

Final Project of Data Visualization – Disparities in Education Among Different Demographics in Israel in 2021

Students

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Introduction

Links to visualizations:

High School Story

https://public.tableau.com/app/profile/lanna.labai/viz/Project_16907479067860/HighSchoolStory?publish=yes

University Story

https://public.tableau.com/app/profile/lanna.labai/viz/Project_16907479067860/UniversityStory?publish=yes

Relationship between University Students, Israeli-Degree Holders, and High School Students in Israel

https://public.tableau.com/app/profile/lanna.labai/viz/Project_16907479067860/RelationshipbetweenUniversityStudentsIsraeli-DegreeHoldersandHighSchoolStudentsinIsrael?publish=yes

The topic we chose for our final project is the disparities in education among the different demographics in Israel in 2021. Specifically, we wanted to understand how much impact (if at all) factors like where a person lives (what district), what kind of a locality they live in, the municipal status of the locality they live in, and ethnic majority of the locality have on the academic success of the students living in those localities.

In our analysis of the data, we will check if there are any disparities between people from Arab-majority localities and those from Jewish-majority localities, between people from different districts, between people from different locality types, and people from localities with different municipal statuses. We will do this by focusing specifically on the eligibility rates for a full Bagrut and university entry of the localities, the percentage of current students per locality, and the percentage of people already holding degrees.

The reason that this topic is important to research is because we need to make sure that the bias in the education that the next generations are receiving is as minimized as possible.

Education opens opportunities to prosperity and allows people to get out of difficult socio-economic situations (or to stay out of them). We need to make sure that this opportunity is provided to all citizens equally so that no one is denied these things, and where there are disparities, we need to try to minimize them as best as we can.

Potential users of these visualizations could be the Ministry of Education, the local councils, and the municipalities of these localities, who can take the findings into account in order to better understand how they can improve the education levels and where more investment in education is needed. Additionally, these visualizations can bring more awareness to the broader public about the state of education in their localities, so that they can then demand for more investment in their education or find ways to also encourage their communities to strive to do better academically.

The Data

We chose our dataset from the Central Bureau of Statistics (link:

<https://www.cbs.gov.il/EN/settlements/Pages/default.aspx?mode=Machoz>), specifically the

Education by Locality dataset which included data related to education per locality.

We joined this dataset with another one (from the same link) that provided general information about each locality (e.g., total population, the district it belongs to, etc.). We did this so that we could examine any possible relationships between the general data about the localities and the academic success rates in these localities. In the education dataset, there were 201 rows (one per locality), and in the general information dataset there were 1284 rows (also one per locality). After joining the datasets, we ended up with 201 rows, matching the localities listed in the education dataset. We also applied several data pre-processing techniques (that will be explained later) in order to prepare the data for analysis.

In the original education dataset, we had the following columns (features per locality):

- Locality code – the code of the locality
- Locality name – the name of the locality
- Total No. of children in public preschools in 2021
- No. of children aged 3 in public preschools in 2021
- No. of children aged 4 in public preschools in 2021
- No. of children aged 5 in public preschools in 2021
- No. of children aged 6 in public preschools in 2021
- Total No. schools
- Total No. classes
- Total No. students
- Total No. Elementary schools
- Total No. Elementary school students
- Total No. Elementary school classes
- Total No. Middle schools
- Total No. Middle school students
- Total No. Middle school classes
- Total No. High schools
- Total No. High school students
- Total No. High school classes
- Total No. school age students – how many students are school-age
- Total percentage of dropouts – total percentage of students that have dropped out of high school
- Percentage of male dropouts – total percentage of male students that have dropped out of high school
- Percentage of female dropouts – total percentage of female students that have dropped out of high school
- Total percentage of people that are students – total percentage of people that are university students
- Total population – total number of people living in that locality

- Average no. of students in elementary school classes
- Average students per teacher – average no. of students per teacher in all schools
- Average no. of weekly work hours spent per student – the amount of hours teachers spend on average per student
- Average seniority of education workers – the average amount of years the education workers have spent working in the education system
- Average work hours per education worker – average number of hours the education workers work in a week
- Percentage of people entering university within 8 years of finishing high school
- Percentage of education workers doing courses
- Percentage of education workers with a Master's degree
- Percentage of new education workers
- Percentage of No. Hours of Absence out of Total Working Hours
- Percentage of People Ages 20-25 that are Students
- Percentage of People Ages 35-55 Possessing Israeli Higher Education Degrees
- Percentage of Senior Year Students Eligible for Bagrut
- Percentage of Senior Year Students Eligible for University Entrance
- Thereof: Arabs – total Arab population in locality
- Thereof: Jews - total Jewish population in locality
- Thereof: Jews and Others - total Jewish and Others population in locality

In the original general information dataset, we had the following columns (features per locality):

- District – the name of the district that the locality belongs to
- Locality Code – the code of the locality
- Locality name – the name of the locality
- Municipal status – municipal status of the locality (e.g., local council, municipality)
- Type of locality – is it Arab/Jewish and the range of the total population of the locality
- Sub-district
- Natural region – which natural region the locality lies in
- Local authorities cluster

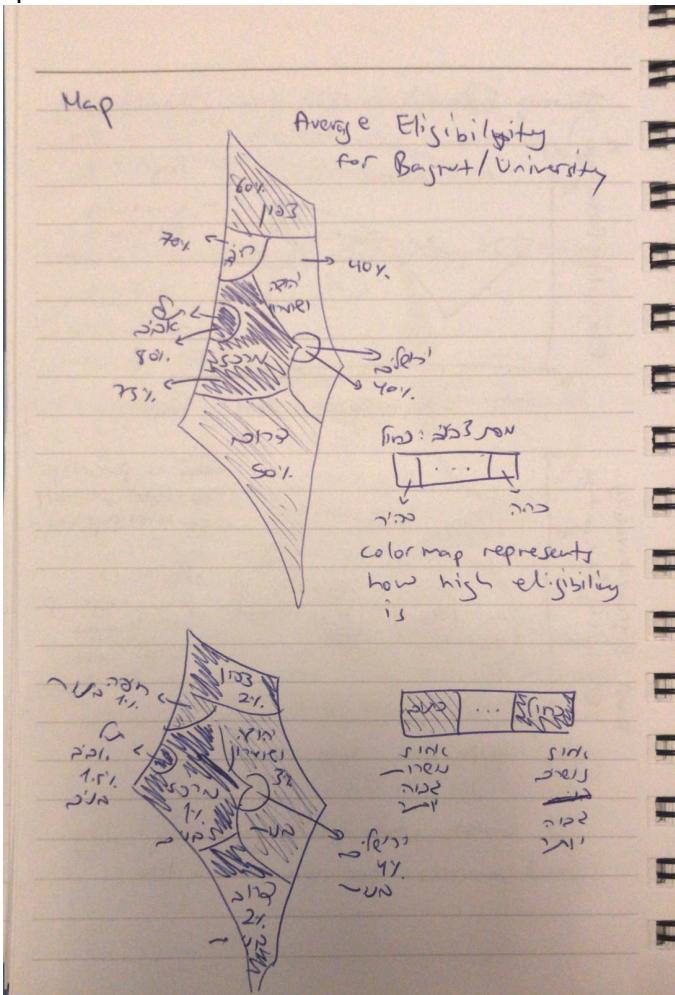
Since there are so many columns in the joint dataset, we filtered a lot of them out or didn't take them into account in our analysis, as we felt it might distract from our initial goal.

Ideas and Plans

Map Visualization

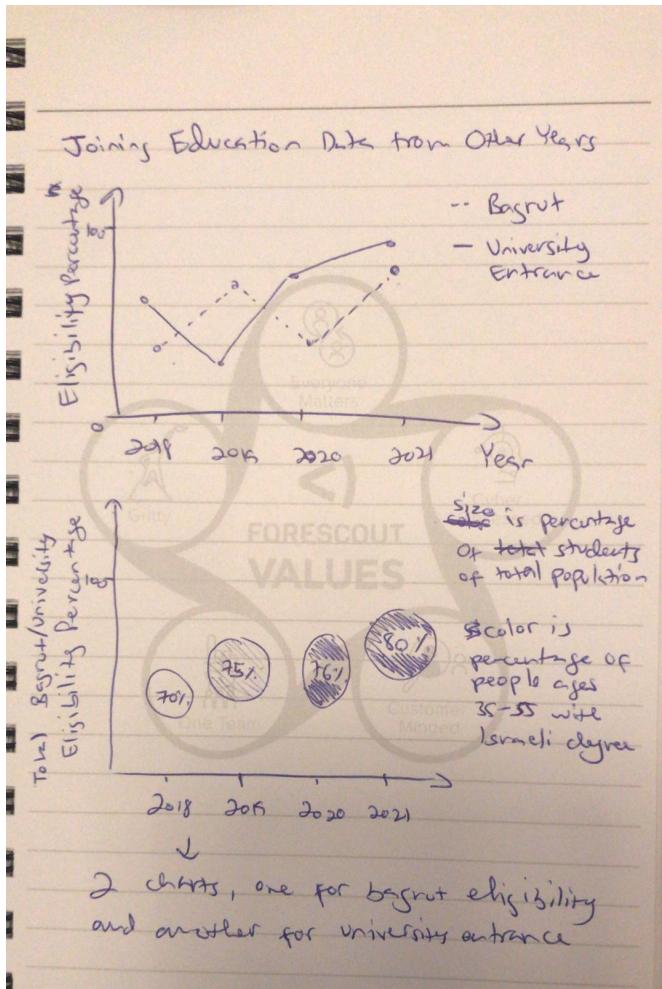
Since our data is geographical (districts, localities), we wanted to initially create a map visualization as we thought that we could show a lot of interesting things in a way that would also be most easily understood. We could have used colors to show the academic success rates for each district while also showing the average of another variable (such as the total population of each district) to maybe show possible patterns in the data or relationships between the variables. We could have also used it to present the basic data about each district

more concisely, instead of having to create several visualizations for them. We also thought of showing the individual localities on the map and coloring them based on several variables such as Arab/Jewish majority and municipal status, this is to highlight a disparity (or lack thereof) in the academic success rates. In the end, we were not able to do this because we didn't have the specific coordinates and data needed in order to build such a map (e.g., longitude and latitude).



Joining education data from other years

We thought about also including data from other years in order to also be able to add the time aspect to our data. Then, we might have been able to better support certain conclusions, as we could also point to previous years and explain that it is clearly a trend. In addition, we could have had better perspective on our data, because the data of the year we chose could have been impacted by the Coronavirus pandemic that was taking place then, and so our conclusions might not be relevant in general. Data from other years could have strengthened or disproven our findings for 2021. For example, we could have compared the academic success rates of each district over the years in a line chart to show if the disparities we found had been there since before the pandemic or not. However, we felt that this would have changed the purpose of the project and it also was quite problematic as the features across the years weren't entirely consistent, thus it would have been very hard to process.

