Health SCENARIO BRIEF – Nutrition at Scale In Somalia

Somalia 2022

Following several years of implementing a new, simplified malnutrition treatment approach in Somalia, the International Rescue Committee's (IRC) Somalia country team intended to expand the program to new parts of the country. However, the team wanted to better understand the cost implications of expanding this approach, in order to maximize value-for-money. The IRC Best Use of Resources (BUR) team developed a scenario model to help answer key questions.

Use-Case for the Scenario Model

The Somalia country team knew their nutrition program was successful, and in the face of growing malnutrition nation-wide, wanted to expand their program. However, they were unsure if wider geographic coverage, or more comprehensive coverage in existing locations, would allow the IRC to reach more children in need within limited budgets.

Existing Program Used for the Somalia Scenario Model

The Somalia team had implemented a medium-scale nutrition program using the combined protocol in several urban health centers, for several years. The combined protocol has a standard treatment for SAM and MAM children, instead of basing treatment on their weight/height as in the traditional approach. Cost-efficiency data from this program gave the BUR team relevant and accurate information to use to build the scenario model.

Cost Question(s) from the Somalia Team

The Somalia team had three key questions they wanted to explore in the scenario model:

- How would costs of the full program change if they added the treatment of moderate acute malnourished children to their current severe malnourished program
- How would operating in new rural locations change the cost-effectiveness of the combined approach, compared to the urban areas that IRC had served before?
- How would costs per child treated be different for an implementing organization that did not have access to free in-kind malnutrition treatment supplies (if, for example, the government were to implement the program in new areas on their own).

Key Findings

- It is more cost-efficient (by up to 50% per child) to increase coverage in a few locations than to expand to additional locations.
- Given that scale due to increased coverage (in fewer facilities) is more cost-efficient than increased scale due to widened geographic coverage (more facilities) – additional money spent on outreach activities to identify malnourished children is expected to actually drive down the cost per child treated.

Introduction

Malnutrition has long been a concern in Somalia, with Global Acute Malnutrition (GAM, which is comprised of Severe Acute Malnutrition (SAM) and Moderate Acute Malnutrition (MAM)) rates of 10 – 15 percent at the end of 2020.[1] In 2021 the International Rescue Committee (IRC) was implementing integrated programs throughout Somalia, including a multi-year primary health program in five clinics in Banadir region (which includes the capital, Mogadishu). Along with supporting general outpatient care and maternal/neonatal care, the clinics offered nutrition treatment using the combined protocol for the treatment of Severe Acute Malnutrition (SAM) (note IRC's initial implementation of the combined program focused only on SAM cases).

Treatment of Malnutrition- Combined Protocol[2]

The Combined Protocol for Acute Malnutrition (CPAM) merges the treatment of uncomplicated SAM and MAM into one treatment protocol using simplified diagnostic criteria and the same therapeutic food product. CPAM is targeted to children 6 to 59 months old.

- Mid-Upper Arm Circumference (MUAC) is used as the sole diagnostic criteria, rather than complicated height and weight measurements– MUAC has been shown to be simpler and easier to use than height and weight.
- Ready to Use Therapeutic Food (RUTF) is used as the sole food treatment with a standard dosage of two sachets a day for SAM and one for MAM.

A 2019 evaluation of the combined protocol in one of the five clinics found a 98% recovery rate with a stay of 28 weeks for SAM patients, indicating that the program was successful in this context. Additional studies in other countries have also found CPAM to be effective, and more cost-effective than the standard malnutrition treatment protocol.[2]

In late 2021 and early 2022, following multiple seasons of drought and failed crop cycles, standard indicators projected malnutrition to rise to serious (IPC 3) and critical (IPC 4) levels throughout the country.[3] As a result, the IRC Somalia team sought to dramatically scale their program to reach more children in need. Several factors affected the team's decisions about how to scale the program, including cost-efficiency. The team knew they could reach more children with the funding available if the cost per child was as low as possible, while still providing an effective program; but they were unsure what would help them to maximize cost-efficiency at scale. Specific factors the team was concerned about when considering the cost of scale-up were:

