
Drowning Rates as a Qualitative Aspect of Regional Development

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Abstract:

Purpose: Spatial and social aspects of safety of people using water areas in the West Pomeranian Region in 2011–2015 with the use of drowning indicators are presented. The main research problem concerned the dependence of the number and distribution of drownings on spatial and social factors.

Design/Methodology/Approach: The achievement of the research objective defined in this way was achieved using the methods of descriptive statistics in conjunction with data from spatial information databases. This allowed for the presentation of a unified drowning index and for the determination of new drowning indexes in water areas in terms of quality.

Findings: The drowning rate may be a diagnosed qualitative feature that allows identifying regional development with a constant increase in the living standards of the region's inhabitants. The drowning index as well as other regional development indicators may be affected by changes in the economic potential, economic structure, natural environment, infrastructure development, spatial order, and spatial development. threats to the safety of people staying in water areas, including the identification of the most endangered areas, types of reservoirs and groups using water in the West Pomeranian Region

Practical Implications: The results of the research may contribute to the adoption of the drowning index as a qualitative aspect of the analyses of regional development in Poland.

Originality/Value: An attempt was made to focus on drowning, which, in the authors' opinion, should be one of the elements of qualitative assessments of regional development regarding the transformation of socio-economic structures, because of which they acquire a new feature.

Keywords: Drowning index, regional development index, water safety.

JEL codes: O18.

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1. Introduction

The Organization for Economic Cooperation and Development (OECD) indicates that regional development policy can be understood as an effort to reduce regional disparities, which can be influenced by providing development opportunities and a high standard of living for inhabitants of different types of regions (OECD Regional Outlook, 2016). Influencing regional growth can be considered in terms of economic, social, environmental, political, or cultural (Pike, Rodriguez-Pose and Tomaney, 2007; Gennaioli and La Porta, 2013).

In this paper, an attempt was made to focus on one of the qualitative aspects of regional development, concerning the transformation of socio-economic structures because of which they acquire a new feature (Kłóska, 2015). The drowning rate may also be a diagnosed qualitative feature that allows identifying regional development with a constant increase in the living standards of the region's inhabitants (Nijkamp and Abreu, 2009). The drowning index and other regional development indicators may be affected by changes in the economic potential, economic structure, natural environment, infrastructure development, spatial order, and spatial development (Kudłacz, 1999). As Kłóska and co-authors emphasize, regional development is multidimensional and can be considered from different points of view (Kłóska, Ociepa-Kicińska *et al.*, 2020).

In Poland, 76 indicators of sustainable development are comprehensively analysed with the use of 26 indicators of social order. The others are environmental, economic, and institutional and political governance indicators (Urząd Statystyczny w Katowicach, 2011). In practice, only selected measures are usually analysed (Brzoska and Lewandowska, 2013). Many qualitative analyses include indicators such as infant deaths per 1,000 live births or the number of road fatalities per 100,000 inhabitants. Both death-based examples point to an important aspect of human development. Highly developing societies attach great importance to the aspects of survival (Adamczyk *et al.*, 2020; Lunetta *et al.*, 2004; Stanula *et al.*, 2015). Infant deaths may indicate not only the condition of the medical infrastructure, management of health care processes, but also indicate the conscious policy of the state related to prenatal care as well as the high pro-health awareness of mothers, which depends on the processes of education, upbringing, and social education (Hossain *et al.*, 2015). Road accidents, which are the most frequent causes of death in statistics in many countries around the world, should be considered in a similar way (Truhlar, Deakin *et al.*, 2016; World Health Organization, 2014).

However, in the analysed region a higher mortality rate in water than on roads was recorded in one year (Zalewski and Świątek, 2017). Improving road infrastructure reduced the number of accidents (Botric, Sisinacki, and Skufflic, 2006; McAndrews *et al.*, 2016), and adequately in water areas, investments in ports, marinas and aquatic facilities attracted a larger population to the water and may have contributed to an

increase in drowning accidents. Along with the development of civilization, there is a need for an increased demand for spending free time, among others, by the water (Myśliwska, 2011).

