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Design and implementation of tailored intervention to increase vaccine acceptance in a Somali community in Stockholm, Sweden - based on the Tailoring Immunization Programmes approach

Asha Jama^{b,d,1}, Emma Appelqvist^{b,c,1}, Asli Kulane^d, Susanne Karregård^e, Johanna Rubin^f, Sahar Nejat^g, Katrine Bach Habersaat^h, Cath Jacksonⁱ, Robb Butler^j, Ann Lindstrand^k, Karina Godoy-Ramirez^{a,*}

^a Public Health Agency of Sweden, The Office of the Head for Communicable Disease Control and Health Protection, Nobels väg 18, SE-171 82, Solna, Stockholm, Sweden

^b Public Health Agency of Sweden, Department of Public Health Analysis and Data Management, Nobels väg 18, SE-171 82, Stockholm, Sweden

^c Lund University, Faculty of Medicine, Clinical Microbiology, Department of Translational Medicine, Jan Waldenströms gata 59, 205 02, Malmö, Lund, Sweden

^d Karolinska Institutet, Department of Global Public Health, Tomtebodavägen 18A, SE-171 77, Stockholm, Sweden

^e Public Health Agency of Sweden, Department of Communication, Nobels väg 18, SE-171 82, Solna, Stockholm, Sweden

^f Public Health Agency of Sweden, Department of Public Health Analysis and Data Management, Nobels väg 18, SE-171 82, Solna, Stockholm, Sweden

^g Paediatric Public Health and Immunization Unit for Stockholm County, Tideliussgatan 12, 118 69, Stockholm, Sweden

^h World Health Organization (WHO) Regional Office for Europe, Behavioural and Cultural Insights Unit, Marmorvej 51, DK-2100, Copenhagen, Denmark

ⁱ World Health Organization (WHO) Regional Office for Europe, Vaccine Preventable Diseases and Immunization, Marmorvej 51, DK-2100, Copenhagen, Denmark

^j World Health Organization (WHO) Regional Office for Europe, The Regional Director's Office, Marmorvej 51, DK-2100, Copenhagen, Denmark

^k World Health Organization (WHO) Headquarters, Department of Immunization, Vaccines and Biologicals, Unit Essential Programme on Immunization, 20 Avenue Appia, 1211, Geneva 27, Switzerland

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ABSTRACT

Objectives: Sweden has had a high and stable vaccination coverage for measles-mumps-rubella (MMR) vaccine (>96%) through the national immunization program (NIP), but coverage rates highlight local pockets of lower vaccination coverage. This project addressed low MMR vaccine acceptance among parents in a Somali community, in Stockholm. The objective of the intervention was to increase vaccine confidence and MMR-vaccine uptake and also to inform practices addressing vaccine acceptance.

Study design: This paper describes the design and implementation of a multi-component intervention based on the Tailoring Immunization Programmes (TIP) approach, developed by the WHO European Regional Office.

Methods: The theoretical underpinning of TIP is the Capability, Opportunity, and Motivation Model (COM-B model) and Behaviour Change Wheel framework (BCW), adapted for vaccination. The COM-model was used to identify barriers and drivers to vaccination and intervention types. The TIP-phases described in this paper are: pre-TIP (planning), three succeeding TIP phases (situational analysis, formative research, intervention design) and the post-TIP phase (implementation).

Results: The situation analysis and formative research revealed that parents feared the MMR vaccine due to autism or that their child would stop talking following vaccination, despite lack of scientific evidence for an association between autism and MMR vaccines. Barriers were linked to their associated COM-B factors and mapped to appropriate intervention types for two target groups: Somali parents and nurses at the Child Health Centres (CHC). Selected intervention types targeting parents were education, persuasion and modelling whereas education and training were selected for CHC nurses. The intervention activities included community engagement for parents, while the activities for nurses focused on improving encounters and dialogue with parents

* Corresponding author.

E-mail addresses: Asha.Jama@folkhalsomyndigheten.se (A. Jama), Emma.Appelqvist@folkhalsomyndigheten.se (E. Appelqvist), Asli.Kulane@ki.se (A. Kulane), Susanne.Karregard@folkhalsomyndigheten.se (S. Karregård), Johanna.Rubin@folkhalsomyndigheten.se (J. Rubin), sahar.nejat@regionstockholm.se (S. Nejat), habersaatk@who.int (K.B. Habersaat), cath@validresearch.co.uk (C. Jackson), butler.robb@gmail.com (R. Butler), lindstranda@who.int (A. Lindstrand), Karina.Godoy@folkhalsomyndigheten.se (K. Godoy-Ramirez).