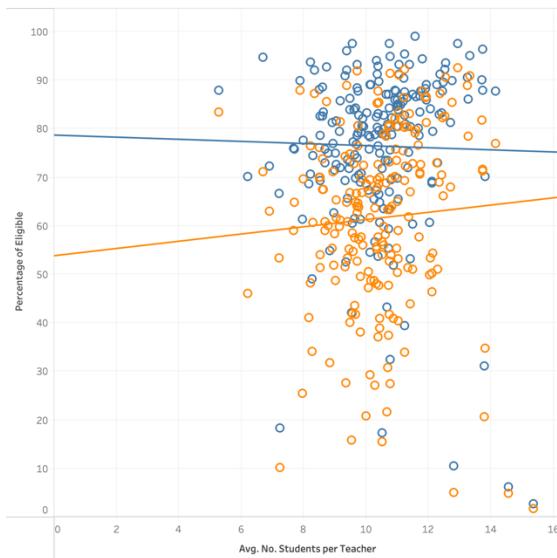


Education workers

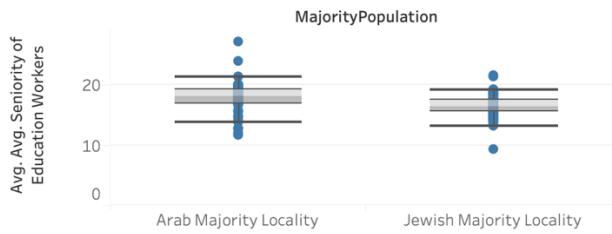
We had several features describing data about the education workers that initially wanted to include in our project, as we thought that that might be another aspect that we have to consider when talking about disparities between the different demographics. We tried to find any relationships between features like the average number of students per education worker in a locality and the academic success rate, for instance, but didn't find any interesting findings, so we decided to leave those features out. We thought that they weren't "good" enough to really contribute to our project. We also thought that it would be best to focus on one aspect of the data (demographic data), so that we don't end up mixing too many variables and ultimately being unable to take away anything meaningful from the visualizations.

Examples of some ideas we had for the education workers:

Relationship Between Avg. No. of Students per Education Workers and Eligibility for Bagrut and University



Seniority by Locality



Our Solution

The solution we ultimately ended up choosing focused more on the different demographics. We examined these differences and tried to see how the academic success rates changed in accordance with them. We decided focus on the data related to university education and high school level education, as we didn't have much interesting data on the preschool, elementary and middle school level education.

With regards to the university education data, we looked at the number of students there were (of 20-25 year old's and of the total population), we compared between students from different demographics, and examined the relationships between the current students and people ages 35-55 who already possess a degree.

With regards to the high school level education data, we looked into the general information of the districts and the localities, we examined the high school dropout rates, then the overall high school stats per district, and finally looked into the eligibility rates for the different variables.

The reason we chose the demographic aspect of the data is because we believe it is the most foundational one. If there are any significant disparities in the education levels based on demographic differences, there is clearly something that is not being done right and needs to be dealt with so that we can ensure the success of all people in that demographic, especially the future generations. Once we have identified these problems and dealt with them at the most

basic level, you can then move on to dealing with the more complex problems (e.g., how the education workers affect the disparities in education among these demographics).

In terms of advantages of our solution, we do believe that it highlights some key insights in understanding which demographics tend to have higher academic success. For example, we noticed that in general, high school students from smaller localities in population tend to have higher success in academics, but also that overall, the Central district has the highest academic success rates. We can conclude perhaps that the reason that there is higher success in smaller localities is because education might be a high priority in these communities, and we could also conclude that because there are more people overall living in the Central district, their schools are better funded and invested in, which gives the students living there a better chance of succeeding. Our solution also gives us a good foundation to later build on when exploring other variables in the complex education system.

In terms of disadvantages, we thought that data on the religious backgrounds being excluded was quite unfortunate, because religion impacts our ways of thinking arguably more than any other factor (such as ethnicity or type of locality). We noticed a lot of things in our findings that we couldn't attribute to any of the factors we had, but that we might have been able to attribute to religious backgrounds. For example, we noticed that the Jerusalem district had a significantly higher no. of dropouts and quite low academic success (relative to other regions), and intuitively, we know that region to be home to many religious communities who maybe don't prioritize our standard education and instead prioritize their religious education, which could explain that disparity. Additionally, we did not think that given the features of the dataset, we were able to get very solid conclusions and reasons as to why things are the way they are in our findings. We think that we need to have more data and maybe also compare to previous years to be able to do that. Finally, we do wonder if the specific year we chose to examine (which we thought would be most relevant as it is the most recent one) was wise because in 2021, we were halfway through a global pandemic, which could have influenced the academic success rates at the time. Perhaps we should have compared the data from that year to previous years.

Pre-processing of Our Data

We applied a lot of data pre-processing methods to the data in order to make it easier to analyze.

We started first by checking for null values in all the columns of both datasets, to see where there was data missing. We removed the rows where the locality code value was null, as we cannot merge the two datasets without it. We also dropped columns that we didn't think were relevant (such as those related to secondary school – which is just the sum of high school and middle school stats and those related to preschool, and in the general information dataset the subdistrict, natural region, and local authorities cluster – as they weren't relevant to our analysis).

We had to convert the numerical values of the columns to float or int types from strings because they couldn't be read straight away as int/float. We also had to translate ‘.’ to null and ‘-’ to 0, which is how we understood those values (they are sometimes represented that way).

We then also had to translate all the column names of the education dataset from Hebrew to English, because even though we downloaded the English version of the file, the column names had not been translated.

We then were able to merge the datasets together.

In order to deal with missing values, we imputed statistical measures of the columns instead of the missing values. We typically grouped the data by districts first and then calculated the average of the non-null values and imputed that average instead of the nulls. For the ‘Total percentage of dropouts’ column specifically, after imputing the ‘percentage of male dropouts’ and ‘percentage of female dropouts’, we calculated their average for each row and imputed that value into the ‘Total percentage of dropouts’ column.

The code for the pre-processing will be included as an ipynb and html file, as will the resulting merged dataset.

Lastly, pre-processing that we did in tableau included adding several calculated fields in order to help us explore the data in more complex ways:

- Majority population – tells us whether the locality is Arab or Jewish majority. We did this by using a conditional statement: if ‘Thereof: Arabs’ is larger than ‘Thereof: Jews and Others’ then the locality is labeled as Arab majority. Otherwise, if ‘Thereof: Jews’ is smaller than ‘Thereof: Others’ then the locality is labeled as Other majority, otherwise Jewish majority.
- Avg. No. of HS Students per HS – the average number of high school students per high school. We did this by dividing the total number of high school students per locality by the number of high schools per locality.
- Avg. No. of HS Students per HS Class – the average number of high school students per high school class. We did this by dividing the total number of high school students per locality by the number of high school classes per locality.
- Diversity Index – diversity index per locality/district. We did this by using a conditional statement as following: if the value of ‘Thereof: Jews and Others’ is larger than ‘Thereof: Arabs’, then we divide ‘Thereof: Arabs’ by ‘Thereof: Jews and Others’, else, we divide ‘Thereof: Jews and Others’ by ‘Thereof: Arabs’. This is in order to keep the ratio between 0 and 1, as we are not too interested in which population is the majority.
- Thereof: Others – this field we calculated by subtracting the ‘Thereof: Jews’ from ‘Thereof: Jews and Others’ per locality/district. However, we didn’t end up using it too much as there aren’t any localities where the majority is the “others”.
- HS Students out of Total Population – percentage of high school students out of the total population per locality. We did this by dividing the total number of high school students by the total population.
- Male-Female Dropout Disparity – this is the difference between the percentage of the male dropouts and the female dropouts.

The Visualizations

In this section, we will explain each of the visualizations that we made in the stories and dashboards we created. The stories are all made of several dashboards, so we will simply explain the visualizations in each dashboard in the order they appear.

High School Story

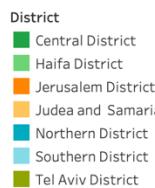
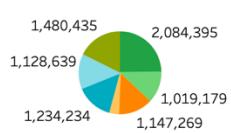
Story point 1 – General Information about Districts

High School Story

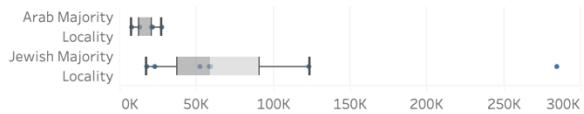


General Information about Districts

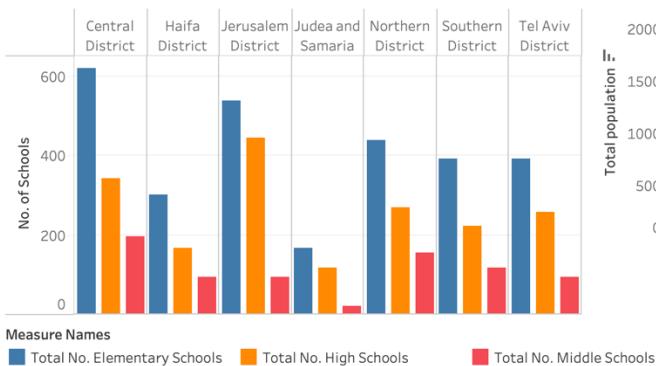
District Populations



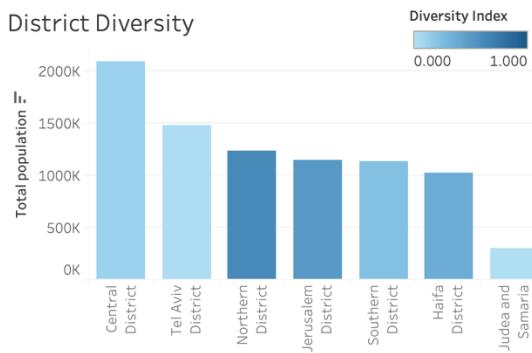
Population Distribution of Districts



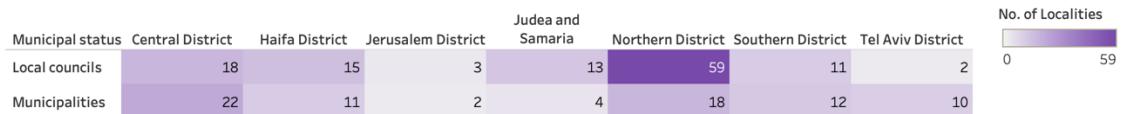
Total No. of Each Type of School per District



District Diversity

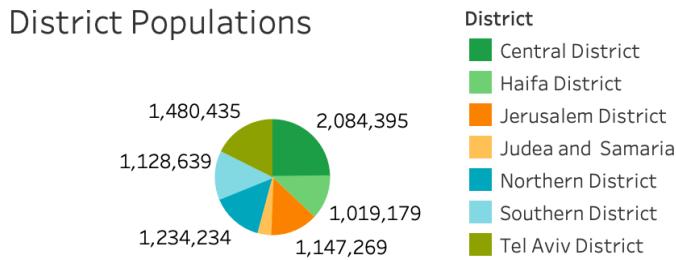


Municipal Statuses of Localities by District



This dashboard helps us understand the districts better by giving us information on the populations, municipal statuses, schools and diversity of each district. In every visualization, if the data of a district is selected, then it highlights the data of that district in all the other visualizations.

District Populations



This visualization is a pie chart that shows the total population for each district. This acts as a filter for all the other visualizations in the dashboard too, where selecting a certain district will highlight the information relevant to it in other visualizations.

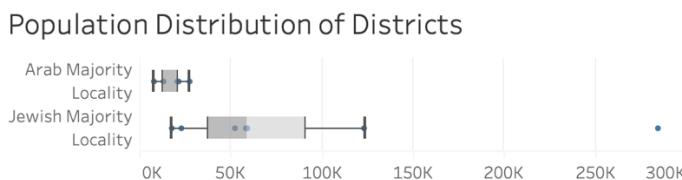
The interactions here include:

- Filtering datapoints by district
- Tooltip – shows the district and total population.

Data mappings:

- Color – each district has its own color in the pie chart.
- Size of slice – mapped to the percentage of the district's population out of the total population of all localities.

Population Distributions of Districts



This visualization is a boxplot showing the distribution of the populations of the districts by majority population.

