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ASSESSMENT OF THE USAGE OF VAT TAX AS A SUSTAINABLE AND ENVIRONMENTALLY FRIENDLY FOOD POLICY TOOL: EVIDENCE FROM POLAND

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ABSTRACT: The purpose is to assess the usability of a sustainable and environmentally friendly food policy tool in Poland in 2022. First, the systematic literature review of regulatory and market-based tools was carried out. Second, interviews with food consumers registered in the municipality of Poznań were conducted. Third, the assessment of the usage of a «higher» VAT tax rate on junk food using one-way ANOVA analysis was examined. In the theoretical part, methods of analysis, synthesis, comparison and graphical transposition of data were used. In the practical part, quantitative methods like the CAWI questionnaire and ANOVA analysis, along with qualitative methods like IDI interviews and case studies, were used. The study shows that the majority of the respondents who do everyday shopping and make decisions on preparation and consumption of food at home are women. Females were characterised by statistically significant social acceptance of a «higher» VAT tax rate.

KEYWORDS: regulatory and market-based food policy tools, sustainable and environmentally friendly food consumption, quantitative and qualitative research, Poland

Introduction

Food economy is one of the most important sectors of the national economy. Food processing enterprises require constant continuity of good quality supplies of raw materials in order to produce food, which corresponds to the changing needs and preferences of consumers and the ongoing changes in food patterns. Regardless of the reason, food industry needs to implement practical aspects of the paradigm of sustainable development and balanced development at every level of food production and processing (Broniewicz & Poskrobko, 2003).

Food production is a key perpetrator of greenhouse gases (GHGs), which in 2021 is responsible for a third of global anthropogenic emissions (Crippa et al., 2021). Poore and Nemecek (2018) noticed that a change in dietary habits can bring positive effects on the global population. Willett et al. (2019) indicate that, if no change in the way and profile of food production and consumption is made, the main goal of reducing global warming to under 2°C or less (as stated in the Paris Agreement) cannot be attained (Clark et al., 2020).

Sustainable food consumption, embedded in the strategy From Farm to Fork (F2F) launched for 2019-2024 in the European Union, is understood as safe, healthy, and nutritious for consumers, as well as meeting the requirements of those at a lower material status (Pietrzyck et al., 2021; EIB, 2020). From the supply side, sustainable food production allows honest livelihood for farmers, processors, and retailers, enabling hiring workers in safe and hygienic working environments (SAI Platform, 2015; Knoor et al., 2020). Sustainable food consumption draws attention to abiding by biophysical and environmental limits in its production and processing while, at the same time, reducing energy consumption and improving the wider environment (European Commission, 2011). Moreover, sustainable food consumption points to following the highest standards of animal health and enhancing rural economies, for example, by encouraging the purchase of local products (Suscof Erasmus+ Project, 2019). In this view, food consumption is an integral part of the food system, respecting the right to food for all and maintaining consumer autonomy (Guiné et al., 2020).

The European Commission supports making positive changes to the food system by promoting access and price reductions for sustainable food and encouraging sustainable and healthy eating (FAO, 2018; Wielicka-Regulska, 2020). Galli et al. (2020) confirm that priority is given to an increase in consumers' awareness of healthy diets, resulting in a change in the consumption profile. The long-run effects are as follows: an increase in the plant-based food share in a human diet, an increase in prices of certain food categories, a promotion of green public procurement, an encouragement of fiscal meas-

ures, and a reduction of food waste (Zaharia et al., 2021). The above-described changes in the food system aim to increase the population in depopulated rural areas and improve the economic situation of farmers in those parts of the world (FAO, 2020; Temme et al., 2020).

The article undertakes three research objectives: theoretical, empirical and applicative.

The theoretical-cognitive goal is:
- to systematise knowledge of the concept, role and importance of food policy tools from the consumer point of view.

The empirical goals are:
- to present qualitative (interviews) and quantitative (ANOVA method) values of the analysed food policy tools based on the research,
- to measure whether and which of the analysed food policy tools statistically significantly affect respondents' metric data.

The applicative goal is:
- to support institutions and actors responsible for the development of the food sector and individual entrepreneurs by increasing the range of available tools for action.

In order to carry out the study, the following research questions have to be answered:
1. Does gender significantly differentiate the level of support for a «higher» VAT tax rate on junk food in Poland in 2022?
2. Does the level of education significantly differentiate the level of support for a «higher» VAT tax rate on junk food by education in Poland in 2022?
3. Do the respondents' opinions on their financial situation significantly differentiate support for a «higher» VAT rate on junk food in Poland in 2022?

