ANALYSIS AND USE OF HEALTH FACILITY DATA

Exercise book

For tuberculosis programme managers

WORKING DOCUMENT SEPTEMBER 2018

World Health Organization

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Contents

Acknowledgements

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Exercise 1: Analysis of TB surveillance indicators – absolute numbers and rates per 100 000 population

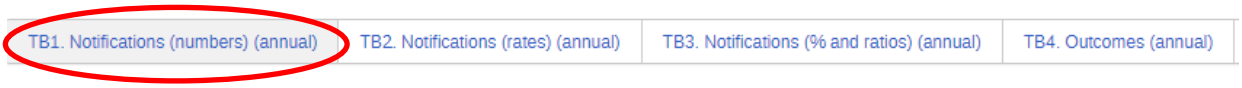
OBJECTIVE

Examine the trends and the rates in TB notifications at the national and sub-national level using the TB dashboard. For each analysis describe the trends in a few sentences and use your knowledge of the country to interpret them or generate hypothesis which might explain them.

Data from Benin is used *as an example* to help you work through the exercises.

National level analysis

1. Examine and describe the trends in TB notifications by year (new and relapse, previously treated and all cases) using the table *TBt_1.1_TB notifications* on the **TB1. Notifications (numbers)** dashboard and explain the possible reasons for any changes over time.

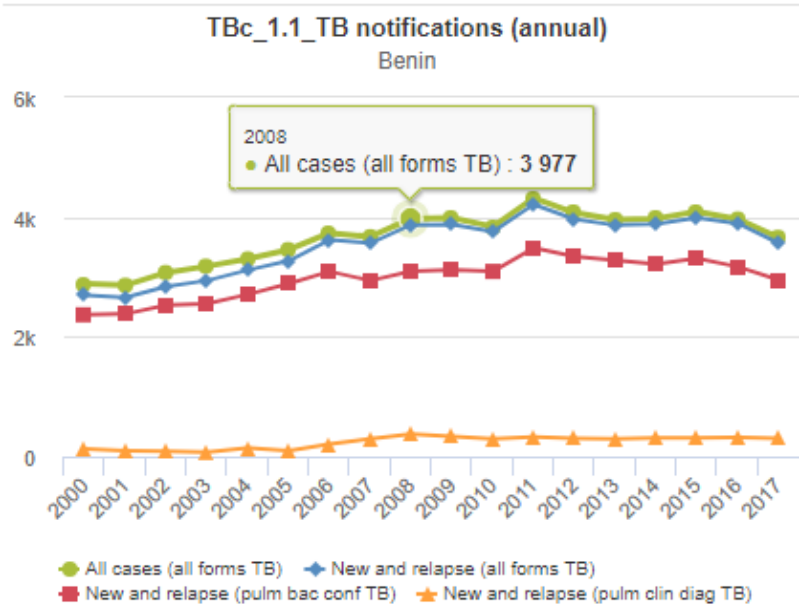


TBt_1.1_TB notifications (annual)

Organisation unit	Data / Period	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015
Benin / Atacora-Donga	New and relapse (all forms TB)	99	108	107	121	123	123	174	193	205	233	210	243	272	253	331	327
	Previously treated (all forms TB)	0	1	3	1	5	2	4	6	2	7	5	8	11	6	7	4
	All cases (all forms TB)	99	109	110	122	128	125	178	199	207	240	215	251	283	259	338	331

Answer:

2. On the same **TB1. Notifications (numbers)** dashboard, examine the trend in TB notifications by year (all cases, new and relapse pulmonary bacteriologically confirmed and new and relapse pulmonary clinically diagnosed) in the graph *TBc_1.1_TB notifications* and describe the trends over time. Are there differences between the trend in pulmonary bacteriologically confirmed or pulmonary clinically diagnosed cases and if so, why do you think this might be?



Note: You can see the numbers of cases by hovering the mouse over the line marker and you can remove a trend line by clicking on it in the legend shown at the bottom of the graph.

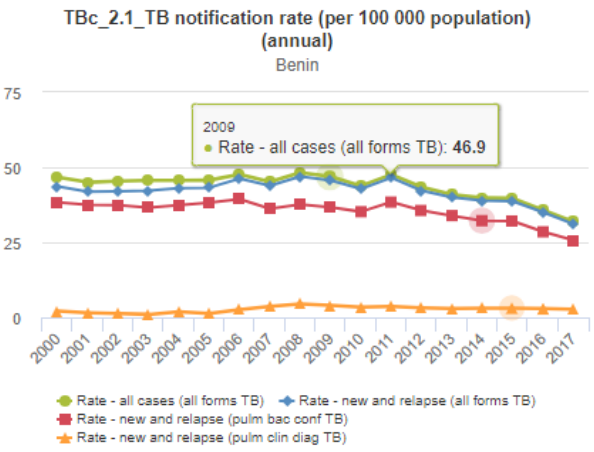
Answer:

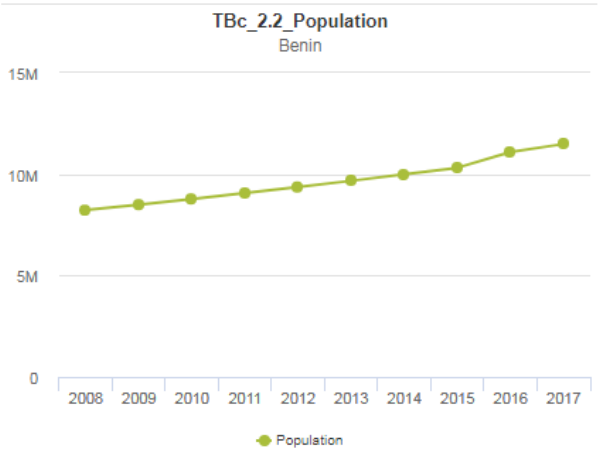
3. Examine and describe the trends in the TB case notification rate by year using the **TB2. Notifications (rates)** dashboard. Examine the rates shown in table *TBt_2.1_TB notification rate per 100 000 population*, in the graph *TBc_2.1_TB notification rate per 100 000 population* and also examine the population in graph *TBc_2.2_Population*. How do the trends in case notification rates compare with the trends in TB notifications over time?

TB1. Notifications (numbers) (annual) | TB2. Notifications (rates) (annual) | TB3. Notifications (% and ratios) (annual) | TB4. Outcomes (annual)

TBt_2.1_TB notification rate (per 100 000 population) (annual)

Organisation unit	Data / Period	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017
Benin	Rate - all cases (all forms TB)	46.7	45	45.4	45.6	45.6	45.7	47.6	45.2	48.2	46.9	43.8	47.6	43.4	40.9	39.8	39.7	35.7	31.9
	Rate - new and relapse (all forms TB)	43.6	41.9	42	42.2	43	43.2	46.2	43.9	46.9	45.6	42.8	46.5	42.2	40	38.9	38.7	35	31.1
	Rate - new and relapse (pulm bac conf TB)	38.3	37.5	37.4	36.6	37.4	38.2	39.4	36.2	37.6	36.7	35.2	38.4	35.6	33.9	32.2	32.1	28.5	25.7
	Rate - new and relapse (pulm clin diag TB)	2.1	1.5	1.3	1	1.9	1.3	2.6	3.6	4.5	4	3.4	3.6	3.2	3	3.1	3.1	2.9	2.7

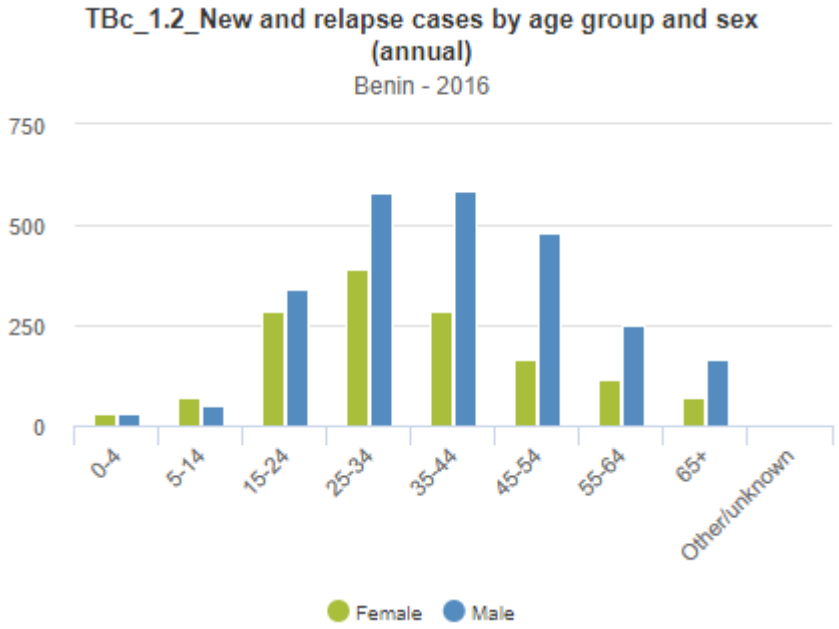




Note: Remember TB notification rate is the number of TB case notifications/population*100 000 population

