strategic geographical place in the region, providing a link to Afghanistan at one end and a connection to China at the other. It is ethnically diverse, though with a majority of Pushtun people, and has provided a stronghold to Taliban and associated militant groups in recent years. The province has a history of political instability with associated violence,
internal population displacement and economic difficulties; ‘the literacy rate is low, health care is scarce, and law enforcement capacity is weak. Illegal trade, smuggling and inadequate infrastructure undermine the economy.’ [(Abbas, 2010) p. 5]

The community surrounding the hospital in Nahaqi is mostly of Pakistani origin, but there is also a large Afghan refugee camp situated in close proximity. During the study, the local population served by the hospital increased due to an influx of internally displaced people, due to the unstable political and security situation. This put particular pressures on health care provision.

The data presented here were collected between May 2008 and March 2009.

**METHODS**

**Operationalization of the research: a triple feedback loop**

The study described here was complex in that it involved multiple partners across two countries. The following describes who these partners are, their role in the study and how the partnership between them was operationalized. This organization formed an integral part to the success of the study and is presented here as such.

**Service users:** Local service users are Pakistani and Afghan refugee women who live in the area surrounding the Nahaqi hospital; they were interviewed in order to ascertain their perception of the impact of their context on their nutritional practices as well as their expectations of the impact of a nutrition intervention once established.

**Health promoters:** The lady health workers (LHW) are a national workforce, trained to deliver health promotion interventions, with particular attention to mothers and children. They usually work in areas close to where they live, so that they have extensive knowledge of the particular community within which they practice. This model is used throughout the world, on the premise that health promotion messages delivered by people known locally are more likely to be adopted. From the onset of the project, this knowledge base was acknowledged and considered key to any service development. LHWs were thus not only assisting with practical data collection tasks, but helping to draw meaning from their, and their service users’ experiences.

**Local researchers** (M.Z., S.B.): are also the service implementers and co-authors to this article.

**UK based researchers:** bring expertise in nutritional issues (N.L.), in qualitative research methods in maternal and infant health (F.D.) and in realist approaches to evaluation and practice development (M.L.).

There were some unique challenges to this study, which need to be acknowledged. These relate to the remoteness of the UK-based researchers, as well as to the fact that the local researchers were acting simultaneously as researchers and practitioners. The range of methods proposed (detailed below) aimed to acknowledge and make the most of these levels of expertise and relationships, while putting the emphasis on local knowledge in the identification of need. UK-based researchers introduced the CMO framework to the local researchers and worked with them to develop the best pragmatic tools to use it with the LHW. During the life of the project, frequent and regular communication between Pakistan and the UK was therefore crucial. The UK-based researchers also developed the participatory appraisal (PA) tools to be used by the local LHW with service users. The project therefore featured the following triple-feedback loop, with information passed between the members of the research team as illustrated in Figure 1. Information sharing and decision making followed an iterative pattern with multiple passes through the feedback loop throughout the study.

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**Fig. 1:** A triple feedback loop.
Ethical considerations

Ethical approval was gained from the University of Central Lancashire, Faculty of Science and Technology ethics committee. At all stages of the research participant autonomy and confidentiality was fully protected. Particular attention was paid to best manage sensitive issues surrounding the participation of women in research.

METHODOLOGICAL TOOLS

The CMO framework

The CMO framework, through close collaboration between researchers and practitioners, poses three sets of questions, designed to surface a knowledge base which is often implicit in experienced practitioners:

(i) What are the range of personal, social, economic and environmental factors that determine the health status of mothers and children in this area? Why is it particularly important to target them? (context)

(ii) What activities/interventions are anticipated to be the most effective and/or acceptable in this context? (mechanism)

(iii) What outcomes would indicate success? (outcome)

In the study reported here, this format was used not only with the Pakistan-based service developers (with UK-based researchers guiding them to identify CMO configurations), but tools were developed so that they could engage both the LHWs and the local community, in identifying the needs (exploration of context) and designing the most appropriate interventions (mechanisms). This formed an iterative loop of information sharing (as illustrated in Figure 2), which enabled the development and refinement of the CMO configuration(s). This is represented in Figure 2.

Participatory appraisal

The principles of PA were used to guide the data collection activity with service users, and engage them in the CMO framework. This choice was made for both pragmatic and philosophical reasons. At a pragmatic level, there is a strong need to acknowledge and respect the informal nature of many local relationships. PA facilitates data collection by local researchers and LHWs, without the introduction of external researchers or ‘experts’. On a philosophical level, PA is in keeping with the aims and approach of local researchers as service developers.

Indeed PA can be used as a tool to ‘identify local needs and priorities, place issues in the context of people’s lives and give direction to programme development and service provision’ (Koning and Martin, 1996).