- The team felt the need to add MAM treatment to their programing, in order to prevent moderate cases of malnutrition from becoming severe due to lack of treatment.
- IRC's nutrition programing was primarily in urban internally displaced person (IDP) camps around Mogadishu – but projections showed more rural areas were experiencing the highest needs. The nutrition team wanted to explore ways they could expand their programing to more rural locations.
- Concurrently, the team knew that to fully cover needs in malnutrition across the country other actors, including NGOs and the government (who were still using the standard treatment protocol) would need to scale up their activities as well. However, these other actors may not have access to the supplies that IRC often receives for free, specifically therapeutic feeding supplies (RUTF) which comprises a large portion of the costs of malnutrition treatment. They wanted to understand how much cost per child treated would change if the government or other actor chose to implement the

CPAM without these donated supplies. In addition, they knew that convincing other actors to change to the CPAM modality would require strong information sharing and advocacy.

In February 2022 the Somalia team partnered with the IRC's Best Use of Resources (BUR) team, the nutrition technical unit, and the IRC advocacy team to undertake a scenario analysis to help them better understand the most cost-effective ways to scale their nutrition programing.

Scenario Analysis

The first step in creating a scenario model is to identify the core questions that the program team wanted to model to address. They agreed on the following:

1. How do costs (both total and per child treated) scale as we increase the number of locations covered and coverage rates within a single location?
2. What are the relative cost differences per child between SAM and MAM treatment?
3. How do rural costs scale? How much would it cost per child?
4. What is the full program cost beyond IRC expenses (including in-kind costs)

Recent cost data from the same context is a requirement to create a quality model of alternative implementation scenarios– so the BUR team next identified appropriate costing data to underly the analysis. Because nutrition programing using the CPAM was already underway in Somalia they had recent, relevant costing data from three different grants to build on.

Finally, the BUR team built a scenario model that works similar to a calculator. This model included all of the individual "ingredients" of a CPAM program, based on prior IRC programming experience, but explicitly linked the amount of each resource needed to the number of districts, clinics, or children served. This allowed the Somalia team themselves to vary the specifics of the program roll-out plan and see results both in the overall cost of the program as well as the cost per child treated and child recovered.

Scenario Model

The scenario model worked by first allowing the user to modify key elements of the rollout approach in Excel tables, as seen in Tables A and B below.

***STEP 1*:**
Choose a model options and delivery method under "OPTIONS" for each of the items to the right. Clicking on the cell wil prompt a drop down menu

TABLE A. Model Options	
Delivery Methods	**OPTIONS: Select 1 for each**
Using Caseload Calculator?	Not Using
IRC costs Only or Full Cost Model?	IRC Costs

TABLE B. Delivery Method	
Delivery Methods	**OPTIONS: Select 1 for each**
Includes Rural Implementation?	No Rural Implementation
Start-Up Included?	Implementation Only
Prevention Included?	Treatment Only

First, the user can decide if they would use an optional caseload calculator (see details below) to input more precise information about the anticipated number of locations and children who would receive treatment. If the team choose not to enter data into the caseload calculator, they would need to enter additional information at a later step. Next, the user would choose if they were interested just in a cost model for IRC (where in-kind costs were excluded), or a projection of costs including materials that are commonly donated.

In Table B, the user can choose if they are interested in including some rural intervention locations or focusing only on urban implementation. They could also choose to examine costs for 'year one' of a program that would include one-time startup costs like community health worker (CHW) trainings and hiring, or instead focus on 'implementation only' costs which assumes the program is already operational and initial start-up investments have been made. Lastly, the user could choose to look at the cost of treatment only, once the child arrived at an IRC health site, or they can include prevention activities like CHW outreach that are expected to both prevent some cases of malnutrition, but also increase coverage of treatment services by proactively identifying children who needed to be treated.