Taking the above into account and comparing this fact with the evolving concept of sustainable development, the purpose of which is to meet the current needs, without endangering future generations (The World Commission on Environment and Development, 1987), an attempt was made to inventory drownings and analyse their possible indicators in order to find dependencies or find trends in the West Pomeranian Region in 2011-2015, which could constitute a valuable direction for institutions influencing the shaping of policies related to regional development in the context of the safety of people staying in water areas.

2. Research Area and Methodology

For the purposes of this study, the analysed region of the West Pomeranian region compared to Poland is identified with each of the sixteen existing regions in 2011-2015 in accordance with the Nomenclature of Territorial Units for Territorial Statistics (NTS) in force in Poland, prepared based on the European Nomenclature of Territorial Statistics Units (NUTS). The region included in the study is of size corresponding in this classification to the NUTS 2 level as a unit of the administrative division of the second-level country, as indicated by many authors (Korenik, 1999; Strahl, 2005; Paradysz 2012).

In the analysis of the structure of drowning in relation to the area of Poland, data from the databases from the National Police Information System (data on the nature and types of water areas) and the Police Headquarters statistics reports were used, while in relation to the West Pomeranian Region - data from the Provincial Police drowning reports Headquarters in Szczecin from 2011-2015. An international rate of drowning per year was adopted per 100,000. Inhabitants (Truhlar *et al.*, 2016), comparing four categories of water bodies, sea, flowing water, stagnant water, and other bodies of water. Regarding drowning in the sea, the coefficient per 100 km of coastline of two coastal regions was compared: West Pomeranian and Pomeranian.

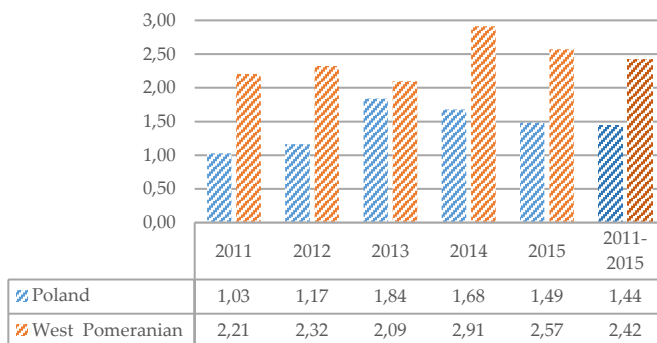
To present drownings in inland areas, comparisons were made of the rate of drowning in standing waters per 1000 ha of water surface in Poland and in the West Pomeranian Region. To show drowning in rivers, the coefficient of drowning in flowing waters per 1000 ha of water surface in the country and the region was compiled. To illustrate the circumstances of the incident, which include the five most common situations, bathing (unguarded places), bathing (prohibited places), imprudence while being by the water, fishing and other circumstances and no data, the drowning rate per 100,000 residents by the circumstances of the event in Poland and the West Pomeranian Region.

In the social area, analyses were made to compare the rate of drowning by sex per 100,000 inhabitants in Poland and the region. The drowning rate in the country and region was also compared by six age groups (0-7, 8-14, 15-18, 19-30, 31-50, over 50) and sobriety (sober or not established and intoxicated, if established). In order to better present the problem under study, comparisons were also made of the structures of drowning in Poland and the West Pomeranian Region in 2011-2015 by type of reservoir, circumstances of the event, sex, age and sobriety of people.

3. Results and Discussion

The analysis includes 14 figures and tables showing the rates of drowning per 100,000 inhabitants by geographical and social aspects and comparing the structure of drowning in the West Pomeranian region compared to Poland in 2011-2015.

