Aggregation and Calculation

Version Name: Electra | Release Date: February 2021

Terminology

Aggregation Criteria: The rules set by the user that determine how an Aggregated Project Indicator aggregates data from the Source Object, including the operator, custom filters to apply to Source Object records, and fields to determine how the Source Object records are aggregated according to Geographic Area, Reporting Period, Disaggregation Value, or Cross-Disaggregation by Sex.

Aggregated Project Indicator: An indicator that aggregates pre-existing, individual-level data stored on a custom object. A user can aggregate results for a project indicator by performing the following operations on the individual-level data: sum, average, count, maximum, or minimum.

Batch: Users can run batches to process a bulk amount of data. "Batch is used to run large jobs (think thousands or millions of records) that would exceed normal processing limits. Using Batch Apex, you can process records asynchronously in batches or chunks (hence the name, "Batch") to stay within platform limits." (Source: Salesforce. Learn more here.)

Calculated Project Indicator: A project indicator for which results are calculated by using source project indicator(s) in a mathematical formula. The operations available to create formulas are '+,' '-,' '*,' and '/.' Users may choose these operations from a dropdown picklist or may type them directly into the formula box. In addition to this, users may also type numbers or decimal points into the formula box.

De-Duplication: When aggregating, the Source Object may contain multiple records with the same value in a certain field (e.g., multiple Attendance records looking up to the same Contact record). Users can select to either aggregate all records, irrespective of that field value, or aggregate only one record per unique field value.

Dependent Calculated Project Indicator: A calculated project indicator that includes one or more calculated indicators in its formula.

Immediate Parent Record: The parent of a Source Object record, as determined by a lookup or master-detail field on the Source Object. The fields of this object can be used to determine how to aggregate according to Geographic Area, Disaggregation Value, or Cross-Disaggregation by Sex.

Info Icon: displays alongside each project indicator definition in the Add Results table. Hovering over the *Info* icon displays a popover with the fields Guidelines and Objective(s). Additional fields, such as Last Aggregation Date and Last Calculation Date, may be customized to display.

Source Project Indicator: A project indicator for which results are entered directly by the user on the AddResults page. This type of project indicator is used in the formula/calculation for a calculated project indicator.

Refresh Icon: displays to the right of each calculated or aggregated project indicator row on the ManageIndicators page. Clicking on the Refresh icon creates or updates Result records for the selected project indicator.

Refresh Indicators Button: To refresh all calculated or all aggregated indicators on-demand, users may click the Refresh Indicators button. This button only displays when there is at least one aggregated or calculated indicator in the Selected Indicators table.

Source Object: An object containing individual-level records with data that can be aggregated into a project indicator.

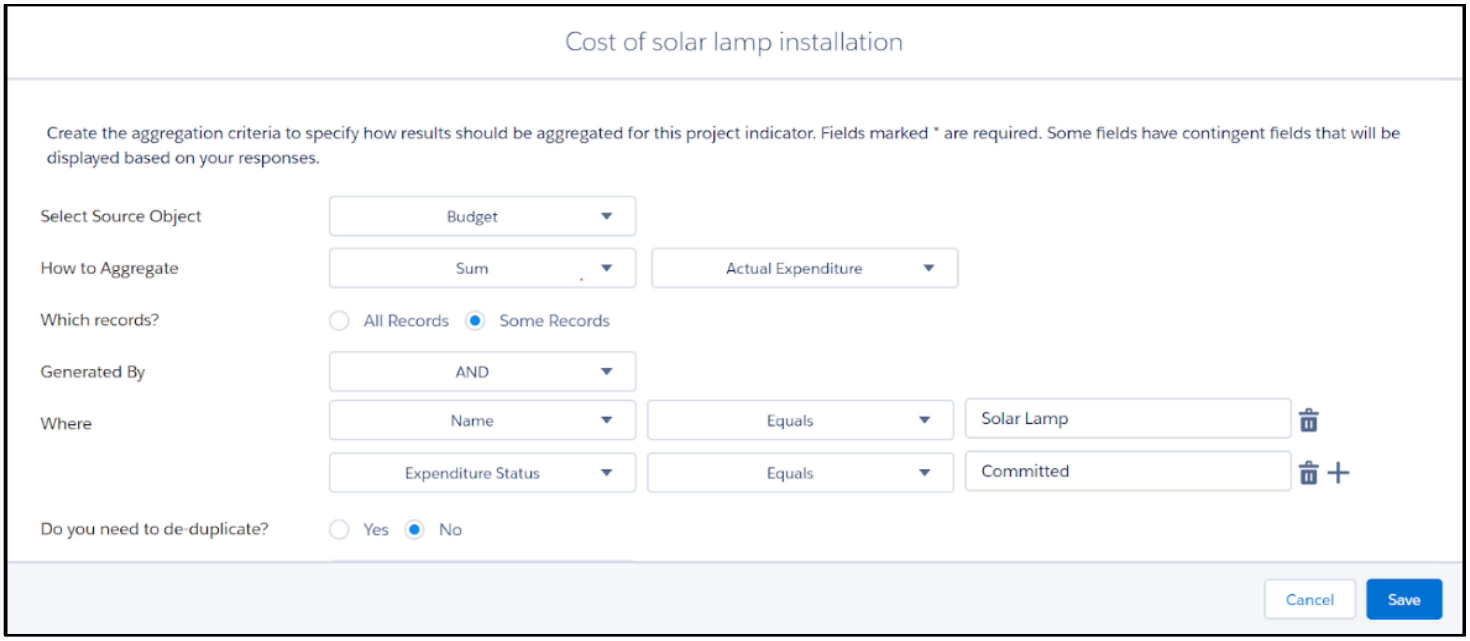
Wrench Icon: displays to the right of each calculated or aggregated project indicator row on the ManageIndicators page. Clicking on the *Wrench* icon prompts a pop-up in which users may view or edit the calculation formula or aggregation criteria.

Overview

Aggregated Indicators

When creating a new Project Indicator, select 'aggregated' for the *Type of Results* field. This opens an Aggregation Criteria pop-up where the user selects a source object from which data can be pulled with a selected criteria to calculate an aggregated result for the Project Indicator.

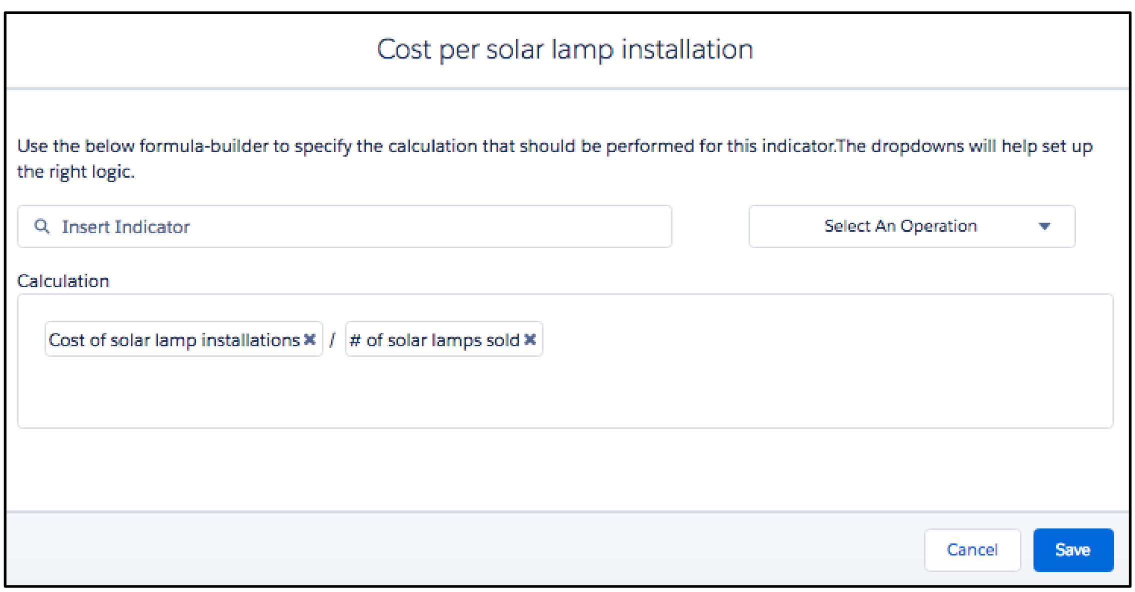
In the example below, I can calculate the total cost of solar lamp installations by summing the individual actual expenditure data stored on a custom object and display this aggregated cost on the AddResults page.