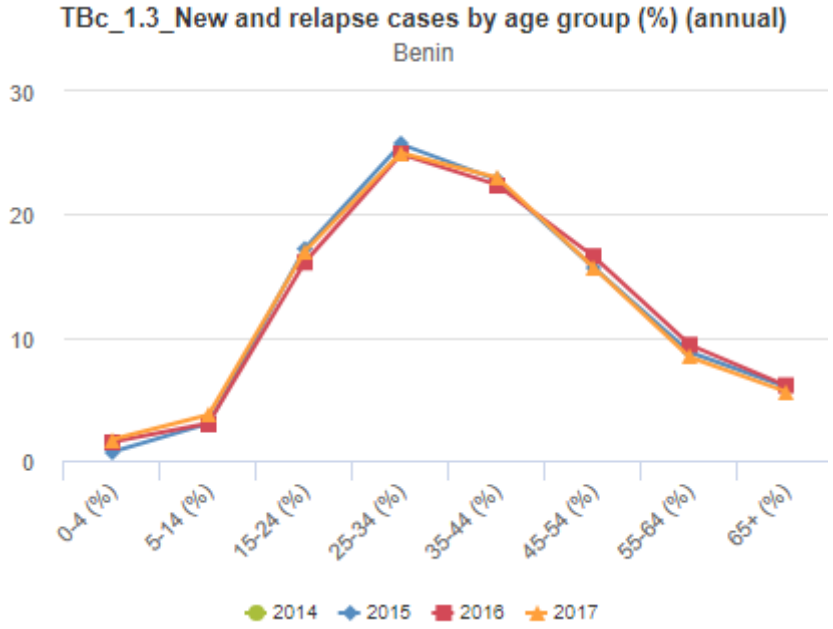
Answer:

4. Now go back to the **TB1. Notifications (numbers)** dashboard to examine new and relapse TB notifications by age group and sex in graph *TBc_1.2_New and relapse cases by age group and sex*. Describe any differences you see by age group between men and women.



Answer:

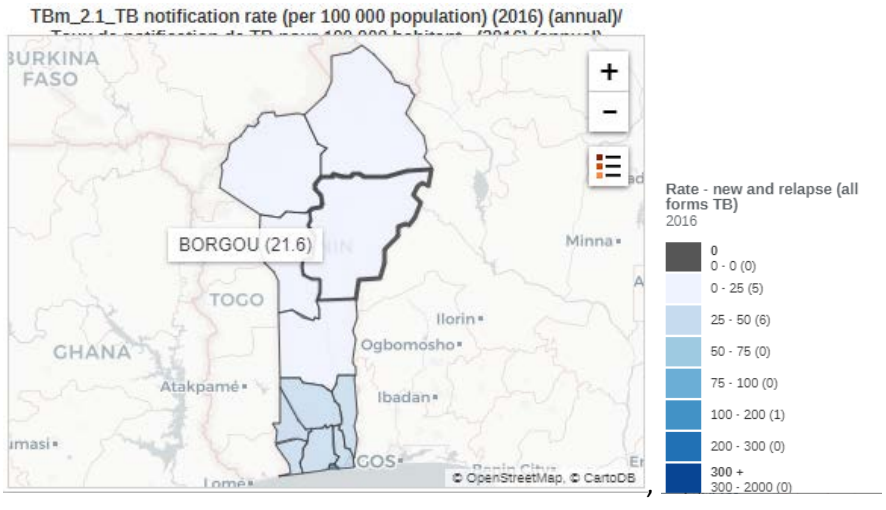
5. Examine graph *TBc_1.3_New and relapse cases by age group*. Does the distribution of TB differ by age group over time?



Answer:

Sub-national level analysis

1. View the rates at sub-national level on the *TBm_2.1_TB notification rate (per 100 000 population)* map available on the **TB2. Notifications (rates)** dashboard. Which regions have the highest rates, which have the lowest and why do you think this is?



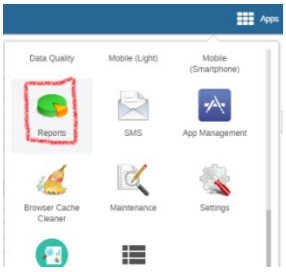
Note: You can see the range of rates if you hover the mouse over the legend. You can also see the exact rates by region in the table *TBt_2.1_TB notification rate per 100 000 population*.

Answer:

To examine trends at the sub-national level you should use the Report app in DHIS2 (*general* instructions below)

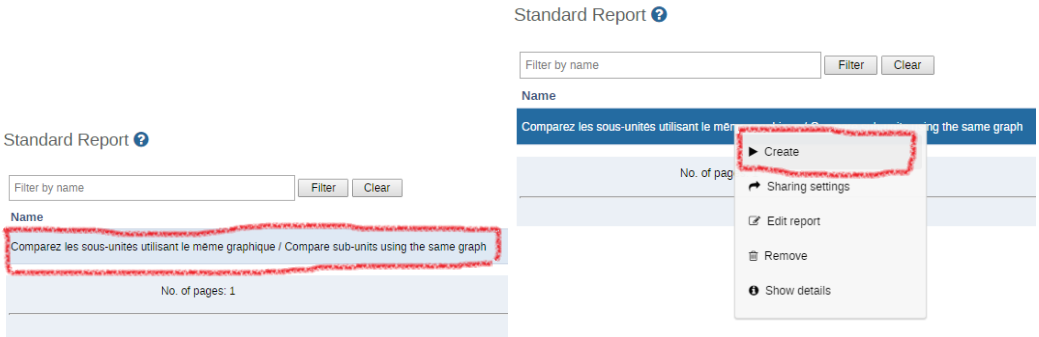
DHIS2 - Getting your charts from the reporting function- General instructions

1. In DHIS2 Apps select **Reports**

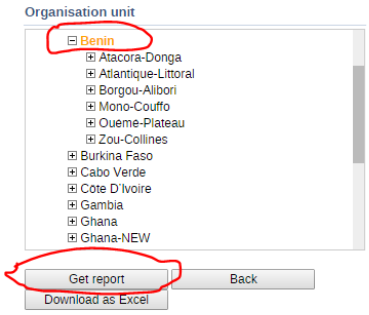


2. Select **Standard Report**

3. Click on **Compare sub-units using the same graph** and select "**Create**"



4. Choose in **Organisation unit** your country/region and click on "**Get report**"

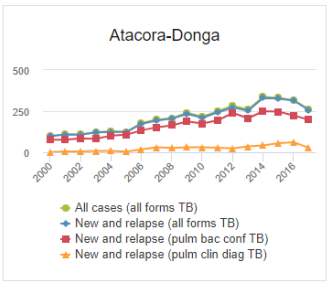


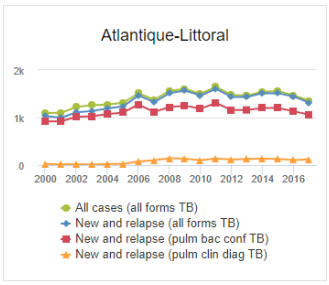
5. Choose from charts: e.g **TBc_1.1_Case notifications, all forms of TB**, select 4 graphs per row and click on "**Generate**"*

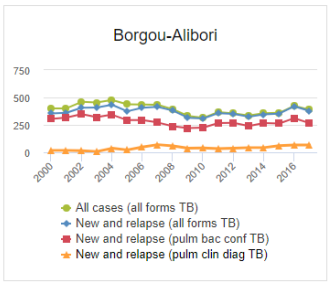
* use "Snipping tool" or other tool to copy graphs to your document and **repeat step 5 for next chart**