Figure and Table 1. Drowning rate per 100 thousand inhabitants in 2011-2015 in Poland and in the West Pomeranian Region

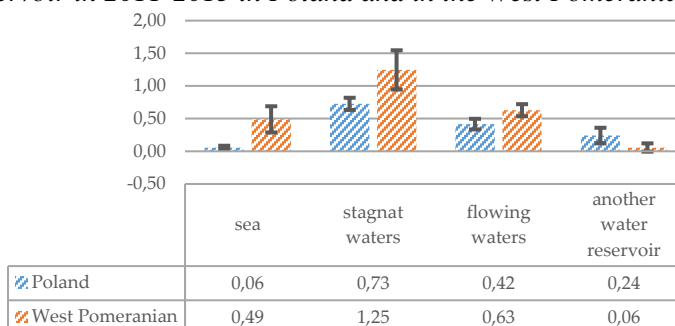


Source: Own study.

In the first part of the analysed period, presented in Figure and Table 1 shows a clear increase in the number of drownings, mainly at the national level. The indicator reached its maximum values in 2013 in Poland (an increase by 79% compared to 2011), and in 2014 in the West Pomeranian Region (an increase by 31% compared to 2011). 2015 is the first and only year in which the number of drownings decreased compared to the previous year at both analysed levels.

Throughout the analysed period, a clearly higher value of the number of drownings per 100,000 inhabitants in the West Pomeranian Region. This difference in four out of five analysed years was more than 1.0 drownings per 100 thousand residents. An exceptional characteristic is shown in 2013, when this difference was significantly smaller and amounted to 0.25 drownings per 100 thousand residents. This is the only case of values below the difference between the ratios established jointly for the entire period (0.98). The values of the indicator at the national level show greater variability than at the region level.

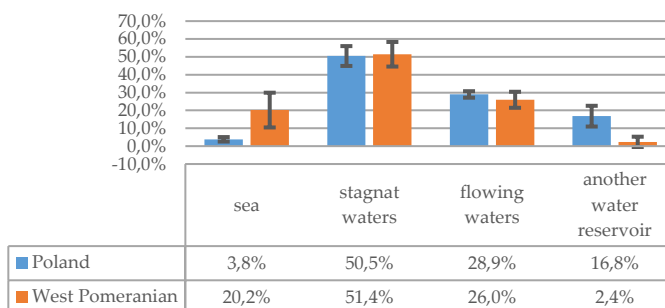
Figure and Table 2. Comparison of the drowning rate per 100 thousand inhabitants by type of reservoir in 2011-2015 in Poland and in the West Pomeranian Region



Source: Own study.

In the conducted analysis, Figure and Table 2, water reservoirs are divided into four categories: sea, flowing waters, and among stagnant waters, lake, lagoon, and pond. There are significant differences between the national and regional levels, especially in terms of sea and another reservoir. The increased number of drownings in terms of stagnant and flowing waters can be described in conjunction with the data in Figure and Table 1, which makes it possible to explain the differences in these categories with the difference in indicators calculated in total. The other tank category is the only one where the index value is higher at the national level. The indicator in the sea category is over eight times higher in the West Pomeranian Region than in Poland. There is a noticeable greater variability in individual categories between years at the regional level.

Figure and Table 3. Comparison of drowning structures in 2011-2015 by type of reservoir in Poland and in the West Pomeranian Region

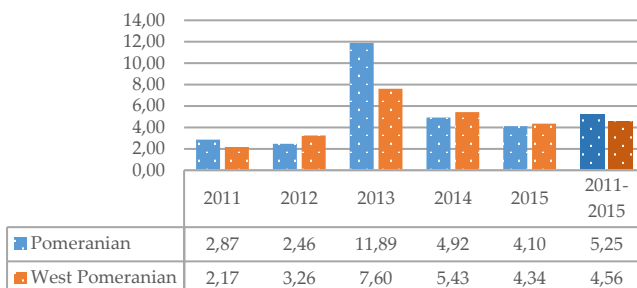


Source: Own study.

Figure and Table 3 confirms the observation concerning Figure and Table 2. A characteristic feature of the West Pomeranian Region is a significantly higher share of drowning in the sea, while in the territory of the country drowning in the other reservoir category has a much higher share. The similar number of drownings in the flowing water category and, in particular, in the standing water category (0.9 pp) is

noteworthy. In both categories, the variability between individual years is greater in relation to the West Pomeranian Region.

