Implementing the Family MUAC approach for infants under six months in the context of COVID-19 in Ethiopia

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Background

The measurement of mid-upper arm circumference (MUAC) by caregivers is a promising approach to improve the frequency and coverage of screening and case identification of child wasting (Bliss et al., 2018; Blackwell et al., 2015). Although measurement of MUAC by community health workers (CHWs) and caregivers has proven to be effective, evidence suggests that it does require adequate operational support, training and supervision (Bliss et al., 2018). While MUAC has been tested and is increasingly used for children aged 6 to 59 months, there are currently no globally established MUAC thresholds to identify at-risk infants under six months of age. There is growing evidence of its effectiveness in identifying infants at increased risk of mortality in several African countries (Mwangome et al., 2012; Leliyfeld et al., 2017). However, the accuracy and reliability of MUAC measurements by caregivers in this age group is unknown.

Since 2014, GOAL has been implementing the Management of At-risk Mothers and Infants under six months (MAMI) programme in four refugee camp sites in Gambella, Ethiopia – Kule-1, Kule-2, Tierkidi-1 and Tierkidi-2 (Burrell et al., 2020). Since 2016, CHWs – called Community Outreach Agents (COAs) locally – have screened infants under six months of age using standard MUAC tapes designed to measure children aged 6 to 59 months. In response to the COVID-19 emergency, GOAL introduced multiple adaptations to its MAMI programme, guided by the 2020 World Health Organization (WHO) and UNICEF implementation guidance for the early detection of malnutrition in infants aged 0 to 6 months in the context of COVID-19 (UNICEF, 2020). This guidance recommends the use of MUAC as a ‘reduced physical contact’ approach for identifying nutritional risk in infants under six months of age using the following thresholds: <11.0 cm for 0-6 weeks and <11.5 cm for 7 weeks to 6 months (UNICEF, 2020).

From March 2020, the Family2 MUAC tape approach was introduced to enable home-based screening of infants in the community, in addition to existing screening by COAs. A specially designed MUAC tape3 called MAMI-MUAC (Figures 1a and 1b), developed by GOAL in 2019, was introduced for use by both caregivers and COAs. Tapes are reversible (one side is used for infants under six months and the other is used for older children and pregnant and lactating women) with two versions available – one enumerated for use by COAs (Figure 1a) and the other non-enumerated for use by caregivers (Figure 1b). This article shares the experiences of implementing the Family MUAC approach for infants under six months in the Gambella refugee camps, Ethiopia.

Implementation of the Family MUAC approach for infants under six months

Training of COAs and caregivers (steps one and two)

The training was conducted in two phases across all four camp locations – COAs in March 2020 and caregivers of infants under six months in May 2020. The GOAL MAMI supervisor trained a maximum of 30 COAs per session, after which they began using

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1 https://www.ennonline.net/ourwork/research/mami
2 The term family includes mothers and/or caregivers
3 A pdf of the MAMI-MUAC tapes is available to download at www.ennonline.net/mamimuactapes

What we know: There is growing evidence of the effectiveness of mid-upper arm circumference (MUAC) in identifying infants under six months at increased risk of mortality but no globally agreed thresholds yet exist for this age group which limits community-based screening.

What this article adds: In response to the COVID-19 pandemic, GOAL adapted its community-based Management of At-risk Mothers and Infants under 6 months (MAMI) programme in Gambella, Ethiopia by introducing the Family MUAC approach to enable home-based screening of infants under six months and a new type of reversible MUAC tape, specially adapted for the screening of infants under six months of age. Following implementation, the average number of monthly referrals increased (from 11.6 infants pre-training to 19.1 post-training). Pre-training, monthly outreach contributed to most referrals (average 77.0%) and there were no self-referrals. Post-training, the average monthly outreach referrals reduced to 45.3% and self-referrals increased to 41.4%. Measurement accuracy analysis showed that most caregivers trained by Community Outreach Agents (COAs) correctly identified the MUAC of their infants. Based on these results, GOAL will explore the feasibility of moving to using Family MUAC alone for the screening of infants under six months of age.
the tapes in the community. COAs then trained caregivers in a series of short, house-to-house training sessions respecting infection prevention control (IPC) measures. The number of COAs and caregivers trained are presented in Table 1. Each caregiver was given their own MUAC tapes and all tapes used by COAs and caregivers were wiped with soap and water solution before each measurement.

**First follow-up assessment (step three)**

The first follow-up assessment was carried out in July 2020, two months post-training of caregivers. During the assessment, caregivers’ screening performance was assessed by comparing it with that of the COAs. A sample population was selected for assessment while respecting IPC measures (Table 2). Follow up with all the COAs and around a third of the caregivers was planned but several COAs were absent on the day of assessment. For each of the caregivers and the COAs included in the sample, detailed information on the following case identifications was also collected – true positive, true negative, false positive and false negative – to calculate the sensitivity and specificity of their measurements (Table 3).

