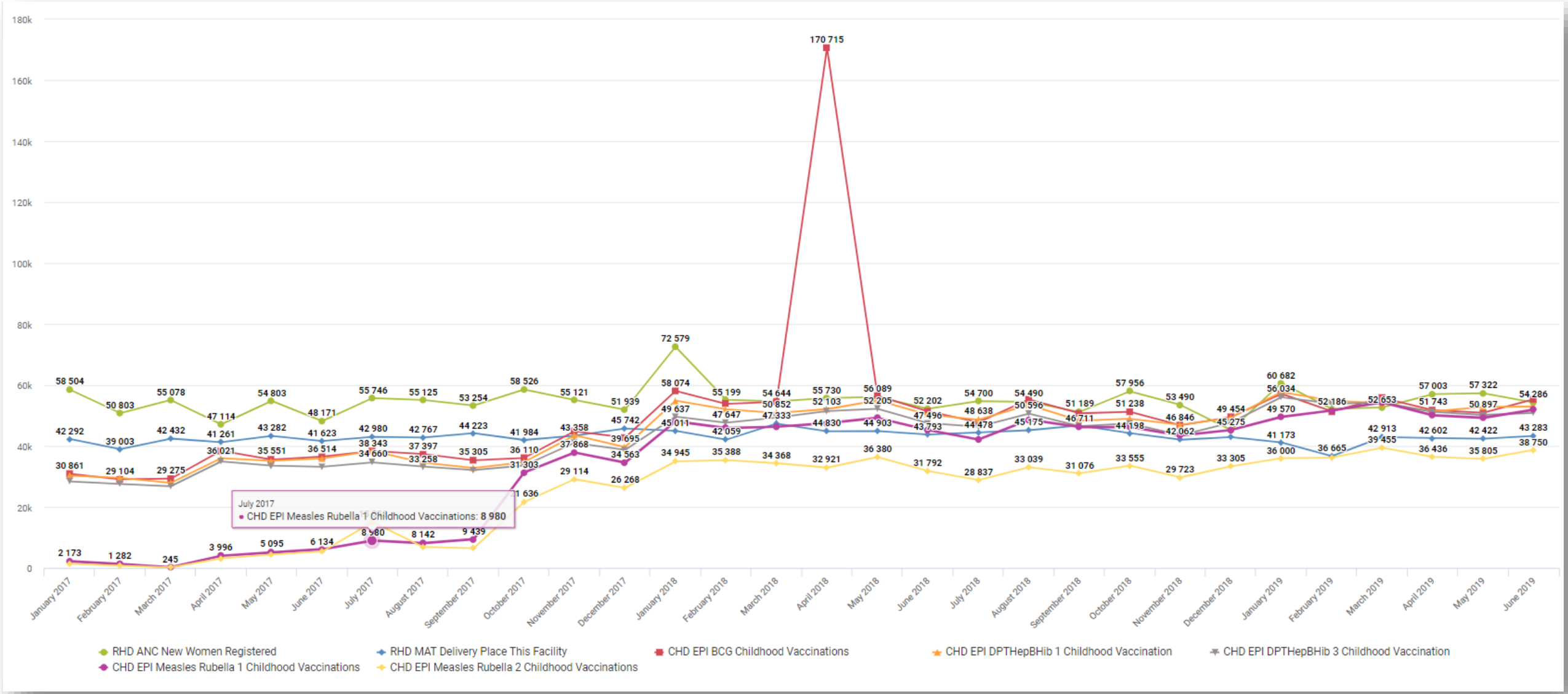
Detecting Outliers in Dashboards and Validation Notifications