The interactions here include:

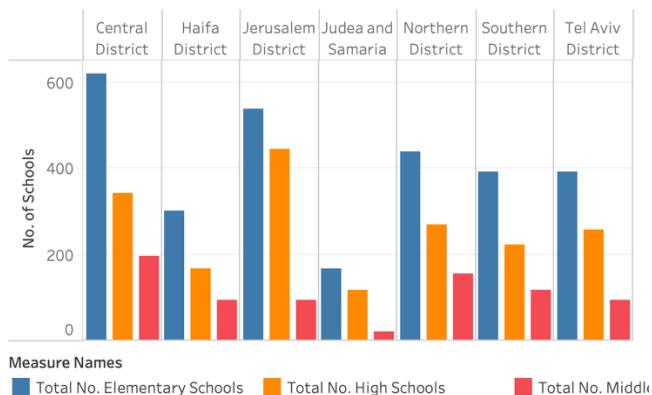
- Tooltip – includes the metrics of the boxplot (median, whiskers, hinges)

Data mappings:

- The distance of each point from the y-axis is mapped to the total population of the district

Total No. of Each Type of School per District

Total No. of Each Type of School per District



This visualization is a multiple bar chart showing the number of elementary, middle and high schools per district.

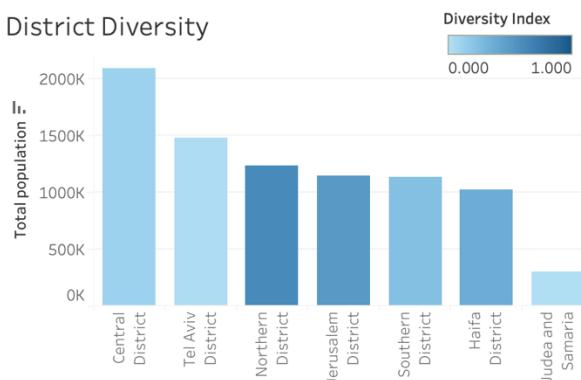
The interactions include:

- Highlighting district data after selecting one of the bars
- Highlight – selecting a bar will highlight the district data in other visualizations.

Data mappings:

- Length of bars – mapped to number of schools per type.
- Color of bars – mapped to type of school (elementary (blue)/middle (red)/high (orange)).
- Each section represents a district.

District Diversity



This visualization is a bar chart that shows the total population of each district and how diverse each one is.

Interactions included:

- Tooltip – includes district name, Arab population, Jewish and others population, total population and diversity index.
- Highlight – selecting a bar will highlight the district data in other visualizations.

Data mappings:

- The length of the bars is mapped to the total population of each district.
- The color of each bar is mapped to the diversity of each district.

Municipal Statuses of Localities by District

Municipal Statuses of Localities by District

Municipal status	Central District	Haifa District	Jerusalem District	Judea and Samaria	Northern District	Southern District	Tel Aviv District	No. of Localities
Local councils	18	15	3	13	59	11	2	59
Municipalities	22	11	2	4	18	12	10	0

This visualization is a highlight table that shows the amount of each municipal status that there is in each district.

Interactions included:

- Selecting a district will highlight the data for that district.
- Tooltip – includes district, municipal status and the number of localities.

Data mapping:

- Intensity of color – mapped to the number of localities.

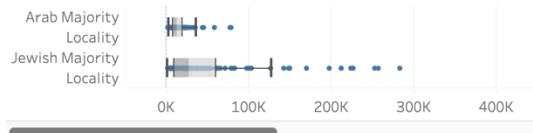
Story point 2 – General Information about Localities

General Information about Localities

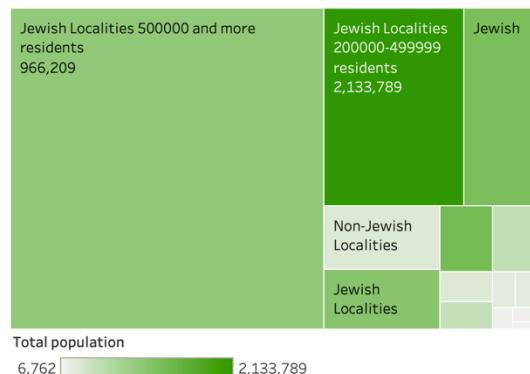
Majority Populations of Localities



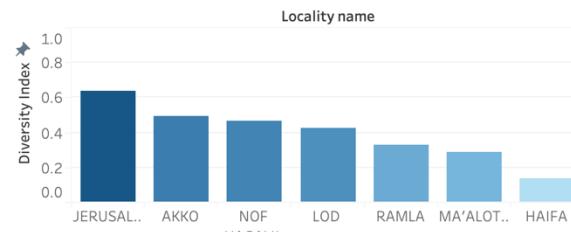
Population Distribution of Localities



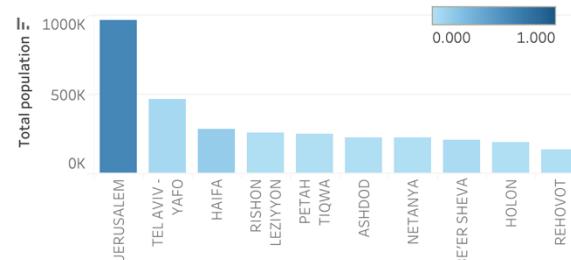
Total No. of People Living in Each Type of Locality



Most Diverse Localities



Diversity Populations of 10 Most Populous Localities



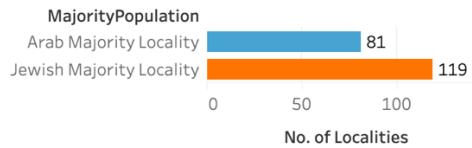
Municipal Statuses of Localities by Majority Population

MajorityPopulation	Municipal status	
	Local councils	Municipalities
Arab Majority Locality	68	13
Jewish Majority Locality	53	66

This dashboard helps us understand the localities better by giving us information on the populations, municipal statuses, and diversity of each district. In every visualization, if the majority population of a district is selected, then it highlights the data of that population in all the other visualizations.

Majority Populations of Localities

Majority Populations of Localities



This visualization is a bar chart that shows how many Arab majority and Jewish majority localities there are in general.

Interactions included:

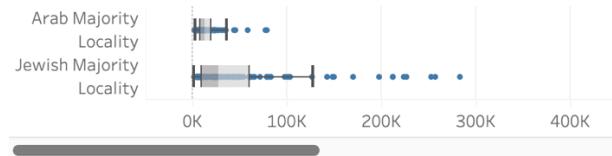
- Tooltip – includes majority population and number of localities
- Filter – acts as a filter for the other visualizations, when we select one of the majorities, it filters out the data in the other visualizations not related to that majority.

Data mappings:

- Color – each color is mapped to a majority (Arab majority (blue)/Jewish majority (orange))
- Length of bar – mapped to the number of localities

Population Distribution of Localities

Population Distribution of Localities



This visualization is a boxplot that shows the distribution of the population sizes of the Arab and Jewish majority localities.

Interaction included:

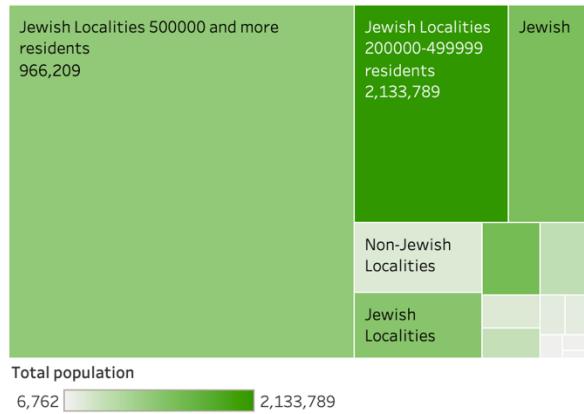
- Tooltip – includes metrics of the boxplot (whiskers, hinges, median)

Data mappings:

- The distance of each point from the y-axis is mapped to the total population of the locality.

Total No. of People Living in Each Type of Locality

Total No. of People Living in Each Type of Locality



This visualization is a treemap that shows the total number of people living in each type of locality.

Interactions included:

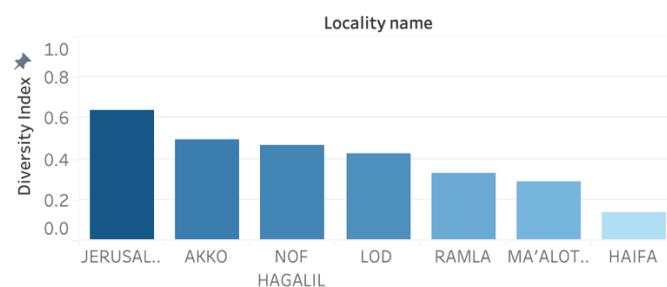
- Tooltip – shows the sum of people living in each type of locality per district (total population), Arab population, Jewish and others population, and type of locality.

Data mappings:

- Size of each box – mapped to the average population size of these localities
- Color of each box – mapped to the total number of people living in each type of locality

Most Diverse Localities

Most Diverse Localities



This visualization is a bar chart that shows the populations and diversity of the most diverse localities (a diverse locality is a locality with a diversity index value of ≥ 0.1).

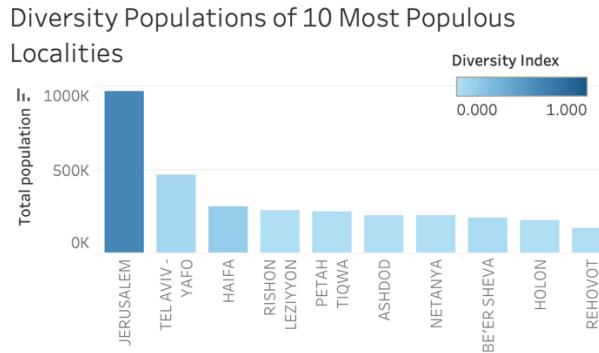
Interactions included:

- Tooltip – shows the Arab population, Jewish and others population, diversity index value and name of locality.

Data mapping:

- The color and length of the bars are mapped to the diversity index value.

Diversity Populations of 10 Most Populous Localities



This visualization is a bar chart showing the populations of the most populous localities and how diverse they are.

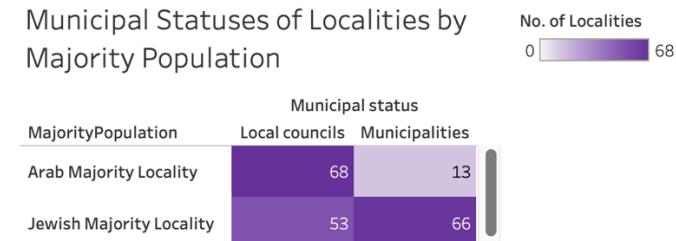
Interactions included:

- Tooltip – shows the total population, Arab population, Jewish and others population, diversity index value and name of locality.

Data mapping:

- Length of bar – mapped to the population of the locality.
- Intensity of color – mapped to the diversity index value.

Municipal Statuses of Localities by Majority Population



This visualization is a highlight table that shows the number of localities of each municipal status.

Interactions included:

- Tooltip – includes majority population, municipal status and the number of localities.

Data mapping:

- Intensity of color – mapped to the number of localities.

Story point 3 – High School Statistics of Districts

This dashboard is meant to show us general statistics about high schools per district.