**Second follow-up assessment (step four)**

The second follow-up training was carried out in November 2020, six months post-training of the caregivers. During this assessment, caregivers’ screening performance was re-assessed using the same methodology as in the first assessment. The sample size is presented in Table 4. Additionally, using a simple checklist, we also collected information on caregivers’ experience of using the MAMI-MUAC tape including on the tape’s wear and tear, its place of storage, any reported confusion over using the tape, frequency of screening and any barriers to referral to management services.

**Referrals to MAMI programme for enrolment**

In order to ascertain whether there had been a change in the origin and proportions of case referrals, we analysed case referrals following Family MUAC training. We extracted enrolment data from the MAMI programme database where MAMI referrals were recorded as follows: self-referral (referral by caregivers), outreach referral (referral by COAs), health facility referral, inpatient referral and monthly screening referral. We compared average monthly referrals pre-training (May 2019-April 2020) and post-training (May 2020-December 2020).

**Findings**

Coverage and performance of caregivers in measuring infants

Overall, 112 COAs (89.7%) and 1,289 caregivers with infants under six months of age (100%) received the training (Table 1). Sensitivity and specificity of screening by caregivers at first and second follow-up are presented in Table 5. Two months post-training (first follow-up) the sensitivity and specificity was 100% and 98.6%, respectively. Six months post-training (second follow-up), sensitivity was 88.9% and specificity was 96.2%.

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**Table 1**

<table>
<thead>
<tr>
<th>Camp and site</th>
<th>Total COAs</th>
<th>Number of COAs trained</th>
<th>% COAs trained</th>
<th>Total eligible caregivers</th>
<th>Number of caregivers trained</th>
<th>% Caregivers trained</th>
</tr>
</thead>
<tbody>
<tr>
<td>Kule-1</td>
<td>31</td>
<td>29</td>
<td>93.5</td>
<td>365</td>
<td>365</td>
<td>100.0</td>
</tr>
<tr>
<td>Kule-2</td>
<td>32</td>
<td>24</td>
<td>75.0</td>
<td>401</td>
<td>402</td>
<td>100.0</td>
</tr>
<tr>
<td>Tierkidi-1</td>
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<td>30</td>
<td>96.8</td>
<td>281</td>
<td>281</td>
<td>100.0</td>
</tr>
<tr>
<td>Tierkidi-2</td>
<td>31</td>
<td>29</td>
<td>93.5</td>
<td>242</td>
<td>242</td>
<td>100.0</td>
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<tr>
<td>Total</td>
<td>125</td>
<td>112</td>
<td>91.8</td>
<td>1289</td>
<td>1289</td>
<td>100.0</td>
</tr>
</tbody>
</table>

Average 89.7% Average 100.0

*Families with infants under six months

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**Table 2**

<table>
<thead>
<tr>
<th>Camp and site</th>
<th>Total COAs</th>
<th>Selected COAs</th>
<th>% COAs covered</th>
<th>Total eligible caregivers</th>
<th>Selected eligible caregivers</th>
<th>% Caregivers covered</th>
</tr>
</thead>
<tbody>
<tr>
<td>Kule-1</td>
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<td>29</td>
<td>93.5</td>
<td>365</td>
<td>173</td>
<td>47.4</td>
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<td>Kule-2</td>
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<td>20</td>
<td>62.5</td>
<td>401</td>
<td>119</td>
<td>29.7</td>
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<tr>
<td>Tierkidi-1</td>
<td>31</td>
<td>23</td>
<td>74.2</td>
<td>281</td>
<td>137</td>
<td>48.8</td>
</tr>
<tr>
<td>Tierkidi-2</td>
<td>31</td>
<td>21</td>
<td>67.7</td>
<td>242</td>
<td>126</td>
<td>52.1</td>
</tr>
<tr>
<td>Total</td>
<td>125</td>
<td>93</td>
<td>-</td>
<td>1289</td>
<td>555</td>
<td>-</td>
</tr>
</tbody>
</table>