The authors undertook quantitative and qualitative research; therefore, the article has five hypotheses comprising all of the analysed food policy tools. On the basis of theoretical analysis and empirical results of the previous authors' studies, the following hypotheses were formulated:

H_1: Gender significantly differentiates the level of support for a «higher» VAT tax rate on junk food.

H_2: The level of education significantly differentiates the level of support for a «higher» VAT tax rate on junk food.

H_3: The respondents' opinions on their financial situation significantly differentiate support for a «higher» VAT rate on junk food.

An overview of the literature

Economic policy for sustainable food consumption relies on the activities of the state and its bodies and the active involvement of citizens in its formation (Dabyltayeva & Rakhymzhan, 2019). At the basis of participation lies the cooperation of various interest groups in order to accurately diagnose the needs of communities, design activities to meet them and use land resources and food production efficiently (Phawitpiriyakliti et al., 2020; Zielińska-Chmielewska et al., 2022). The economic policy tools for sustainable food consumption can support the choices of food products bought and food products sold in the food market (Zielińska-Chmielewska et al., 2021). There are the following food policy tools: higher tax rates on junk food, green public procurement, deposit for plastic bottles, VAT exemption for food donated to charitable institutions, waste fee for food consumed by customers in retail outlets like coffee shops, bars, restaurants, etc.

Sustainable consumption is the optimal, conscious and responsible use of available natural resources, goods and services at the level of individuals, households, communities and local communities, business communities, local governments, national governments and international structures, in accordance with the principles of sustainable development (Consumer Council, 2016; Vergragt et al., 2016). Sustainable food consumption consists of a reduction in the amount of junk food consumption and appropriate attitudes and behaviour of consumers based on pro-social and ethical attitudes (Godawska, 2021; Pabian, 2013; Zegar, 2021).

Universal characteristics of the analysed food policy tools are their voluntary (Dawkins et al., 2019) vs. coercive (Acciai & Capano, 2021) nature. Other important characteristics include effectiveness (Nissinen et al., 2015), fairness (Vermeir et al., 2020) and the tool's advisability (Testa et al., 2016). Baker et al. (2018) indicated that there is variation in the adequacy of these tools depending on cultural and economic circumstances.

One of the main obstacles to their use is the implementation and maintenance costs (Vermeir et al., 2020; EUPHA, 2017; Hendriks et al., 2021), the low uptake of tools to stimulate sustainable consumption (Dawkins et al., 2019) and potential public resistance to stronger actions and measures to limit the freedom of consumers' buying and retailers' selling behaviour (Jürkenbeck et al., 2020). Important for solving the aforementioned obstacles in the implementation of policy tools for sustainable food consumption in Poland is the increasing importance of public institutions and policies at the local (Bengtsson et al., 2018; Doernberg et al., 2019), national (Mozaffarian et al., 2018; Prosperi et al., 2016) and international (Sonnino & Coulson, 2021; Saviolidis et al., 2020) levels.

Economic policy tools for sustainable food consumption are defined by Vedung (1998) as a various set of techniques by which governmental authorities wield their power in attempting to ensure support and affect or prevent social change. Bemelmans-Videc et al. (1998) and Vedung (2020) divided tools into three groups: regulative, economic and informative. With reference to these tools, Reisch et al. (2013) made a classification of tools for sustainable food consumption into policy instruments to promote sustainable food systems: information-based, market-based, regulatory, and self-committing. In turn, Acciai and Capano (2021) provide a review of the most frequently used typologies of economic policy tools and, through a meta-analysis, they indicated how these tools have been differentially adopted to explain real-world phenomena. The results are highly diversified, due to the nature and concept of the economic policy tools and a division between typologies focused on governmental resources and those focused on consumers' expected behaviour. Further, Lehner et al. (2015; 2020) reviewed evidence that nudging might be a tool to promote more sustainable consumption behaviours. They concluded that nudges hold a certain potential for reducing environmental impacts in domains of sustainable consumption. Nudge tools are seen as a complement to the traditional policy tools rather than as a substitute for legal, regulatory and economic tools. Nudge comprises four types of tools: 1) simplification and framing of information, 2) changes to the physical environment, 3) changes to the default policy and 4) the use of social norms (Preuss, 2009).