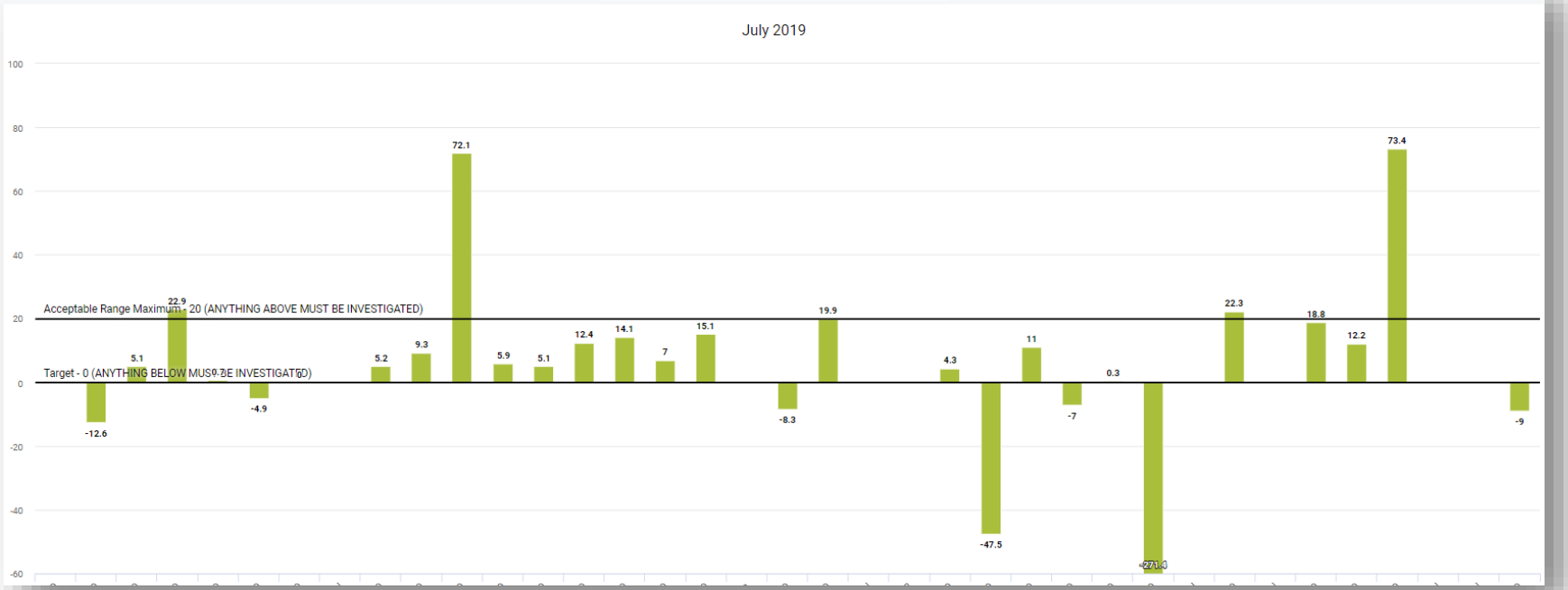
DQ Academy, Day 4 – Oct 22

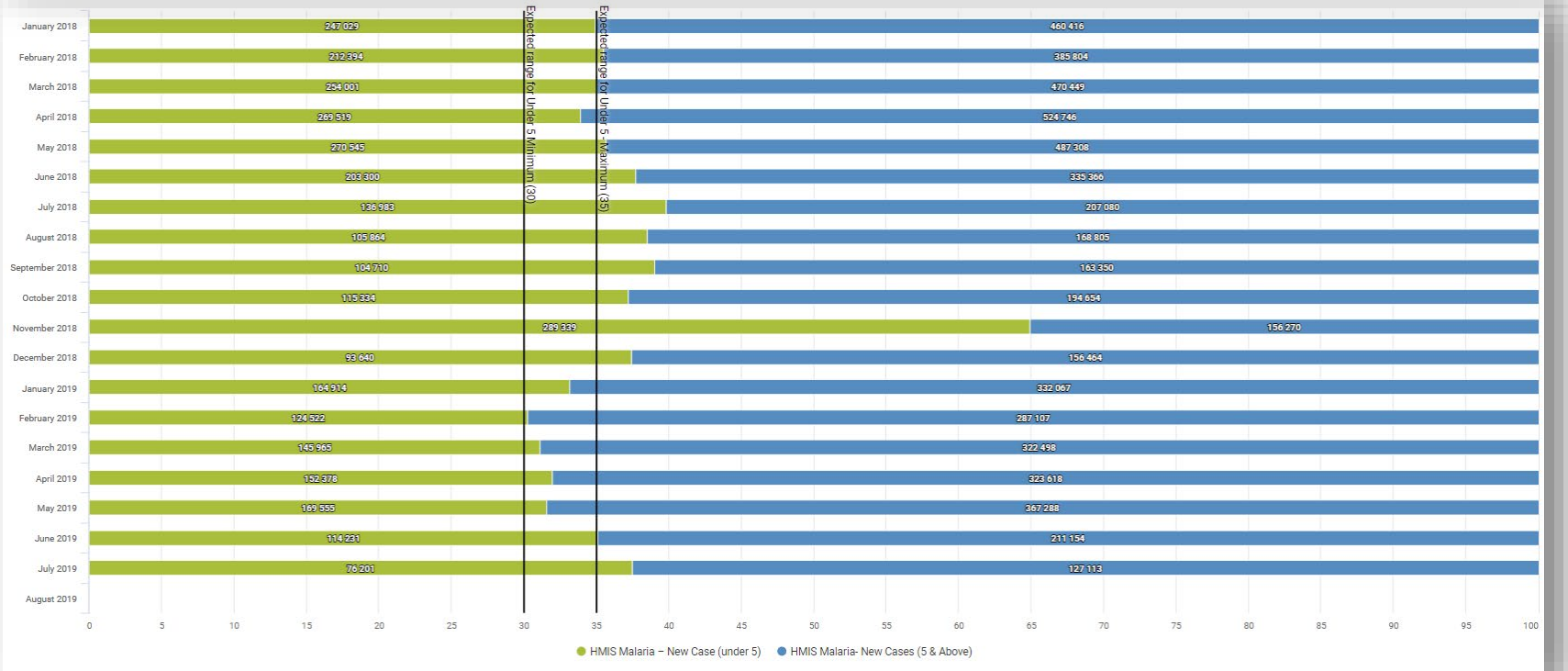
Part 2

Outliers -


July 2017
CHD EPI Measles Rubella 1 Childhood Vaccinations: 8 980
RHD ANC New Women Registered
RHD MAT Delivery Place This Facility
CHD EPI BCG Childhood Vaccinations
CHD EPI DPTHepBHib 1 Childhood Vaccination
CHD EPI DPTHepBHib 3 Childhood Vaccination
CHD EPI Measles Rubella 1 Childhood Vaccinations
CHD EPI Measles Rubella 2 Childhood Vaccinations

DQ BCG to Measles 1st dose dropout rate by districts - Last Months





Example

- https://academy.demos.dhis2.org/dq/dhis-web-dashboard/#/

Steps for identifying outliers from trend-line charts.

1. Isolate the period. – Usually just one month
2. Change the chart type to a bar chart
3. Isolate the data element
4. Turn on facility level in your org unit hierarchy.
5. Change the layout so org units is in category, period in filter, and data in series.

Now you should see where the outlier is!

Outliers are a fact of life

Outliers throw off national statistics - They must be caught and corrected quickly

But why should you have to dig through the data to find the outlier? They should come to you.

From: "Rwanda HMIS Message [No reply]" <trainmutali@gmail.com>
Date: June 6, 2019 at 10:00:00 PM PDT
To: Undisclosed recipients: ;
Subject: [Rwanda HMIS] Validation violations as of 2019-06-07T07:00:00

Violations: High 23, medium 0, low 0

A violation of the Penta 3 outlier data validation rule was detected at Batsinda HP for 201905 on 20
Please confirm that the value is correct of Penta 3

A violation of the Penta 3 outlier data validation rule was detected at Bumbogo (ex-Gikomero I) CS f
Please confirm that the value is correct of Penta 3

A violation of the Penta 3 outlier data validation rule was detected at Cyuga HP for 201905 on 2019-
Please confirm that the value is correct of Penta 3

A violation of the Penta 3 outlier data validation rule was detected at Cyumba CS for 201905 on 2019
Please confirm that the value is correct of Penta 3

A violation of the Penta 3 outlier data validation rule was detected at Gatsata CS for 201905 on 201
Please confirm that the value is correct of Penta 3

A violation of the Penta 3 outlier data validation rule was detected at Gikore CS for 201905 on 2019
Please confirm that the value is correct of Penta 3

A violation of the Penta 3 outlier data validation rule was detected at Gitarama CS for 201905 on 20
Please confirm that the value is correct of Penta 3

A violation of the Penta 3 outlier data validation rule was detected at Gitwe CS for 201905 on 2019-
Please confirm that the value is correct of Penta 3

A violation of the Penta 3 outlier data validation rule was detected at Harmony Clin for 201905 on 2
Please confirm that the value is correct of Penta 3

A violation of the Penta 3 outlier data validation rule was detected at Jenda (nyabihu) HP for 20190
Please confirm that the value is correct of Penta 3

A violation of the Penta 3 outlier data validation rule was detected at Kirambi CS for 201905 on 201
Please confirm that the value is correct of Penta 3

A violation of the Penta 3 outlier data validation rule was detected at Kirarambogo CS for 201905 on
Please confirm that the value is correct of Penta 3

A violation of the Penta 3 outlier data validation rule was detected at Ntoma CS for 201905 on 2019-
Please confirm that the value is correct of Penta 3

A violation of the Penta 3 outlier data validation rule was detected at Nyarugunga CS for 201905 on
Please confirm that the value is correct of Penta 3

A violation of the Penta 3 outlier data validation rule was detected at Rubengera CS for 201905 on 2
Please confirm that the value is correct of Penta 3

A violation of the Penta 3 outlier data validation rule was detected at Ruheru CS for 201905 on 2019

Using Predictors in Validation Rules

- A predictor is a value calculated from previously reported values in DHIS2.28 – DHIS2.34. This can be done using indicators in DHIS2.35+
  - EX: Average Malaria incidence over the last 6 months.
  - EX: Average monthly ART consumption over the last 3 months.
  - EX: Average ANC 1 Visits with 3 standard deviation for the last 12 months – ANC 1 Outlier Threshold
  - If this value is 0 then count 1 – Count the number of facilities that reported some value.