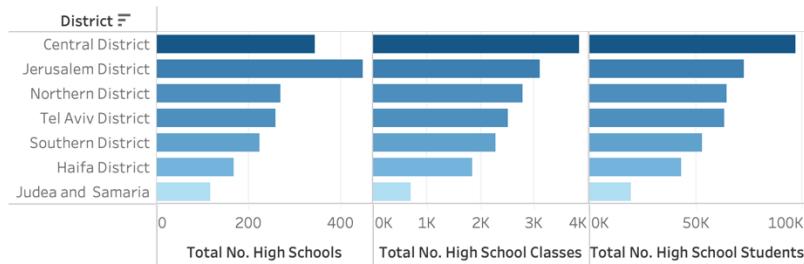
High School Statistics of Districts

MajorityPopulation
 (All)
 Arab Majority Locality
 Jewish Majority Locality

High School Students out of Total Population

District	Avg. No. of HS Students per HS
Central District	1.701
Haifa District	1.168
Jerusalem District	0.247
Judea and Samaria	0.995
Northern District	3.820
Southern District	1.210
Tel Aviv District	0.454

Total No. of High Schools, HS Classes, and HS Students per District



Distribution of High School Students per High School



Distribution of High School Students per High School Class



High School Students out of Population

High School Students out of Total Population

District	Avg. No. of HS Students per HS
Central District	1.701
Haifa District	1.168
Jerusalem District	0.247
Judea and Samaria	0.995
Northern District	3.820
Southern District	1.210
Tel Aviv District	0.454

This visualization is a highlight table that shows the total percentage of high school students out of the total population per district. It also acts as a filter for all the other visualizations.

Interactions:

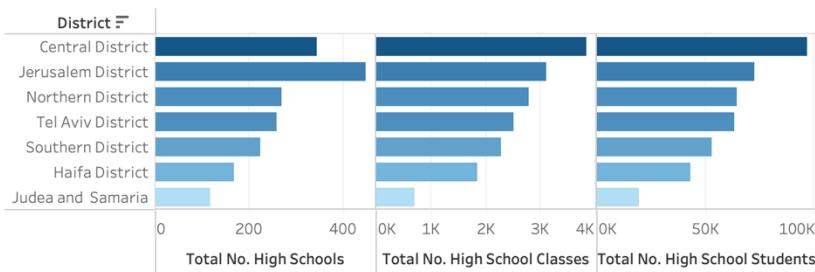
- Filter – when a district is selected in the visualization, it filters all the other visualizations accordingly so that they match the district.
- Filter – we can filter by population majority (Arab/Jewish/All)
- Tooltip – includes the district and the percentage of high school students out of the total population.

Data mapping:

- Color intensity and value – mapped to the percentage of high school students out of the total population.

Total No. of High Schools, HS Classes, and HS Students per District

Total No. of High Schools, HS Classes, and HS Students per District



This visualization is a multiple bar chart that shows the number of high schools, high school classes and high school students per district.

Interactions:

- Tooltip – includes the district, no. of High schools, no. of High school classes, no. of High school students.
- Filter – we can filter by population majority (Arab/Jewish/All)

Data mapping:

- Color intensity – mapped to the total number of high school students per district.
- Length of the bar – mapped to the total amount of high schools/high school classes/high school students.

Distribution of High School Students per High School

Distribution of High School Students per High School



This visualization is a boxplot that shows the distribution of high school students per high school.

Interactions:

- Tooltip – includes metrics of the boxplot (whiskers, hinges, median)

Data mapping:

- The height of each point from the x-axis is mapped to the average number of students per high school per district.

Distribution of High School Students per High School Class

Distribution of High School Students per High School Class



This visualization is a boxplot that shows the distribution of high school students per high school.

Interactions:

- Tooltip – includes metrics of the boxplot (whiskers, hinges, median)

Data mapping:

- The height of each point from the x-axis is mapped to the average number of students per high school class per district.

Story point 4 – High School Dropout Statistics

This dashboard is meant to help us understand the high school dropout rates of the localities and districts.

High School Dropout Statistics

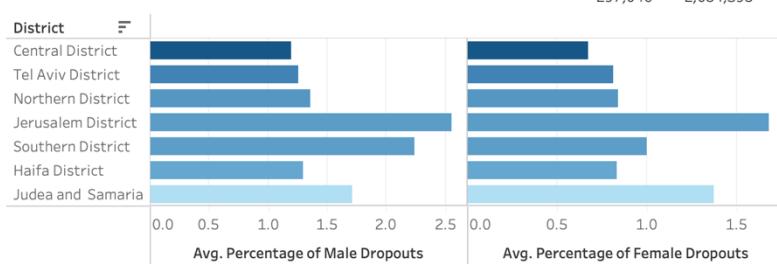
MajorityPopulation
 (All)
 Arab Majority Locality
 Jewish Majority Locality

Total High School Dropouts per District

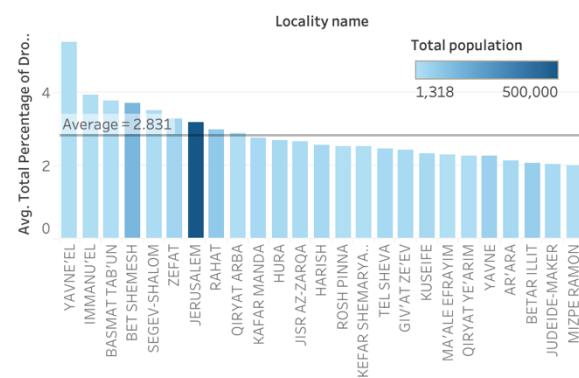
District	Avg. Total Percentage of Dropouts
Central District	0.935
Haifa District	1.063
Jerusalem District	2.136
Judea and Samaria	1.550
Northern District	1.102
Southern District	1.618
Tel Aviv District	1.038

Avg. Total Percentage of Dropouts

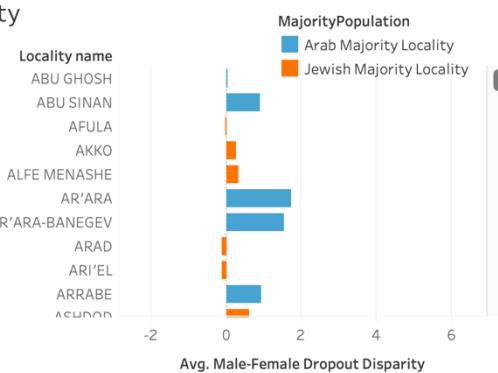

Male and Female Dropouts per District



Localities with Highest Dropout Rate



Disparities in Male and Female Dropouts per Locality



Total High School Dropouts per District

Total High School Dropouts per District

District	Avg. Total Percentage of Dropouts
Central District	0.935
Haifa District	1.063
Jerusalem District	2.136
Judea and Samaria	1.550
Northern District	1.102
Southern District	1.618
Tel Aviv District	1.038

Avg. Total Percentage of Dropouts


This visualization is a highlight table that shows the total percentage of dropouts per district. It also acts as a filter for all the other visualizations.

Interactions:

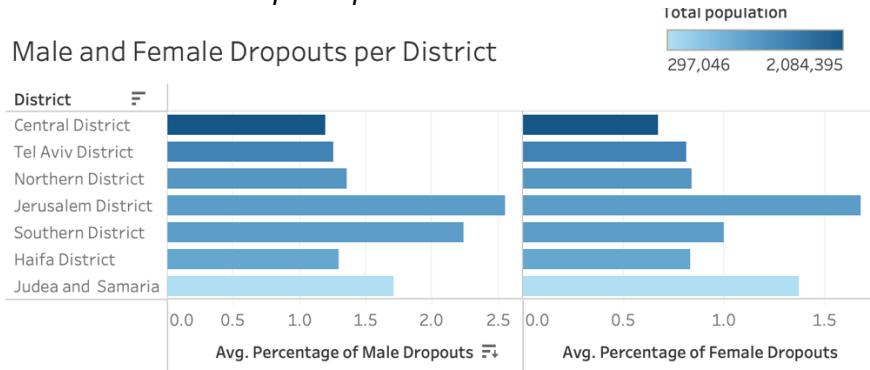
- Filter – when a district is selected in the visualization, it filters all the other visualizations accordingly so that they match the district.

- Tooltip – includes the district, percentage of male dropouts, percentage of female dropouts, and percentage of total dropouts.

Data mapping:

- Color intensity and value – mapped to the percentage of total dropouts.

Male and Female Dropouts per District



This visualization is a multiple bar chart that shows the male and female dropout rates per district.

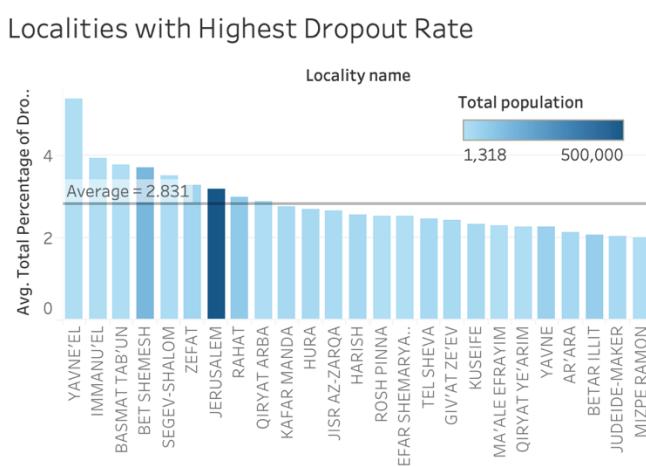
Interactions:

- Tooltip – includes the district, percentage of male dropouts, percentage of female dropouts, and total population.

Data mapping:

- Color intensity– mapped to the total population of the district.
- Length of the bar – mapped to the dropout rate.

Localities with Highest Dropout Rates



This visualization is a bar chart that shows the localities with the highest high school dropout rates (defined as more than 2%).

Interactions:

- Tooltip – includes the locality name, locality type, municipal status, percentage of male dropouts, percentage of female dropouts, percentage of total dropouts, and total population.

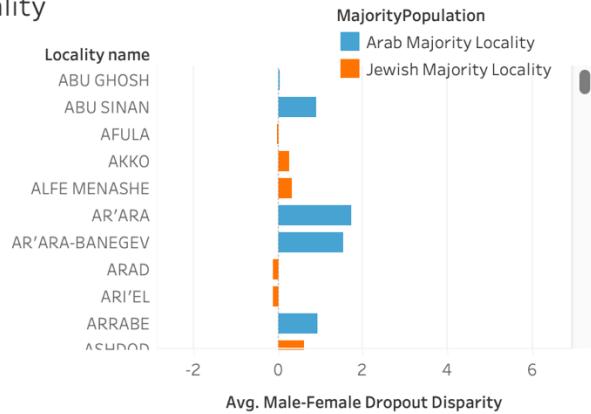
Data mapping

- Length of bar – mapped to total percentage of dropouts
- Color of bar – mapped to total population

Disparities in Male and Female Dropouts per locality

Disparities in Male and Female Dropouts per

Locality



This visualization is a bar chart that shows the disparity between male and female high school dropouts per locality. The localities are also distinguished by the majority popularity (Arab/Jewish). Positive values of disparity indicate there are more male dropouts, negative values indicate more female dropouts.

Interactions:

- Highlight – we can select the majority popularity which will then highlight all localities that have that majority.
- Tooltip - includes the locality name, majority popularity, municipal status, percentage of male dropouts, percentage of female dropouts, male-female dropout disparity.

Story point 5 – High School Statistics for Eligibility for Bagrut/University

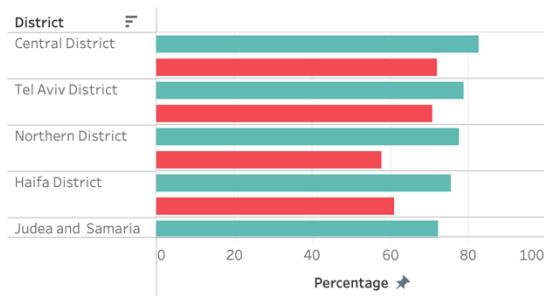
This dashboard presents the high school success rates, i.e., eligibility for bagrut rates and university per locality.

