

# Evolution of suicides in Poland in the last two decades

July 24, 2024

## 1 Introduction

The data used in this analysis come from the website of the Polish National Police, available at <https://statystyka.policja.pl/st/wybrane-statystyki/zamachy-samobojcze>. The data are divided into three ranges of years: from 1999 to 2012, from 2013 to 2016 and from 2017 to 2023, some discrepancies in the format were inevitably present and fortunately easy to fix. In every range of years, the data are provided in different excel files, each file focusing on a different aspect, here follows a list of the files for each range of years.

- Age range (grupa wiekowa) and day of the week (dzień tygodnia)(the day of the week is not treated in this writing).
- Place where the deed took place (miejsce popełnienia), also containing the subdivision into men (w tym mężczyzn) and women (w tym kobiet), unfortunately the subdivision is not made for every place where the corpses were found but it only regards the total values, that is, it is not reported for a specific place how many were the women and how many were the men found there.
- Method used (sposób popełnienia), reason for the deed (powód popełnienia), the two *variables* are treated separately, e.g. it is not possible to know how many people that committed suicide for a specific reason adopted a specific method. Again, this file contains the same information on the sex of the victim as in the previous file but this information is not reported for every specific reason or method.
- Civil status (stan cywilny), education (wykształcenie), job (informacja o pracy/nauce), these *variables* are treated separately (that is, it is not reported for a specific education level how many were the people that committed suicide that worked in a specific area) and the same goes again for the information on sex.

The 4 files are published in couples: one reports the information on attempted suicides (zamachy samobójcze) and the other reports the attempted suicides

resulting in death (zamachy samobójcze zakończone zgonem). Other data regarding the source of income (źródło utrzymania), state of consciousness (stan świadomości), mental state (stan psychiczny) and criminal history (przeszłość karna) are available but they are not treated in this article.

Each of these files displays data by rows, where every row focuses on a specific country and a specific year, this format is not the one commonly adopted and referred to as *tabular data*, where every variable is a column. The preparation of data is available at: <https://www.kaggle.com/code/denisfesta/preparation-of-data-on-suicides-in-poland>, where the code is available to see how the excel files were translated into csv files with a tabular format.

## 2 Global view

Figures 1 and 2 show the evolution of the the number of suicides in Poland from 1999 to 2022 and the ratio of the suicides resulting in death over the total number of attempts, respectively.

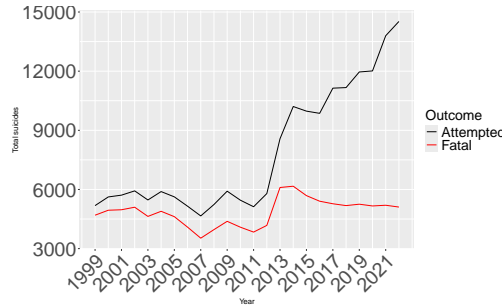


Figure 1: The evolution of the suicides (attempts and deaths) in Poland

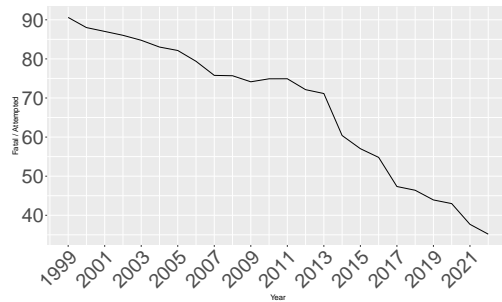


Figure 2: The ratio of the suicides resulting in death over the total number of attempts

The abrupt increase in the suicide attempts just before 2013 is more due to a technical reason rather than a real increase in the number of attempts, as reported on the main page of the website:

*Since 2013, the method of collecting and generating statistical data on suicide attempts has changed. Currently, data are entered into KSIP via form KSIP 10 – “Registration of a suicide attempt report” immediately after the event at the moment it is determined that a suicide attempt has occurred. Additionally, the system “freezes” the data with a one-month delay, allowing for modifications in cases where it is determined at a later stage of the procedure that a suicide attempt did not occur.*

The change in how attempted suicides are reported might explain why, from around 2015, the trend of attempted suicides shows a different behaviour that does not resemble the one of the trend of fatal suicides.

The unfortunate increment between 2012 and 2013 in the number of fatal suicides cannot be simply justified by the technical reason reported above. One quantity whose trend might be relevant to compare to that of the suicides is the income but, as shown in the following graphs (3), it does not seem to bring relevant justifications since it is only increasing during the years. Another possibly relevant quantity is the employment ratio (4), unfortunately the only available data start from 2010. The naive assumption initially made was that people aged between 30 and 50 are more likely to commit suicide because of unemployment. The increase of suicides between 2012 and 2013 is present also for that range of age and it looks correlated to the decrease in the employment ratio.

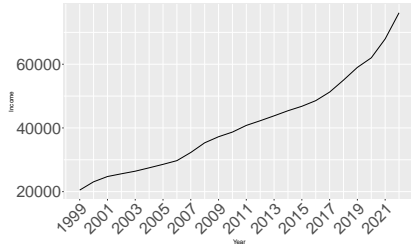


Figure 3: The income

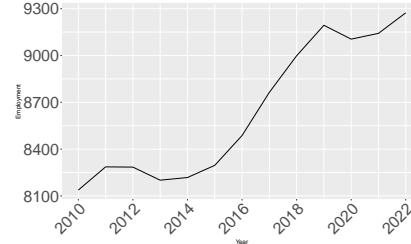


Figure 4: The employment ratio

It is interesting to compare how suicides increased for all the ranges of age available to guess which categories were affected the most (5, 6), in actuality the relative change in suicides for different ranges of years is not guaranteed to be influenced by the employment ratio. It is also interesting to see how people working in different areas committed suicide during the years to look for correlations with the employment ratio (7).

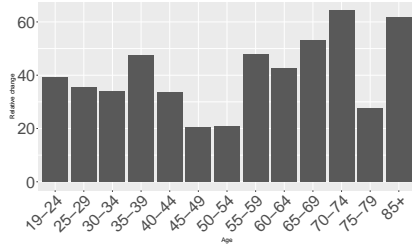


Figure 5: Relative change in fatal suicides from 2012 to 2013

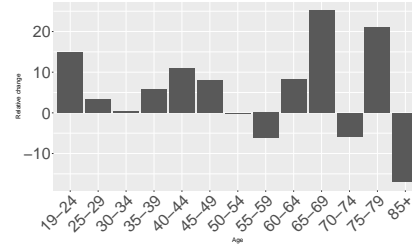


Figure 6: Relative change in fatal suicides from 2013 to 2014

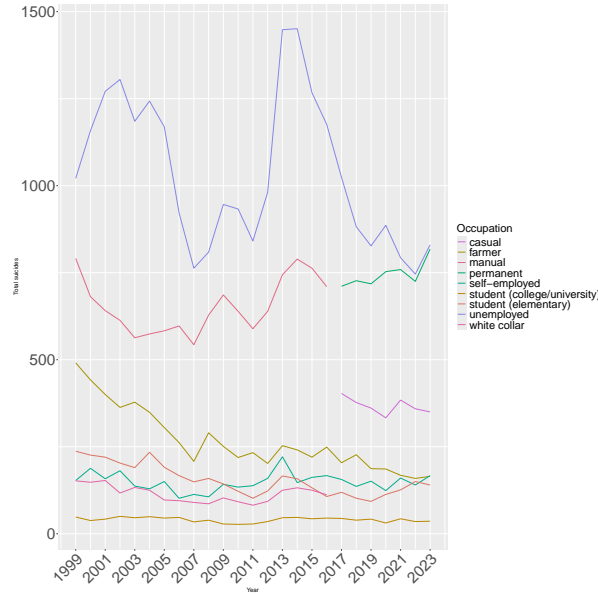


Figure 7: Fatal suicides of people with different jobs

The employment ratio decreased between 2012 and 2013 and, in the same period, unemployed people in particular committed more suicides, then again between 2019 and 2020 the employment ratio decreased and suicides among unemployed people increased. It is worth noticing that, when it comes to age groups, none of them showed a decrease between 2012 and 2013, this suggesting either that unemployed people cover the whole spectrum of ages or that the correlation between the decrease of employment ratio and the increment in suicides by unemployed people is not so strong. Between 2013 and 2014 the situation generally improved.

Between 2019 and 2020 another decrease in the employment ratio took place but, in this case, the increase in the number of suicides was not as significant as the one between 2012 and 2013 (8), moreover, only a few age groups showed an increase in the number of suicides. Between 2020 and 2021, when the employment ratio increased, there was no significant improvement, on the contrary, the number of people aged between 45 and 49, between 55 and 59 and between 70 and 74 that attempted suicide increased (9) whereas it decreased between 2019 and 2020. The enormous increase in the number of suicides between 2012 and 2013 is likely to be the consequence of a more complex phenomenon rather than just the decrease in the employment ratio.

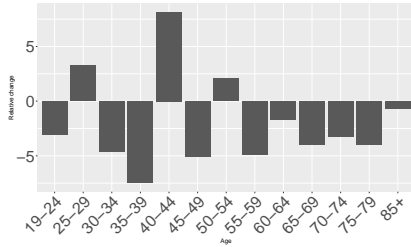


Figure 8: Relative change in fatal suicides from 2019 to 2020

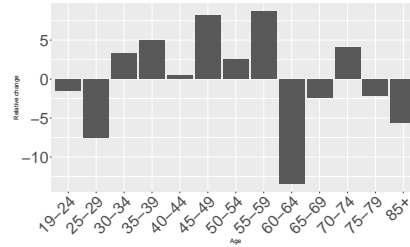


Figure 9: Relative change in fatal suicides from 2020 to 2021

### 3 Focus on the single variables

#### 3.1 City

Figures 10, 11, 12 show that in 2022 the city with the highest rate of suicide attempts per population was Katowice (645 attempts every 100000 people), followed by Rzeszów (377 attempts every 100000 people), Olsztyn (359 attempts every 100000 people), Radom (350 attempts every 100000 people) and Gdańsk (301 attempts every 100000 people). The cities with the lowest rate of suicide attempts per population were Warszawa (34 every 100000), Bydgoszcz (144 every 100000), Szczecin (149 every 100000). The city with the highest rate of fatal suicide attempts per population was Radom (186 every 100000), followed by Katowice (183 every 100000), Rzeszów (145 every 100000) and Olsztyn (142 every 100000). The cities with the lowest rate of fatal suicide attempts per population are Warszawa (19 every 100000), Białystok (51 every 100000), Kraków (53 every 100000). In Poland (36.82 milion of inhabitants), during 2022, 14520 suicide attempts were registered (39 every 100000) of which 5108 resulted in death (14 every 100000), the reason why densities of suicides per inhabitants result higher when considering the single city is probably because the considered population is only relative to the city whereas the registered cases of suicide attempts in the garrisons are comprehensive of a larger area than just the city each garrison refers to.