Calculated Indicators

When creating a new Project Indicator, select 'calculated' for the *Type of Results* field. This opens a Calculation Formula pop-up where the user enters a calculation formula utilizing Source Project indicators.

In the example below, I can calculate the *Cost per solar lamp installation* by creating a formula based on my Source Project Indicators - Cost of solar lamp installations and the number of solar lamps sold.



Set-up Instructions

The following fields are available in the package and applicable to this guide. Listed below are the objects and field sets in which the fields can be found. *Contact your System Admin for further information*.

1. Indicator__c object
    a. Add New Indicator Popup:
        i. Type_of_Results__c (this is a required field)
2. Project_Indicator__c object
    a. Edit Project Indicator Popup:
        i. Type_of_Results__c
    b. Selected Project Indicators table on ManageIndicators page:
        i. Type_of_Results__c
        ii. Last_Aggregation_Date__c
        iii. Last_Calculation_Date__c
        iv. Calculation_Formula__c
    c. Add Results Info Popover on AddResults page:
        i. Type_of_Results__c
        ii. Last_Aggregation_Date__c
        iii. Last_Calculation_Date__c
        iv. Calculation_Formula__c

Reminder - to make any edits to Field Sets:

1. Navigate to Setup
2. Type in ‘Objects’ into the ‘Quick Find/Search’
3. Select the Object
4. Navigate to ‘Field sets’

> ⓘ NOTE: It is recommended to include no more than five fields to display in the *Selected Indicators table*, to be able to view the information in a user-friendly manner

Aggregated Indicators

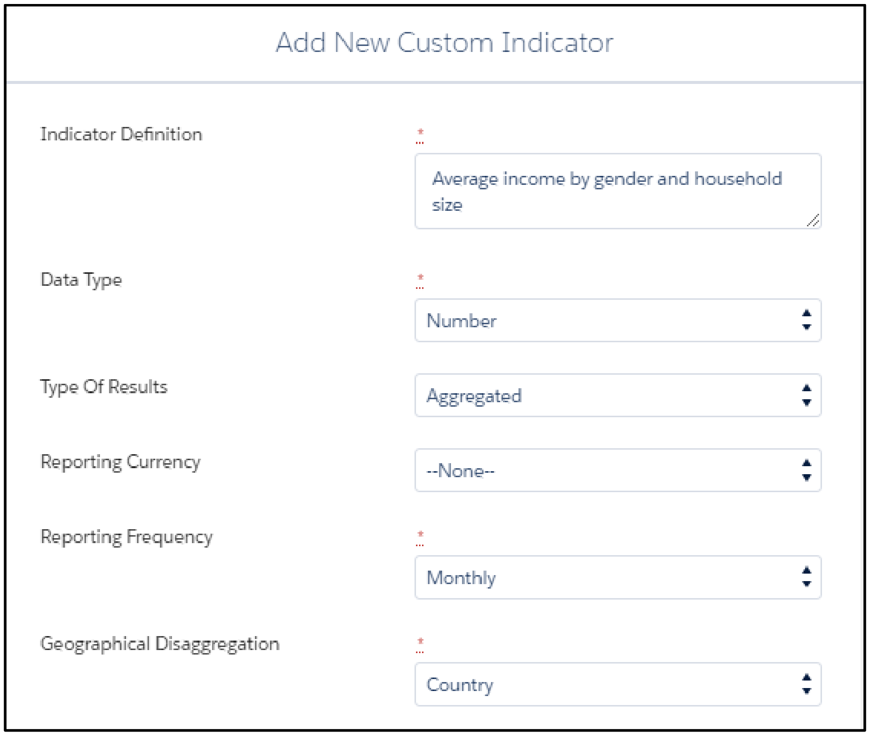
For numeric project indicators, users can create an Aggregated Project Indicator. Creating an aggregated indicator allows a user to take individual-level data that is stored in another Salesforce object and aggregate that information. This feature allows a user to perform the following functions to aggregate results for a project indicator:

- Sum
- Average
- Count
- Maximum
- Minimum

ⓘ **NOTE:** The Aggregated Indicators functionality may be impacted if your organization runs multiple Salesforce packages and apps, as the API names may conflict and interfere with aggregation queries. To prevent this, speak to your System Administrator to ensure that your organization's custom objects have unique API names.

Create an Aggregated Project Indicator

1. Navigate to 'Manage Indicators' and click on the *Add New Custom Indicator* button
2. Fill out the fields that appear in the popup and select 'Aggregated' for the *Type of Results* field.



3. On clicking *Save*, the *Aggregation Criteria* popup will appear where the user can create the criteria used to aggregate results for this project indicator.

Create Criteria to Aggregate Results

1. Once the *Aggregation Criteria* popup opens, the user can either set the criteria immediately or select *Cancel*. Selecting *Cancel* will save the project indicator with no aggregation criteria, allowing the user to return and set the criteria at a later time.
2. In the *Aggregation Criteria* popup, enter the following:

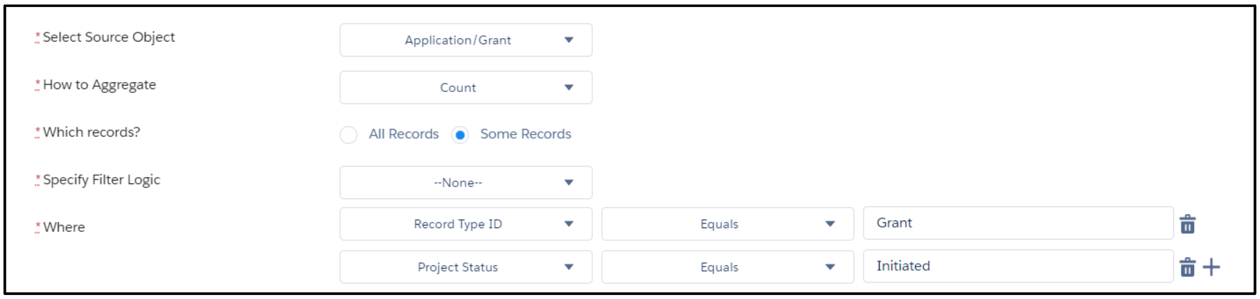
Criterion	Required?	Description
Source Object	Yes	Object in Salesforce that contains the individual-level data to be aggregated
How to Aggregate (Operator)	Yes	How the data will be aggregated, i.e. Sum, Average, Count, Maximum, Minimum
Field that Reporting Period is based on	Yes	The date field on the Source Object that determines which Reporting Period an individual record will be aggregated to
Field that Geographic Area is based on	Yes	The field on the Source Object (or any of its parent objects) that determines which Geographic Area an individual record will be aggregated to.
Active	Yes	This checkbox controls whether the criteria is active and creates results when the batch is run

Custom filters	No	● If multiple filters are created, the user will be prompted to select filter logic
		● The following field types are not currently supported:
		  ○ Date/Time
		● The following field types are available to use as filter criteria:
		  ○ Record Type
		  ○ Checkbox
		  ○ Currency
		    ■ Displays according to user locale
		  ○ Date (displays according to user locale)
		  ○ Formula
		  ○ Relationship (lookup or master-detail) - criteria must use the record Id
		  ○ Number
		  ○ Percent
		  ○ Picklist (single or multi-select)
		  ○ Text

De-duplication	No	This feature allows the user to choose whether multiple records with the same value in a specified field are considered individually or together when aggregating

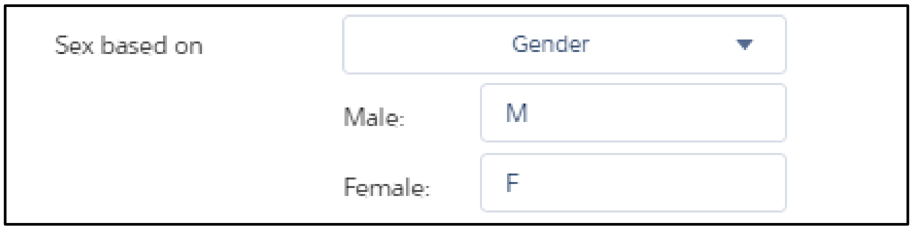
Create custom filters by selecting ‘Some Records’ to display this interface. Select fields on the Source Object in the first picklist and the filter operator in the second picklist. Type directly into the input cell to set the criteria. If multiple filters are used, select the filter logic (AND or OR) in the Specify Filter Logic’ dropdown.