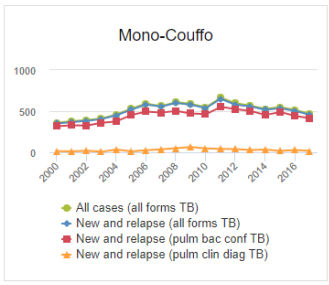
Sub-national level analysis continued

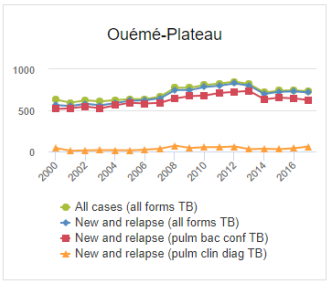
2a. Examine TB case notifications by year for regions or districts you have been assigned to. From the drop down choose *TBc_1.1_ TB notifications.*

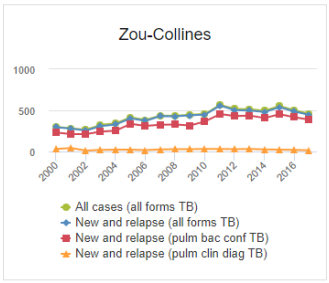




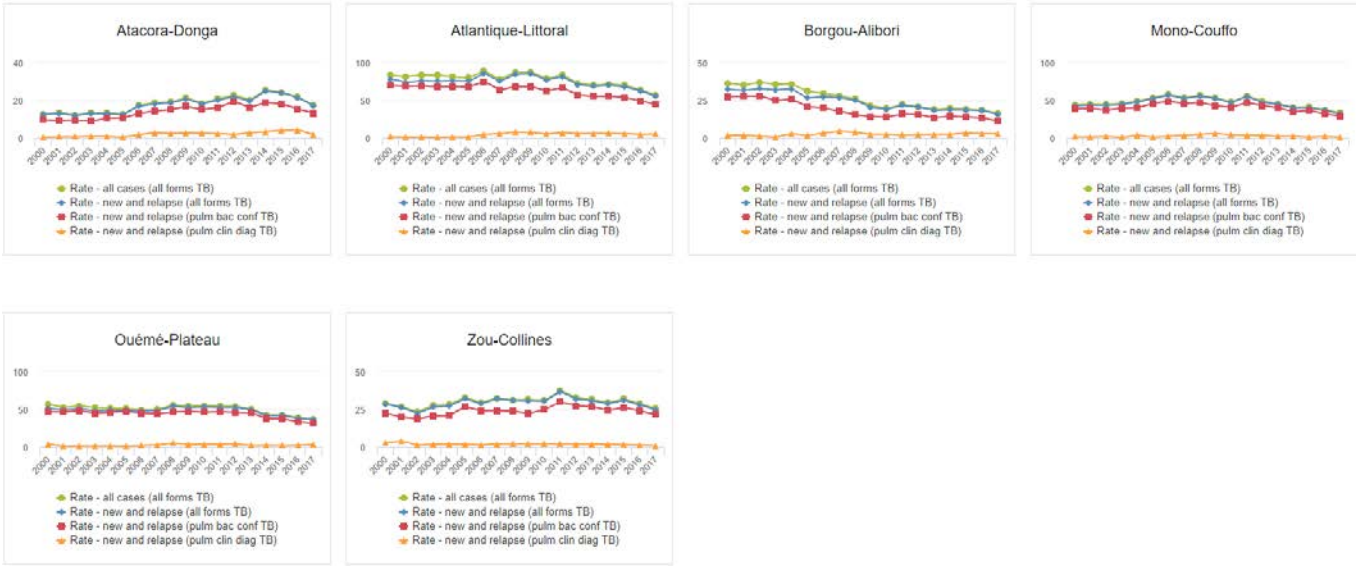








2b. Examine TB case notification rates by year for regions or districts you have been assigned to. From the drop down choose *TBc_2.1_TB notification rates (per 100 000 population).*



- Are there any differences in trends in TB case notifications or rates at the sub-national level?
- Are there any unusual trends, for example a large peak at a specific time point, and if so, why do you think this is?

Answer:

3. Examine TB notifications by age group and sex for regions or districts you have been assigned to. Choose *TBc_1.2_New and relapse cases by age group and sex* from the drop down. Are there differences in the distribution of TB cases at the sub-national level?

Answer:

Exercise 2- Analysis of indicators to assess internal consistency of TB data

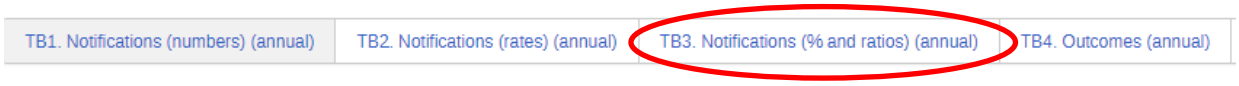
OBJECTIVE

Assess whether the data are internally consistent by examining the following indicators over time; % of new TB cases that are extra-pulmonary, % previously treated TB cases, % of children among new and relapse TB cases, % of bacteriologically confirmed by new and previously treated; ratio of 0-4:5-14 year olds and ratio male:female. Examine these indicators at the sub-national level to identify geographical variation. Generate hypotheses to explain any inconsistent data or geographical variation.

Data from Benin are used *as an example* to help you work through the exercises.

National level analysis

Using the **TB3. Notifications (%and ratios)** dashboard examine the trends showed in the table *TBt_3.1_ Internal consistency for notified TB cases*.



TBt_3.1_TB notifications (% and ratios) (red=outside of expected range) (annual)

Period	Organisation unit / Data	New extrapulmonary TB (%)	Previously treated incl. relapse (all forms TB)(%)	Ratio male:female (new and relapse, all forms TB)	0-14 year olds (new and relapse, all forms TB) (%)	Ratio 0-4:5-14 (new and relapse, all forms TB)	Bacteriologically confirmed TB (new, pulm) (%)	Bact. confirmed TB (prev. treated incl. rel) (%)
2010	Benin	10.1	5.3	1.8	1.6		90.9	100
2011	Benin	9.8	6.1	1.8	1.9		91	100
2012	Benin	8.3	6.9	1.9	2		91.2	100
2013	Benin	7.9	6.1	1.9	1.5		91.4	100
2014	Benin	9.6	5.7	1.8	1.9		90.8	100
2015	Benin	9.5	5.7	1.8	3.7	0.23	91	98.7
2016	Benin	10.8	5.7	1.8	4.5	0.5	90.4	100
2017	Benin	9.1	7.1	1.9	5.4	0.45	90.1	100

1. Describe the trends in the following indicators over time and decide whether they are consistent or not; % new extra-pulmonary, % previously treated, % children (0-14 year olds), % of bacteriologically confirmed, ratio of 0-4:5-14 year olds and ratio of male: female.

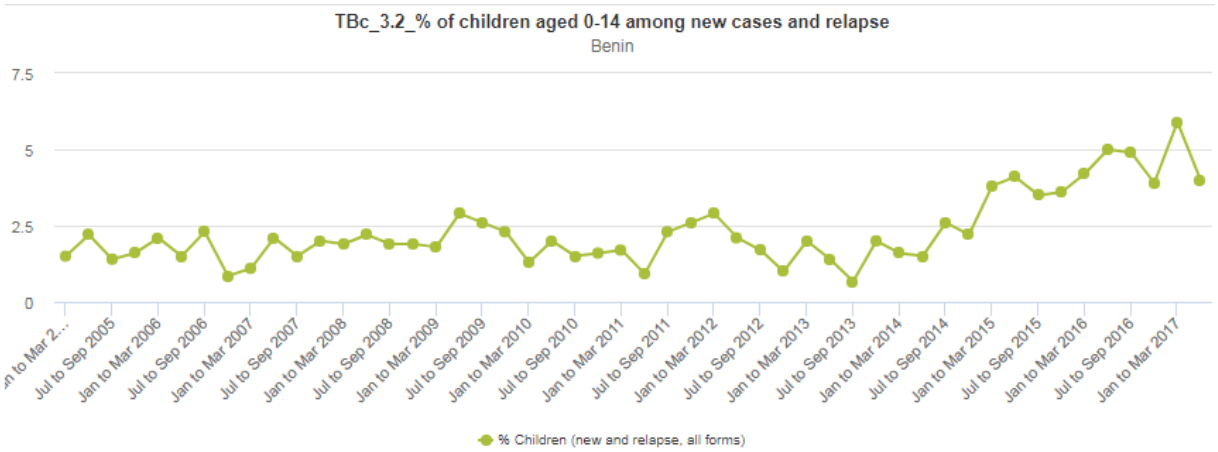
Answer:

2. If some indicators are not consistent over time can you think of reasons to explain this?

Note: Remember, inconsistencies can be due to artefact such as missing reports or may be for real reasons, for example, the implementation of an intervention by the National TB Programme, such as active case finding.