¹ Jama and Appelqvist have shared first authorship.

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having low vaccine acceptance. Following the intervention design the activities were developed, pilot tested and implemented.

Conclusion: This study confirms that the TIP approach is valuable for guiding a stepwise working process for a thorough understanding of barriers and drivers for MMR vaccination among parents in this Somali community. It facilitated the design of a theory and evidence-informed intervention targeting parents and nurses.

1. Introduction

Immunization is one of the most efficient public health measures for preventing disease, saving more than 4.4 million lives worldwide each year [1,2]. Vaccination provides the possibility to eradicate certain vaccine-preventable diseases (VPD) if a high vaccination coverage is achieved and sustained worldwide. However, in 2013 at the start of this project, 15% of 2-year old children did not receive a measles-containing vaccine, and disparities in coverage exist in most countries [3]. Reports over the last 10 years have highlighted challenges related to vaccine confidence and vaccine hesitancy [4–7], increasing the risk for outbreaks due to partially or unvaccinated children [8,9]. Vaccine hesitancy, defined as “a delay in acceptance or refusal of vaccines despite availability of vaccination services” [10] is both complex and context-specific, influenced by a variety of factors such as; individual perceptions and values, structural and health service-related conditions as well as scientific, economic, psychological, cultural and political factors [11,12]. Several studies highlight the importance of individual attitudes towards vaccination [4,6,11,13,14], as well as the critical role of health professionals in parental decision-making regarding vaccination [15–19]. The importance of having open and accepting approaches in discussions regarding vaccination have been highlighted previously [15,16]. Addressing vaccine hesitancy is a global priority and public health authorities are searching for effective strategies to address vaccine hesitancy and vaccine confidence [20].

The World Health Organization (WHO) European Region remains committed to achieving the goals of the European Immunization Agenda 2030 [21]. The WHO/Europe developed the *Tailoring Immunization Programmes (TIP)* approach, to offer a process through which to identify populations with lower immunization coverage, to better understand their barriers and drivers to vaccination with a view to developing tailored and targeted interventions [22,23]. In Sweden, the national immunization program for children (NIP) is voluntary, free of charge and implemented by the Child Health Services and the School Health Services [24]. The first Measles, Mumps and Rubella (MMR) vaccination is given at 18 months with a second dose at 7–8 years. For more than a decade, Sweden has had a high and stable MMR vaccination coverage rate of >96% for two-year-olds. However, there are pockets with lower vaccination coverage rates, particularly vulnerable to measles outbreaks. With this in mind, the Public Health Agency of Sweden (PHAS) implemented a TIP project Sweden in 2013 (based on the TIP Guide version 1, 2013) [25] which focused on the formative research (TIP phase 1&2) in three communities identified to have lower MMR vaccination uptake: the anthroposophic [26], Somali community in northern Stockholm [27–29] and undocumented migrants [30]. Following the formative research, a decision was taken to proceed with an intervention phase only in the Somali community.

The theoretical underpinning of TIP [31] is the Capability-Opportunity-Motivation-Behaviour (COM-B) model and the Behaviour Change Wheel (BCW) framework [32], both adapted for vaccination behaviours [31,32]. The COM-B model identifies three inter-linked factors, capability, opportunity and motivation that need to be present for any health behaviour to take place. The model was chosen as it encompasses a broad range of individual and contextual factors affecting health behaviours.

The TIP approach has been implemented in several countries 2013–2021, targeting different communities and thus, several papers have been published describing the TIP process [23,40–50]. However, this

study was one of the first projects using the TIP approach that went beyond identification of susceptible groups and diagnosis of challenges and design to implementation of tailored strategies for long-term behavioural change.

This paper describes the formative research (Phases 1 & 2) as well as the intervention design and implementation (Phase 3 & Post-TIP) of the TIP project Sweden, targeting the Somali community (see Fig. 1). The development and design of the activities were based on the adapted COM-B model [31,32].

2. Method - TIP phases

We describe below the setting and phases of the TIP project that started in 2013 and is still ongoing, with a particular focus on the intervention design and implementation phases.

2.1. Setting

The Somali community is located in Rinkeby and Tensta, two neighbouring districts in northern Stockholm. At the start of the TIP project 2013, there was a Child Health Clinic (CHC) in each district. The area has an increased risk of outbreaks due to low MMR vaccination rates around 70% since 2002 [33]. The year coincides with the publication of a later refuted article, by Andrew Wakefield, on a presumed link between autism and the MMR vaccine [33,34]. Both districts have a high percentage of residents with foreign background and approximately 30% are of Somali origin [33].

