Malnutrition Cost Analysis Methodology at the IRC

Until recently, humanitarian organizations have not routinely used cost data to compare the efficiency or effectiveness of different interventions and program delivery models. As a result, policy makers and practitioners have had little data to inform decisions on the allocation of financial resources for humanitarian response. With better information about the cost-efficiency and cost-effectiveness of our interventions, the IRC is able to understand how and why costs vary across contexts, enabling more informed decision making to maximize the impact of each dollar spent to improve our clients' lives.

The IRC conducts cost-efficiency and cost-effectiveness analyses of key interventions to inform program and advocacy decisions around the best use of resources. Cost-efficiency analyses are used to compare the costs of a program, or set of activities, to the number of clients provided with services (e.g. children treated for acute malnutrition, students reached with a new pedagogy). Cost-effectiveness analyses (CEAs) are conducted concurrently with our research team's impact evaluations. CEAs compare the costs of a set of activities to the change in outcomes for clients (e.g., reduction in mortality, improvements in child literacy).

Cost-efficiency and cost-effectiveness analyses enable practitioners to make comparisons across programs to understand how different approaches and contexts affect program cost and impact. With enough cost evidence from different countries, we can understand how context affects the costs of delivering services, enable better planning, and improve budgeting for humanitarian responses. Because the goal of such analyses is comparative, it is necessary to use a consistent methodology for cost analysis of humanitarian interventions.

There are many resources on the appropriate methodology for estimating the costs and cost-effectiveness of social programs[i,ii], including several articles on social programs in low-income countries[iii,iv]. Existing literature outlines the decisions that organizations must address when conducting cost analyses. It is important to note that the same set of decisions must be applied uniformly to analyses to enable a comparative analysis. Different interventions produce different outputs, goods or services provided by humanitarian programs, requiring potentially different metrics. For instance, calculating the cost per dollar transferred to beneficiaries of cash transfer programs versus the cost per person-year of latrine access for sanitation programs. Despite this, the humanitarian sector must be able to compare costs across intervention types and contexts. To do this, the IRC bases its costing methodology on the Levin Cost Ingredients Method.

This guidance note outlines the methodology that the IRC uses to conduct cost analyses, with a particular focus on malnutrition treatment projects.

1. Identifying Program Ingredients

In order to run a reliable cost analysis, it is necessary to understand all inputs required to implement a program. Consider a program a "recipe" for producing a particular output. All necessary inputs are the "ingredients" required to make that recipe, or that program.

This is rarely the same as an award budget, as these often include items used to produce many different outputs and the inputs necessary to produce any one output may have been funded across multiple awards. Only inputs that have contributed to the specific output in question are included in a cost analysis.

Deciding on an output to analyze requires a clear understanding of what activities should be included. For instance, would an emergency malnutrition treatment program consider the costs of mass screenings led by community health workers (CHWs) as a necessary input to that program? While technically a separate activity to direct malnutrition treatment, mass screenings aid in increasing coverage of treatment and almost all acute malnutrition treatment programs include additional screenings and outreach programs. Questions like these emerge in each analysis. **It is extremely important to have a common understanding of which activities contribute to which outputs. Working in close consultation with technical and program staff, the IRC applies clear standards for the costs included or omitted for every analyzed program.**

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Figure 1: Awards and Outputs