Answer:

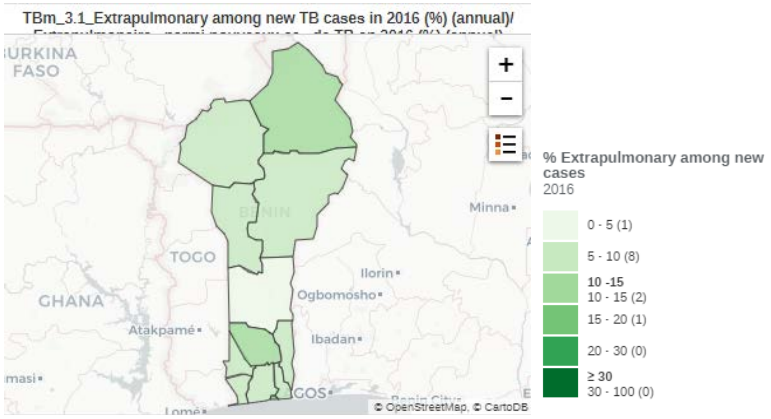
3. Examine some of the indicators by quarter shown on the graphs *TBc_3.1-3.6,* like the one below, using the explore function to change the time period from annual to quarter. Are there fluctuations by quarter that could not be seen when the data were examined by year or does the quarterly data help to explain the annual trends?



Answer:

Sub-national level analysis

1. Examine the maps for each of the indicators, like the one shown below. Do the indicators differ by region? If so, can you think of any reasons for this?



Answer:

To examine internal consistency indicators at the sub-national level you should use the Report function in DHIS2 apps (see Exercise 1 for general instructions) and carry out the analysis for the geographical level you have been assigned to (national, region or district).

2. Examine the % of new extra-pulmonary cases by selecting *TBc_3.1_Extrapulmonary among new cases (%)* from the drop down list. Is the percentage consistent over time at the sub-national level and are there any differences in trends?

Answer:

2. Examine the % of retreatment cases by selecting *TBc_3.2_Previously treated among all TB cases (%)* from the drop down list. Is the percentage consistent over time at the sub-national level and are there any differences in trends?

Answer:

3. Examine the ration of male:female by selecting the *TBc_3.3_Ratio of male: female in new and relapse TB cases* from the drop down list. Is the ratio consistent over time at the sub-national level and are there any differences in trends?

Answer:

4. Examine % of TB cases that are 0-14 years old by selecting *TBc_3.4_0-14 year olds among new cases and relapse TB cases (%)* from the drop down list. Is the percentage consistent over time at the sub-national level and are there any differences in trends?

Answer:

5. Examine the ratio of 0-4:5-14 year olds by selecting *TBc_3.5_Ratio of TB cases aged 0-4: 5-14 year olds in new and relapse* from the drop down list. Is the ratio consistent over time at the sub-national level and are there any differences in trends?

Answer:

6. Examine the % of bacteriologically confirmed cases by selecting *TBc_3.6_Bacteriologically confirmed pulmonary TB cases (%)* from the drop down list. Is the ratio consistent over time at the sub-national level and are there any differences in trends?

Answer:

Exercise 3- Analysis of TB Outcomes

OBJECTIVE

Examine trends in TB outcomes at the national and sub-national level using the TB dashboard. For each analysis describe the trends in a few sentences and use your knowledge of the country to interpret them or generate hypothesis which may explain them.

Data from Benin are used as an example to help you work through the exercises.

National level analysis

Using the **TB4. Outcomes** dashboard examine treatment outcomes by year.

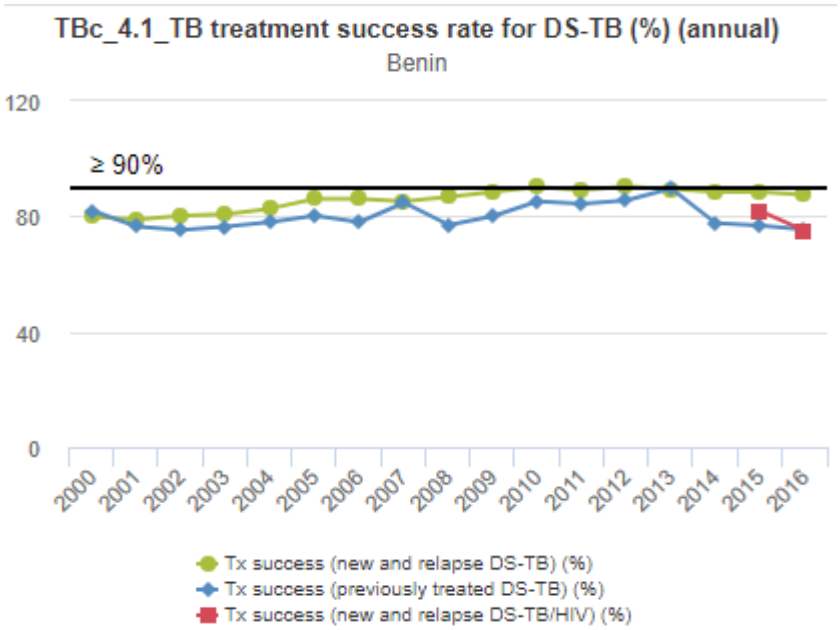
1. Examine the trends in treatment success over time for new and relapse and previously treated cases using table *TBt_4.1_ TB treatment success for new and relapse DS-TB cases* and graph *TBc_4.1_TB treatment success rate for DS-TB (%)*. Have there been any improvements in treatment outcomes over time? Does treatment success reach the international target of 90%? Are there any differences in treatment success rate between new and relapse and previously treated cases?

TBt_4.1_TB treatment success for new and relapse DS-TB (%) (annual)

Tx success (new and relapse DS-TB) (%)																	
Organisation unit / Period	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016
Benin / Atacora-Donga	61.8	63.5	51.8	68.3	69.6	78.9	83.8	81.5	89.9	86.7	87.9	91.2	90.9	91.4	88.8	91.7	90.
Benin / Atlantique-Littoral	81.7	81.4	83.6	81.8	84.8	86.6	84.6	82.4	83.2	85.2	88.3	84.3	87.4	87.8	86.3	87	87.
Benin / Borgou-Alibori	65.4	65.4	66.8	66.3	71.2	76.1	77	77.2	81.2	86	83.9	87.2	89.4	87.3	87.8	85.9	82.
Benin / Mono-Couffo	85.8	81.2	83.3	86.8	85.9	84.5	87.5	89.8	89.7	90.7	92.3	93.5	90.1	89.4	87.3	88.8	83.
Benin / Ouémé-Plateau	84.4	82	85.1	84	85.8	91.8	91.4	91.4	91.8	92.6	93.9	94.5	94.4	93	92.8	89.1	88.
Benin / Zou-Collines	80.9	83.3	81.9	82.7	83.3	88.2	89.5	87.9	89.7	93.1	92.7	90.3	92.2	88.3	90.8	90.2	90.
Global TB / WARN-TB / Benin	79.9	78.9	80.3	80.7	82.7	86.1	86.1	85.2	86.8	88.5	90.2	89.2	90.3	89.4	88.5	88.4	87.

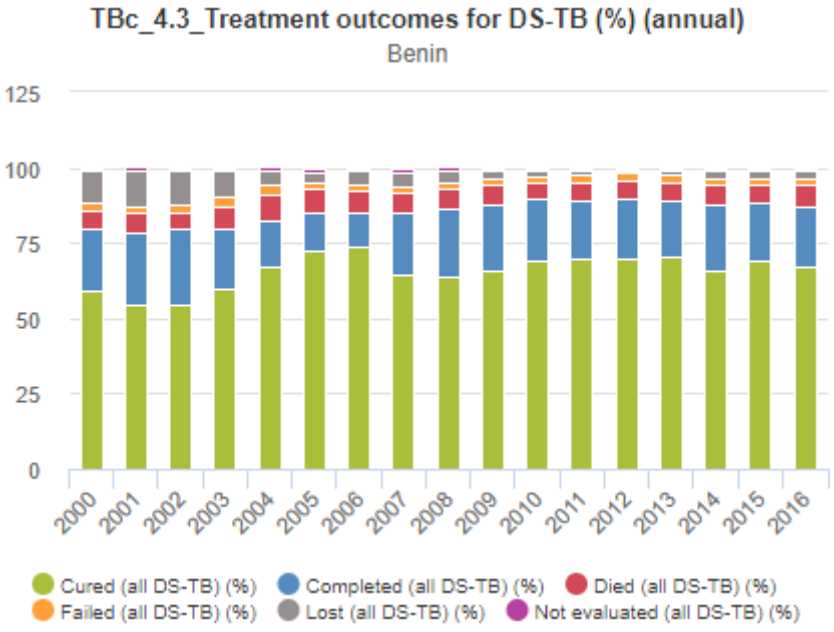
Answer:

2. On the same graph treatment success for TB/HIV co-infected cases is shown. Is the treatment success rate better or worse than the overall treatment success rate?