Warning!

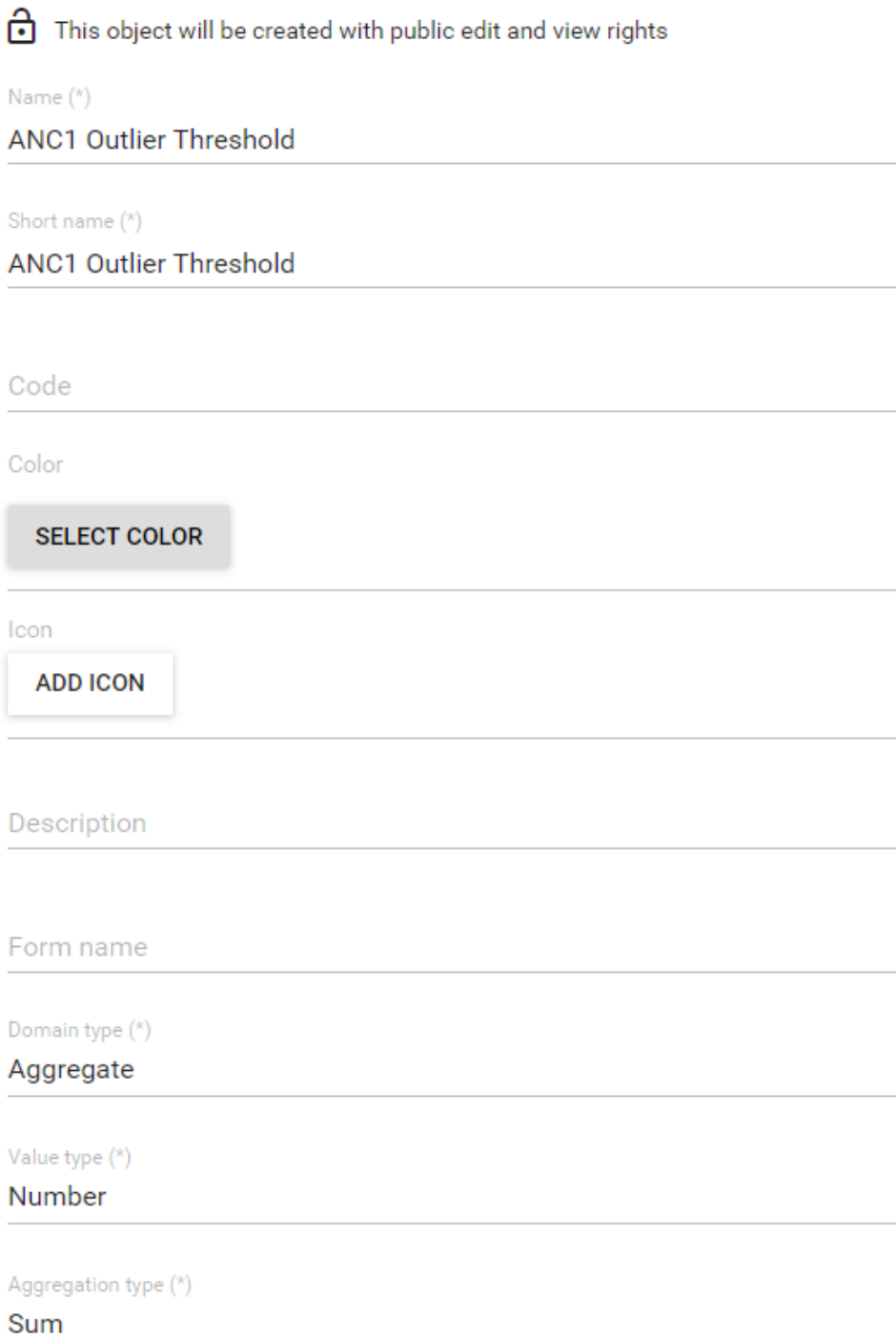
- Predictors are a scheduled job that consume a lot of server resources when run.
  - Do not run predictors during peak server usage hours
  - Do not use predictors is you have any server issues at all
  - Do not use predictors if you have limited storage, CPUs, or RAM

How to make a predictor

1. Make a data element to store the predicted value
2. Make the predictor
3. Put the predictor in a predictor group
4. Schedule the predictor group to run
5. Put the predictor in a validation rule