If the user opts to use the caseload calculator, they are asked to input key data on the prevalence of acute in the yellow cells of the Tables 1 (for urban/IDP locations) and 2 (for rural locations). The white cells auto-populate based on the data entered. All of these input parameters are standard in nutrition program proposals and should be readily available. The calculator itself simply helps to compile these numbers for multiple locations to produce a more accurate estimate of cost and cost efficiency.

TABLE 1: Urban/IDP Caseload Calculation		
Region 1		
Total Catchment population		*Persons*
% children 6-59 months		*percent*
SAM prevalence		*percent*
MAM prevalence		*percent*
SAM Correction Factor		
MAM Correction Factor		
Children with SAM	0	*children*
Children with MAM	0	*children*
SAM Coverage		*percent*
MAM Coverage		*percent*
SAM Caseload	0	*SAM children treated*
MAM Caseload	0	*MAM children treated*
IRC supported facility or MOH?		

TABLE 2: Rural Caseload Calculation		
Total Catchment population		*Persons*
% children 6-59 months		*percent*
# of sites/villages targeted		*sites*
SAM prevalence		*percent*
MAM prevalence		*percent*
SAM Correction Factor		
MAM Correction Factor		
Children with SAM	0	*children*
Children with MAM	0	*children*
SAM Coverage		*percent*
MAM Coverage		*percent*
SAM Caseload	0	*SAM children treated*
MAM Caseload	0	*MAM children treated*
# of sites a mobile team can reach	4	*Sites per Week*
Number of mobile teams	0	*teams*
Recovery Rate		*percent*

Lastly, the user must fill in the yellow cells in Table C below, ideally using data from previous IRC nutrition programs—for instance, about the length of training necessary to familiarize clinic staff with the simplified protocol—to improve cost estimates. Note that grey cells are required *only* if the caseload calculator is not used. If it is used, then these cells are populated automatically.

TABLE C. Program Parameters		
Parameters that Impact Intervention Cost	**Units**	**Label**
The Program & Health Portfolio		
Months of Implementation		*months*
Urban/IDP Targets		
~~Number of IRC health centers/districts~~	~~1~~	~~*centers*~~
~~Number of MOH health centers/districts~~	~~2~~	~~*centers*~~
Urban/IDP Districts covered	0	*districts*
Number of CHWs		*CHWs*
~~Total # of children with SAM treated~~	~~3012~~	~~*children*~~
~~Total # of children with MAM treated~~	~~4084~~	~~*children*~~
Recovery Rate		*percent*
Total # of children recovered	0	*children*
Average # of children per CHW	#DIV/0!	*children*
Number of days of CHW Outreach		*days*
# of Caregivers in Family MUAC	0	*caregivers*
Rural Targets		
~~SAM Caseload~~		~~*SAM treated*~~
~~MAM Caseload~~		~~*MAM treated*~~
~~Number of mobile teams~~		~~*teams*~~
Recovery Rate		*percent*
Total # of children recovered	0	*children*
Number of Rural CHWs		*CHWs*
Trainings		
Length of Training for Family MUAC		*day(s)*
Length of Training for nutrition staff		*day(s)*
Length of Refresher Trainings		*day(s)*
Staffing		
Number of Nutrition Staff	7	*persons*
Number of Facility Level Staff	0	*persons*
Number of Trips per International Staff		*trips*
International Staff Benefits %	27%	
National Staff Benefits %	25%	
Treatment		
Average Length of Stay for SAM		*weeks*
Average Length of Stay for MAM		*weeks*
Relative Staff Cost of MAM to SAM	#DIV/0!	*percent*
Average # Sachets Consumed by SAM		*sachets*
Average # Sachets Consumed by MAM		*sachets*
Buffer Stock Purchased by IRC		*% of expected cases*

The inputs into Tables A, B, C, and the caseload calculator automatically combine with data on the ingredients needed and the specific amounts used from previous Somalia nutrition programs (Table D –in the annex) to calculate estimated costs for the scaled nutrition intervention. Cost estimates are presented as total program cost, cost per child treated, and cost per child recovered, in the Summary Table below (note that these amounts are based on random inputs into the tables and are not representative of specific predictions for Somalia).