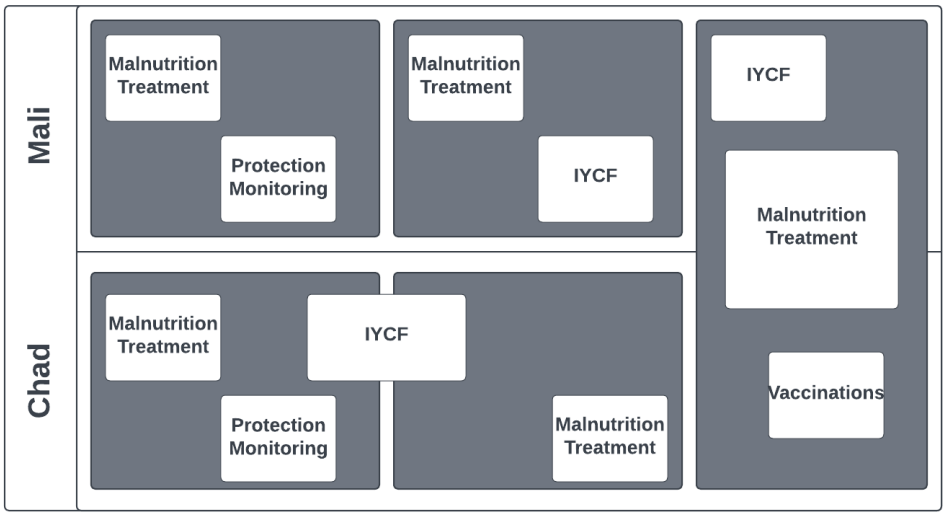


Figure 1 shows the range of relationships that one set of outputs (white blocks) can have to an award (grey blocks). Nearly all awards produce more than one output, meaning that for single award-funded programs, it is still necessary to disentangle the costs associated with that output versus the other outputs on the award. Some awards span multiple countries or field offices, meaning that costs must be broken down further based on their location as well as their output. And, most challenging, some programs are produced by resources funded across multiple awards.

For example, an IRC malnutrition treatment project in Mali used funding from five separate awards in 2021. To identify the necessary ingredients to provide malnutrition treatment in that program, we had to create one large "ingredients list" from five separate awards. Ingredients were then further allocated to represent their contribution to *only* malnutrition treatment and expenses filtered by the time frame in question.

Sources of cost information used to build ingredients lists can take many shapes. Different types of financial documents provide useful insights, and limitations, when answering cost research questions. The types of data used for cost analysis can be found below.

Award budgets generated in the proposal or program design stage offer detailed information on subcomponents of total cost (e.g. Program Staff, Travel, Supplies, etc.).

Accounting databases provide precise spending information that can be used to understand how much of planned spending happened in practice. Expenditure information from accounting databases provides disaggregated primary data, which reduces the chance of results being skewed by error. For organizations with well-developed accounting systems, individual transactions also tend to have accounting codes applied to them—e.g., general ledger category, programming sector, sub-office—which can be used as meta-data to understand the costs themselves. However, the value of this data depends on the quality of the accounting processes which produced it, and errors in coding (i.e. tagging the general ledger category, programming sector, or sub-office) can compromise the quality of analysis based on this data. Accounting data often includes tens of thousands of lines of spending per program, transaction-level data, which is infeasible to go through one by one and often needs to be reshaped in order to be usable. As a result, IRC analysts and finance staff track each individual expenditure to award budgets that have unique codes for each budget line item. Each expense is then mapped onto the appropriate codes so that the IRC has an accurate sum of spending for each budget item.

Time and Effort data collection captures how staff spend their time. Personnel are a major cost for most programs; therefore, the accuracy of a costing exercise significantly improves when staff time and resources are tracked specifically to the activity or program being analyzed. Awards often only capture staff time down to the level of individual projects/funding sources and not to the level of activities *within* one project. Time and effort tracking at the activity-level requires a time investment from program staff, so imposing time tracking tools onto program teams can be a significant burden. At IRC, cost-efficiency analyses typically capture one-time retrospective estimates of time allocation across activities based on conversations directly with program staff. For cost-effectiveness analyses, time and effort allocations are captured at regular intervals throughout implementation by holding 30-minute or 1-hour calls with program staff.

Country operating budgets provide insight on how country level management and shared costs are used at the country level. While donor constraints often dictate how much funding can be used for overhead or infrastructure, country level operating budgets capture the resources incurred to run country operations, regardless of the sector or program. Shared costs from awards are included proportional to the percentage of direct program costs included in the analysis, as discussed below.

Country operating budgets are now only used as back-up resource. While operating costs are necessary to implement a program, IRC ingredient lists typically aggregate all operating costs into one line, as the percentage charged to any one grant varies depending on a multitude of factors (number of grants per country program, size of grants, etc.).

Program Ingredients are the inputs used to achieve the desired output. These typically match the budget lines of award budgets but can often be either more specific than budget line items or include non-budgeted items. For example, a table of program ingredients can include goods donated in-kind and therefore not captured within tracked expenses. In addition, the cost analysis can also break down budget line items into multiple ingredients or combine others to suit the needs of the analysis. These decisions should be based on the final learning objective of the cost analysis and to ensure all expenses are tracked and matched to each ingredient.