High School Story



High School Statistics for Eligibility for Bagrut/University

Average Eligibility Percentage for Bagrut/University per District



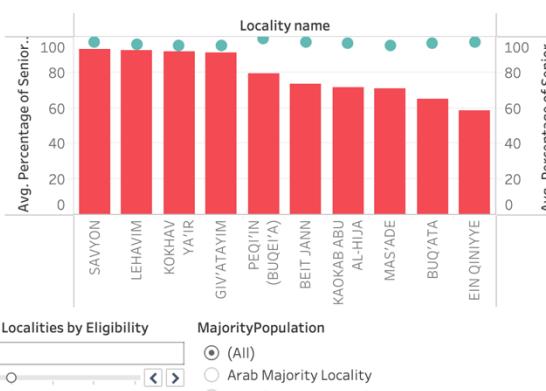
Average Eligibility Percentage for Bagrut/University per Locality Type



Localities with Highest Eligibility Rates for Bagrut

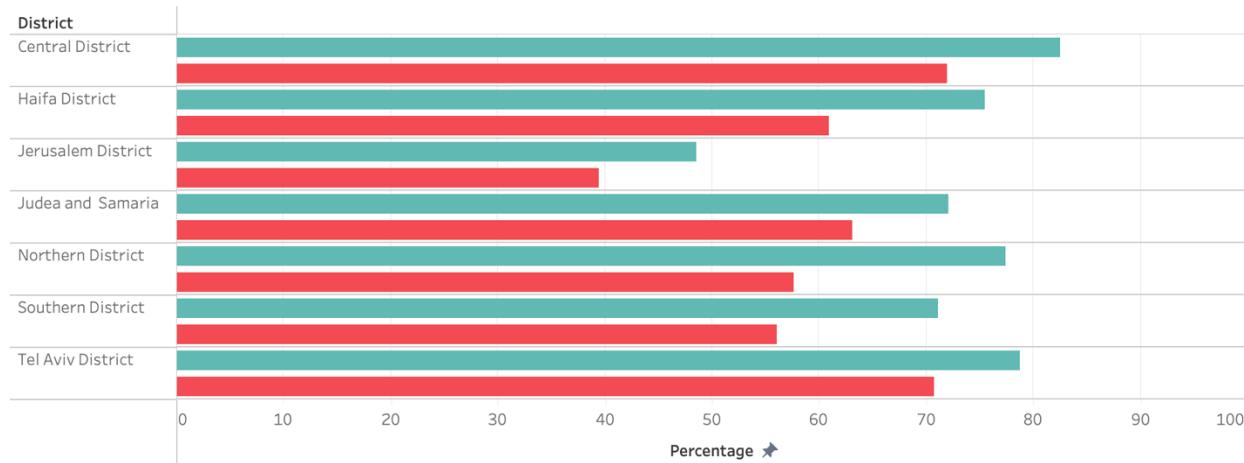


Localities with Highest Eligibility Rates for University



Average Eligibility Percentage for Bagrut/University per District

Average Eligibility Percentage for Bagrut/University per District



This visualization is a multiple bar chart that shows the average high school senior eligibility rates for bagrut and university per district. This also acts as a filter for the rest of the visualizations in the dashboard.

Interactions included:

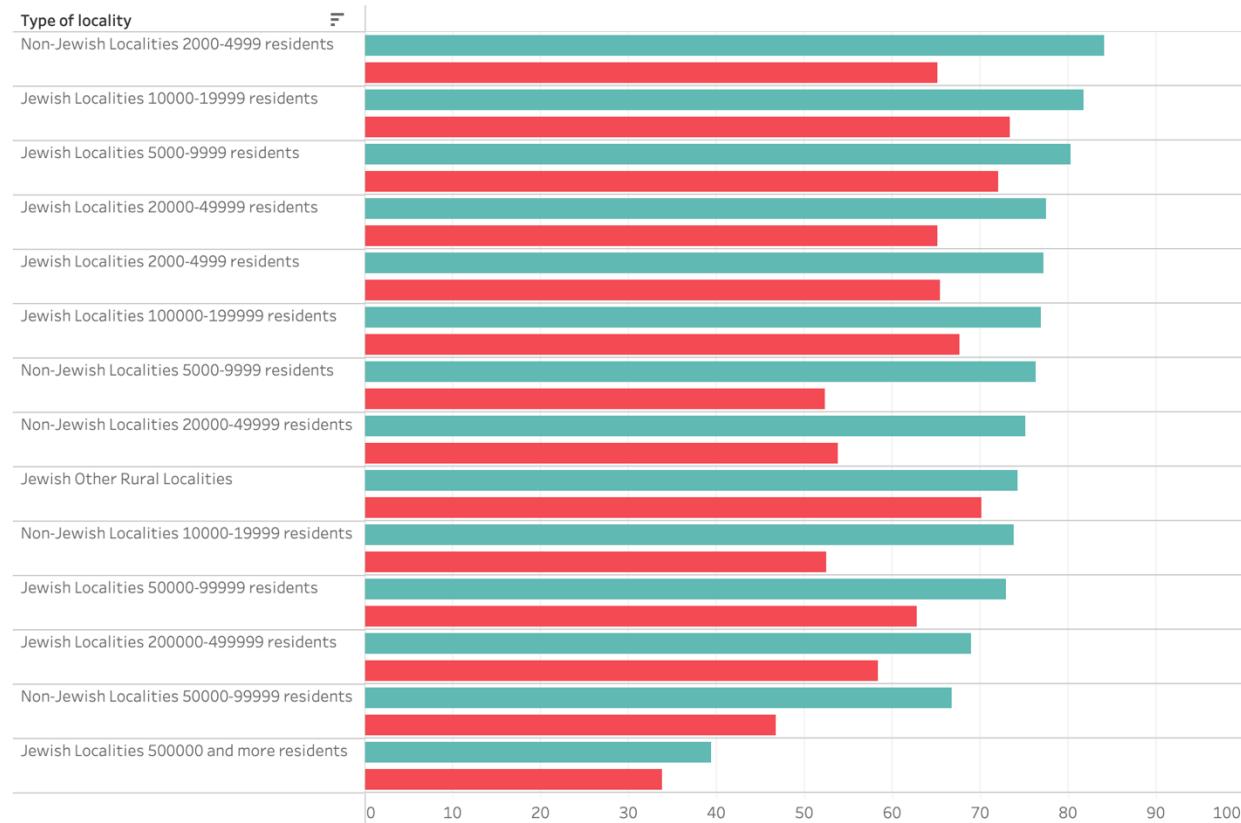
- Filter - if a certain district is selected, the data shown in the visualizations will be relevant to that district.
- Tooltip – includes district and percentage of high school seniors eligible for a bagrut and university entrance.
- Filtering – we filter by the majority population.

Data mapping:

- Color of bar – mapped to the bagrut (blue)/university (pink) eligibility rate.
- Length of bar – mapped to the eligibility percentage (how many are eligible for a bagrut/university).

Average Eligibility Percentage for Bagrut/University per Locality Type

Average Eligibility Percentage for Bagrut/University per Locality Type



This visualization is a multiple bar chart that shows the average high school senior eligibility rates for bagrut and university per locality type. This also acts as a filter for the rest of the visualizations in the dashboard.

Interactions included:

- Filter - if a certain locality type is selected, the data shown in the visualizations will be relevant to that locality type.

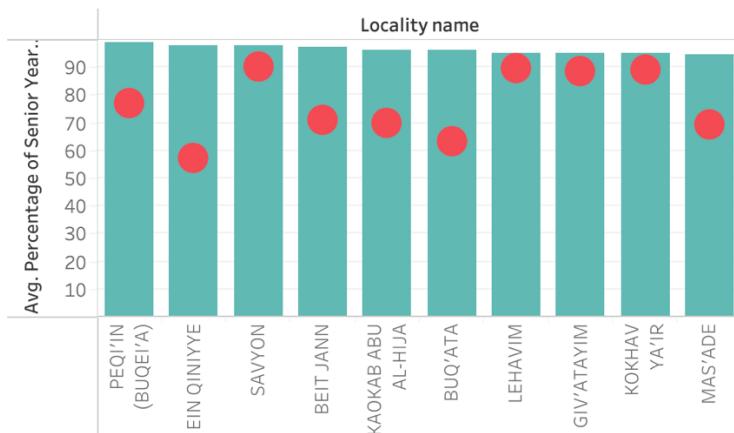
- Tooltip – includes locality type and percentage of high school seniors eligible for a bagrut and university entrance.
- Filtering – we filter by the majority population.

Data mapping:

- Color of bar – mapped to the bagrut (blue)/university (pink) eligibility rate.
- Length of bar – mapped to the eligibility percentage (how many are eligible for a bagrut/university).

Localities with Highest Eligibility Rates for Bagrut

Localities with Highest Eligibility Rates for Bagrut



This visualization is a bar chart showing the localities with the highest eligibility rates for a bagrut, with additional points to indicate their corresponding university eligibility rates.

Interactions:

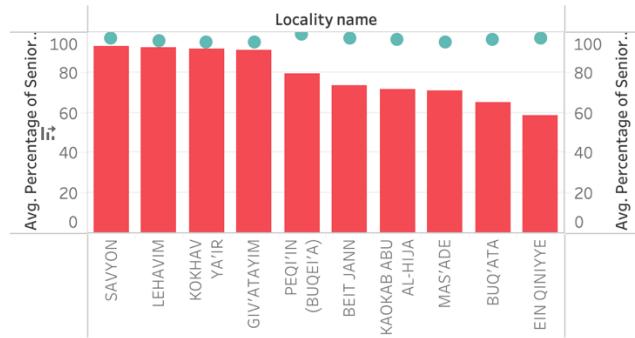
- Tooltip – includes locality name and percentage of high school seniors eligible for a bagrut.
- Filtering – we can choose how many of the top localities for eligibility to show (5-25, where the step is 5) and by the majority population.

Data mapping:

- Color of bar – mapped to the bagrut (blue)/university (pink) eligibility rate.
- Length of bar – mapped to the bagrut eligibility percentage (how many are eligible for a bagrut).
- Height of point – mapped to the university entrance eligibility percentage (how many are eligible for a university).

Localities with Highest Eligibility Rates for University

Localities with Highest Eligibility Rates for University



This visualization is a bar chart showing the localities with the highest eligibility rates for a university entrance, with additional points to indicate their corresponding bagrut eligibility rates.

Interactions:

- Tooltip – includes locality name and percentage of high school seniors eligible for a university entrance.
- Filtering – we can choose how many of the top localities for eligibility to show (5-25, where the step is 5) and by the majority population

Data mapping:

- Color of bar – mapped to the bagrut (blue)/university (pink) eligibility rate.
- Length of bar – mapped to the university entrance eligibility percentage (how many are eligible for a university).
- Height of point – mapped to the bagrut eligibility percentage (how many are eligible for a bagrut).