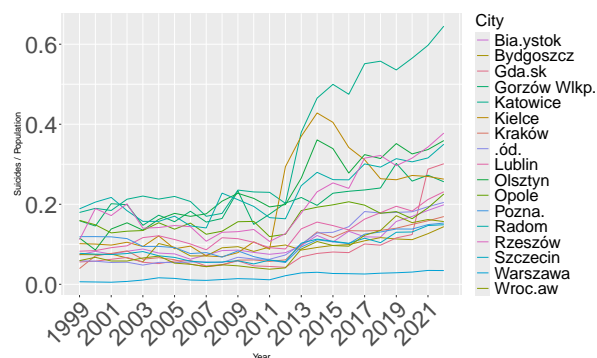


Figure 10: Suicide attempts in different cities from 1999 to 2022

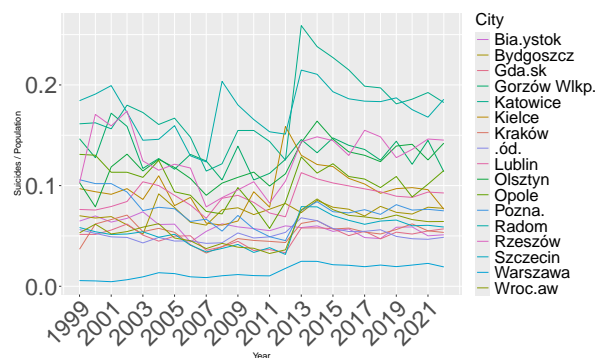


Figure 11: Fatal suicide attempts in different cities from 1999 to 2022

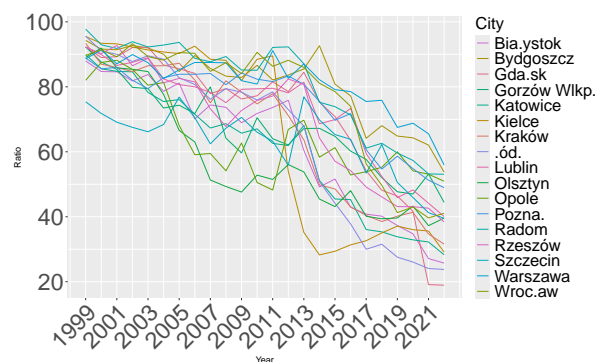


Figure 12: Fatal suicide attempts over all attempts in different cities from 1999 to 2022

### 3.2 Age

As shown in figures 13, 14, 15, the ranges of age that show the most worrying increment in attempted suicides are the youngest ones, whereas the oldest ones keep a slightly increasing trend and appear to be less affected by the economic crisis. People aged over 40 and under 70 are the ones to commit the most fatal suicides and are those who show the most significant increment between 2012 and 2013. Older people are the most likely to unfortunately succeed in their attempt and younger people are the least likely to do so, the difference in this ratio of fatal over attempted suicides increased in time.

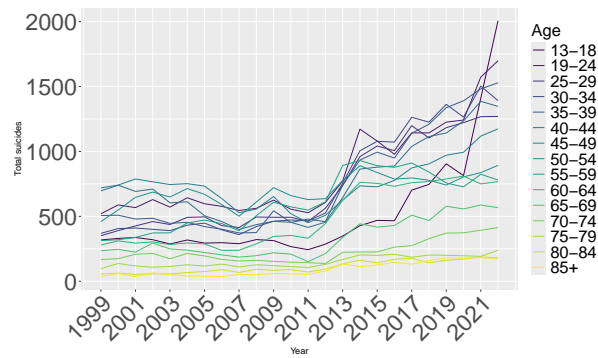


Figure 13: Trend of attempted suicides by age range

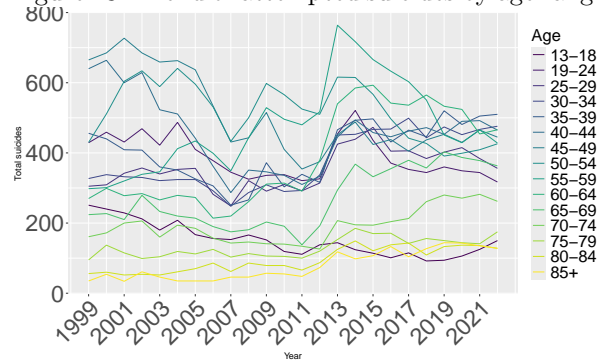


Figure 14: Trend of fatal suicides by age range

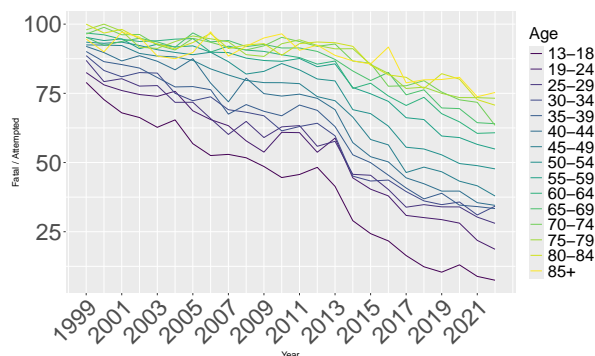


Figure 15: Trend of fatal over attempted suicides by age range

The heatmap in figure 16 confirms that for younger people the ratio of fatal over attempted suicides improved (decreased) in time more than it happened for older people. Figure 17 shows that from 1999 to 2020 there was no significant change in how people from different age ranges attempted suicide in different cities, what is revealed from a first look at the youngest range is that Gdańsk was the city with the smallest number of teenagers attempting suicide in 1999 and became the one with the most teenagers attempting suicide in 2020, whereas in 2015 Opole had a lot more younger people attempting suicide with respect to other cities. There seems not to be an apparent trend that might suggest whether a city needs more prevention programs than others. When focusing on more recent years (2021 and 2022), as in figure 18, apart from noticing again the general increase in the percentages of suicides attempted by the youngest, it becomes more concerning how again Gdańsk displays the greatest percentage of the youngest attempting suicide, this disproves the previous naive conclusion: some serious investigation should be made about why so many teenagers attempted suicide in Gdańsk.

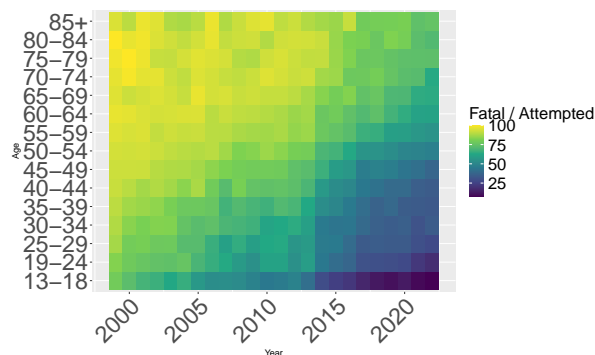


Figure 16: Heatmap of fatal over attempted suicides by age range



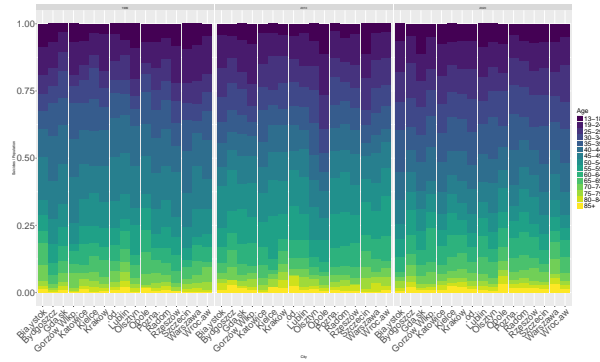


Figure 17: Attempted suicides by age range in 1999, 2010 and 2020

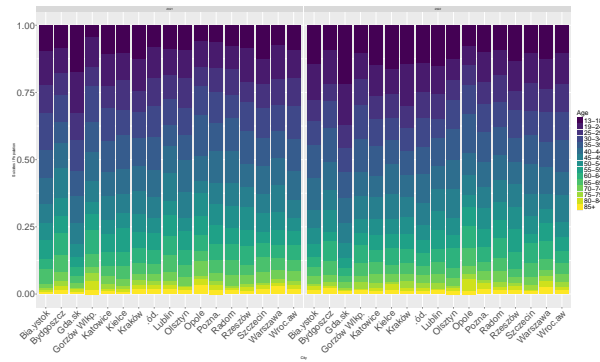


Figure 18: Attempted suicides by age range in 2021 and 2022

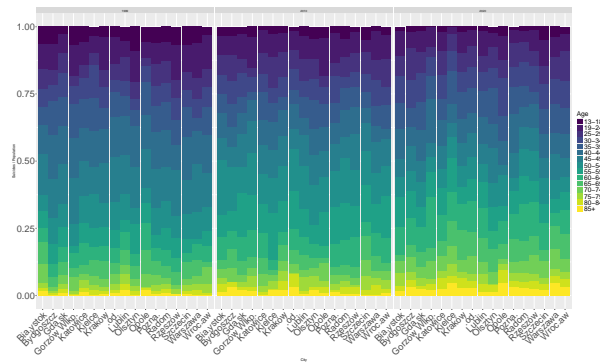


Figure 19: Fatal suicides by age range in 1999, 2010 and 2020

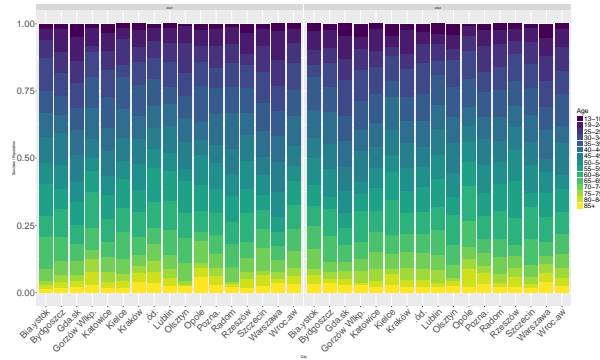


Figure 20: Fatal suicides by age range in 2021 and 2022

Figures 21 and 22 show that the place where most people attempted suicide in 2022 is Katowice, in particular younger people, while focusing on fatal suicides also Radom and Rzeszów appear to be problematic places. The least affected city appears to be Warszawa.