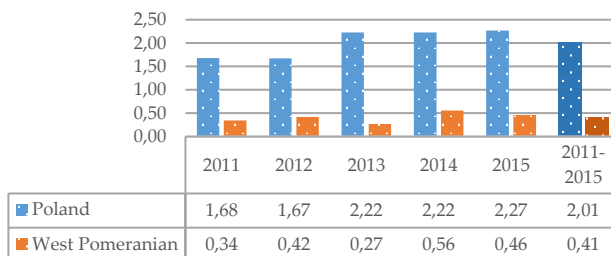
Figure and Table 4. Comparison of the sea drowning rate per 100 km of coastline in 2011-2015 in the West Pomeranian and Pomeranian regions



Source: Own study.

Data analysis in Figure and Table 4 concerning the rate of drowning in the sea in two coastal regions indicates a similar time system. Relatively low values in 2011-2012, record high values in 2013 and significantly lower than in 2013 values in 2014-2015, however, higher than the indications from 2011-2012. The coefficient for the entire period is higher in the Pomeranian Region, although at the same time, when examining individual years, it can be noticed that in 3 out of 5 cases the values were higher in the West Pomeranian Region. The value of the ratio for the entire period is therefore probably the result of the extreme results from 2013.

Figure and Table 5. Comparison of the rate of drowning in standing waters per 1000 ha of water surface in 2011-2015 in Poland and in the West Pomeranian Region



Source: Own study.

Figure and Table 5 indicates that the value of the indicator for Poland for the entire period is almost five times higher than for the West Pomeranian Region. The indicator was higher at the country level than in the region in each individual year of the period under examination. There are some similarities in the time distribution. In 2011-2012, both in the country and in the region, the values were lower than for the entire period under study, and in 2014-2015, both levels were higher for the entire period. The year 2013 was again special, when a sharp increase in the number of drownings was

recorded at the national level (by 33%), and in the region - the minimum value (a decrease by 36%). In 2013, the difference between the index in Poland and in the West Pomeranian Region was also the largest (1.95 compared to 1.6 for the entire period).

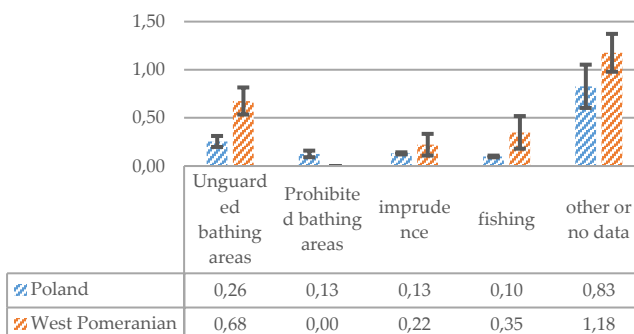
Figure and Table 6. The rate of drowning in flowing waters per 1000 ha of water surface in 2011-2015 in Poland and in the West Pomeranian Region



Source: Own study.

Figure and Table 6 concerns a water category other than Tables and Figures 4 and 5, but nevertheless significant similarities are visible, especially at the Polish level. The values of the indicator in 2011-2012 are the lowest, while in 2013 there is a maximum value. In the years 2014-2015 there is a decrease in the value of the indicator, but at the same time they are higher than in 2011-2012. The year 2013 is exceptional because the maximum values at the Polish level are accompanied by the minimum values at the level of the West Pomeranian Region. The values of the index, both in the whole period under examination and in individual years, are higher at the country level than at the regional level.

Figure and Table 7. Comparison of the drowning rate per 100,000 inhabitants by the circumstances of the event in 2011-2015 in Poland and in the West Pomeranian Region

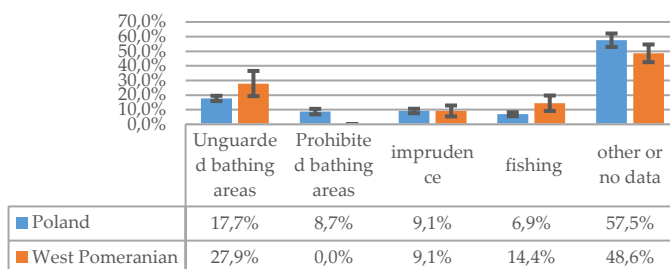


Source: Own study.