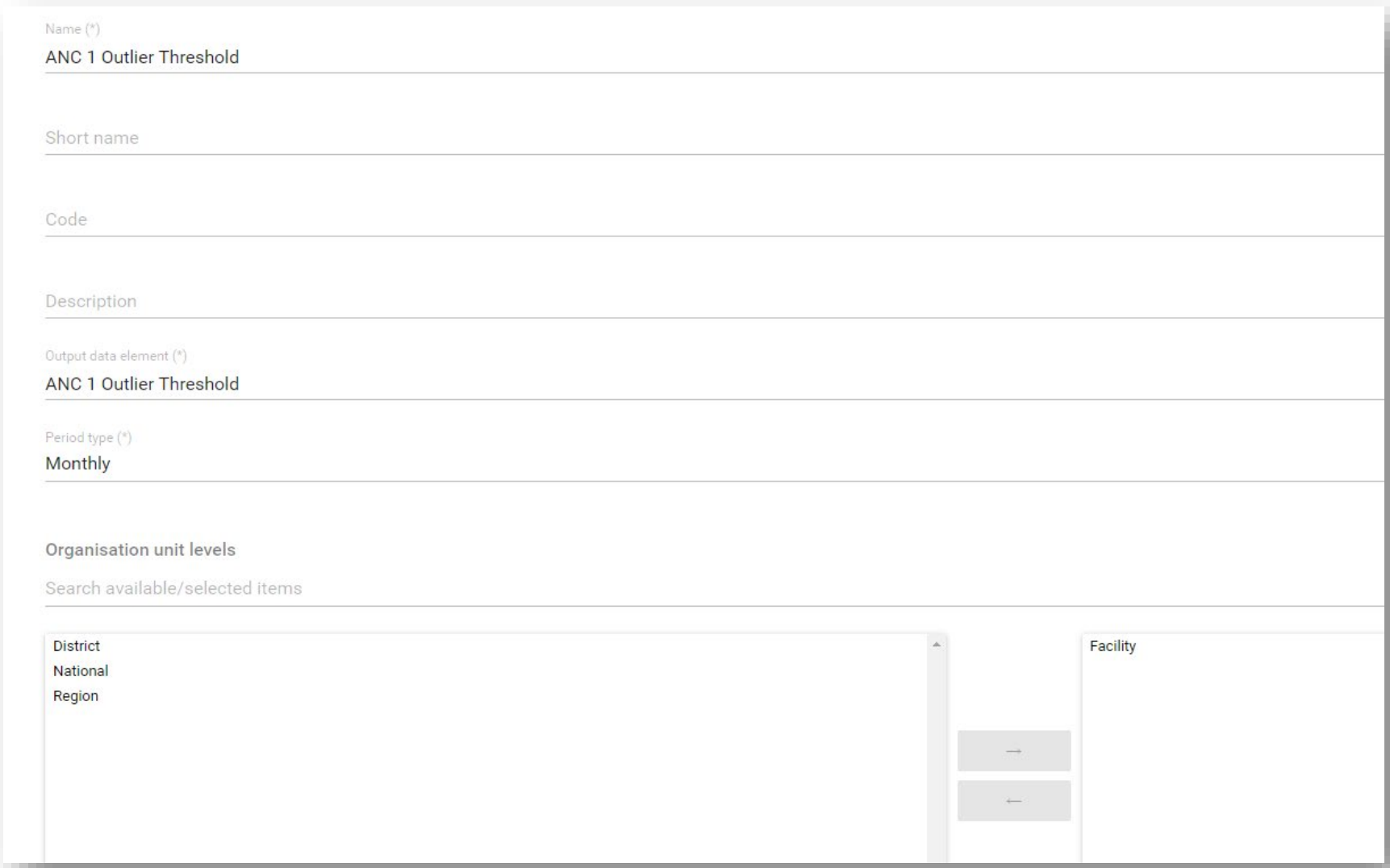
Create outlier threshold data element

- Name – **ANC 1 Outlier Threshold – *Your Name***
- Short name – Same
- Domain type – Aggregate
- Value type – Number
- Aggregation type - Sum



Make the predictor

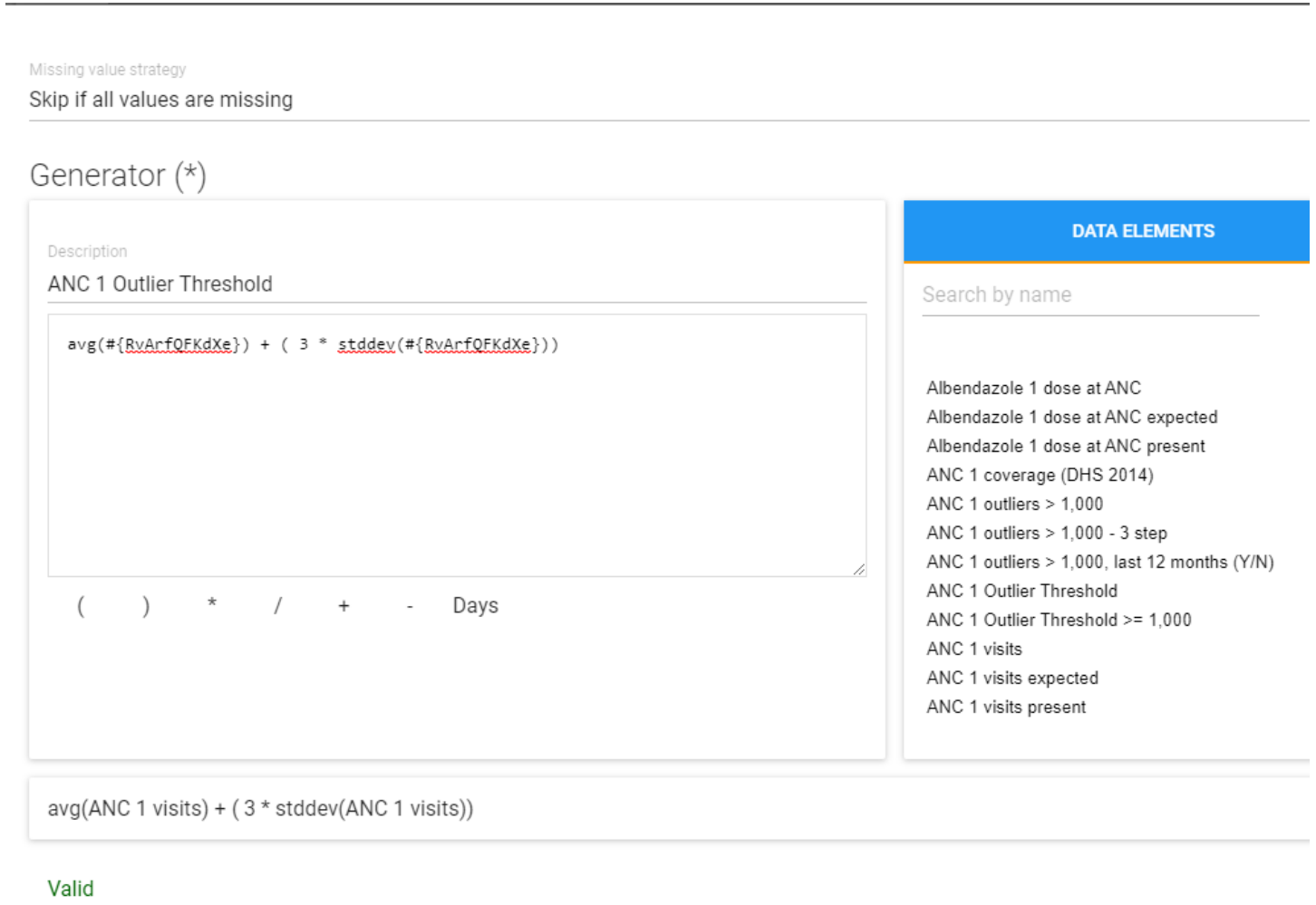
1. Name – **ANC 1 Outlier Threshold**
2. Define output DE – **ANC 1 Outlier Threshold**
3. Select Org unit level - **Facility**



