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Infant and young child nutritional status and their caregivers' feeding knowledge and hygiene practices in internally displaced person camps, Somalia

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1 **Title page**

2 **Title: Infant and young child nutritional status and their caregivers' feeding knowledge**
3 **and hygiene practices in internally displaced person camps, Somalia**

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23 **Abstract**

24 **Background:** In an attempt to design an educational programme targeting caregivers of
25 children aged 6 to 59 months in internally displaced persons camps in Somalia, the objective
26 of this study was twofold. First, to explore the nutritional situation of all children aged 6-59
27 months enrolled in a nutrition programme provided by Save the Children in 2017 in internally
28 displaced persons camps. Second, to identify gaps in the caregivers' hygiene and feeding
29 practices. **Methods:** In a study of 1655 households, 1655 caregivers for 2370 children aged 6
30 to 59 months enrolled in a nutrition programme provided by Save the Children answered an
31 adapted questionnaire on hygiene and feeding practices. At the same time, based on standard
32 criteria in the questionnaire, naturalistic observations of caregivers' hygiene practices were
33 conducted. Every child in the study was measured with anthropometric Mid-Upper-Arm
34 Circumference measurements for the classification of Moderate Acute Malnutrition, Severe
35 Acute Malnutrition and Global Acute Malnutrition. Descriptive statistics were used for
36 analysis. **Results:** 1) There was Severe (12.1%) and Global Acute (19.9%) Malnutrition
37 among children included in the nutrition programme, more frequently in the 6-24 month age
38 group compared to the 25-59 month age group ($p < 0.01$). 2). The practices in the households
39 were below what could generally be considered hygienic. 3) There was poor caregivers'
40 knowledge of breastfeeding benefits and complementary foods. **Conclusion:** Child
41 malnutrition might derive from gaps in the caregiver's knowledge, attitudes, and practices
42 regarding hygiene and infant feeding. An awareness of these gaps can be helpful in designing
43 future educational programmes that target caregivers, particularly in at-risk population
44 groups.

45
46 **Keywords:** breastfeeding, complementary foods, hygiene, education, counseling, Internally
47 Displaced Persons

48 **Background**

49 Internally Displaced Persons (IDP) remain within their own country when they flee their
50 homes due to natural disasters, violence and insecurity. In Africa, many countries play host to
51 IDP populations in official camps and outside for shorter or longer period of time often with
52 inadequate provision of housing and food supply in the camps. As a result of the uprooting,
53 many IDP, particularly children, suffer from poor health and malnutrition. Studies have
54 shown that IDP children suffer from high levels of illness and mortality [1-4]. For example, in
55 a survey of IDP households in Nigeria, after liberation from Boko Haram, high levels of child
56 mortality were reported that were above the emergency threshold. Researchers suggested that
57 vaccinations and other preventative services could be used to treat the common childhood
58 illnesses behind these figures [1]. After the political crisis in Uganda in East Africa in 2006, a
59 cross-sectional study with 1080 IDP found three main physical health conditions:
60 fever/malaria (48%), respiratory problems (45%), and depressive symptoms (67%) [2]. In
61 Kenya, following post-election violence in 2007/2008, HIV infection and other chronic
62 conditions were identified as significant causes of morbidity and mortality among their IDP
63 population [3]. In a cross-sectional nutritional assessment survey from 2007 to 2010, with the
64 aim of informing the better targeting of nutritional interventions, two of the predictors of
65 malnutrition risk among children under the age of 5 in Somalia were the presence of
66 infectious diseases and the likelihood of drought [5]. Somalia is a country with frequent
67 humanitarian crises due to droughts and civil war. By 2018, more than 60% of Somali
68 children had been uprooted because of the ongoing political unrest and repeated natural
69 disasters. The deterioration of individual coping mechanisms and reduced communal
70 resilience, which occurred as a result of eroded coping mechanisms, have affected how
71 parents raise their children [4]. Internally displaced children and their caregivers, therefore,
72 live under constrained conditions [6].