In the range presented in Figure and Table 7 there are significant differences in the structure of the number of drowning between Poland and the West Pomeranian

Region. In the region in the period 2011-2015 there was no case of drowning in a place where bathing is forbidden, unlike in the country. In all other categories, the index values are clearly higher at the regional level. The standard deviation is particularly noticeable in the fishing category. However, when drawing conclusions, account must be taken of the high percentage of drownings classified as other or no data.

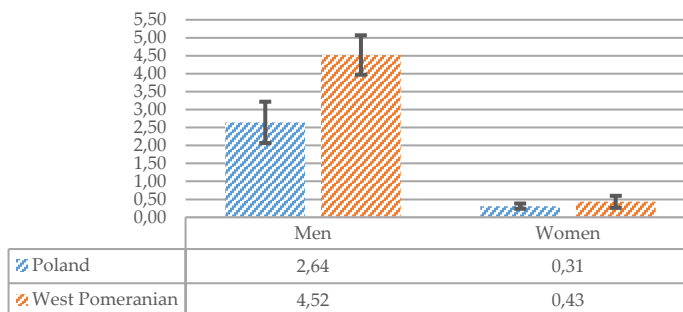
Figure and Table 8. Comparison of the drowning structures in 2011-2015 according to the circumstances of the incident in 2011-2015 in Poland and in the West Pomeranian Region



Source: Own study.

Figure and Table 8 concerning the structure of drownings in the type of circumstances of the event, confirms the observation in Figure 7. An example may be the lack of drowning in prohibited places in the West Pomeranian Region. A feature that distinguishes the West Pomeranian Region is a higher value in the category of fishing drowning, which is by 7.5% higher than in the country. Noteworthy is also the much higher drowning rate in unguarded bathing areas in the West Pomeranian Region. There are no differences in the category of imprudence while being by the water.

Figure and Table 9. Comparison of the drowning rate by gender per 100,000 inhabitants in 2011–2015 in Poland and in the West Pomeranian Region

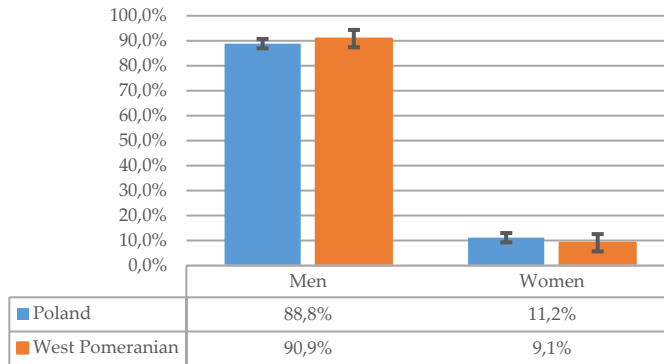


Source: Own study.

The basic observation of Figure and Table 9 is a finding of a significant disproportion in the structure of drowning by gender. Men drown much more often than women

(both nationally and at the level of the West Pomeranian Region). In Poland, there are more than 8 male drownings per one drowning of a woman. Noting the difference between the value of the male drowning rate per 100,000 inhabitants in Poland and in the West Pomeranian region (1.88), however, it must be considered that it is largely due to the higher value of the total drowning rate in the West Pomeranian region.

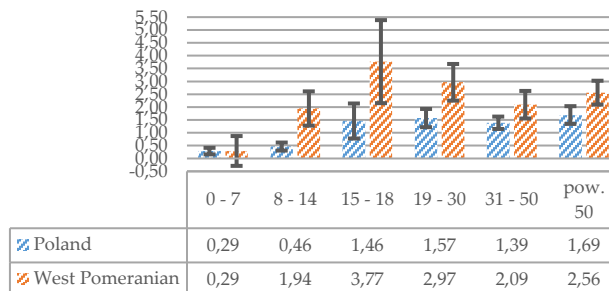
Figure and Table 10. Comparison of the structure of drownings by sex in 2011–2015 in Poland and in the West Pomeranian region



Source: Own study.

