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# Less meat on the table: findings from the German Socio-Economic Panel 2016–2022

Jörg Hartmann [a] and Peter Preisendörfer [b]

[a]German Institute of Economic Research, DIW Berlin, Berlin, Germany; [b]Institute of Sociology, University of Mainz, Mainz, Germany

**ABSTRACT**

Based on the German Socio-Economic Panel (SOEP), this article investigates the recent development of meat consumption in Germany and selected socio-demographic determinants of meat-related dietary habits. In line with official data, the SOEP shows a downward trend in the frequency of meat consumption and an upward trend in self-reported vegetarianism for 2016–2022. Women, the better educated, singles, urban residents, and supporters of the Green Party eat meat less often. The effects of age and income are inconsistent. Looking at changes over time, we find that those groups that already had lower meat consumption in 2016 have continued to reduce it.

**KEYWORDS**

Meat consumption; vegetarianism; veganism; dietary habits; Germany; German Socio–Economic Panel

## Introduction

The development of meat consumption in Germany since World War II can be divided into three periods.[1–3] First, there was a period of rapidly increasing meat consumption from the early 1950s to the early 1990s. While the average per capita meat consumption was less than 30 kg per year in 1950, it more than doubled to 64 kg in 1991. Second, from the early 1990s to the mid-to-late 2010s, the volume of annual meat consumption leveled off, i.e. stagnated and slightly went down to around 60 kg. Third, from about 2018 to the present, a new trend of significantly declining meat consumption seems to have begun. Meanwhile, the consumption level of meat is approaching 50 kg per capita. In 2023, it reached 51.6 kg.[4] As the time span is short, the persistence of this most recent period of "less meat on the table" is still controversial. Clearly, there is a need for more research specifically focused on this recent trend.

Several reasons lead to the expectation that meat consumption is, and will continue to be on a downward trend, not only in Germany but also in other advanced Western societies. The general public in Western countries is concerned about ecological problems, is increasingly worried about animal welfare, and more and more sees too much meat as a health issue.[5,6] Less meat

**CONTACT** Peter Preisendörfer preisen@uni-mainz.de Institute of Sociology, University of Mainz, Jakob-Welder-Weg 12, Mainz D-55099, Germany

consumption can contribute to environmental protection, sustainability, and climate change mitigation.[7,8] Raising animals for human consumption is associated with high emissions of greenhouse gases (CO2, CH4, etc.), and meat consumption significantly increases the ecological footprint of individual households. Less meat on the table is also beneficial for animal welfare and often recommended for ethical reasons.[9,10] It means fewer animal deaths and the possibility of a better life for the remaining animals. In addition, a growing body of medical and public health research has revealed positive health effects of eating less meat. In particular, numerous studies have found health benefits of vegetarian diets.[11–13] Vegetarian diets tend to preclude adiposity, to reduce the risk of cardiovascular disease, prevent certain types of cancer, and contribute to increased life expectancy.

Against this background, our article aims at a more detailed analysis of the recent "less meat trend" in Germany. Using individual-level data, we rely on the answers of respondents in Germany's most important and most prominent panel study, the German Socio-Economic Panel (SOEP). The SOEP operates on an annual basis and surveys more than 20,000 individuals in each wave. Regular sample refreshments and data weighting procedures ensure that the target population is also representative for annual cross-sections. For more information on the SOEP, see Goebel et al.[14] Since the 2016 wave, the SOEP questionnaire includes questions on the frequency of meat consumption and vegetarian diets. Compared to official meat consumption data, a recourse to survey data provides the opportunity to examine socio-demographic and other individual-level determinants of the frequency of eating meat. And because the SOEP is a longitudinal database, we can also explore whether the role of these determinants has changed over our observation period, and which social groups in particular have adjusted their dietary patterns.

In the first part of this article, we will describe the recent development of meat consumption in the German population, as revealed by the SOEP data from 2016 to 2022. In line with the official data on meat consumption, the survey data should also show a downward trend. However, it is interesting to see how strong this trend is in the SOEP data and what the exact trajectory looks like. The second part of our article is devoted to multivariate analyses of individual-level, mostly socio-demographic determinants of meat consumption and possible changes over time. Regarding these determinants, there is a lot of previous research. Before presenting our results, we will briefly review this research. The article concludes with a final discussion.