Define Generator

1. Select missing value strategy: Skip if all values are missing

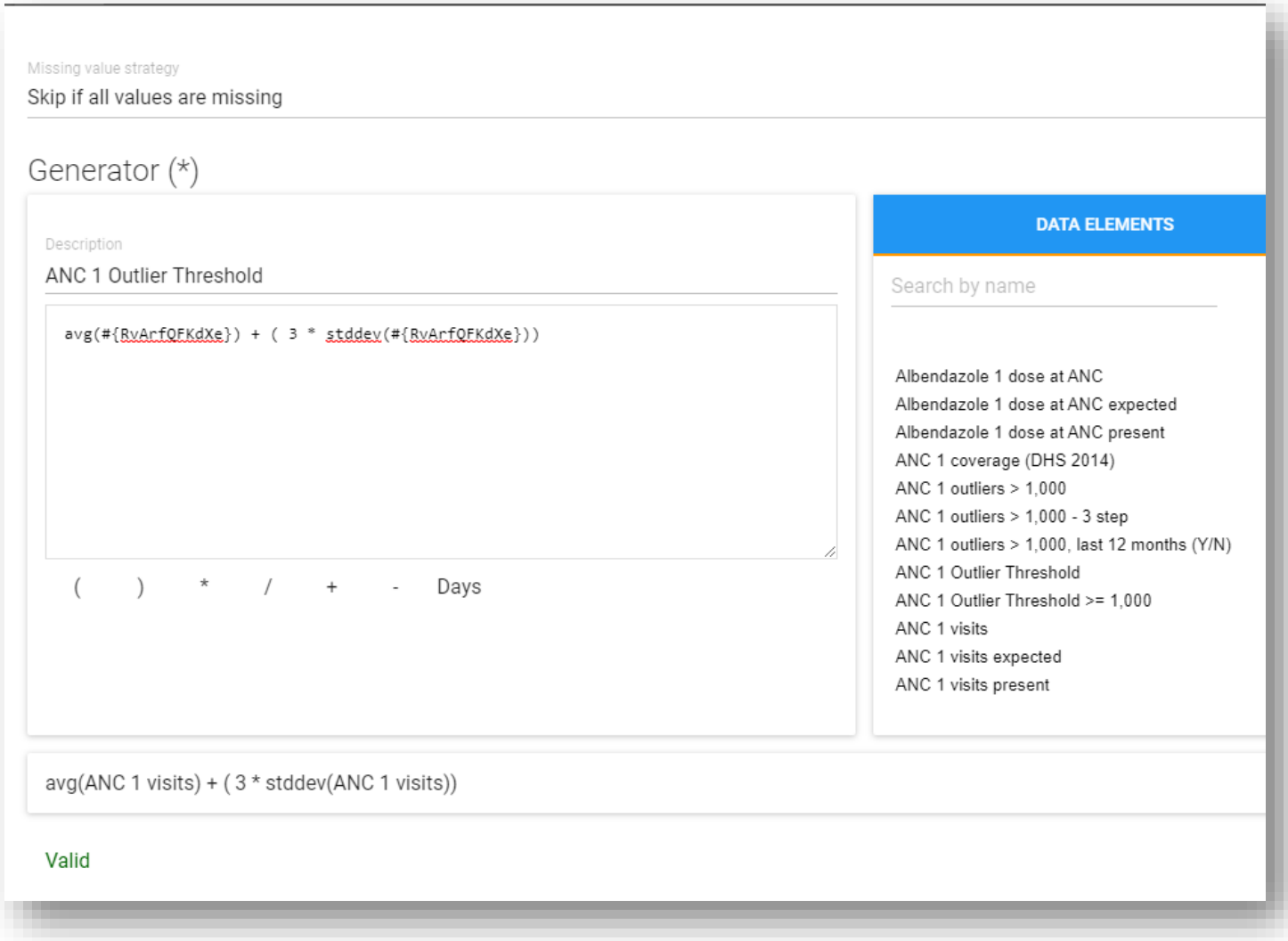
- **Default is skip is any is missing?** Is this good for this?
- No, we want the calculation even if there are missing values



Define Generator

2. Name – **ANC 1 Outlier Threshold**

3. Formula – **avg(ANC1 UID) + (3 * STDDEV(ANC1 UID))**



Other functions for predictors

Aggregate function	Means
AVG	Average (mean) value
COUNT	Count of the data values
MAX	Maximum value
MEDIAN	Median value
MIN	Minimum value
STDDEV	Standard deviation
SUM	Sum of the values

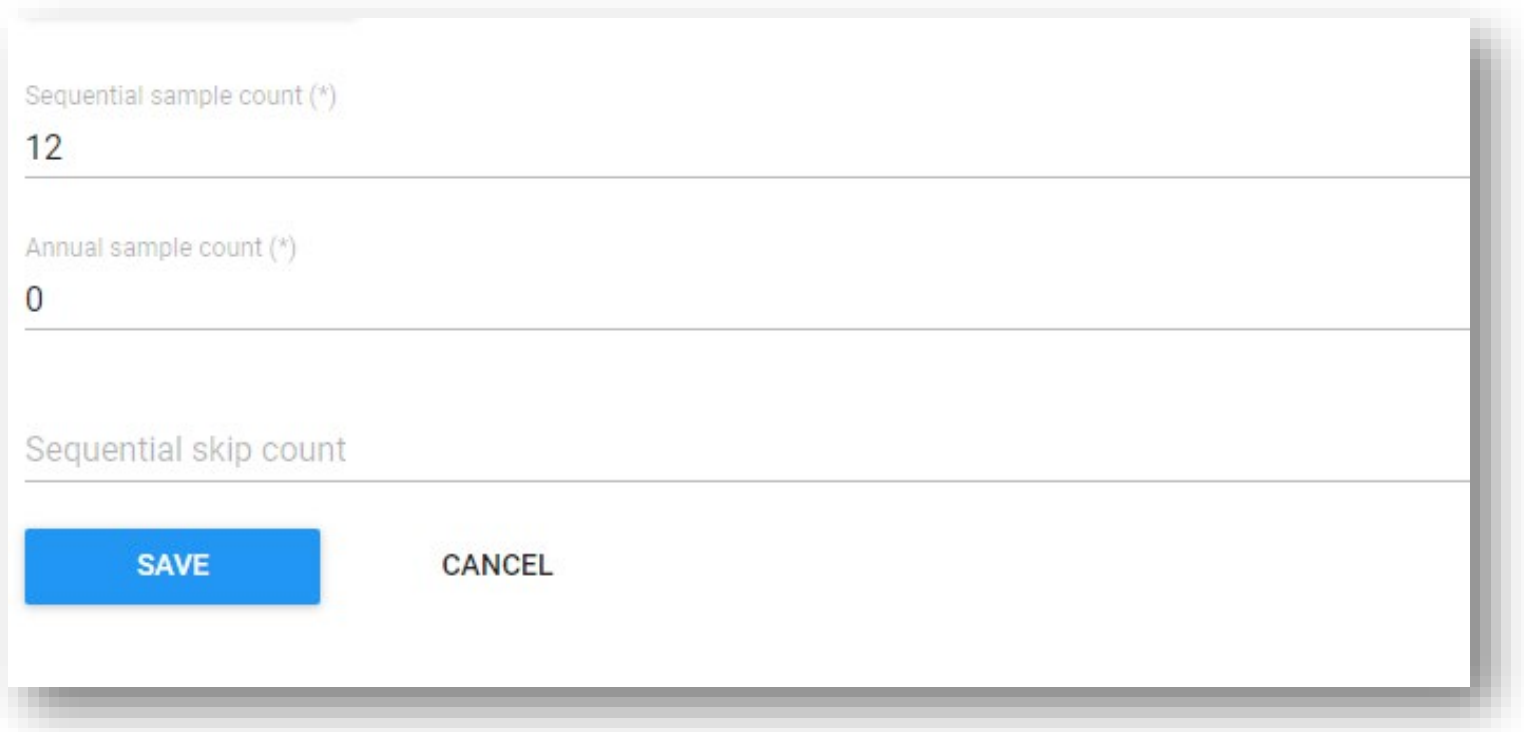
BE AWARE: the functions are case sensitivie.