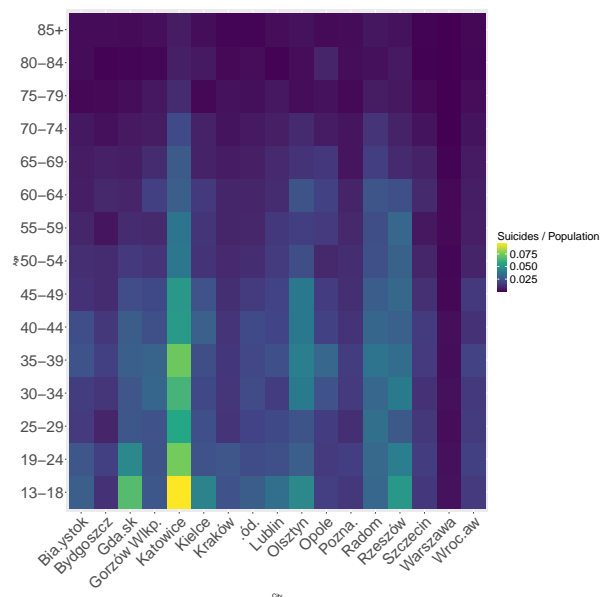


Figure 21: Attempted suicides by age range in 2022 in different cities

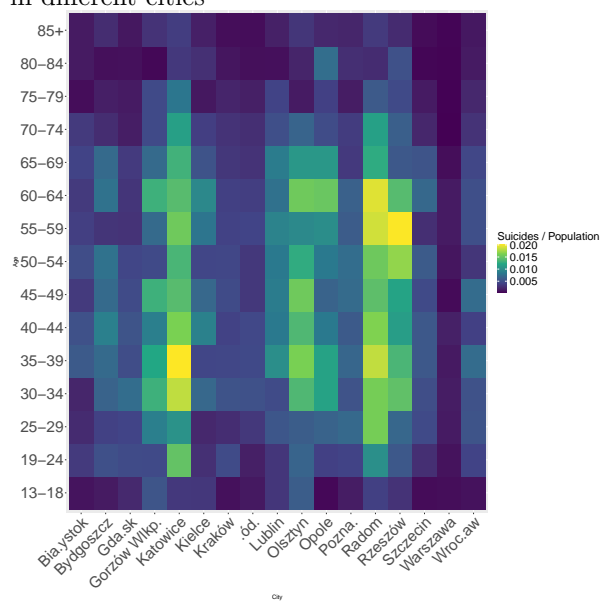


Figure 22: Fatal suicides by age range in 2022 in different cities

### 3.3 Sex

Figures 23, 24, 25 show that the two trends of attempted and fatal suicides for males and females are quite similar up until 2013, with less abrupt changes for females but still increasing and decreasing in the same years men did, then a worrying trend of attempted suicides of women starts after 2017 and it unfortunately reflects in an increment in the number of fatal suicides of women starting from 2018 whereas men, starting from 2019, show a decrease. It is important to remark that the condition of women in Poland still needs improvements, unfortunately some political choices made during the last years did not help <sup>1</sup>:

*The court removed the right to abortions because of birth defects, which had accounted for more than 90% of all abortions. Since January 2021, abortion has been allowed only in cases of rape, incest or when a mother's health is in danger.*

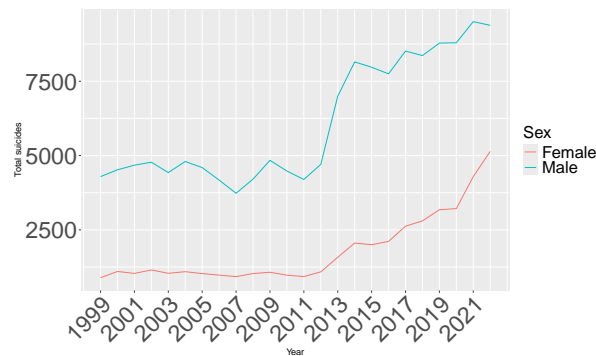


Figure 23: Trend of attempted suicides by sex

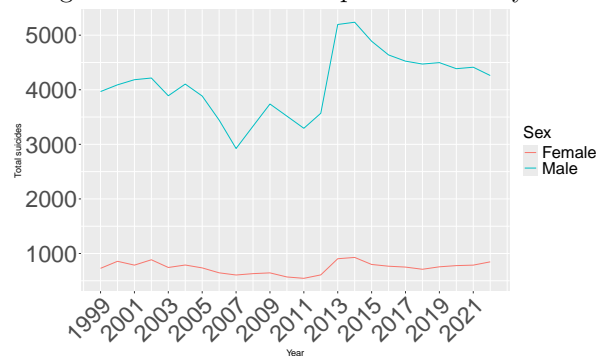


Figure 24: Trend of fatal suicides by sex

<sup>1</sup><https://theconversation.com/why-polands-new-government-is-challenged-by-abortion-228863>

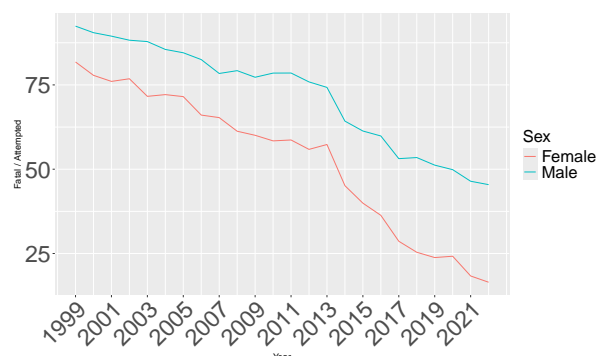


Figure 25: Trend of fatal over attempted suicides by sex

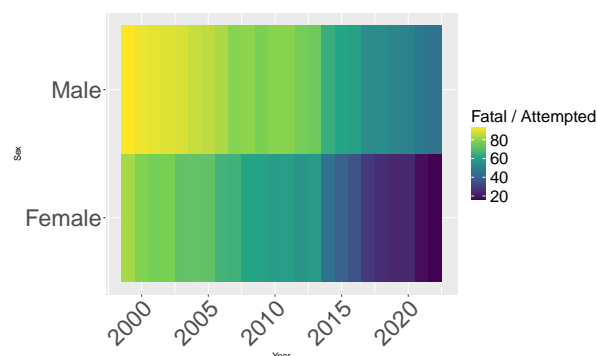


Figure 26: Heatmap of fatal over attempted suicides by sex

Figure 26 shows that in general women are less likely to commit suicide when attempting. From figure 27 it is not easy to spot a city in particular where disparity between women and men is more present than in others, Białystok, Szczecin and Warszawa are among the cities with a higher percentage of women attempting suicide, the peak in Łódź in 2020 does not seem to be part of a trend. Figure 28 shows that women's condition in Łódź worsened, but the most problematic city became Gdańsk. Figures 29 and 30 seem to contradict the sad situation for women in Gdańsk and suggest that Warszawa in 2022 had the worst condition for women to live, but in actuality what the barplots tell is that in Warszawa it is more likely that women end up dead when attempting suicide, this does not suggest by any means that Gdańsk has less serious social issues that lead to depression. Figure 31 shows that the places where women are more likely to die when attempting suicide are Bydgoszcz and Warszawa but, similarly to what suggested above, this is independent from sex since those two cities are also the places where males are more likely to end up dead when attempting suicide. It is worth to investigate why in Gdańsk there were so many

suicide attempts by women.

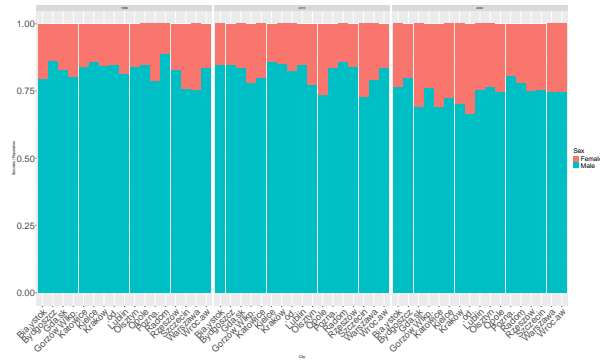


Figure 27: Attempted suicides by sex in 1999, 2010 and 2020

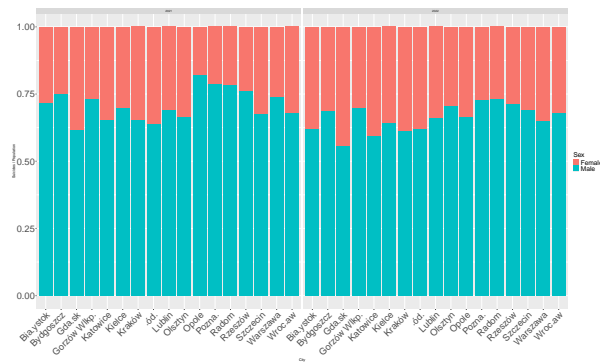


Figure 28: Attempted suicides by sex in 2021 and 2022

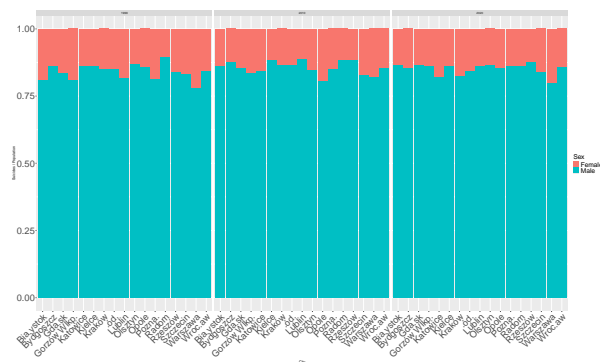


Figure 29: Fatal suicides by sex in 1999, 2010 and 2020

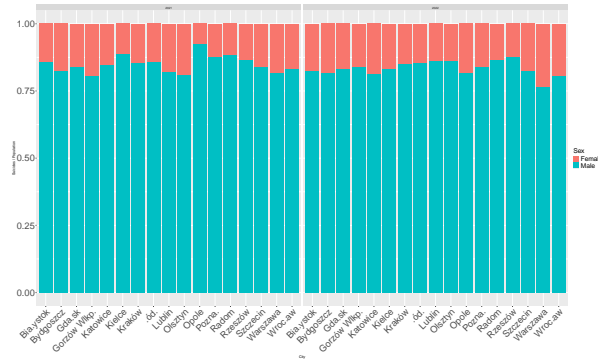


Figure 30: Fatal suicides by sex in 2021 and 2022

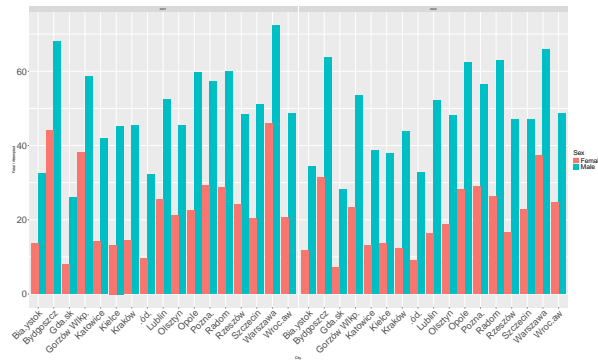


Figure 31: Fatal over attempted suicides by sex in different cities in 2021 and 2022

### 3.4 Place

Figures 32, 33, 34, reveal that the most common place where people in Poland attempt suicide is home, then other common places are farms, basements and forests, suicides committed in farms decreased in time, whereas suicides at home, on the street and on railways increased. The places where most suicide attempts resulted fatal were farms, basements, forests and legal isolations.