## The recent trend of meat consumption in Germany

For the first time in 2016, and then again in 2018, 2020, and 2022, the SOEP measured dietary habits of its respondents with the aim of recording the amount of meat and fish consumed on a regular basis. The questionnaire

uses two questions in this context: (1) In a first step, it asks "How often do you eat meat, fish, or poultry?" The response categories for each of the three food items are "every day," "four to six days a week," "two to three days a week," "two to four days a month," "once a month or less frequently" and "never". (2) Directly behind this question, the questionnaire asks in a second step "Do you follow a mainly vegetarian or vegan diet?" The response categories are "yes, vegetarian," "yes, vegan" and "no, none of the above." The first question induces the respondents to think about their daily routines regarding the consumption of meat, fish and poultry. The second question aims at the prevalence of self-reported vegetarians and vegans. It can be argued that this two-step procedure yields more valid responses to the self-report vegetarian/vegan question because the answers to the first question serve as an anchor and reference for the second question.

For the adult population in Germany (18 years and older), Table 1 shows the responses to the question about the frequency of eating meat/fish/poultry as declared by the respondents. We have combined the three separate items on meat, fish and poultry into a single item because all three items can be subsumed under the label of meat (and for short, in the following we will simply speak of meat consumption). The table gives the frequency distributions for the four cross-sections 2016, 2018, 2020, and 2022. In order to obtain representative results for the four years, our analyses apply cross-sectional weights provided in the SOEP dataset.

The percentages in the table confirm the expected trend of a declining consumption of meat in Germany. Although the percentages of those who declare that they "never" eat meat or only "once or less a month" are rather low, the combined percentages of "never," "once or less a month" and "2–4 days a month" increased from 13.2 percent in 2016 to 21.8 percent in 2022. The sum of the three categories indicating a high meat consumption (1–3), on the other hand, decreased from 86.8 percent in 2016 to 78.2 percent in 2022. We can further see in Table 1 that the trend of a lower meat consumption in Germany is most clearly pronounced in the transition from 2020 to 2022.

For the second SOEP variable on dietary habits, the question about following a mainly vegetarians or vegan diet, Figure 1 summarizes the results. Self-reported vegans increased from 0.6 percent in 2016 to 1.5 percent in 2022, and

**Table 1.** Frequency of eating meat/fish/poultry, percentage values for the four cross-sections 2016, 2018, 2020, and 2022.

| Frequency of eating meat/fish/poultry | 2016 | 2018 | 2020 | 2022 |
|---|---|---|---|---|
| 1 = Every day | 10.4 | 11.5 | 11.5 | 8.7 |
| 2 = 4–6 days a week | 25.8 | 25.5 | 24.0 | 20.6 |
| 3 = 2–3 days a week | 50.6 | 48.5 | 47.3 | 48.9 |
| 4 = 2–4 days a month | 10.4 | 11.3 | 13.0 | 16.0 |
| 5 = Once or less a month | 1.5 | 1.7 | 2.1 | 2.6 |
| 6 = Never | 1.3 | 1.5 | 2.2 | 3.2 |