> ⓘ **NOTE**: Results can be aggregated by filtering records based on the record type labels configured on the source object. For example, if the Application/Grant (ampi__Project__c) record is configured with two record types with labels ‘Grant’ and ‘Application’, then the user can select Record Type Name field in the filter criteria drop down and type the value ‘Grant’ in the input field.
>
> Depending on the disaggregation levels of the Project Indicator (i.e., disaggregation by group and/or cross-disaggregation by sex), additional criteria may be required. See below for the variations that may display depending on disaggregation level.



<u>If the Project Indicator is cross-disaggregated by sex:</u>

a. Select the field that sex is based on
    i. This field may sit on an immediate parent record
b. Map the possible values in the field selected in (a) to Amp Impact’s sex disaggregation values (Male, Female). As depicted below, the Amp Impact sex disaggregation values are listed to the left of the input boxes. For each sex disaggregation value, enter the corresponding field value to be mapped to that disaggregation (e.g. M for Male).
    i. Multiple values can be mapped to the Male and Female sex disaggregation values. For example: ‘Man’; ‘M’; and ‘Male’ can all map to the Male sex disaggregation value when specifying aggregation criteria for an aggregated indicator.



    ii. Any source records that do not match the 'Male' or 'Female' mapped values are automatically mapped to the 'Unknown' disaggregation. Upon refreshing the aggregated project indicator, the result values for the Unknown column populate on the AddResults table for the corresponding geographic area and reporting period.

ⓘ **Note the following Limitation**: When specifying the aggregation criteria, if the same sex disaggregation value is mapped to both Male and Female, then the source records gets mapped to Male value by default. For example, if Male and Female values are both mapped to 'Male' only, then the aggregation value is attributed to the Male sex disaggregation.

<u>If the Project Indicator is disaggregated by group:</u>

a. Select the field that the disaggregation is based on
    i. This field may sit on an immediate parent record

b. Map the possible values in the field selected in (a) to the custom Disaggregation Values
    i. Multiple field values may be mapped to each custom Disaggregation Value by using commas to separate the field values.

ⓘ When creating a new Disaggregation Group, always create one *Other / Unknown* Disaggregation Value to account for records that may be missing that data. While mapping the possible field values to the custom Disaggregation Values, leave the mapping for only this Other/Unknown field blank. Any additional blank mapping will cause the Project Indicator to aggregate incorrectly.

4. After clicking *Save* on the *Aggregated Indicator* popup, a banner will display confirming the successful creation of the aggregated indicator. The new project indicator will appear in the *Selected Indicators* table on the Manage Indicators page.
5. To edit the aggregation criteria through the Manage Indicators page, click on the *Wrench* icon to open the *Aggregation Criteria* popup and make any changes required.

ⓘ **Note the following Limitation**: If a user creates an aggregated Project Indicator, or sets the aggregation criteria for an aggregated Project Indicator, the details in aggregation criteria popup display in that user's language (i.e. the default language as per user's locale settings).

Calculate Results for an Aggregated Indicator

Click on the *Refresh* icon displayed next to the Project Indicator in the *Selected Indicators* table.

1. A popup will open with the date and time of any previously run aggregations displayed.
   - If no aggregations have been run previously, then the date and time field will be blank.
   - If any aggregations have been run previously, the date and time is displayed in the user's locale.
2. The results will populate on the Add Results page only if all of the data required has been entered:
   - Aggregation criteria has been correctly set up
   - Records for the source object exist
3. The result will be populated for the corresponding project indicator on the Add Results page.

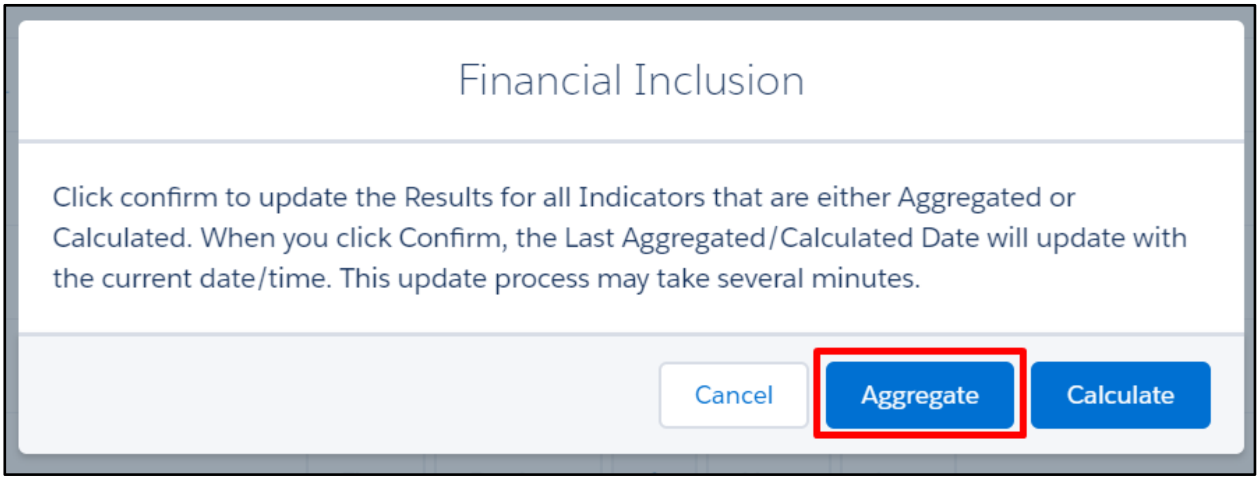
Calculate Results for All Aggregated Indicators

The previous section describes how to calculate results for a single aggregated indicator in a project. Alternatively, users can also calculate results for *all* aggregated indicators in a project. In order to do so, ensure:

- The relevant permissions have been provided by the System Admin
- The relevant aggregated indicators have been created in the project
- The appropriate aggregation criteria has been entered for every aggregated indicator
- There is source data that will be pulled for each aggregation

1. To get started, click on the *Refresh Indicators* button to run a batch update for all aggregated indicators. See screenshot below.
   a. Please note, this button will not display if there are no aggregated or calculated indicators in the Selected Indicators table.

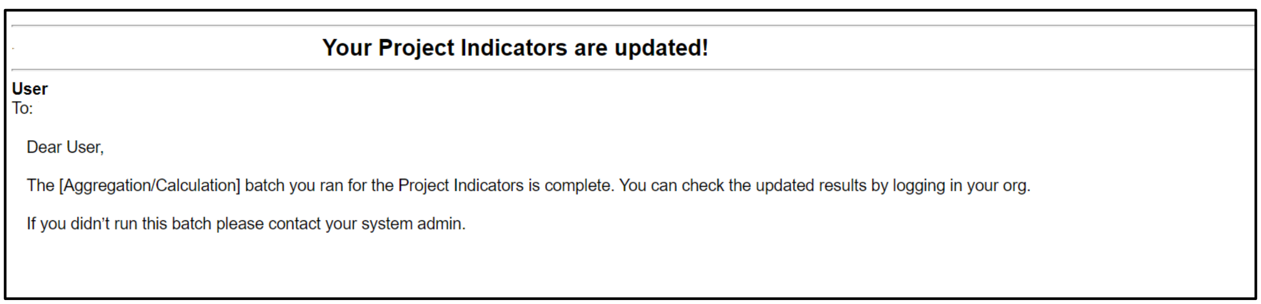
2. A pop-up will display to confirm the batch. Click to run the batch for *Aggregate* indicators.