SUMMARY TABLE. Cost Projections		
Total Program Cost	$	487,403
Total Fixed + Program Cost	$	619,380
Cost per Child Treated	$	131
Cost per Child Recovered	$	145

Results

The Somalia team was able to run the scenario model calculator with any number of modifications and scenarios, using it to learn the most cost-efficient ways to scale their nutrition program would be. Concurrently, the BUR team used the model to identify themes in costs and cost-efficiency that could be considered lessons learned either for Somalia or for programing in general. The lessons identified were as follows.

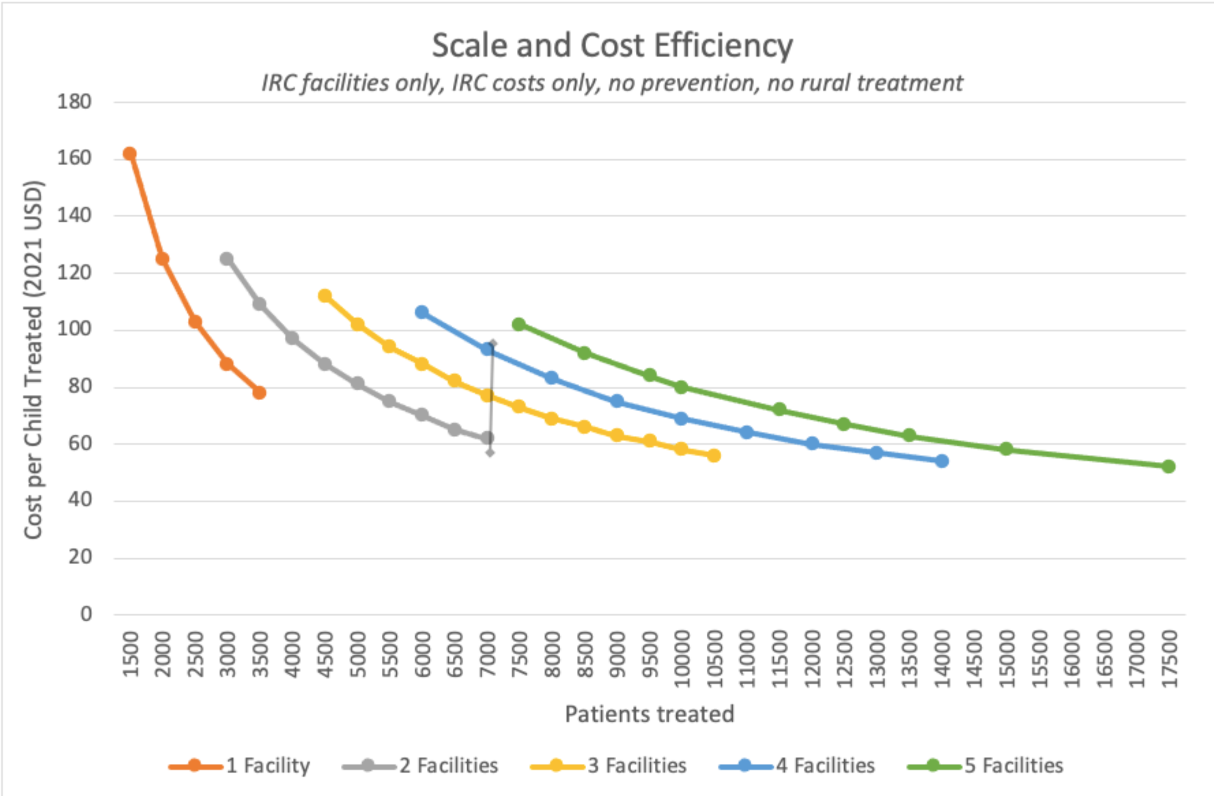
The cost of treating 7000 children (3000 SAM and 4000 MAM) ranged from $44 (if the program was implemented in five rural locations, *excluding* in-kind costs, start-up costs, and prevention/proactive referrals from CHWs) to $198 (in five urban/IDP locations, *including* in-kind costs, start-up costs, and prevention/proactive referrals from CHWs).