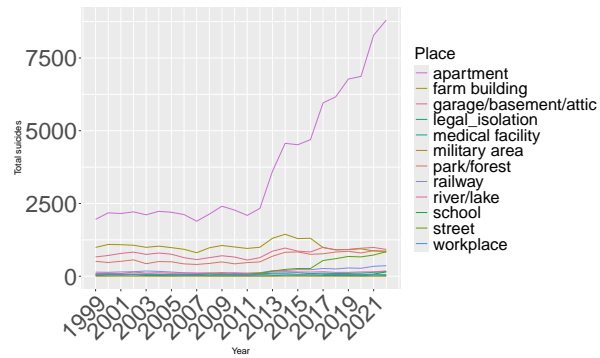


Figure 32: Trend of attempted suicides by place

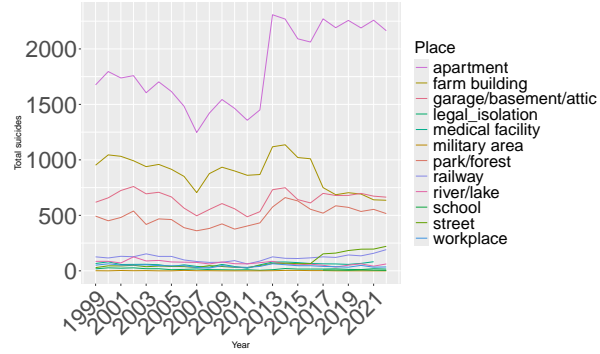


Figure 33: Trend of fatal suicides by place

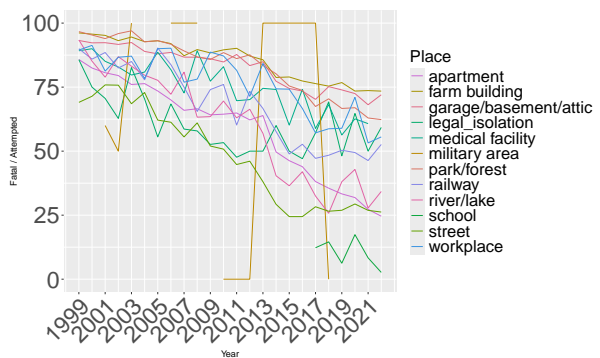


Figure 34: Trend of fatal over attempted suicides by place

The heatmap in figure 35 confirms that suicide attempts inside farms, base-



ments and forests kept a higher fatal outcome rate whereas those in the apartment decreased during the years, suicide attempts in schools have been documented only since 2017 and fortunately they often did not result in death. The row relative to military areas shows abrupt gradients because of the small number of cases, the only time when more than 2 attempts of suicide happened was in 2012 in Lublin (3 attempts, 0 resulted in death).

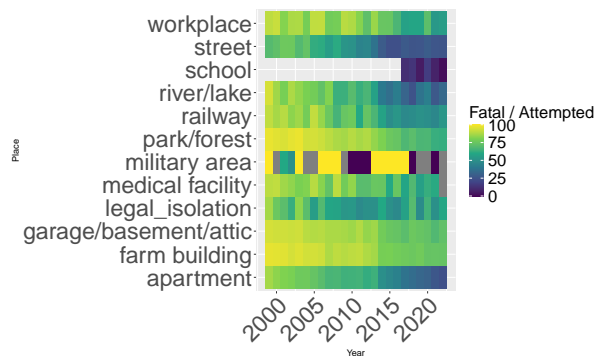


Figure 35: Heatmap of fatal over attempted suicides by place

The barplots in 36 do not reveal particular differences among different cities, and neither do those in 37, barplots in 38 and 39 confirm that among suicides resulting in a fatal outcome those committed in the apartment are less predominant than they are when considering suicide attempts in general.

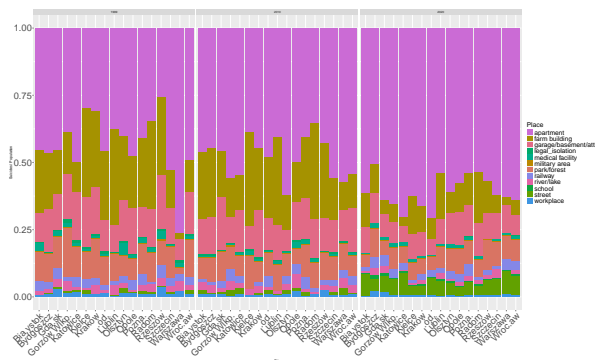


Figure 36: Attempted suicides by place in different cities in 1999, 2010 and 2020

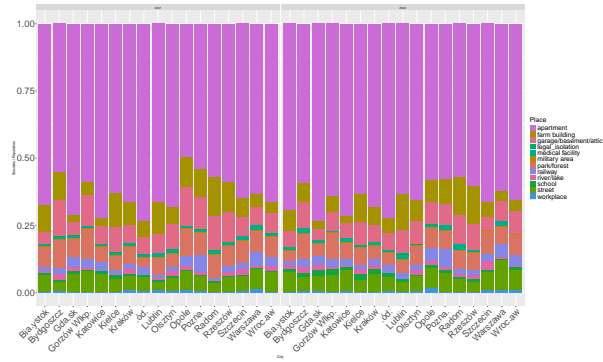


Figure 37: Attempted suicides by place in different cities in 2021 and 2022

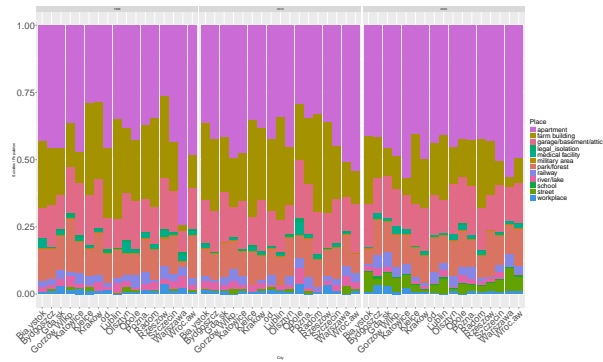


Figure 38: Fatal suicides by place in different cities in 1999, 2010 and 2020

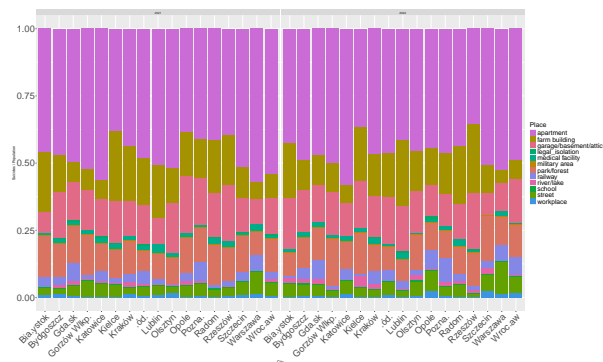


Figure 39: Fatal suicides by place in different cities in 2021 and 2022

Figures 40 and 41 immediately draw the attention to Katowice, the city

where the most suicide attempts (and also fatal) took place.

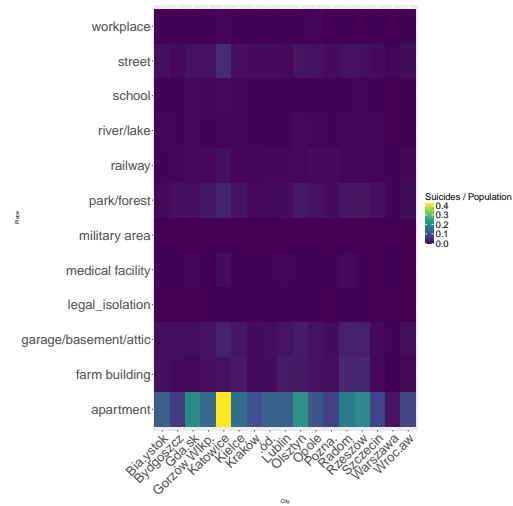


Figure 40: Attempted suicides by place in 2022 in different cities

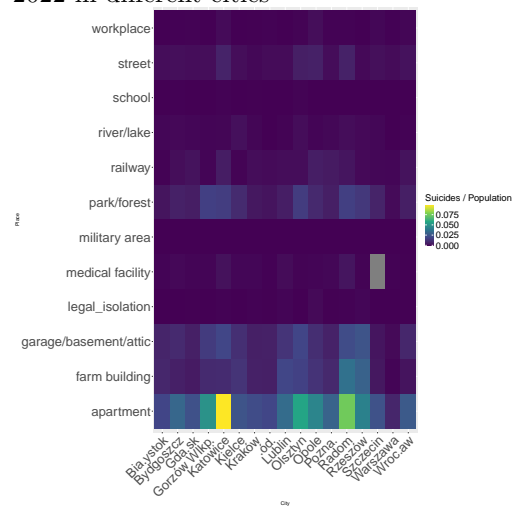


Figure 41: Fatal suicides by place in 2022 in different cities

### 3.5 Way

Figures 42, 43, 44 show that the most common method to commit suicide in Poland is by hanging, then follows an increasing trend in suicide attempts by taking pills, then by self harm and by throwing from a height. The majority of suicide attempts that resulted in a fatal outcome are again by hanging, then by throwing from a height (suggesting that taking pills is not an effective method). In Poland, what resulted as the most effective methods to commit suicide are by shooting and by hanging, the least effective methods are by self harm and taking pills. Unfortunately data about attempted suicides in general are available only after 2013, whereas data about suicides resulting in death are available since 1999.