3. On confirmation, Aggregation batch runs for every aggregated indicator in the project.

4. While the batch is processing, users cannot edit or delete the aggregated indicators. All icons, including the *Refresh* icon and *Wrench* icon, greys out.
    a. Users may navigate away from the screen until the batch completes.

5. The user is notified via email when the batch is complete and project indicators are updated.



Your Project Indicators are updated!

User
To:

Dear User,

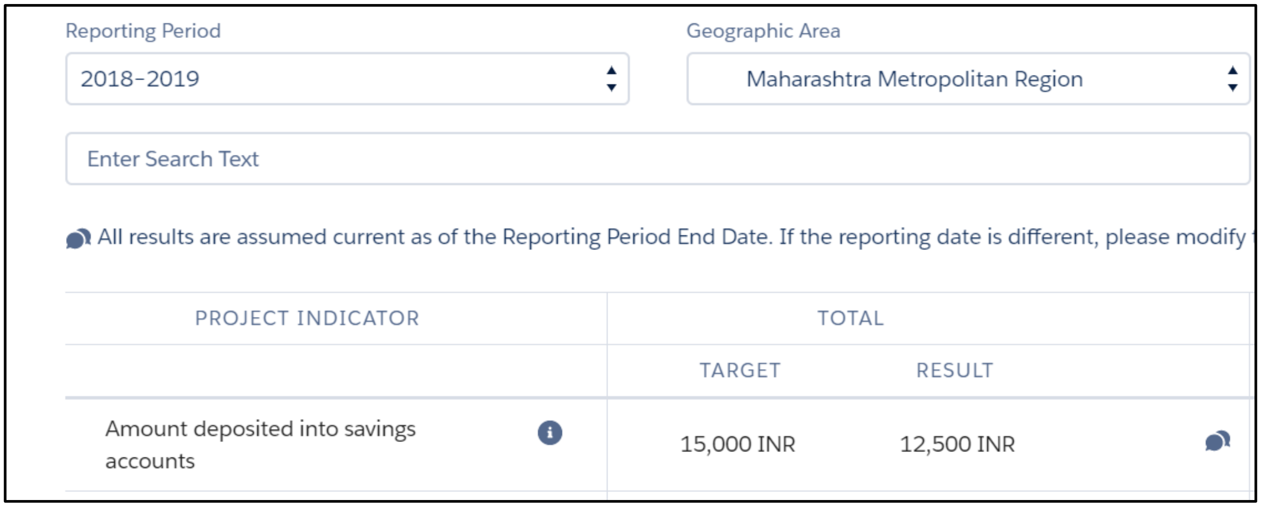
The [Aggregation/Calculation] batch you ran for the Project Indicators is complete. You can check the updated results by logging in your org.

If you didn't run this batch please contact your system admin.

6. When batch is complete, the icons will display again and:
    a. Batch updates or creates Result records
    b. Results are updated and reflected on the Add Results table
    c. Last Aggregation Date is updated with TODAY()

View Results on the AddResults page

After the batch has been run, users can navigate to the AddResults page to see results.



In the AddResults table, each project indicator has an *Info* icon. On hover, users may view information such as Guideline and Objective(s). By customizing the popover with additional fields, user may also view:

- Type_of_Results__c
- Last_Aggregation_Date__c

See screenshot below.

ⓘ **NOTE**: To customize the fields that display in the ampi__ADD_RESULTS_INFO_POPOVER field set, speak to your System Administrator.

Stop Aggregating Data

If data is no longer being collected for an Aggregated Indicator or the aggregation no longer needs to be calculated, the user can deactivate the Aggregation.

1. Click the *Wrench* icon to open the *Aggregation Criteria* popup.

2. Scroll to the bottom and un-check the *Active* checkbox field.
3. Click *Save*.

Once the *Active* checkbox is false, when a user clicks on the *Refresh* icon to aggregate data, the aggregation will not run on click of *Confirm* in the popup.

Calculated Indicators

Creating a calculated project indicator allows a user to use project indicators in a mathematical formula to track results. This feature allows a user to perform the following functions to calculate results for a project indicator:

- Add
- Subtract
- Multiply
- Divide
- Custom formula using any of the operators above and numerical values

ⓘ **NOTE:** In order to create a calculated indicator, at least one project indicator must be created in order to enter a formula.

Create an Source Project Indicator

1. Navigate to Manage Indicators and click on the *Add New Custom Indicator* button.
2. The source project indicator must be a currency, number or percent indicator.
3. Select the relevant value from the *Type of Result* picklist. You can use a project indicator where results are manually input or another Calculated or Aggregated project indicator.
4. Select *Save* after all the information needed has been entered.

ⓘ **NOTE**: When creating a Calculated indicator, source project indicators display in the *Select Indicator* dropdown only if they have the same:

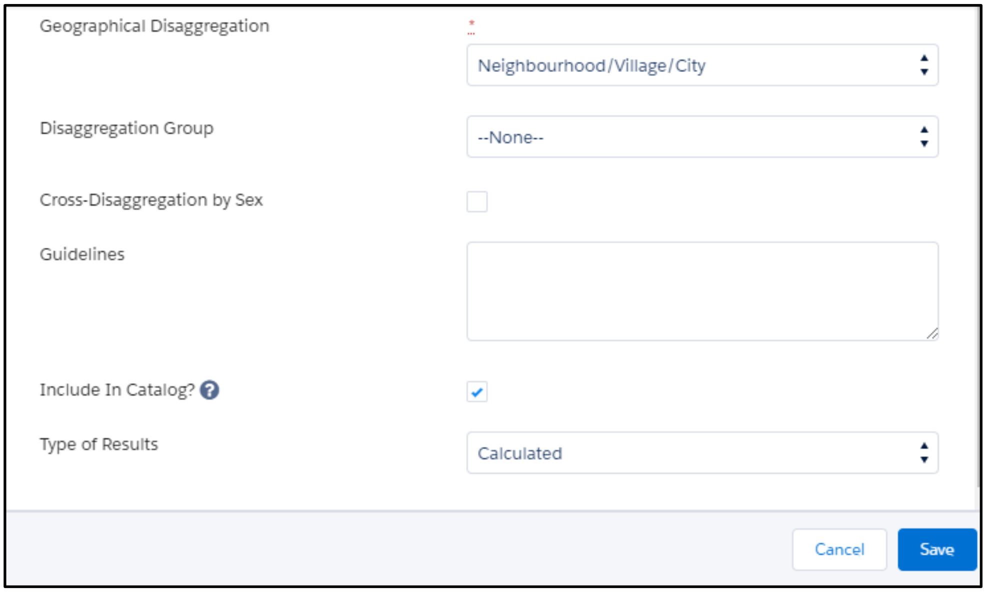
- Reporting frequency,
- Geographic level,
- Level of disaggregation as the Calculated indicator.

For example: If the Calculated indicator has a disaggregation group and is cross-disaggregated by sex, then the only source indicators that will appear in the dropdown picklist are also disaggregated by the same group and are cross-disaggregated by sex.

Create a Calculated Project Indicator

1. Navigate to the Manage Indicators page and click on the *Add New Custom Indicator* button.

2. Fill out the relevant information to create a new project indicator and select “Calculated” for the *Type of Results* field.

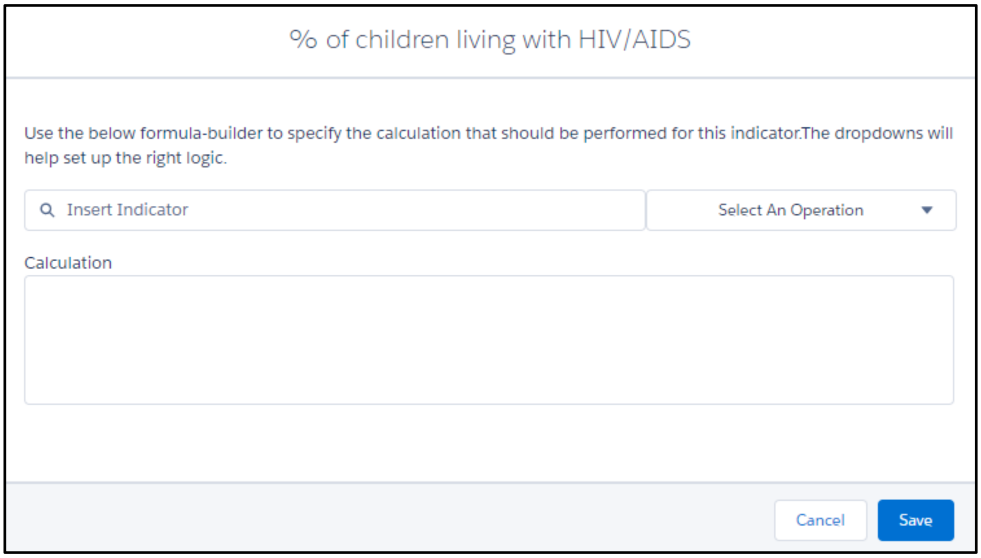


3. On clicking *Save*, the *Calculation Formula* popup will appear where user can create the formula used to calculate results for this project indicator.