In addition, knowing the total cost of each ingredient, the unit costs and units needed for each of the ingredients provide valuable insight into which resources drive total program spending. This level of detail is necessary for two reasons: First, breaking down the cost components ensures the analyst has included only the necessary program ingredients. If the number of units used is not counted, it is difficult to know whether the entire reported expense, or just a portion, was included. Second, details enrich analyses by providing greater insight into why cost-efficiency or cost-effectiveness varies across programs.

For example, if all malnutrition treatment programs tend to cost more per child treated in the Middle East compared to similar programs in West Africa, additional questions into the underlying cost models naturally arise: Are salaries higher in the Middle East? Do MENA programs require more intensive management structures? Is MENA implementation spread across more facilities with a lower patient per clinic ratio? Or are more costs covered in-kind in West Africa? Understanding unit cost and units needed can help address these questions.

Direct Project Costs

Direct project resources, or required resources incurred to implement a program, can be straightforward to calculate. For example, consider the purchasing of MUAC bands for mothers. The IRC's budget will reflect the unit cost per MUAC band, and the number of bands purchased. Multiplying them together will provide the total cost of that input. The total cost should also match expenses tracked against budget lines throughout the course of the program.

In addition to obtaining the total cost of an ingredient, it is necessary to allocate a percentage of the cost to the output being analyzed. While some resources will be fully used to achieve one output, other resources may support multiple outputs. This is particularly important for staff. Staff can work across many projects so the cost analyst must understand what percentage of their time contributes to the activity or program being analyzed. For example, a MEAL specialist may be supporting data quality across multiple health projects at the same time. Determining the percentage of a resource that should be included in an analysis, or an "allocation", requires meetings between analysts and field staff to go through the list of ingredients to allocate percentages to each individual line.

$$Cost\ of\ Ingredient = Unit\ cost\ \times Units\ Needed \times Percent\ of\ ingredient\ allocated\ to\ output$$

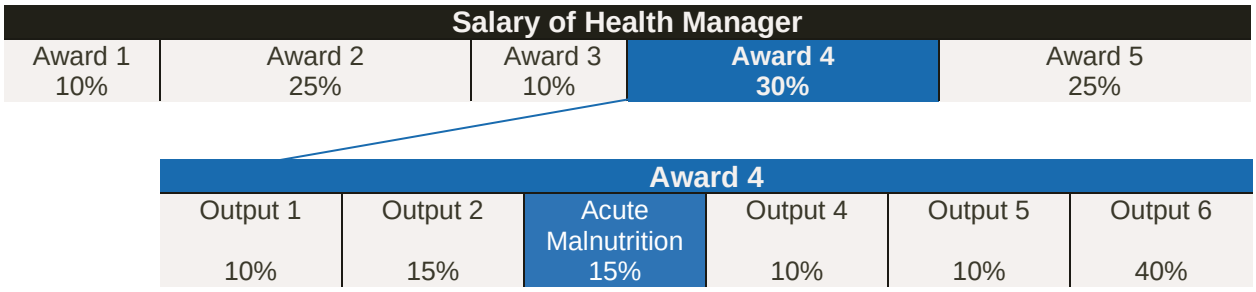
OR

$$Cost\ of\ Ingredient = Total\ Expensed\ to\ Ingredient \times Percent\ of\ ingredient\ allocated\ to\ output$$

It is also important to understand how many awards staff salaries are spread across, and which fund the work being analyzed in a cost analysis. In addition, if a staff member contributes to multiple outputs in each award, only the proportion of their time that is used for the focus of the analysis is necessary to include.

Consider **Figure 2**, which provides an example of how a Health Manager's salary would be allocated for an acute malnutrition program. The Health Manager's full salary is funded by five awards, however, their time on the acute malnutrition program is covered entirely by Award 4. Under their time charged to award 4, only 15% of their time is spent on supporting acute malnutrition treatment. As a result, you would allocate 15% of the cost charged to award 4 for the Health Manger to acute malnutrition treatment, which would be 4.5% of their total salary.

Figure 2: Staff Allocation Example



Note: The IRC does not include research costs in their cost analyses as it inflates the true cost of programming. Research costs that are removed from the analysis may include activities such as: staff time dedicated to research activities, enumerator training on research, or research-implemented baseline and endline surveys.