2.2. Pre-TIP – planning

This phase aimed to prepare and secure funding for the TIP project Sweden. It involved project planning, securing ethical clearance, allocation of budget, establishing a TIP Core Group (TCG) and steering committee, engaging stakeholders and allocating dividing roles and responsibilities. The TCG included experts in public health sciences, epidemiology, immunology, vaccinology, health communication and paediatrics at the PHAS; paediatricians at the Regional Preventive Child Health Services, Region Stockholm; and a public health researcher with expertise on global and migrant health at Karolinska Institutet. The steering committee at PHAS – consisted of the State Epidemiologist, the Head of Vaccine Unit and the Manager of the childhood vaccination program. It met regularly and provided support, guidance and oversight for all phases of the project. Stakeholders were vaccine experts from the Health Communications Unit at the European Centre for Disease Prevention and Control who participated in the situational analysis (Phase 1). A community reference board (CRB) consisting of five Somali speaking community organizers and social workers, provided guidance and expertise for intervention design and implementation (Phase 3, Post-TIP phases).

The phases and planned timeline are illustrated in Fig. 1.

2.3. Phase 1 - situation analysis

This phase aimed to get an overview of existing evidence regarding barriers and drivers to MMR vaccination in the Somali community with the support of stakeholders.

Workshop 1: The PHAS identified key stakeholders to participate in a workshop on March 11th and 13th, 2013, facilitated by TIP experts from

WHO/Europe. Participating stakeholders (n = 16) were vaccine experts, researchers, public health scientists, paediatric public health and immunization advisors. Specific objectives of the workshop were to [1]: share information on the current Swedish immunization situation and system and analyse strengths, weaknesses, opportunities and threats (SWOT) [2]; create a common understanding of the phases of the TIP approach [3]; review what was known regarding MMR vaccination coverage, barriers and drivers to vaccination of the Somali community.

The output from the workshop was a plan for the next research phase to explore barriers and drivers to MMR vaccination. Specifically, to understand the parents who accept, delay or refuse MMR vaccination; to understand knowledge gaps, their questions and concerns raised regarding vaccination in general, and MMR in particular, as well as health workers' experiences of MMR vaccination in the setting.

2.4. Phase 2 – research

This phase aimed to conduct formative studies to build on the insight from the situational analysis by gaining the community and child health nurses perspectives. This research was approved by the Regional Ethical Review Board in Stockholm, Sweden, Dnr 2013/678–31/3.

Two linked qualitative studies were undertaken in 2013 aiming to explore barriers and drivers to MMR vaccination from the perspective of Somali parents and child health nurses. Individual in-depth interviews with 13 parents and 11 child health nurses, were conducted. The process of recruitment, data collection and data analysis has been described elsewhere [27,28]. The findings [27,28] were merged with knowledge from the first stakeholder workshop and presented in a conceptual map organized by the COM-B factors (see Fig. 2). The theoretical structuring of TIP that guided the early phases of the project in 2013 [25] was different, although rather similar, to the updated COM-B model 2019 [31]. In the early version of the TIP guide the COM-B factors were termed as “opportunity, support and personal motivation” while in the adapted COM-B model, the factors were named as “capability, opportunity and motivation” [25,33]. Thus, the conceptual map in this paper illustrated in Fig. 2 has been updated to reflect the introduction of the COM-B model into the TIP approach [31].

The TIP conceptual map provided an overview of the main factors organised by the –capability, social and physical opportunity and motivation factors [31] influencing MMR 1st dose vaccination behaviours among parents of Somali origin in Rinkeby and Tensta. Capability

and motivation relate to the individual factors while opportunity relate to the contextual ones. Parent barriers to MMR vaccination were evident across all three factors, whilst drivers for motivation and opportunity factors (not capability) were in place. In short, parents who did not vaccinate their children according to the schedule for the first dose MMR at 18 months, feared that the vaccine would cause side-effects such as autism or that their child would stop talking following MMR vaccination. There is a temporal association at 18 months of age since the recommended time for the first dose of MMR coincides with the time of onset of the first symptoms of autism. These concerns were reinforced by negative peer pressure and a perception of unpleasant encounters with nurses [27]. In addition, newcomers to the area have in general a more positive attitude towards vaccines, however, they become more skeptical and vaccine hesitant the longer they live in the area due to peer pressure not to vaccinate their children. The results highlighted a need of support in skills and training to improve communication and dialogue with hesitant parent for CHC nurses. In addition, findings indicated that the communication format strongly preferred by parents was oral communication in Somali language since the word-of-mouth tradition is strong in the Somali community and information and knowledge is passed through personal relationships [29].