The main environmental problems resulting from the broadly defined production activities of enterprises include production waste, emissions of atmospheric air pollutants, wastewater discharge, use for production of agricultural and forest land, devastation and degradation of soils, electromagnetic radiation, changes in the environment due to extraction of raw materials from deep underground, changes in the landscape and other aesthetic qualities (Hadryjańska, 2015; Wrzosek & Kisała, 2019).

A key aspect in works addressing the issues of sustainable development is the influence of citizens, who require high accuracy of interventions and social control of the process (Spadło & Grotowska, 2022). The use of market-based food policy tools promotes societal inclusiveness and facilitates a better perception of food policy programs by all stakeholders (Hanus, 2020).

The scientific novelty of the manuscript is the presentation, analysis and assessment of the usability of sustainable and environmentally friendly food policy tools shaping food consumption in Poland. To achieve that goal, first interviews among the residents of the municipality of Poznań (Wielkopolska Voivodship, Poland) were conducted using the CAWI method. Second, ANOVA analysis was used to find only statistically significant relationships between the analysed food policy tools and metric characteristics of the

respondents. To fully reveal the issue of the study, methods of comparative analysis of various cases of food policy tools in the literature over the world were used. According to the authors, the fusion of qualitative and quantitative methods deserves the interest of the audience.

The practical novelty of the manuscript is the ability to implement the analysed food policy tools in the food market at the national level in accordance with the paradigm of sustainable and balanced development of the economy. Direct and indirect benefits are revealed in this article. The direct, measurable benefits are:
- a conscious, long-term action of managing the consumption of the population by state authorities,
- influencing the selection of food producers and processors according to certain criteria, e.g. healthiness of food, lower environmental nuisance of food production, etc.

Research methods

To assess the highly-interesting issue of social acceptance of the analysed food policy tools in Poland, a variety of research methods and tools were used. Quantitative methods such as CAWI questionnaire and ANOVA analysis were used in order to evaluate social acceptance of those tools on the representative population of respondents in the Poznań municipality in 2022. Qualitative methods such as IDI interviews on the assessment of the practical usage of the analysed food policy tools with six experts in the Wielkopolska Voivodship in 2022 were carried out. Additionally, different case studies confirming the use of the analysed food policy tools, as well as pointing out the nuisances of running these food policy tools, were presented (Table 1).

Table 1. Presentation of the primary research characteristics

Subject	Objects, Country, Time	Measurement Methods and Tools	Goal
Assessment of social acceptance on the analysed food policy tool	Full-structured interviews (N = 150) in the municipality of Poznań (Poland) in 2022	Quantitative: CAWI questionnaire, ANOVA analysis	A comprehensive study on the social acceptance of the analysed food policy tool in Poland
		Qualitative: IDI interviews, Case-studies	A case-study on the classification of the interest groups on the analysed food policy tool

To best present the research issue under study, the article uses primary and secondary research sources. **The primary resource sources** include the CAWI questionnaire, ANOVA analysis, IDI interviews and case studies.

In the first step, questionnaires among 150 residents in the municipality of Poznań were conducted via an electronic form and in a paper version.

The second research measure wassemi-structured in-depth interviews conducted between 01.03.2022 – 30.06.2022 in a remote mode with six experts (N = 6). The collected data were transcribed and coded using QDA Miner software, LITE v2.0.8, to create a database and code the responses. The analysis of in-depth interviews covered five stages suggested by Yin (2015). The stages are as follows:

1. Compiling a database; making a transcription of interviews,
2. Disassembling; coding respondents' responses,
3. Reassembling; rearrangements and re-combinations of the data into tabular,
4. Interpreting; the frequency at which individual causes of losses were named during interviews was determined,
5. Concluding.

The conducted IDI interviews were focused on the experts' identification of the social acceptance affecting the usage of the analysed food policy tools. The substantive reason for using this method was the need to obtain qualitative data from a group of experts to identify the main areas for inquiry for the next stage of research.

In the second step, IDI interviews involving detailed transcription and coding were used. Conducting in-depth interviews requires a significant amount of an effort from the researchers. First, a metric with time, date, place, name and position of the interviewed person needs to be filled out. Second, the researcher has to arrange a comfortable environment for the time of an interview. Third, the respondent must be thoroughly informed about the objectives and rules of the interview, i.e. why it is being recorded and to whom it will be made available. Fourth, an interview should be recorded with at least one voice recorder. Fifth, the researcher is obliged to know the content of an interview by heart. Sixth, the questionnaire script is its support, not the main research tool. Coding was done according to a categorisation key in order to classify expert statements. The findings discovered through the undertaken interviews were visualised, mapped and translated into artefacts (Table 2).