Shared Project Costs

Country-level shared project costs, or "support costs", are frequently spread across all active awards within a country. Shared project costs are resources that are necessary to implement and support humanitarian programs, regardless of what program is being implemented. Shared project costs include items such as human resources staff, award managers, or country office rent.

A single allocation rate should be applied to all support costs within an analysis. To ensure consistency across our analyses, IRC allocates shared project costs by taking the percentage of allocated direct project costs (i.e. the percentage of all direct project costs deemed relevant for the specific activity included in the cost analysis), as a proportion of the total direct project costs charged on that award in the same time frame:

$$Allocation\ \%\ for\ Direct\ Shared\ Costs = \frac{Allocated\ direct\ program\ costs\ in\ analysis}{All\ direct\ program\ costs\ in\ grant}$$

This allocation method assumes that the proportion of direct program costs allocated to the output in question compared to other outputs is an accurate proxy for shared project costs as well. This proxy method is used in place of attempting to allocate indirect project costs to a single program. For example,

a Country Director does not work on direct programming, however, they are necessary for a program office to run so some portion of their time should be included in an analysis. This calculation allows us to account for a portion of their indirect time.

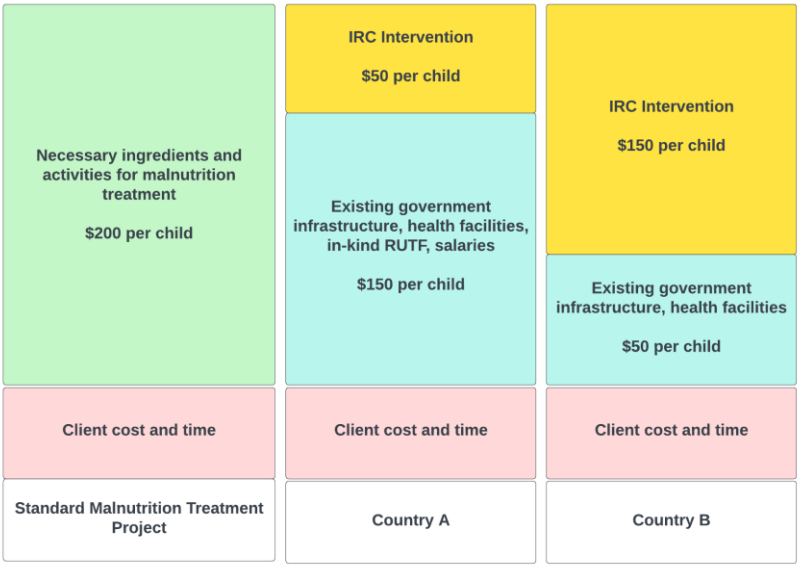
2. Costing External Cost Categories

The IRC often works with partners and local ministries of health to integrate programming into existing social protection mechanisms and health infrastructure of national governments. As a result, it is important to understand the full social cost to better compare across programs.[1] If costs to these stakeholders were not included in the analysis, we run the risk of under-resourcing future projects or pushing necessary costs onto other actors in the humanitarian system. In addition, costs to the IRC differ across contexts due to the varying health care infrastructures across countries.

For example, the IRC runs the entire health care system in certain camps in the Dadaab refugee complex in Kenya, paying for all staff and RUTF supplies.[2] However, in most other contexts, the IRC receives donated RUTF for nutrition programs. If we looked at the cost-efficiency of IRC-only costs in Dadaab versus all other contexts, we risk claiming that Dadaab is not cost-efficient when, in reality, the comparison is not fair. Both Dadaab and other contexts use RUTF, however, IRC pays for RUTF only in Dadaab. By failing to consider external costs, nutrition programs aiming to be "cost-efficient" will skew towards contexts that require only light resources to provide treatment.

Figure 3 demonstrates how cost analyses can differ based on the existing health infrastructure. A cost analysis that *only* looks at the IRC's costs would falsely conclude that acute malnutrition treatment is more cost-efficient in Country A than in Country B. If a government wanted to implement a project modeled after an IRC project, and planned on paying for all resources required, they would need a full social costing to inform their decision making. The cost of client time, including financial and opportunity costs, should also be included in full social cost analyses.