THEY MUST BE IN LOWER CASE/SMALL LETTERS

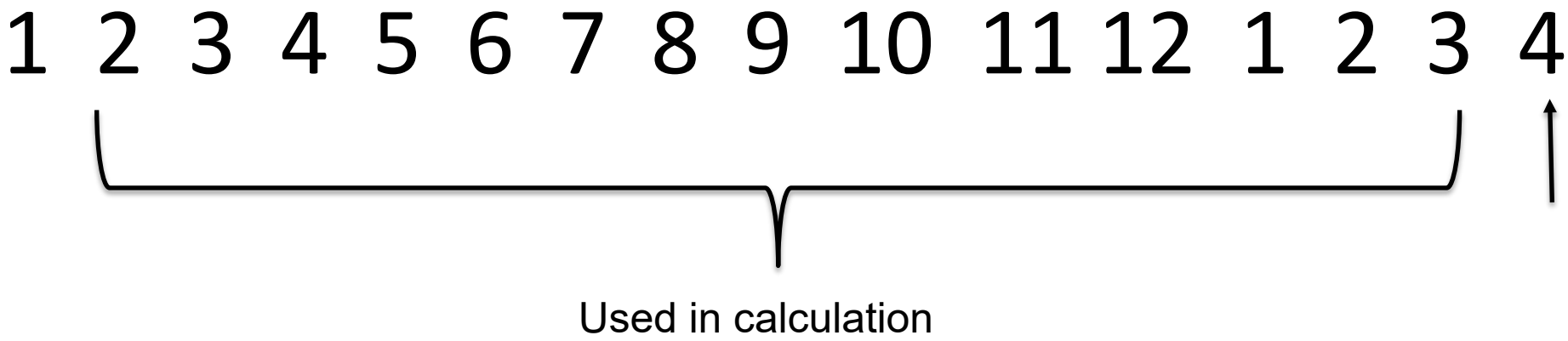
EX: avg, count, max, median, min, stddev