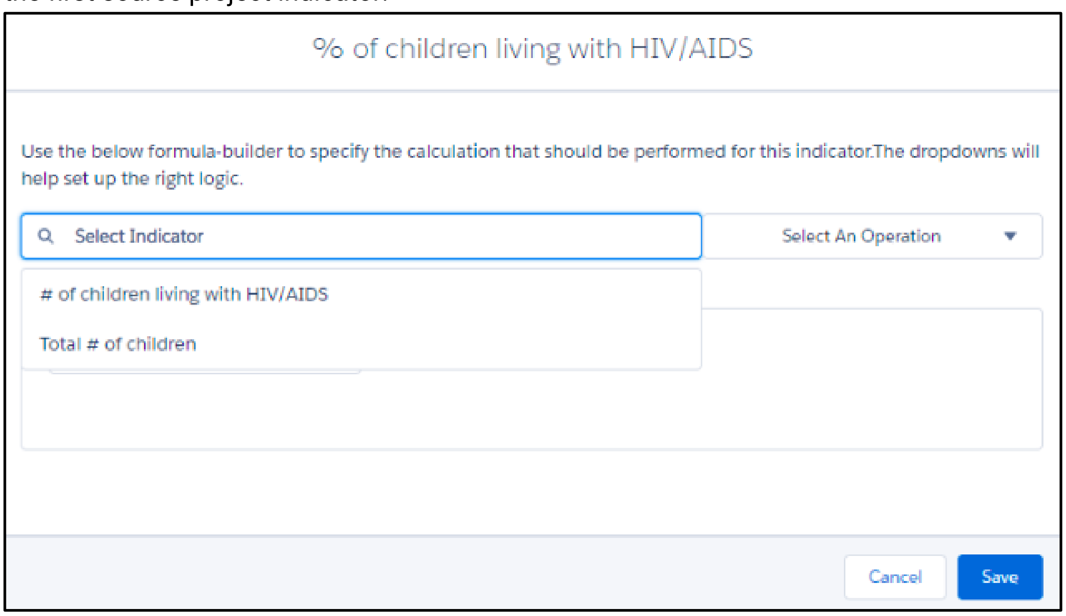
ⓘ NOTE: Once a calculated project indicator has been created, it can be used as an underlying indicator to create a calculation formula for another calculated project indicator.

Create Calculation Formula

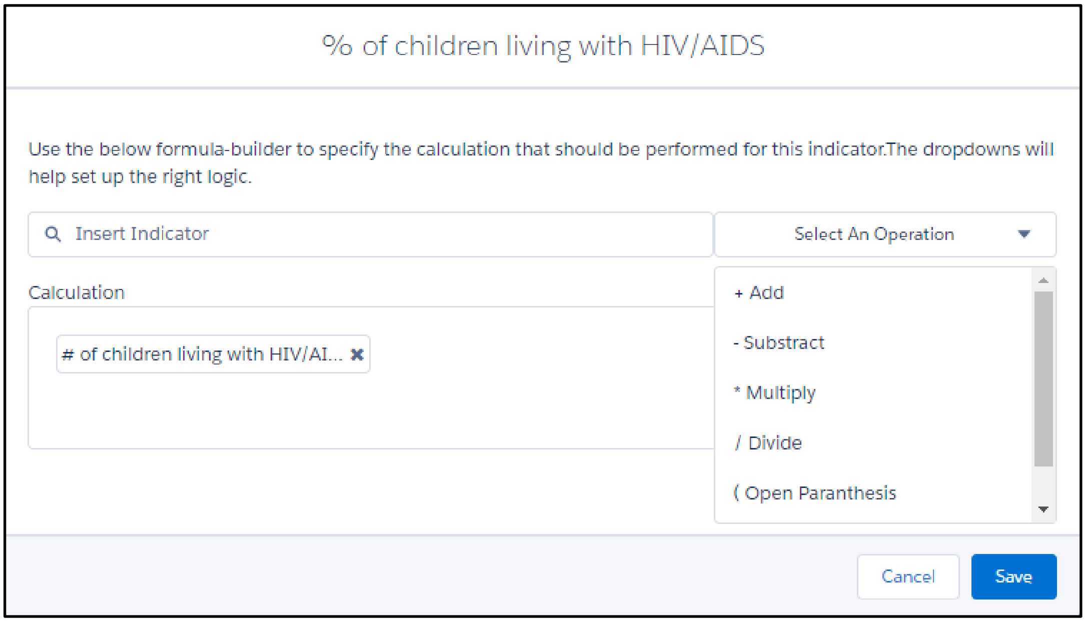
1. Once the *Calculation Formula* popup opens, the user can either create a formula immediately or select *Cancel*. Selecting *Cancel* will save the project indicator with no calculation formula, allowing the user to return and set the formula at a later time.



2. In the *Calculation Formula* popup, to create a formula, use the *Select Indicator* dropdown to select the first source project indicator.

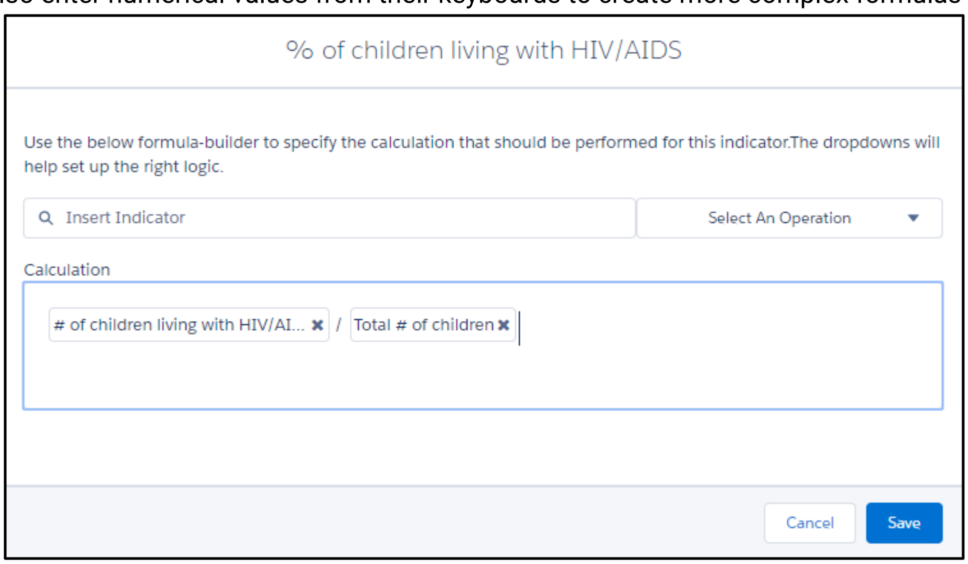


Use the *Select an Operation* dropdown to select the operation desired.



ⓘ NOTE: When creating a calculated project indicator that involves division in the formula, ensure that the *Number of Decimal Points Allowed* field for that project indicator has been set to either 1 or 2. This can be specified in the *Add New Custom Indicator* popup.

Continue navigating between the dropdown and select additional project indicators or operators as needed. Users can also enter numerical values from their keyboards to create more complex formulas as well.



An incomplete formula - for example, “source indicator 1 +” - will not be saved. If an incomplete formula is entered and a user selects *Save*, an error message will appear in response to the formula that is not mathematically possible. If a user clicks on the “X” in the right hand corner of the popup, or selects *Cancel*, then the popup will close and the indicator will save with no formula entered.