Figure 3: Example of Social Costs by Country



[1] Social cost refers to both the incurred costs by service providers as well as the costs to clients and communities to participate in a program.

[2] RUTF, or "ready-to-use therapeutic food" is an energy dense, micronutrient paste given as the primary treatment to children under five suffering from acute malnutrition. This is usually delivered under the brand Plumpy'nut

Donated Goods (RUTF)

In-kind medications are often provided by UNICEF or WFP for malnutrition treatment. Among these, the most common is RUTF, such as Plumpy'nut. As a result, the IRC does not regularly procure RUTF. If possible, the cost of donated goods should be included in analyses using the standard market price. Total units used should be recorded, as well as any shipping and importation costs required.

Data sources for total units used can be collected from facility-level inventory data or calculated based off treatment data. Facility-level and patient-level data should be cross analyzed, as the two sources can differ significantly. It is common to see RUTF leakage across data sources as a result of loss and misuse in the supply chain. Which data source to use to calculate RUTF costs depends on the purpose of the analysis. If the cost analysis will be used to compare different protocols' effectiveness to decide which program to run, patient-level RUTF data should be used. However, if the purpose of the analysis is to understand overall program implementation costs, facility-level data should be used to account for the RUTF leakage costs that are borne by the provider.
For both approaches, IRC multiplies the average per-patient sachet consumption by the unit cost as provided by the in-kind supplier (or market price, if the actual cost is unavailable) to determine the per-patient cost of RUTF. The calculation can also be disaggregated for programs that treat both patients with severe acute malnutrition (SAM) and moderate acute malnutrition (MAM) to compare relative RUTF consumption.

Donated or Subsidized Personnel

In malnutrition programs, there are frequently personnel that contribute to implementation, but their time is not reflected in IRC's spending records. This includes personnel such as: government and partner staff, volunteers, and incentive workers. Additional data collection will be necessary to collect compensation costs of external personnel. Time use data will also need to be captured to understand what percentage of external personnel time was spent on malnutrition treatment.

In cases where government- or partner-run heath facilities dedicate specific days to provide malnutrition treatment, the number of days dedicated to nutrition services can be taken as a proportion of a work week. For example, if one health facility in Mali dedicates two out of six working days to provide malnutrition treatment, the allocation of staff salaries to the nutrition program would be 33 percent. However, if malnutrition treatment is provided continuously along with other health treatments, allocation of staff time will be required for the analysis.

Cost to Clients

Costs borne by clients includes several components:

$$Beneficiary\ cost = Opportunity\ cost\ of\ time + foregone\ income + out\ of\ pocket\ expenses$$

The cost for clients to access nutrition services is not typically considered in IRC analyses. IRC does not have regular data collection methods to track the total time clients spend on participation, lost income, travel time, or out-of-pocket expenses. Most services require clients to bear some form of cost, whether financial or opportunity cost. To accurately quantify client time and cost, additional data collection would be required. Cost to client should be collected for comparison across different delivery methods.

In the past, IRC has conducted surveys to understand the forgone activities of clients seeking nutrition treatment to understand opportunity cost. Enumerators filled in a calendar of daily activities that

caregivers performed to provide a numerical figure that was used to calculate opportunity cost per client. Surveys also gathered employment data to use missed wages. In many areas, IRC provides malnutrition treatment where family members responsible for accessing treatment are not formally employed. In this case, rather than extrapolating from the estimates of foregone income, analyses use metrics such as the national minimum wage, or the market rate for daily wage labor, to estimate the opportunity cost to the client.

There are important considerations when presenting cost to client alongside cost to implementing agencies. While partner or donated costs may be simply added on top of IRC-borne costs in a cost analysis, adding client costs in the same manner may cause issues. Clients that humanitarian organizations serve will value each dollar differently than humanitarian organizations. For example, a recent client cost analysis performed by the IRC in Mali discovered that the average caregiver cost was around $6 USD during the course of treatment. $6 USD, when compared to the overall cost of $160 for other costs, seems almost negligible. However, when compared to client ability to pay, $6 USD represents 20 hours of daily wage labor.

Another consideration is how to value client time. In emergency contexts, clients who are not employed typically have their time estimated at the daily wage rate. This can be misleadingly low compared to clients with steady income, as clients without formal income are often the least able to pay. To avoid these problems, it is best to present client costs separately from other cost categories. This will allow for a more accurate comparison of costs across similar programs and help to minimize the costs to clients.