Average 74.5 Average 44.5

*Families with infants under six months

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**Table 3**

<table>
<thead>
<tr>
<th>True risk status (measure by COAs)</th>
<th>Positive (red)</th>
<th>Negative (green)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Results of screening test (measure by caregivers)</td>
<td>a + c</td>
<td>b + d</td>
</tr>
<tr>
<td>Positive (red)</td>
<td>a</td>
<td>b</td>
</tr>
<tr>
<td>Negative (green)</td>
<td>c</td>
<td>d</td>
</tr>
<tr>
<td>Total</td>
<td>a + c</td>
<td>b + d</td>
</tr>
</tbody>
</table>

a = infants who are at risk of malnutrition and were identified in the red category by the MAMI-MUAC tapes (true positive)  
b = infants who are not at risk of malnutrition but were identified in the red category by the MAMI-MUAC tapes (false positive)  
c = infants who are at risk of malnutrition and were identified in the green category by the MAMI-MUAC tapes (true negative)  
d = infants who are not at risk of malnutrition and were identified in the green category by the MAMI-MUAC tapes (false negative)  
Sensitivity = a/(a + c) and Specificity = d/(b + d)

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**Table 4**

<table>
<thead>
<tr>
<th>Camp and site</th>
<th>Total COAs</th>
<th>Selected COAs</th>
<th>% COAs covered</th>
<th>Total eligible caregivers</th>
<th>Selected eligible caregivers</th>
<th>% Caregivers covered</th>
</tr>
</thead>
<tbody>
<tr>
<td>Kule-1</td>
<td>31</td>
<td>29</td>
<td>93.5</td>
<td>365</td>
<td>174</td>
<td>47.4</td>
</tr>
<tr>
<td>Kule-2</td>
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<td>29.7</td>
</tr>
<tr>
<td>Tierkidi-1</td>
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<td>30</td>
<td>96.8</td>
<td>281</td>
<td>180</td>
<td>48.8</td>
</tr>
<tr>
<td>Tierkidi-2</td>
<td>31</td>
<td>27</td>
<td>87.1</td>
<td>242</td>
<td>162</td>
<td>52.1</td>
</tr>
<tr>
<td>Total</td>
<td>125</td>
<td>93</td>
<td>-</td>
<td>1289</td>
<td>654</td>
<td>-</td>
</tr>
</tbody>
</table>

Average 80.6 Average 53.2

*Families with infants under six months

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* MAMI programme database was maintained since May 2019
Implications for case enrolment

Overall, the total number of referrals increased after Family MUAC training (Figure 3) – average monthly referrals pre-training was 11.6 and this increased to 19.1 post-training. Pre-training, average monthly outreach referrals contributed to most of the referrals (77.0%) and there were no self-referrals. Post-training, average monthly outreach referrals reduced to 45.3% while average monthly self-referrals contributed to 41.4% of total referrals.

Caregivers’ experiences of MAMI-MUAC tapes

During the second follow-up assessment we asked caregivers about their experiences of using the MAMI-MUAC tapes. Findings showed that 56% of caregivers reported no tear and tear at all, 67% reported no confusion while using the tapes and 93% reported no barriers to referring their infants. Of caregivers who experienced wear and tear of tapes, it transpired that this was minimal and was mainly reported as the folding of the tape from the corners and in the middle due to its place of storage. The functionality of the tape was not considered to be affected. Of caregivers who reported confusion while using the tape was not considered to be affected. Of caregivers who experienced wear and tear of tapes, it transpired that this was minimal and was mainly reported as the folding of the tape from the corners and in the middle due to its place of storage. The functionality of the tape was not considered to be affected.

Screening of infants under six months of age using MAMI-MUAC tapes by both COAs and caregivers appears to be a feasible and effective approach, accounting for a major proportion of total enrolments between May and December 2020 (Figure 3). This means, in the absence of such training, and without the use of the MUAC tool, it is plausible that many of these at-risk cases who need support would be missed. This highlights the value of MUAC screening in the context of COVID-19. Although we did not attempt to statistically validate our findings, our data could be useful to other organisations who are interested in implementing a similar approach. Our findings demonstrate that the MAMI-MUAC tape can function well when appropriate training and supervision are provided.

Nine months following the implementation of the Family MUAC approach alongside the use of MUAC by COAs, we plan to explore the feasibility of moving to using Family MUAC alone for the screening of infants under six months of age. This would reduce physical contact between health workers and beneficiaries and thus the risk of COVID-19 transmission. Additionally, the time saved by health workers could be utilised to provide other services such as community-based nutrition education or counselling, absentee and defaulter tracing and programme monitoring. The feasibility of this approach will be examined and documented.

For more information, please contact Hatty Barthorp at: hbarthorp@goal.ie

More information can also be found at: GOAL (2020). MAMI mid-upper arm circumference (MUAC) tapes. www.ennonline.net/mamimuactapes

GTAM Conversations on how programmes are adapting in light of COVID-19: Implementing the Family MUAC approach in Gambella, Ethiopia. https://www.ennonline.net/mediashub/podcast/gtamconversationsmamimuactapes

References