Define counts

- Sequential sample count – 12
- Annual sample count 0
- Sequential skip count 0



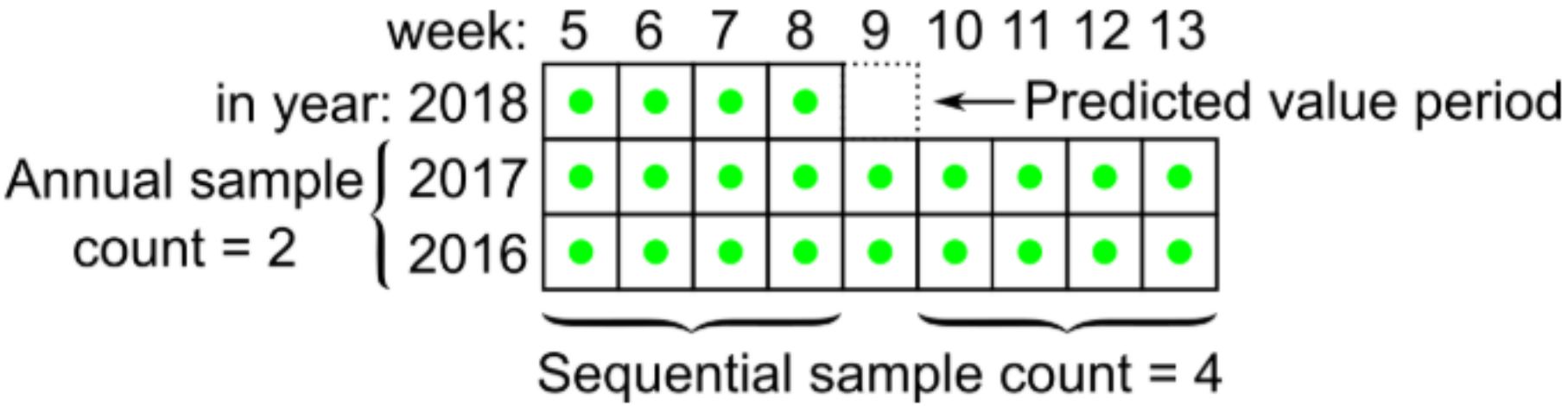
Sequential – 12, Annual – 0, Skip - 0

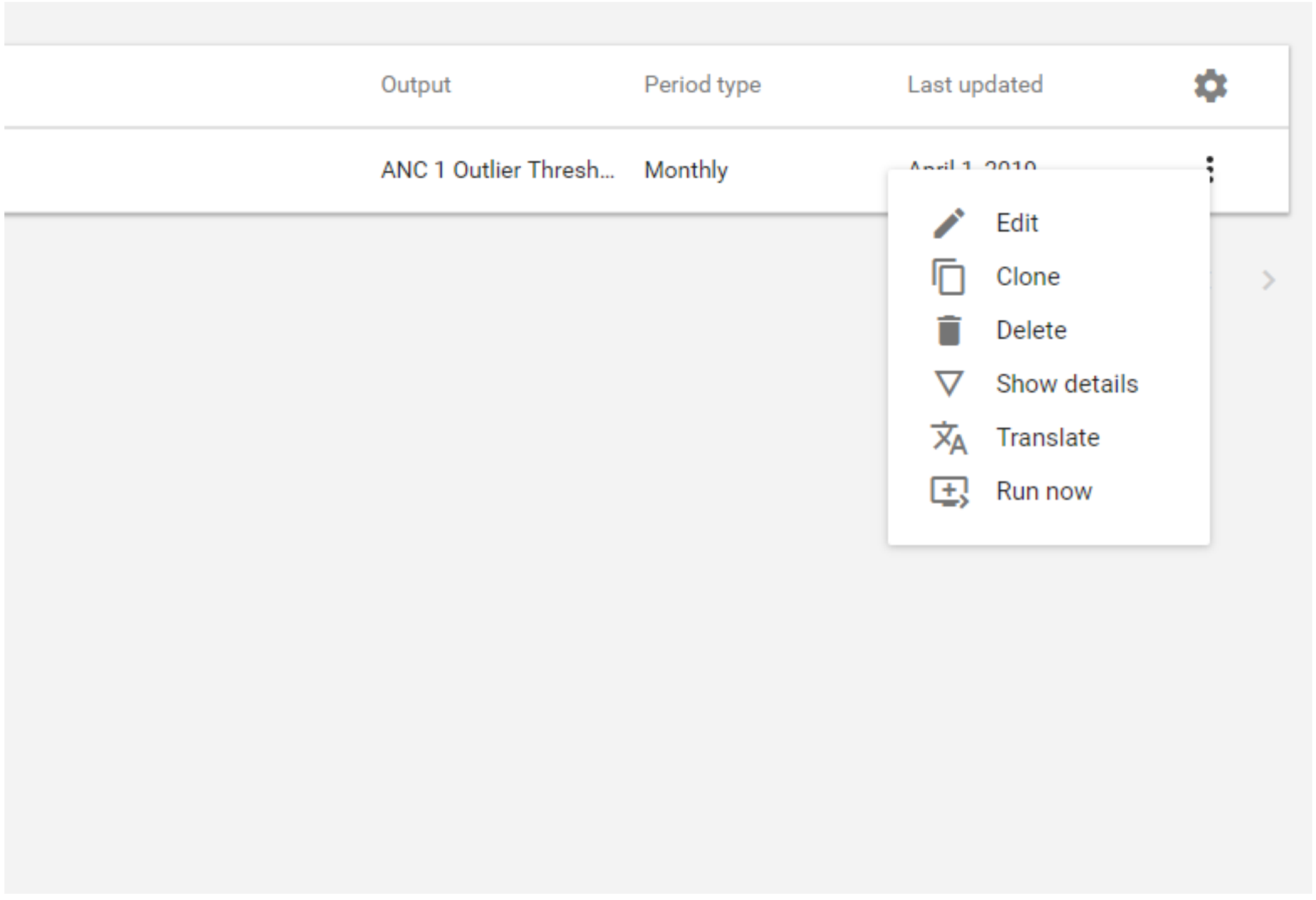


Sample count for seasonal data – Malaria

Sequential sample count is = 4
Annual sample count is = 2

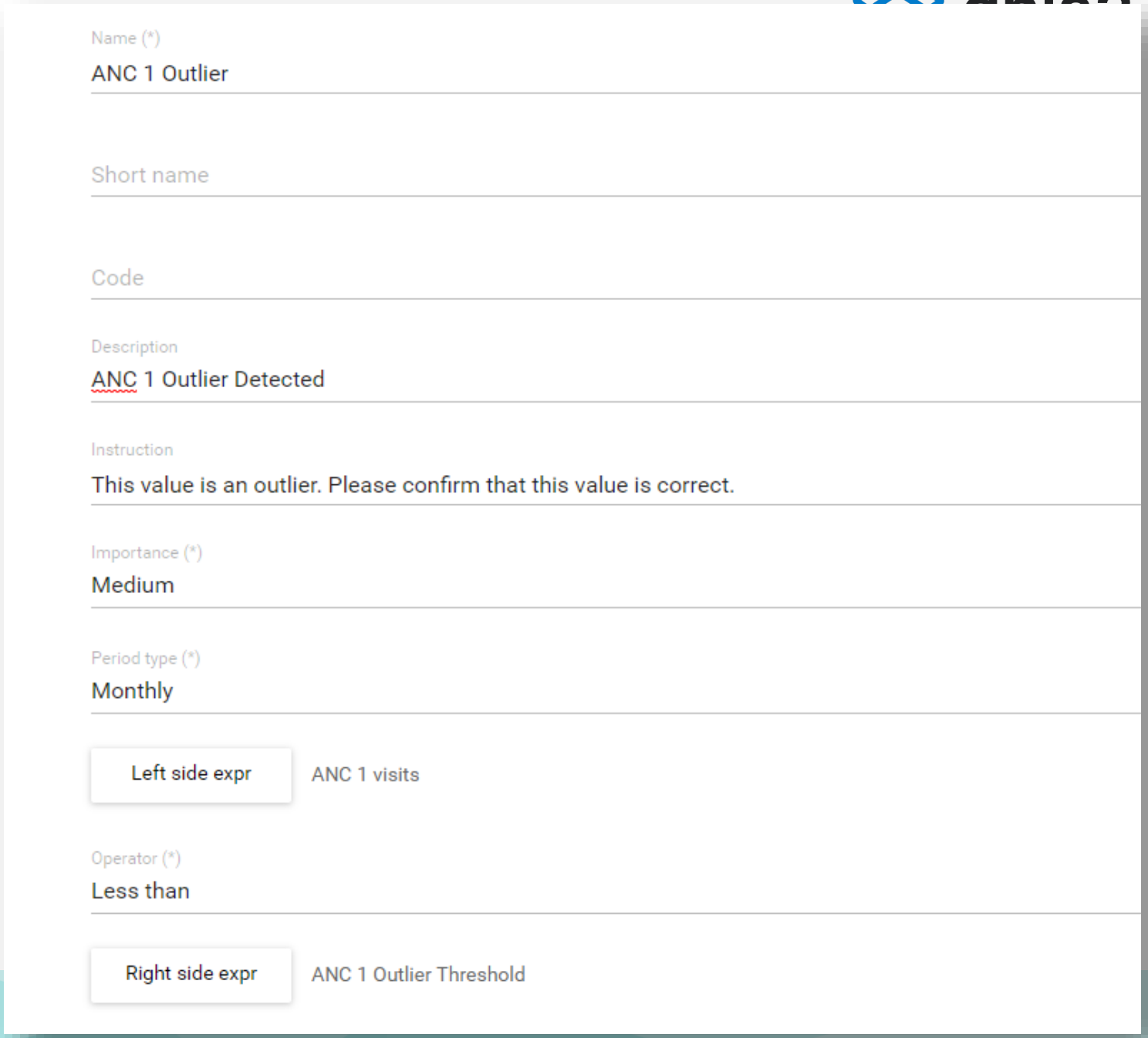
Total sampled period is 22 =
4 previous weeks
+ 8 weeks from the previous weeks over the last two years
+ 8 weeks from the period weeks over the last two years
+ 2 week 9 from the last two years