2.5. Phase 3 - Intervention design and implementation

This phase aimed to design a theory- and evidence-informed intervention based on the results of the situational analysis (phase 1) and formative research (phase 2), and with stakeholder input. The intervention was developed, based on the TIP guide from 2013 [25], and implemented from 2015 until end of 2017. In the beginning of phase 3 intervention activities were piloted and tailored to the needs of the target groups. In 2018 the TCG retrospectively mapped the intervention activities following COM-B model in order to describe the intervention according to the updated TIP guide [31].

Workshop 2: A second stakeholder workshop was held on August 19th and 20th, 2013, and the same group of participants as in workshop 1 were invited to participate. Specific objectives were to [1] review the conceptual map to agree on the key barriers and [2] discuss ideas for interventions and constituent activities to remove key barriers.

Key barriers were selected as parents' need for increased knowledge (capability), fears (motivation) and negative social pressure (social opportunity); as well as CHC nurses' need for training, skills and

Overview of Tailoring Immunization Program (TIP) in Sweden

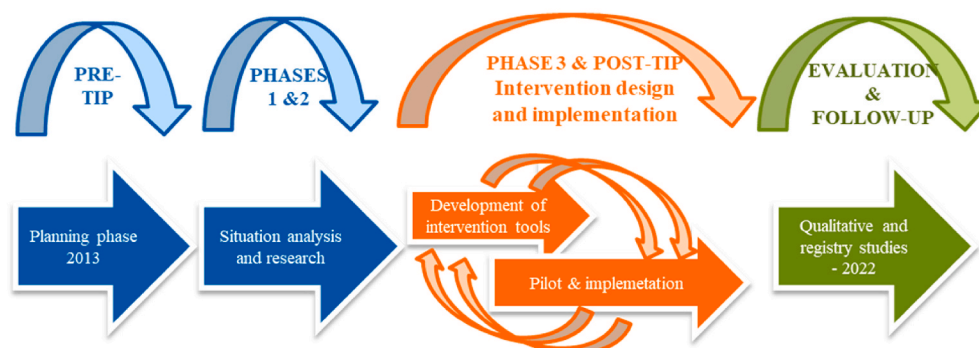


Fig. 1. An overview and timeline (years) of the completed and ongoing phases of the TIP project in chronological order, including the planning phase (pre-TIP); situation analysis (phase 1); formative research (phase 2); intervention design and development (phase 3) and implementation (Post-TIP), as well as the planned evaluation phase.