University Story

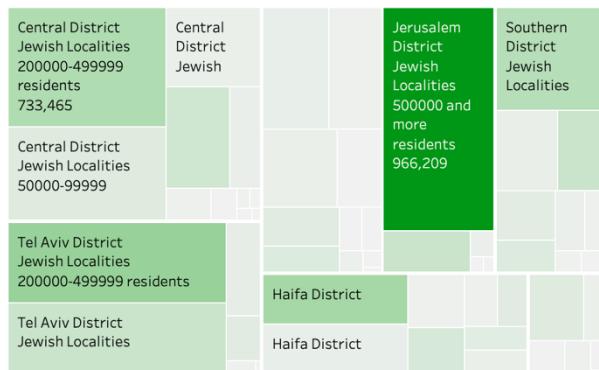
Story Point 1 - Locality Types and Municipalities per the Majority Populations

Higher Level Education Story



Locality Types and Municipalities per the Majority Populations

Types of Localities per District



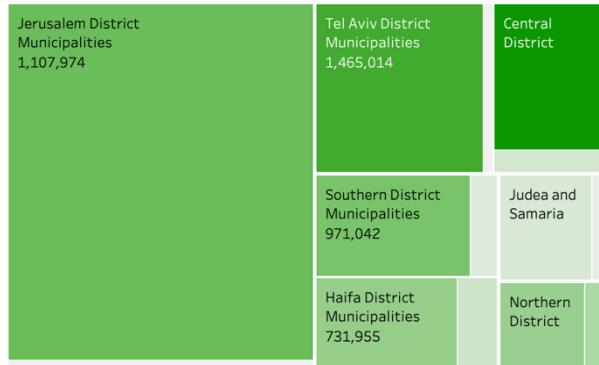
MajorityPopulation
 (All)
 Arab Majority Local...
 Jewish Majority Lo...

District
 (All)
 Central District
 Haifa District
 Jerusalem District
 Judea and Samaria
 Northern District
 Southern District
 Tel Aviv District

We first want to understand where each of the demographics (majority populations) live - what kind of localities and what the municipal status of the localities are in order to better understand the background of the demographics.

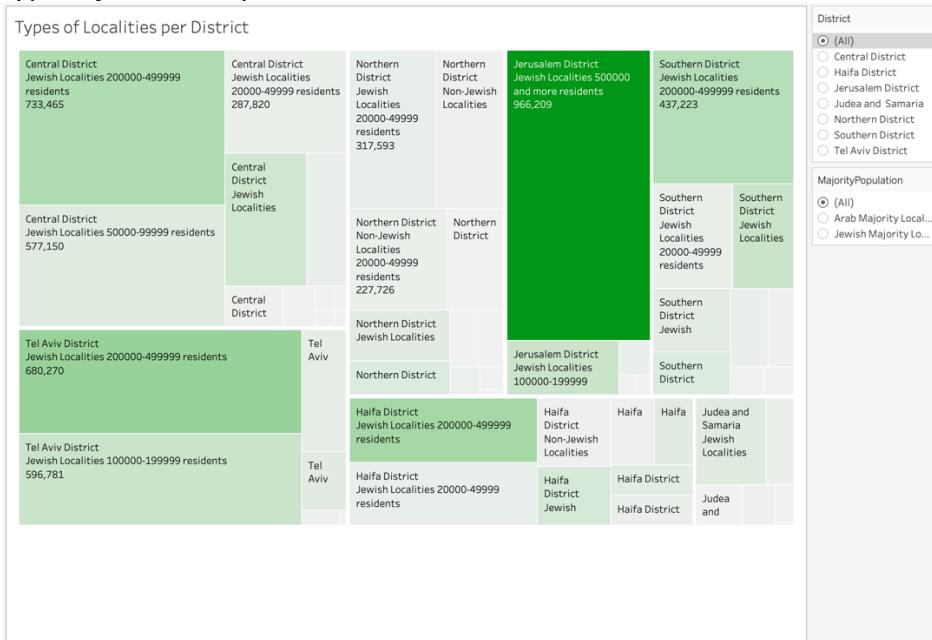
We can see that most Arabs live in the Northern District of Israel and especially in relatively small localities (under 20,000 residents for the most part) and that there are more Arab local councils than there are Arab Municipalities. However, we can see that Jewish people are more evenly dispersed and that there are especially more municipalities than local councils among them.

Municipal Statuses per District



In this dashboard, we present the population distributions over types of localities and municipal statuses via treemaps.

Types of Localities per District



This visualization is a treemap that shows the types of localities there are in each district and includes the sum of people living in each type of locality per district.

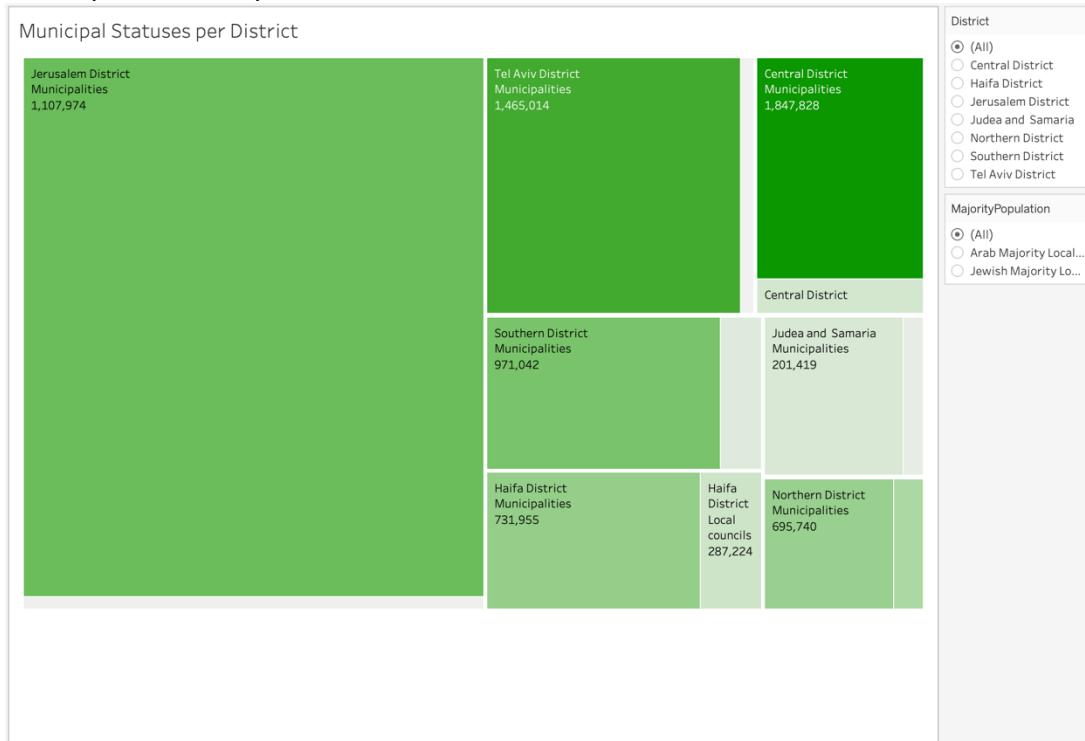
The interactions here include:

- Filtering datapoints by population majority (all/Arab/Jewish)
 - Filtering datapoints by district
 - Tooltip – shows the sum of people living in each type of locality per district (total population), district, and type of locality.

Data mappings:

- The size of each box is mapped to the total population (sum of people living in each type of locality per district), where the darker the shade, the higher the population
 - The shade of color of each box is mapped to the average population size of the localities of each locality type per district.

Municipal Statuses per District



This visualization is a treemap that shows the municipal statuses there are in each district and includes the sum of people living in each municipal status per district.

The interactions here include:

- Filtering datapoints by population majority (all/Arab/Jewish)
- Filtering datapoints by district
- Tooltip – shows the sum of people living in each municipal status per district (total population), district, and municipal status.

Data mappings:

- The size of each box is mapped to the total population (sum of people living in localities of each municipal status per district), where the darker the shade, the higher the population
- The shade of color of each box is mapped to the average population size of the localities of each municipal status per district.

Story point 2 - People with Degrees Statistics

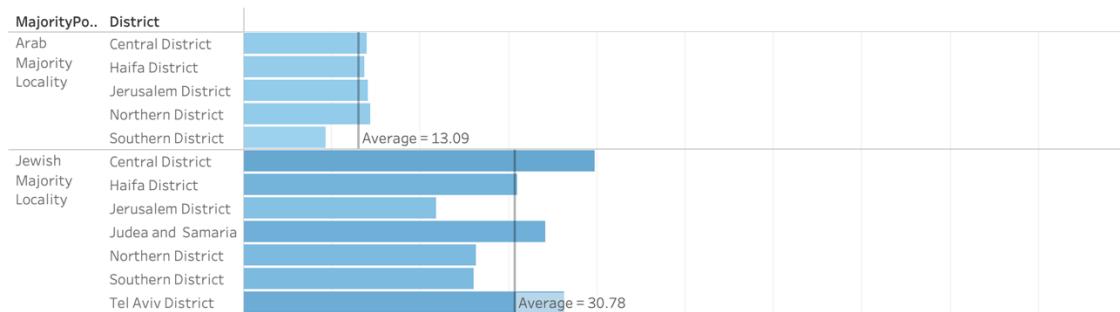
Higher Level Education Story



In this dashboard, we compare the data of the percentage of people ages 35-55 possessing Israeli higher education degrees using 3 parameters: locality type, municipal status, and by district. We can also filter by majority population and district.

Percentage of People Ages 35-55 with Degrees by District

Percentage of People Ages 35-55 with Degrees by District



This visualization is a bar chart that compares the percentage of people ages 35-55 possessing Israeli higher education degrees by district.

The interactions here include:

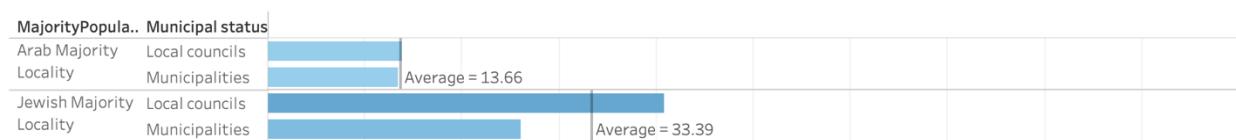
- Filtering datapoints by population majority (all/Arab/Jewish)
- Filtering datapoints by district
- Tooltip – shows the average percentage of people ages 35-55 possessing Israeli higher education degrees (of localities per district), district, and population majority.

Data mappings:

- The length of each bar is mapped to the percentage of people ages 35-55 possessing Israeli higher education degrees by district and population majority
- The color of each bar is the average percentage of people ages 35-55 possessing Israeli higher education degrees by district and population majority (of localities per district).

Percentage of People Ages 35-55 with Degrees by Municipal Status

Percentage of People Ages 35-55 with Degrees by Municipal Status



This visualization is a bar chart that compares the percentage of people ages 35-55 possessing Israeli higher education degrees by municipal status.

The interactions here include:

- Filtering datapoints by population majority (all/Arab/Jewish)
- Filtering datapoints by district
- Tooltip – shows the average percentage of people ages 35-55 possessing Israeli higher education degrees (of localities per municipal status), municipal status, and population majority.

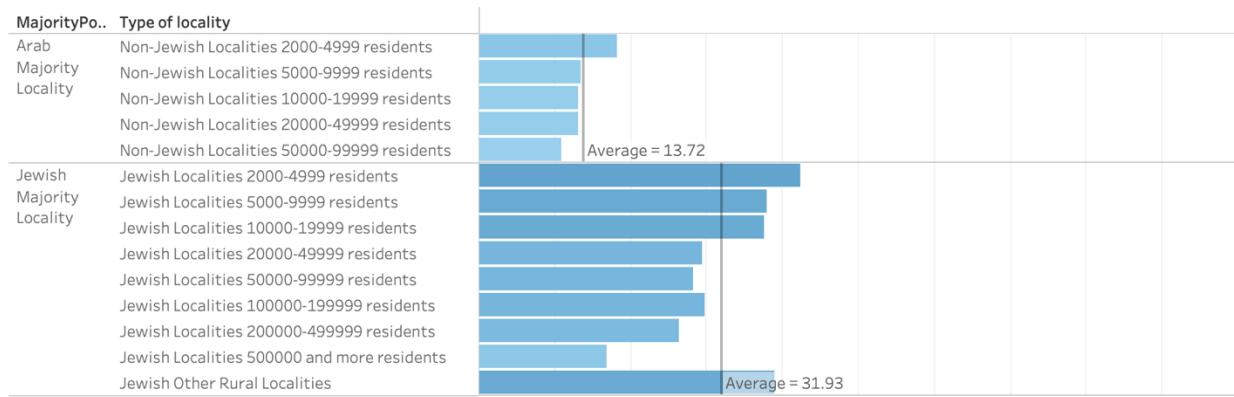
Data mappings:

- The length of each bar is mapped to the percentage of people ages 35-55 possessing Israeli higher education degrees by municipal status and population majority.