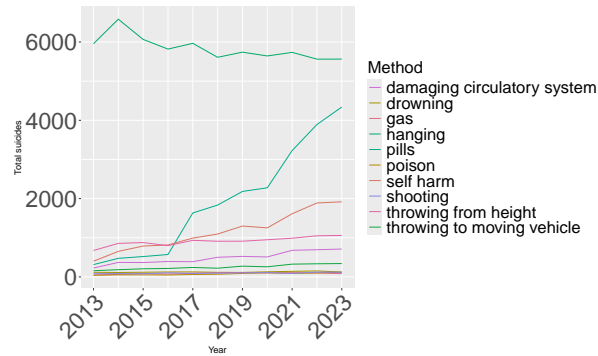


Figure 42: Trend of attempted suicides by way

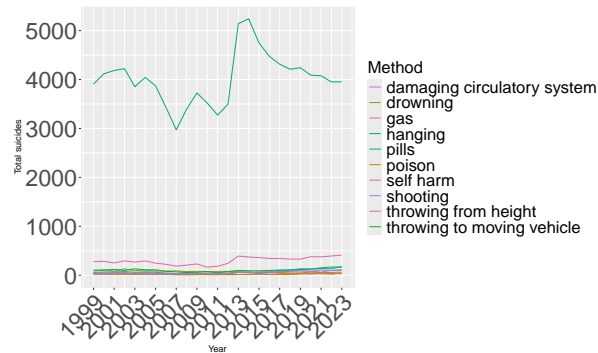


Figure 43: Trend of fatal suicides by way

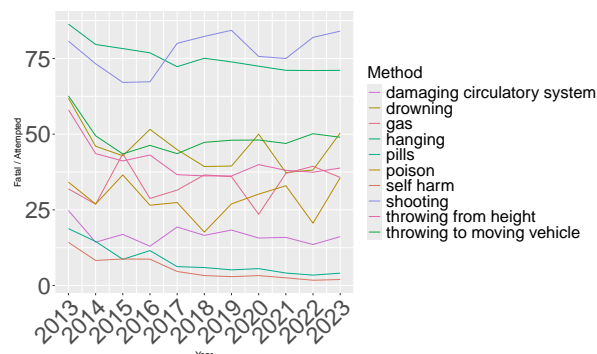


Figure 44: Trend of fatal over attempted suicides by way

Figure 45, similarly to the previous one, does not show any evolution in the effectiveness of suicide methods.

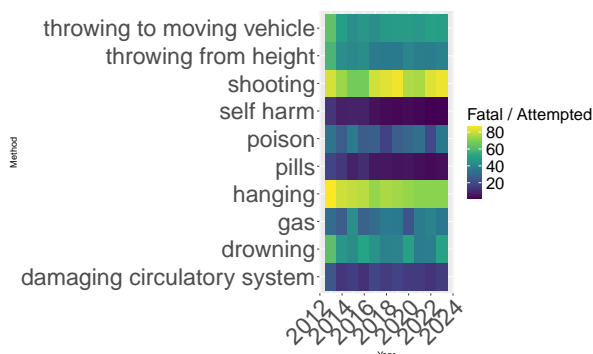


Figure 45: Heatmap of fatal over attempted suicides by way

Figures 46 and 47 show that suicide attempts by taking pills increased in all cities, in Gdańsk and Łódź in 2022 they were even more than suicide attempts by hanging, in the section focusing on sex it was shown that a great number of females attempted suicide in Gdańsk, this might suggest that taking pills is a popular method among females, a similar reasoning can be applied to suicide attempts by self harm, however, such speculations cannot be proved, these correlations could be caused by a hidden variable that would not be easy to uncover. An argument against this hypothesis could simply be that suicide attempts by taking pills increased in percentage in all the cities and not just Gdańsk or Łódź.

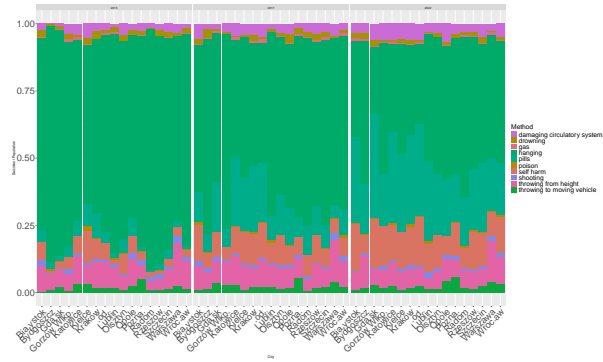


Figure 46: Attempted suicides by way in 2013, 2017 and 2022

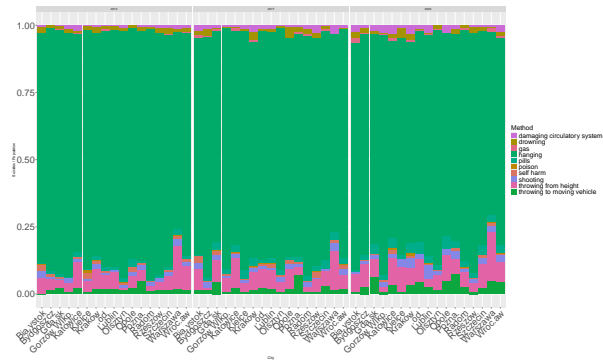


Figure 47: Fatal suicides by way in 2013, 2017 and 2022

Figures 48 and 49 remark how hanging is the most frequently adopted method to commit suicide resulting in death and that Radom was the city with the greatest number of cases by population: 156 every 100000. The other most affected cities were Katowice, Rzeszow and Olsztyn.

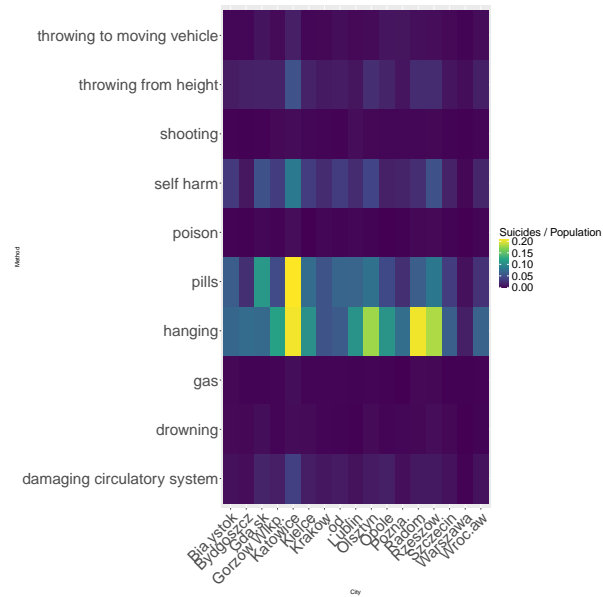


Figure 48: Attempted suicides by way in 2022 in different cities

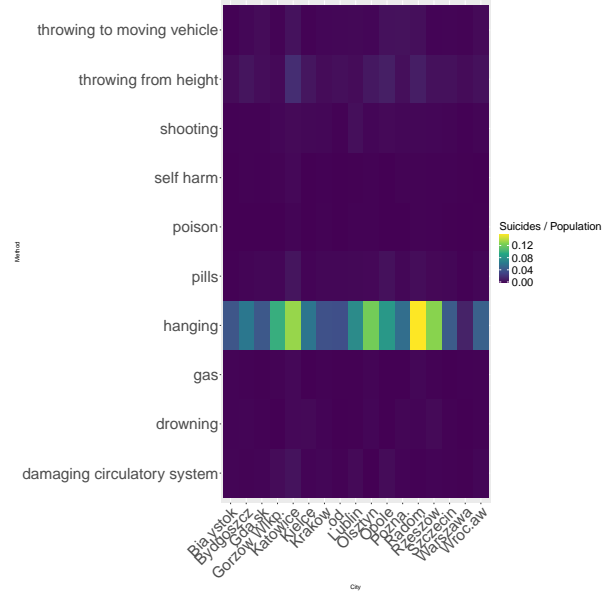


Figure 49: Fatal suicides by way in 2022 in different cities

### 3.6 Reason

Figures 50, 51, 52 show that the most common reason for attempting suicide is mental illness, followed by heartbreak and family problems. When considering fatal suicide attempts, mental illness is the reason that increased the most, although this might be regarded as a reason lead to by other reasons; this is why it is not easy to decide what are the social diseases to work on to contain the phenomenon of suicides as much as possible. Suicide attempts because of school/work problems are unfortunately increasing: in 2020, 2021, 2022 and 2023 they were respectively 159, 240, 313 and 322. The reason that caused the highest fatality ratio is physical illness, followed by disability, loss of health and committing a crime, interestingly enough, none of the most common reasons for attempting suicide is among the ones with highest fatality ratio. Unfortunately, only data about fatal suicide attempts are available since 1999, whereas data about all attempts are available only since 2013.

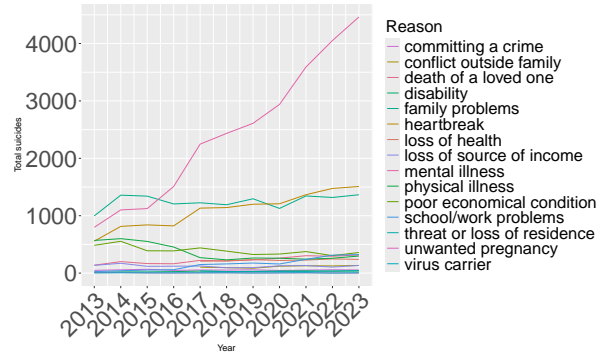


Figure 50: Trend of attempted suicides by reason

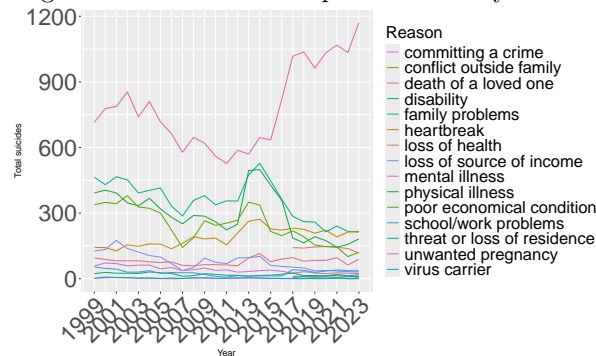


Figure 51: Trend of fatal suicides by reason



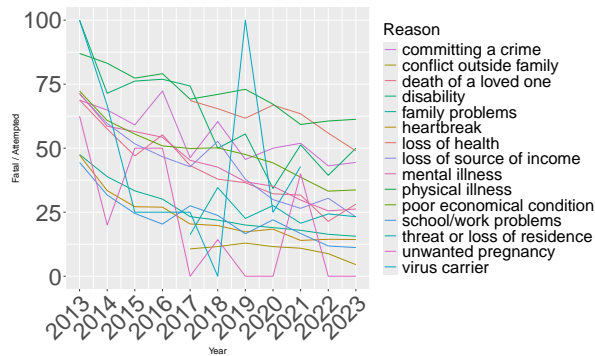


Figure 52: Trend of fatal over attempted suicides by reason

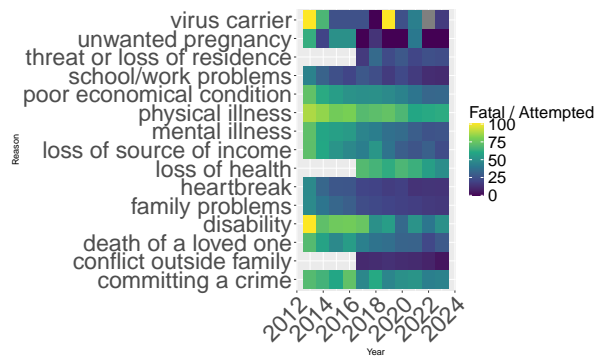


Figure 53: Heatmap of fatal over attempted suicides by reason

In figures 54 and 55 it is shown that family problems, physical illness and poor economical conditions decreased as the percentage of all reasons that lead to suicide (both attempted and fatal suicides), mental illness and school/work problems on the other hand increased.