3. Providing Relative SAM and MAM Costs

In situations where combined treatment programs treat both SAM and MAM patients, disaggregating the cost per child is common. Discrete cost calculations for SAM and MAM are commonly used to compare relative costs of treatment between groups, whether in combined or separate treatment programs.

The IRC has modeled the relative costs of SAM and MAM patients in combined programs through two methodologies. The first option is to calculate the cost per patient *visit*, rather than cost per patient, to calculate the relative cost to treat a SAM and MAM patient in a combined program as a function of the number of visits.

$$SAM\ cost\ per\ child = \frac{Total\ program\ cost}{Total\ visits\ in\ program} \times average\ number\ of\ visits\ per\ SAM\ patient$$

If the total number of visits is not tracked at the patient level, the second option is to estimate cost using the average number of SAM patients and MAM patients multiplied by their average number of visits.

$$Total\ visits\ in\ program = (average\ number\ of\ SAM\ visits\ \times \#\ SAM\ patients) + (average\ number\ of\ MAM\ visits\ \times \#\ MAM\ patients$$

The limitations of using the visit number method is that it assumes the number of visits is an accurate proxy for the actual cost incurred per child. In programs that deviate significantly from the typical treatment protocol and have large one-time treatment costs for patients, the number of visits may be a less accurate proxy.

It is possible to estimate the cost difference between SAM and MAM patients based on the average length of stay of patients if the number of visits is not recorded. However, this method requires some assumptions that may not be accurate in practice. One assumption is that the costs incurred by patients are evenly spaced out throughout the course of treatment. This is not always the case, especially in combined programs where SAM and MAM patients receive treatment at different frequencies. For example, in a nutrition program in Mali, SAM patients received treatment once a week, while MAM patients received treatment once every two weeks. This means that two weeks of treatment for a SAM patient would be more costly than two weeks of treatment for a MAM patient. To take into account varying treatment methods, it may be possible to model the average number of visits using the length of stay and the local protocol used.

4. Additional Costing Considerations

Discounting

It is common within public policy to account for the opportunity cost of capital (money that could have been gained through investment of capital rather than for program use) using a discount rate applied to expenses in later years. However, the IRC does not apply discounting to most cost analyses. Most of the IRC's cost analyses analyze programs in one-year increments or less, which makes discounting costs back to a base year unnecessary. In addition, as grant-based organizations such as the IRC lack the ability to invest funds to generate returns over time, it can be argued they do not experience the opportunity cost of capital that a government or private company does. Many humanitarian organizations face penalties if they do not spend awarded money within the agreed upon timeframe.

Exchange Rates

The IRC uses the U.S. Dollar (USD) as the standard accounting currency. Exchanges of unit cost and financial data use the average annual exchange rate for the year that the expense was incurred. Within cost analyses and IRC accounting, the IRC uses standard market exchange rates rather than purchasing power parity (PPP) exchange rates to translate prices into USD. While PPP allows for greater comparability across programs, they also represent the cost of programs as though they had been implemented in the United States, which dramatically overstates the real financial costs of implementation.

Inflation

Inflation is an important consideration for multi-year projects and for comparative analysis of different programs. The respective currency, unit cost, and total expense data implicitly reflect the price level of the year that the expenses were incurred and reported. For example, consider a study that analyzes cost differences between multiple malnutrition programs from as early as 2012 to as late as 2022. Failing to account for inflation would bias the results of the study to consider earlier programs as more cost-efficient. Two adjustments for inflation must be made to compare programs from different years. First, multi-year program expenses need to be adjusted to a base calendar year (typically the first calendar year of implementation, subsequent years are deflated to the base year). Second, all programs within the comparative analysis need to be inflated or deflated to a base year for comparison.

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For additional information on Nutrition Cost Analysis at the IRC, please contact Derek Lee, BUR Nutrition Advisor, at Derek.Lee@Rescue.org

Airbel Impact Lab
Research & Innovation at the IRC

[i] United States Department of Health & Human Services (1996). Cost-Effectiveness in Health and Medicine: Report to the U.S. Public Health Services by the Panel on Cost-Effectiveness in Health and Medicine.
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