**Table 2.**   Presentation of the IDI experts' interviews

Individual in-depth interviews	
Instructions: The researcher conducts a scenario-based interview with the respondent, exploring important issues.	
1.	Duration of interview:	Duration of the research: 3 months
2.	Composition: 1 participant versus 1 researcher	Sample: 6 experts
3.	Design stage: during context analysis and project modelling as part of evaluation and basis for redesign	
4.	Infrastructure: minimum 1 recorder, a notebook, a pencil, 1 separate room	
5.	Research tools: researcher's scenario	
Objective of the study: to obtain an independent opinion on the current state of affairs	

In the third step a statistical one-way analysis of variance (ANOVA analysis) was used to examine observations that depend on one factor acting simultaneously. A one-way ANOVA compares the effects of an independent variable on multiple dependent variables. This method explains with what probability the extracted factor can cause differences between the observed groups. There are a few limitations of ANOVA analysis (Carpenter, 2023). The first one is that the groups have the same, or very similar, standard deviations. The second limitation concerns its restrictive assumptions (Davies, 2020).

In the fourth step results of case studies were presented. According to Stańko (2013), qualitative research is no easier to conduct than quantitative research. They are not without methodological rigour at the stages of data collection and analysis or theory building.

The secondary research sources include a literature review to introduce and lead the discussion on the characteristics of selected regulatory and market-based policy tools using databases, market reports, newsletters, and information services. Based on the literature, relevant areas to the acceptance of sustainable food consumption and interventions in food systems were identified. Prior to the study, the questionnaire was reviewed by a group of six experts using the Delphi method. As a result of this process, questions were enhanced, including the respondent's connection to agriculture and food processing. Afterwards, the questionnaire was tested on five respondents. After taking into account the respondents' comments, the survey was launched. Studies included in the systematic literature review count 106.

Secondary research sources were identified, screened and included in the process of creating the article. Figure 1 presents the selection of secondary research sources according to PRISMA guidelines.
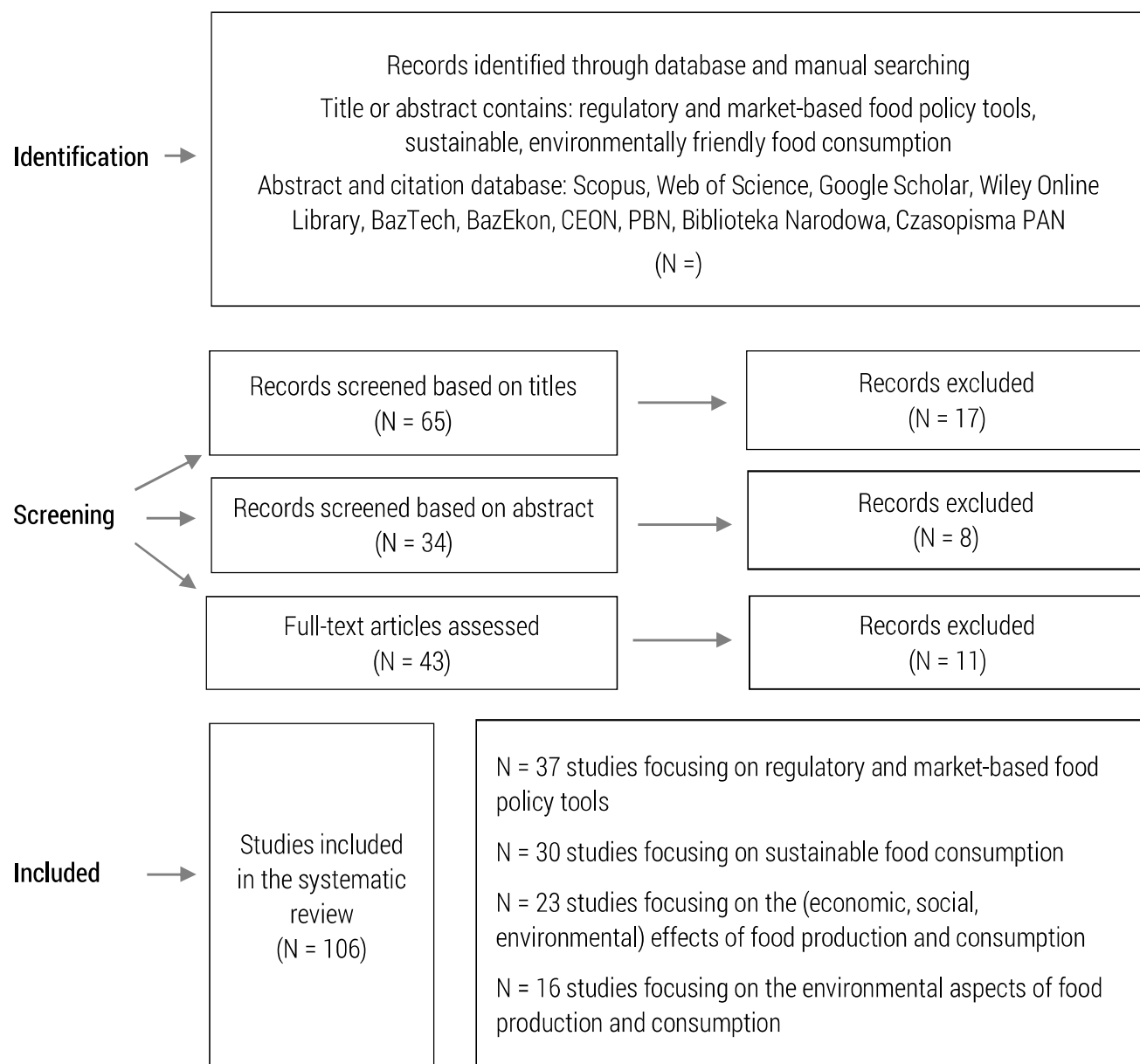
Figure 1. Presentation of the selection of secondary sources according to PRISMA
guidelines