73

74 Located at the tip of the Horn of Africa, modern Somalia was formed out of former British
75 and Italian colonies. In 1991 a bitter civil war commenced. The north-western part of the
76 country broke away to form the autonomous region of Somaliland. A federal parliamentary
77 system was established in Mogadishu, although fighting and political unrest has continued.
78 Since the 1990s more than a million Somalis have become IDP. They share the same
79 language and culture as their neighbours but lack homes, land, cattle or livelihood. Instead
80 they are housed in IDP camps and outside of the official IDP camps [6]. Healthcare for IDP
81 children has been of growing concern. Humanitarian agencies initially focused on providing
82 food aid for IDPs, both inside and outside official IDP camps. As the conflict continued, and
83 as long term stays in IDP camps became a reality, the focus has shifted towards healthcare
84 provision. Alongside food supplies, humanitarian agencies began to provide Maternal and
85 Child Health Clinics (MCH), Antenatal Care (ANC), vaccinations and health check-ups for
86 children. The long-time civil war and recurring drought have not only contributed to
87 children's psychological suffering but also led to nutritional deficiencies and physical ill-
88 health [7]. UNICEF estimated that 1.4 million children in Somalia were acutely malnourished
89 by the end of 2017 [8]. Food insecurity has been assumed to be the explanation for these high
90 levels of malnutrition [6]. In an attempt to respond to this humanitarian crisis, cash transfer
91 programmes have been implemented. The role of an unconditional cash transfer, non-food
92 item kit and free piped water to reduce malnutrition among children aged 6-59 months in the
93 IDP camps has been investigated with a non-randomised cluster trial. While food security and
94 wealth per household increased, no reduction of acute malnutrition in children was found [9,
95 10]. According to the World Bank, Somalia still has the highest under-five mortality rate in
96 the world. In 2017, 127 per 1000 or one out of every eight children died before they were 5
97 years of age [11].

99 With this situation in mind a study was devised that would improve the effectiveness of life-
100 saving actions in humanitarian emergencies; in particular, that would improve the design of
101 educational programmes that target caregivers and their role in child health, nutrition and
102 hygiene [12-14]. This study examined all caregivers with children 6 to 59 months taking part
103 in a Save the Children nutrition programme in three IDP camps in three districts in Somalia.
104 The research was conducted in August 2017, when a nationwide famine-like situation
105 prompted Save the Children to scale up their humanitarian assistance. The objective was
106 twofold. First to explore the nutritional situation of all children aged 6-59 months enrolled in
107 a nutrition programme provided by Save the Children in IDP camps. Second to identify gaps
108 in the caregivers' hygiene and feeding practices. The study lent itself to a cluster sampling
109 approach [15]. Gap identification of biological, social and cultural processes was carried out
110 in cooperation with operational research and humanitarian agencies [12-14]. The underlying
111 premise in this study was that formative research with key informants in different IDP camps
112 could provide important insights to development agencies for improved educational
113 programmes around child health and nutrition.

114 **Material and methods**

115 **Design**

116 All children aged 6-59 months living in the 1655 households and one caregiver per household
117 enrolled in a nutrition programme provided by Save the Children in 2017 were included in the
118 study. The nutrition programme was provided in three IDP camps in three different districts in
119 Somalia. One caregiver from each of 1655 households answered a questionnaire on hygiene
120 and feeding practices. At the same time, based on standard criteria in the questionnaire,
121 naturalistic observations of caregivers' hygiene practices were performed by the data
122 collectors. Mid-Upper-Arm Circumference measurement was carried out for 2370 children

123 [16]. Ethical approval was obtained from the Research and Ethics Review Committee of the
124 Ministry of Health, South Central Somalia (D-nr: MoH& HS/DGO/0129/2017).

125 **Setting**

126 The three selected IDP camps are located in the districts of Baidoa, Dharkenley and Dayniile.
127 The camps in Dharkenley and Dayniile districts in the Benadir region were established in the
128 21st century. The selected IDP camp in the district of Baidoa in Bay region was established in
129 the 1990s. Together they represent approximately 600,000 of the 1.1 million total Somali IDP
130 population. The caregivers and the children in this study were living in the IDP camps in
131 traditional houses, in so-called “aqals” built of straw or plastic with shared water supply and
132 latrines. Goats, cattle, chicken, dogs roamed throughout the camps.

133 **Participants**

134 As per the inclusion criteria, 1655 caregivers and 2370 children were included in the study.
135 Caregivers and any of their children aged 6-59 months enrolled in a nutrition programme
136 provided by Save the Children in 2017 were included. As part of the study’s ethical
137 guidelines, Community Nutrition Volunteers’ (CNVs) observations which identified children
138 with malnutrition and diseases such as pneumonia, malaria, measles or AIDS or with weights
139 <2500 grams and the severely malnourished or ill were referred to health facilities for
140 treatment and care [17]. The study used, ideally, vaccination cards to determine children’s
141 ages. If there was no vaccination card or the caregiver did not recall their children’s dates of
142 birth, a seasonal calendar was used as a tool to estimate age by mapping back through
143 monthly changes in weather (rainfall or temperature) and agricultural activities.