Unsurprisingly, the factor that had the largest impact on of the predicted costs was the inclusion of the RUTF purchase, which in many cases (depending on model configuration) was at least 50% of the full cost of the program. IRC typically receives RUTF in-kind from UNICEF or WFP but if the government or another actor who was unable to receive the supplies in kind were to implement CPAM, costs would be expected to be in the higher range.

It costs less per child treated to increase coverage of in-need children in a few locations than to expand to additional locations but achieve lower coverage in each.

Figure 1, on the following page, looks at how cost-efficiency changes as the nutrition program grows given an option to scale by 1) improving coverage at fewer facilities (e.g., increasing outreach activities to improve coverage of malnourished children from 60% in the facility catchment area to 90%) or 2) increasing the number of facilities/catchment areas where IRC nutrition services are active, but keeping the children reached per facility constant.

The figure shows the relationship between the cost per child treated (y-axis) to the number of children treated (x-axis) based on the number of facilities/locations IRC is covering (color of the line) and if all cases are SAM (darker lines) or MAM (transparent lines). For all of the pictured estimates, the model is assuming that all facilities are IRC run (not MoH run), located in urban/IDP areas, we are excluding the costs of RUTF/in-kind supplies, and excluding the costs for outreach.



The figure demonstrates, if we are seeking to maximize the number of children we reach within a given budget, it is a more efficient strategy to first increase coverage at existing facilities than to open services in new catchment areas For example, it is predicted to cost $62/child for a caseload of 7000 children who are treated for SAM from two facilities (or $55 for MAM), but the cost-per-child nearly doubles when the same 7000 children are treated in four facilities ($93 for SAM and $86 for MAM). Of course, to reach larger and larger numbers of children in need, eventually, it is necessary to offer services at more facilities—as the graph shows, there's no means of reaching 10,000 children with just two facilities. The key insight is that, with a given amount of money to invest, you can likely reach the most additional children by first maximizing coverage at existing facilities and only then moving on to offer services at new facilities.

As a result, the BUR team recommended that if the IRC does not have guaranteed funding for more than two years to maintain high coverage at newly added facilities, it is better to focus on maximizing coverage at existing facilities than it is to expand to new ones, at least from a cost-efficiency standpoint.

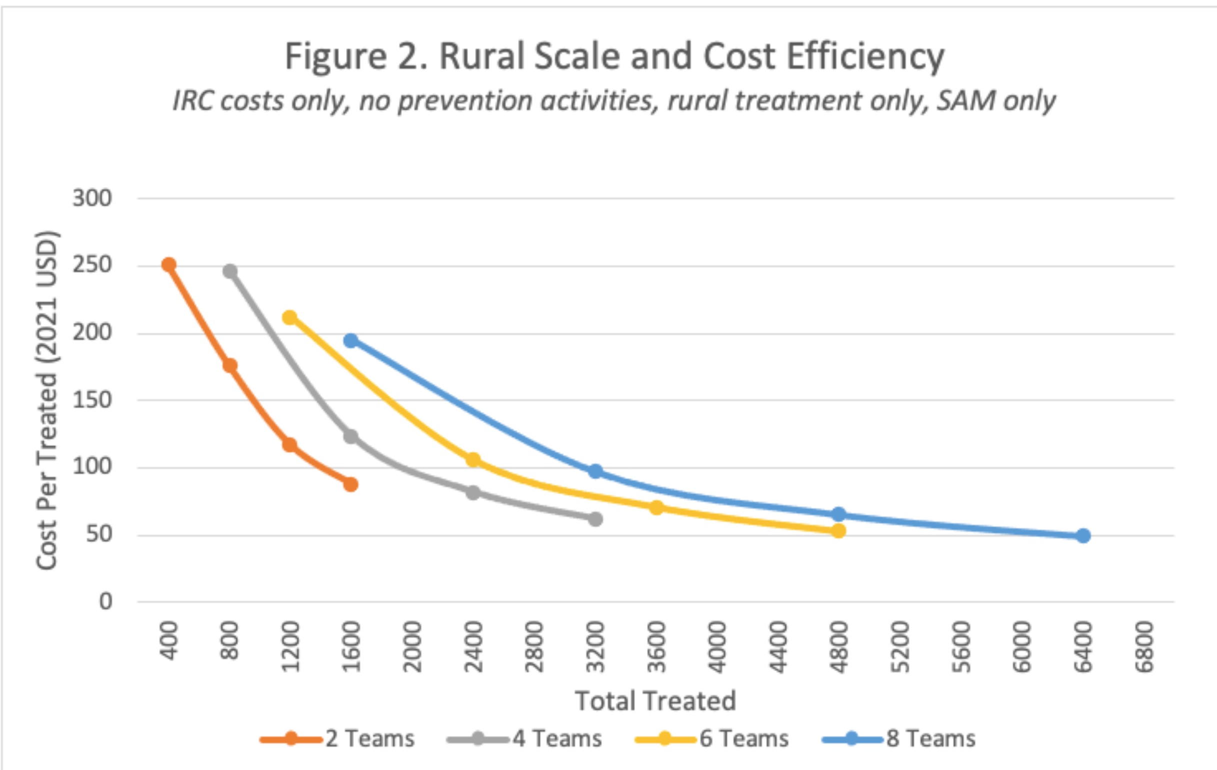
Given that scale due to increased coverage (in fewer facilities) is more cost-efficient than increased scale due to widened geographic coverage (more facilities) – investing additional funding in outreach activities is actually expected to drive *down* the cost per child treated.