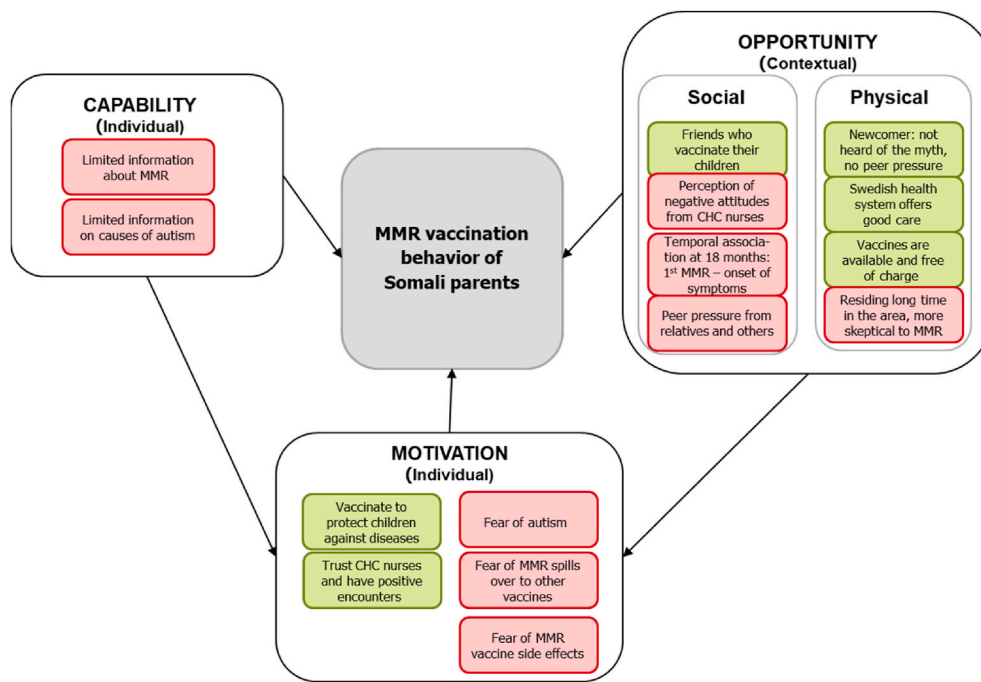


Fig. 2. Barriers and drivers to MMR vaccination for Somali parents Footnote1: This conceptual map has been updated to reflect the introduction of the COM-B model into the TIP approach [31]. Footnote 2: Barriers are indicated in red and drivers in green boxes. (For interpretation of the references to colour in this figure legend, the reader is referred to the Web version of this article.)

confidence for difficult vaccination conversations (capability). Thus, two target groups were identified for the intervention: Somali parents of children aged 0–5 years, and CHC nurses. The aim was to increase knowledge on childhood vaccination, dispel misperceptions and convey the importance of vaccination.

Activities for each of the intervention types were discussed at the final step of workshop 2. Subsequently, the key barriers and their associated COM factors were mapped to evidence-based types of interventions for addressing those barriers [31,35] (see Table 1). Selected

Table 1
Mapping barriers and COM factors to intervention types and activities for parents and CHC nurses.

KEY BARRIER	COM FACTOR	SELECTED INTERVENTION TYPE	SELECTED ACTIVITIES
Need of increased knowledge about MMR side effects Need of increased knowledge about autism	Capability	Education (parents)	Public seminars Animated cartoon Information card
Need of training, skills and confidence for CHC nurses for difficult vaccination conversations		Education (nurses)	Information-based seminars with training
Fear of autism Fear of MMR vaccine side effects	Motivation	Education (parents) Persuasion (parents)	Public seminars Peer-to-peer training
Perception of negative attitudes from some CHC nurses Peer pressure from relatives and others in social networks not to vaccinate	Social opportunity	Training (nurses) Modelling (parents)	Information-based seminars with training Narrative film with Somali role models Peer-to-peer training

Footnote 3: Definition of selected intervention types [31]. Education: Increasing knowledge or understanding; Persuasion: Using communication to induce positive or negative feelings or stimulate action; Training: Imparting skills; Modelling: Providing an example for people to aspire to or imitate.

intervention types targeting parents were education, persuasion and modelling, and targeting CHC nurses were education and training.

Discussion about these different intervention types and the ideas for activities focused on acceptability to the two target groups as well as the feasibility of delivery in terms of budget and timeline. Concerning education and training, it was deemed important to develop and offer different types of communication channels and forums for dialogue and discussion with parents. The concept of using peer-to-peer education about vaccination in addition to information and conversations with CHC nurses. Community centred programs using lay health workers or peer health educators have been shown to increase vaccination coverage [36, 37] and were seen to be both acceptable and feasible for these parents. Moreover, the peer-to-peer training related to modelling as an intervention type as the group would be able to lead by example and be outspoken vaccine ambassadors for other parents after their training when interacting with parents in the community. The narrative film also related to modelling as Somali parents shared their personal stories to promote vaccination and to share their thoughts and experiences for other parents. The element of persuasion relates to the way messages were phrased in both the peer-to-peer training (and also used by peers) and the film to generate feelings which could then inspire action. More information of the messages used are described in more detail below.

Tailored activities targeting the nurses were discussed separately. In considering activities targeting the CHC nurses, other studies [17–21] and the results of the formative research [26–30] highlighted the crucial role of nurses in facilitating the dialogue with parents. A seminar series to deliver education to nurses on MMR vaccination and training on communication skills were agreed to be acceptable and feasible.

Finally, the proposed plans for the intervention and its constituent activities were discussed with the advisory group, CRB, regional stakeholders and health workers. All activities had to be accepted by the community and the target groups.

Following discussions and agreement on the type of activities, the process of designing and planning the various tools and activities started. External grants were applied for to fund part of the implementation phase and the production of the films.

2.5.1. Intervention activities - design and implementation

The community members participated in all phases of the intervention at different levels. Their participation was crucial in a variety of activities, for instance, in the organization of the seminars and conveying of knowledge to the community by dissemination of information through existing networks and platforms in the community.