It has an aim to ‘break the monopoly of professional knowledge and communication’ (Rifkin et al., 2000) and opens access to a wide population, as it allows communication via the written or spoken word and visualizations. In PA, the emphasis is therefore placed on the use of tools and techniques which are highly visual in order to try to overcome literacy problems and strive to maximize participation rates within the community. It inherently acknowledges the potential power relationships between researchers/practitioners/communities, and is designed to minimize them, by giving local people an explicit voice (Plottu and Plottu, 2009). PA sessions are often undertaken in small peer groups, where participants are comfortable with each other. There are a large range of PA methods and tools that can be drawn upon. These include (among many others) use of secondary sources, semi-structured interviews, mapping, timelines, oral histories and biographies, seasonal/daily calendars, spider/’brainstorm’ diagrams, role-play, observation, photographs or video, matrix and pair-wise ranking or flowcharts (Rifkin et al., 2000).

One key advantage of PA in this project was therefore that it simultaneously produced verbal
and written information from service users, which directly fed into the CMO framework used with the local researchers. The participation of local people, through the use of PA, therefore informed both the service development and its subsequent evaluation.

**STUDY DESIGN**

Practically, the project ran in three interrelated phases (represented in Figure 3).

**Phase 1**

UK-based researchers interviewed the local researchers, using the CMO framework (Pawson and Tilley, 1997). This guided them to make explicit statements about the context in which they were working. This context also included a wide range of related information, collected either directly, for example mothers’ nutritional status, or indirectly when local ‘grey’ literature was accessed (e.g. locally written reports and surveys). This included any information relevant to understanding the contributing factors to maternal and infant nutrition, such as access to clean water; dietary habits information; vaccination data; data on infant malnutrition; pre-existing evidence of avitaminooses in the population in general and pregnant women in particular (vitamin A, iodine, iron); potential security issues; cultural values/beliefs surrounding nutrition in pregnancy, breast feeding and weaning. From this, an intervention programme outline was established.

**Phase 2**

The local researchers ran a series of three focus groups (FGs), at 2 months intervals, with the LHW. From the context and potential mechanisms established in phase 1, the UK-based researchers helped the local researchers to refine the questions to be explored in the FGs.

The first FG occurred concurrently to the setting up phase of the intervention, and explored the LHW’s views of local population need around maternal and infant nutrition. They were also involved, during this initial FG, in setting up the format of the intervention and mode of recruitment (advertised locally, through word of mouth, through hospital referral). The role of the LHWs in relation to the intervention was also determined during the FG, and they were asked to identify their own training needs (if any) with regards to maternal and infant nutrition.
This FG fed into the CMO framework, so that it could evolve and remain adapted to the progress of the project. Potential intervention outcomes identified by the local researchers were shared and augmented by the LHW in a subsequent FG. Those agreeing to take part in the project further were asked to evaluate short-term outcomes, and feed them back at the third FG. They were also asked to gather local women’s views, using PA tools.

Beyond the sharing of early outcomes, the third FG focused on progress since the setting up of the nutrition intervention programme, and on suggestions for further improvements or adaptations. These FGs therefore formed an action learning loop, allowing the project to evolve in concordance to local need.

**Phase 3**

Phase 3 consisted of the LHW gathering the views of women living in the area surrounding Nahaqi hospital. Practically, this took the form of home visits, and group work organized with local women, all fitting around the LHWs working day. The participatory tools used were designed by the UK-based researchers, in conjunction with the local researchers, in view of phases 1 and 2. Women were encouraged to discuss health issues for these groups, identify causes of childhood illnesses such as diarrhoea and potential solutions. Where gatherings would happen anyway, for example when women would queue up to be seen at Nahaqi hospital, a proportion of time would be allocated to the research. Minimal disruption was thus achieved for both local women and LHWs. LHWs would communicate any finding or observation on a regular basis to the local researchers. In addition and in an iterative manner, this work fed back into the third FG between local researchers and the LHW. Progressively, but quite rapidly, this iterative loop supported the setting up of the most culturally sensitive and effective set of interventions.

**RESULTS**

**Context**

Contextual information was provided from the Malnutrition Assessment survey that was performed in 2004–2005 in under 5-year-old children and their mothers in the Federally Administered Tribal Areas (FATA, consisting of six agencies and five frontier regions) under the ‘Child and Mother Promotion Project’ (personal communication). Key outcomes were: protein energy malnutrition in young children was a serious problem with 36% of the children being underweight and 33% of short stature. Based on body mass index, 28% of the mothers were found to be malnourished. Iron, iodine and vitamin A deficiencies were major problems for mothers and children. Calorie consumption for approximately 40% of women was less than the Recommended Daily Allowance. Both the local researchers and the LHW strongly emphasized the fact that pregnant, breastfeeding women and young children constitute a nutritionally vulnerable group.