144 **Questionnaire**

145 The WHO Infant and Young Child Feeding Counselling (IYCF) questionnaire adopted by the
146 research department of Save the Children, South Central Somalia was inspired by several
147 other interrogative tools [18-20]. It was written first in English, then translated into Somali

148 and back-translated into English as a built-in control to reduce bias [21]. The questions were
149 pre-tested on 10 IDPs to ensure validity [15] before back-translation into English [21]. The
150 feeding questions were, after pre-testing, adapted to the Somali context with regards to the
151 specific foods available in South Central Somalia. The questions consisted of 98 closed and
152 open yes/no or multiple-choice response alternatives in the following sections: demographic
153 information on caregivers and households; household hunger; hygiene practices and
154 observations; child feeding practices; and, infant and young child feeding (IYCF) knowledge
155 and attitudes. For further details see a summary of the content of each section of the
156 questionnaire in Appendix 1. Child anthropometry in terms of Mid-Upper Arm circumference
157 [16] is included in the questionnaire as a subsection and described below.

158 *Anthropometry*

159 Malnutrition is divided into three measurements of the nutritional situation in a population;
160 Moderate Acute Malnutrition (MAM), Severe Acute Malnutrition (SAM) and Global Acute
161 Malnutrition (GAM). MAM and SAM are % of children below the anthropometric thresholds
162 in a population and GAM is the sum of those. A GAM value of more than 10 percent
163 indicates an emergency [22]. Humanitarian agencies use Mid-Upper-Arm Circumference as a
164 anthropometric thresholds for admitting children with malnutrition to feeding programmes.
165 The mid-point between the tip of the shoulder and the tip of the elbow is identified and then
166 measured [23]. The cut-offs used by WHO to classify a child as MAM is a Mid-Upper-Arm
167 Circumference between 110mm and 125mm, less than 110mm is classified as SAM [16, 22].
168 A cut-off of point of 110mm was used for SAM in this study. In some other studies where the
169 Mid-Upper-Arm Circumference was measured the cut-offs has been increased from 110mm
170 to 115mm to define SAM. This to ensure that children between are not missed out from
171 management of malnutrition [22, 24, 25].

172 **Data Collection**

173 Twenty data collectors were recruited from rosters in the Mogadishu and Baidoa Save the
174 Children offices. They were all professional data collectors with years of experience of
175 gathering data for periodic monitoring and research projects. They received two days'
176 additional training before commencing their work for this study. This training was carried out
177 at the end of July 2017 by the Save the Children research manager in the Save the Children
178 office in Mogadishu. The training focused on administering the study questionnaire and how
179 to make naturalistic observations. Intra-examiner reliability was established among the data
180 collectors by a thorough discussion and testing of the questionnaire at the training sessions
181 [15]. During the training, an online link to the questionnaire was distributed. The data
182 collectors worked with Save the Children Community Nutrition Volunteers (CNV), who
183 carried out the Mid-Upper-Arm Circumference measurements. The data collectors and CNVs
184 gathered and recorded data seven days a week throughout the month of August 2017.

185

186 The data collectors made one house visits to each of the 1655 households participating in the
187 study. During the visit, data collectors provided verbal information about the twofold aim of
188 the study, the design and assurances that participants could withdraw from the study without
189 consequences at any time. The data collectors gained verbal consent from the guardians of the
190 children. Informed consent was thus obtained from all 1655 caregivers and consent for the
191 children involved before the data gathering began [17]. During the visit to the household, data
192 collectors gave out appointment times and locations for the Mid-Upper Arm Circumference
193 measurement and the completion of the questionnaire. It was at this visit that data collectors
194 collected observational data on hygiene. Using naturalistic observation the real-life
195 environment created by the household member's behaviour was observed [15]. Household
196 hygiene practices and environment were observed for an hour without providing advice to the
197 caregivers. Corrective measures were suggested after the observation. Data collectors

198 evaluated the presence of human faeces, garbage, and animal droppings (Appendix 1). By
199 asking caregivers if their household experienced hunger often, rarely/sometimes or never
200 during the past month/30 days, data collectors assessed hunger levels within the household
201 [18]. The data collectors asked the caregivers to bring the child/children to the appointment at
202 set time and place.