2.5.2. Targeting Somali parents

2.5.2.1. Dialogue-based public seminars. Design: Two types of seminars for parents were developed. The first focused on general child health, including information about the human body and the immune system, how vaccines work, the NIP and VPDs. This type of seminar was delivered by vaccination experts from the PHAS and the Karolinska Institutet. The second type of seminar focused on child development, including factors that influence early child development and in-depth information about autism. Plenty of time was allocated for questions and answer sessions as well as group discussions. This second type of seminar was delivered by two child psychiatrists with expertise on autism from Region Stockholm. Both types of seminars started with an introduction of the TIP project Sweden, followed by lectures on different topics and lastly open questions and discussion between the audience and lecturers in both Somali and Swedish, using simultaneous interpretation. An important aspect of the intervention was that all lecturers and experts had a cultural competence and experience of work with different vulnerable and migrant communities. Moreover, a child psychiatrist and one of the vaccine experts were Somali speaking, which added a level of cultural authenticity to the knowledge sharing.

Implementation: Four seminars were held during the weekends in October–November 2015 at local and accessible venues in Rinkeby and Tensta, respectively. They were free of charge. Invitations to the seminars were posted at local arenas such as the libraries, CHCs, open preschools and at local NGOs. Local key actors also disseminated the invitation; the CRB members by text messages and face-to-face contacts; the nurses informed parents attending the clinics, active members in NGOs spread invitations on social media (Facebook, WhatsApp and Viber chat-groups) and through mobile texting. The TCG and the peer group both distributed the invitations and attended the seminars.

The first three seminars, focused on child health and on child development, were attended by 20–30 individuals. The fourth seminar focusing on child development and autism was attended by approximately 100 persons. Lessons learned from each seminar were used to improve the succeeding ones. Large venues were provided to accommodate everyone and it was an open invitation to all interested.

2.5.2.2. Narrative film with Somali role models. Design: In a 14 min film entitled “Vaccination – a wise choice for your child” [38], parents shared their personal stories regarding their vaccination decisions and vaccine experts shared evidence-based vaccination knowledge. The film aimed to convey the importance of vaccination and the seriousness of VPD, especially MMR, but also to highlight the role of the CHCs and what nurses may offer to families regarding follow-ups and support with their child’s health. An important aspect of the film was to present three parents as positive role models and to promote their personal stories. Two of the parents (a mother and a father) talked about the reasons why they chose to vaccinate their children against MMR. Another mother shared her frightening experience of when her un-vaccinated daughter of one year got infected with measles during a holiday in Somalia. The film also featured an active community leader with deep knowledge of Islam who shared his views on prevention and the importance of seeking relevant knowledge from a religious perspective to improve one’s health. All participants spoke Somali with Swedish subtitled translation. A well-known and trusted local child health nurse shared additional information, in Swedish with Somali subtitles, on her role and work at the CHC with parents in general. The film was piloted and adjusted

according to additional input from the peer group before it was launched and published on the PHAS website.

Implementation: The film was presented to parents at different venues such as preschools and social events. The nurses actively used it in their encounters with parents and also handed out the information card with a link to the web page described above. Several local partners such as preschools, NGO’s and the peer group distributed the film through social media. The film was published online at the PHAS project website and YouTube on July 4th, 2016 and has also been shown multiple times by PHAS during the European immunisation week both in 2017 and 2018 as well as during an event for citizens in Rinkeby in May 2018. During 2016 and 2017 the project group held eight film events to show the film with the aim to disseminate the film in the community and to facilitate dialogue of the content.

2.5.2.3. Animated cartoon. Design: As requested by the parents, a 7 min animated cartoon entitled “Vaccination – a wise choice for your child” [39] was produced, with the overall aim to convey knowledge and facts about the immune system, how vaccination works and the NIP, using visual illustrations and speaker voice. The film is narrated in Swedish with subtitles in Swedish for increased accessibility and to reach a wider audience beside the Somali community.

Implementation: The animated film was published 27 November 2017 on YouTube. Similar disseminating channels as for the first film was also used for the animated cartoon.

2.5.2.4. Information card. Design: An information card for parents with five brief key messages on childhood vaccination was printed conveying the messages: the NIP is free of charge, VPDs are contagious, the importance of completing the vaccination schedule for adequate protection, especially when traveling and, to contact the CHC nurses for further information. The messages were both in Somali and Swedish in a postcard format with a QR-code and, in a pdf format for easy dissemination.

Implementation: The postcard was also published on the project website together with the two films and additional vaccination information to be easily accessed. It was distributed to and used by nurses at CHCs and the peer group in Rinkeby and Tensta as well as other stakeholders for instance preschools. A smaller outbreak of measles occurred in the area in the spring of 2017, during which 12 cases of measles were reported. During the outbreak, five additional CHCs in nearby areas requested and utilised both films and the information card, as preventive measures.