The BUR team found that the inclusion of preventative/outreach activities completed by community health workers (such as proactive family MUAC screenings) added $10 to the cost per treatment of each child at most. At a minimum, it added less than $1. The variation in cost comes from varying the number of children treated from low to high ranges – prevention activities cost less per child, for each additional child they reach. In practice, this means that if the CHW outreach allows a Program to increase admissions by at least

10%, the program is more cost efficient (costs less per child) with the CHWs than without them due to the increase in scale. This was identified by looking at the cost-per-child treated using the number of children treated in the 2021 Somali program. When prevention activities are excluded, we found a cost of $96 per child. If we increase the number of children from 2021 by 10% and include the cost of prevention (again using estimates from 2021) – we get a cost-per-child of $97. This means that if the same outreach workers actually increase the number of children treated by more than 10% the cost per child will be lower with prevention measures, than without them.

For the rural program delivering services via mobile teams to be as cost-efficient as facility-based programing, each mobile team needs to reach between 450 to 550 children per year.

As seen in Figure 1, assuming a target of 7000 SAM/MAM cases (the reach of IRC's 2021 nutrition program), we expect our cost per child treated to be below $100. Figure 2 below examines the expected cost per child treated by mobile teams in rural areas, based on the number of teams and the number of children treated.



In order to achieve a cost per child treated below $100, a mobile-focused rural program would need between four and eight mobile teams. Given limits on the number of children one mobile team can reach, the start-up costs to mobilize just two rural teams are spread over so few beneficiary children that the cost-per-child remains high. The number of children who can be treated per team is also important, as either four teams will need to treat 2200 children (550 children per team), six teams will need to treat 2800 children (467 per team), or eight teams will need to treat 3600 children (450 per team). Rather than prescriptively suggesting a single conclusion, this data can be used to highlight important questions for team planning—how many children can a mobile team feasibly reach? In what areas are investments in mobile teams likely to “pay off” with the greatest number of children served? Are there additional investments the team could consider, that maximize the reach of each mobile team?

Conclusions

It is important to remember that this scenario model was built for a specific use case based on contextual monitoring and cost data, so not all findings will be transferable to different contexts or activities. At a minimum, this case study simply demonstrates the value of accumulating quality cost evidence, to help inform decision-making at key moments. Nonetheless, a few broader lessons are likely to hold true in many other settings.