ⓘ **NOTE:** In order to multiply a Percent source indicator with a Number source indicator, the formula must include division by 100 in order to obtain an accurate result.

For example: (Percent of Students who Passed the Exam * Number of Total Students)/100

3. After clicking *Save* on the *Calculation Formula* popup, a banner will display and confirm the successful creation of the calculated indicator. The new project indicator will appear in the *Select Indicators* table on the Manage Indicators page.
4. To edit/add the formula through the Manage Indicators page, click on the *Wrench* icon to open the popup and make any changes required.

ⓘ **NOTE:** Once a project indicator is deactivated, it cannot be used in the formula for a calculated project indicator. The calculation formula popup will not display the deactivated project indicators when the user clicks into the search bar to create the formula. If the user types a deactivated project indicator in the search bar, the message “No matching records found” will display in the dropdown.

Additionally, if a calculated project indicator uses an source indicator in its formula and the source indicator is later deactivated, then the user would be notified that the formula contains a deactivated project indicator through a toast message.

Calculate Results for a Calculated Indicator

Click on the *Refresh* icon displayed next to the Project Indicator in the *Selected Indicators* table.

1. A popup will open with the date and time of any previously run calculations displayed.
    a. If no calculations have been run previously, then the date and time field will be blank.
    b. If a calculation has been run previously, the date and time is displayed in the user’s locale.
2. The results will populate on the Add Results page only if all of the data required has been entered:
    a. A mathematically appropriate formula has been entered
    b. Result records exist for the source indicators involved in the formula.
3. The result will be populated for the corresponding project indicator on the Add Results page.

Calculate Results for All Calculated Indicators

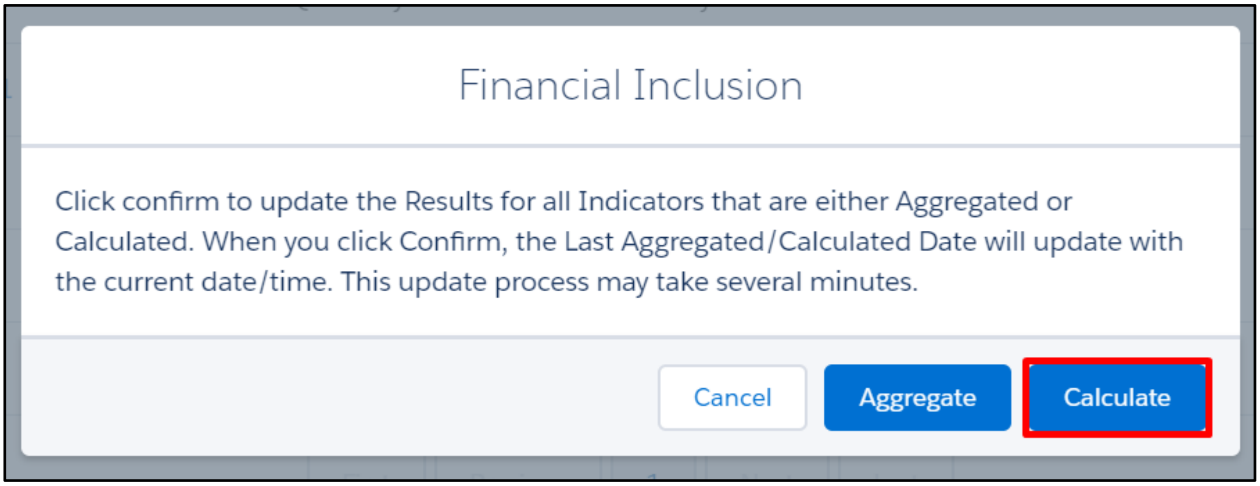
The previous section describes how to calculate results for a single calculated indicator in a project. Users can also calculate results for *all* calculated indicators in a project, similar to aggregated indicators.

Before starting, please ensure the following:

- The relevant permissions have been provided by the System Admin
- The relevant calculated indicators have been created in the project
- The appropriate calculation formula has been entered for every calculated indicator
- There is source data that will be pulled for the calculation

1. Click on the *Refresh Indicators* button to run a batch update for all calculated indicators, as shown in the screenshot below.
   a. Please note, this button will not display if there are no aggregated or calculated indicators in the Selected Indicators table.

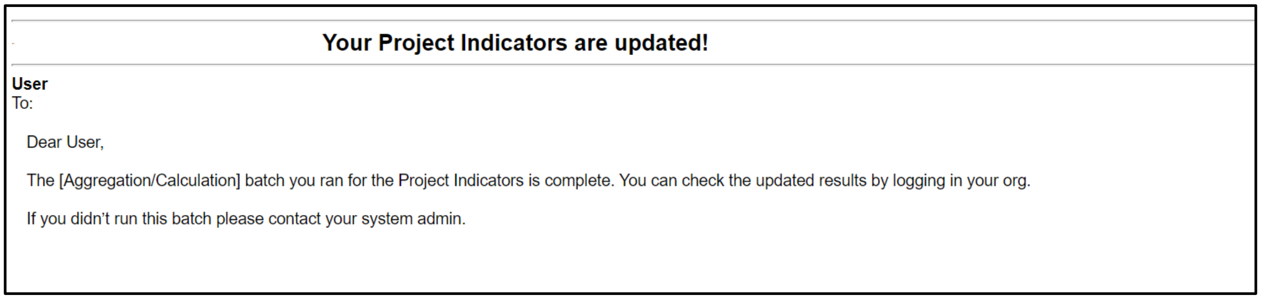
2. A pop-up will display to confirm the batch. Click to run the batch for *Calculated* indicators.



3. On confirmation, Calculation batch runs for every calculated indicator in the project.

4. While the batch is processing, users cannot edit or delete the calculated indicators. All icons, including the *Refresh* icon and *Wrench* icon, greys out.
   a. Users may navigate away from the screen until the batch completes.

5. The user is notified via email when the batch is complete and project indicators are updated.



Your Project Indicators are updated!

User
To:

Dear User,

The [Aggregation/Calculation] batch you ran for the Project Indicators is complete. You can check the updated results by logging in your org.

If you didn't run this batch please contact your system admin.

6. When batch is complete, the icons will display again and:
    a. Batch updates or creates Result records
    b. Results are updated and reflected on the Add Results table
    c. Last Calculation Date is updated with TODAY()

> ⓘ **NOTE**: Refreshing results for calculated project indicators where the formula contains a **deactivated** project indicator produces **inaccurate** Result records as the deactivated project indicator may contain outdated values.
>
> Refreshing results for calculated project indicators where the formula contains a **deleted** project indicator does **not** successfully run a batch, and no new Result records are created or updated.
>
> To ensure the calculation runs successfully, ensure that all project indicators referenced in the calculated project indicators' formula are active.

Calculating Results for Calculated Indicators dependent on other Calculated Indicator(s)

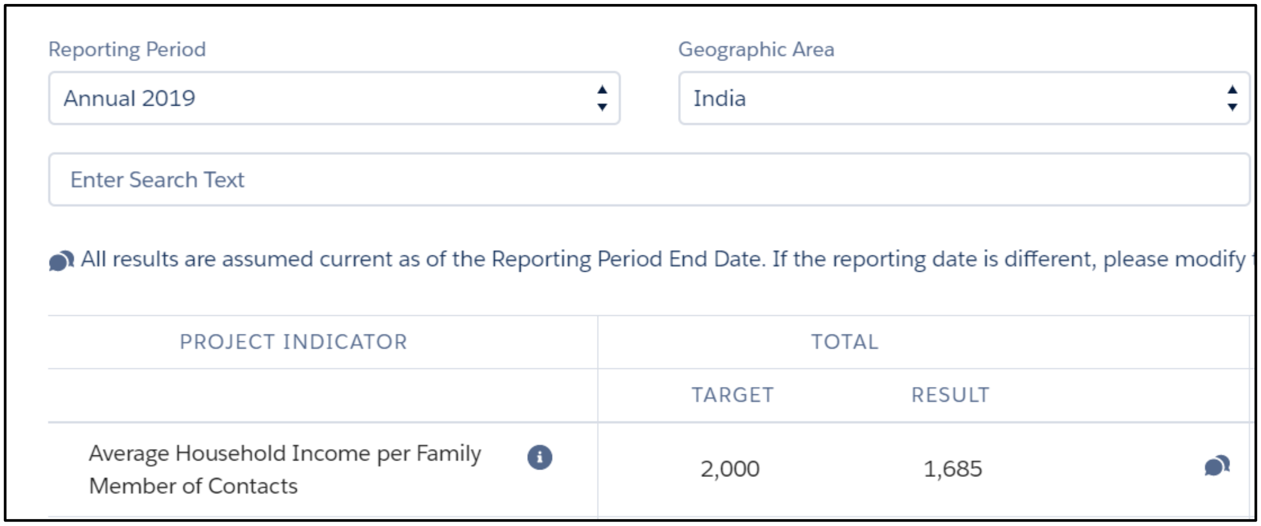
Calculated indicators that are run en masse do not update in any particular order. If a calculated indicator includes one or more calculated indicators in its formula, users will need to perform one of the two actions below:

- *Option One*
  Run the batch en masse twice by clicking *Refresh Indicators* twice. After the second run of the batch, results will be displayed for all calculated indicators.