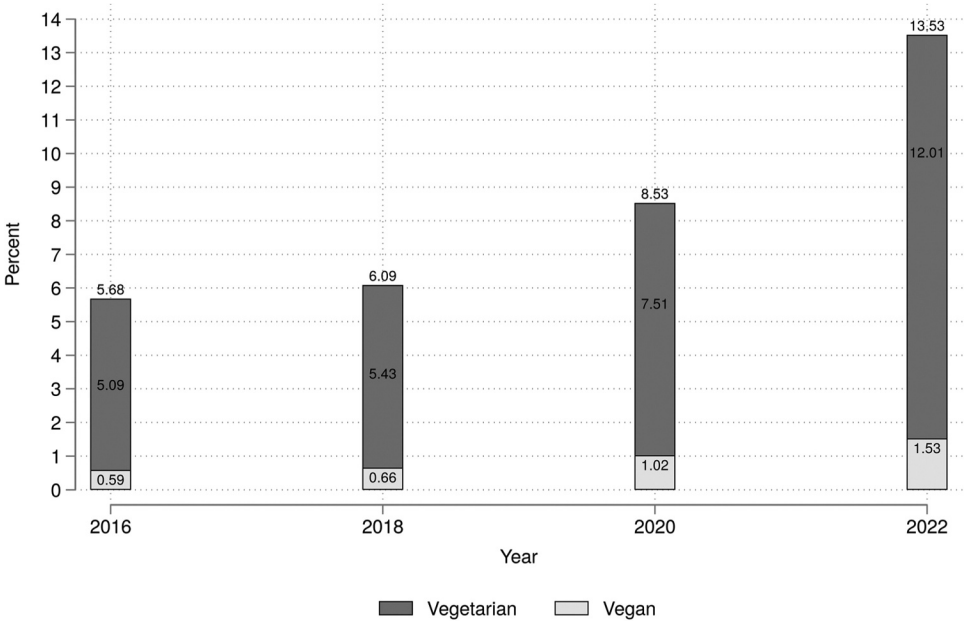


**Figure 1.** Self-reported vegetarians and vegans, percentage values for the four cross-sections 2016, 2018, 2020, and 2022.

self-reported vegetarians increased from 5.1 percent in 2016 to 12.0 percent in 2022. The combined percentages of vegetarians and vegans are 5.7 in 2016 and 13.5 in 2022. This means more than a doubling of vegetarians and vegans in our observation period from 2016 to 2022. Again, the general trend shows up particularly in the transition from 2020 to 2022.

The percentages in Table 1 and Figure 1 clearly support the diagnosis of a downward trend of meat consumption, and – vice versa – an upward trend of vegetarianism in Germany. With respect to the second SOEP question, the self-reported vegetarians and vegans, in the following we will add up the percentages of vegetarians and vegans, and simply refer to them as self-reported vegetarians (vegans are a special variant of vegetarians).

## Influence factors on meat consumption

In addition to the trend analysis presented so far, our data allow us to study socio-demographic and other individual-level determinants of the frequency of meat consumption in Germany. There is a large body of previous international research on such determinants, focusing primarily on the probability of following a more or less strictly defined vegetarian diet.

This research consistently reports that women, young people, and those with higher levels of education are more likely to be vegetarian and/or to reduce their meat consumption.[15–20] Women tend to be more health and

environmentally conscious than men. The same is true for those with higher versus lower education. Younger people are more likely to follow current social trends, and (as shown above) "less meat on the table" is one such trend.

Potential effects of income on meat consumption are controversial. Some studies find no effect of income, others find a negative effect, and still others report an inverted-U effect pattern where both low- and high-income groups are less likely to eat meat.[16,18] The argument for a possible inverted-U effect is that low-income people often cannot afford to buy meat, while high-income people may be more likely to voluntarily limit their meat consumption.

Another interesting factor is the size of the household.[17] More people in a household mean that it is more difficult to reach a consensus on a meat-reduced diet, but it may also be that household members convince each other that there are "good reasons" to adopt a lifestyle that consciously restricts meat intake. Dietary choices in a multi-person household can be seen as a bargaining problem, and the outcome can go one way or the other. In our data, we can only observe the final outcome without being able to disentangle the underlying bargaining processes.

Whether there are differences in dietary patterns between natives and immigrants in a country depends mainly on the origin of the immigrants.[6] For Germany, we expect a lower level of meat consumption among the native population because the natives have a stronger affinity to current social trends. There are still historically based differences between the eastern part of Germany (the former socialist GDR) and the western part, so we will include this variable in our analyses with the expectation that East Germans eat meat more often than West Germans. The reason for this expectation is that modern western lifestyles are likely to be more widespread in West than in East Germany. Furthermore, the recent trend toward less meat seems to be more of an urban rather than a rural phenomenon. One reason for this (and at the same time a consequence) may be that the supply of trendy vegetarian and vegan food is more abundant in urban contexts than in rural ones. We therefore expect that people living in urban areas have a higher propensity to reduce their meat consumption and to practice a vegetarian lifestyle than people living in rural areas.

In many Western countries, including Germany, public debates on meat consumption, vegetarianism and veganism have been highly controversial political and ideological issues for at least three decades.[21,22] Although these debates partly follow the traditional political left-right divide,[23,24] attitudes and values that reflect a "green political worldview" seem to be more essential in the German context. Tailored to the political constellation in Germany, we will examine how strongly "support for the Green Party" is associated with meat-reduced diets.