Figure and Table 10 allows to develop the observations formulated based on fig. No. And tab. 9 and a more complete explanation of the reasons for the variation in the value of the drowning rate by gender at the level of Poland and the West Pomeranian Region. Male drownings account for 88.8% of all drownings in 2011-2015 nationwide and 90.9% for the region, respectively, which indicates a greater similarity of the structure of drownings in the two studied areas than indicated by a cursory observation of Fig. and Tab. 9.

Figure and Table 11. Comparison of the drowning rate by age groups in 2011–2015 in Poland and in the West Pomeranian Region

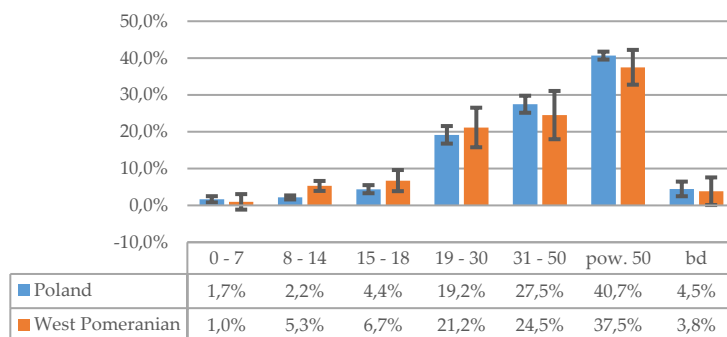


Source: Own study.

Figure and Table 11 includes 6 age groups according to the taxonomy adopted for the purposes of the Polish Police within the National Police Information System. In five

out of six age groups the values of the drowning index are higher in the West Pomeranian Region: in the group 15–18 more than twice, and in the group 8–14 even four times higher. The exception here is the group 0–7, where the value of the index is identical. At the same time, two characteristics of the distribution are noticeable at both levels, very low values for the 0-7 group and, surprisingly, lower values in the 31–50 group than in the neighbouring 19-30 and over 50 groups.

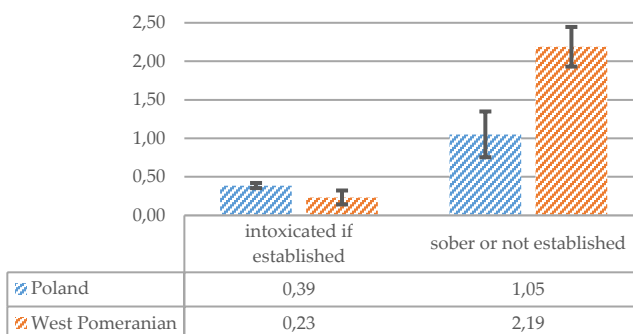
Figure and Table 12. Comparison of the structure of drownings by age groups in 2011–2015 in Poland and in the West Pomeranian Region



Source: Own study.

The data presented in Figure and Table 12 allows for the conclusions other than those derived from Figure and Table 11. What draws attention is the extremely high proportion of people over 50. Two age groups (31-50 and over 50) account for 68.2% of all drownings in the country and 62% in the region. Minors account for only 8.3% of all drownings in Poland and 13.0% in the West Pomeranian Region. It is worth emphasizing the higher share of people in groups 8–14 and 15–18 in the total number of drownings in the region than in the country. The standard deviation, especially at the level of Poland, is not significant.