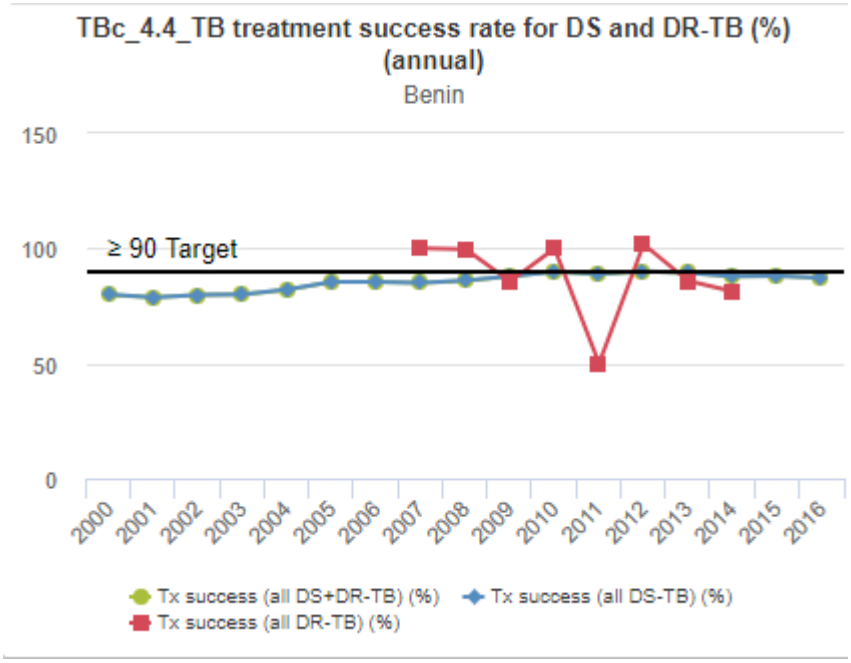
Answer:

3. Remain on the **TB4. Outcomes** dashboard to examine and describe the trends in TB treatment outcomes by year using the graph *TBc_4.3_Treatment outcomes for DS-TB (%)*. What are the main reasons for not successfully completing treatment? Have there been any improvements in poor treatment outcomes over time and if so, which ones?



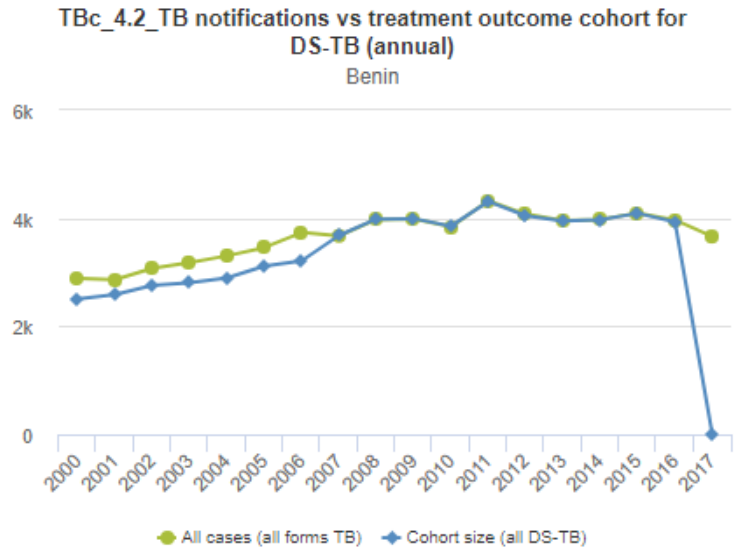
Answer:

4. Examine the graph *TBc_4.4_TB treatment success rate for DS and DR-TB (%)*. Is the treatment success for DR-TB cases lower or higher than for DS TB cases? Do the results surprise you, and if so, why?



Answer:

5. Use graph *TBc_4.2_TB notifications vs treatment outcome cohort for DS-TB* to look at the internal consistency of the treatment outcome data. Comment about missing data and completeness. Do you think the data is reliable? What corrective action can you take to resolve any inconsistent data?



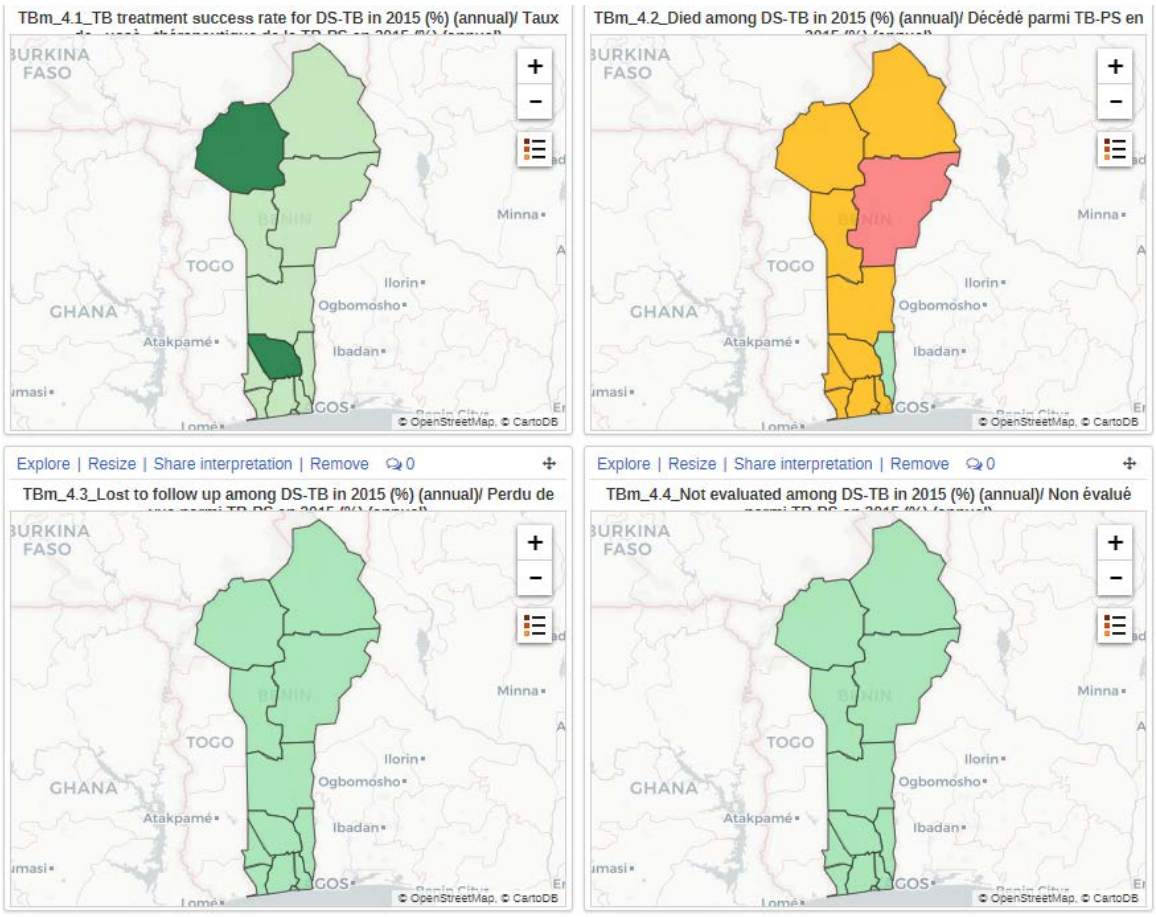
Answer:

Sub-national analysis

1. Examine the maps *TBm_4.1-4.4* for % treatment success, died, lost to follow up and not evaluated by region. Which regions have the highest and lowest treatment success rates?