To examine whether the influence factors just introduced actually show significant effects on the respondents' consumption of meat in

Germany, we first pooled the SOEP data for our four years of observation and then estimated random effects models (REMs) on the pooled 2016–2020 data. The REMs account for the possibility of serial correlations initiated by repeated observations of the same subjects in the panel. The results of these regressions with the dependent variable "low frequency of meat consumption" (range from 1 = meat consumption every day to 6 = never, see Table 1) and the dependent variable "self-reported vegetarian" (0 = no, 1 = yes, vegetarian/vegan, see Figure 1) are presented in Table 2. Whereas the regression for "low frequency of meat consumption" is an ordinary least square regression (OLS), the regression for "self-reported vegetarian" is a binary logistic regression.

Looking at the coefficients of the two models (low frequency of meat consumption and self-reported vegetarian) simultaneously, we can see the following: In general, but with the notable exception of age, the corresponding coefficients for the two dependent variables point in the same direction. This means that groups or constellations with a lower frequency of meat consumption are also more likely to have higher percentages of vegetarians.

**Table 2.** Factors affecting the frequency of meat consumption and self-reported vegetarianism (pooled data for 2016, 2018, 2020, and 2022).

| | OLS-REM: Low frequency of meat consumption | | Binary logit-REM: Self-reported vegetarian | |
|---|---|---|---|---|
| | Coefficient | t-Value | AME-Coefficient | t-Value |
| Year of observation (ref: 2016) | | | | |
| 2018 | 0.01 | (1.03) | 0.01* | (2.40) |
| 2020 | 0.06** | (8.91) | 0.03** | (17.41) |
| 2022 | 0.16** | (22.60) | 0.06** | (28.20) |
| Women (ref: men) | 0.38** | (47.96) | 0.05** | (26.59) |
| Age group (ref: up to 30 years) | | | | |
| 31–60 years | 0.00 | (0.40) | −0.04** | (−14.75) |
| Over 60 years | 0.05** | (3.97) | −0.07** | (−22.36) |
| High education (ref: low) | 0.15** | (18.92) | 0.05** | (20.44) |
| Income class (ref: lower tercile) | | | | |
| Middle tercile | −0.06** | (−8.24) | −0.01** | (−4.45) |
| Upper tercile | −0.05** | (−5.55) | −0.00 | (−1.29) |
| Household size (ref: 1 person HH) | | | | |
| 2 Person HH | −0.12** | (−12.39) | −0.03** | (−9.69) |
| 3+ Person HH | −0.24** | (−23.76) | −0.04** | (−14.89) |
| Migration background (ref: no) | −0.09** | (−9.39) | −0.00 | (−0.72) |
| Germany East (ref: Germany West) | −0.03** | (−3.00) | −0.00 | (−1.35) |
| Rural (ref: urban) | −0.11** | (−11.96) | −0.03** | (−13.01) |
| Supporters of Green Party (ref: no) | 0.32** | (28.63) | 0.10** | (23.95) |
| Intercept | 2.65** | (177.93) | | |
| Rho | 0.55 | | 0.74 | |
| Sigma u | 0.74 | | 3.06 | |
| Observations | 105.394 | | 105.521 | |

REM = random effects model; t-values in parentheses; AME = average marginal effects; significance levels: ** $p < .01$, *$p < .05$. In the OLS-regression, the dependent variable "low frequency of meat consumption" ranges from 1 = meat consumption every day to 6 = never (see Table 1). In the binary logistic regression, the dependent variable "self-reported vegetarian" is a dummy variable with 0 = no and 1 = yes, vegetarian/vegan (see Figure 1).

Taking 2016 as reference year, the model-effects of "year of observation" confirm the upward trend toward less frequent meat consumption and more vegetarianism. Even after controlling for gender, age, education, etc., the diagnosis of a "trend towards less meat" in Germany remains valid. According to Table 2, the model-adjusted quantities of those who describe themselves as vegetarians are 1 percentage point higher in 2018 than in 2016, 3 percentage points higher in 2020, and 6 percentage points higher in 2022. The increase is thus 1 additional percentage point from 2016 to 2018, 2 additional percentage points from 2018 to 2020, and 3 additional percentage points from 2020 to 2022. This is broadly in line with the trajectory already observed in Figure 1.

As expected, women, younger people (up to 30 years old) and the highly educated (those with an educational qualification that allows access to a university) are much more likely to self-identify as vegetarians than men, older people (over 60 years old) and the less educated. Women and the highly educated have also a lower frequency of meat consumption. However, this is not the case for younger people. Although they are more often vegetarians, Table 2 shows that their frequency of meat consumption is significantly higher than that of the over-60s. The reason for this at first sight surprising finding is that young people are not only more likely to be vegetarians, but also more likely to be "heavy meat consumers," compared to the over-60s. This is shown in Table 3, which is based on the pooled 2016–2022 data.