203
204 On the day of the appointment, to collect data at each IDP camp, data collectors and CNVs set
205 up a collection centre in one of the ‘aqals’ in the IDP camp. CNVs set up their equipment for
206 the anthropometric Mid-Upper-Arm measurements. At each appointment a CNV conducted
207 the anthropometric Mid-Upper-Arm Circumference measurement/s of the child/children. The
208 children turned up in a piece of cloths, or pants and a shirt. Children were examined in a
209 standing position with their left/right arm hanging freely at their side. Because the arm
210 measurement needed to be taken with a bare shoulder and arm, CNVs asked caregivers to
211 remove any shirts with sleeves. For weak and young children, measurements were taken while
212 in a recumbent position [16]. The procedure took approximately 10 minutes including
213 information. Together with the caregiver and their child/children, the data collectors filled out
214 the questionnaire. This process took approximately 30 to 45 minutes. The data collectors sent
215 the completed questionnaires, including observations and anthropometric Mid-Upper-Arm
216 Circumference measurement data, to the online server at Save the Children on a daily basis.

217 **Analysis**

218 The information gained from the three districts (Baidoa, Dharkenley, and Dayniile) was
219 entered into Stata© statistical software (StataCorp LLC™) [(26)], cleaned and analyzed using
220 mean (m), standard deviation (SD) and percentage (%). The Chi-squared test (Pearson chi-
221 squared) , a non-parametric method for ordinal data, was used to analyze the differences
222 between children aged 6-24 months and those aged 25-59 months for the classification of

223 malnutrition and between the groups in each of the Baidoa, Dharkenley and Dayniile districts.
224 Statistical significance was set at 0.05 [15].

225 **Results**

226 There was Severe (12.1%) and Global Acute (19.9%) Malnutrition among children in these
227 Somalian IDP camps in August 2017; this was more frequent in the age group 6-24 months
228 than it was in the age group 25-59 months ($p<0.01$). The frequency of malnourished children
229 in the Dayniile district ($p<0.01$) was higher in comparison to the Baidoa and Dharkenley
230 districts (Table 1). Child marriage among the caregivers and illiteracy among household heads
231 were frequently reported (Table 2). The use of ANCs and skilled birth attendants for
232 deliveries in a health facility varied widely, from 89.2% in Baidoa, 9.5% in Dharkenley and
233 1.5% in Dayniile. For demographic data on caregivers ($n=1655$) and households ($n=1655$) see
234 Table 2.

235
236 Hygiene ($n=1655$) was below what can be considered a result of hygiene practices (Table 3).
237 Caregivers' statements on child feeding practices ($n=1655$) indicate the presence of unhealthy
238 practices, such as giving animal milk to a child under 6 months in Baidoa $n=459$ (48.5%), in
239 Dharkenley $n=299$ (52.2%) and in Dayniile $n=120$ (88.2%), using water to quench the thirst
240 of newborn infants Baidoa $n=583$ (61.6%), Dharkenley $n=267$ (46.6%), Dayniile $n=132$
241 (97.1%), perceiving colostrum to be harmful to the health of a child Baidoa $n=485$ (51.3%),
242 Dharkenley $n=360$ (62.8%), Dayniile $n=46$ (33.8%) and giving fewer liquids than normal to a
243 child with diarrhoea Baidoa $n=211$ (22.3%), Dharkenley 161 (28.1%), Dayniile $n=77$ (56.6%)
244 (Table 4). Table 5 presents the knowledge and attitudes of caregivers regarding infant and
245 young child feeding. Gaps identified were the unhealthy practices of sugar or glucose water to
246 children under 6 months. Half to two-thirds of the caregivers stated that a newborn baby
247 should be put on the breast to suckle within an hour after birth and that breastfeeding should

248 be continued throughout the entire complementary foods period until the child reached the age
249 of two. Most caregivers reported that the introduction of solid and semi-solid food should be
250 introduced to children after 6 months of age. Food that could be introduced to a child during
251 the complementary food period included thin porridge, rice, vegetables, fruits and fruit juice,
252 egg yolk or whole eggs, meat, fish and poultry.