- *Option Two*
  Run the batch individually for each calculated indicator based on the hierarchy established by the formula.
    - For example: if calculating *% of households with access to clean water* and the formula includes a calculated indicator *# of households* which adds rural and urban households, then be sure to first run the calculation for *# of households*, and then after the first batch, run the *% of households with access to clean water* indicator by clicking the *Refresh* icon.

View Results on the AddResults page

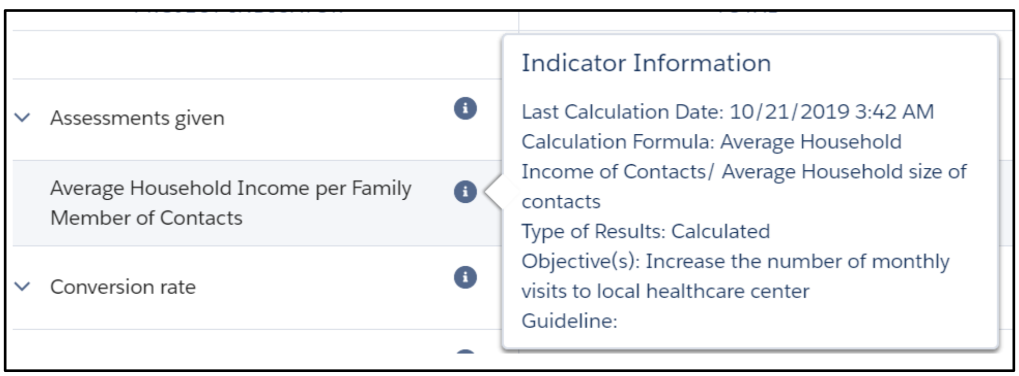
Explain that the batch has been run, users can navigate to the AddResults page to see results.



In the AddResults table, each project indicator has an *Info* icon. On hover, users may view information such as Guideline and Objective(s). By customizing the popover with additional fields, user may also view:

- Type_of_Results__c
- Last_Calculation_Date__c
- Calculation_Formula__c

See screenshot below.



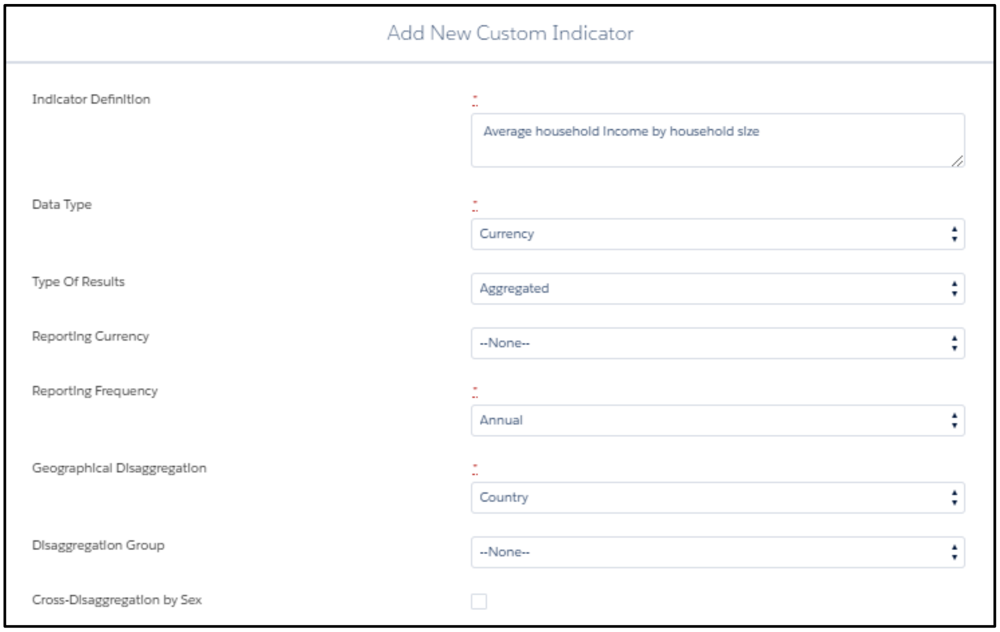
ⓘ **NOTE**: If the Project Indicator has any level of disaggregation (i.e., cross-disaggregation by sex or a custom disaggregation group), then the Total Column and/or Total Row will be populated on the Add Results page if the "Sum Total" value is selected for the *Calculate Total* field on the project indicator object.

Examples

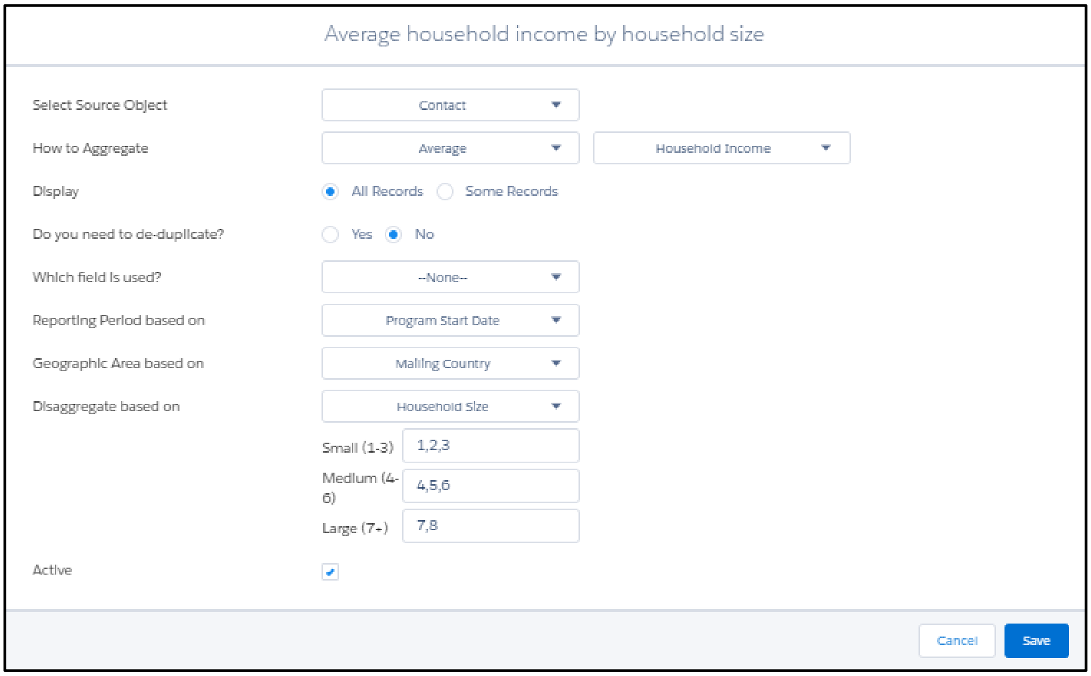
The following pages will walk through an example of an aggregated indicator and calculated indicator respectively.

Aggregated Indicator

In the following example, we will create an Aggregated Indicator to measure the average income by household size for farmers in our coffee program.