First, the lesson learned that it is more cost-efficient to serve more people from fewer field sites is well demonstrated in the model but is also intuitive for the majority of center-based humanitarian service delivery. Certainly, this does not mean that those most in need of IRC assistance will always be in concentrated areas, or that the additional cost to program in more dispersed geographic areas is not, often, required. Rather this lesson can serve as a reminder to evaluate the density of need in new locations compared to existing locations and consider the trade-off between the “carrying costs” of new facilities and the possibilities of intensifying activities in areas already being served.

Second, encouraging care-seeking behaviors can be one of the most cost-effective additions to any service delivery that has high fixed costs to operate in a particular area. Unfortunately, because it is often time-consuming, training heavy, and hard to calculate its impact (did this child come to the clinic because of the CHW, or would they have come anyway?), behavior change activities can also be the easiest to cut when a given budget is tight – often in favor of additional staff or program supplies. The transferable insight from this analysis is that it may be worthwhile to calculate how much additional impact (e.g. more children reached, more children recovered) would be required from the behavior change activity for it to ‘pay for itself’ in cost per beneficiary analyses. While the analysis presented here is likely to be more precise than the back-of-envelope calculations that are possible during standard proposal development, even a few simple calculations to cost out the behavior change activities per beneficiary should give a strong starting point for evaluating their potential contribution to cost-effectiveness.

Lastly, the choice to implement static clinics to mobile teams must be based on need and context—cost-efficiency analysis can help us understand the relative cost-efficiency of different strategies to meet need in a particular context. The comparison of costs between mobile and static facilities in Somalia may not hold in different contexts with different distances, security, staffing costs, etc. Nevertheless, the findings from Figure 2 that costs per client drop dramatically when a certain threshold of clients per mobile team is reached supports the argument for phased scale-ups, that is starting with one or two mobile teams, monitoring caseloads, and scaling as and when the caseload of existing teams surpasses a predefined threshold.

What is a Scenario Model?

The Best Use of Resources (BUR) team at the International Rescue Committee works with field teams and technical units on several types of cost analyses. One of these analysis types is "scenario modeling"—where the cost and results of a hypothetical future program are estimated, based on the ingredients and prices of inputs from past programs. The value of a scenario analysis is that it helps program design teams and advocacy teams to answer 'what if' questions about modifications to a specific program prior to making decisions. For example, a technical team may have a limited budget and want to know how many of each of their ten ideal activities they can implement with the funding available. Or an advocacy colleague may be working with a national government to promote the uptake of an IRC education program at scale and need to have projections of what such programing might cost for an implementer who uses a slightly different delivery structure.

Four key pieces of information are required for the BUR team to complete a scenario analysis: 1) there must be an existing program in the context for which the scenario is being developed to use as a basis for cost data- thus scenario analysis cannot model a completely new program or a program in a completely new context; 2) there must be a clear use-case- meaning there must be a clear understanding of who will use the scenario analysis and why it is needed; 3) There must be a clear cost question of interest, as the more variables within a scenario model, the less accurate it will be – it is necessary to be explicit about what variables are used in the model to answer what specific question(s).

[1] Somalia Nutrition Cluster Snapshot. Jan 2021. UNICEF. https://reliefweb.int/report/somalia/somalia-nutrition-cluster-snapshot-jan-dec-2020#:~:text=Attachments&text=The%20median%20Global%20Acute%20Malnutrition,in%202018%2F19%20Deyr).

[2] Bailey J, Opondo C, Lelijveld N, Marron B, Onyo P, Musyoki EN, et al. (2020) A simplified, combined protocol versus standard treatment for acute malnutrition in children 6–59 months (ComPAS trial): A cluster-randomized controlled non-inferiority trial in Kenya and South Sudan. PLoS Med 17(7): e1003192. https://doi.org/10.1371/journal.pmed.1003192.

[3] Somalia: Acute Malnutrition Situation January 2022 and Projection February - April 2022. Integrated Food Security Classification. https://www.ipcinfo.org/ipc-country-analysis/details-map/fi/c/1155654/?iso3=SOM

This work was conducted by the Best Use of Resources Initiative at the IRC. For questions or more information please contact us at airbel@rescue.org.

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