Key structural and cultural barriers were women’s lack of general education, low level of awareness of nutritional issues, gender inequalities and poverty. Local women live within extended families and have significant household responsibilities. Although they cook family meals, male and elderly members of the household eat first and the women and children last. In one case, the husband was reported to be taking illicit drugs making the financial situation worse:

My husband is not educated and he is a labourer by profession and often takes drugs. We hardly fulfil our expenses. We cannot afford good food. (participant E)

The LHW noted that most women do not realize the need for higher energy intake during pregnancy and the lactation period. Repeated and closely spaced pregnancies were also seen to contribute to the lack of resources and maternal and child ill health.

When asked about where they have learned about breastfeeding practices, participants mentioned the LHW, midwives or doctors; family members, such as mothers-in-law, also featured. Women requested further health education and wanted men involved:

Some training sessions for the common people should be conducted regarding health education. If possible the male [family] members should be involved for building their attitude, as they are the main decision makers in many aspects. (participant G)
Some women avoid giving colostrum as it is sometimes thought to cause diarrhoea and other complications. Instead, some may give a local herbal liquid referred to as ‘Ghutti’ (honey, butter mixed with sugar, glucose and other liquids). LHW reported that late initiation of breastfeeding is much more common in the Afghan refugee population. Some participants referred to religious guidance to determine the most desirable breastfeeding duration:

The ideal breastfeeding duration is up to two years according to Islam. (participant D)

If a mother becomes pregnant she is likely to cease or decrease breastfeeding, as the continuation of breastfeeding is considered to adversely affect the health of the unborn baby. Talking about weaning practices, the early use of cow or buffalo milk was highlighted, but women reported little knowledge with regard to dilution and hygienic bottle feeding practices.

Large family sizes and heavy workloads in the fields and in the home meant that it is common practice for women to use sedating drugs. Examples include antihistamines and herbs such as ‘doda’ (poppy syrup—the pulp is boiled and the extracts are given to the babies).

Mechanisms

The LHW were very proactive in suggesting potential intervention strategies, building on the services already in place in Nahaqi. They highlighted the need for better motivation and attitudinal changes in the community, which could be achieved through nutrition and health awareness programmes aimed at the female segments of the population. Special emphasis should be given to major issues like exclusive breastfeeding practices, weaning practices, hygiene, family planning and birth issues. They suggested that senior male members of the community should be involved in the awareness programmes to facilitate changes in attitude, as they are often the decision makers. The provision of incentives for the community to engage with these awareness programmes was proposed, as well as the need for continuous professional development and training for the LHW.

Given the data gathered thus far, an intervention implementation strategy was discussed and agreed between local researchers and UK-based researchers. It was felt that practical cookery demonstration kitchens offered weekly would be a good low tech, low cost intervention that would engage local women. It is important to note here that women may lack opportunities to

<table>
<thead>
<tr>
<th>Table 1: Summary of nutrition and health education</th>
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<tr>
<td>Information given to mothers of infants under 3 years of age</td>
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<tr>
<td>Importance of food groups and a balanced diet</td>
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<tr>
<td>Supplementary diet for malnourished children and mothers</td>
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<tr>
<td>Feeding children during illnesses</td>
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<tr>
<td>Hygiene, especially hand washing</td>
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<tr>
<td>Diarrhoea prevention</td>
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<tr>
<td>ORS (Oral rehydration salt)/WSS(Wheat salt solution)—distribution as necessary</td>
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<tr>
<td>Malaria prevention</td>
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<tr>
<td>Importance of growth monitoring</td>
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<tr>
<td>Family planning</td>
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<tr>
<td>Information given to pregnant and lactating mothers</td>
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<tr>
<td>Importance of having an antenatal card</td>
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<tr>
<td>Importance of diet during pregnancy and lactation</td>
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<tr>
<td>Hygiene</td>
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<tr>
<td>Importance of TT(tetanus toxid) vaccine</td>
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<tr>
<td>Safe delivery (by trained birth attendant)</td>
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<tr>
<td>Early initiation of breastfeeding (within one hour of birth)</td>
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<tr>
<td>Exclusive breastfeeding for first 6 months of life</td>
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<tr>
<td>Complementary feeding after 6 months of age</td>
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<tr>
<td>Continued breastfeeding for 2 years</td>
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<tr>
<td>Complete immunization before first birthday, especially measles</td>
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<tr>
<td>Information given at demonstration kitchens</td>
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<tr>
<td>Importance of food groups and their role in the development and growth of children</td>
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<tr>
<td>How to offer children a balanced diet with locally available and affordable foods</td>
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<tr>
<td>Feeding children during illnesses</td>
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socialize and are therefore likely to engage in any gathering activity that they can justify going to. If the cookery sessions are seen to be part of the care provided by the hospital, they are likely to be able to attend without too much resistance. A Nutrition Support Programme was developed that included both education and nutritional screening and monitoring of mothers and infants. The education was in the form of cookery demonstrations and the giving of basic nutrition, breastfeeding and health advice (Table 1). Incentives were provided in the form of food (milk powder, rice, pulses) and nutritional supplements for those identified as being malnourished at the screening clinic.