Upon saving this window, the aggregation criteria popup will appear._Fill out the information as required:



Upon saving the popup, the aggregated indicator will appear on the *Manage Indicators* page.

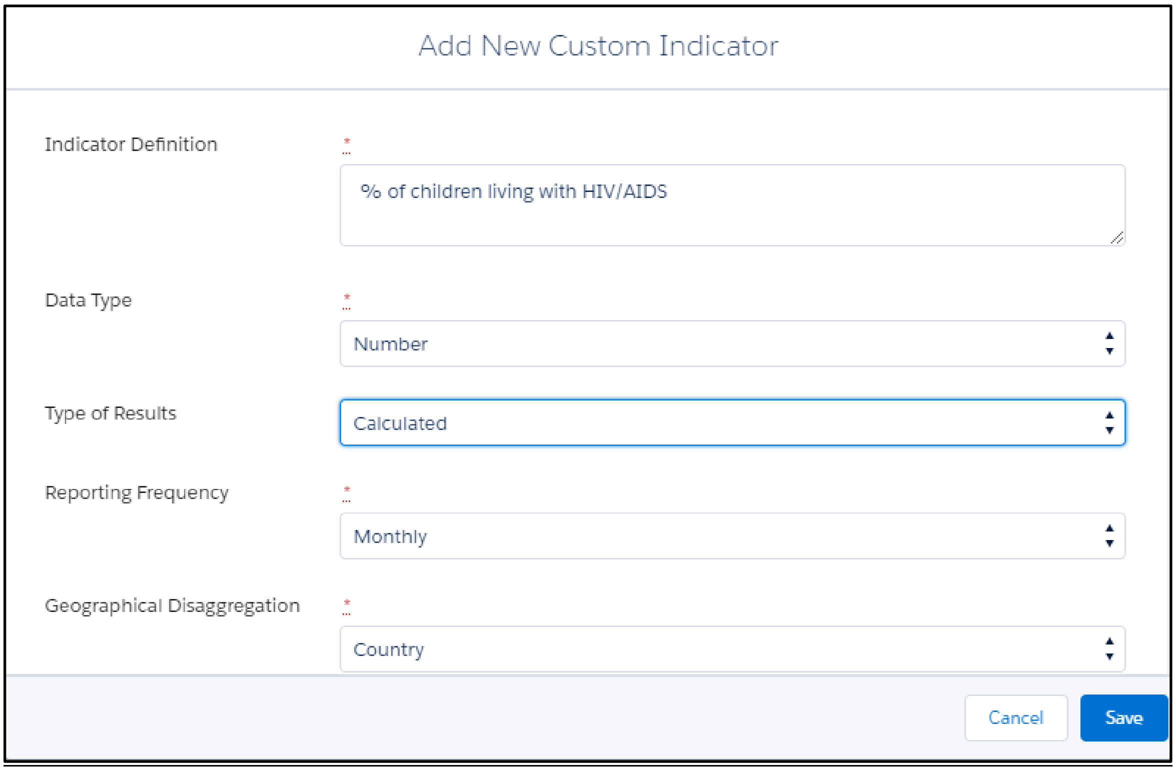
To run the aggregation, click the *Refresh* icon and confirm. Navigate to the *Add Results* page to see the result.

Calculated Indicator

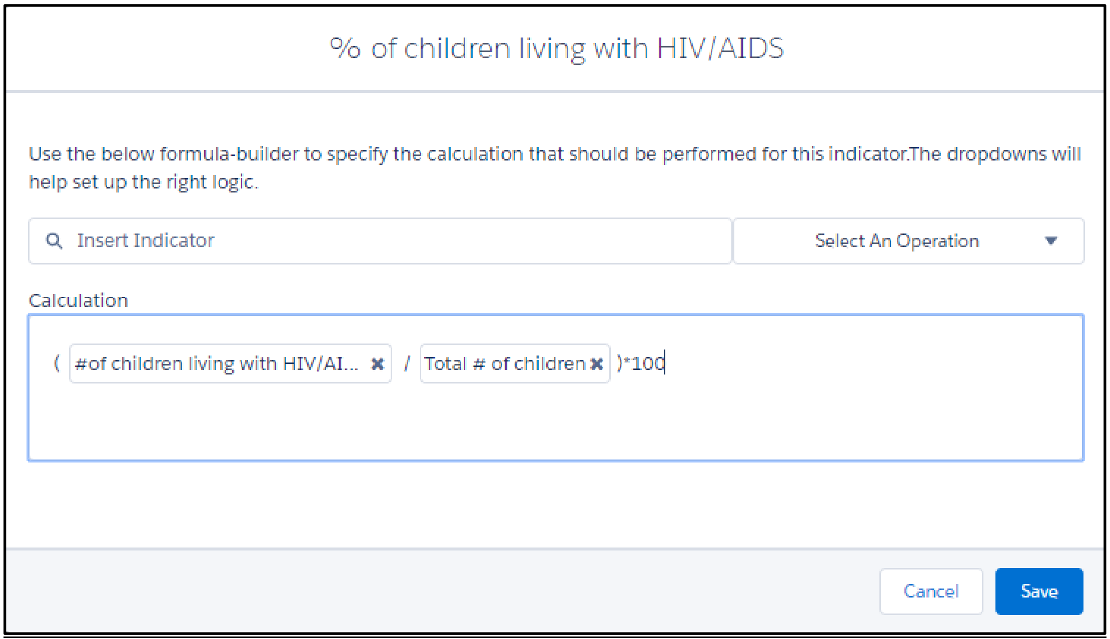
In the following example, we will create a Calculated Indicator to calculate the percent of children living with HIV/AIDS in our Health Access program.
We will first create the two Source Project Indicators:

1. Total number of children
2. Number of children living with HIV/AIDS.

Next, we create the Calculated Indicator.



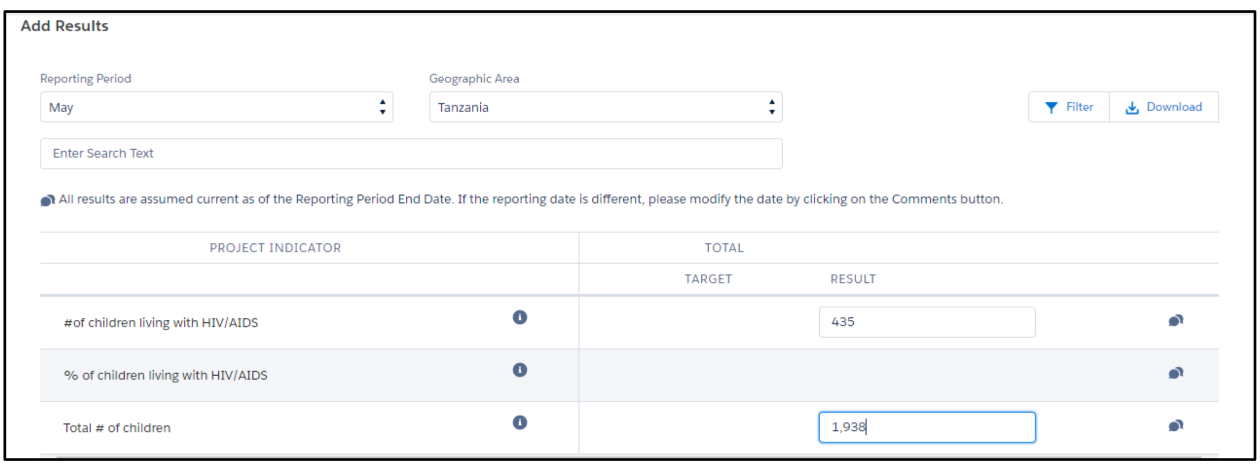
Upon clicking *Save*, the Calculation Formula popup will appear. Enter the necessary formula.



Upon saving the formula, the calculated project indicator will appear on the *Manage Indicators* page.

Navigate to the Add Results page:

Before running the calculation, navigate to the *Add Results* page to enter result values for the two source project indicators, if they have not been previously entered.



Navigate back to the *Manage Indicators* page to run the calculation. Click the *Refresh* icon and confirm. Navigate to the *Add Results* page to see the result.