- The color of each bar is the average percentage of people ages 35-55 possessing Israeli higher education degrees by municipal status and population majority (of localities per municipal status)

Percentage of People Ages 35-55 with Degrees by Locality Type

Percentage of People Ages 35-55 with Degrees by Locality Type



This visualization is a bar chart that compares the percentage of people ages 35-55 possessing Israeli higher education degrees by locality type.

The interactions here include:

- Filtering datapoints by population majority (all/Arab/Jewish)
- Filtering datapoints by district
- Tooltip – shows the average percentage of people ages 35-55 possessing Israeli higher education degrees (of localities per locality type), locality type, and population majority

Data mappings:

- The length of each bar is mapped to the percentage of people ages 35-55 possessing Israeli higher education degrees by locality type and population majority
- The color of each bar is the average percentage of people ages 35-55 possessing Israeli higher education degrees by locality type and population majority (of localities per locality type)

Story point 3 - Comparison of Students by Locality Type and Municipality Status

Comparison of Students by Locality Type and Municipality Status

Percentage of Total Students by Majority Population

MajorityPopulation
Arab Majority Locality
Jewish Majority Locality

Percentage of Students Ages 20-25 by Majority Population

MajorityPopulation
Arab Majority Locality
Jewish Majority Locality

Avg. Percentage of Peopl..
0.0 100.0

Municipal status

(All)

Local councils

Municipalities

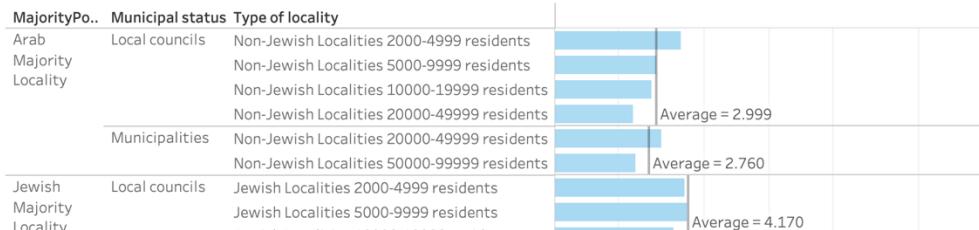
We can conclude that people from Jewish localities tend to start university later than people from Arab localities because while a higher percentage of people from Jewish localities are students, a higher percentage of people ages 20-25 from Arab localities are students.

Percentage of Students among 20-25 Year-Olds by Municipality Status and Locality Type



We can see here too that people from localities with smaller populations have higher percentages of students among their population (the way that they also had a higher percentage of people with higher education degrees).

Percentage of Students of Total Population by Municipality Status and Locality Type



In this dashboard, we compare the total percentage of people that are students and the percentage of students among 20-25 year old's based on the locality type and municipality status variables.

Percentage of Total Students by Majority Population

Percentage of Total Students by Majority Population



This visualization is a bar chart that compares the percentage of total students by the majority populations (i.e., what percentage of the Arab population are students, and same for the Jewish population). This also acts as a filter in the dashboard to filter the students by the majority population.

The interactions included are:

- Tooltip – shows the average percentage of people that are students per population and population majority

Data mappings:

- The length of each bar is mapped to the average percentage of people that are students per population
- The color is mapped to the name of the majority population

Percentage of Students Ages 20-25 by Majority Population



This visualization is a bar chart that compares the Percentage of Students Ages 20-25 by the majority populations (i.e., what percentage of the 20-25 year old Arab population are students, and same for the 20-25 year old Jewish population). This also acts as a filter in the dashboard to filter the students by the majority population.

The interactions included are:

- Tooltip – shows the average Percentage of Students Ages 20-25 per population and population majority

Data mappings:

- The length of each bar is mapped to the average Percentage of Students Ages 20-25 per population
- The color is mapped to the name of the majority population

Percentage of Students among 20-25 Year-Olds by Municipality Status and Locality Type

Percentage of Students among 20-25 Year-Olds by Municipality Status and Locality Type



This visualization is a bar chart comparing the Percentage of Students Ages 20-25 by locality type and municipal status, majority population, and municipal status. We also show the average percentage for each municipal status.

The interactions included are:

- Filtering datapoints by population majority (all/Arab/Jewish)
- Filtering datapoints by municipal status
- Tooltip – shows the average Percentage of Students Ages 20-25 by locality type and municipal status, locality type, municipal status and population majority

Data mappings:

- Both the length and color of each bar is mapped to the average Percentage of Students Ages 20-25

Percentage of Students of Total Population by Municipality Status and Locality Type

Percentage of Students of Total Population by Municipality Status and Locality Type



This visualization is a bar chart comparing the percentage of students of total population by locality type and municipal status, majority population, and municipal status. We also show the average percentage for each municipal status.

The interactions included are:

- Filtering datapoints by population majority (all/Arab/Jewish)
- Filtering datapoints by municipal status
- Tooltip – shows the average percentage of students of total population by locality type and municipal status, locality type, municipal status and population majority

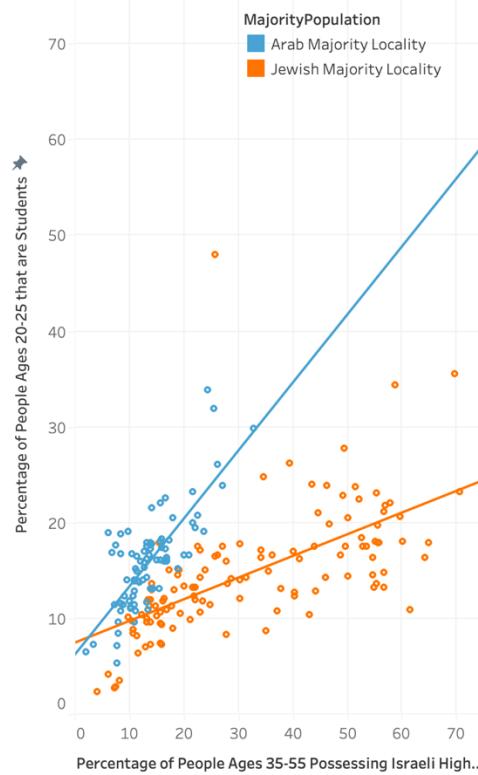
Data mappings:

- Both the length and color of each bar is mapped to the average percentage of students of total population

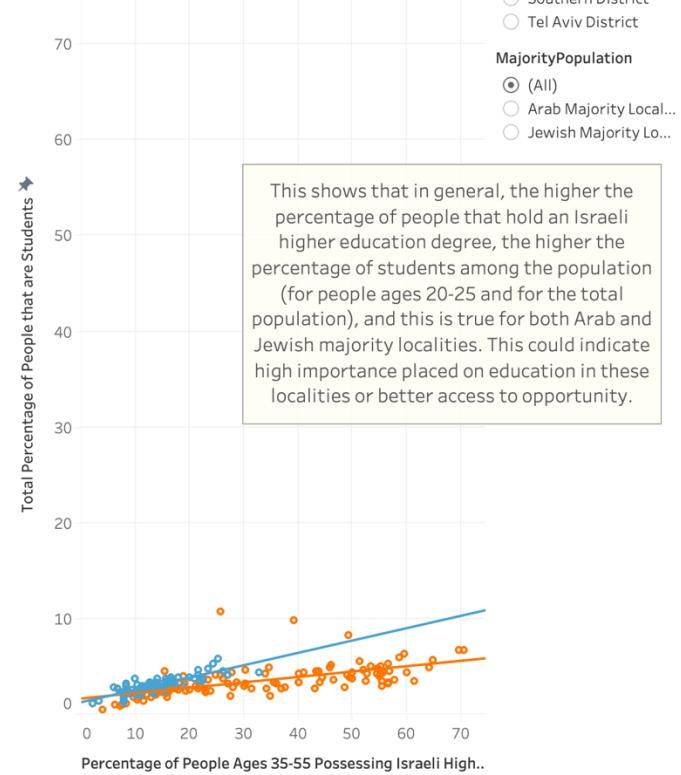
Story point 4 - Relationships between People with Degrees and Students

Relationships between People with Degrees and Students

Relationship between People with Degrees and Young Students



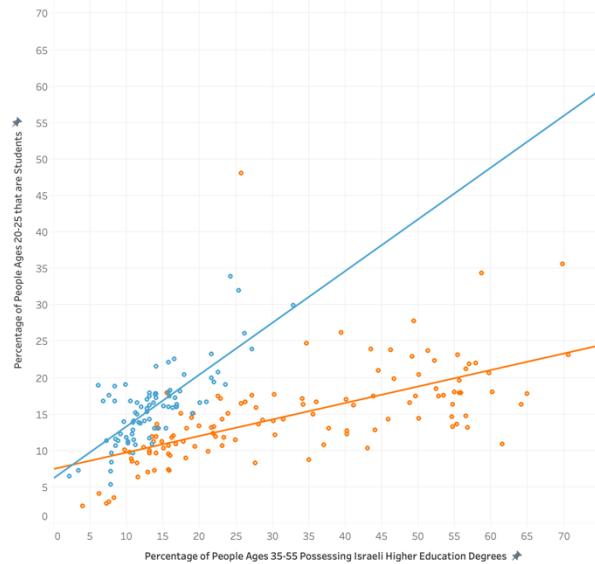
Relationship between People with Degrees and Total Students



This dashboard shows the relationship between percentage of people ages 35-55 possessing Israeli higher education degrees and the percentage of people that are students (both out of the total population and the 20-25 year old's).

Relationship between People with Degrees and Young Students

Relationship between People with Degrees and Young Students



This visualization is a scatter plot that shows the relationship between the percentage of people ages 35-55 possessing Israeli higher education degrees and the percentage of people ages 20-25 that are students.