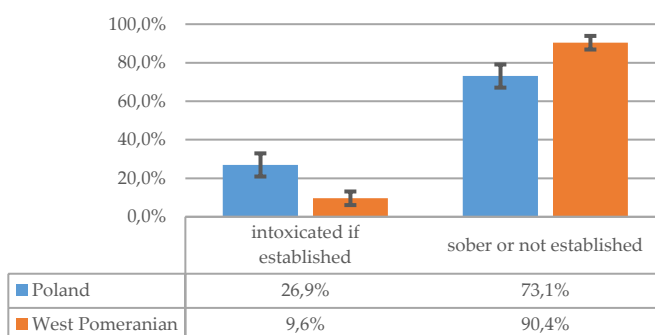
Figure and Table 13. Comparison of the drowning rate according to the victim's sobriety in 2011-2015 in Poland and in the West Pomeranian



Source: Own study.

Firstly, it should be noted that the category presented in Figure and Table 13 includes two types of people who drowned: those who were clearly found to be sober as a result of tests and those who were not tested - which, however, most often happened when the police, as a result of examining the circumstances of the incident, did not raise doubts as to the sobriety of a given person. It is not possible to accurately quantify the size of these individual groups within a category. The Figure shows the far-reaching differences between the West Pomeranian Region and Poland. Despite the clearly higher value of the total drowning rate per 100,000 inhabitants in the West Pomeranian Region, in the category of persons who were found to be intoxicated, the value of the indicator per 100 thousand inhabitants is about 70% higher in Poland.

Figure and Table 14. Comparison of the structure of drowning according to the sobriety of victims in the years 2011–2015 in Poland and in the West Pomeranian Region



Source: Own study.

Figure and Table 14 shows even more clearly the disproportions in terms of the intoxication of drowning people between the West Pomeranian Region and Poland. This observation was originally formulated based on Figure 13. The share of drowning people whose intoxication was established in the total number of drownings is 180% higher in Poland than in the region.

4. Conclusions

The analysis of the structure of drownings in the West Pomeranian Region compared to Poland confirmed the hypothesis that there is a correlation between the number of drownings and the type of water area. An international rate of drowning per year was adopted per 100,000. inhabitants by comparing the four categories of water bodies: sea, flowing water, stagnant water, and other bodies of water. Regarding drowning in the sea, the index per 100 km of coastline of two seaside regions was compared, West Pomeranian and Pomeranian. The indicator for the entire period is higher in the Pomeranian Region (5.25 to 4.56), although at the same time, when examining individual years, it can be noticed that in three (2012, 2014, 2015) out of five cases the values were higher in the West Pomeranian Region.

Throughout the analysed period, a clearly higher value of the number of drownings per 100,000 inhabitants in the West Pomeranian Region (2.42 to 1.44). An obvious feature, as specific to the West Pomeranian Region, is a significantly higher share of drowning in the sea (West Pomeranian - 20.2%, Poland - 3.8%), while in the country a much higher share is drowning in the other reservoir category. To present drowning in inland areas, comparisons of the rates of drowning in standing waters per 1000 ha of water surface in Poland and in the West Pomeranian Region were made. The value of the indicator for Poland (2.01) for the entire period is almost five times higher than for the West Pomeranian Region (0.41). The indicator was higher at the country level than in the studied region in each of the individual years of the period under examination. In order to present drownings in rivers, the index of drowning in flowing waters per 1000 ha of water surface in the country and in the West Pomeranian Region was compiled. The values of the index, both in the entire period under investigation and in individual years, are higher at the country level (0.32) than at the regional level (0.16).

Therefore, it is necessary to interdisciplinary determination of the nature of research on geographical conditions related to the social aspects of drowning in the study area. The studies conducted so far are dominated by studies on the impact of only a few types of drowning conditions. There have also been no examples of empirical drowning studies on a regional scale so far, therefore it was not possible to compare the corrected research results with other regions in the indicated indicators, which made it impossible to conduct an interregional analysis. The above-specified research findings on drowning may contribute to expanding the knowledge base in this field, while opening new research areas on drowning in the West Poland Region and throughout the country. The authors' bold postulate is also to include the drowning indicators in the list of indicators adopted in the process of regional development analyses. Referring to the already indicated conclusions from other studies by Klóska R.'s team, such an extension may contribute to the development of diagnostic tools in a properly conducted decision-making process related to the implementation of appropriate socio-economic policy in a given region.

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