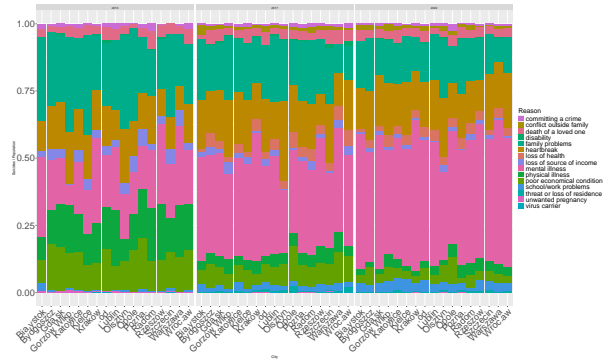


Figure 54: Attempted suicides by reason in 2013, 2017 and 2022

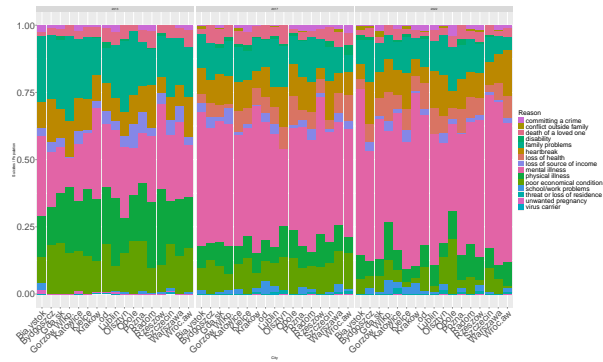


Figure 55: Fatal suicides by reason in 2013, 2017 and 2022

In figures 56 and 57 it is again confirmed that mental illness is the most common reason for attempting suicide and that Katowice, Rzeszow and Radom are the most problematic.

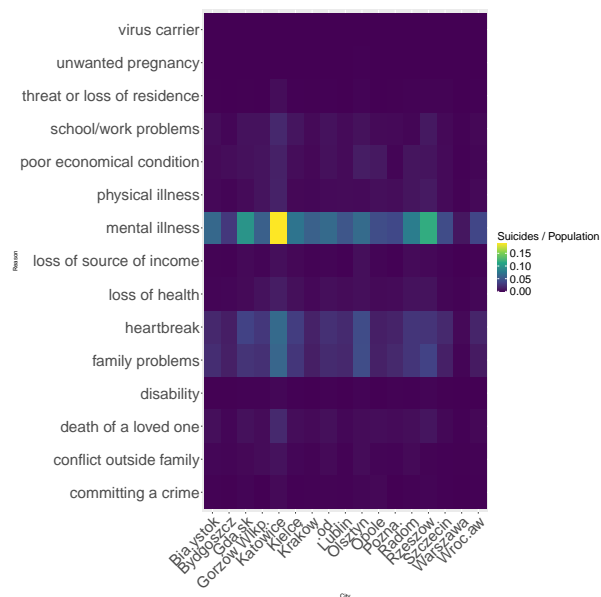


Figure 56: Attempted suicides by reason in 2022 in different cities



Figure 57: Fatal suicides by reason in 2022 in different cities

### 3.7 Status

As shown in figures 58 and 59, the majority of people attempting suicide were single, then married. Regarding suicides with a fatal outcome, since 2014, the numbers have been decreasing for married people and have been increasing for single people.

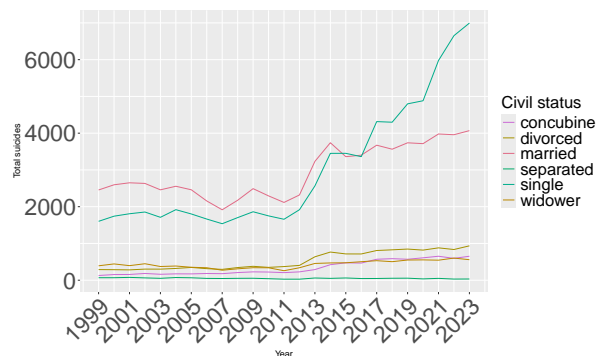


Figure 58: Trend of attempted suicides by civil status

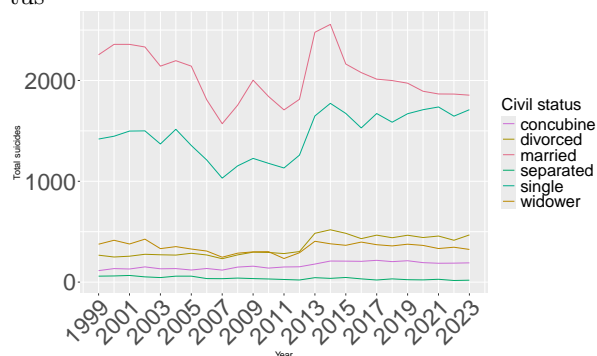


Figure 59: Trend of fatal suicides by civil status

For all of the social statuses the fatality of the attempts seems to have been decreasing: again, this is not because people have been failing more and more often when attempting suicide, but rather because many more cases have been registered as attempted during the last years than they have been during the first years the data have been made available since, and this could be justified by the technical reason explained at the beginning of the document.

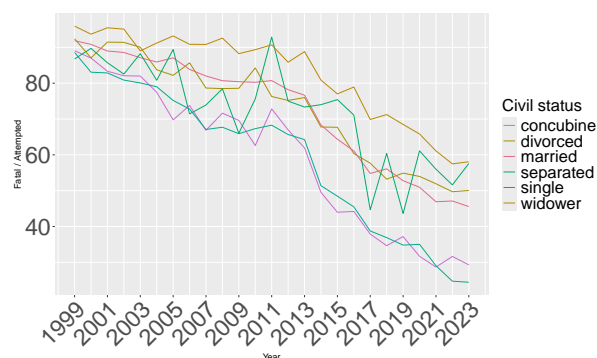


Figure 60: Trend of fatal over attempted suicides by civil status

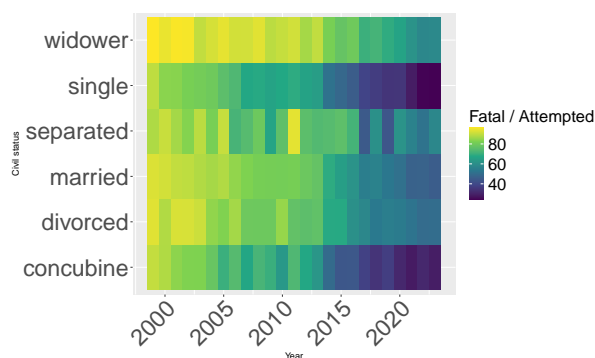


Figure 61: Heatmap of fatal over attempted suicides by civil status

By what is shown in figure 63 the first thing that can be noticed is the peak in the percentage of single people attempting suicide in Gdańsk in 2021, 2022 and 2023, with a similar reasoning to the one made regarding suicide attempts by taking pills in Gdańsk, it could be investigated whether single women are more likely to commit suicide; if that was the case then it could make sense to investigate whether heartbreak was a major reason for attempting suicide in the last years but Gdańsk does not display any relevant peak in 54, this could either mean that single women are more likely to commit suicide but not because of a heartbreak or that the correlation is simply coincidental or caused by a hidden variable.

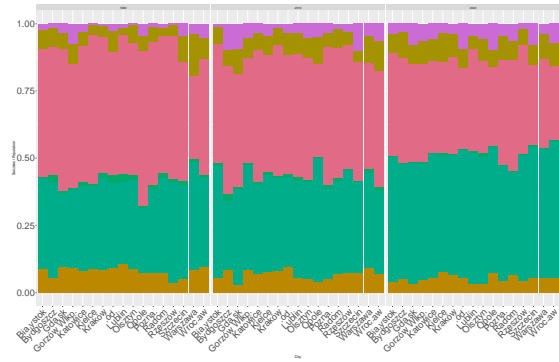


Figure 62: Attempted suicides by civil status in 1999, 2010 and 2020

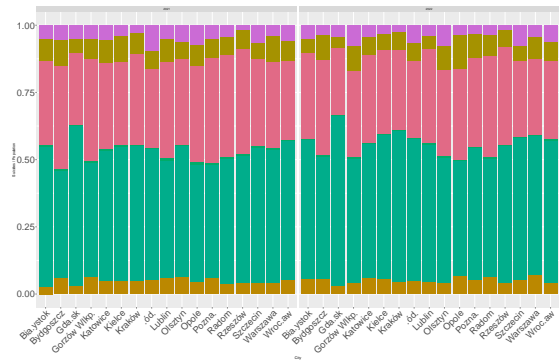


Figure 63: Attempted suicides by civil status in 2021 and 2022

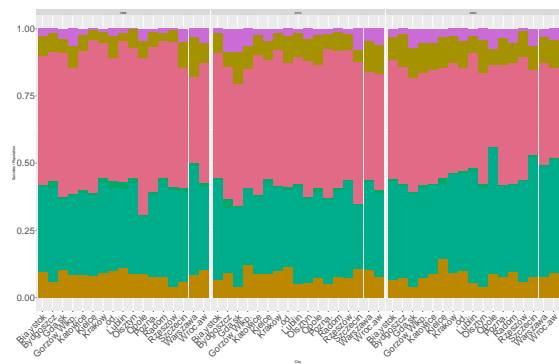
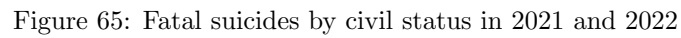