According to this table, 8.4 percent of the young people say that they eat meat "never" or "once or less a month," but also 42.3 percent say that they eat meat "every day" or "4–6 times a week." The corresponding percentages for the over-60s are significantly lower, 1.9 percent versus 26.8 percent. For the age group 31–60 years, the respective percentages are 3.6 percent versus 37.1 percent. The distribution of the frequency of meat consumption is thus more "polarized" in the younger than in the older age groups.

Going back to Table 2, we see that income has negative effects on "low frequency of meat consumption," i.e. higher income is associated with more frequent meat consumption. The income effects on "self-reported vegetarian" are also negative, but in fact very small (1 percentage point or less). It seems worth noting that the pattern of negative income effects is not due to the

**Table 3.** Frequency of meat consumption by age groups, column percentages (pooled data for 2016, 2018, 2020, and 2022).

| Frequency of eating meat/fish/poultry | Age group: Up to 30 years | Age group: 31–60 years | Age group: Over 60 years |
|---|---|---|---|
| 1 = Every day | 15.7 | 11.4 | 6.7 |
| 2 = 4–6 days a week | 26.6 | 25.7 | 20.1 |
| 3 = 2–3 days a week | 38.5 | 47.5 | 57.6 |
| 4 = 2–4 days a month | 10.9 | 11.7 | 13.7 |
| 5 = Once or less a month | 3.0 | 1.8 | 1.3 |
| 6 = Never | 5.4 | 1.8 | 0.6 |

statistical control for education in our models. When we exclude education from the models in Table 2, the income effects do not become positive. Comparing the role of education and income, education is obviously much more important than income in determining the level of meat consumption in a household and its affinity toward a vegetarian diet.

Household size has highly significant effects on both meat consumption and vegetarianism. More people in a household lead to more frequent meals with meat and to a lower tendency to be vegetarian. While migration background and East Germany show the expected negative effects on the frequency dimension of meat consumption, their effects on self-reported vegetarianism are not significant. Significant effects are associated with place of residence, in the predicted direction that people from rural areas are more likely to eat meat and less likely to be vegetarian than people from urban areas.

Last but not least, Table 2 shows strong effects of support for the Green Party. Supporters of the Green Party are less likely to eat meat and more likely to be vegetarian than non-supporters of the Green Party. Even after controlling for the time trend, gender, age, education, etc., Green supporters have a 10 percentage point higher probability of being vegetarian than non-supporters – this is the strongest single effect of all the influence variables in the logistic regression in Table 2.

In a final step of our analyses, we examined whether the effects of the influence factors of interest remained stable or changed over time in our seven-year window of observation. For this exploration, we ran fixed effects models (FEMs) for those respondents who participated in all four panel waves, i.e. 2016, 2018, 2020, and 2022. Our FEMs include interaction effects between the years of observation and five selected influence factors (gender, age, education, rural versus urban place of residence, and support for the Green Party) that showed strong main effects on meat consumption in our regression models of Table 2. Significant interaction effects indicate a significant change in the effect of an influence factor over time. The results of these FEMs for the frequency of meat consumption are summarized in Figure 2, and for the probability of following a vegetarian diet in Figure 3. While the model behind Figure 2 is an OLS regression (as in Table 2), the model behind Figure 3 is a linear probability model. We switched to a linear probability model for Figure 3 in order to calculate meaningful probabilities for interaction effects.

The two figures reveal substantial changes in the effects of the influence factors "gender," "age," "education," "place of residence (urban versus rural)" and "support for the Green Party" over time. Whereas most effects did not change significantly when comparing 2018 with 2016, all effects became significantly stronger when comparing 2020 with 2016, and even more so when comparing 2022 with 2016. This strengthening of the effects also pertains to the initially surprising pattern that older people are more likely to have a low frequency of meat consumption. The main reason for these findings in