2.5.2.5. Project website. A web page linked to the website for the national immunization program at the PHAS was launched where relevant information for the TIP project Sweden was gathered including activities, information tools, films, etc. The information card included the link to the website to facilitate easy access to all information about the project and the two films.

2.5.2.6. Peer-to-peer training targeting local community parents. Design: This activity consisted of a peer-based intervention aiming to provide peer education focusing on vaccination knowledge and communication skills in Somali and Swedish language and for the peers to further inform other parents in their communities. In total, 32 mothers with different backgrounds and professions joined the peer group, all very active and engaged in the community in one way or another. Two rounds of peer education were conducted, each one full day: the first one in September–October 2015 with 14 participants and the second one in October–November 2016 with 18 participants. The first group of peers were recruited in the Somali community with the help of the CRB, local NGOs as well as advertisement at the CHCs and local open preschools. The second group of peers with was recruited in a similar manner, with the additional active recruitment by the peers from the first group. The

tailored peer-to-peer training was delivered by four Somali speaking experts in different fields, covering four core topics: (i) the human body and immune system, basic vaccinology, how vaccines work, the basis for using combined vaccination such as MMR and reasons for multiple injections; (ii) the NIP (vaccines, vaccination schedule, importance of vaccination and risks of the VPDs); (iii) communication skills, how to communicate vaccine knowledge with other parents, the importance of trust and how to deliver tailored messages; (iv) child development in general, including autism.

Implementation: After completion of the peer training, follow-up peer meetings, approximately one to 2 h, were held once or twice each semester throughout the implementation phase 2015-2017. The follow-up activities aimed to sustain engagement and further advance the previous training and discuss related issues of interest for the peers such as cancer prevention and HPV-vaccination. Each follow-up meeting was attended by 8–10 of the peers. Additional post-training efforts to reach the peer group included outreach contact via telephone calls, social media application WhatsApp, e-mails and one-to-one meetings. The WhatsApp was adopted as a strategy to keep the peer-group informed on relevant news about the NIP or VPD, for example local outbreaks of measles in Stockholm 2017 and another outbreak in Gothenburg 2018. The WhatsApp group additionally facilitated a forum to reach the peers with vaccination information such as web links, messages and other information such as dates for the regular peer meetings.

2.5.3. Targeting CHC nurses

2.5.3.1. Information-based seminars with training. **Design:** The seminars were designed to elicit discussion and offer the nurses a forum for reflecting and expressing their thoughts on challenges that they face in encounters and dialogue with parents having vaccination concerns. A series of tailored seminars were developed, as a group-level intervention, for the CHCs nurses in Rinkeby and Tensta in collaboration with the Child Health Services to increase their knowledge and competence for improving the encounters and dialogue with vaccine hesitant parents. The seminars focused on the following topics: (i) Measles and rubella-Complications, prevalence, vaccine effectiveness and outbreaks in Sweden, Somalia and globally as well as reporting of adverse events due to vaccination; (ii) Autism – What do we currently know about its development and prevalence? A review of the scientific literature regarding the lack of scientific evidence between MMR and autism was also included; (iii) How to communicate to parents with concerns regarding vaccination - Advice on how nurses can encounter and talk to vaccine hesitant parents, and on the importance of tailoring health messaging and health communication to parents. Experts on vaccination and autism (paediatricians, physicians, public health experts and a health communicator). Each seminar included instructive lectures or interactive workshops followed by discussions.

Implementation: The seminars for the CHC nurses were implemented in collaboration with the head of unit for the Child Health Services in the area and the head nurse at one of the CHCs. PHAS sent invitations by email to all the nurses employed at Rinkeby and Tensta CHC, at the time of the intervention. During three consecutive weeks in August and September 2015, three seminars were held at Rinkeby CHC. Each seminar lasted for 2 h. All 12 nurses invited participated in the series of seminars.

2.5.3.2. Dissemination. Dissemination is not part of the TIP process of mapping barriers, COM factors, intervention types and selecting activities. Nevertheless, it is an important aspect of the TIP project Sweden as the intervention activities, the films and the information card, were intended to disseminate tailored communication regarding MMR vaccination to the Somali community. In addition, community engagement and involvement of Somali speaking experts, trainers and peers was the core of the intervention strategy. It facilitated the dialogue,

understanding of community perspectives and knowledge sharing.

