

Venn Diagram for Three or More Categories in Occupational Health

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Title: Venn diagram for three or more categories in occupational health:

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To the editor:

Summarizing data, results or concepts is a common practice to facilitate their analysis and communication. Mosaics plots and Venn diagrams can display several categorical variables in a rigorous and informative way. The firsts are able to show a contingency table. Venn and Euler diagrams are widely used in some scientific disciplines.(1) They allow logical representations of different sets using overlapping closed curves, usually circles or ellipses. To be able to produce these diagrams, the main condition is that each shape crosses only once all the existing subdivisions produced by the previous shapes.(2) There can be two, three or more sets or categories depending on the variables studied and the question at stake. All combinations of the selected categories will be represented by subdivisions of space (areas) which allows to illustrate their intersections, or disjointness.(2) These intersections are represented graphically even if there are no subjects in the intersection subgroup. In that case, a “0” is indicated in the corresponding area. Venn diagrams may also be more faithful to the

data, as the area of each subdivision of the diagram is directly proportional to the considered quantitative variables,(1) which is often not fully possible when they are more than three categories in this type of proportional Venn diagram. To improve the graphical results, various shapes might be used.(3) Therefore, Venn diagrams allow to visualize the differences and similarities between the selected categories.

This type of diagram can be useful in occupational health, though few examples exist. Yildiz et al. used Venn diagrams to highlight the prevalence of multimorbidity in two populations of employed and unemployed people.(4) When assessing risks or associations, multidimensional and proportionality diagrams derived from Venn diagrams and mosaic plots can also be used to illustrate attributable risk fractions.(5) They strong point is to clearly show at the same time all the modalities of each explanatory variable studied. Venn diagrams could also use to study co-exposure to chemicals or biomechanical factors.

To illustrate its usefulness, we have studied five definitions of occupational disability using data from the latest cross-sectional study on disability in the general population in France (Handicap-Santé, volet Ménages (HSM) - 2008, INSEE [producteur], ADISP-CMH [diffuseur]).(6) Subjects of working age, working in an ordinary environment were selected if they reported suffering from a discomfort in the joint of one or both shoulders. In order to show the heterogeneity of the five definitions of work disability, a Venn diagram and a proportional Venn-Euler diagram were used to represent the overlap of these definitions (Figure 1a and 1b). These diagrams illustrate the complementarity of the different definitions of work disability. It should be noted that most statistical software has the option to create these figures.

While this method is only a graphical representation and the number of variables represented should remain reasonable. However, this new version of an old graphic might be useful tool

for occupational researchers and practitioners to improve the impact of their results when communicating with other researchers and decision-makers. The usefulness of this graphical representation is noteworthy when dealing with large amount of data, such as during outbreaks.

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Legends of figure

Figure 1. Venn diagram (a) and proportional Venn-Euler diagram (b) representing the distribution of the participants according to the various disability definitions. The numbers inside intersections represent percentages of the population.