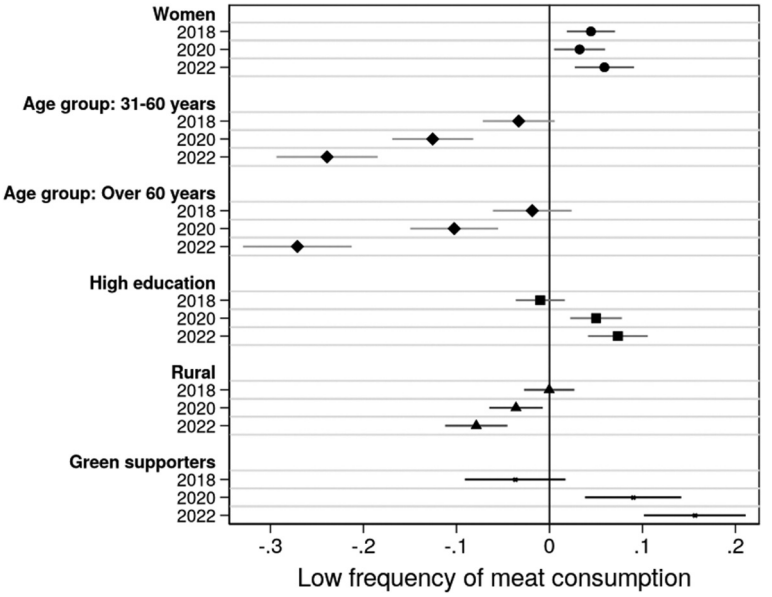


**Figure 2.** Factors affecting the frequency of meat consumption: effects in 2018, 2020 and 2022 compared to 2016.

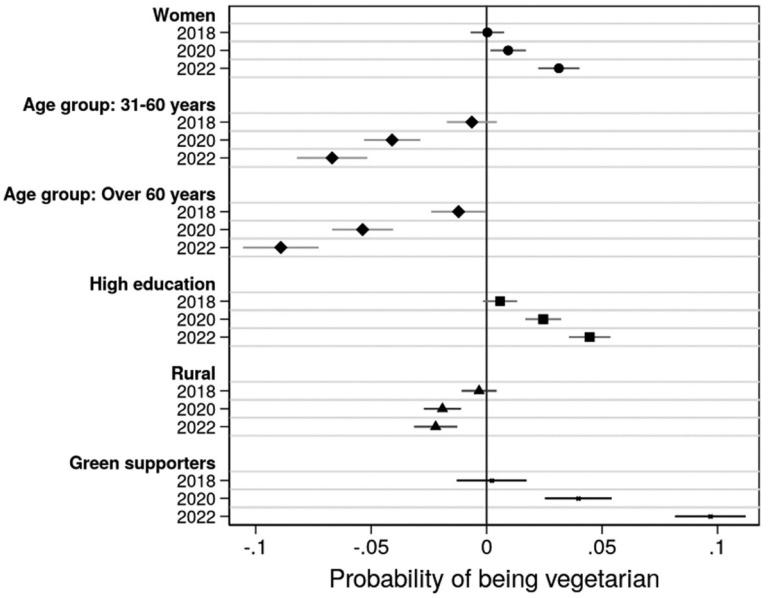


**Figure 3.** Factors affecting self-reported vegetarianism: effects in 2018, 2020 and 2022 compared to 2016.

Figures 2 and 3 is that especially those groups that already in 2016 had a lower frequency of meat consumption and a higher propensity toward vegetarianism pushed the general trend of "less meat on the table," i.e. further reduced their

meat consumption and increased their probability of being vegetarian. As a result, we observe widening differences and a tendency toward polarization of dietary habits between demographic groups (men versus women, younger versus older people), social status groups (low versus high education), regional locations (urban versus rural population) and between political attitude clusters (supporters versus non-supporters of green positions).

## Discussion and conclusions

Our survey data shows that "less meat on the table" is an important nutrition trend in Germany since the mid-to-late 2010s. This is consistent with official data on meat consumption in Germany, and also in line with other studies in Germany that refer to survey data.[15,25]

The probabilities of both eating meat less often and being vegetarian are higher among women, the better educated, those living in single-person households, residents of urban areas, and those who support the Green Party. The effects of income, migration background and East Germany tended to be negative, but were not consistently significant for our two dependent variables (low frequency of meat consumption and self-reported vegetarian). An unexpected and surprising finding concerns the age effects. Although younger people are much more often vegetarians, at the same time their frequency of meat consumption is higher than that of older people. Younger people are not only more likely to be vegetarians, but also more likely to be "heavy meat consumers." The distribution of the frequency of meat consumption is thus more "polarized" in the younger than in the older age groups.