253 **Discussion**

254 The nutrition situation in Dayniile was critical (GAM 19.9%), whereas in Dharkenley and
255 Baidoa the situation was serious (GAM 12.1% and 13.5% respectively). With the Somali
256 national GAM level sitting at 17.4 %, the situation in two of the three districts included in this
257 study was actually less serious for children compared to the national average [6, 27, 28]. The
258 MAM in Dayniile (8.0%), Baidoa (5.6%) and Dharkenley (3.3%) can be compared with the
259 national MAM figure of 3.2 % indicating there was more MAM for the children included in
260 this study than the national data indicated [6, 27, 28]. With figures like this it goes without
261 saying that SAM is endemic for Somali children on a national level. In one systematic review,
262 the risk of malnutrition in Somalia was shown to be largely predictable. A key predictor of
263 malnutrition was in a previous study shown to be the presence of disease, such as HIV and
264 other chronic conditions. It was concluded that healthcare and support efforts had to include
265 infected IDPs located outside of IDP camps as well as those within if malnutrition was to be
266 avoided [4]. Another key predictor of malnutrition was the lack of close monitoring of
267 drought forecasts. The study showed that closer monitoring of climatic trends could provide
268 valuable information for nutritional intervention planning [5]. In 2017, when our study was
269 carried out, a nationwide famine was making assistance necessary to IDPs both in the camps
270 and outside of them. Humanitarian agencies were scaling up their efforts to reach the nearly
271 1.2 million children under five who were acutely malnourished [8]. The Food and Agriculture
272 Organization of the United Nations [29], continues to report widespread shortages of water

273 across Somalia, nearly 1.7 million people living in emergency situations and a further 72.869
274 people being displaced. Researchers now agree that gaps in local caring practices should be
275 identified as a baseline prior to scaling up interventions [13, 14, 30].

276

277 The use of ANCs and skilled birth attendants for deliveries in a health facility varied widely,
278 from 89.2% in Baidoa, 9.5% in Dharkenley and 1.5% in Dayniile. This is a striking difference
279 that can influence nutrition knowledge and hygiene practices. The IDP camp in Baidoa was
280 since decades established compared to the IDP camps in Dharkenley and Dayniile established
281 in the 21st century. The time from establishment might influence women's ANC visits and
282 facility-based births. The contact with health care providers at the health facility can influence
283 women's nutrition knowledge and hygiene practices. This is interesting because the
284 households in Baidoa reported high hunger levels but they had fairly decent hygiene practices.
285 And it looks like households in the Dayniile had poor hygiene practices though they reported
286 low hunger levels. The acceptability and accessibility of health professionals in the health
287 facilities might differ between the camps due to the time from establishment. The gaps in the
288 hygiene and feeding practices identified in this study can be used to build the capacity of local
289 caregivers, through counselling or education, in areas such as hygiene, breastfeeding, and
290 complementary feeding practices. Advice from health professionals at MCH clinics can help
291 to promote the benefits of colostrum, early initiation of breastfeeding after birth and exclusive
292 breastfeeding for 6 months continued to 24 months with complementary feeding practices.
293 This is consistent with previous research and recommendations on counselling, education and
294 programme implementation [31-33] in various settings.

295

296 According to the Sustainable Development Goals (SDGs) [34, 35] the potential for a child to
297 thrive starts with pregnancy and is particularly important in the first months and years when

298 children are most vulnerable to sickness and malnutrition. Consequently, a cash-based
299 intervention and the risk of acute malnutrition in children aged 6-59 months living in IDP
300 camps in Mogadishu, Somalia was undertaken in 2016. The conclusion was that cash-based
301 interventions improved wealth and food security but did not reduce acute malnutrition in
302 children. The authors suggested the addition of specific nutritious foods and more
303 communication around social and behavioural change would be more effective [10].

304

305 Sustainable humanitarian assistance in terms of counselling or education in care practices may
306 enhance caregivers' resilience in the long-term [31] when combined with other emergency
307 efforts from time to time [4, 5]. The distress caused by long term insecurity, lack of income
308 and drought and the effect of recurrent emergencies on the emotional well-being and mental
309 health of caregivers and children was not investigated in this study although it needs further
310 attention. In an upcoming study the correlations between malnutrition and care practices
311 considering water, sanitation and hygiene will be more closely examined. The results, it is
312 hoped, will further contribute to the understanding of effective interventions in malnutrition.

313

314 This study showed that children aged 24 months were most vulnerable to malnutrition. This
315 may be a result of the occasional hunger situation in participant households and the presence
316 of unhealthy practices regarding hygiene and feeding. After the acute phase of humanitarian
317 assistance, a more sustainable phase of humanitarian assistance and the reintegration of IDPs
318 has been emphasized [4, 27, 28]. Sustainable humanitarian assistance in the form of clean
319 water supplies and sanitation modalities is one fundamental strategy for health; another is
320 education. Hygiene and cleanliness are well-known keys to the health and growth of children
321 [4, 30]. Universal, affordable and sustainable access to water, sanitation, and hygiene
322 (WASH) is a public health effort focusing on SDG 6 [30, 35]. It includes behaviour change

323 communication for caregivers with limited education including depression and stressful
324 situations, it will help development agencies to design the best programmes for caregivers in
325 the future [(30)].