Figure 64: Fatal suicides by civil status in 1999, 2010 and 2020



31

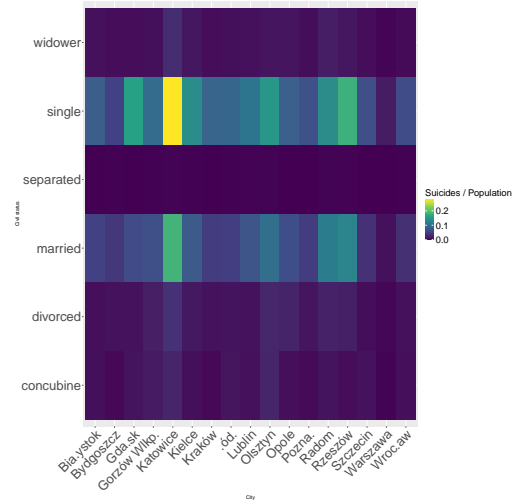


Figure 66: Attempted suicides by civil status in 2022 in different cities

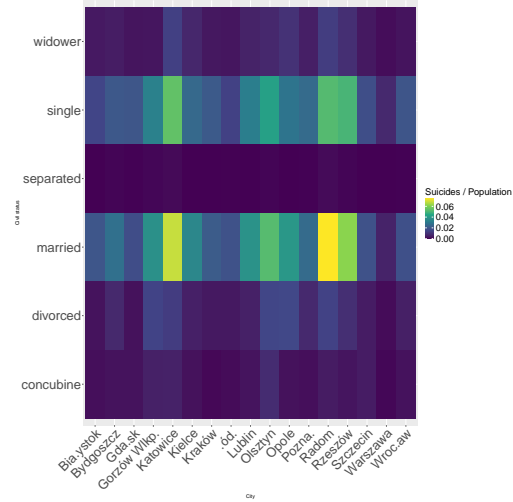


Figure 67: Fatal suicides by civil status in 2022 in different cities

### 3.8 Education

The plots 68, 69 and 70 show an unprecedented behaviour: the attempted suicides by people with a basic, medium or technical/professional education decreased until 2011 and then increased. The trend in the suicide attempts with a fatal



outcome decreased until 2011 for the previous categories (which are also the three with the greatest numbers) but did not increase after. The reason for the dissimilarity between the trends focusing on education and the more general ones such as those focusing on sex (23) or on total values (1) is that the cases labeled with an education level are the minority, as an example, in 2022 there were 14520 suicide attempts, 9421 of which, were not labeled with any education.

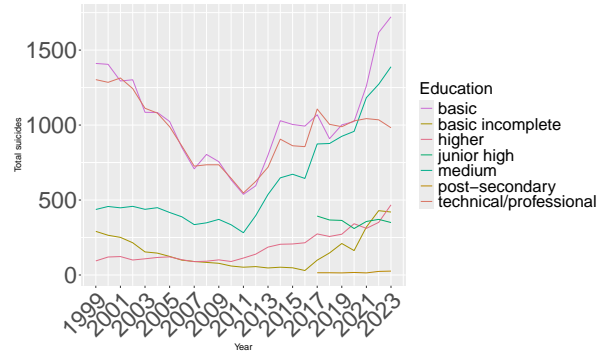


Figure 68: Trend of attempted suicides by education

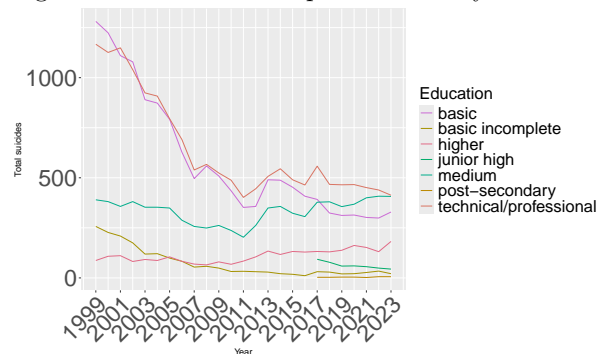


Figure 69: Trend of fatal suicides by education

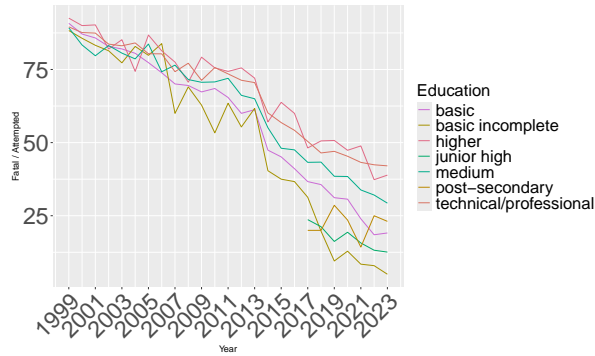


Figure 70: Trend of fatal over attempted suicides by education

From the barplots representing the percentage of each education level in the different cities ( 71, 72, 73, 74) it is not easy to spot any relevant trend that could suggest that a city has a higher scholarization level than another, and even if the plots had shown such a trend, a further investigation would have still been needed because the majority of the cases were not labeled with an education level.

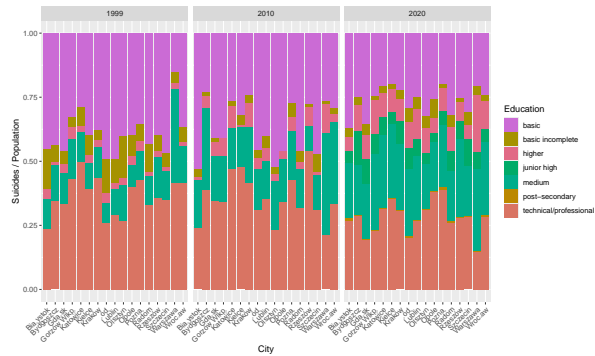


Figure 71: Attempted suicides by education in 1999, 2010 and 2020

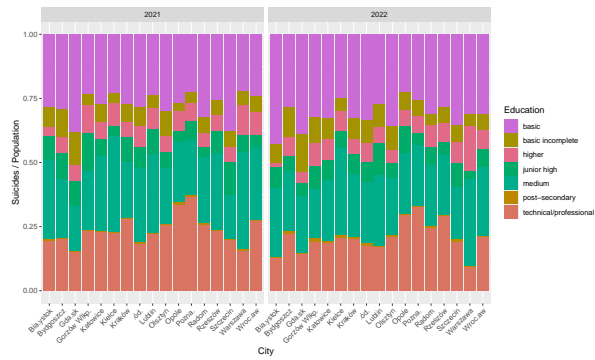


Figure 72: Attempted suicides by education in 2021 and 2022

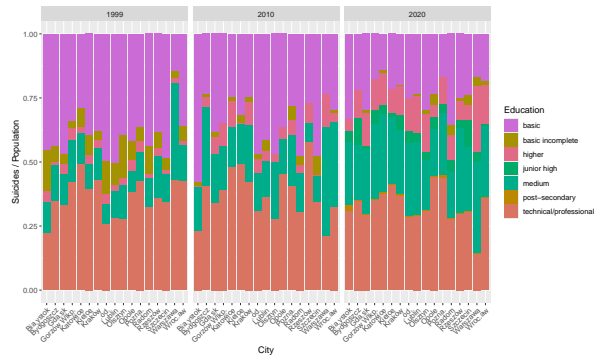


Figure 73: Fatal suicides by education in 1999, 2010 and 2020

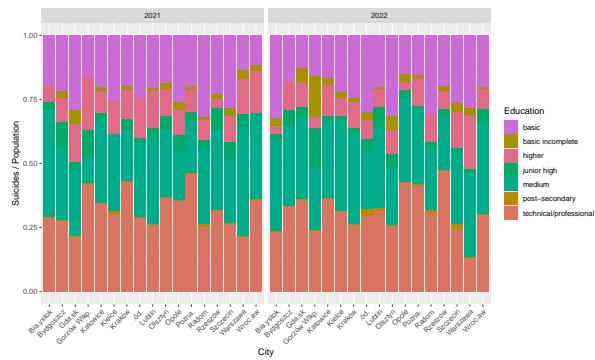


Figure 74: Fatal suicides by education in 2021 and 2022

Figures 75 and 76 again show that, in 2022, basic, medium and techni-

cal/professional education were the most common among the few labeled cases and that Katowice had the greatest number of suicide attempts by population, on the other hand Rzeszów had the greatest number of fatal suicide attempts by population.

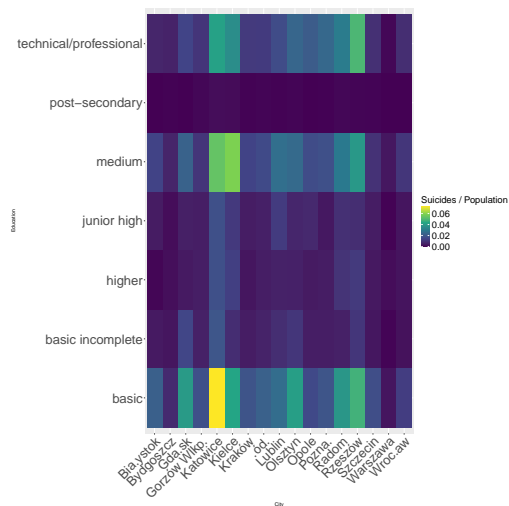


Figure 75: Attempted suicides by education in 2022 in different cities

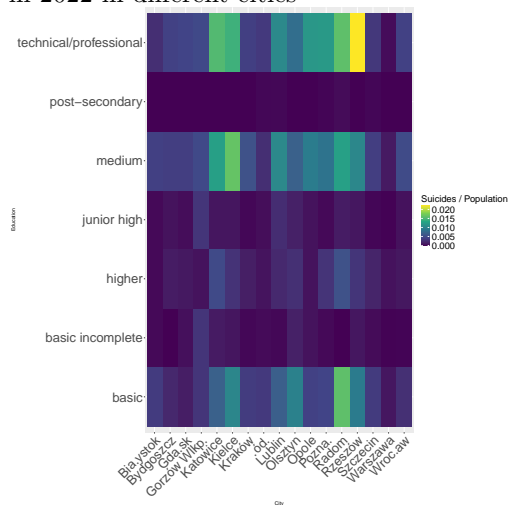


Figure 76: Fatal suicides by education in 2022 in different cities

### 3.9 Job

As it happened for the data on education levels, the majority of suicide cases were not labeled with the job of the victim, because of this, a satisfactory analysis on the influence of the job on committing suicide is not possible. In figure 77 and 78 it is shown that most of the people that committed suicide were unemployed, as argued in the first part of the document, the reason could be the decrease in the employment ratio (or it could be another reason that lead to both phenomenons). The most concerning trend is the one of suicide attempts by elementary students (uczeń, that is, students in primary and secondary school, below the university level), what could explain such an abrupt increase since 2020 is the Covid pandemic. Looking back at figure 13 it becomes more evident how people among 13 years old to 18 years old attempted a lot more suicides from 2020 to 2022, without doubt they were the most affected by the pandemic and probably other related reasons. People that most frequently died when attempting suicide were farmers, this is coherent with what observed in figure 34, that is, people that most frequently died when attempting suicide were found in farm buildings. University students, white collars, farmers and self employed kept an almost constant trend and were the people that committed the least suicides.