Examining the question whether the role of essential determinants of meat consumption has changed over time, we got further hints to "polarization" tendencies. In particular, those groups that already had a lower meat consumption and a higher proportion of vegetarians in 2016 (women, the highly educated, etc.) have continued to reduce their meat consumption – leading to a strengthening of group-specific differences. As a caveat to polarization claims, however, it should be borne in mind that the overwhelming majority of Germans (over 85 percent) still include meat in their diet. If one wants to use the term of polarization, it is more a case of "polarization at the margins."

Given these analyses and results from the SOEP data 2016–2022, our paper has limitations. The article is mainly descriptive. We did not go into a theoretical debate on nutrition lifestyles and their causes and consequences, but limited ourselves to describing rather elementary survey results. A more in-depth theoretical analysis would require a primary study of its own, tailored to theoretical approaches and a set of hypotheses. Within the SOEP survey program, the topic of meat consumption is no more than a minor side issue, and no additional data are collected on individual motivations, planned future

behavior, barriers to behavioral change, and intended and unintended effects of daily eating habits.

With seven years, our observation window is relatively short. The SOEP data do not allow us to go back further, as the two "meat consumption questions" were first used in the panel in 2016. Since 2016, the questions have been and will be repeated in a two-year cycle, so we will have to wait some time before empirical analyses can be based on a longer period.

Probably the most important point of potential criticism is that we relied on self-declarations in surveys. Responses to the two key variables, frequency of eating meat and being vegetarian, are likely to be influenced by so-called social desirability. The public debate about meat consumption and vegetarianism in Germany is politically controversial, and there is a basic understanding that Germans eat "too much meat" and should try to reduce it (see, e.g., the nutrition recommendations of the German Nutrition Society,[26] its current recommendation is no more than 300 g meat and sausages a week). This public opinion climate can induce survey respondents to underreport their actual amount of meat consumption and to overreport vegetarianism. In nutrition research, there are more sophisticated methods for assessing people's dietary habits – methods that promise a higher validity. The most prominent of these are Food Frequency Questionnaires (FFQs). Aiming to measure total dietary intake, FFQs ask respondents to recall how often they consumed a given set of food and beverage items (typically between 80 and 100 items, sometimes a smaller number of food and beverage groups) over a given period of time (typically one or four weeks). See, for the German context, e.g., Mensink et al.[15] It can be assumed that FFQ responses are less influenced by social desirability because the respondents work through a given list of items. Nevertheless, also FFQ responses are self-reports and not observed behavior. It is worth noting that the presumed social desirability thread in our analyses has its own limitations: First, because meat consumption is such a "hot topic" in the public debate in Germany, it is plausible to assume that there are also people who self-report in a survey that they consume more meat than they actually do. For anti-green, anti-woke and/or right-wing people, the social desirability norm within their peer groups may be the other way round. At least, they do not see and accept a social norm that encourages a low(er) level of meat consumption. Second, as far as our analyses deal with the time trend and with factors influencing meat consumption, the potential desirability bias is present for all observation years and for all different sub-groups, and is thus held constant in comparisons across years and groups.

For future research, it seems advisable to analyze meat, fish and poultry consumption more often as a continuous rather than a dichotomous variable.[27] There is a large group of people, who follow a more or less strict "meat-reduced diet." And there are many others, who, at least sometimes,

make serious efforts in this direction.[6] The simple dichotomy of vegetarians versus non-vegetarians that dominates the public debate on meat consumption in Germany (and elsewhere) tends to neglect the important group of people in-between.

Also for practical reasons, the in-between option of "lower meat consumption" – rather than the stronger principle of vegetarianism – has some appeal.[27,28] It is less demanding for the individual consumer and it reduces the "ideological fixation" that characterizes the debate on vegetarianism and veganism. Most people cannot imagine becoming a (strict) vegetarian, but they are relatively open to the idea of reducing their meat consumption. Public policy could support this openness through campaigns that emphasize the environmental, ethical, and personal health benefits of reducing meat consumption. Finally, eating less meat may also be associated with lower monetary expenditures on food and thus with savings in a household's financial budget. Taken together, this package of good reasons, without a conflict between ecological and economic incentives, seems to be a promising constellation for behavior change.

## Disclosure statement

No potential conflict of interest was reported by the author(s).

## ORCID

Jörg Hartmann http://orcid.org/0000-0001-5204-4652
Peter Preisendörfer http://orcid.org/0000-0002-9280-4975

## Data availability statement

The data of the German Socio-Economic Panel used in this article are publicly available to the scientific community.

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