Sample and Procedure

The geographical scope of the research was limited to the municipality of Poznań in order to reflect the characteristics of cities in highly developed economies in Europe.

The survey is targeted because it was conducted in the municipality of Poznań. At the same time, the research is a representative sample by the amount (subject) because its composition corresponds to the composition of the population of municipalities and counties of highly developed economies

of Europe due to the selected variables which characterise the respondents, such as gender, age and place of residence (size of a town, rural area). In that sense, the sample is representative (N = 150). The research was conducted by the SW Research Sp. z o. o. Agency. The agency applies the standards set in the Program for Quality Control of the Work of Interviewers (pl. PKJPA) in the CAWI survey category, in accordance with the quality audit of the Professional Responsibility Commission and the Board of Directors of the Organization of Opinion and Market Research Firms.

The sampling was done by quota according to the place of residence, gender, age, education, number of people in the household, number of children in the household and source of income. Data collection was done via an electronic Google form, but the traditional way (paper questionnaire) was also used. he data from both sources were later processed in a spreadsheet and using a statistical analysis package. The data was cleaned and coded and then one-dimensional and two-dimensional analysis was carried out. The results were presented in the form of tables and graphs and interpreted descriptively.

The study was developed using Statistica software. Only statistically significant correlations (*p-value* = 0.005) were taken into account. The normality of variable distribution was checked using the Shapiro–Wilk test. For the assessment of quantitative variables, the Kruskal–Wallis test was implemented. If the Kruskal–Wallis test unveiled statistically significant disparities, Dunn's test was used.

In the quantitative analysis, independent variables such as gender (a nominal variable), level of education (an ordinal variable), and financial situation (an ordinal variable) were used. To investigate respondents' attitudes toward the VAT tax rate for enhancing sustainable food consumption, the dependent variable, which is an acceptance of a «higher» VAT tax rate on junk food, was used. Similarly, as with the studies by Mindrila (2010) and Schumacker and Beyerlein (2000), the acceptance was measured on a 5-item Likert scale (an ordinal variable).

The basic criterion for a research selection sample was:
- Municipality residents: Poznań,
- Gender: female /male,
- Age: 20-34; 35-49; 50-64, 65+,
- Education: vocational, secondary, post-secondary/baccalaureate, higher,
- Number of people in the household,
- Number of children in the household,
- Source of income,
- Amount of disposable income in the household per month.