Answer:

2. Can you see any correlations between treatment success and died, lost to follow up or not evaluated cases in your region?



Answer:

To examine treatment outcomes at the sub-national level you should use the Report function in DHIS2 apps (see Exercise 1 for general instructions) and carry out the analysis for the geographical level you have been assigned.

3. Select graph *TBc_4.1_TB treatment success rate for DS-TB (%)* from the drop down list and describe any differences in trends over time at the sub-national level.

Answer:

4. Select graph *TBc_4.2_ TB notifications vs treatment outcome cohort for DS-TB* from the drop down list to assess whether treatment outcome data is internally consistent. Do you think you can trust the data or is data inconsistent at the sub-national level?

Answer:

Exercise 4- Analysis of RR-/MDR-TB indicators

OBJECTIVE

Examine trends in RR-/MDR-TB indicators at the national level using the TB dashboard. For each analysis describe the trends in a few sentences and use your knowledge of the country to interpret them or generate hypothesis which may explain them.

Data from Country X are used as an example to help you work through the exercises.

National level

On the **TB5. DR-TB** dashboard examine the table and graphs shown below and describe the trends for RR/MDR-TB indicators over time.

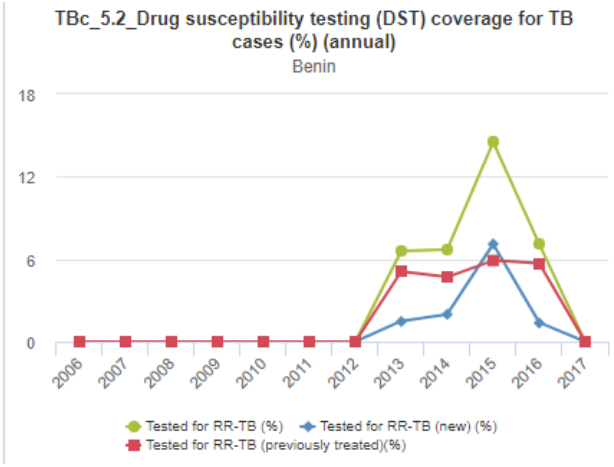
TB5. DR-TB (annual) | TB6. TB/HIV (annual) | TB7. Resources

1. Table *TBt_5.1_Drug resistance TB*

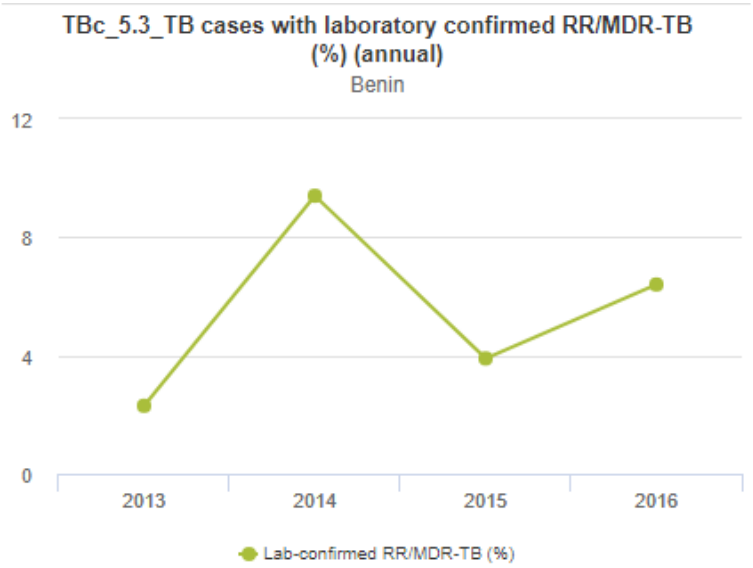
TBt_5.1_Drug resistance TB (annual)

Organisation unit	Data / Period	2012	2013	2014	2015	2016
Benin	Tested for RR-TB (new)	0	59	81	292	54
	Tested for RR-TB (previously treated)	0	203	185	243	226
	Tested for RR-TB (history unknown)	0	0	0	59	0
	Tested for RR-TB	0	262	266	594	280
	Lab-confirmed RR/MDR-TB	0	6	25	23	18
	Lab-confirmed MDR-TB	24.9	7	8	17	18
	Lab-confirmed RR/MDR-TB started MDR treatment	8	6	16	19	18
	Unconfirmed RR/MDR-TB started MDR-TB treatment	0	0	0	0	0

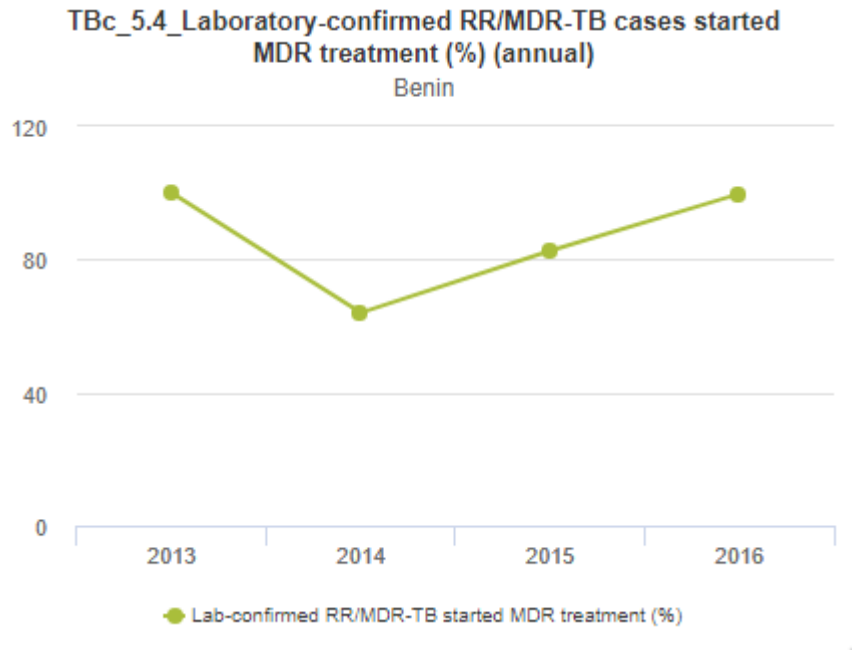
2. Graph *TBc_5.2_Drug susceptibility testing (DST) coverage tor TB cases (%)*



3. Graph *TBc_5.3_TB cases with laboratory confirmed RR/MDR-TB (%)*



4. Graph *TBc_5.4_ Laboratory-confirmed RR/MDR-TB cases started on MDR treatment (%)*



5. Consider the example from Country X shown in the TB curriculum. Try to interpret the data for your own country in a similar way.

Answer:

Exercise 5 - Analysis of TB-HIV indicators

OBJECTIVE

Examine trends in TB/HIV indicators at the national and sub-national level using the TB dashboard. For each analysis describe the trends in a few sentences and use your knowledge of the country to interpret them or generate hypothesis which may explain them.

Data from Benin are used as an example to help you work through the exercises.

National level

On the **TB6. TB/HIV** dashboard examine the trends for the TB/HIV indicators in the following graphs and tables, describe the trends over time and comment on whether you think that the country is doing well at a) testing for HIV in TB cases and b) treating the TB/HIV co-infected patients?