Output
Period type
Last updated
ANC 1 Outlier Thresh...
Monthly
Edit
Clone
Delete
Show details
Translate
Run now

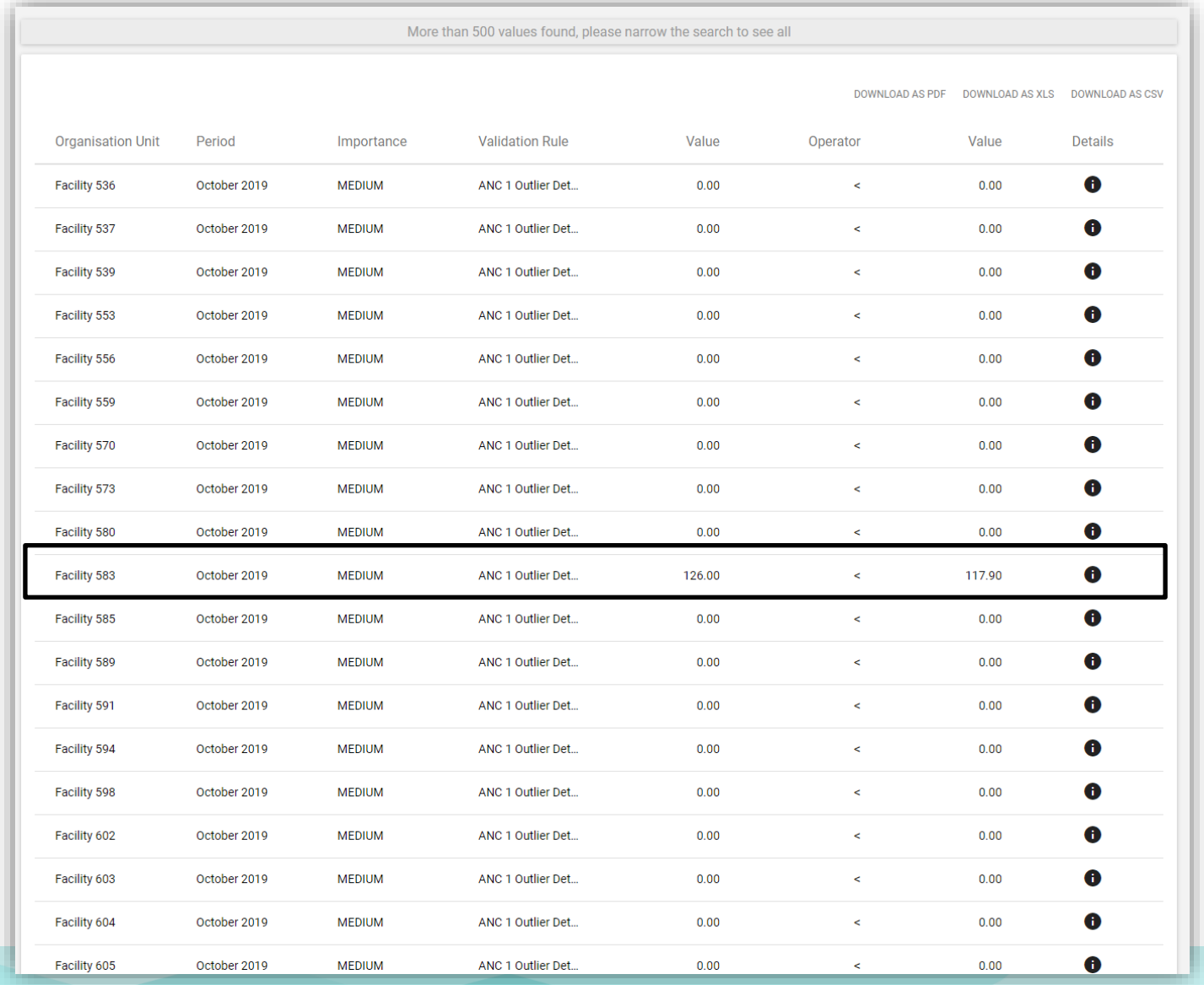
Outlier Threshold into validation rule

- Name
- Description
- Instruction
- Importance
- Period type
- Left side – **ANC 1 Visits**
- Operator – **Less than**
- Right side – **ANC 1 Outlier Threshold**



Last Step

- Add it to a validation rule group and run it:



More than 500 values found, please narrow the search to see all

DOWNLOAD AS PDF DOWNLOAD AS XLS DOWNLOAD AS CSV

Organisation Unit	Period	Importance	Validation Rule	Value	Operator	Value	Details
Facility 536	October 2019	MEDIUM	ANC 1 Outlier Det...	0.00	<	0.00	
Facility 537	October 2019	MEDIUM	ANC 1 Outlier Det...	0.00	<	0.00	
Facility 539	October 2019	MEDIUM	ANC 1 Outlier Det...	0.00	<	0.00	
Facility 553	October 2019	MEDIUM	ANC 1 Outlier Det...	0.00	<	0.00	
Facility 556	October 2019	MEDIUM	ANC 1 Outlier Det...	0.00	<	0.00	
Facility 559	October 2019	MEDIUM	ANC 1 Outlier Det...	0.00	<	0.00	
Facility 570	October 2019	MEDIUM	ANC 1 Outlier Det...	0.00	<	0.00	
Facility 573	October 2019	MEDIUM	ANC 1 Outlier Det...	0.00	<	0.00	
Facility 580	October 2019	MEDIUM	ANC 1 Outlier Det...	0.00	<	0.00	
Facility 583	October 2019	MEDIUM	ANC 1 Outlier Det...	126.00	<	117.90	
Facility 585	October 2019	MEDIUM	ANC 1 Outlier Det...	0.00	<	0.00	
Facility 589	October 2019	MEDIUM	ANC 1 Outlier Det...	0.00	<	0.00	
Facility 591	October 2019	MEDIUM	ANC 1 Outlier Det...	0.00	<	0.00	
Facility 594	October 2019	MEDIUM	ANC 1 Outlier Det...	0.00	<	0.00	
Facility 598	October 2019	MEDIUM	ANC 1 Outlier Det...	0.00	<	0.00	
Facility 602	October 2019	MEDIUM	ANC 1 Outlier Det...	0.00	<	0.00	
Facility 603	October 2019	MEDIUM	ANC 1 Outlier Det...	0.00	<	0.00	
Facility 604	October 2019	MEDIUM	ANC 1 Outlier Det...	0.00	<	0.00	
Facility 605	October 2019	MEDIUM	ANC 1 Outlier Det...	0.00	<	0.00	

Counting Org Units Using Predictors

- Example: I want to know all of the org units the recorded a positive value for the number of stock-out days.