The TCG presented the project at regional, national and international seminars, workshops and conferences. Other stakeholders and policy-makers at the national, regional and local level were important to target for both disseminating purposes and also for raising awareness of the importance of addressing low vaccine acceptance at the local level. The aim was to inform key stakeholders in order to advocate support for long-term solutions and sustainability of the intervention, as this group also influences the implementation of NIP and has the mandate to influence the sustainability of the intervention and planned evaluation phase.

2.6. Post-TIP – Evaluation ongoing

Following the implementation of the intervention, evaluation of the strategies aiming at behavioural changes for increased vaccine uptake is needed in a long-term perspective to assess its impact. Public health authorities and regional/local implementers need effective evidence-based strategies to use for increasing vaccine acceptance in targeted populations. Data is collected until 2022 to evaluate the intervention with focus on both process and impact evaluation. The comprehensive evaluation is based on a mixed methods approach, involving both qualitative and quantitative methods of data collection and analysis. The process evaluation is predominantly qualitative aiming to investigate how the different activities have been carried out and perceived by peers, CHC nurses, the CHS staff and CRB. The impact evaluation will include registry studies using both local and national vaccination registers, aiming at following the vaccination coverage rates over time.

3. Discussion - good practices and lessons learned

In this paper, we describe a TIP based project from its situational analysis to design, development and implementation of intervention activities. The development and design of the activities were based on the adapted COM-B model [31,32]. This was one of the first projects using the TIP approach that went beyond identification of susceptible groups and diagnosis of challenges and design to implementation of tailored strategies for long-term behavioural change. The TIP approach has so far been used in 12 countries or states during 2013–2021 (23, 40–50).

The TIP approach was helpful in guiding the working process with a stepwise systematic process to achieve a thorough understanding of barriers and drivers for MMR vaccination among parents in the targeted Somali community. The use of both quantitative and qualitative data enhanced the situational analysis and interpretation of data. The workshops held with an interdisciplinary team of experts and key informants were essential to get a comprehensive view and to facilitate discussions during both the situational analysis and research phases. The conceptual mapping of determinants by opportunity, motivational and capability, categorized and clarified the barriers and drivers that Somali parents are facing for MMR vaccination in the community. From our experience, the TIP framework is a valuable tool for structuring the research and problem statement. It also allows flexibility in terms of data collection from different sources and working approaches. Thus, the findings from the TIP phases 1 and 2 informed and facilitated the design of a theory and evidence-based design and implementation of the tailored intervention targeting parents and nurses.

Implementing activities for nurses and parents was deemed crucial by the TCG as the interaction between nurses and parents had been shown to play a central role in parental decision-making for vaccination [51,52]. In addition, multicomponent and dialogue-based interventions are shown to be most effective [53]. Also, interventions incorporating elements of community engagement and improved communication for health care workers have been suggested to be effective for increased vaccination coverage [54]. Although there are suggestions for interventions for increased vaccine uptake, there is a need for evaluation

of vaccine acceptance interventions to add further evidence [55]. The effectiveness of public health interventions depends on several factors including on a well-designed and executed research phase, design and feasibility as well as evaluation [54].

3.1. Future steps

Our intention with this TIP project Sweden is to inform practices addressing vaccine acceptance while also contributing to long-term and sustainable solutions that can be integrated into the routine of health services for children and adults, respectively. Insights may be scaled up or replicated and tailored to other communities or groups with low vaccine acceptance where similar preventive intervention approaches are indicated. Based on the experience and lessons learned of this intervention project the TIP guide has been adapted specifically for the Swedish context targeting regional and local level stakeholders responsible for the implementation of vaccination to strengthen resilience and also equity in the NIP for children and immunization programs for adults.

Contributors

AJ, EA, AK, AL, RB and KGR, shared the original idea to the conception and design of the intervention. AJ, EA, AK, AL, KGR and SK contributed to the development of the tools and, together with JR and SN, contributed and participated in the piloting of the intervention activities. CJ and KH lead the structuring of the intervention according to the TIP and COM-B model and participated in the initial discussion of the outline of this paper. AJ, EA and KGR wrote the first draft of this paper, substantially revised by CJ, and all authors contributed with critical revisions on successive drafts. All authors approved the final version of the paper and agreed to be accountable for all aspects of the work.

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Ethical approval

The study received ethical approval from the Regional Ethics Committee in Stockholm, Sweden, Dnr. 2013/678–31/3.

Declaration of competing interest

The authors declare no conflict of interest.

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