326 **Limitations**

327 The main limitation of the data was regarding construct validity [(15)] and the lack of
328 statistical correlations across the data. Alpha-reliability was not measured. Instead, we chose
329 to rely on conclusion validity among the authors of this study, discussing and reflecting on
330 similarities and differences between and across the data. The decision was taken to present the
331 data from the three districts separately to provide readers with a more nuanced picture of IDPs
332 across Somalia. The results from Baidoa could reflect its long history of humanitarian aid and
333 suggest that caregivers there knew more about child health and nutrition than in the other two
334 districts. It could be seen as a strength of our study that it was possible to compare our results
335 with country data [15].

336

337 In our experience, social-acceptability bias [15] may be a problem with some of the questions
338 in the questionnaire. For example, mothers answered that they always washed their hands
339 before preparing food or before a meal, but when naturalistic observations were conducted,
340 based on standard criteria in the questionnaire, this washing did not seem to have taken place.

341 The fact that reported household hunger levels did not fully correspond with child
342 anthropometry Mid-Upper-Arm Circumference (n=2370) suggests that caregivers may have
343 underreported hunger levels by disproportionately choosing the ‘rarely/sometimes’ option.

344 The utilization of the Mid-Upper-Arm Circumference measurement [16], despite its
345 limitations, could be seen as strengthening reliability when carried out by well-trained CNVs
346 and recorded by experienced data collectors.

347

348 Intra-examiner reliability of the questionnaire was established through consensus validity
349 among the data collectors at the training event organised before the commencement of data
350 collection and pilot testing. Regarding generalization, there are several weaknesses in this
351 study [15]. It is important for further studies to use random sampling to avoid biased results;
352 to present the effect of birth order on malnutrition when more than one child is included from
353 a household and weight for height in addition to the Mid-Upper-Arm measurements.
354 Concurrently with this study, the USAID [36] and UN Refugee Agency (UNHCR) described
355 similar results [37]. Hence, the recommendations from this study, with caution, can be applied
356 not only to Somali internally displaced children and their caregivers but can be generalized to
357 similar IDP settings elsewhere in the world.

358 **Conclusion and Clinical implications**

359 This study provides information on risk factors for malnutrition of children 6-59 months from
360 three districts of Somalia with frequent humanitarian crises. The risk factors for malnutrition
361 in this study derive from gaps in the caregiver's knowledge, attitudes and practices regarding
362 hygiene and feeding. The data can be helpful in documenting child malnutrition levels in
363 Somalia and prioritizing the actions needed to combat these. The information on gaps can be
364 helpful in designing future educational programmes for caregivers in at-risk population
365 groups. The results can be presented to local authorities in the planning phase of humanitarian
366 aid interventions.

367

368 **List of abbreviations**

369 CNV: Community Nutrition Volunteers

370 GAM: Global Acute Malnutrition

371 IDP: Internally Displaced Person

372 IYCF: Infant and Young Child Feeding

373 MAM: Moderate Acute Malnutrition

374 SAM: Severe Acute Malnutrition

375 **Declarations**

376 **Ethical approval and consent to participate**

377 The Research and Ethics Review Committee of the Ministry of Health, South Central Somalia
378 provided ethical approval (D-nr: MoH& HS/DGO/0129) for the study in 2017. The committee
379 agreed verbal information from participants was sufficient to gather data. Because children
380 were involved in this study, information and consent was exchanged with adult guardians.

381 **Consent for publication**

382 The verbal information and verbal consent included confirmation from guardians to publish
383 data on the children.

384 **Availability of data and materials**

385 All of the data and materials related to this study are available upon request from Save the
386 Children, Somalia Country office. The data is stored on the Save the Children server.

387 **Competing interests**

388 The authors declare no competing interests.

389 **Funding**

390 Save the Children, Somalia Country Office funded the study. There is no conflict of interest to
391 be declared.

392 **Authors' Contributions**

393 All authors contributed to the design of the study, interpretation of analyzed data and writing
394 of the manuscript. MK developed the study design together with KE FO, MS and FD. MK
395 gathered the data together with local data collectors and CNVs under the supervision of MS.
396 MK entered the data into the data set and performed the analysis on the data under
397 supervision of MS. MK wrote the manuscript together with KE, FO, and FD.

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