The analysed group of 150 respondents aged +20 were divided into females (N_f = 46%) and males (N_m = 54%). The test sample was divided into

four age categories: 20-34 years old (N = 29%), years old 36-49 (N = 27%), years old 50-64 (N = 25), and 65+ years old (N = 19%). The sample was categorised by education levels, which are vocational (13%), secondary (23%), post-secondary/baccalaureate (21%), and higher (43%). The sample was described by the number of people in the household, which were: 1-person (10%), 2-person (29%), 3-person (23%), 4-person (25%), 5-person (11%), 6-person (1%), 7-person (1%). The number of children in the research sample was as follows: no children (53%), 1-child (22%), 2-children (19%), 3-children (5%), 4-children (1%). In the research sample, the respondents disclosed the source of income: contract work (61%), self-employment in non-agricultural economic activities (13%), self-employment in agricultural economic activities (3%), retirement/pension (16%), unearned sources of income: unemployment benefits, property income, dependent on parents, pupil, student (7%). The amount of disposable income in the household per month in PLN presents as follows: no more than 2.000 PLN (5%), 2001-4000 (19%), 4001-6000 (26%), 6001-8000 (23%), 8001-10.000 (19%), more than 10.000 (8%).

Results of the research

In Tables 3-5, the presentation of the results on the acceptability of a «higher» VAT rate on junk food among respondents of the municipality of the city of Poznań in 2022 is presented.

Junk food is understood as unhealthy food high in calories from sugar or fat, with little dietary fibre, protein, vitamins, minerals, or other important forms of nutritional value. It is also known as HFSS food, which means high in fat, salt and sugar (Bohara et al., 2021; Qiu et al., 2021). The imposition of taxes and charges on manufacturers for the production of foods with high levels of unfavourable substances for health is an increasingly common practice worldwide (Wright et al., 2017; Pfinder et al., 2020; Jürkenbeck et al., 2020; Temme et al., 2020). Such interventions concern HFSS food, one which is causing high social costs, as is the case with alcohol and cigarettes. The reason for applying so-called *sin taxes* is to reduce obesity and diet-related chronic diet-related diseases (Thowet et al., 2018; Härkänenet et al., 2014; D'Innocenzo et al., 2019). Seuring (2013) shows that people with obesity are more likely to suffer from chronic diseases, such as cardiovascular disease and diabetes, leading to higher healthcare costs and resulting in higher average prices for medical services. Finkelstein et al. (2005) point out that obesity and related chronic diseases generate indirect costs and lower labour market efficiency, stemming from lower labour market participation and less work provided by both obese affected individuals and their caregivers.

Table 3. Presentation of the results on the acceptability for a «higher» VAT rate on junk food by gender of the respondents

Variable	N = 150	Mean Rank	Median (+/-quarter deviation)	Mean
Females	81	82.80	*4 (1)*	3.68
Males	69	66.93	*3 (1)*	3.19
Kruskal-Wallis test = 5.276, *critical significance level* = 0.022				
H1:	Gender significantly differentiates the level of support for a «higher» VAT tax rate on junk food*			
Interpretation	The acceptability of a «higher» VAT tax rate on junk food was significantly higher for females than for males. Women displayed higher support voting with a median of 4 and men demonstrated lower acceptability voting with a median of 3.			
Conclusion	Females with comparison to males display bigger support for «higher» VAT tax rate on junk food.			
Decision on H1	Do not reject			
Summary	Females are more in favour of a «higher» VAT tax rate on junk food than males. The result confirms many various studies conducted all over the world. For instance, Jürkenbeck et al. (2020) confirm that consumers accept food taxes on unhealthy products combined with tax cuts on healthy products. In addition, it is considered an appropriate practice of national food policy to impose a tax on junk food to cover health care costs (Moghimi & Wiktorowicz, 2019). Niebylski et al. (2014) analysed subsidies for healthy food and taxation of unhealthy food. They recommended implementing healthy food subsidies and taxing unhealthy food. Based on their study, they proved that a tax on unhealthy food causes a 20% increase in the price of that food, thereby reducing its consumption (Jürkenbeck et al., 2020).			

*Junk food is understood as food rich in salt and sugar.

To engage in an in-depth discussion on the analysed food policy tool from Table 3, Duplaga (2020) shows that parents are more likely than non-parents, as well as respondents with higher socioeconomic status, to support a tax on soft drinks and unhealthy foods. Moreover, Donaldson et al. (2015) and Petrescu et al. (2016) proved that females were more in support of the sugar tax than males. For instance, in 2015 in Germany, only 32% of consumers agreed with the introduction of a tax on unhealthy foods (Effertz, 2015). Studies (Jürkenbeck et al., 2020) indicate that acceptance could increase, if budget revenues from taxing unhealthy foods were directly used to improve the healthcare system or reduce taxes on healthy foods.