Outcomes

Local women reported increased awareness of the nutritional needs of pregnant and breastfeeding women, though many identified limited financial resources as a major detrimental factor. This very argument convinced participants that breastfeeding was the cheapest, most available and hygienic infant feeding method. They reported increased knowledge about recommended time for initiating breastfeeding and adequate weaning practices. Examples were given of potato, kheer, pudding or rice.

I attended a part of a session in ESH. I have learnt a lot. When I visited the hospital for the first time I had problem with less breast milk but they guided me properly about food and how I can increase breast milk. Now I am happy that I am feeding breast milk to my child. (participant 15)

Many participants declared trying to put into practice what they had learned at the cookery demonstrations, but some said that they were limited by lack of money:

I do practice because they taught us in hospital during feeding sessions how we can make healthy diet for our children from easily and cheap available food. And I try to spread these messages among females. (Participant 15)

This last comment may provide an important intervention mechanism, which will need to be explored. Indeed, in such tight knit communities using ‘snowball’ tactics for health promotion message dissemination may be key.

DISCUSSION

The use of a realist framework for this project has enhanced the development of a nutrition support programme in a rural region of North West Pakistan. Specifically, it has involved the community and local health workers in the design and mode of delivery of much needed nutrition support in the form of supplementation, education and the monitoring of the nutritional status of mothers and infants. The success of the programme in reducing infant malnutrition is currently being evaluated quantitatively, however this is an iterative process that will continue as the nutrition support programme develops and adapts to the ongoing changes in local communities. Examples of these are the movement of internally displaced people from the more remote mountainous regions into NWFP, and also refugees from the recent floods in the region. Ability to adapt and respond to such changes is vital. After this study was initiated, the ESH was asked by UNICEF to step up its malnutrition screening and feeding activities. The demonstration kitchen was closed and the emphasis was placed on providing nutrient supplements for those identified with malnutrition. Nutrition and health education continued to be given to all women attending the ESH for screening. In addition, and following this work, teams of LHWs went into the communities served by the hospital to deliver nutrition and health education which also included males, and this, for the first time. As the project progresses, it is anticipated that further FGs will be organized between local researchers and LHW, with a shifting focus on improved and adaptable intervention mechanisms, intervention outcomes and their measurement.

This study has also provided local researchers with the tools and arguments to successfully bid for further funding for intervention development. Thus, while empowerment was not an explicit aim of this study, it is clear that it has had repercussions for the local researchers. It has enabled them to (i) rationalize the development of the service, in a way that is most sensitive to local needs as identified by the community; and (ii) given them the tools to evaluate its effectiveness. In this area of Pakistan, the LHW’s provide an ideal combination of both health worker and mother-to-mother supporter that is akin to lay health advisor schemes in the
Western world. Empowering such a grass root workforce to assess and surface their cultural knowledge is a key and transferrable component to any intervention development.

Methodologically, the prospective use of a realist framework (Pawson and Tilley, 1997), in combination with participatory appraisal techniques (Koning and Martin, 1996), offers real potential to health promotion development in countries where political and economic priorities may sometimes prevail. It offers a flexible framework that has the potential to empower local practitioners and that can mature with the project. The value of using participatory techniques in similar situations has been established elsewhere (Leung et al., 2004; Snowdon et al., 2008). Thus, the combined methodology offered a successful framework for engagement at the level of both service users (with participatory appraisal techniques) and local researchers (with the CMO framework), thus reducing the gap between research and action. As Plottu and Plottu (Plottu and Plottu, 2009) have highlighted, it is of course difficult to establish how much of the preconditions for successful partnerships could be met in Nahaqi. With the evolving socio-political situation, ensuring partnership sustainability and effectiveness between local women, LHW and local researchers might prove a continuous challenge. However, this project has sown the seeds of participation in intervention implementation and evaluation.

**CONCLUSION**

The methodological combination employed in this study, which also enabled UK-based researchers to work ‘remotely’, could be translated in many contexts. A recommendation thus emerges from this project, which is the increased refinement of the use of realist methodologies in a prospective, participatory and remote manner to enable health promotion developments in developing countries. As far as the intervention presented here is concerned, collaborative work is ongoing and expanding as this article is being published. The next steps of methodological development will involve a greater emphasis on the identification of intermediate intervention outcomes, and their measurement. They will also focus on developing means to create favourable conditions to participation, capable of withstanding influx of refugee or internally displaced populations.

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