1. TB/HIV cascade of care in the table *TBt_6.1_TB/HIV*

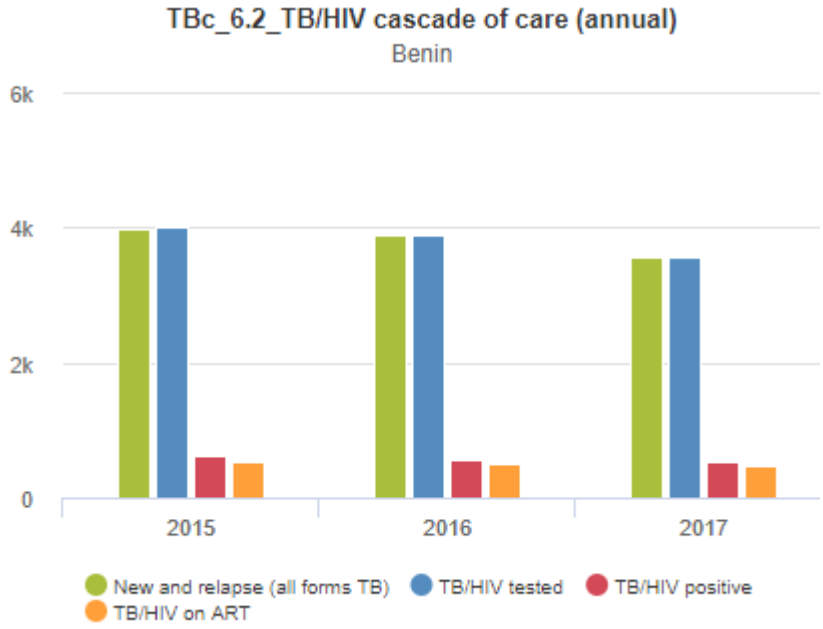
TBt_6.1_TB/HIV (annual)

Organisation unit	Data / Period	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017
Benin	All cases (all forms TB)	3 734	3 673	3 977	3 987	3 841	4 320	4 075	3 957	3 977	4 092	3 968	3 662
	New and relapse (all forms TB)	3 619	3 565	3 872	3 878	3 756	4 212	3 966	3 866	3 886	3 991	3 896	3 567
	TB/HIV tested	3 318	3 396	3 802	3 845	3 779	4 259	4 006	3 730	3 828	4 017	3 879	3 568
	TB/HIV positive	494	501	653	633	592	727	640	594	598	613	572	544
	TB/HIV on ART	48	161	261	276	340	537	553	530	549	531	504	486
	TB/HIV on CPT	337	451	635	622	572	709	628	579	592	591	557	521

Answer:

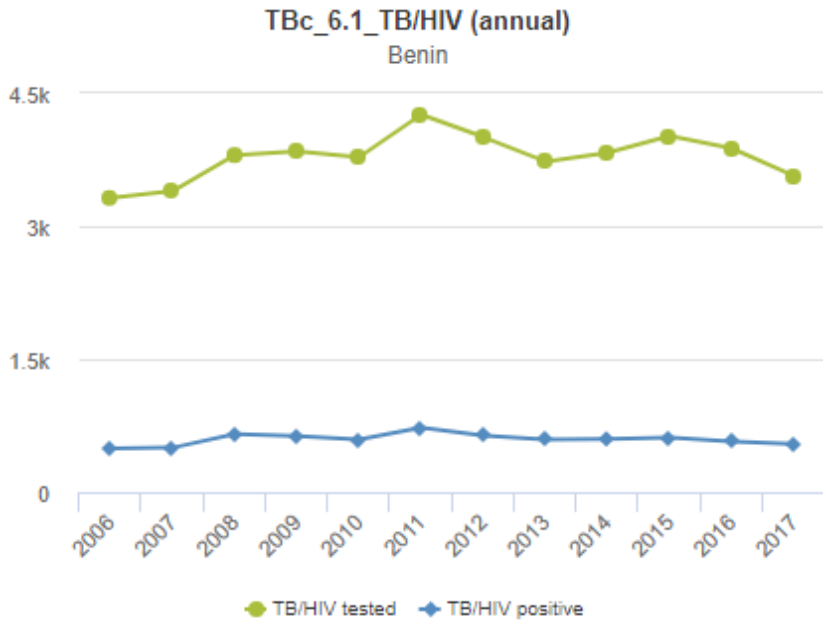
2. TB/HIV cascade of care in the graph *TBc_6.2_TB/HIV cascade of care*.

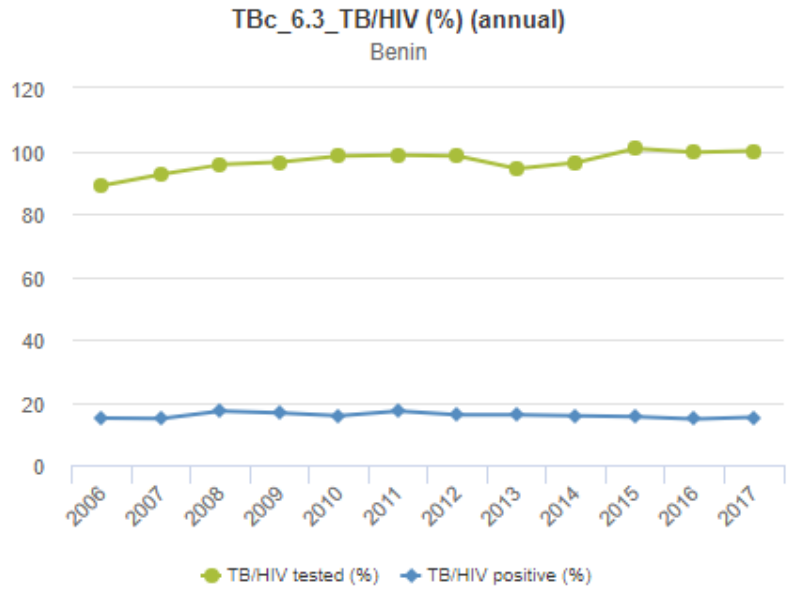
3.



Answer:

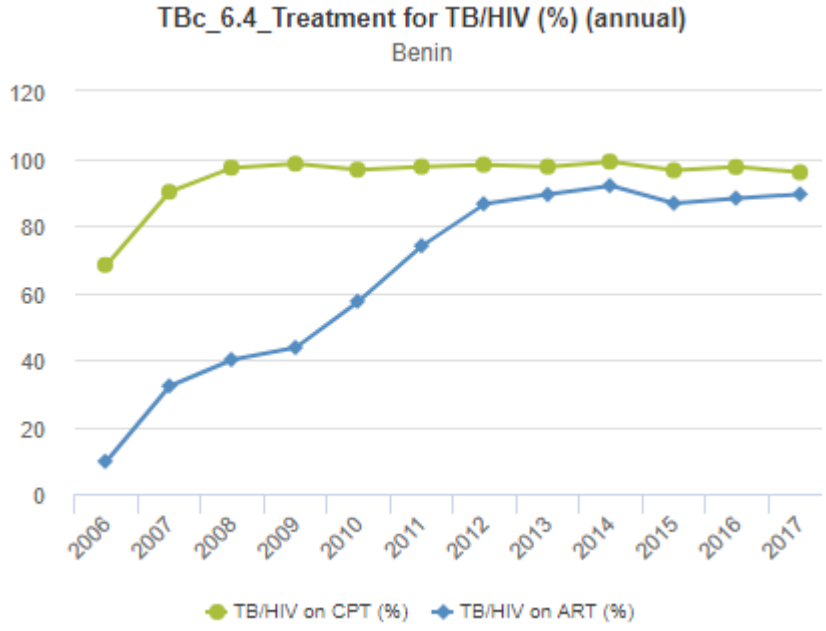
4. Number and % of TB patients tested for HIV and % TB-HIV co-infected in the graphs *TBc_6.1_TB/HIV* and *TBc_6.3_TB/HIV (%)*.





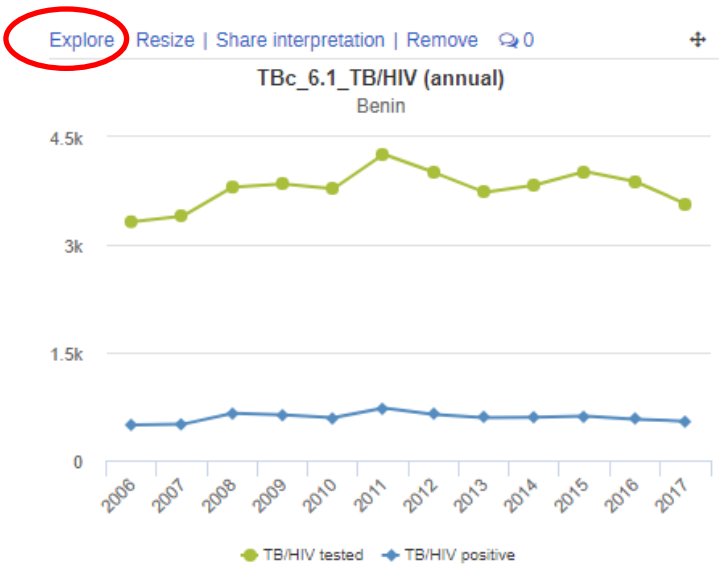
Answer:

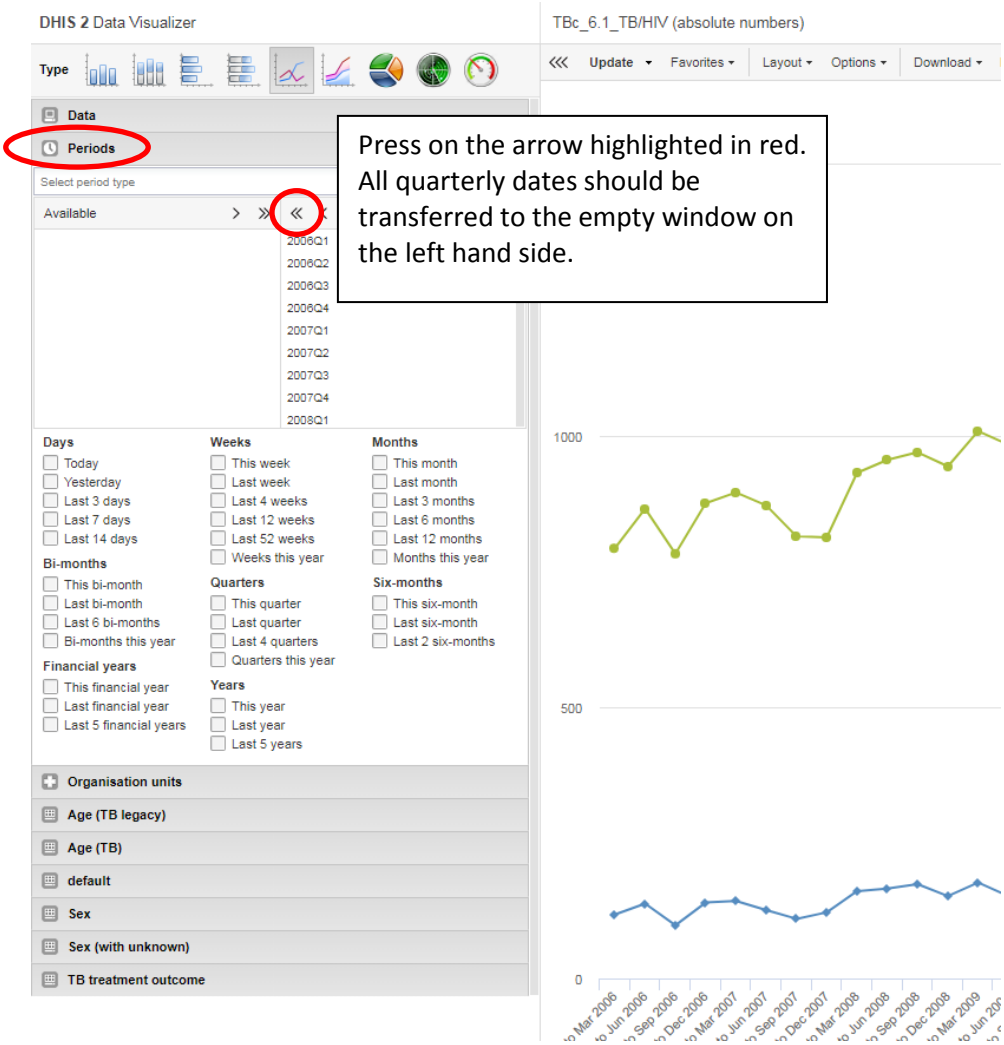
5. % on CPT and % on ART on the graph *TBc_6.4_Treatment for TB/HIV (%)*

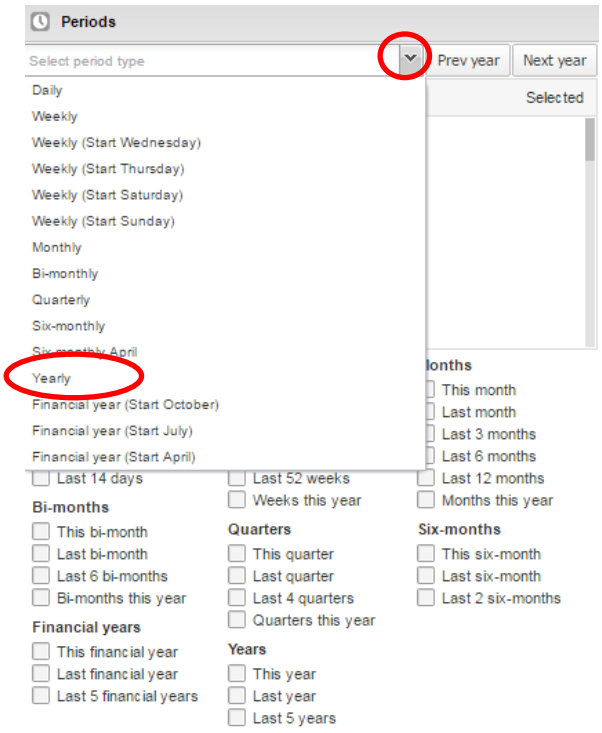


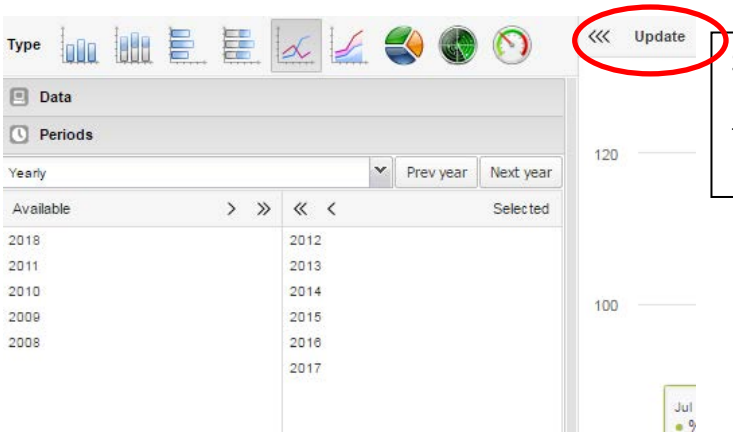
Answer:

6. Use the explore function to open each of the graphs (TBc_6.1, 6.3 and 6.4) in the Data Visualizer app and change the time period from quarterly to annual. **General instructions are given below.**









Select the years you would like to look at by double clicking on them in the correct order and press Update highlighted in red

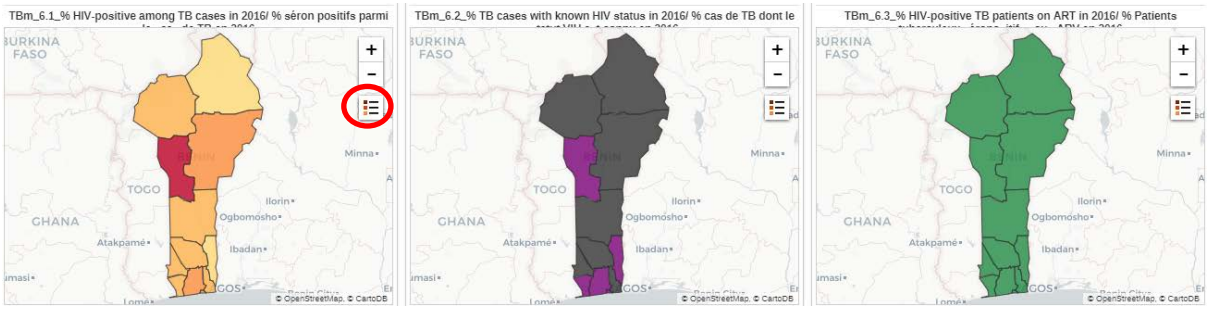
- Describe the trends based on annual data? What are your key observations?

Answer:

Sub-national level analysis

To view a snapshot in time of sub-national level data for the key indicators you can view the maps *TBm_6.1, 6.2 and 6.3* available on the **TB6. TB/HIV** dashboard.

1. Are there any differences by region in the three indicators; % TB cases with known HIV status, % HIV positive TB patients and % HIV positive patients placed on ART? Look at the three maps side by side. Do you see any correlations between the indicators?



Note: Remember to hover the mouse over the legends to see the scales

Answer:

To examine TB/HIV indicators at the sub-national level you should use the Report function in DHIS2 apps (see Exercise 1 for general instructions) and carry out the analysis for the geographical level you have been assigned.

2. Select graph *TBc_6.3_TB/HIV (%)* from the drop down list and describe any differences in trends over time at the sub-national level.

Answer:

3. Select graph *TBc_6.4_Treatment for TB/HIV* (*%)* from the drop down list and describe any differences in trends over time at the sub-national level.

Answer:

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