The interactions included are:

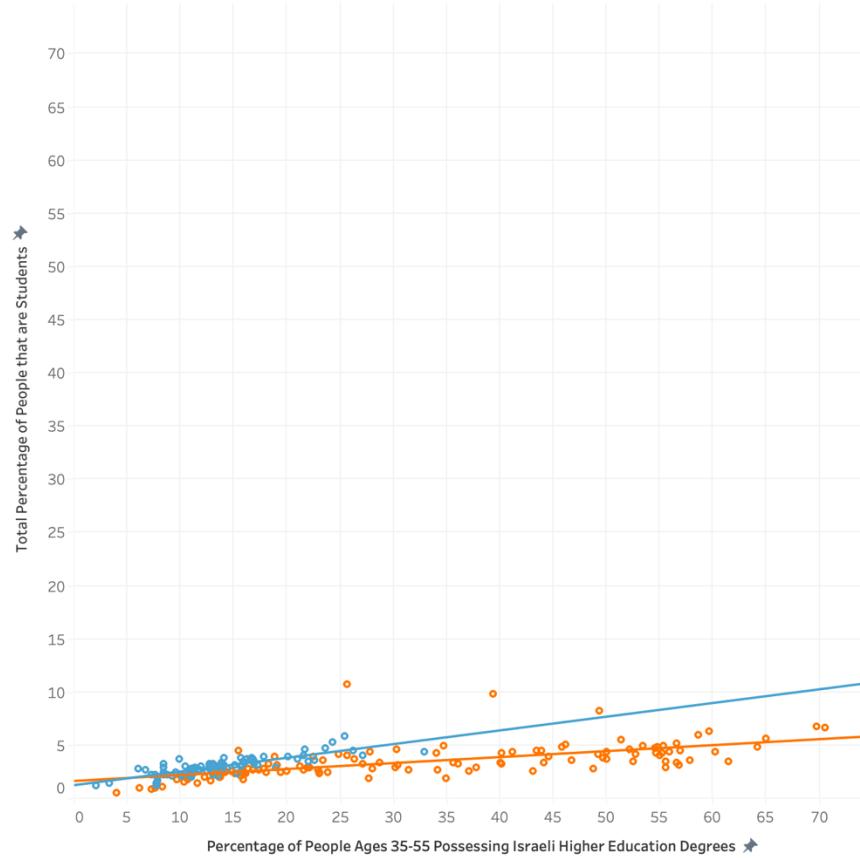
- Filtering datapoints by population majority (all/Arab/Jewish)
- Filtering datapoints by district
- Tooltip – shows the average percentage of people ages 20-25 that are students, percentage of people ages 35-55 possessing Israeli higher education degrees, locality name and population majority

Data mappings:

- The color of each point is mapped to the population majority (Arab (blue)/Jewish (orange))
- Coordinates of the datapoints – mapped to the percentage of people ages 35-55 possessing Israeli higher education degrees and the percentage of people ages 20-25 that are students (accordingly)

Relationship between People with Degrees and Total Students

Relationship between People with Degrees and Total Students



This visualization is a scatter plot that shows the relationship between the percentage of people ages 35-55 possessing Israeli higher education degrees and the percentage of people that are students of the total population.

The interactions included are:

- Filtering datapoints by population majority (all/Arab/Jewish)
- Filtering datapoints by district
- Tooltip – shows the average percentage of people that are students of the total population, percentage of people ages 35-55 possessing Israeli higher education degrees, locality name and population majority

Data mappings:

- The color of each point is mapped to the population majority (Arab (blue)/Jewish (orange))
- Coordinates of the datapoints – mapped to the percentage of people ages 35-55 possessing Israeli higher education degrees and the percentage of people that are students of the total population (accordingly)

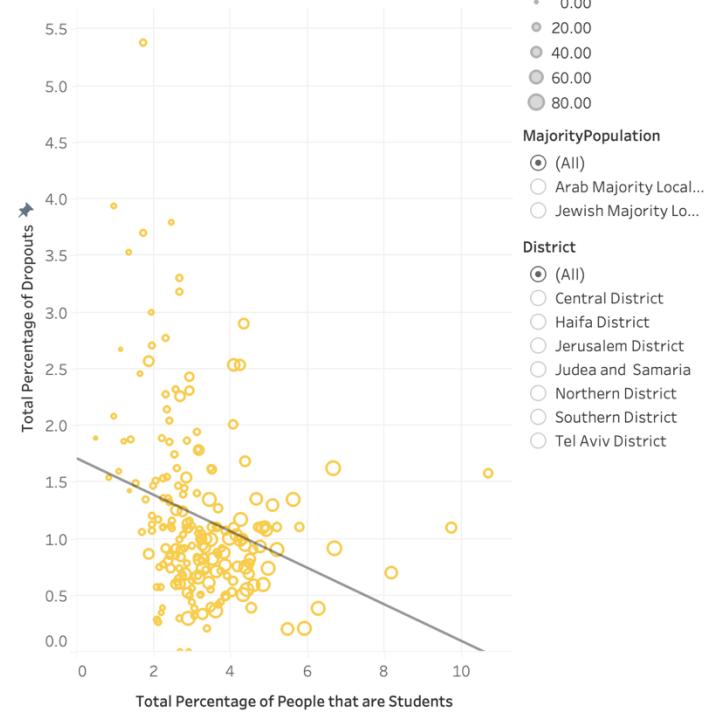
Relationship between University Students, Israeli-Degree Holders, and High School Students in Israel Dashboard

Relationship between University Students, Israeli-Degree Holders, and High School Students in Israel

Relationship between Percentage of Degree-Holders, Percentage of All Students and Seniors' Eligibility for Bagrut/University

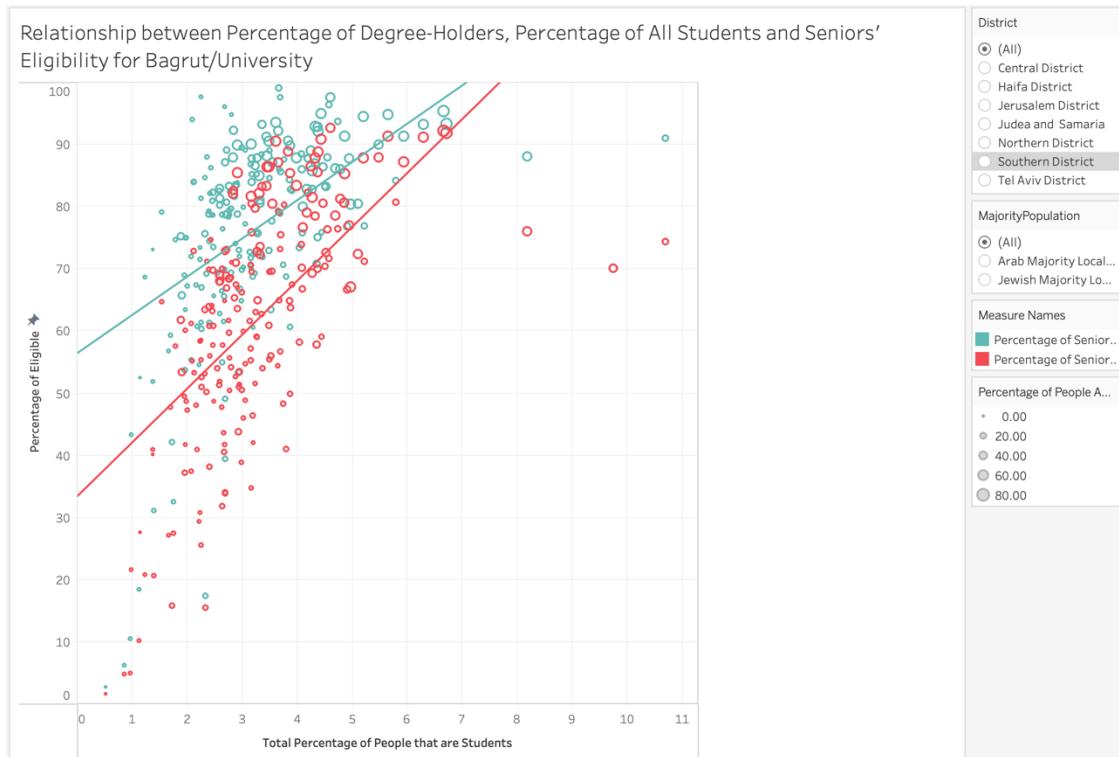


Relationship between Percentage of Degree-Holders, Percentage of All Students and Total Dropouts



This dashboard includes joint filters for the 2 scatter plots: one for filtering based on the districts and the other based on population majority (all/Arab/Jewish).

Relationship between Percentage of Degree-Holders, Percentage of All Students and Seniors' Eligibility for Bagrut/University



This visualization shows the relationship of 2 variables (separated by color) to another 2 variables: percentage of people ages 35-55 possessing Israeli higher education degrees, the total percentage of people that are students, the percentage of high school seniors eligible for a bagrut, and the percentage of high school seniors eligible for university entrance. We also show the trend line of each variable.

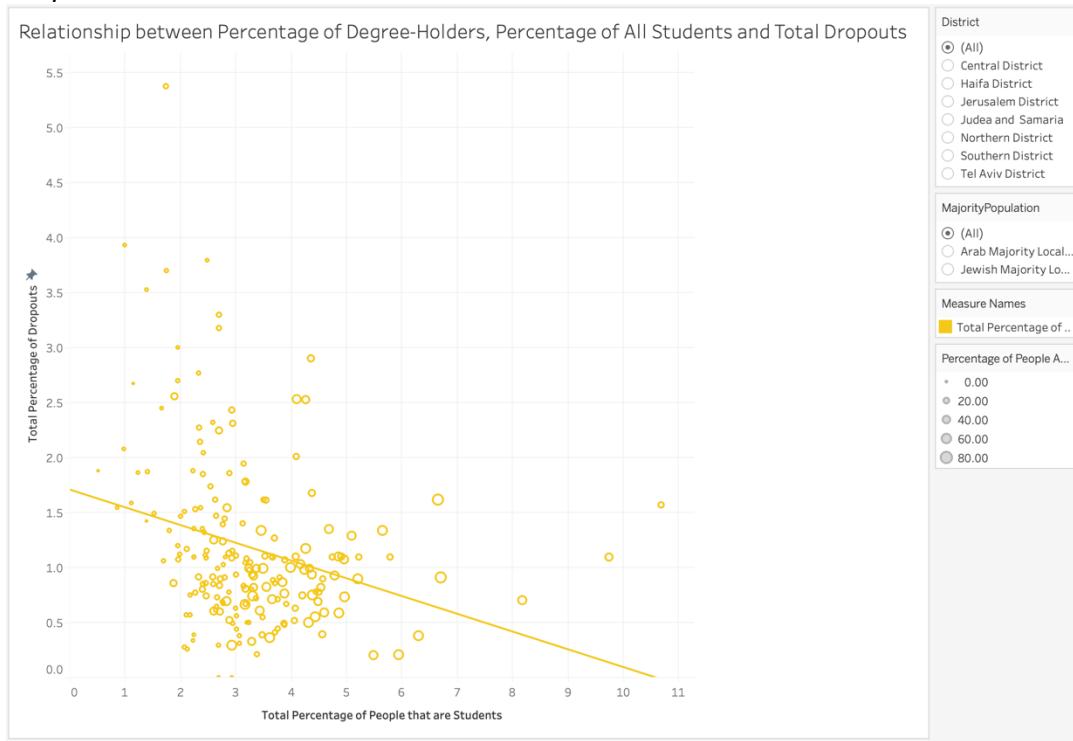
The interactions here include:

- Filtering the datapoints by districts
- Filtering the datapoints by the majority populations
- Tooltip – shows the percentage of people ages 35-55 possessing Israeli higher education degrees, the total percentage of people that are students, the percentage of high school seniors eligible for a bagrut/university entrance (accordingly), and the name of the locality

Data Mappings:

- Coordinates of the datapoints – mapped to the total percentage of people that are students and the percentage of high school seniors eligible for a bagrut/university entrance (accordingly)
- Color (pink) – mapped to the percentage of high school seniors eligible for a bagrut for a certain locality
- Color (blue) - mapped to the percentage of high school seniors eligible for a university entrance for a certain locality
- area of datapoints – mapped to the percentage of people ages 35-55 possessing Israeli higher education degrees (the higher the percentage, the bigger the area of the datapoints)

Relationship between Percentage of Degree-Holders, Percentage of All Students and Total Dropouts



This visualization shows the relationship between 3 variables: the total percentage of dropouts, the percentage of people ages 35-55 possessing Israeli higher education degrees, and the total percentage of people that are students. We also show the trend line.

The interactions here include:

- Filtering the datapoints by districts
- Filtering the datapoints by the majority populations
- Tooltip – shows the percentage of people ages 35-55 possessing Israeli higher education degrees, the total percentage of people that are students, the percentage of dropouts, and the name of the locality

Data Mappings:

- Coordinates of the datapoints – mapped to the total percentage of people that are students and the total percentage of dropouts
- area of datapoints – mapped to the percentage of people ages 35-55 possessing Israeli higher education degrees (the higher the percentage, the bigger the area of the datapoints)