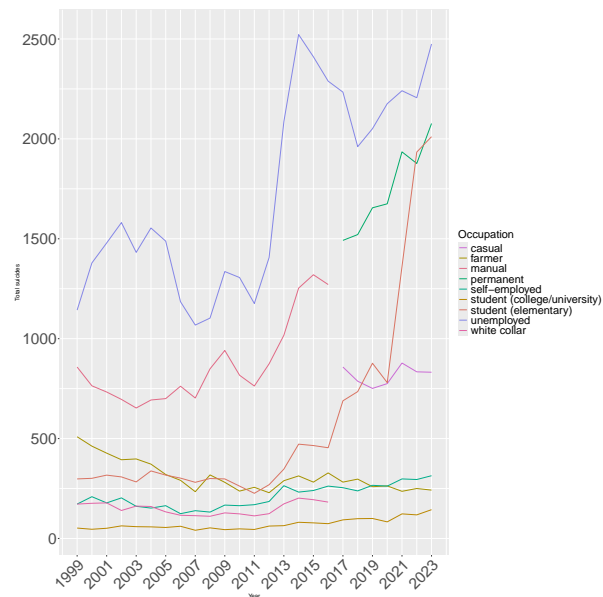


Figure 77: Trend of attempted suicides by occupation

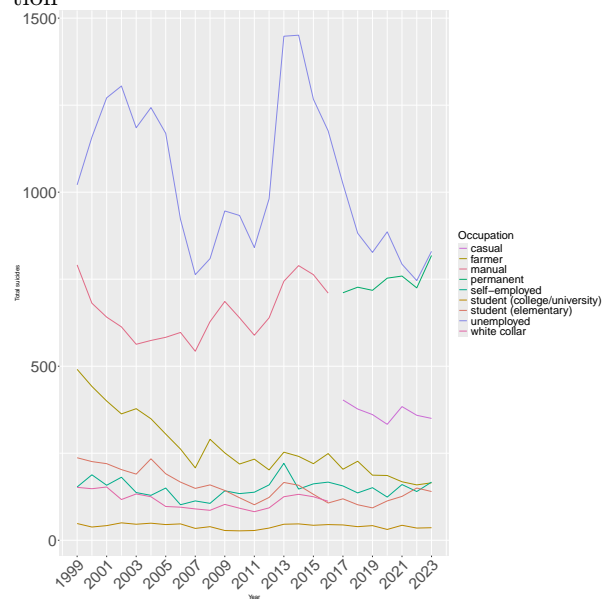


Figure 78: Trend of fatal suicides by occupation

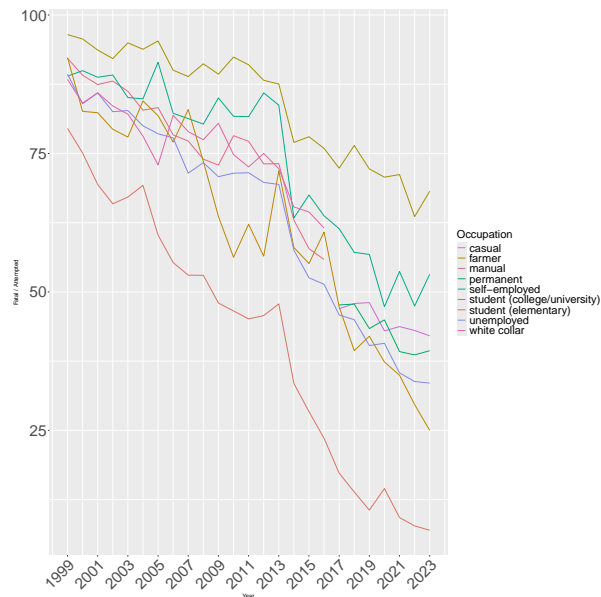


Figure 79: Trend of fatal over attempted suicides by occupation

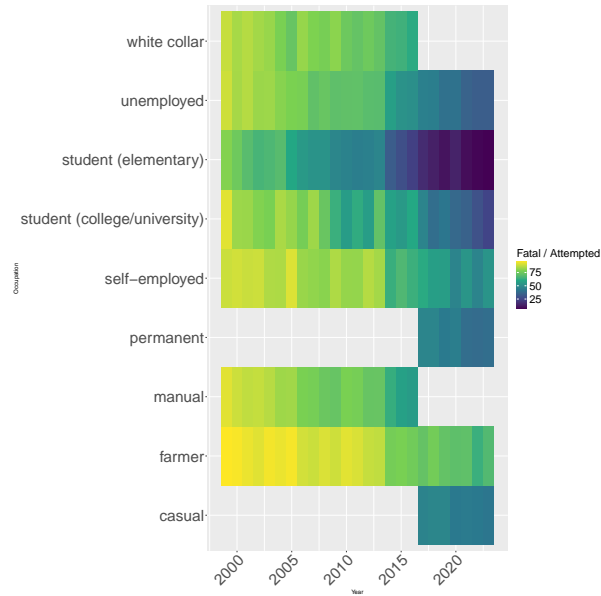


Figure 80: Heatmap of fatal over attempted suicides by occupation

The barplots in figures 81 and 82 show again how the number of students

under university level that attempted suicide increased, moreover, before 2020 Gdańsk had not shown any peak but, since 2020, the percentage of students over other categories of workers committing suicide has been increasing.

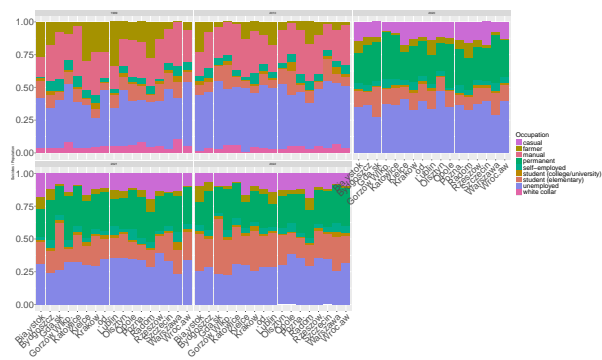


Figure 81: Attempted suicides by occupation in 1999, 2010 and 2020

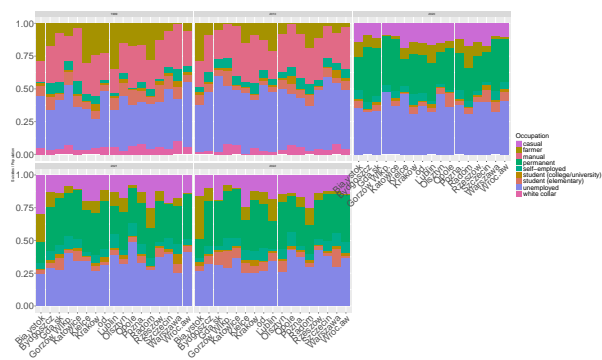


Figure 82: Fatal suicides by occupation in 1999, 2010 and 2020

The heatmaps in 83 and 84 show that the categories committing more suicides over population are students, unemployed and permanent workers, the most affected cities are Katowice, Rzeszow and Radom.



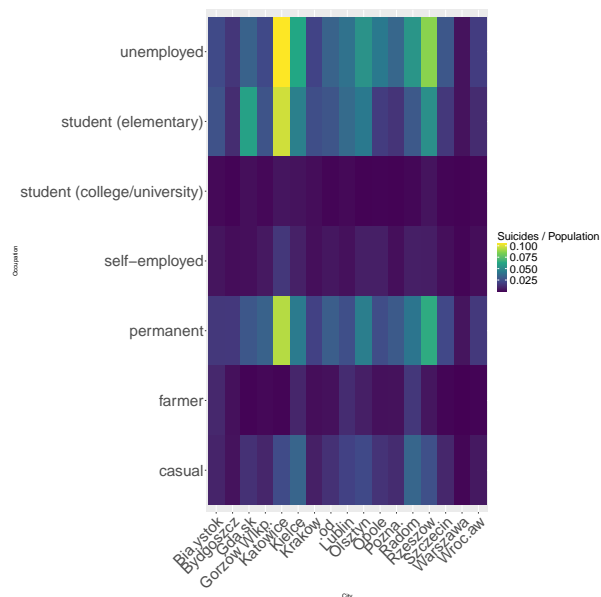


Figure 83: Attempted suicides by occupation in 2022 in different cities

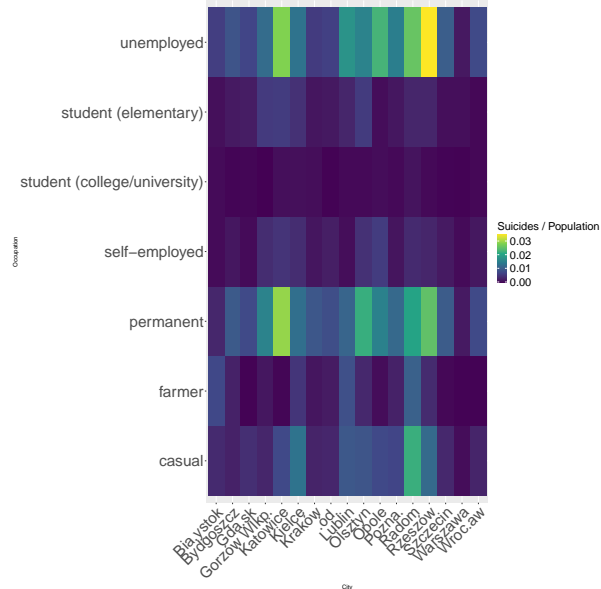


Figure 84: Fatal suicides by occupation in 2022 in different cities