Moretto et al. (2014) conducted a multi-stage study in Australia, and found that taxing nutrient-poor foods with high energy content translates into food consumption patterns. The study's authors, therefore, want to prevent and reduce childhood obesity in Australia. There is strong community acceptance of taxing sugar-sweetened beverages. Public acceptance is higher the more often these beverages have been better labelled and supplemented

with increased educational initiatives on healthy eating principles. They found that public support would increase even more if budget revenues from taxing sugar-sweetened beverages were to be used to promote healthy eating or to subsidise healthy food alternatives and if the tax was at a high enough level to change parents' consumption patterns. Authors (Moretto et al., 2014) outlined several basic conditions for taxation to succeed.

Table 4. Presentation of the results on the acceptability of a «higher» VAT tax rate on junk food by education

Variable	Coefficient	Standard error	N = 150	Mean Rank	Median (+/-quartile deviation)	Mean
Const	vocational education	secondary education				
vocational education		1.000000	19	45.32	2(1)	2.421053
secondary education	1.000000		34	59.25	3(1)	2.970588
secondary education with matriculation	0.003004*	0.031577	32	89.11	4(0,5)	3.937500
higher education	0.001898*	0.020835	65	86.12	4(1)	3.769231
Kruskal-Wallis test = 22.22463, *critical significance level* = 0,0001						
H2:	The level of education differentiates significantly the level of support for a «higher» VAT tax rate on junk food by education.					
Interpretation	The acceptability for a «higher» VAT tax rate for respondents characterised by vocational education significantly varied from those who completed secondary education. Respondents with secondary and higher education displayed higher support voting 4 +/-1 and males demonstrating lower acceptability voting 4 +/-0,5.					
Conclusion	The level of education significantly differentiates the level of the acceptability for a «higher» VAT tax rate on junk food.					
Decision on H2	Do not reject					
Summary	Respondents differ from each other regarding obtained level of education. Moreover, respondents with a lower level of education were not in favour of a «higher» VAT tax rate on junk food. In turn, groups with a higher education level expressed greater interest in rising VAT tax rate on junk food. For the differences in groups, one can refer to the quartile deviation that is obtained from the first quartile and third quartile. The quartile deviation is one half of the difference calculated by subtracting the first quartile from the third quartile in a frequency distribution. A supplementing information is given the mean value of acceptance in groups by the level of education. The median for acceptability of a «higher» VAT tax rate on junk food amounted to 4 in groups with the highest education level. Respondents characterised by secondary education and vocational education, the median for this tool acceptability equaled between 2 and 3.					

A statistically significant differentiating factor among the respondents surveyed was the acceptance of a «higher» VAT tax rate on junk food. A post hoc test showed variation between the financial situation of respondents living modestly and other groups (see Table 5).

Table 5. Presentation of the results on the acceptability of a «higher» VAT tax rate on junk food by the respondents' opinion on their financial situation

Variable	Coefficient	Standard error	N = 150	Mean Rank	Median (+/-quartile deviation)	Mean
Const	21.252					
We live a modest life	0.000001		15	30.70	2 (+/-0.5)	1.933333
We live on average	0.000946	0.000946	81	76.85	4 (+/-1.5)	3,518519
We live well	0.000254	0.000254	46	83.59	4 (+/-1.5)	3.695652
We live on a high standard	0.001833	0.001833	8	99.38	4.5 (+/-0.75)	4.250000
Kruskal-Wallis test = 21.25242, *critical significance level* = 0.0001						
H3:	The respondents' opinions on their financial situation significantly differentiates support for a «higher» VAT rate on junk food.					
Interpretation	The acceptability for a «higher» VAT tax rate on junk food displayed by respondents living in households with modest financial conditions was significantly different from those living in better-off households. Persons coming from modest financial households expressed less support for a «higher» VAT tax rate on junk food as the median for acceptance of a «higher» VAT tax rate was equal to 2 and for the remaining groups were equal to 4.					
Conclusion	The respondents' opinion on their financial situation significantly differentiates the level of support for a «higher» VAT tax rate on junk food.					
Decision on H3	Do not reject					
Summary	Respondents from financially better situated households gave a statistically significant support for a «higher» VAT tax rate on junk food.					

The level of acceptance for a «higher» VAT tax rate on junk food is significantly different among lower-income households compared to other household groups. Households with the lowest incomes are most negatively affected by the level of this tax (Wielicka & Soltysiak, 2021). Less well-off households are more likely to consume foods rich in sugars and fats with low nutritional value. The authors recommend that, with this tax entering into force, shielding measures should be introduced for these households, further supported by educational activities. Shielding measures could include a reduction in consumption taxes on other food groups, as well as the introduction of food stamps enabling less well-off households to purchase healthy meals.

The fundamental tools for influencing consumer food consumption behaviour are market regulations (demand, supply, price) and economic incentives, mainly of a financial nature (Zielińska-Chmielewska et al., 2023). Authors consider the unit waste fee policy as a Pigouvian tax, which incorporates economic incentives and a market mechanism to reduce pollution (Table 6). If environmental damage, such as food waste pollution, can be accurately measured, and the waste fee is charged in proportion to the volume of emissions, the economic incentive instrument can control waste disposal behaviour (Lee & Jung, 2017).

Table 6. Presentation of the rationale for the implementation of a «higher» VAT tax rate on junk food in Poland

Economic, environmental and social reasons	Causes and Consequences	Recommended actions
• To reduce obesity and diet-related chronic diseases, • To promote healthy nourishment positively influencing any human's everyday efficiency.	• Avoidance of economic and social losses resulting from the need to treat and hospitalise those suffering from junk food consumption, • Building healthy eating and living habits among citizens.	• Reduction in VAT tax rate on non-junk food, • An introduction of food stamps enabling less well-off households to purchase healthy meals.

Conclusions

The results of the research contribute to the discussion on the usage of the chosen food policy tools in Poland. The recognition of the development of these state policy tools from the demand side of the market shall contribute to the accuracy of public institutional policies and financial support for this industry.

The article's results made it possible to draw conclusions about the potential and real possibilities of the usage of food policy tools in terms of its economic utility and environmental viability in Poland in 2022. The presented values of the social acceptability of a «higher» VAT tax rate on junk food are statistically significant.

The conclusions from the research can be presented in three ways.
• In the context of the literature review:
a) Introduction of the concepts and definitions of market-based food policy tools.
b) Systematisation of the greening process, sustainable and environmentally friendly food policy tools within the paradigm of sustainable development.

- From the scientific point of view:
a) On a hypothesis level (H_1; H_2; H_3), all three hypotheses have not been rejected and have been positively confirmed.
- From the practical point of view:
a) On a consumer basis: choice and rationalisation of food purchases depend on females who are more in favour of different kinds of incentives, both of a financial and non-financial origin,
b) On a production basis: implementing new technological solutions and new production methods.

General conclusions

1. People can take care of their health with the use of educational programs, a conscious attitude towards eating habits, financial incentives, etc.
2. The priority activities of post-COVID-19 are more resilient to demand and- supply shocks and food policy systems emphasising sustainable food consumption in the food market.
3. The analysed food policy tools, such as a «higher» VAT tax rate, are examples of multi-level economic and environmental issues related to multi-factor motivations.
4. The economic instruments trigger actions to avoid emissions and improve the environment at a relatively low cost and leave the path to achieving environmental goals to the individual.
5. **A «higher» VAT tax rate on junk food** should be introduced with shielding measures such as a reduction in the VAT tax rate on non-junk food and an introduction of food stamps, enabling less well-off households to purchase healthy meals.

Possible limitations of the conducted research include the size of the research sample and the lack of complete data, which is due to the fact that respondents are not always willing to provide truthful data on their financial situation.

The limitations set a potential direction for future research as follows:

- There is a measurable limitation in quantifying the analysed market-based food policy tools due to the fact that they happen at various stages of the food supply chain,
- It may be difficult to measure, calculate and monitor which consumers who resign from eating junk food take the opportunity to implement rules of an everyday healthy diet.

Acknowledgements

The contribution of the authors

Conception, A.Z-Ch.; literature review, A.W.-R. and D.M.-T.; acquisition of data, A.W.-R., A.Z.-Ch. and D.M.-T.; data analysis, A.Z.-Ch. and D.M.-T.; writing original draft, A.Z.-Ch. and D.M.-T.; review and editing, A.Z.-Ch.; development of study results, D.M.-T. and A.Z.-Ch.; conclusions, A.Z.-Ch. and D.M.-T.; conducting survey, A.W.-R.

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